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Solicitation Addendum

Addendum No.: 5
Solicitation No.: 20-TA003311SAM
Project No.: 6088380 & 6097680
Solicitation Title: Southeast Water Reclamation Facility Reclaimed Pump
Back Station and Arc Flash Mitigation
Addendum Date: May 28, 2020
Procurement Contact: Sherri Meier

20-TA003311SAM is amended as set forth herein. Responses to questions posed by prospective bidders are provided below. This addendum is hereby incorporated in and made a part of IFBC No. 20-TA003311SAM.

CHANGE TO:

ADVERTISEMENT, SECOND PARAGRAPH, DATE, TIME AND PLACE DUE:

The Due Date and Time for submission of Bids in response to this IFBC is **June 5, 2020 at 2:00 P.M. ET**. Bids must be delivered to the following location: Manatee County Administration Building, 1112 Manatee Ave. W., Suite 803, Bradenton, FL 34205 prior to the Due Date and Time.

CHANGE TO:

SECTION A, INFORMATION FOR PROPOSERS, A.01 BID DUE DATE

The Due Date and Time for submission of Bids in response to this Invitation for Bid (IFBC) is **June 5, 2020 at 2:00 P.M. ET**. Bids must be delivered to the following location: Manatee County Administration Building, 1112 Manatee Ave. W., Suite 803, Bradenton, FL 34205 and time stamped by a Procurement representative prior to the Due Date and Time.

Due to the Manatee County Administration Building being closed in response to the current COVID-19 pandemic, Bidders who wish to hand-deliver Bids prior to the Due Date and Time shall contact the Procurement Division at 941-749-3014 upon arrival at the Manatee County Administration Building. A Procurement representative shall meet Bidder or Bidder's representative at the Manatee County Administration Building's main entrance and receive the Bid while maintaining the current social distancing guidelines. The Bid shall be time stamped by the Procurement representative prior to the Due Date and Time.

CHANGE TO:

Bids will be opened immediately following the Due Date and Time at the Manatee County Administration Building, Suite 803 in the presence of County officials. Bidders or their representatives may attend the Bid opening virtually by accessing the link below.

Zoom® Webinar Link: <https://manateecounty.zoom.us/j/83478172234>

Manatee County will make public at the opening the names of the business entities which submitted a Bid and the total bid price submitted. No review or analysis of the Bids will be conducted at the Virtual Bid Opening.

CHANGE TO:

Scheduled Item	Scheduled Date
No Solicitation Information Conference will be conducted for this solicitation.	
Question and Clarification Deadline	May 8, 2020
Final Addendum Posted	May 27, 2020
Bid Response Due Date and Time	June 5, 2020, <u>2:00</u> PM, ET
Due Diligence Review Completed	June 2020
Projected Award	August, 2020

REPLACE:

ELECTRONIC BID PRICING FORM

Replace Electronic Bid Pricing Form with the Revised Electronic Bid Pricing Form issued with this Addendum 5 as a separate attachment.

REPLACE:

SECTION C, BID ATTACHMENTS, BID ATTACHMENT 2, TECHNICAL SPECIFICATIONS.

Replace Section C, Bid Attachments, Bid Attachment 2, Technical Specifications in its entirety as attached to this Addendum 5.

REPLACE:

SECTION C, BID ATTACHMENTS, BID ATTACHMENT 3, SEWRF RECLAIMED PUMP BACK STATION & SEWRF ARC FLASH MITIGATION, CIVIL & MECHANICAL PLAN SET IN ITS ENTIRETY.

Replace Bid Attachment 3 Mechanical & Civil Plan Set (Unsigned) notating the engineer's changes:

C-7 (Response to Q13)

C-23 and Electrical Sheets (Response to Q8)

C-24 (Response to Q15)

C-25 (Response to Q31)

C-28 (Response to Q11)

G-2, G-6, and Demolition Sheets (Response to Q5)

M-1 & M-3 (Response to Q33)

M-1, M-3, and Electrical Sheets (Response to Q1)

REPLACE:

SECTION C, BID ATTACHMENTS, BID ATTACHMENT 4, SEWRF RECLAIMED PUMP BACK STATION & SEWRF ARC FLASH MITIGATION, STRUCTURAL GENERAL NOTES PLAN SHEET NUMBER C-25 & S-8.

Replace Bid Attachment 4 Plan Sheet Numbers:

C-25 & S-8 (Response to Q8)

REPLACE:

SECTION C, BID ATTACHMENTS, BID ATTACHMENT 5, SEWRF RECLAIMED PUMP BACK STATION & SEWRF ARC FLASH MITIGATION, LEGEND AND ABBREVIATIONS PLAN SHEET NUMBERS E-2 THROUGH E-10, I-2 THROUGH I-4 AND I-7 THROUGH I-9.

Replace Bid Attachment 5 Plan Sheet Numbers E-2 Through E-10, I-2 Through I-4 And I-7 Through I-9.

ADD:

SECTION C, BID ATTACHMENTS, BID ATTACHMENT 6, SEWRF AS-BUILT PLAN SHEETS

Add Bid Attachment 6, As-Built Plan Sheets:

Manatee County East Lake Extent PG1 (Response to Q44)

SEWRF – As-Built Isolation Valve Locations (Response to Q18)

SEWRF – Water Automation As-Built (Response to Q36)

QUESTIONS AND RESPONSES:

Q1. “Section 11931 Table that calls out Flow -Head - Horsepower is not correct. Hydromatic cannot offer 100 HP motor at those conditions of service 3470 @ 71’ 1750 RPM non overloading. We will have to take exception and quote 125HP unless addenda address the issue.”

R1. Plan sheets M-1 and M-3 have been revised to specify 125 horsepower motors. Electrical and instrumentation drawings have been updated. Section 11931 of the technical specification package and the electrical and instrumentation specifications have been updated.

Q2. “While visiting the site yesterday we found gopher tortoise burrows along the berm at the East Lake. Can a bid item be created for relocating gopher tortoises from the site? We have no way to accurately quantify the amount at this time and therefore a bid item would be beneficial.”

R2. The County will be taking care of the gopher tortoise relocations. The County has completed a survey and it is anticipated to take up to 90 days to permit and relocate the gopher tortoises. The contractor shall coordinate construction activities to occur after the planned relocation of the identified gopher tortoises. No additional time or compensation will be given to the contractor for this coordination.

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Q3. “There is a considerable amount of clearing/grubbing to be performed on this project. Which bid item should that work fall under for payment?”

R3. Clearing and grubbing has been revised to be included under the bid items “Rough Grading” and “Ductile Iron Piping” in the Measurement and Payment Section of the technical specifications package.

Q4. “The bid form mentions “South Lake” and the drawings mention a “South Lake 2”. Please confirm that they are considered one in the same for bidding purposes.”

R4. Bid form has been revised to “South Lake 2”.

Q5. “The existing pump back station on the South Lake is called for to be “decommissioned” per note 10 on sheet G-6. Please provide a detailed scope of work explaining what is expected of the contractor for this scope. Is the intent to demolish this one in the same manner as called out on the East Lake pump station?”

R5. The same scope of work will be needed for the demolition of the South Lake 2 pump station. Plan Sheet D-3 has been added to the plan set, “Demolition-Pump Station” has been added to the bid form and the Measurement and Payment section of the technical specifications package.

Q6. “Under which bid item should we include the shoring, excavation and backfill at the new pump station?”

R6. Shoring, excavation, and backfill at the new pump station has been revised to be included under the bid item “Reinforced Concrete” in the Measurement and Payment Section of the technical specifications package.

Q7. “I am writing to request that Hydro Gate, a brand of Mueller Water Products, be named to the slide gate specification for the referenced project. Attached you will find brief history of Hydro Gate and our 100 years of gate experience, as well our slide gate catalog, overall product Line Card, and a list of some of our many previous projects where our gates have been installed. All our gates are designed to meet all AWWA standards.”

R7. Hydro Gate will be considered an approved equal for this project. Section 11288 of the technical specification package has been revised to include Mueller Hydro Gate as an approved manufacturer.

Q8. “Do you know the frequency that this valve will be automated throughout the day/month/year as this could also play a role in best valve selection to what may have been historically in place?”

R8. The 24” Motor operated gate valve has been removed from the project and replaced with a 24” plug valve. Plan sheet C-23, bid form, and technical specifications have been updated, no motor operator will be required.

Q9. “I respectfully request you consider DRYLOK FastPlug Hydraulic Cement as an equivalent and include in an upcoming Addendum. “

R9. The DRYLOK Hydraulic Cement will be considered an approved equal for this project. Section 07100 of the technical specification package has been revised to include DRYLOK FastPlug Hydraulic Cement.

Q10. “Under spec section 01010 Summary of Work, 1.01, A., it states that the *expansion of the East Lake* is part of the scope of work for this contract. We also noticed that there is a “Lake Expansion Plan” drawing 1 provided in the spec book and designed by Kimley-Horn. Please confirm that this “expansion plan” is not part of this contract and is provided for reference only. Our understanding of any work associated with the East Lake is called out in the Bid Set drawings prepared by Kimley-Horn in March of 2020”

R10. The Florida Department of Environmental Protection Permit that included the “Lake Expansion Plan” has been modified to remove the expansion of East Lake from the project as shown in “Appendix A: FDEP Environmental Resource Permit - Modification” of the technical specifications package, which is the current permit. Section 01010 Summary of Work, of the technical specifications package has been revised to remove the expansion of East Lake.

Q11. “The bid documents state this project is to use the Manatee County Utility Standards Manual approved in June 2015. The most recent update of the Utility Standards Manual was approved in February 2020. Please verify which specs we are using for this bid?”

R11. The Manatee County Utility Standards Manual from February 2020, updated specifications, and approved products list will be used. Details on sheet C-28 have been updated to the February 2020 standards.

Q12. “Can you provide the existing normal water level elevation in the East Lake?”

R12. Plant operations currently are working to keep the water levels down in both lakes prior to the project starting. The plant will coordinate with Contractor to draw down the South Lake 2 or East Lake as far as possible before turning it over to the contractor.

Q13. “There is a note on the shell access road to the new pump station that states low profile barrier to be installed. Can you provide a quantity for the barrier as the plans are not clear?”

R13. Plans call for approximately 460LF of low-profile barrier, however there will be sloping along the ramp that could require more barriers. The legend on plan sheet C-7 has been updated for clarification.

Q14. “There is a note on the shell access road to the new pump station that states low profile barrier to be installed. Is the low profile barrier meant to be purchased and installed as permanent?”

R14. Yes, these low-profile barriers are to be permanent.

Q15. “Plan sheet D-2 shows the removal of all the East Lake pump station equipment including the discharge piping. Plan sheet C-24 shows the East Lake discharge piping being modified and remaining in place. Please clarify?”

R15. East Lake discharge piping does not connect to above ground piping, plan sheet C-24 has been updated for clarification.

Q16. “Plan sheets C-22 and C23 shows the removal of existing 20” DIP reclaim watermain and installation of new 24” DIP reclaim watermain in the same location. Can the existing reclaim watermain be shut down for removal and installation or will line stops be required?”

R16. Reclaim Water Main can be shut down and isolated.

Q17. “Plan sheets C-22 and C23 shows the removal of existing 20” DIP reclaim watermain and installation of new 24” DIP reclaim watermain in the same location. What is the location of existing valves for isolation and shut down purposes?”

R17. See attached PDF “SEWRF-As-Built Isolation Valve Locations”.

Q18. “Plan sheets C-22 and C23 shows the removal of existing 20” DIP reclaim watermain and installation of new 24” DIP reclaim watermain in the same location. How long can the existing reclaim watermain be shut down for?”

R18. The existing reclaim water main can be shut down for 2 weeks.

Q19. “Plan sheets C-22 and C23 shows the removal of existing 20” DIP reclaim watermain and installation of new 24” DIP reclaim watermain in the same location. Will there be any night work required for his work?”

R19. Night work is not anticipated but if needed in an emergency can be coordinated with engineer/County during construction.

Q20. “Plan sheets C-22 and C23 shows the removal of existing 20” DIP reclaim watermain and installation of new 24” DIP reclaim watermain in the same location. What is the County’s input and restrictions on the shutdown of the existing reclaim watermain?”

R20. Contractor shall coordinate with plant operations and EOR for turning of isolation valves to shut down of reclaim water main.

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Q21. “Is the new pump station pad area at approximately elevation 48.00 intended to be shell similar to the access road? The quantity appears to be extremely high for just the access road as shown on plan sheet C-7. Please clarify.”

R21. No, on sheet C-7 the access road to the pump station is shell, the pump station pad will be concrete surrounded by grass at elevation 48.00'. There is shell access road also proposed as shown on sheet C-1 for the East Lake rehabilitation, this will be around the entire perimeter of East Lake. Also see bid item “Shell Drive” where it states: “Measurement of shell drive will be per actual number of square yards installed or restored along East Lake and the new pump station access road”.

Q22. “Can you specify what material is required for the shell access roads? Does this material need to be FDOT Certified?”

R22: Shell roads shall conform to FDOT bank run shell. Bid item “Shell Drive” in the Measurement and Payment Section of the technical specifications package has been revised to specify FDOT certified bank run shell.

Q23. “Specification section 02575, 2.01.B states that crushed concrete is an acceptable material for road base replacement. Is the crushed concrete required to be FDOT Certified material?”

R23. Yes, the crushed concrete shall conform to FDOT Section 285.

Q24. “Specification section 02575, 2.01.B states that crushed concrete for road base replacement is to be installed at a 10” minimum thickness. Detail UG-12 states that the crushed concrete is to be installed at a 8” minimum thickness. Please clarify which is correct?”

R24. Crushed Concrete for road base shall be 8” minimum, Section 02575 of the technical specifications package has been updated.

Q25. “The structural drawings do not call out location of any construction joints in the walls or foundation of the new pump station. Please advise as to location and quantity.”

R25. Per details 5 and 7 on Sheet S-7 of the construction plans, locations of proposed construction joints are to be submitted by the contractor for review by engineer of record prior to construction.

Q26. “The bid form has a unit of “SY” for Square Yards in relation to the rough grading, but the measurement and payment section mentions a unit of “CY” for Cubic Yard. Which is the correct unit to be utilized for this project? We would assume cubic yard considering the work involved. “

R26. The “Rough Grading” bid item in the Measurement and Payment Section of the technical specifications package has been corrected to Square Yards (SY).

Q27. “I am requesting approval for a Crane Deming submersible pump.”

R27. Crane Deming Submersible pump is not an approved equal.

Q28. “Can you provide the existing normal water level elevation in South Lake 2?”

R28. Plant operations currently are working to keep the water levels down in both lakes prior to the project starting. The plant will coordinate with Contractor to draw down the South Lake 2 or East Lake as far as possible before turning it over to the contractor.

Q29. “What type and size of shell is required for the shell road?”

R29. Shell roads shall conform to FDOT bank run shell. Bid item “Shell Drive” in the Measurement and Payment Section of the technical specifications package has been revised to specify FDOT certified bank run shell.

Q30: “Can you add a pay item for unsuitable material removal?”

R30. The bid item “Unsuitable Material Removal” has been added to the Measurement and Payment section of the technical specification package. Line item “Unsuitable Material Removal” has been added as 10 CY in the bid form. All unsuitable materials must pass an EPA paint filter test to be accepted by the landfill onsite.

Q31. “Drawing S-8 Detail 1 and Detail on Drawing C-25 show an “Energy Dissipater” on the overflow structure. There does not seem to be a corresponding detail show exactly what the “energy Dissipater” is. Please provide detail on the energy dissipater.”

R31. Plan sheets C-25 and S-8 have been updated for clarification.

Q32. “Drawing C-27 indicates that the proposed Concrete Endwall for the 42” RCP be per FDOT Index 430-033. FDOT section 430-033 is for Single and Double 72” pipe only. Is this the correct detail to be used for these endwalls? Would Section 430-030 be more appropriate given the size of the RCP pipe?”

R32. Yes, the intent was to use FDOT 430-033 with a 42” RCP due to the required grades behind the headwall.

Q33. “Drawing M-1, Note 20 lists the access hatches as “4’-8”x4’-8”. Drawing S-2 shows these openings as “4’-8”x5’-6”. Please clarify the proper dimensions of the openings and associated hatches.”

R33. The access hatches are 4’-8” x 5’-6”, sheet M-1 and M-3 have been updated for clarification.

Q34. “Drawing G-6 notes that the dewatering effluent is to be discharged into the “temporary sediment basin as identified in the phasing schedule”. Is this note referencing the dewatering effluent associated with the construction of the temporary coffer dam?”

R34. Yes.

Q35. “What are the requirements for dewatering effluent generated during pump station excavation and trench dewatering for the 24” and 36” lines?”

R35. As indicated on the plans, no dewatering effluent shall leave the site. Dewatering effluent will be coordinated with operations staff to pump into one of the adjacent lakes.

Q36. “In reference to the temporary emergency bypass pump requirements as shown on Drawing G-7, what are the discharge and influent elevation of the existing pump station this will replace?”

a. Are there any screening requirements for the influent of the temporary bypass system?”

R36. Pipe influent invert elevation for East Lake is 25.00’ and discharge top of pipe is 44.97’ (per detail FLW-114). See as-built pdf “SEWRF Water Automation As-built”.

R36a: There is no requirement for the placement of screening. However, Contractor is allowed to use screens if they feel it is necessary to protect their dewatering equipment.

Q37. “What are the restoration requirements for the area that will need to be cleared in order to install the 36” intake piping from the East Lake?”

R37. Restore all disturbed areas with sod.

Q38. “Question from one of the Pump Suppliers - Section 11931 Table that calls out Flow -Head – Horsepower is not correct. Hydromatic cannot offer 100 HP motor at those conditions of service 3470 @ 71’ 1750 RPM non overloading. We will have to take exception and quote 125HP unless addenda addresses the issue.”

R38. Refer to response for question 1.

Q39. “E-12 and E-13 note 43 stipulates (3) #600 & (1) #1/0 in a 4” for the MCC-9 and MCC-10 tie. E-14 notes 10 and 21 stipulate (3) #500 & (1) #3 in a 4” for the MCC-9 and MCC-10 tie. Please confirm which one we should use.”

R39. Please provide (3) #600 & (1) #1/0 in a 4” in all instances.

Q40. “Bid Form, East Lake, Bid Item 5, Import Fill 16,000 CY – is this item for filling the back side of the berm, and board as it is modified around the East Lake?”

R40. Yes, import fill is for berms as well as for East Lake earthen ramp. Refer to Measurement and Payment Section.

Q41. “Will any of the excavated material cut from the front/water side of the berm be permitted for use on the back side of the berm?”

R41. Yes, if suitable material, refer to Geotech recommendations. Per Geotech report, “mechanically mixing soils may be considered as an allowable option to allow the use of more of the site soils”.

Q42. “If the cut material from the front side of the berm can be used on the back side of the berm for fill, will Bid Item be used?”

R42. Yes, the cut material will not be enough fill material.

Q43. “Is there a location available on County property for the excess material cut from the berm, and what is the distance?”

R43: Cut material can be stockpiled directly behind the berm, if contractor chooses to use the berm cut as fill on the backside of the berm after mechanically mixing per Geotech report recommendations.

Q44. “Is the depth/size know for Bid Item 4 Demolition – Pump Station?”

R44. Wet well depth is 25’ per as-built pdf “Manatee County East Lake Extent PG1”.

Q45. “Sheet D-2, EX, EAST LAKE PUMP STATION detail – Contractor to demolish existing wet well 4’ below existing grade. Excavation to be fully dewatered and backfilled with compacted fill up to grade. Will the wet well below 4’ need to be backfilled with concrete?”

R45. No, compacted fill to grade per sheet D-3.

Q46. “Is the depth of the wet well known?”

R46. See response to question 44.

Q47. “What are tree clearing limits for the installation of the pump station and pipe connection corridors to the east, west and north of the pump station location?”

R47. There are no established limits for tree clearing with the exception of the identified wetlands. Please note all tree clearing shall be coordinated with the Owner and Engineer prior to commencement of clearing operations.

Q48. “Is the lake slow drawdown dewatering anticipated to take 95 days for dewatering for each section? (per Geotechnical Report)”

R48. The County is able to drawdown either lake at 8 MGD. Currently the County is keeping the water levels down in both lakes as much as possible prior to the project starting. The lakes cannot be drawn all the way down with the existing pump stations. Before starting work on either lake, the County will drawdown the lake the Contractor is working on as far

as possible before turning it over to the Contractor. With current low water levels in each lake, it will take about 20 days to drawdown either lake. The amount of water in each lake will be dependent on hurricane season and large wet weather events which could add time to drawdown.

Q49. “On sheet E-6 there is a reference to install 4” conduit w/3-600mcm & 1-250mcm. I cannot find a distance reference in the plans. What is the distance between the FPL pole and the new meter can for the electrical service at the central pump station?”

R49. Refer to response to question 17 in Addendum 1.

Q50. C.C. Control Corp. requests to be added to the list of “Approved Suppliers/Fabricators for PLC Cabinet and supplier of Instrumentation Hardware for this project” Per Division 13, Section 13300, Part 1, 1.02, A.

R50. C.C. Control Corp. is not an approved systems integrator.

Q51. “Who do I need to speak to have Danfoss added to your specification?”

R51. Danfoss Drives is not an approved equal.

Q52. “I would like to be considered for the intake screen equipment (item #50 on bid form – Johnson Intake Screens). - Chad Barber, Elgin”

R52. The Elgin screen may be considered an or equal, however if there are any variations from the existing specification that were not listed as requested, the Elgin screen may be subsequently denied in shop drawing review. The difference of the cost between the screens will be at the contractor’s expense. No additional compensation will be provided by the county.

Additional Items:

- Reinforced concrete quantity has been revised from 1000 CY to 600 CY on the bid form and measurement and payment specification.
- Unscanned Civil and Mechanical drawings have been provided.

NOTE: Items that are ~~struck through~~ are deleted. Items that are underlined have been added or changed. All other terms and conditions remain as stated in the IFBC.

END OF ADDENDUM

INSTRUCTIONS:

Receipt of this addendum must be acknowledged as instructed in the solicitation document. Failure to acknowledge receipt of this Addendum may result in the response being deemed non-responsive.

AUTHORIZED FOR RELEASE

CONTRACT DOCUMENTS
TECHNICAL SPECIFICATIONS

FOR



Manatee County
SEWRF Reclaimed Pump Back Station & SEWRF Arc Flash Mitigation

PROJECT #6088380/6097680

May 2020

PROJECT OWNER:

County of Manatee, Florida
c/o Manatee County Procurement Division
1112 Manatee Avenue West
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This specification includes by reference the Manatee County Public Works Standards, Part I Utilities Standards Manual approved February 25, 2020.

All items and/or materials furnished and installed shall conform to the Manatee County Approved Products List dated February 2020. All items listed in the submittal requirements under each section shall be required to be submitted for review and/or acceptance.

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01005 GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE AND INTENT

A. Description

The work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all work included in this Contract.

B. Work Included

The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, shop drawings, working drawings and other means of construction necessary or proper for performing and completing the work. He shall obtain and pay for all required permits necessary for the work, other than those permits such as the DEP permit and railroad permit, which may have already been obtained. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the County, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all incidental costs. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.

The cost of incidental work described in these General Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made.

The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment.

C. Public Utility Installations and Structures

Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto.

The Contractor shall protect all installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the County. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor, which are shown on the Plans or have been located in the field by the utility, shall be repaired by the Contractor, at his expense, as approved by the County. No separate payment shall be made for such protection or repairs to public utility installations or structures.

Public utility installations or structures owned or controlled by the County or other governmental body, which are required by this contract to be removed, relocated, replaced or rebuilt by the Contractor not identified in any separate bid item shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various contract items. No separate payment shall be made.

Where public utility installations or structures owned or controlled by the County or other governmental body are encountered during the course of the work, and are not indicated on the Plans or in the Specifications, and when, in the opinion of the County, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the County, for the contractor to accomplish. If such work is accomplished by the utility having jurisdiction, it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be in accordance with the General and Supplemental General Conditions.

The Contractor shall give written notice to County and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight hours in advance of breaking ground in any area or on any unit of the work. This can be accomplished by making the appropriate contact with the "Sunshine State One-Call of Florida, Inc. Call Center ("Call Sunshine") and per all requirements provided for in the Florida Underground Facilities Damage Prevention and Safety Act (Florida Statutes, Title XXXIII, Chapter 556).

The maintenance, repair, removal, relocation or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the County.

1.02 PLANS AND SPECIFICATIONS

A. Plans

When obtaining data and information from the Plans, figures shall be used in preference to scaled dimensions, and large-scale drawings in preference to small-scale drawings.

B. Copies Furnished to Contractor

The Contractor shall furnish each of the subcontractors, manufacturers, and material men such copies of the Contract Documents as may be required for their work. Additional copies of the Plans and Specifications, when requested, may be furnished to the Contractor at cost of reproduction.

C. Supplementary Drawings

When, in the opinion of the County, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications

pertaining thereto, will be prepared by the County and five paper prints thereof will be given to the Contractor.

D. Contractor to Check Plans and Data

The Contractor shall verify all dimensions, quantities and details shown on the Plans, Supplementary Drawings, Schedules, Specifications or other data received from the County, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the County, should such errors or omissions be discovered. All schedules are given for the convenience of the County and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

E. Specifications

The Technical Specifications consist of three parts: General, Products and Execution. The General Section contains General Requirements which govern the work. Products and Execution modify and supplement these by detailed requirements for the work and shall always govern whenever there appears to be a conflict.

F. Intent

All work called for in the Specifications applicable to this Contract, but not shown on the Plans in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Plans or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.

The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

The inclusion of the Related Requirements (or work specified elsewhere) in the General part of the specifications is only for the convenience of the Contractor, and shall not be interpreted as a complete list of related Specification Sections.

1.03 MATERIALS AND EQUIPMENT

A. Manufacturer

All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the County, that the manufacturer or subcontractor deal directly with the County. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.

Any two or more pieces or material or equipment of the same kind, type or classification, and being used for identical types of services, shall be made by the same manufacturer.

B. Delivery

The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the work so as to complete the work within the allotted time. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.

C. Tools and Accessories

The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

Spare parts shall be furnished as specified.

Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

D. Installation of Equipment.

The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise by the County during installation. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

The Contractor shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the County and made of ample size and strength for the purpose intended. Substantial templates and working drawings for installation shall be furnished.

The Contractor shall furnish all materials and labor for, and shall properly bed in non-shrink grout, each piece of equipment on its supporting base that rests on masonry foundations.

Grout shall completely fill the space between the equipment base and the foundation. All metal surfaces coming in contact with concrete or grout shall receive a coat of coal tar epoxy equal to Koppers 300M or provide a 1/32-inch neoprene gasket between the metal surface and the concrete or grout.

E. Service of Manufacturer's Engineer

The Contract prices for equipment shall include the cost of furnishing (as required by equipment specifications sections) a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test and place in operation the equipment in conformity with the Contract Documents. After the equipment is placed in permanent operation by the County, such engineer or superintendent shall make all adjustments and tests required by the County to prove that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the County in the proper operation and maintenance of such equipment.

1.04 INSPECTION AND TESTING

A. General

Inspection and testing of materials will be performed by the County unless otherwise specified.

For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Three (3) copies of the reports shall be submitted and authoritative certification thereof must be furnished to the County as a prerequisite for the acceptance of any material or equipment.

If, in the making of any test of any material or equipment, it is ascertained by the County that the material or equipment does not comply with the Contract, the Contractor will be notified thereof and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the County.

Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.

The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the County formally takes over the operation thereof.

B. Costs

All inspection and testing of materials furnished under this Contract will be performed by the County or duly authorized inspection engineers or inspections bureaus without cost to the Contractor, unless otherwise expressly specified.

The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor and such costs shall be deemed to be included in the Contract price.

Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the County for compliance. The Contractor shall reimburse the County for the expenditures incurred in making such tests on materials and equipment which are rejected for non-compliance.

C. Inspections of Materials

The Contractor shall give notice in writing to the County, at least two weeks in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the County will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials or he will notify the Contractor that the inspection will be made at a point other than the point of manufacture, or he will notify the Contractor that inspection will be waived. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

D. Certificate of Manufacture

When inspection is waived or when the County so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

E. Shop Tests of Operating Equipment

Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the work until the County notifies the Contractor, in writing, that the results of such tests are acceptable.

The cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

F. Preliminary Field Tests

As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make preliminary field tests of equipment. If the preliminary field tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, prior to the acceptance tests, make all changes, adjustments and replacements required. The furnishing Contractor shall assist in the preliminary field tests as applicable.

G. Final Field Tests

Upon completion of the work and prior to final payment, all equipment and piping installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost to the County. The Supplier shall assist in the final field tests as applicable.

H. Failure of Tests

Any defects in the materials and equipment or their failure to meet the tests, guarantees or requirements of the Contract Documents shall be promptly corrected by the Contractor. The decision of the County as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to make these corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees of specified requirements, the County, notwithstanding its partial payment for work, and materials and equipment, may reject the materials and equipment and may order the Contractor to remove them from the site at his own expense.

In case the County rejects any materials and equipment, then the Contractor shall replace the rejected materials and equipment within a reasonable time. If he fails to do so, the County may, after the expiration of a period of thirty (30) calendar days after giving him notice in writing, proceed to replace such rejected materials and equipment, and the cost thereof shall be deducted from any compensation due or which may become due the Contractor under his Contract.

I. Final Inspection

During such final inspections, the work shall be clean and free from water. In no case will the final pay application be prepared until the Contractor has complied with all requirements set forth and the County has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Document.

1.05 TEMPORARY STRUCTURES

A. Temporary Fences

If, during the course of the work, it is necessary to remove or disturb any fence or part thereof, the Contractor shall, at his own expense, if so ordered by the County, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced. The County shall be solely responsible for the determination of the necessity for providing a temporary fence and the type of temporary fence to be used.

1.06 TEMPORARY SERVICES

A. First Aid

The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when people are employed on the work.

1.07 LINES AND GRADES

A. Grade

All work under this Contract shall be constructed in accordance with the lines and grades shown on the Plans, or as given by the County. The full responsibility for keeping alignment and grade shall rest upon the Contractor.

B. Safeguarding Marks

The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or removing without authorization such established points, stakes and marks.

The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

C. Datum Plane

All elevations indicated or specified refer to the Mean Sea Level Datum of the NAVD 1988 and/or NGVD 1929.

1.08 ADJACENT STRUCTURES AND LANDSCAPING

A. Responsibility

The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of

the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Plans, and the removal, relocation and reconstruction of such items called for on the Plans or specified shall be included in the various Contract Items and no separate payments will be made therefore. Where such public and private property, structures of any kind and appurtenances thereto are not shown on the Plans and when, in the opinion of the County, additional work is deemed necessary to avoid interference with the work, payment therefore will be made as provided for in the General Conditions.

Contractor is expressly advised that the protection of buildings, structures, tunnels, tanks, pipelines, etc. and related work adjacent and in the vicinity of his operations, wherever they may be, is solely his responsibility. Conditional inspection of buildings or structures in the immediate vicinity of the project which may reasonably be expected to be affected by the Work shall be performed by and be the responsibility of the Contractor.

Contractor shall, before starting operations, make an examination of the interior and exterior of the adjacent structures, buildings, facilities, etc., and record by notes, measurements, photographs, etc., conditions which might be aggravated by open excavation and construction. Repairs or replacement of all conditions disturbed by the construction shall be made to the satisfaction of the County. This does not preclude conforming to the requirements of the insurance underwriters. Copies of surveys, photographs, reports, etc., shall be given to the County.

Prior to the beginning of any excavations, the Contractor shall advise the County of all buildings or structures on which he intends to perform work or which performance of the project work will affect.

B. Protection of Trees

1. All trees and shrubs shall be adequately protected by the Contractor with boxes and otherwise and in accordance with ordinances governing the protection of trees. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at the proper season and at the sole expense of the Contractor.
2. Beneath trees or other surface structures, where possible, pipelines may be built in short tunnels, backfilled with excavated materials, except as otherwise specified, or the trees or structures carefully supported and protected from damage.
3. The County may order the Contractor, for the convenience of the County, to remove trees along the line or trench excavation. If so ordered, the County will obtain any permits required for removal of trees. Such tree removal ordered shall be paid for under the appropriate Contract Items.

C. Lawn Areas

Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed, and later replaced, or the area where sod has been removed shall be restored with new sod.

D. Restoration of Fences

Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good a condition as before the starting of the work. The manner in which the fence is repaired or replaced and the materials used in such work shall be subject to the approval of the County. The cost of all labor, materials, equipment, and work for the replacement or repair of any fence shall be deemed included in the appropriate Contract Item or items, or if no specific Item is provided therefore, as part of the overhead cost of the work, and no additional payment will be made therefore.

1.09 PROTECTION OF WORK AND PUBLIC

A. Barriers and Lights

During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers and lights as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public, in accordance with state and local requirements.

B. Smoke Prevention

A strict compliance with ordinances regulating the production and emission of smoke will be required. No open fires will be permitted.

C. Noise

The Contractor shall eliminate noise to as great an extent as practicable at all times. Air compressing plants shall be equipped with silencers and the exhaust of all engines or other power equipment shall be provided with mufflers. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.

D. Access to Public Services

Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.

E. Dust prevention

The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the roads and/or construction areas sprinkled with water at all times.

1.10 CUTTING AND PATCHING

The Contractor shall do all cutting, fitting or patching of his portion of the work that may be required to make the several parts thereof join and coordinate in a manner satisfactory to the County and in accordance with the Plans and Specifications. The work must be done by competent workmen skilled in the trade required by the restoration.

1.11 CLEANING

A. During Construction

During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the County, such material, debris, or rubbish constitutes a nuisance or is objectionable. The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops.

B. Final Cleaning

At the conclusion of the work, all equipment, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver such materials and equipment undamaged in a bright, clean, polished and new operating condition.

1.12 MISCELLANEOUS

A. Protection Against Siltation and Bank Erosion

1. The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses and drainage ditches.
2. The Contractor, at his own expense, shall remove any siltation deposits and correct any erosion problems as directed by the County which results from his construction operations.

B. Protection of Wetland Areas

The Contractor shall properly dispose of all surplus material, including soil, in accordance with Local, State and Federal regulations. Under no circumstances shall surplus material be disposed of in wetland areas as defined by the Florida Department of Environmental Protection or Southwest Florida Water Management District.

C. Existing Facilities

The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in the Special Provisions.

D. Use of Chemicals

All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01010 SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS/REQUIREMENTS INCLUDED

- A. The work included in this contract consists of the following:
- Construction of a reclaimed pump back station, piping modifications, berm repair, South Lake 2 modifications, overflow structures, energy dissipating structures, site piping, electrical, instrumentation, controls, and demolition.
- B. The Contractor shall furnish all shop drawings, working drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all work required by these Specifications and as shown on the Contract Drawings.
- C. The Contractor shall perform the work complete, in place and ready for continuous service and shall include any repairs, replacements, and/or restoration required as a result of damages caused prior to acceptance by the County.
- D. The Contractor shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

1.02 CONTRACTS

Construct all the Work under a single contract.

1.03 WORK SEQUENCE

- A. All work done under this Contract shall be done with a minimum of inconvenience to the users of the system or facility. The Contractor shall coordinate his work with private property owners such that existing utility services are maintained to all users to the maximum extent possible.
- B. The Contractor shall, if necessary and feasible, construct the work in stages to accommodate the County's use of the premises during the construction period; coordinate the construction schedule and operations with the County's Representative.
- C. The Contractor shall, where feasible, construct the Work in stages to provide for public convenience and not close off public use of any facility until completion of construction to provide alternative usage.

1.04 CONSTRUCTION AREAS

- A. The Contractor shall: Limit his use of the construction areas for work and for storage, to allow for:
1. Work by other Contractors.
 2. County's Use.

3. Public Use.

- B. Coordinate use of work site under direction of County's Representative.
- C. Assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.
- D. Move any stored products under the Contractor's control, which interfere with operations of the County or separate contractor.
- E. Obtain and pay for the use of additional storage of work areas needed for Contractor operations.

1.05 COUNTY OCCUPANCY

- A. It is assumed that portions of the Work will be completed prior to completion of the entire Work. Upon completion of construction of each individual facility, including testing, if the County, at its sole discretion, desires to accept the individual facility, the Contractor will be issued a dated certificate of completion and acceptance for each individual facility. The County will assume ownership and begin operation of the individual facility on that date and the three-year guaranty period shall commence on that date. The County has the option of not accepting the entire work as a whole until it is completed, tested and approved by the County.

1.06 PARTIAL COUNTY OCCUPANCY

The Contractor shall schedule his operations for completion of portions of the Work, as designated, for the County's occupancy prior to substantial completion of the entire work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01015 CONTROL OF WORK

PART 1 GENERAL

1.01 WORK PROGRESS

The Contractor shall furnish personnel and equipment which will be efficient, appropriate and adequately sized to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated in the Contract. If at any time such personnel appears to the County to be inefficient, inappropriate, or insufficient for securing the quality of work required for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character, or increase the personnel and equipment and the Contractor shall conform to such order. Failure of the County to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.02 PRIVATE LAND

The Contractor shall not enter or occupy private land outside of easements, except by permission of the affected property owner.

1.03 WORK LOCATIONS

Work shall be located substantially as indicated on the drawings, but the County reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

1.04 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the County may require special construction procedures such as limiting the length of open trench, prohibiting stacking excavated material in the street and requiring that the trench shall not remain open overnight.
- B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be barricaded and well lighted at all times when construction is not in progress.

1.05 DISTRIBUTION SYSTEMS AND SERVICES

- A. The Contractor shall avoid interruptions to water, telephone, cable TV, sewer, gas, or other related utility services. He shall notify the County and the appropriate agency well in advance of any requirement for dewatering, isolating, or relocating

a section of a utility, so that necessary arrangements may be made.

- B. If it appears that utility service will be interrupted for an extended period, the County may order the Contractor to provide temporary service lines at the Contractor's expense. Inconvenience of the users shall be kept to the minimum, consistent with existing conditions. The safety and integrity of the systems are of prime importance in scheduling work.

1.06 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

- A. The Contractor shall assume full responsibility for the protection of all buildings, structures and utilities, public or private, including poles, signs, services to building utilities, gas pipes, water pipes, hydrants, sewers, drains and electric and telephone cables and other similar facilities, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operation shall be repaired by the Contractor at his expense.
- B. The Contractor shall bear full responsibility for obtaining locations of all underground structures and utilities (including existing water services, drain lines and sewers). Services to buildings shall be maintained and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- C. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit prices established in the Bid.
- D. If, in the opinion of the County, permanent relocation of a utility owned by the County is required, the County may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for at the Contract unit prices, if applicable, or as extra work as classified in the General Conditions. If relocation of a privately owned utility is required, the County will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the County and utility and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies in writing at least 48 hours (excluding Saturdays, Sundays and legal holidays) before excavating near their utilities.

1.07 TEST PITS

Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor immediately after the utility location and the surface shall be restored in a manner equal or better than the original condition. No separate payment will be made.

1.08 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account

of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition equal or better to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the County.

- B. All sidewalks which are disturbed by the Contractor's operations shall be restored to their original or better condition by the use of similar or comparable materials. All curbing shall be restored in a condition equal to the original construction and in accordance with the best modern practice.
- C. Along the location of this work, all fences, walks, bushes, trees, shrubbery and other physical features shall be protected and restored in a thoroughly workmanlike manner unless otherwise shown on the drawings. Fences and other features removed by the Contractor shall be replaced in the location indicated by the County as soon as conditions permit. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be regraded and sodded to equal or exceed original conditions.
- D. Trees close to the work which drawings do not specify to be removed, shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any tree be cut or removed without prior notification to the County. All injuries to bark, trunk, limbs and roots of trees shall be repaired by dressing, cutting and painting according to approved methods, using only approved tools and materials.
- E. The protection, removal and replacement of existing physical features along the line of work shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit and/or lump sum prices established under the items in the Bid.

1.09 MAINTENANCE OF TRAFFIC

- A. Open pits, trenches, unpaved streets, debris, or other obstructions due to construction that will prevent the normal flow of traffic during an extended construction stoppage, for any reason, shall be minimized. In the event an extended construction stoppage is found to be necessary, Contractor shall, at his own expense, provide normal traffic flow during extended construction stoppage. Extended stoppage will be defined by the County.
- B. All excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he shall repair the road surface, provide temporary roadways, erect wheel guards or fences, or take other safety measures which are satisfactory to the County.
- C. Any changes to the traffic pattern require a Traffic Control Plan as detailed in section 01570 of this specification..

1.10 WATER FOR CONSTRUCTION PURPOSES

- A. In locations where public water supply is available, the Contractor may purchase

water for all construction purposes.

- B. The Contractor shall be responsible for paying for all water tap fees incurred for the purpose of obtaining a potable water service or temporary use meter.

1.11 MAINTENANCE OF FLOW

The Contractor shall at his own cost, provide for the flow of sewers, drains and water courses interrupted during the progress of the work and shall immediately cart away and remove all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the County well in advance of the interruption of any flow.

1.12 CLEANUP

During the course of the work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. He shall dispose of all residue resulting from the construction work and at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and shall leave the entire site of the work in a neat and orderly condition.

1.13 COOPERATION WITHIN THIS CONTRACT

- A. All firms or person authorized to perform any work under this Contract shall cooperate with the General Contractor and his subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.
- B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the County.

1.14 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be reconstructed by the Contractor at his own expense.
- B. All structures shall be protected in a manner approved by the County. Should any of the floors or other parts of the structures become heaved, cracked, or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor, at his own expense and to the satisfaction of the County. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the warranty period described in the Contract.

- C. Further, the Contractor shall take all necessary precautions to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the County.

1.15 CONSTRUCTION WITHIN RIGHT-OF-WAY

Where pipe lines are installed within FDOT right-of-way, all excavation backfill and compaction for the purpose of reconstructing roadways and/or adjacent slopes contiguous thereto shall be in accordance with FDOT or Manatee County Standards and Specifications, whichever is applicable. Contractor shall satisfy the authorized representative of the FDOT with respect to proper safety procedures, construction methods, required permitting, etc., within the FDOT right-of-way.

PART 2 PRODUCTS (NOT USED)
PART 3 EXECUTION (NOT USED)
END OF SECTION

SECTION 01030 SPECIAL PROJECT PROCEDURES

PART 1 GENERAL

1.01 PERMITS

Upon notice of award, the Contractor shall immediately apply for all applicable permits not previously obtained by the County to do the work from the appropriate governmental agency or agencies. No work shall commence until all applicable permits have been obtained and copies delivered to the County. The costs for obtaining all permits shall be borne by the Contractor.

1.02 CONNECTIONS TO EXISTING SYSTEM

The Contractor shall perform all work necessary to locate, excavate and prepare for connections to the existing systems all as shown on the Drawings or where directed by the County. The cost for this work and for the actual connection shall be included in the price bid for the project and shall not result in any additional cost to the County. The termination point for each contract shall be as shown on the Contract Drawings.

1.03 RELOCATIONS

The Contractor shall be responsible for the coordination of the relocation of structures, including but not limited to light poles, power poles, signs, sign poles, fences, piping, conduits and drains that interfere with the positioning of the work as set out on the Drawings. No relocation of the items under this Contract shall be done without approval from the County.

1.04 EXISTING UNDERGROUND PIPING, STRUCTURES AND UTILITIES

- A. The attention of the Contractor is drawn to the fact that during excavation, the possibility exists of the Contractor encountering various utility lines not shown on the Drawings. The Contractor shall exercise extreme care before and during excavation to locate and flag these lines as to avoid damage to the existing lines.
- B. It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the close proximity of excavation, are temporarily stayed in position while work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice.
- C. The existing utility locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping to be encountered. The Contractor shall be responsible for notifying the various utility companies to locate their respective utilities in advance of construction in conformance with all requirements provided for in the Florida Underground Facilities Damage Prevention and Safety Act (Florida Statutes, Title XXXIII, Chapter 556).
- D. The existing piping and utilities that interfere with new construction shall be rerouted as shown, specified, or required. Before any piping and utilities not shown

on the Drawings are disturbed, the Contractor shall notify the County and shall provide suggestions on how best to resolve the issue.

- E. The Contractor shall exercise care in any excavation to locate all existing piping and utilities. All utilities which do not interfere with complete work shall be carefully protected against damage. Any existing utilities damaged in any way by the Contractor shall be restored or replaced by the Contractor at his expense as directed by the County.
- F. It is intended that wherever existing utilities such as water, sewer, gas, telephone, electrical, or other service lines must be crossed, deflection of the pipe within recommended limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated in the Drawings. However, when in the opinion of the County this procedure is not feasible, he may direct the use of fittings for a utilities crossing as detailed on the Drawings. No deflections will be allowed in gravity sanitary sewer lines or in existing storm sewer lines.

1.05 SUSPENSION OF WORK DUE TO WEATHER

Refer to FDOT Standards and Specifications Book, Section 8.

1.06 HURRICANE PREPAREDNESS PLAN

- A. Within 30 days of the date of Notice to Proceed, the Contractor shall submit to the County a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the County in case of a hurricane warning.
- B. In the event of inclement weather, or whenever County shall direct, Contractor shall insure that he and his Subcontractors shall carefully protect work and materials against damage or injury from the weather. If, in the opinion of the County, any portion of work or materials is damaged due to the failure on the part of the Contractor or Subcontractors to protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

1.07 POWER SUPPLY

Electricity as may be required for construction and permanent power supply shall be secured and purchased by the Contractor.

1.08 SALVAGE

Any existing equipment or material, including, but not limited to, valves, pipes, fittings, couplings, etc., which is removed or replaced as a result of construction under this project may be designated as salvage by the County and if so shall be protected for a reasonable time until picked up by the County. Any equipment or material not worthy of salvaging, as directed by the County, shall be disposed of by the Contractor at no additional cost.

1.09 DEWATERING

- A. The Contractor shall do all groundwater pumping necessary to prevent flotation of any part of the work during construction operations with his own equipment.
- B. The Contractor shall pump out water and wastewater which may seep or leak into the excavations for the duration of the Contract and with his own equipment. He shall dispose of this water in an appropriate manner.

1.10 ADDITIONAL PROVISIONS

- A. Before commencing work on any of the existing pipelines, structures or equipment, the Contractor shall notify the County, in writing, at least 10 calendar days in advance of the date he proposes to commence such work.
- B. The Contractor shall provide, at his own expense, all necessary temporary facilities for access to and for protection of, all existing facilities. The County's personnel must have ready access at all times to the existing facilities. The Contractor is responsible for all damage to existing structures, equipment and facilities caused by his construction operations and must repair all such damage when and as ordered by the County.

1.11 CONSTRUCTION CONDITIONS

The Contractor shall strictly adhere to the specific requirements of the governmental unit(s) and/or agency(ies) having jurisdiction over the work. Wherever there is a difference in the requirements of a jurisdictional body and these Specifications, the more stringent shall apply.

1.12 PUBLIC NUISANCE

- A. The Contractor shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, excessive noise or dust.
- B. Sound levels must meet Manatee County Ordinance #87-34, (which amends Ordinance 81-3, The Manatee County Noise Control Ordinance). Sound levels in excess of such ordinance are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the County for excessive noise shall not relieve the Contractor of the other portions of this specification.
- C. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.13 WARRANTIES

- A. All material supplied under these Specifications shall be warranted by the Contractor and the manufacturers for a period of three (3) years. Warranty period shall commence on the date of County acceptance.
- B. The material shall be warranted to be free from defects in workmanship, design and materials. If any part of the system should fail during the warranty period, it

shall be replaced at no expense to the County. All material and installation costs shall be 100% borne by the Contractor.

- C. The manufacturer's warranty period shall run concurrently with the Contractor's warranty or guarantee period. No exception to this provision shall be allowed. The Contractor shall be responsible for obtaining warranties from each of the respective suppliers or manufacturers for all the material specified under these contract specifications,
- D. In the event that the manufacturer is unwilling to provide a three-year warranty commencing at the time of County acceptance, the Contractor shall obtain from the manufacturer a four (4) year warranty starting at the time of equipment delivery to the job site. This four-year warranty shall not relieve the Contractor of the three-year warranty starting at the time of County acceptance of the equipment.

1.14 FUEL STORAGE & FILLING

- A. If the contractor is storing fuel on site, or doing his own fuel filling of portable equipment (other than hand-held equipment), he is responsible for any required response, clean-up or reporting required, at no additional cost to the county.
- B. The Contractor shall prepare and submit a fuel storage / spill abatement plan prior to start of construction if required.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01045 CUTTING AND PATCHING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall be responsible for all cutting, fitting and patching, including excavation and backfill, required to complete the work or to:
 - 1. Make its several parts fit together properly.
 - 2. Uncover portions of the work to provide for installation of ill-timed work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to requirements of Contract Documents.
 - 5. Provide penetrations of non-structural surfaces for installation of piping and electrical conduit.

PART 2 PRODUCTS

2.01 MATERIALS

Comply with specifications and standards for each specific product involved.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, inspect conditions affecting installation of products, or performance of work.
- C. Report unsatisfactory or questionable conditions to County. Do not proceed with work until County has provided further instructions.

3.02 PREPARATION

- A. Provide adequate temporary support as necessary to assure structural value to integrity of affected portion of work.
- B. Provide devices and methods to protect other portions of project from damage.
- C. Provide protection from elements for that portion of the project which may be exposed by cutting and patching work and maintain excavations free from water.

3.03 PERFORMANCE

- A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.

- B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.
- C. Fit and adjust products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- D. Restore work which has been cut or removed; install new products to provide completed work in accordance with the requirements of the Contract Documents.
- E. Replace surfaces airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- F. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes.

END OF SECTION

SECTION 01050 FIELD ENGINEERING AND SURVEYING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall provide and pay for field surveying service required for the project.
- B. The Contractor shall furnish and set all necessary stakes to establish the lines and grades as shown on the Contract Drawings and layout each portion of the Work of the Contract.

1.02 QUALIFICATION OF SURVEYOR AND ENGINEER

All construction staking shall be conducted by or under the supervision of a Florida Registered Professional Surveyor and Mapper. The Contractor shall be responsible for the layout of all such lines and grades, which will be subject to verification by the County.

1.03 SURVEY REFERENCE POINTS

- A. Existing basic horizontal and vertical control points for the Project are designated on the Contract Drawings.
- B. Locate and protect all survey monumentation, property corners and project control points prior to starting work and preserve all permanent reference points during construction. All costs associated with the replacement of all survey monumentation, property corners and project control points shall be borne by the Contractor.

Make no changes or relocations without prior written notice to County.

Report to County when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

Require surveyor to replace project control points which may be lost or destroyed.

Establish replacements based on original survey control.

1.04 PROJECT SURVEY REQUIREMENTS

The Contractor shall establish temporary bench marks as needed, referenced to data established by survey control points.

1.05 RECORDS

The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare record drawings per Section 01720.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01090 REFERENCE STANDARDS

PART 1 GENERAL

1.01 REQUIREMENTS

Abbreviations and acronyms used in Contract Documents to identify reference standards.

- A. Application: When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes established stricter standards.
- B. Publication Date: The most recent publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

1.03 ABBREVIATIONS, NAMES AND ADDRESSES OR ORGANIZATIONS

Obtain copies of reference standards direct from publication source, when needed for proper performance of work, or when required for submittal by Contract Documents.

AA	Aluminum Association 818 Connecticut Avenue, N.W. Washington, DC 20006
AASHTO	American Association of State Highway and Transportation Officials 444 North Capital Street, N.W. Washington, DC 20001
ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AISC	American Institute of Steel Construction 1221 Avenue of the Americas New York, NY 10020
AISI	American Iron and Steel Institute 1000 16th Street NW Washington, DC 20036
ANSI	American National Standards Institute 1430 Broadway

New York, NY 10018

ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers
1791 Tullie Circle, N.E.
Atlanta, GA 30329

ASME American Society of Mechanical Engineers
345 East 47th Street
New York, NY 10017

ASTM American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103

AWWA American Water Works Association
6666 West Quincy Avenue
Denver, CO 80235

AWS American Welding Society
2501 N.W. 7th Street
Miami, FL 33125

CRSI Concrete Reinforcing Steel Institute
180 North LaSalle Street, Suite 2110
Chicago, IL 60601

FDEP Florida Department of Environmental Protection
3900 Commonwealth Blvd.
Tallahassee, Florida 32399

FDOT Florida Department of Transportation Standards Specifications for Road and Bridge Construction
Maps & Publication Sales - Mail Station 12
605 Suwannee St.
Tallahassee, FL 32399-0450

FS Federal Specification
General Services Administration Specifications and Consumer Information Distribution Section (WFSIS)
Washington Navy Yard, Bldg. 197
Washington, DC 20407

MCPW UTIL STD Manatee County Utility Engineering
1022 26th Ave E
Bradenton, FL 34208

MLSFA Metal Lath/Steel Framing Association
221 North LaSalle Street
Chicago, IL 60601

MMA	Monorail Manufacturer's Association 1326 Freeport Road Pittsburgh, PA 15238
NAAMM	National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601
NEMA	National Electrical Manufacturer's Assoc. 2101 L Street N.W. Washington, DC 20037
OHSA	Occupational Safety and Health Assoc. 5807 Breckenridge Pkwy., Suite A Tampa, FL 33610-4249
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 20076
PCI	Prestressed Concrete Institute 20 North Wacker Drive Chicago, IL 60606
SDI	Steel Door Institute 712 Lakewood Center North Cleveland, OH 44107
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association 8224 Old Court House Road Vienna, VA 22180
SSPC	Steel Structures Painting Council 402 24 th Street, Suite 600 Pittsburgh, PA 15213
SWFWMD	Southwest Florida Water Management District 2379 Broad Street Brooksville, FL 34604-6899
UL	Underwriter's Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01150 MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SCOPE

- A. The scope of this section of the Contract Documents is to further define the items included in each Bid Item in the Bid Form section of the Contract Documents. Payment will be made based on the specified items included in the description in this section for each bid item.
- B. All contract prices included in the Bid Form section will be full compensation for all shop drawings, working drawings, labor, materials, tools, equipment and incidentals necessary to complete the construction as shown on the Drawings and/or as specified in the Contract Documents to be performed under this Contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction in the manner set up for each item in this section of the Specifications. Payment for all items listed in the Bid Form will constitute full compensation for all work shown and/or specified to be performed under this Contract.

1.02 ESTIMATED QUANTITIES

The quantities shown are approximate and are given only as a basis of calculation upon which the award of the Contract is to be made. The County does not assume any responsibility for the final quantities, nor shall the Contractor claim misunderstanding because of such estimate of quantities. Final payment will be made only for satisfactorily completed quantity of each item.

1.03 WORK OUTSIDE AUTHORIZED LIMITS

No payment will be made for work constructed outside the authorized limits of work.

1.04 MEASUREMENT STANDARDS

Unless otherwise specified for the particular items involved, all measurements of distance shall be taken horizontally or vertically.

1.05 AREA MEASUREMENTS

In the measurement of items to be paid for on the basis of area of finished work, the lengths and/or widths to be used in the calculations shall be the final dimensions measured along the surface of the completed work within the neat lines shown or designated.

1.06 LUMP SUM ITEMS

Where payment for items is shown to be paid for on a lump sum basis, no separate payment will be made for any item of work required to complete the lump sum items. Lump sum contracts shall be complete, tested and fully operable prior to request for final payment. Contractor may be required to provide a break-down of the lump sum

totals.

1.07

UNIT PRICE ITEM

Separate payment will be made for the items of work described herein and listed on the Bid Form. Any related work not specifically listed, but required for satisfactory completion of the work shall be considered to be included in the scope of the appropriate listed work items.

No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work. Final payments shall not be requested by the Contractor or made by the County until as-built (record) drawings have been submitted and approved by the County.

1. Shop Drawings, Working Drawings.
2. Clearing, grubbing and grading except as hereinafter specified.
3. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
4. Dewatering and disposal of surplus water.
5. Structural fill, backfill, and grading.
6. Replacement of unpaved roadways, and shrubbery plots.
7. Cleanup and miscellaneous work.
8. Foundation and borrow materials, except as hereinafter specified.
9. Testing and placing system in operation.
10. Any material and equipment required to be installed and utilized for the tests.
11. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
12. Maintaining the existing quality of service during construction.
13. Maintaining or detouring of traffic.
14. Appurtenant work as required for a complete and operable system.
15. Seeding and hydromulching.
16. As-built Record Drawings.

BID ITEM NO. 1 - MOBILIZATION

Measurement and payment for this Bid Item shall include full compensation for the required 100 percent (100%) Performance Bond, 100 Percent (100%) Payment Bond, all required insurance for the project and the Contractor's mobilization and demobilization costs as shown in the Bid Form. Mobilization includes, but it not limited to: preparation and movement of personnel, equipment, supplies and incidentals such as safety and sanitary supplies/ facilities

Payment for mobilization shall not exceed 10 percent (10%) of the total Contract cost unless the Contractor can prove to the County that his actual mobilization cost exceeds 10 percent (10%).

Partial payments for this Bid Item will be made in accordance with the following schedule:

Percent of Original Contract Amount:	Percent Allowable Payment of Mobilization/Demobilization Bid Item Price:
5	25
10	35
25	45
50	50
75	75
100	100

These payments will be subject to the standard retainage provided in the Contract. Payment of the retainage will be made after completion of the work and demobilization.

BID ITEM NO. 2 - RECORD DRAWINGS

Payment for all work included under this Bid Item shall be made at the Contract lump sum price bid listed in the Bid Form for any other miscellaneous work not specifically included for payment under other Bid Items obviously necessary to complete the Contract. Partial payments will be based on the breakdown of the Bid Item in accordance with the Schedule of Values submitted by the Contractor and approved by the County. Payment shall also include, but not limited to, full compensation for project photographs, as-builts record drawings, project signs, traffic control, rubbish and spoil removal, repair, and related items and any and all other items required to complete the project in accordance with Contract Documents.

BID ITEM - EROSION AND SEDIMENT CONTROL

Payment for all work included, but is not limited to, under this Bid Item shall represent full compensation in accordance with the lump sum price bid for erosion and sediment control, including permitting if required, coordination with federal, state and local agencies and all equipment and manpower necessary to comply with necessary agencies. Contractor shall follow recommendations of Geotechnical report No. 17-7261 dated September 2018 for erosion and sediment control operations.

Measurement for periodic payments of this lump sum bid item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

BID ITEM	DESCRIPTION	UNITS
3, 16, 22	Erosion and Sediment Control	LS

BID ITEM - DEMOLITION

Payment for all work included under this Bid Item shall be made at the Contract lump sum price bid listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to perform all the demolition work as shown on the Contract Drawings and specified herein, including any other miscellaneous work associated with removal of aboveground and below ground structures; including all associated piping, equipment, conduit, wire, valve pads, valve boxes, fencing, signs,

and associated appurtenances.

Excavation, including rock, unsuitable soils, bedding, backfill, dewatering, sheeting, testing, all necessary grout, and proper disposal of any items demolished as part of this project as necessary for a completed system in accordance with the Contract Documents shall be included. This pay item also includes proper disposal of all items to be demolished. Partial payments will be based on the breakdown of the Bid Item in accordance with the Schedule of Values submitted by the Contractor and approved by the County. Any equipment in working condition shall be salvaged as requested by the County.

BID ITEM	DESCRIPTION	UNITS
4, 17	Demolition - Pump Station	LS

Payment for all work included under this Bid Item shall be made at the Contract lump sum price bid listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to perform all the demolition work as shown on the Contract Drawings and specified herein, including any other miscellaneous work associated with removal and/or abandonment of all below ground piping, fittings, and all other associated appurtenances required to properly remove, abandon existing piping, and connections of proposed pipelines as shown in the Contract Documents. Included in this bid item is the installation of all restrained plugs and caps necessary to abandon existing pipelines.

Excavation, including rock, unsuitable soils, bedding, backfill, dewatering, sheeting, testing and proper disposal of any items demolished as part of this project as necessary for a completed system in accordance with the Contract Documents shall be included. This pay item also includes proper disposal of all items to be demolished. Partial payments will be based on the breakdown of the Bid Item in accordance with the Schedule of Values submitted by the Contractor and approved by the County. Any equipment in working condition shall be salvaged as requested by the County.

BID ITEM	DESCRIPTION	UNITS
23	Demolition - Piping	LS

BID ITEM -UNSUITABLE MATERIAL REMOVAL

Payment for all work included in these Bid Items will be made at the applicable Contract unit price per cubic yard for removal of unsuitable material encountered during excavation for pipeline installation; including but not limited to muck, debris, stone, concrete, and shell. Payment shall represent full compensation for all labor, materials, equipment, dewatering, and stockpiling onsite for properly removing and disposing of all unsuitable material to the onsite landfill. All unsuitable materials must pass an EPA paint filter test to be accepted by the landfill onsite. Contractor shall notify Owner/Engineer when unsuitable materials are encountered. Contractor shall provide backup documentation (load tickets) to County Inspector at time of export or import of material.

BID ITEM	DESCRIPTION	UNITS
5	Unsuitable Material Removal	CY

BID ITEM - IMPORT FILL

Payment for all work included under this Bid Item shall be made at the applicable Contract unit price per cubic yard of imported suitable fill material. Payment shall represent full compensation for fill and permanent stabilization for the pump station berm, East Lake earthen ramps and berms including transporting, stockpiling, backfilling, compacting, and all other labor, materials, and equipment required per the Contract Documents. Contractor shall follow recommendations of Geotechnical report No. 17-7261 dated September 2018 for suitable fill materials.

BID ITEM	DESCRIPTION	UNITS
6, 24	Import Fill	CY

BID ITEM - ROUGH GRADING

Payment for all work included under this Bid Item shall be made at the applicable Contract unit price per square yard of rough grading the East Lake and pump station. Payment shall represent full compensation for clearing and grubbing, rough grading, compaction, and permanent stabilization of the berms, access drives, pump station, and boat ramps including cutting, transporting, stockpiling, backfilling, compacting, and all other labor, materials, and equipment required to properly grade the site improvements as shown in Contract drawings. Contractor shall follow recommendations of Geotechnical report No. 17-7261 dated September 2018 for grading operations.

BID ITEM	DESCRIPTION	UNITS
7, 25	Rough Grading	SY

BID ITEM - DEWATERING

Payment for all work included under this Bid Item shall be made at the applicable Contract lump sum price for all dewatering required to perform the work including but not limited to the rehabilitation of East Lake, South Lake and East Lake intake structures, and proposed pump station installation. Payment shall represent full compensation for all site work, permits, materials, equipment, emergency pump stations and labor required to dewater during construction. The contractor will be responsible for any and all permits related to dewatering. Contractor shall follow recommendations of Geotechnical report No. 17-7261 dated September 2018 for dewatering operations.

BID ITEM	DESCRIPTION	UNITS
8, 18, 26	Dewatering	LS

BID ITEM - HYDROSEEDING

Payment for all work included under this Bid Item shall be made at the applicable Contract unit price per acre of hydroseeding to permanently stabilize East Lake and pump station berms. Payment shall represent full compensation including materials, equipment, and labor required to properly hydroseed, establish, and permanently

stabilize the berms. Contractor shall follow recommendations of Geotechnical report No. 17-7261 dated September 2018 for hydroseeding operations.

BID ITEM	DESCRIPTION	UNITS
9, 27	Hydroseeding	AC

BID ITEM - CONCRETE OVERFLOW WEIR

Payment for all work included under this bid item shall be made at the applicable Contract unit price for each of the two (2) concrete overflow weirs. Furnishing all labor, materials, tools and equipment necessary to install and test all concrete structures, consisting of, but not limited to splash pads, berm compaction, concrete curbs, spillways, rip rap and all other features, required for proper installation of the listed concrete structures.

BID ITEM	DESCRIPTION	UNITS
10, 19	Concrete Overflow Weir	EA

BID ITEM NO. 11 - DISCHARGE PIPING MODIFICATIONS

Payment for all work included under this Bid Item shall be made at the applicable Contract lump sum price for labor, materials, tools and equipment necessary to install the discharge piping structure, consisting of, but not limited to proper sloping of the berm, mitered end sections with grates, rip rap, associated piping, piping removal and pipe connections.

Payment shall represent full compensation for all excavation, including rock, cement, reinforcement bars as necessary, bedding, backfill, compaction, testing and equipment required to complete this Bid Item.

BID ITEM - SHELL DRIVE

Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid per square yard of shell drive as listed on the Bid Form. Measurement of shell drive will be per the actual number of square yards installed or restored along East Lake and the new pump station access road, including the low profile barrier per FDOT index 102-120 as depicted on the Contract Drawings. Payment shall represent full compensation for all labor, materials and equipment required for compacting, furnishing and installing the shell drive as shown on the Contract Drawings. Shell roads shall be FDOT certified bank run shell.

BID ITEM	DESCRIPTION	UNITS
12, 28	Shell Drive	SY

BID ITEM - TEMPORARY COFFER DAM

Payment for all work included in these Bid Items will be made at the applicable Contract lump sum price for all work related to the installation of temporary coffer dams. Payment shall represent full compensation for all labor, materials and equipment required for furnishing, installation and removal of the temporary coffer dam, including repairs to any berms damaged by coffer dam installation, and

restoration of all disturbed areas back to original conditions, as shown on the Contract Drawings. Included in this bid item are signed and sealed coffer dam designs by a Florida Professional engineer submitted to the Engineer for review and approval, prior to any work being done. Contractor shall follow recommendations of Geotechnical report No. 17-7261 dated September 2018 for construction of temporary coffer dam.

BID ITEM	DESCRIPTION	UNITS
13, 20	Temporary Cofferd Dam	LS

BID ITEM - AQUATIC WILDLIFE REMOVAL AND CLEANUP

Payment for all work included under this Bid Item shall be made at the Contract lump sum price bid listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to perform all aquatic wildlife removal, relocation, and cleanup specified herein. Any alligators encountered during construction shall be relocated onsite by a licensed trapper. If a fish kill occurs the contractor shall properly collect, haul, and dispose of fish in the adjacent landfill. Partial payments will be based on the breakdown of the Bid Item in accordance with the Schedule of Values submitted by the Contractor and approved by the County.

BID ITEM	DESCRIPTION	UNITS
14, 21	Aquatic Wildlife Removal and Cleanup	LS

BID ITEM NO. 15 - 42" RCP CULVERT

Payment for all work included in this Bid Item shall be made at the applicable Contract lump sum bid for furnishing and installing the listed diameter reinforced concrete pipe for reclaimed pond connection as shown on the Contract Drawings and listed on the Bid Form. Measurement and Payment shall be made for the actual length of the listed diameter pipe, rip rap, grates, fabric, and two FDOT standard index 430-033 headwall installation and will represent full compensation for all labor, materials, excavation, including rock, dewatering, stabilizing, bedding, backfill, compaction, testing and equipment required to complete these Bid Items. No additional compensation shall be made for excavation below the bottom of the pipe, for rock removal or bedding and backfill material, or for repair of any trench settlement.

BID ITEM NO. 29 - REINFORCED CONCRETE

Payment for all work included in this Bid Item will be made at the applicable Contract unit price bid per cubic yard of reinforced concrete required to construct the pump station, slab on grade, electrical equipment slab and leachate piping slab, including all ancillary components associated with the construction of all structures, such as forms, PVC water stops, rebar, etc.. Payment for work includes furnishing all materials, labor, tools and equipment necessary to install and test all concrete structures identified in the construction documents. Contractor shall follow recommendations of Geotechnical report No. 17-7261 dated September 2018 for formwork operations.

Excavation, including rock, unsuitable soils, bedding, backfill, dewatering, shoring, sheeting, testing and proper disposal of any items demolished as part of this project

as necessary for a completed system in accordance with the Contract Documents shall be included. This pay item also includes proper disposal of all items to be demolished.

Measurement for periodic payments of this unit price bid item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

BID ITEM NO. 30 - SUBMERSIBLE PUMPS

Payment for all work included under this Bid Item shall be made at the applicable Contract bid for each of the three (3) submersible pumps, including suction elbow with inspection port, base plate, cable, lift chain, guide rails with bracing, pump cable hook, cable holder, wet well cover variable speed electric motor, spare parts, and all other materials and equipment necessary for a complete and fully operable system, including testing and start-up, all as shown on the Contract Drawings and/or called for in the Contract Specifications, ready for approval and acceptance by the County.

BID ITEM NO. 31 - PUMP STATION PIPING, ASSEMBLIES, AND MECHANICAL ADJUSTMENTS

Payment for all work included under this Bid Item shall represent full compensation in accordance with the lump sum price bid for labor, materials, tools, and equipment necessary to construct the pump station piping, assemblies and mechanical adjustments. Work shall include all wet well and aboveground discharge piping associated with the reclaimed pump back station (from the submersible pump discharge up to and including the vertical 24" 45-degree flanged bend after the meter assembly), valves, wall pipe, pressure gauges, assemblies, vent pipe, link seals, air release valves, vacuum air release valves, and mechanical adjustments. This item includes pipe support assemblies, fittings, valves, piping, couplings, restraints, adapters, bollards, painting, trenching, backfilling, compaction, and any mechanical adjustments needed. All hardware shall be 316 stainless steel.

Measurement for periodic payments of this lump sum bid item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

BID ITEM NO. 32 - SLIDE GATES

Payment for all work included under this Bid Item shall be made at the applicable Contract unit price bid per each of the two (2) slide gates. Furnishing all labor, materials, tools and equipment necessary to install and test all slide gates, consisting of, but not limited to frames, discs, seals, stems, operators, floor stands, stem guides, anchorage, bracing and all other appurtenances, in place and complete.

Measurement for periodic payments of this unit price bid item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

BID ITEM NO. 33 - 18" MAG METER

Payment for all work included in these Bid Items shall be made at the applicable Contract unit price bid per each for the purchase and installation of a magnetic flow meter, meter display, restraints, taps, and pipe appurtenances included in the proposed aboveground mag meter detail shown in the construction drawings. The mag meter shall be an Endress Hauser Mag Meter Promag L 400.

BID ITEM - DUCTILE IRON PIPING

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per the schedule of prices for furnishing and installing the listed diameter Ductile Iron reclaim water line pipe as shown on the Contract Drawings and listed on the Bid Form. Measurement and Payment shall be made for the actual length of the listed diameter pipe and installed and will represent full compensation for all labor, clearing and grubbing, materials, excavation, including rock, dewatering, bedding, backfill, compaction, bell joint restraints, testing, polyethylene encasement, and equipment required to complete these Bid Items. No additional compensation shall be made for excavation below the bottom of the pipe, for rock removal or bedding and backfill material, or for repair of any trench settlement.

BID ITEM	DESCRIPTION	UNITS
34	16" DI Class 350 Pipe (Open Cut)	LF
35	24" DI Class 350 Pipe (Open Cut)	LF
36	36" DI Class 350 Pipe (Open Cut)	LF

BID ITEM NO. 37 - 36" PERMALOK STEEL PIPE AND INSTALLATION (MICROTUNNELING)

Payment for all work included, but is not limited to, under this Bid Item shall represent full compensation in accordance with the unit price bid per liner foot of steel piping to be installed via microtunneling.

Measurement for microtunneling shall be per linear foot as shown on the Contract Drawings or as ordered by the Engineer in writing. Excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary for a completed system in accordance with the Contract Documents shall be included. Payment shall represent full compensation for all labor, materials, equipment, restoration and incidental items necessary to complete.

BID ITEM - DUCTILE IRON FITTINGS

Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid for furnishing and installing each listed ductile iron fitting as shown on the Contract Drawings and listed on the Bid Form. Payment will be made for each fitting installed and will represent full compensation for all labor, material, excavation, including rock, bedding, backfill, compaction, mechanical joint restraints, polyethylene encasement, testing and equipment required to complete these Bid Items. All hardware shall be 316 stainless steel.

BID ITEM	DESCRIPTION	UNITS
38	16" 90 Degree	EA
39	24" 90 Degree	EA
40	24" 45 Degree	EA
41	24" Tee	EA
42	24" Coupling	EA
43	24" x 16" Wye	EA
44	36" x 24" Reducer	EA
45	24" EBAA Iron Flex-Tend Flexible Expansion Joint	EA
46	36" Romac Style RC400 Transition Coupling	EA
47	36" Coupling	EA
48	36" 22.5 Degree	EA
49	36" 45 Degree	EA

BID ITEM NO. 50 - 24" PLUG VALVE

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per each valve for furnishing and installing the listed diameter 24" full port round plug valve, box, cover and concrete pad as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, excavation, including rock as necessary, bedding, backfill, compaction, testing and disinfection and equipment required to complete. Stem and hardware shall be 316 stainless steel.

BID ITEM NO. 51 - 2" ARV

Payment for all work included in this Bid Item shall be at the applicable Contract unit price bid per each air release valve for furnishing and installing the listed diameter air release valve, enclosure, tapping sleeve and valve, and 316 stainless steel piping as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, excavation, including rock as necessary, bedding, backfill, compaction testing, disinfection and equipment required to complete these Bid Items.

BID ITEM NO. 52 - JOHNSON INTAKE SCREENS

Payment for all work included under this Bid Item shall be at the applicable Contract unit price bid per each of the two (2) Johnson intake screens, including concrete intake slabs, pipe supports, compacted #57 stone, and ancillary 24" Schedule 40 stainless steel piping. The screens shall be Johnson Intake Screens, Model T-36HC. Payment shall represent full compensation for all labor, materials, necessary equipment, and incidentals necessary to complete the work, ready for approval and acceptance by the County. Labor to include the installation of the screen structure and all associated concrete pipe supports and intake screen foundation.

BID ITEM NO. 53 - LECHATE PIPING IMPROVEMENTS

Payment for all work included under this Bid Item shall represent full compensation in accordance with the lump sum price bid for labor, materials, tools, and equipment necessary to construct the leachate piping improvements. Work shall include all below grade and aboveground piping modifications associated with the leachate piping including, the furnishing and installation of the 12" magnetic flow meter assembly (Endress Hauser Mag Meter), valves, assemblies, mechanical adjustments and grouting abandoned pipes, and removal of electrical and mechanical equipment as shown in the Contract Drawings. This item includes pipe support assemblies, fittings, valves, piping, restraints, repair couplings, adapters, reinforced concrete, bollards, stripping, painting, trenching, backfilling, compaction, and any mechanical adjustments needed.

Measurement for periodic payments of this lump sum bid item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

BID ITEM NO. 54 - ELECTRICAL / INSTRUMENTATION AND CONTROLS

Payment for all work included under this Bid Item shall represent full compensation in accordance with the lump sum price bid for the Electrical and Instrumentation work including power and instrumentation conductors; conduit to include any stripping, trenching, compaction, backfill and re sodding as required; New MCC's (Motor Control Centers to include circuit breakers starters, pilot devices and controls), Motor Control Cabinet, Pump Control Cabinet, Panelboards (including circuit breakers), Mini Power-Zones, Surge Protection Devices, Electric Meters, Lighting Fixtures (to include poles), antenna (and associated tower), BioSolids Building MCC Main Circuit Breaker replacement, generator for temporary power, ground rods, supporting devices (channel strut, concrete posts, etc.), arc flash warning stickers, ancillary items and equipment necessary for a complete and fully operable pump station, including level transducers, ancillary items and equipment necessary for a complete and fully operable leachate metering assembly, testing and start-up, all as shown on the Contract Documents, ready for approval by the Engineer and acceptance by the Owner.

Measurement for periodic payments of this lump sum bid item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

BID ITEM NO. 55 - SIDEWALK REPAIR

Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid per square yard of concrete sidewalk as listed on the Bid Form. Measurement of drive restoration will be per the actual number of square yards implemented or restored. Payment shall represent full compensation for all labor, materials and equipment for cutting the edges of existing driveways or concrete, compacting subgrade, furnishing and installing the concrete including all incidentals necessary to complete the sidewalk restoration as shown on the Contract Drawings and included in the Specifications, all ready for approval and acceptance by the County.

BID ITEM NO. 56 - ASPHALT DRIVEWAY REPAIR

Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid per square yard of asphalt driveway as listed on the Bid Form. Measurement of drive restoration will be per the actual number of square yards implemented or restored. Payment shall represent full compensation for all labor, materials and equipment for cutting the edges of existing driveways or removing asphalt, concrete, compacting subgrade, furnishing and installing the subgrade and asphalt, including all incidentals necessary to complete the driveway restoration as shown on the Contract Drawings and included in the Specifications, all ready for approval and acceptance by the County.

BID ITEM NO. 57 - CONTRACT CONTINGENCY

Payment for all work under this Bid Item shall be made only at the County's discretion. This Bid Item shall not exceed 10% of the Bidder's Total Base Bid. The Bidder shall calculate and enter a dollar amount for this Bid Item.

PART 2 PRODUCTS (NOT USED)
PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01152 REQUESTS FOR PAYMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Submit Applications for Payment to the Project Manager or as directed at the preconstruction meeting, in accordance with the schedule established by Conditions of the Contract and Agreement between County and Contractor.

1.02 FORMAT AND DATA REQUIRED

- A. Submit payment requests in the form provided by the County with itemized data typed in accordance with the Bid Form.
- B. Provide construction photographs in accordance with Contract Documents.

1.03 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. When the County requires substantiating data, Contractor shall submit suitable information with a cover letter.
- B. Submit one copy of data and cover letter for each copy of application.

1.04 PREPARATION OF APPLICATION FOR FINAL PAYMENT

Fill in application form as specified for progress payments.

1.05 SUBMITTAL PROCEDURE

- A. Submit applications for payment at the times stipulated in the Agreement.
- B. Number: Three (3) copies of each application; all signed and certified by the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01153 CHANGE ORDER PROCEDURES

PART 1 GENERAL

1.01 DEFINITION

- A. Change Order: A written order signed by the Owner, the Architect/Engineer and the Contractor authorizing a change in the Project Plans and/or Specifications and, if necessary, a corresponding adjustment in the Contract Sum and/or Contract Time, pursuant to Article V of the General Conditions of the Construction Agreement.
- B. Administrative Change Adjustment: Minor change order under 10% of project cost or 20% time, does not have to be Board approved.
- C. Field Directive: A written order issued by Owner which orders minor changes in the Work not involving a change in Contract Time, to be paid from the Owner's contingency funds.
- D. Field Order: Minor change to contract work that does not require adjustment of contract sum or expected date of completion.

1.02 REQUIREMENTS INCLUDED

- A. The Contractor shall promptly implement change order procedures:
 - 1. Provide full written data required to evaluate changes.
 - 2. Maintain detailed records of work done on a time-and-material/force account basis.
 - 3. Provide full documentation to County on request.
- B. The Contractor shall designate a member of the Contractor's organization who:
 - 1. Is authorized to accept changes to the Work.
 - 2. Is responsible for informing others in the Contractor's employ of the authorized changes into the Work.

1.03 PRELIMINARY PROCEDURES

- A. Project Manager may initiate changes by submitting a Request to Contractor. Request will include:
 - 1. Detailed description of the change, products, costs and location of the change in the Project.
 - 2. Supplementary or revised Drawings and Specifications.
 - 3. The projected time extension for making the change.
 - 4. A specified period of time during which the requested price will be considered valid.
 - 5. Such request is for information only and is not an instruction to execute the changes, nor to stop work in progress.

- B. Contractor may initiate changes by submitting a written notice to the Project Manager, containing:
 - 1. Description of the proposed changes.
 - 2. Statement of the reason for making the changes.
 - 3. Statement of the effect on the Contract Sum and the Contract Time.
 - 4. Statement of the effect on the work of separate contractors.
 - 5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.04 FIELD ORDER CHANGE

- A. In lieu of a Change Order, the Project Manager may issue a Field Order for the Contractor to proceed with additional work within the original intent of the Project.
- B. Field Order will describe changes in the work, with attachments of backup information to define details of the change.
- C. Contractor must sign and date the Field Order to indicate agreement with the terms therein.

1.05 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump sum proposal and for each unit price which has not previously been established, with sufficient substantiating data to allow the County to evaluate the quotation.
- B. On request, provide additional data to support time and cost computations:
 - 1. Labor required.
 - 2. Equipment required.
 - 3. Products required.
 - a. Recommended source of purchase and unit cost.
 - b. Quantities required.
 - 4. Taxes, insurance and bonds.
 - 5. Credit for work deleted from Contract, similarly documented.
 - 6. Overhead and profit.
 - 7. Justification for any change in Contract Time.
- C. Support each claim for additional costs and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal.
 - 1. Name of the County's authorized agent who ordered the work and date of the order.
 - 2. Date and time work was performed and by whom.
 - 3. Time record, summary of hours work and hourly rates paid.
 - 4. Receipts and invoices for:
 - a. Equipment used, listing dates and time of use.
 - b. Products used, listing of quantities.
 - c. Subcontracts.

1.06 PREPARATION OF CHANGE ORDERS

- A. Project Manager will prepare each Change Order.
- B. Change Order will describe changes in the Work, both additions and deletions, with attachments as necessary to define details of the change.
- C. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.

1.07 LUMP SUM/FIXED PRICE CHANGE ORDER

- A. Project Manager initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by the Contractor, or requests from the County, or both.
- B. Once the form has been completed, all copies should be sent to Contractor for approval. After approval by Contractor, all copies should be sent to County for approval. The County will distribute executed copies after approval by the Board of County Commissioners.

1.08 UNIT PRICE CHANGE ORDER

- A. Contents of Change Orders will be based on, either:
 - 1. County's definition of the scope of the required changes.
 - 2. Contractor's Proposal for a change, as approved by the County.
 - 3. Survey of completed work.
- B. The amounts of the unit prices to be:
 - 1. Those stated in the Agreement.
 - 2. Those mutually agreed upon between County and Contractor.

1.09 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/CONSTRUCTION CHANGE AUTHORIZATION

- A. Refer to Article V.5.6 of the General Conditions of the Construction Agreement.

1.10 CORRELATION WITH CONTRACTOR'S SUBMITTALS

- A. Periodically revise Schedule of Values and Application for Payment forms to record each change as a separate item of work, and to record the adjusted Contract Sum.
- B. Periodically revise the Construction Schedule to reflect each change in Contract Time. Revise sub schedules to show changes for other items of work affected by the changes.
- C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01200 PROJECT MEETINGS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The County shall schedule the pre-construction meeting, periodic progress meetings and special meetings, if required, throughout progress of work.
- B. Representatives of contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- C. The Contractor shall attend meetings to ascertain that work is expedited consistent with Contract Documents and construction schedules.

1.02 PRE-CONSTRUCTION MEETING

- A. Attendance:
 - 1. County's Engineer.
 - 2. County's Project Manager
 - 3. Contractor.
 - 4. Resident Project Representative.
 - 5. Related Labor Contractor's Superintendent.
 - 6. Major Subcontractors.
 - 7. Major Suppliers.
 - 8. Others as appropriate.
- B. Suggested Agenda:
 - 1. Distribution and discussion of:
 - a. List of major subcontractors.
 - b. Projected Construction Schedules.
 - c. Coordination of Utilities
 - 2. Critical work sequencing.
 - 3. Project Coordination.
 - a. Designation of responsible personnel.
 - b. Emergency contact persons with phone numbers.
 - 4. Procedures and processing of:
 - a. Field decisions.
 - b. Submittals.
 - c. Change Orders.
 - d. Applications for Payment.
 - 5. Procedures for maintaining Record Documents.
 - 6. Use of premises:
 - a. Office, work and storage areas.
 - b. County's REQUIREMENTS.
 - 7. Temporary utilities.
 - 8. Housekeeping procedures.
 - 9. Liquidated damages.
 - 10. Equal Opportunity Requirements.

11. Laboratory testing.
12. Project / Job meetings: Progress meeting, other special topics as needed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01310 CONSTRUCTION SCHEDULE & PROJECT RESTRAINTS

PART 1 GENERAL

1.01 GENERAL

- A. Construction under this contract must be coordinated with the County and accomplished in a logical order to maintain utilization and flow through existing facilities and public properties and rights-of-way and to allow construction to be completed within the time allowed by Contract Documents and in the manner set forth in the Contract.

1.02 CONSTRUCTION SCHEDULING GENERAL PROVISIONS

- A. No work shall be done between 7:00 p.m. and 7:00 a.m. nor on weekends or legal holidays without written permission of the County. However, emergency work may be done without prior permission.
- B. Night work may be established by the Contractor as regular procedure with the written permission of the County. Such permission, however, may be revoked at any time by the County if the Contractor fails to maintain adequate equipment and supervision for the proper execution and control of the work at night.
- C. Due to potential health hazards and requirements of the State of Florida and the U.S. Environmental Protection Agency, existing facilities must be maintained in operation.
- D. The Contractor shall be fully responsible for providing all temporary piping, plumbing, electrical hook-ups, lighting, temporary structure, or other materials, equipment and systems required to maintain the existing facility's operations. All details of temporary piping and temporary construction are not necessarily shown on the Drawings or covered in the Specifications. However, this does not relieve the Contractor of the responsibility to insure that construction will not interrupt proper facility operations.
- E. The Contractor shall designate an authorized representative of his firm who shall be responsible for development and maintenance of the schedule and of progress and payment reports. This representative of the Contractor shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the commitments of the Contractor's schedule.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. The Contractor shall submit a critical path schedule as described herein.
- B. The planning, scheduling, management and execution of the work is the sole responsibility of the Contractor. The progress schedule requirement is established to allow County to review Contractor's planning, scheduling, management and execution of the work; to assist County in evaluating work progress and make

progress payments and to allow other contractors to cooperate and coordinate their activities with those of the Contractor.

2.02 FORM OF SCHEDULES

- A. Prepare schedules using the latest version of Microsoft Project, or other County approved software, in the form of a horizontal bar chart diagram. The diagram shall be time-scaled and sequenced by work areas. Horizontal time scale shall identify the first work day of each week.
- B. Activities shall be at least as detailed as the Schedule of Values. Activity durations shall be in whole working days. In addition, man-days shall be shown for each activity or tabulated in an accompanying report.
- C. Diagrams shall be neat and legible and submitted on sheets at least 8-1/2 inches by 11 inches suitable for reproduction. Scale and spacing shall allow space for notations and future revisions.

2.03 CONTENT OF SCHEDULES

- A. Each monthly schedule shall be based on data as of the last day of the current pay period.
- B. Description for each activity shall be brief, but convey the scope of work described.
- C. Activities shall identify all items of work that must be accomplished to achieve substantial completion, such as items pertaining to Contractor's installation and testing activities; items pertaining to the approval of regulatory agencies; contractor's time required for submittals, fabrication and deliveries; the time required by County to review all submittals as set forth in the Contract Documents; items of work required of County to support pre-operational, startup and final testing; time required for the relocation of utilities. Activities shall also identify interface milestones with the work of other contractors performing work under separate contracts with County.
- D. Schedules shall show the complete sequence of construction by activities. Dates for beginning and completion of each activity shall be indicated as well as projected percentage of completion for each activity as of the first day of each month.
- E. Submittal schedule for shop drawing review, product data, and samples shall show the date of Contractor submittal and the date approved submittals will be required by the County, consistent with the time frames established in the Specifications.
- F. For Contract change orders granting time extensions, the impact on the Contract date(s) shall equal the calendar-day total time extension specified for the applicable work in the Contract change orders.
- G. For actual delays, add activities prior to each delayed activity on the appropriate critical path(s). Data on the added activities of this type shall portray all steps leading to the delay and shall further include the following: separate activity identification, activity description indicating cause of the delay, activity duration

consistent with whichever set of dates below applies, the actual start and finish dates of the delay or, if the delay is not finished, the actual start date and estimated completion date.

- H. For potential delays, add an activity prior to each potentially delayed activity on the appropriate critical path(s). Data for added activities of this type shall include alternatives available to mitigate the delay including acceleration alternatives and further show the following: separate activity identification, activity description indicating cause of the potential delay and activity duration equal to zero work days.

2.04 SUPPORTING NARRATIVE

- A. Status and scheduling reports identified below shall contain a narrative to document the project status, to explain the basis of Contractor's determination of durations, describe the Contract conditions and restraints incorporated into the schedule and provide an analysis pertaining to potential problems and practical steps to mitigate them.
- B. The narrative shall specifically include:
 - 1. Actual completion dates for activities completed during the monthly report period and actual start dates for activities commenced during the monthly report period.
 - 2. Anticipated start dates for activities scheduled to commence during the following monthly report period.
 - 3. Changes in the duration of any activity and minor logic changes.
 - 4. The progress along the critical path in terms of days ahead or behind the Contract date.
 - 5. If the Monthly Status Report indicates an avoidable delay to the Contract completion date or interim completion dates as specified in the Agreement, Contractor shall identify the problem, cause and the activities affected and provide an explanation of the proposed corrective action to meet the milestone dates involved or to mitigate further delays.
 - 6. If the delay is thought to be unavoidable, the Contractor shall identify the problem, cause, duration, specific activities affected and restraints of each activity.
 - 7. The narrative shall also discuss all change order activities whether included or not in the revised/current schedule of legal status. Newly introduced change order work activities and the CPM path(s) that they affect, must be specifically identified. All change order work activities added to the schedule shall conform with the sequencing and Contract Time requirements of the applicable Change Order.
 - 8. Original Contract date(s) shall not be changed except by Contract change order. A revision need not be submitted when the foregoing situations arise unless required by County. Review of a report containing added activities will not be construed to be concurrence with the duration or restraints for such added activities; instead the corresponding data as ultimately incorporated into the applicable Contract change order shall govern.
 - 9. Should County require additional data, this information shall be supplied by Contractor within 10 calendar days.

2.05 SUBMITTALS

- A. Contractor shall submit estimated and preliminary progress schedules (as identified in the Terms and Conditions of the Contract and the General Conditions), monthly status reports, a start-up schedule and an as-built schedule report all as specified herein.
- B. All schedules, including estimated and preliminary schedules, shall be in conformance with the Contract Documents.
- C. The finalized progress schedule discussed in the Contract Documents shall be the first monthly status report and as such shall be in conformance with all applicable specifications contained herein.
- D. Monthly Status Report submittals shall include a time-scaled (days after notice to proceed) diagram showing all contract activities and supporting narrative. The initial detailed schedule shall use the notice to proceed as the start date. The finalized schedule, if concurred with by County, shall be the work plan to be used by the contractor for planning, scheduling, managing and executing the work.
- E. The schedule diagram shall be formatted as above. The diagram shall include (1) all detailed activities included in the preliminary and estimated schedule submittals, (2) calendar days prior to substantial completion, (3) summary activities for the remaining days. The critical path activities shall be identified, including critical paths for interim dates, if possible.
- F. The Contractor shall submit progress schedules with each application for payment.

2.06 MONTHLY STATUS REPORTS

- A. Contractor shall submit detailed schedule status reports on a monthly basis with the Application for Payment. The first such status report shall be submitted with the first Application for Payment and include data as of the last day of the pay period. The Monthly Report shall include a "marked-up" copy of the latest detailed schedule of legal status and a supporting narrative including updated information as described above. The Monthly Report will be reviewed by County and Contractor at a monthly schedule meeting and Contractor will address County's comments on the subsequent monthly report. Monthly status reports shall be the basis for evaluating Contractor's progress.
- B. The "marked-up" diagram shall show, for the latest detailed schedule of legal status, percentages of completion for all activities, actual start and finish dates and remaining durations, as appropriate. Activities not previously included in the latest detailed schedule of legal status shall be added, except that contractual dates will not be changed except by change order. Review of a marked-up diagram by County will not be construed to constitute concurrence with the time frames, duration, or sequencing for such added activities; instead the corresponding data as ultimately incorporated into an appropriate change order shall govern.

2.07 STARTUP SCHEDULE

- A. At least 60 calendar days prior to the date of substantial completion, Contractor shall submit a time-scaled (days after notice to proceed) diagram detailing the work to take place in the period between 60 days prior to substantial completion, together with a supporting narrative. County shall have 10 calendar days after receipt of the submittal to respond. Upon receipt of County's comments, Contractor shall make the necessary revisions and submit the revised schedule within 10 calendar days. The resubmittal, if concurred with by County, shall be the Work Plan to be used by Contractor for planning, managing, scheduling and executing the remaining work leading to substantial completion.
- B. The time-scaled diagram shall use the latest schedule of legal status for those activities completed ahead of the last 60 calendar days prior to substantial completion and detailed activities for the remaining 60-day period within the time frames outlined in the latest schedule of legal status.
- C. Contractor will be required to continue the requirement for monthly reports, as outlined above. In preparing this report, Contractor must assure that the schedule is consistent with the progress noted in the startup schedule.

2.08 REVISIONS

- A. All revised Schedule Submittals shall be made in the same form and detail as the initial submittal and shall be accompanied by an explanation of the reasons for such revisions, all of which shall be subject to review and concurrence by County. The revision shall incorporate all previously made changes to reflect current as-built conditions. Minor changes to the approved submittal may be approved at monthly meetings; a minor change is not considered a revision in the context of this paragraph.
- B. A revised schedule submittal shall be submitted for review when required by County.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01340 SHOP DRAWINGS, PROJECT DATA AND SAMPLES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall submit to the County for review and approval: working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this section called data) that have been produced within the last three (3) years, and material samples (hereinafter in this section called samples) as are required for the proper control of work, including, but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings. Submittals may be done electronically via PDF documents.
- B. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the County. The County will provide the initial submittal log in electronic format. The electronic log (excel file) shall be passed back and forth between the Contractor and the County for each submittal package. This log shall include the following items:
1. Submittal description and number assigned.
 2. Date to County.
 3. Date returned to Contractor (from County).
 4. Status of Submittal (No exceptions taken, returned for confirmation or resubmittal, rejected).
 5. Date of Resubmittal and Return (as applicable).
 6. Date material released (for fabrication).
 7. Projected date of fabrication.
 8. Projected date of delivery to site.
 9. Projected date and required lead time so that product installation does not delay contact.
 10. Status of O&M manuals submitted.

1.03 CONTRACTOR'S RESPONSIBILITY

- A. It is the duty of the Contractor to check all drawings, data and samples prepared by or for him before submitting them to the County for review. Each and every copy of the Drawings and data shall bear Contractor's stamp showing that they have been so checked. Shop drawings submitted to the County without the Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the contract Documents.
- B. The Contractor shall ensure that all submitted cut sheets, product sheets, product documentation, etc. are current versions of the product information and are not older than three (3) years. Product certification(s) shall be no older than three (3) years. Any submitted documents found to be beyond the acceptable date ranges shall be rejected.
- C. Determine and verify:

1. Field measurements.
 2. Field construction criteria.
 3. Catalog numbers and similar data.
 4. Conformance with Specifications and indicate all variances from the Specifications.
- D. The Contractor shall furnish the County a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall indicate those that are critical to the progress schedule.
- E. The Contractor shall not begin any of the work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the County, with No Exceptions Taken or Approved As Noted.
- F. The Contractor shall submit to the County all drawings and schedules sufficiently in advance of construction requirements to provide no less than twenty-one (21) calendar days for checking and appropriate action from the time the County receives them. Submittals are to be scheduled, submitted, reviewed, and approved prior to the acquisition of the material or equipment. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow time for potential resubmittal.
- G. No delay costs or time extensions will be allowed for time lost in late submittals or resubmittals.
- H. All material & product submittals, other than samples, may be transmitted electronically as a pdf file. All returns to the contractor will be as a pdf file only unless specifically requested otherwise.
- I. The Contractor shall be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by County of the necessary Shop Drawings.

1.04 COUNTY'S REVIEW OF SHOP DRAWINGS AND WORKING DRAWINGS

- A. The County's review of drawings, data and samples submitted by the Contractor shall cover only general conformity to the Specifications, external connections and dimensions which affect the installation.
- B. The review of drawings and schedules shall be general and shall not be construed:
1. As permitting any departure from the Contract requirements.
 2. As relieving the Contractor of responsibility for any errors, including details, dimensions and materials.
 3. As approving departures from details furnished by the County, except as otherwise provided herein.

- C. If the drawings or schedules as submitted describe variations and show a departure from the Contract requirements which the County finds to be in the interest of the County and to be so minor as not to involve a change in Contract Price or time for performance, the County may return the reviewed drawings without noting any exception.
- D. When reviewed by the County, each of the Shop and Working Drawings shall be identified as having received such review being so stamped and dated. Shop Drawings stamped "REJECTED" and with required corrections shown shall be returned to the Contractor for correction and resubmittal.
- E. Resubmittals will be handled in the same manner as first submittals. On resubmittals, the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by the County on previous submissions. The Contractor shall make any corrections required by the County.
- F. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the County.
- G. The County shall review a submittal/resubmittal a maximum of three (3) times after which cost of review shall be borne by the Contractor. The cost of engineering shall be equal to the County's actual payroll cost.
- H. When the Shop and Working Drawings have been completed to the satisfaction of the County, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the County.
- I. No partial submittals shall be reviewed. Incomplete submittals shall be returned to the Contractor and shall be considered not approved until resubmitted.

1.05 SHOP DRAWINGS

- A. When used in the Contract Documents, the term "Shop Drawings" shall be considered to mean Contractor's plans for material and equipment which become an integral part of the Project. These drawings shall be complete and detailed. Shop Drawings shall consist of fabrication, drawings, setting drawings, schedule drawings, manufacturer's scale drawings and wiring and control diagrams. Cuts, catalogs, pamphlets, descriptive literature and performance and test data, shall be considered only as supportive to required Shop Drawings as defined above.
- B. Drawings and schedules shall be checked and coordinated with the work of all trades involved, before they are submitted for review by the County and shall bear the Contractor's stamp of approval and original signature as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval and original signature shall be returned to the Contractor for resubmission.

- C. Each Shop Drawing shall have a blank area 3-1/2 inches by 3-1/2 inches, located adjacent to the title block. The title block shall display the following:
 - 1. Number and title of the drawing.
 - 2. Date of Drawing or revision.
 - 3. Name of project building or facility.
 - 4. Name of contractor and subcontractor submitting drawing.
 - 5. Clear identification of contents and location of the work.
 - 6. Specification title and number.
- D. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility of executing the work in accordance with the Contract, even though such drawings have been reviewed.
- E. Data on materials and equipment shall include, without limitation, materials and equipment lists, catalog sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.
- F. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name and address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained.
- G. All manufacturers or equipment suppliers who proposed to furnish equipment or products shall submit an installation list to the County along with the required shop drawings. The installation list shall include at least five installations where identical equipment has been installed and have been in operation for a period of at least one (1) year.
- H. Only the County will utilize the color "red" in marking shop drawing submittals.

1.06 SUBMITTAL PREPARATION

- A. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.
- B. Collect required data for each specific material, product, unit of work, or system into a single submittal. Prominently mark choices, options, and portions applicable to the submittal. Partial submittals will not be accepted for expedition of construction effort. Submittal will be returned without review if incomplete.
- C. If available product data is incomplete, provide Contractor-prepared documentation to supplement product data and satisfy submittal requirements.

- D. All irrelevant or unnecessary data shall be removed from the submittal to facilitate accuracy and timely processing. Submittals that contain the excessive amount of irrelevant or unnecessary data will be returned with review.
- E. Provide a transmittal form for each submittal with the following information:
 1. Project title, location and number.
 2. Construction contract number.
 3. Date of the drawings and revisions.
 4. Name, address, and telephone number of subcontractor, supplier, manufacturer, and any other subcontractor associated with the submittal.
 5. List paragraph number of the specification section and page number; and sheet number of the contract drawings by which the submittal is required.
 6. When a resubmission, the resubmittal document name shall remain the same, but shall add an alphabetic suffix on submittal description. For example, submittal 18 would become 18A, to indicate resubmission.
 7. Product identification and location in project.
- F. The Contractor is responsible for reviewing and certifying that all submittals are in compliance with contract requirements before submitting to the County for review.
- G. Stamp, sign, and date each submittal transmittal form indicating action taken.
- H. Stamp used by the Contractor on the submittal transmittal form to certify that the submittal meets contract requirements is to be similar to the following:

<p>CONTRACTOR (Firm Name)</p> <p>___ Approved</p> <p>___ Approved with corrections as noted on submittal data and/or attached sheet(s).</p> <p>I certify that the following document and information has been verified to be is not more than three (3) years old.</p> <p>SIGNATURE: _____</p> <p>TITLE: _____</p> <p>DATE: _____</p>
--

1.07 WORKING DRAWINGS

- A. When used in the Contract Documents, the term "working drawings" shall be considered to mean the Contractor's fabrication and erection drawings for structures such as roof trusses, steelwork, precast concrete elements, bulkheads, support of open cut excavation, support of utilities, groundwater control systems, forming and false work; underpinning; and for such other work as may be required for construction of the project.

- B. Copies of working drawings as noted above, shall be submitted to the County where required by the Contract Documents or requested by the County and shall be submitted at least thirty (30) days (unless otherwise specified by the County) in advance of their being required for work.
- C. Working drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Florida and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the County, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error are assumed by the Contractor; the County and Engineer shall not have responsibility therefor.

1.08 SAMPLES

- A. The Contractor shall furnish, for the review of the County, samples required by the Contract Documents or requested by the County. Samples shall be delivered to the County as specified or directed. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in work until reviewed by the County.
- B. Samples shall be of sufficient size and quantity to clearly illustrate:
 - 1. Functional characteristics of the product, with integrally related parts and attachment devices.
 - 2. Full range of color, texture and pattern.
 - 3. A minimum of two samples of each item shall be submitted.
- C. Each sample shall have a label indicating:
 - 1. Name of product.
 - 2. Name of Contractor and Subcontractor.
 - 3. Material or equipment represented.
 - 4. Place of origin.
 - 5. Name of Producer and Brand (if any).
 - 6. Location in project.
(Samples of finished materials shall have additional markings that will identify them under the finished schedules.)
 - 7. Reference specification paragraph.
- D. The Contractor shall prepare a transmittal letter in triplicate for each shipment of samples containing the information required above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the County. Review of a sample shall be only for the characteristics or use named in such and shall not be construed to change or modify any Contract requirements.
- E. Reviewed samples not destroyed in testing shall be sent to the County or stored at the site of the work. Reviewed samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment

incorporated in work shall match the reviewed samples. If requested at the time of submission, samples which failed testing or were rejected shall be returned to the Contractor at his expense.

1.09 APPROVED SUBMITTALS

- A. County approval of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory.
- B. County approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor's expense.
- C. After submittals have been approved, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.
- D. Retain a copy of all approved submittals at project site, including approved samples.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01370 SCHEDULE OF VALUES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall submit to the County a Schedule of Values allocated to the various portions of the work, within 10 days after date of Notice to Proceed.
- B. Upon request of the County, the Contractor shall support the values with data which will substantiate their correctness.
- C. The Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment.

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Schedule of Values will be considered for approval by County upon Contractor's request. Identify schedule with:
 - 1. Title of Project and location.
 - 2. Project number.
 - 3. Name and address of Contractor.
 - 4. Contract designation.
 - 5. Date of submission.
- B. Schedule of Values shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction.
- C. Follow the table of contents for the Contract Document as the format for listing component items for structures:
 - 1. Identify each line item with the number and title of the respective major section of the specification.
 - 2. For each line item, list sub values of major products or operations under item.
- D. Follow the bid sheets included in this Contract Documents as the format for listing component items for pipe lines.
- E. The sum of all values listed in the schedule shall equal the total Contract sum.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01380 CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall employ a competent photographer to take construction record photographs or perform video, recording including furnishing all labor, materials, equipment and incidentals necessary to obtain photographs and/or video recordings of all construction areas.
- B. Preconstruction record information shall consist of video recordings on digital video disks (DVD).
- C. Construction progress information shall consist of photographs and digital photographs on a recordable compact disc (CD-R).

1.02 QUALIFICATIONS

- A. All photography shall be done by a competent camera operator who is fully experienced and qualified with the specified equipment.
- B. For the video recording, the audio portion should be done by a person qualified and knowledgeable in the specifics of the Contract, who shall speak with clarity and diction so as to be easily understood.

1.03 PROJECT PHOTOGRAPHS

- A. Provide one print of each photograph with each pay application.
- B. Provide one recordable compact disc with digital photographs with each pay application.
- C. Negatives:
 - 1. All negatives shall remain the property of photographer.
 - 2. The Contractor shall require that photographer maintain negatives or protected digital files for a period of two years from date of substantial completion of the project.
 - 3. Photographer shall agree to furnish additional prints to County at commercial rates applicable at time of purchase. Photographer shall also agree to participate as required in any litigation requiring the photographer as an expert witness.
- D. The Contractor shall pay all costs associated with the required photography and prints. Any parties requiring additional photography or prints shall pay the photographer directly.
- E. All project photographs shall be a single weight, color image. All finishes shall be smooth surface and glossy and all prints shall be 8 inches x 10 inches.

- F. Each print shall have clearly marked on the back, the name of the project, the orientation of view, the date and time of exposure, name and address of the photographer and the photographers numbered identification of exposure.
- G. All project photographs shall be taken from locations to adequately illustrate conditions prior to construction, or conditions of construction and state of progress. The Contractor shall consult with the County at each period of photography for instructions concerning views required.

1.04 VIDEO RECORDINGS

- A. Video, recording shall be done along all routes that are scheduled for construction. Video, recording shall include full, recording of both sides of all streets and the entire width of easements plus 10 feet on each side on which construction is to be performed. All video recording shall be in full color.
- B. A complete view, in sufficient detail with audio description of the exact location shall be provided.
- C. The engineering plans shall be used as a reference for stationing in the audio portion of the recordings for easy location identification.
- D. Two complete sets of video recordings shall be delivered to the County on digital video disks (DVD) for the permanent and exclusive use of the County prior to the start of any construction on the project.
- E. All video recordings shall contain the name of the project, the date and time of the video, recording, the name and address of the photographer and any other identifying information required.
- F. Construction shall not start until preconstruction video recordings are completed, submitted and accepted by the County. In addition, no progress payments shall be made until the preconstruction video recordings are accepted by the County.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01410 TESTING AND TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. County shall employ and pay for the services of an independent testing laboratory to perform testing specifically indicated on the Contract Documents or called out in the Specifications. County may elect to have materials and equipment tested for conformity with the Contract Documents at any time.
 - 1. Contractor shall cooperate fully with the laboratory to facilitate the execution of its required services.
 - 2. Employment of the laboratory shall in no way relieve the Contractor's obligations to perform the work of the Contract.

1.02 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirements of Contract Documents.
 - 2. Approve or accept any portion of the Work.
 - 3. Perform any duties of the Contractor.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel; provide access to Work and/or to Manufacturer's operations.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes which require control by the testing laboratory.
- D. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The County may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor and no extra charge to the County shall be allowed on account of such testing and certification.
- E. Furnish incidental labor and facilities:
 - 1. To provide access to work to be tested.
 - 2. To obtain and handle samples at the project site or at the source of the product to be tested.

3. To facilitate inspections and tests.
 4. For storage and curing of test samples.
- F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
1. When tests or inspections cannot be performed due to insufficient notice, Contractor shall reimburse County for laboratory personnel and travel expenses incurred due to Contractor's negligence.
- G. Employ and pay for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required for the Contractor's convenience and as approved by the County.
- H. If the test results indicate the material or equipment complies with the Contract Documents, the County shall pay for the cost of the testing laboratory. If the tests and any subsequent retests indicate the materials and equipment fail to meet the requirements of the Contract Documents, the contractor shall pay for the laboratory costs directly to the testing firm or the total of such costs shall be deducted from any payments due the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01510 TEMPORARY AND PERMANENT UTILITIES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

The Contractor shall be responsible for furnishing all requisite temporary utilities, i.e., power, water, sanitation, etc. The Contractor shall obtain and pay for all permits required as well as pay for all temporary usages. The Contractor shall remove all temporary facilities upon completion of work.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with National Electric Code.
- B. Comply with Federal, State and Local codes and regulations and with utility company requirements.
- C. Comply with County Health Department regulations.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

Materials for temporary utilities may be "used". Materials for electrical utilities shall be adequate in capacity for the required usage, shall not create unsafe conditions and shall not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

Arrange with the applicable utility company for temporary power supply. Provide service required for temporary power and lighting and pay all costs for permits, service and for power used.

2.03 TEMPORARY WATER

- A. The Contractor shall arrange with Manatee County Utilities Customer Service office to provide water for construction purposes, i.e., meter, pay all costs for installation, maintenance and removal, and service charges for water used.
- B. The Contractor shall protect piping and fitting against freezing.

2.04 TEMPORARY SANITARY FACILITIES

- A. The Contractor shall provide sanitary facilities in compliance with all laws and regulations.
- B. The Contractor shall service, clean and maintain facilities and enclosures.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall maintain and operate systems to assure continuous service.
- B. The Contractor shall modify and extend systems as work progress requires.

3.02 REMOVAL

- A. The Contractor shall completely remove temporary materials and equipment when their use is no longer required.
- B. The Contractor shall clean and repair damage caused by temporary installations or use of temporary facilities.

END OF SECTION

SECTION 01580 PROJECT IDENTIFICATION AND SIGNS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install and maintain County project identification signs.
- B. Remove signs on completion of construction.
- C. Allow no other signs to be displayed except for traffic control and safety.

1.02 PROJECT IDENTIFICATION SIGN (COUNTY)

- A. Two painted sign, of not less than 32 square feet (3 square meters) area, with painted graphic content to include:
 - 1. Title of Project.
 - 2. Name of County.
 - 3. Names and titles of authorities as directed by County.
 - 4. Prime Contractor.
- B. Graphic design, style of lettering and colors: As approved by the County.
- C. Erect on the site at a lighted location of high public visibility, adjacent to main entrance to site, as approved by the County

1.03 INFORMATIONAL SIGNS

- A. Painted signs with painted lettering, or standard products.
 - 1. Size of signs and lettering: as required by regulatory agencies, or as appropriate to usage.
 - 2. Colors: as required by regulatory agencies, otherwise of uniform colors throughout project.
- B. Erect at appropriate locations to provide required information.

1.04 QUALITY ASSURANCE

- A. Sign Painter: Professional experience in type of work required.
- B. Finishes, Painting: Adequate to resist weathering and fading for scheduled construction period.

1.05 PUBLIC NOTIFICATION

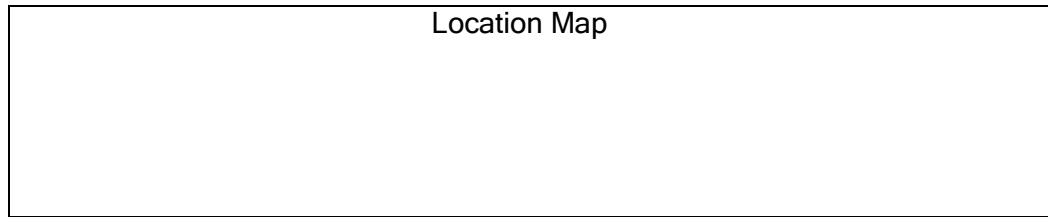
- A. Door Hangers: The Contractor shall generate and distribute door hangers to all residents who will be impacted by project construction.

1. Residents impacted include anyone who resides inside, or within 500 feet of project limits of construction.
- B. Door Hangers shall be distributed prior to start of construction of the project. Hangers shall be affixed to doors of residents via elastic bands or tape.

EXAMPLE:

PLEASE PARDON THE INCONVENIENCE WHILE THE ROADWAY IS BEING RECONSTRUCTED IN YOUR NEIGHBORHOOD

This project consists of utility improvements and the reconstruction of ??? Boulevard from U.S. ??? to ??? Street West. The project is expected to begin in August, 200X and be completed in July 200X.



WE HOPE TO KEEP ANY INCONVENIENCE TO A MINIMUM. HOWEVER, IF YOU HAVE ANY PROBLEMS, PLEASE CONTACT THE FOLLOWING:

- | | | |
|----|---|--|
| A. | Contractor
Contractor Address
Contractor Phone (Site Phone) | Project Manager
PM Address
PM Phone No. & Ext. |
| B. | Project Inspector
Inspector Phone Number | |

AFTER HOURS EMERGENCY NUMBER - (941) 747-HELP
THANK YOU FOR YOUR UNDERSTANDING AND PATIENCE
MANATEE COUNTY GOVERNMENT - PROJECT MANAGEMENT DEPT.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

- A. Structure and Framing: May be new or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.
- B. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard large sizes to minimize joints.
 1. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.
- C. Rough Hardware: Galvanized.

- D. Paint: Exterior quality, as specified in the Contract Documents.

PART 3 EXECUTION

3.01 PROJECT IDENTIFICATION SIGN

- A. Paint exposed surface or supports, framing and surface material; one coat of primer and one coat of exterior paint.
- B. Paint graphics in styles, size and colors selected.

3.02 MAINTENANCE

The Contractor shall maintain signs and supports in a neat, clean condition; repair damages to structures, framing or sign.

3.03 REMOVAL

The Contractor shall remove signs, framing, supports and foundations at completion of project.

END OF SECTION

SECTION 01600 MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Material and equipment incorporated into the work:
1. Conform to applicable specifications and standards.
 2. Comply with size, make, type and quality specified, or as specifically approved in writing by the County.
 3. Manufactured and Fabricated Products:
 - a. Design, fabricate and assemble in accordance with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
 - c. Two or more items of the same kind shall be identical and manufactured by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
 4. Do not use material or equipment for any purpose other than that for which it is specified.
 5. All material and equipment incorporated into the project shall be new.

1.02 MANUFACTURER'S INSTRUCTIONS

- A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to County. Maintain one set of complete instructions at the job site during installation and until completion.
- B. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with County prior to proceeding. Do not proceed with work without clear instructions.

1.03 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site.
1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals and that products are properly protected and undamaged.

- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.04 SUBSTITUTIONS AND PRODUCT OPTIONS

Contractor's Options:

1. For products specified only by reference standard, select any product meeting that standard.
2. For products specified by naming one or more products or manufacturers and "or equal", Contractor must submit a request for substitutions of any product or manufacturer not specifically named in a timely manner so as not to adversely affect the construction schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01620 STORAGE AND PROTECTION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Provide secure storage and protection for products to be incorporated into the work and maintenance and protection for products after installation and until completion of Work.

1.02 STORAGE

- A. Store products immediately on delivery and protect until installed in the Work, in accord with manufacturer's instructions, with seals and labels intact and legible.
- B. Exterior Storage
 - 1. Provide substantial platform, blocking or skids to support fabricated products above ground to prevent soiling or staining.
 - a. Cover products, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
 - b. Prevent mixing of refuse or chemically injurious materials or liquids.
- A. Arrange storage in manner to provide easy access for inspection.

1.03 MAINTENANCE OF STORAGE

- A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
 - 1. State of storage facilities is adequate to provide required conditions.
 - 2. Required environmental conditions are maintained on continuing basis.
 - 3. Surfaces of products exposed to elements are not adversely affected. Any weathering of products, coatings and finishes is not acceptable under requirements of these Contract Documents.
- B. Mechanical and electrical equipment which requires servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package.
 - 1. Equipment shall not be shipped until approved by the County. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the County.
 - 2. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the County until such time as the equipment is to be installed.

3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.
4. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.
5. Lubricants shall be changed upon completion of installation and as frequently as required, thereafter during the period between installation and acceptance.
6. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

1.04 PROTECTION AFTER INSTALLATION

- A. Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, prior to completion of work.
- B. Control traffic to prevent damage to equipment and surfaces.
- C. Provide coverings to protect finished surfaces from damage.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01670 EQUIPMENT ALIGNMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Summary of Work: This specification section covers furnishing all labor, materials, and equipment for the alignment of shaft coupled machines to eliminate premature machine failure due to misalignment. This section provides general information and should not be relied on solely for the alignment requirements. The CONTRACTOR shall submit detailed descriptions of the alignment methods proposed for the equipment specified. The focus of the details in regard to the alignment requirements should be specified in the section that pertains to the equipment.

1.02 DEFINITIONS

The following definitions apply to this specification:

ACCESSIBLE: The ability to reach and adjust the aligning feature. Consideration should be given to confined space restrictions, removing guards, bushing plates, hydraulic lines, lubrication lines, electric lines etc.

ALIGNMENT TARGET SPECIFICATIONS: Desired intentional offset and angularity at coupling center to compensate for thermal growth and/or dynamic loads. Most properly specified as an OFFSET, and an angle in two perpendicular planes, horizontal and vertical.

ANGULAR ERROR: A misalignment condition characterized by the angular error between the desired centerline and the actual centerline. This misalignment condition may exist in planes both horizontal and vertical to the axis of rotation.

ANGULARITY: The angle between the rotational centerlines of two shafts. Angularity is a "slope" expressed in terms of a rise (millimeters or thousandths of an inch) over a run (meter or inches).

AXIAL PLAY, AXIAL FLOAT, END FLOAT: Shaft axial movement along its centerline caused by axial forces, thermal expansion or contraction, and permitted by journal bearings, sleeve bearings and/or looseness.

BASE PLATE: The surface often made of steel plate or cast iron, to which the feet of a machine are attached.

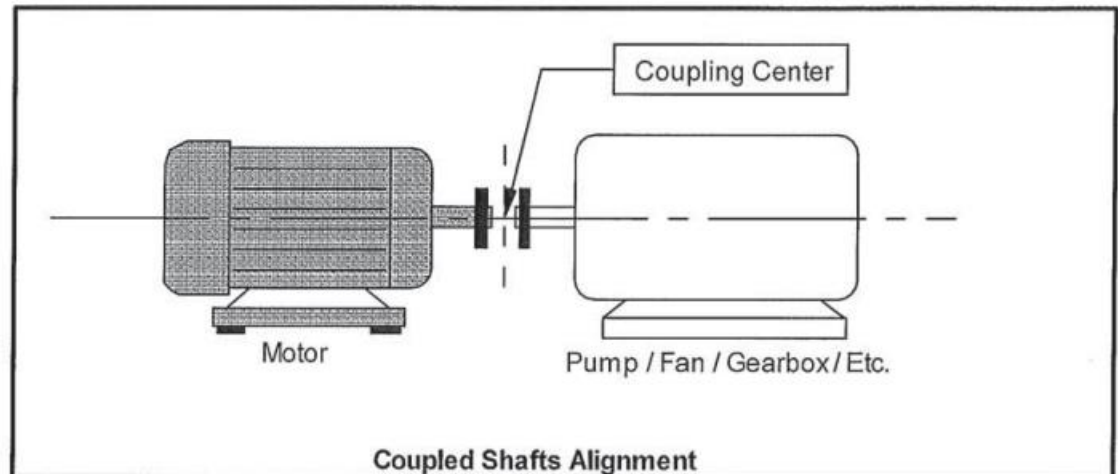
CO-LINEAR: Co-linear means two lines that are positioned as if they were one line. Co-linear as used in alignment means two or more centerlines of rotation with no offset or angularity between them. Two or more lines are co-linear when there is no offset or angularity between them (i.e. they follow the same path).

COPLANAR: The condition of two or more surfaces having all elements in one plane.

COUPLING POINT: The phrase "COUPLING POINT" in the definition of SHAFT

ALIGNMENT is an acknowledgment that vibration due to misalignment originates at the point of power transmission, the coupling. The shafts are being aligned and the coupling center is just the measuring point.

COUPLED SHAFTS ALIGNMENT: Coupled shaft alignment is the positioning of two or more machines so that the rotational centerlines of their shafts are co-linear at the coupling center under operating conditions.



ECCENTRICITY: The distance of the axis from the geometric center. The axis could be the shaft axis or the rotating center defined by the bearings.

FULL BEARING FITTING SPACE BLOCK: A single spacer block used for aligning the machine tool in the vertical plane.

FLATNESS: The condition of a surface having all elements in one plane. As used in this specification, a flat is a small surface flush with or cut into a BASE PLATE, machined flat, and co-planar with the other flats in the base plate. The flats support the Shims and/or feet of the machine to be installed. A pad is a small block of metal that serves to elevate the feet of the machine above the surface of the base plate. Pads are commonly used to compensate for differences in machine center line heights, and for increased corrosion resistance by raising the machine feet out of any possible standing fluids. Pads and flats have holes drilled and tapped in their centers to accept hold down bolts.

HORIZONTAL: Parallel to the mounting surface.

JACKBOLTS, JACKSCREWS, PUSH/PULL BLOCKS: Positioning bolts on the machine base which are located at, each foot of the machine and are used to adjust the position of the machines. Bolts mounted on the machine base or foundation, optimally at the machine foot locations, which provides exact control in positioning the machine.

LEVEL: Parallel to a reference plane or a reference line established by a laser.

MACHINE: The total entity made up of individual machine components such as motors, pumps, spindles, fixtures, etc. Also reference MACHINE COMPONENT.

MACHINE BASE: The structure that supports the machine or machine components under consideration.

MACHINE COMPONENT: An individual unit such as a motor, pump, spindle, fixture, etc. often referred to as a machine in its own context.

MACHINE DEPENDENT: A condition which is dependent on the machining operation and the design requirement of the part being machined.

OFFSET: The distance (in thousands of an inch or in millimeters) between two reference centerlines such as a spindle center line and a part characteristic centerline or the rotational centerlines of two parallel shafts.

OUT-OF-ROUNDNESS: Deviation from a perfect circle.

PITCH: An angular misalignment in the vertical plane.

POSITION ERROR (CENTERLINE/OFFSET MISALIGNMENT): A misalignment condition that exist when the spindle/shaft centerline is parallel but not in line with (not coincidental) with the desired alignment centerline.

PUSH-PULL BLOCKS: Side push-pull adjustment blocks used for aligning machine tool in horizontal plane.

QUALIFYING LEVEL POINTS: Qualified leveling points are locations which have their heights defined and must be in same plane. That plane must be parallel to the mounting surfaces of the slide assembly.

REPEATABILITY: The consistency of readings and results between consecutive sets of measurements.

RUN-OUT: The composite deviation of a circular part during one full rotation of 360 degrees. Run-out includes out-of-roundness, eccentricity and offset.

SHAFT ALIGNMENT: Positioning two or more machines (e.g. a motor driving a hydraulic pump(s), etc.) so that the rotational centerlines of their shafts are collinear at the coupling center under operation conditions

SPINDLE ALIGNMENT: The geometric relationship between the spindle axis or rotation and a reference datum.

SOFT FOOT: A condition that exists when the bottom of all of the feet of the machinery components are not on the same plane (can be compared to a chair with one short leg). Soft foot is present if the machine frame distorts when a foot bolt is loosened or tightened. It must be corrected before the machine is actually aligned.

PARALLEL SOFT FOOT: A parallel gap between the machine foot and its support

surface.

ANGULAR SOFT FOOT: An angled gap between the machine foot and its support surface.

INDUCED SOFT FOOT: A type of soft foot that is caused by external forces, (pipe strain, coupling strain, etc.) acting on a machine independent of the foot to base plate connection.

“SQUISHY” SOFT FOOT: A type of soft foot characterized by material (shims, paint, rust, grease, oil, dirt, etc.) acting like a spring between the underside of the machine foot and the base plate contact area.

SPACER BLOCKS: See FULL BEARING FITTING SPACER BLOCK.

STRESS FREE CONDITION: The condition that exists when there are no forces acting on the structure of a machine, machine component, or machine base that would cause distortion in the structure such as bending, twist, etc.

THERMAL EFFECTS (GROWTH OR SHRINKAGE): This term is used to describe displacement of shaft axes due to machinery temperature changes (or dynamic loading effects) during start-up.

TOLERANCE, DEADBAND, WINDOW, OR ENVELOPE: An area where all misalignment forces sum to a negligible amount and no further improvement in alignment will reduce significantly the vibration of the machine or improve efficiency.

TOLERANCE VALUES: Maximum allowable deviation from the desired values, whether such values are zero or non-zero.

TRACKING/TRACKING ERROR: An angular MISALIGNMENT condition between spindle centerline and the machine way centerline. This condition may be present in both parallel and perpendicular to the way centerline.

VERTICAL: Perpendicular to the horizontal plane.

YAW MISALIGNMENT: An angular misalignment in the horizontal plane.

PART 2 EQUIPMENT AND MATERIALS

2.01 GENERAL REQUIREMENTS:

The alignment specialist shall employ the standard practices and use the necessary instruments to achieve the required alignment. Vibration shall not be used as a criterion to judge alignment. The alignment shall be judged with static measurement instruments fixture to shafts and judged in accordance with the allowable tolerance limits shown below.

- A. **Measurement System:** The measurement system shall be repeatable to within 0.002 inch when exercised through a complete cycle. The measurement system shall be checked for repeatability at the start of each alignment task after the system is in place on the machine to insure the set-up is rigid and satisfies the repeatability

requirements. The measurement system shall have a resolution of 1 mil or less. A laser alignment system shall be implemented.

- a. The Laser Alignment System used for Coupled Shafts Alignment shall use either a combined laser emitter and laser target detector unit or separate units for its laser emitter and laser target detector.
- B. Gravity Sag: The alignment specialist shall compensate for gravity sags of the measuring fixtures of greater than 0.002 inch.
- C. External Strain:
 1. Piping: Pipe flanges shall be mated with no more than 200 pounds force applied to the flange bolts.
 2. Fluids Handling Machinery: Flanged connection to the machine shall be checked for residual pipe strain. With measuring devices positioned at each end of the machine, the machine anchor bolts shall be loosened. Movement indicated on the measuring devices greater than 0.0025 inch indicates unacceptable external strain on machine.
- D. Axial Spacing: For machines with plain bearings, the axial spacing shall be set with machine pushed against the thrust bearing similar to the operating condition. For electric motors with thrust bearings, the axial spacing shall be set with the armature positioned at the motor magnetic center.
- E. Bases and Foundations: The bottoms of the machine feet shall rest on the base or foundation with 90 percent contact of the footprint. A 0.003 inch thick shim shall not penetrate under any foot with all hold-down bolts loose. The measuring device shall be positioned to measure the vertical rise at each foot as the hold-down bolt is loosened. All other bolts shall remain tight. A rise of less than 0.002 inch shall be considered acceptable. A rise of 0.002 inch or more shall be corrected with shims. The test shall be repeated at all feet until a less than 0.002 inch rise is measured at each foot.
 1. Shims: All shims shall be pre-stamped stainless steel.
- F. Shaft Run-Out: The exposed shaft of each machine shall be measured for run-out. The total indicated reading (T.I.R.) shall be no more than 0.001 inch.
- G. Thermal Growth: The alignment technician shall estimate and correct for any change, thermal or mechanical, from cold alignment conditions to hot running conditions. Thermal growth calculations shall be made for any temperature change greater than 100 F degrees.
- H. Machine Adjustments: Machines shall be adjusted by small precise movements. Excessive force that could cause damage shall be avoided. Jackscrews are the preferred method of adjustment.
 1. Bolt-bound Conditions: The following adjustment methods may be used for machines that are restrained and without a means of adjustment.
 - a. Undercutting the bolt diameter to remove threads.

- b. Reducing bolt size one nominal fractional size.
- c. Enlarging hole if structural integrity is not compromised.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01700 CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the work.

1.02 SUBSTANTIAL COMPLETION

- A. The Contractor shall submit the following items when the Contractor considers the work to be substantially complete:
 - 1. A written notice that the work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, the County shall make an inspection to determine the status of completion.
- C. Project record documents and operations and maintenance manuals must be submitted before the project shall be considered substantially complete.
- D. If the County determines that the work is not substantially complete:
 - 1. The County shall notify the Contractor in writing, stating the reasons.
 - 2. The Contractor shall remedy the deficiencies in the work and send a second written notice of substantial completion to the County.
 - 3. The County shall reinspect the work.
- E. When the County finds that the work is substantially complete:
 - 1. The Engineer shall prepare and deliver to the County a tentative Certificate of Substantial Completion (Manatee County Project Management Form PMD-8) with a tentative list of the items to be completed or corrected before final payment.
 - 2. The Engineer shall consider any objections made by the County as provided in Conditions of the Contract. When the Engineer considers the work substantially complete, he will execute and deliver to the County a definite Certificate of Substantial Completion (Manatee County Project Management Form PMD-8) with a revised tentative list of items to be completed or corrected.

1.03 FINAL INSPECTION

- A. When the Contractor considered the work to be complete, he shall submit written certification stating that:
 - 1. The Contract Documents have been reviewed.

2. The work has been inspected for compliance with Contract Documents.
 3. The work has been completed in accordance with Contract Documents.
 4. The equipment and systems have been tested in the presence of the County's representative and are operational.
 5. The work is completed and ready for final inspection.
- B. The County shall make an inspection to verify the status of completion after receipt of such certification.
- C. If the County determines that the work is incomplete or defective:
1. The County shall promptly notify the Contractor in writing, listing the incomplete or defective work.
 2. The Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to County that the work is complete.
 3. The County shall reinspect the work.
- D. Upon finding the work to be acceptable under the Contract Documents, the County shall request the Contractor to make closeout submittals.
- E. For each additional inspection beyond a total of three (3) inspections for substantial and final completion due to the incompleteness of the work, the Contractor shall reimburse the County's fees.

1.04 CONTRACTOR'S CLOSEOUT SUBMITTALS TO COUNTY

- A. Project Record Documents (prior to substantial completion).
- B. Operation and maintenance manuals (prior to substantial completion).
- C. Warranties and Bonds.
- D. Evidence of Payment and Release of Liens: In accordance with requirements of General and Supplementary Conditions.
- E. Certification letter from Florida Department of Transportation and Manatee County Department of Transportation, as applicable.
- F. Certificate of Insurance for Products and Completed Operations.
- G. Final Reconciliation, Warranty Period Declaration, and Contractor's Affidavit (Manatee County Project Management Form PMD-9).

1.05 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the County.
- B. Statement shall reflect all adjustments to the Contract Sum:
 1. The original Contract Sum.

2. Additions and deductions resulting from:
 - a. Previous Change Orders
 - b. Unit Prices
 - c. Penalties and Bonuses
 - d. Deductions for Liquidated Damages
 - e. Other Adjustments
 3. Total Contract Sum, as adjusted.
 4. Previous payments.
 5. Sum remaining due.
- C. Project Management shall prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.06 FINAL APPLICATION FOR PAYMENT

Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01710 CLEANING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Execute cleaning during progress of the work and at completion of the work, as required by the General Conditions.

1.02 DISPOSAL REQUIREMENTS

Conduct cleaning and disposal operations to comply with all Federal, State and Local codes, ordinances, regulations and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulation of waste materials, rubbish and wind-blown debris, resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish.
- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.

- B. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- C. Prior to final completion or County occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire work is clean.

END OF SECTION

SECTION 01720 PROJECT RECORD DOCUMENTS

PART 1 STANDARDS

1.01 MINIMUM RECORD DRAWING STANDARDS FOR ALL RECORD DRAWINGS SUBMITTED TO MANATEE COUNTY

- A. Record drawings shall be submitted to at least the level of detail in the contract documents. It is anticipated that the original contract documents shall serve as at least a background for all record information. Original drawings in CAD format may be requested of the County.
- B. Drawings shall meet the criteria of paragraph 2.04 D above and as mentioned in Section 1.14 Record Drawings in the Manatee County Public Works Standards, Part I Utilities Standards Manual approved June 2015.

PART 2 STANDARDS

2.01 REQUIREMENTS INCLUDED

- A. Contractor shall maintain at the site for the County one record copy of:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. County's field orders or written instructions.
 - 6. Approved shop drawings, working drawings and samples.
 - 7. Field test records.
 - 8. Construction photographs.

2.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
 - 1. Provide files and racks for storage of documents.
 - 2. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with CSI format.
- C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by the County.

2.03 MARKING DEVICES

- A. Provide felt tip marking pens for recording information in the color code designated by the County.

2.04 RECORDING DRAWINGS PREPARATION

- A. Record information concurrently with construction progress.
- B. Do not conceal any work until required information is recorded.
- C. Drawings; Legibly mark to record actual construction:
 - 1. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc. Locations of drainage ditches, swales, water lines and force mains shall be shown every 200 feet (measured along the centerline) or alternate lot lines, whichever is closer. Dimensions at these locations shall indicate distance from centerline of right-of-way to the facility.
 - 2. Field changes of dimension and detail.
 - 3. Changes made by Field Order or by Change Order.
 - 4. Details not on original contract drawings.
 - 5. Equipment and piping relocations.
 - 6. Locations of all valves, fire hydrants, manholes, water and sewer services, water and force main fittings, underdrain cleanouts, catch basins, junction boxes and any other structures located in the right-of-way or easement, shall be located by elevation and by station and offset based on intersection P.I.'s and centerline of right-of-way. For facilities located on private roads, the dimensioning shall be from centerline of paving or another readily visible baseline.
 - 7. Elevations shall be provided for all manhole rim and inverts; junction box rim and inverts; catch basin rim and inverts; and baffle, weir and invert elevations in control structures. Elevations shall also be provided at the PVI's and at every other lot line or 200 feet, whichever is less, of drainage swales and ditches. Bench marks and elevation datum shall be indicated.
 - 8. Slopes for pipes and ditches shall be recalculated, based on actual field measured distances, elevations, pipe sizes, and type shown. Cross section of drainage ditches and swales shall be verified.
 - 9. Centerline of roads shall be tied to right-of-way lines. Elevation of roadway centerline shall be given at PVI's and at all intersections.
 - 10. Record drawings shall show bearings and distances for all right-of-way and easement lines, and property corners.
 - 11. Sidewalks, fences and walls, if installed at the time of initial record drawing submittal, shall be located every 200 feet or alternate lot lines, whichever is closer. Dimensions shall include distance from the right-of-way line and the back of curb and lot line or easement line.
 - 12. Sanitary sewer mainline wyes shall be located from the downstream manhole. These dimensions shall be provided by on-site inspections or televising of the sewer following installation.
 - 13. Elevations shall be provided on the top of operating nuts for all water and force main valves.
 - 14. Allowable tolerance shall be ± 6.0 inches for horizontal dimensions. Vertical dimensions such as the difference in elevations between manhole inverts shall have an allowable tolerance of $\pm 1/8$ inch per 50 feet (or part thereof)

- of horizontal distance up to a maximum tolerance of ± 2 inch.
15. Properly prepared record drawings on mylar, together with two copies, shall be certified by a design professional (Engineer and/or Surveyor registered in the State of Florida), employed by the Contractor, and submitted to the County.

D. Specifications and Addenda; Legibly mark each Section to record:

1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
2. Changes made by field order or by change order.

E. Shop Drawings (after final review and approval):

1. Five sets of record drawings for each process equipment, piping, electrical system and instrumentation system.

2.05 SUBMITTAL

- A. Prior to substantial completion and prior to starting the bacteria testing of water lines, deliver signed and sealed Record Documents and Record Drawings to the County. These will be reviewed and verified by the inspector. If there are any required changes or additions, these shall be completed and the entire signed and sealed set resubmitted prior to final pay application.
- B. The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare record drawings. Record drawings shall be certified by the professional(s) (Engineer or Surveyor licensed in Florida), as stipulated by the Land Development Ordinance and submitted on signed and sealed paper drawings, signed and dated mylar drawings together with an AutoCAD version on a recordable compact disk (CD).
- C. The CD shall contain media in AutoCad Version 2004 or later, or in any other CAD program compatible with AutoCad in DWG or DXF form. All fonts, line types, shape files, external references, or other pertinent information used in the drawing and not normally included in AutoCad shall be included on the media with a text file or attached noted as to its relevance and use.
- D. Accompany submittal with transmittal letter, containing:
 1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. Title and number of each Record Document.
 5. Signature of Contractor or his authorized representative.

Note: The data required to properly prepare these record drawings shall be obtained at the site, at no cost to the County by the responsible design professional or his/her duly appointed representative. The appointed representative shall be a qualified employee of the responsible design professional or a qualified inspector retained by the responsible design professional on a project-by-project basis.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01730 OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Compile product data and related information appropriate for County's maintenance and operation of products furnished under Contract.

Prepare operating and maintenance data as specified in this and as referenced in other pertinent sections of Specifications.

- B. Instruct County's personnel in maintenance of products and equipment and systems.
- C. Provide three (3) sets of operating and maintenance manuals for each piece of equipment provided within this Contract.

1.02 FORM OF SUBMITTALS

- A. Prepare data in form of an instructional manual for use by County's personnel.

- B. Format:

1. Size: 8-1/2 inch x 11 inch
2. Paper: 20 pound minimum, white, for typed pages
3. Text: Manufacturer's printed data or neatly typewritten
4. Drawings:
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Fold larger drawings to size of text pages.
5. Provide fly-leaf for each separate product or each piece of operating equipment.
 - a. Provide typed description of product and major component parts of equipment.
 - b. Provide indexed tabs.
6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
 - a. Title of Project.
 - b. Identity of separate structures as applicable.
 - c. Identity of general subject matter covered in the manual.

- C. Binders:

1. Commercial quality three-ring binders with durable and cleanable plastic covers.
2. Maximum ring size: 1 inch.
3. When multiple binders are used, correlate the data into related consistent groupings.

1.03 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit three copies of complete manual in final form.
- B. Content for each unit of equipment and system, as appropriate:
 - 1. Description of unit and component parts.
 - a. Function, normal operating characteristics and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - 2. Operating Procedures:
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shut-down and emergency instructions.
 - c. Summer and winter operating instructions.
 - d. Special operating instructions.
 - 3. Maintenance Procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
 - c. Disassembly, repair and reassembly.
 - d. Alignment, adjusting and checking.
 - 4. Servicing and lubricating schedule.
 - a. List of lubricants required.
 - 5. Manufacturer's printed operating and maintenance instructions.
 - 6. Description of sequence of operation by control manufacturer.
 - 7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 - a. List of predicted parts subject to wear.
 - b. Items recommended to be stocked as spare parts.
 - 8. As installed control diagrams by controls manufacturer.
 - 9. Each contractor's coordination drawings.
 - a. As installed color coded piping diagrams.
 - 10. Charts of valve tag numbers, with location and function of each valve.
 - 11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
 - 12. Other data as required under pertinent sections of specifications.
- C. Content, for each electric and electronic system, as appropriate:
 - 1. Description of system and component parts.
 - a. Function, normal operating characteristics and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - 2. Circuit directories of panelboards.
 - a. Electrical service.
 - b. Controls.
 - c. Communications.
 - 3. As-installed color coded wiring diagrams.
 - 4. Operating procedures:
 - a. Routine and normal operating instructions.
 - b. Sequences required.

- c. Special operating instructions.
 - 5. Maintenance procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
 - c. Disassembly, repair and reassembly.
 - d. Adjustment and checking.
 - 6. Manufacturer's printed operating and maintenance instructions.
 - 7. List of original manufacture's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
 - 8. Prepare and include additional data when the need for such data becomes apparent during instruction of County's personnel.
- D. Prepare and include additional data when the need for such data becomes apparent during instruction on County's personnel.
- E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

1.04 SUBMITTAL SCHEDULE

- A. Submit one copy of completed data in final form fifteen days prior to substantial completion.
 - 1. Copy will be returned after substantial completion, with comments (if any).
- B. Submit two copies of approved data in final form. Final acceptance will not be provided until the completed manual is received and approved.

1.05 INSTRUCTION OF COUNTY'S PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct County's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction.
 - 1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01740 WARRANTIES AND BONDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Compile specified warranties and bonds.
- B. Compile specified service and maintenance contracts.
- C. Co-execute submittals when so specified.
- D. Review submittals to verify compliance with Contract Documents.
- E. Submit to County for review and transmittal.

1.02 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Number of original signed copies required: Two each.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product or work item.
 - 2. Firm, with name of principal, address and telephone number.
 - 3. Scope.
 - 4. Date of beginning of warranty, bond or service and maintenance contract.
 - 5. Duration of warranty, bond or service maintenance contract.
 - 6. Provide information for County's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.
 - 7. Contractor, name of responsible principal, address and telephone number.

1.03 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 - 1. Size 8-1/2 inch x 11 inch punched sheets for standard 3-ring binder. Fold larger sheets to fit into binders.
 - 2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
 - a. Title of Project.
 - b. Name of Contractor.
- C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.04 TIME OF SUBMITTALS

- A. Make submittals within ten days after date of substantial completion and prior to final request for payment.
- B. For items of work, where acceptance is delayed materially beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.05 SUBMITTALS REQUIRED

- A. Submit warranties, bonds, service and maintenance contracts as specified in respective sections of Specifications.
- B. Approval by the County of all documents required under this section is a prerequisite to requesting a final inspection and final payment

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

DIVISION 2 SITE WORK

SECTION 02050 DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section includes demolition, debris removal and items to be salvaged as indicated on the Drawings and as specified herein.
- B. Demolition items consist of, but are not limited to the following:
 - 1. Removal of: Old East and South Lake pump stations, including electrical equipment, antenna, culvert and above ground piping.
- C. Items to be salvaged and turned over to the Owner shall be identified by the Owner during the preconstruction meeting.

1.02 QUALITY ASSURANCE

- A. Accomplish all demolition work so there is no injury to any persons and no damage to adjacent structures or property. All demolition methods shall be in full compliance with municipal, county, state, and federal ordinances. Demolition work shall comply with the requirements of the Occupational Safety and Health Administration (OSHA).
- B. The Contractor shall comply with all municipal, county, state and federal ordinances regarding the disposal of rubble, scrap metal, and refuse.
- C. Demolition procedures shall provide for safe conduct of the work, protection of property which is to remain undisturbed, and coordination with other work in progress.

1.03 JOB CONDITIONS

- A. It shall be the responsibility of the Contractor to visit the site and inspect the nature and condition of the items to be removed and salvaged before submitting his bid.
- B. Dust Control: Control the amount of dust resulting from demolition to prevent the spread of dust to occupied portions of buildings and to avoid creation of a nuisance in the surrounding area. Do not use water when it will result in, or create, hazardous or objectionable conditions such as flooding and pollution.
- C. Protection of Existing Work: Protect existing work. Work damaged by the Contractor shall be repaired to match existing work.
- D. No interference with plant operations: Demolition work shall be scheduled and conducted so there is no interference with normal plant operations or deliveries.

PART 2 PRODUCTS

2.01 REPAIR AND REPLACEMENT MATERIALS

- A. Materials used in the repair or replacement of existing work to remain shall be identical or equal to the materials used in existing work when new.

PART 3 EXECUTION

3.01 STRUCTURES AND BUILDINGS

- A. Remove all parts of existing structures to be demolished to a minimum depth of 3-ft below grade unless otherwise shown on the drawings. Structures left below grade shall be punctured to allow water to pass through and prevent flotation.

3.02 EQUIPMENT

- A. Completely remove equipment which is designated to be removed.
- B. Remove concrete equipment bases if the existing bases are not to be used for new equipment.
- C. Completely remove isolated equipment bases.

3.03 PIPING

- A. Completely remove piping, conduit, and wiring in structures and buildings which are to be demolished, partially demolished, and where otherwise designated to be removed as shown on the Drawings. When not indicated on the Drawings, the removal of said piping, conduit and wiring shall be a minimum of 5-feet from the outside of the structure or building. The Contractor shall schedule underground pipe removal and new pipe installation in order to minimize disruption of the existing piping system and reduce bypass pumping.
- B. Underground piping, conduit, and wiring which are to be abandoned and do not interfere with new work may be left in place, unless otherwise shown on the Drawings. Plug and seal ends of underground piping to be abandoned. Grout fill abandoned pipes in accordance with plans. Do not leave abandoned branches of piping and wiring "live". Isolate abandoned branches by closing branch valve at main or by disconnecting branch at main. Plug, cap, and seal active branch at isolating valve or point of disconnection.
- C. Properly disconnect, seal and plug utility services to structures and buildings which are completely demolished. Properly disconnect, seal, and plug utility lines within structures and buildings which are partially demolished.

3.04 DISPOSAL

- A. Equipment, piping, and materials which are designated to remain the property of the Owner shall be moved to a location within the project site designated by the Owner.
- B. All removed equipment, piping, and materials not specifically designated to remain the property of the Owner shall become the property of the Contractor and shall be removed from the site.
- C. Do not allow debris and rubbish to accumulate on the site. Remove debris and rubbish from the site.
- D. If the Contractor uses Manatee County Sanitary Land fill for disposal, the Contractor shall be required to pay a tipping fee when crossing the landfill weighting scales.

3.05 FILLING

- A. Backfill excavations resulting from demolition.
- B. Backfill excavations which will not be beneath new structures, buildings, piping, or other new work as specified in this paragraph.
- C. Backfill excavations more than three feet deep or more than five cubic yards in volume as specified in Section 02200 - Earthwork.
- D. Place and compact backfill in other excavations to produce an adequate foundation for grassing.

3.06 CLEAN-UP

- A. Clean-up in areas where other work is to be done following demolition shall be as specified in the applicable Sections.
- B. Clean-up the job site in areas where no other work is to be done under this Contract following demolition. Remove all debris and rubbish, temporary facilities, and equipment. Level surface irregularities to eliminate depressions. Leave the work in a neat and presentable condition.

END OF SECTION

SECTION 02064 MODIFICATIONS TO EXISTING STRUCTURES, PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required to modify, alter and/or convert existing structures as shown or specified and as required for the installation of piping, mechanical equipment and appurtenances. Existing piping and equipment shall be removed and dismantled as necessary for the performance of facility alterations in accordance with the requirements herein specified.

PART 2 PRODUCTS

- A. Epoxy mortar shall be fiberglass fiber mixed with an epoxy filler.
- B. Non-shrink grout shall be a sand-cement, non-metallic formulation, having a 28-day strength of 4,000 psi and 0.0 percent shrinkage per ASTM C1090.
- C. Liners to be installed in existing manholes and wetwells shall be spray-applied, monolithic, reinforced urethane resin. Urethane resin-based manhole liner material shall be resistant to hydrogen sulfide gas, and other common contents found in a sanitary sewer environment.
- D. Approved manhole and wet well liner products are Raven 405, SprayWall, Green Monster, or SpectraShield.

PART 3 EXECUTION

3.01 GENERAL

- A. Cut, repair, reuse, excavate, demolish or otherwise remove parts of the existing structures or appurtenances, as indicated on the construction drawings, or as necessary to complete the work as required. Dispose of surplus materials resulting from the above work in an approved manner. The work shall include all necessary cutting and bending of reinforcing steel, structural steel, or miscellaneous metal work found embedded in the existing structures.
- B. Dismantle and remove all existing equipment, piping, and other appurtenances required for the completion of the work. Where called for or required, cut existing pipelines for the purpose of making connections thereto.
- C. Anchor bolts for equipment and structural steel to be removed shall be cut off one inch below the concrete surface. Surfaces shall then be refinished using non-shrink grout or epoxy mortar or as indicated on the construction drawings. Repairs to the interior surfaces of existing concrete structures in sanitary sewers shall be made with epoxy mortar. Repairs to be made on other existing concrete surfaces using non-shrink grout shall be made using a bonding agent such as Acrylbond by Concrete Producers Solutions or an equal approved by the County. Remove all dirt, curing compounds, sealers, paint, rust or other foreign material, and etch with

muriatic acid solution. Flush with clean water and while still damp, apply a coating of the bonding agent. Place the new grout patch onto the treated area immediately.

- D. At the time that a new connection is made to an existing pipeline, additional new piping, extending to and including a new valve, shall be installed. Pipe restraint devices, if required, shall also be installed as required. At the time when a new potable or reclaimed water service is installed, a pipe locator tracer wire shall be installed and connected to the tracer wire at the main.
- E. No existing structure, equipment, or appurtenance shall be shifted, cut, removed, or otherwise altered except with the express approval of and only to the extent approved by the County. All existing valve boxes, fire hydrants, air release valve cabinets, and manholes shall be relocated to meet the new finished grade elevations after construction.
- F. When removing materials or portions of existing utility pipelines or structures or when making openings in walls and partitions, take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new work, and not to damage the structures or contents by falling or flying debris. Unless otherwise approved by the County, saw-cutting, rotary core-boring, or line drilling will be required in removing material from existing concrete structures or pipes.
- G. Materials and equipment removed in the course of making alterations and additions shall remain the property of the County, except that items not salvageable, as determined by the County, shall be disposed of off the work site.
- H. All alterations to existing utility pipes and structures shall be done at such time and in such a manner as to comply with the approved time schedule. Before any part of the work is started, all tools, equipment, and materials shall be assembled and made ready so that the work can be completed without delays.
- I. All cutting of existing concrete or other material to provide suitable bonding to new work shall be done in a manner to meet the requirements of the respective section of these Standards covering the new work. When not covered, the work shall be carried on in the manner and to the extent directed by the County or per the construction drawings.
- J. Surfaces of seals visible in the completed work shall be made to match as nearly as possible the adjacent surfaces.
- K. Non-shrink cementitious grout shall be used for setting wall castings, sleeves, leveling pump bases, doweling anchors into existing concrete and elsewhere as shown on the construction drawings. The surface to which grout is to be applied shall be wetted to facilitate good bonding.
- L. Where necessary or required for the purpose of making connections; cut existing pipelines in a manner to provide an approved joint. Where required, use flanges, couplings, or adapters, all as required.

- M. Provide flumes, hoses, piping, pumps and well points, and other related items to divert or provide suitable plugs, bulkheads, or other means to hold back the flow of water or other liquids, all as required in the performance of the work.
- N. Care shall be taken not to damage any part of existing buildings or foundations or outside structures.
- O. Prior to entering confined spaces in sanitary sewer structures, conduct an evaluation of the atmosphere within, in accordance with local, state, and federal regulations. Provide ventilation equipment and other equipment as required to assure safe working conditions.

3.02 CONNECTING TO EXISTING PIPING AND EQUIPMENT

The Contractor shall verify exact location, material, alignment, joint, etc. of existing piping and equipment prior to making the connections called out in the Drawings. The verifications shall be performed with adequate time to correct any potential alignment or other problems prior to the actual time of connection. A County Inspector must be present for all tie-ins for a visual inspection.

3.03 REMOVAL AND ABANDONMENT OF ASBESTOS CEMENT PIPE AND APPURTENANCES

- A. All work associated with the removal or abandonment of existing asbestos cement pipe and appurtenances shall be performed by a licensed asbestos removal Contractor registered in the State of Florida.
- B. The asbestos Contractor shall contact the appropriate regulatory agencies prior to removal or abandonment of any asbestos material and shall obtain all required permits and licenses and issue all required notices. The cost for all fees associated with permits, licenses and notices to the governing regulatory agencies shall be borne by the asbestos Contractor.
- C. All work associated with removal or abandonment of asbestos cement pipe and appurtenances shall be performed in accordance with the standards listed below and all other applicable local, State, or Federal standards.
 - (1) Florida Administrative Code, Chapter 62-257, ASBESTOS PROGRAM
 - (2) Title 40 CFR, Part 61, Subpart M, NATIONAL EMISSION STANDARD FOR ASBESTOS
 - (3) Occupational Safety and Health Act, Title 29 CFR
 - (4) Title 40 CFR, Part 763, ASBESTOS
 - (5) Florida Statute Title XXXII, Chapter 469, ASBESTOS ABATEMENT
- D. All asbestos cement pipe sections indicated on the construction drawings to be removed, and all related tees, valves, fittings and appurtenances shall be removed in their entirety and disposed of by the asbestos Contractor in accordance with this Section. Asbestos cement nipples between tees and valves shall be replaced. After removal of the pipelines, all excavations shall be backfilled in accordance with the applicable provisions of the Trenching and Excavation Section of these

Standards. The cost of disposing of the removed materials shall be borne by the asbestos Contractor.

- E. The cutting of existing asbestos-cement (A/C, a.k.a. "Transite") pipe shall be by hand tools only. No powered machine cutting is allowed. Removal of all fragments of pipe shall be double bagged prior to shipment. Longer sections of pipe removed may be shipped without double bagging. An asbestos manifest form must accompany each shipment of such pipe or pipe material waste to the Manatee County Lena Road Landfill. Prior to each shipment, a minimum of 24 hours notice to the Landfill field office (telephone (941) 748-5543) is required.

3.04 IN-PLACE GROUTING OF EXISTING PIPE

- A. Where water and wastewater utility pipes are to be abandoned in place, they shall be filled with a nonshrinking sand-cement grout or cement slurry. When such pipes are made of asbestos-cement materials, the abandonment activities shall be performed by a licensed asbestos Contractor. It is completely the Contractor's responsibility to obtain all regulatory clearances and provide documentation in cases where they have determined that an asbestos-cement pipe abandonment activity by in-place grouting does not require a licensed asbestos Contractor.
- B. The ends of the pipe sections to be grout or slurry filled shall be capped or plugged with suitable pipe fittings. The pumping material shall be of suitable properties and the pumping pressure shall be such that the pipe sections are filled completely with grout or slurry. All above ground features shall be removed: hydrants, meters, valve & meter boxes, pads, vaults, etc. Existing tees, crosses, and valves left in service shall be plugged and restrained.
- C. The County shall be given timely notice so that the County's representative may be present to monitor all pipe filling operations. Provide standpipes and/or additional means of visual inspection as required to determine if adequate grout/slurry material has filled the entire pipe sections.
- D. All tees, crosses, and valves left in service shall be plugged and restrained.
- E. Existing pipelines that are being grouted and abandoned must be cut and capped at a maximum distance of 2,000 linear foot segments. The caps must have offset grout port on the top side of the cap. The County preferred grout mix in the contract specifications must be used.

F. Approved Grout Mix is shown below:

Materials Per Cubic Yard				
Material	Description	Amount Qty	Specific Gravity	Absolute Volume
Cement	Cement Type I/II ASTM C150	400 lbs	3.15	2.04
Fly Ash	Fly Ash Class F ASTM C618	1350 lbs	2.45	8.83
Total Water	Potable	118 gal.		
Total Water	(includes any admixture water present)	982.9 lbs		15.75
TOTAL CEMENTITIOUS MATERIAL PER ASTM C595		1750 lbs		
Design Percent Air (Entrapped and Entrained)		1.5%		
Slump Range (From Mixer Discharge)		N/A		Absolute Volume 27 CF
Air Content (From Mixer Discharge)		2.0% (±1.5%)		
Plastic Density ("Unit Weight")		101.2 lb/sf		
W/CM Ratio		0.56		
Total Mix Weight		2733 lb/cy		

Note: Grout mix strength shall be 340 psi @ 28 days

3.05 SPRAY-APPLIED LINERS

- A. Use a high-pressure water spray to remove all foreign material from the walls and bench of the structure. Loose or protruding masonry materials shall be removed using a hammer and chisel. Fill any voids, holes or cracks using a hand trowel with epoxy mortar to form a uniform surface. Place covers over all pipe openings to prevent extraneous material from entering the pipes. Block or divert sewer flow from entering the structure. Any infiltration leaks shall be stopped by using such methods as approved by the County.
- B. The liner material shall be sprayed onto the invert, bench and wall areas. The sprayed-on material shall be applied such that the entire structure is lined with a structurally enhanced monolithic liner. The thickness of the wall liner material shall be such that it will withstand the hydraulic load generated by the surrounding groundwater table, using a factor of safety of two, and using the assumption that the groundwater table is at the level of the top of the structure. The invert and bench liner material shall be the same thickness as that required for the base of the wall.

- C. Special care shall be used to provide a smooth transition between the intersecting pipelines and the manhole inverts such that flow is not impaired. Remove concrete material from the existing manhole base channel in depth to the required thickness of the new liner material.
- D. No active sewer flow shall be allowed in the newly lined structure, nor shall any vacuum tests be performed, until the liner material has had adequate time to cure, as recommended by the liner material manufacturer.
- E. Install the coating systems per manufacturer's recommendation and completely protect the structure from corrosion. The liner or coating systems must extend and seal onto manhole ring, onto and around pipe openings and any other protrusions, and completely cover the bench and flow invert. Provide a five (5)-year unlimited warranty on all workmanship and products. The work includes the surface preparation and application of the coating or liner system, and shall protect the structure for at least five (5) years from all leaks and from failure due to corrosion from exposure to corrosive gases such as hydrogen sulfide.

3.06 CONNECTION TO EXSTING MANHOLE

- A. Where required or as indicated on the construction drawings, make connection of new pipelines to existing manhole structures. If pipe stub-outs of the correct size and position are not available, make connections by removing a portion of the manhole wall by mechanical rotary core boring. The connection between pipe and concrete manhole shall be complete with resilient seals meeting the requirements of ASTM C923.
- B. A new channel shall be formed in the manhole base by removing and reforming or by providing new concrete to convey the new flow into the existing channel in accordance with the standard requirements for new sewer manhole structures. Flow direction shall not change by more than 90 degrees within the manhole base.
- C. Repair internal coating of existing manholes cored during connection of new sewers by applying approved coating material as listed above in accordance with the manufacturer's recommendations. If existing manhole has an internal coating other than that listed above, sandblast the interior of the existing manhole and apply an approved coating in accordance with the manufacturer's recommendations.
- D. When connecting a force main to an existing manhole, the force main termination manhole and the next two manholes downstream shall be rehabilitated and lined with a currently approved liner. If the existing manholes are lined with a non-conforming liner according to Part 2.D above, the existing liner shall be removed and replaced, unless otherwise noted on the plans or with written approval by the County.

END OF SECTION

SECTION 02100 SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section covers clearing, grubbing and stripping of the project site and/or along the pipeline route.
- B. The Contractor shall clear and grub all of the area within the limits of construction or as required, which includes, but is not limited to utility easements. The width of the area to be cleared shall be reviewed by the County prior to the beginning of any clearing.
- C. The Contractor's attention is directed to any Soil Erosion and Sediment Control Ordinances in force in Manatee County. The Contractor shall comply with all applicable sections of these ordinances.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CLEARING

The surface of the ground, for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, trees shall be preserved as hereinafter specified unless otherwise designated by the County. Clearing operations shall be conducted so as to prevent damage to existing structures and installations and to those under construction, so as to provide for the safety of employees and others. Soil erosion control devices such as hay bales and silt fences shall be installed to satisfy all Federal, State and County requirements.

3.02 GRUBBING

Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

3.03 STRIPPING

In areas so designated, topsoil shall be stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. The County shall have the option to receive all excess topsoil materials. The Contractor shall pay all equipment and labor cost to deliver excess top soil material to a remote site chosen by the County within a five mile radius of the construction site. Should County not choose to receive any

or all excess topsoil materials, the Contractor shall dispose of said material at no additional cost to County.

3.04 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

The Contractor shall dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris off site. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be considered a subsidiary obligation of the Contractor; the cost of which shall be included in the prices bid for the various classes of work.

3.05 PRESERVATION OF TREES

Those trees which are not designated for removal by the County shall be carefully protected from damage. The Contractor shall erect such barricades, guards and enclosures as may be considered necessary by him for the protection of the trees during all construction operation.

3.06 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

- A. The Contractor shall exercise extreme care to avoid unnecessary disturbance of developed private property adjacent to proposed project site. Trees, shrubbery, gardens, lawns and other landscaping, which are not designated by the County to be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.
- B. All soil preservation procedures and replanting operations shall be under the supervision of a nursery representative experienced in such operations.
- C. Improvements to the land such as fences, walls, outbuildings and other structures which of necessity must be removed, shall be replaced with equal quality materials and workmanship.
- D. The Contractor shall clean up the construction site across developed private property directly after construction is completed upon approval of the County.

3.07 PRESERVATION OF PUBLIC PROPERTY

The appropriate paragraphs of these Specifications shall apply to the preservation and restoration of public lands, parks, rights-of-way, easements and all other damaged areas. This includes, but is not limited to the trimming of trees damaged by contractor's equipment.

END OF SECTION

SECTION 02200 EARTHWORK

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section includes digging of excavations for structures, piping and roadways; backfilling around structures and piping; shaping and contouring the ground surface to conform to established grades and elevations; compacting of earth or rock materials to specified densities; bracing, sheeting and shoring; dewatering; removal of surplus excavated materials; and related work as shown on the Drawings and as specified herein.

1.02 DEFINITIONS

- A. Excavation: Removal of earth and rock to form cavities for the construction of foundations and structures and to form trenches for the installation of piping or conduits.
- B. Cavity: Formed by the removal of earth and rock.
- C. Earth: Unconsolidated material in the crust of the earth derived by weathering and erosion. Earth includes:
1. Materials of both inorganic and organic origin.
 2. Boulders less than 1/3 cubic yard in volume, gravel, sand, silt, and clay
 3. Materials which can be excavated with a backhoe, trenching machine, drag line, clam shell, bulldozer, highlift, or similar excavating equipment without the use of explosives, rockrippers, rock hammers, or jack hammers
- D. Rock: A natural aggregate of mineral particles connected by strong and permanent cohesive forces. Rock includes:
1. Limestone, sandstone, dolomite, granite, marble, and lava
 2. Boulders 1/3 cubic yard or more in volume
 3. Materials which cannot be excavated by equipment which is used to remove earth overburden without the use of explosives, rock rippers, rock hammers, or jack hammers
- E. Undercutting: Excavation of rock and unsuitable earth below the bottom of a foundation, structure, pipe or conduit to be constructed or installed.
- F. Subgrade: Undisturbed bottom of an excavation.
- G. Bedding: Earth placed in trench to support pipe and conduit.
- H. Backfill and Fill: Earth placed around structures from the bottom of an excavation to finished grade, or to the sub base of pavement. Earth placed in a trench from the top of bedding to finished grade, or to sub base of pavement.

- I. Structural Compact Fill: Required to establish the finished grade should consist of clean cohesion less fill comprising the SP to SP-SM unified soil classification or ASSHTO A-3 Classification. Each lift, which should not exceed 12 inches, should be uniformly compacted to not less than 95% of the modified proctor maximum density.
- J. Topsoil: Earth containing sufficient organic materials to support the growth of grass.

1.03 JOB CONDITIONS

- A. Carefully maintain bench marks, monuments and other reference points, and if disturbed or destroyed, replace as directed.
- B. Should the Contractor encounter unusual subsurface and/or latent conditions at the site, he shall immediately give notice to the Owner and Engineer of such conditions before they are disturbed.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation and landfill work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Testing and Inspection Service: The Owner will retain a Soils Engineer to perform soil testing and inspection service for quality control testing of earthwork operations. Tests revealing satisfactory results will be paid for by the Owner. The cost of tests revealing unsatisfactory results will be deducted from monies due to the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Earth for Fill and Backfill: Earth used for fill or backfill shall be of such gradation and moisture content that it will compact to the specified density and remain stable.
- B. Pipe Bedding: Pipe bedding material for Type A-2 trenches shall be No. 57 crushed stone with gradation as noted in Table 1 of Section 901 of the FDOT Standard Specifications.
- C. Pipe Cover Material: Pipe cover material shall consist of durable particles ranging in size from fine to coarse (No. 200 to 1-inch) in size, in a substantially uniform combination. Unwashed bank run sand and crushed bank-run gravel will be considered generally acceptable. Bedding material may be used for cover material.
- D. Special Backfill: Special backfill shall be the following soils, classified by the Unified Soil Classification System, ASTM D-2487:

Group Symbols	Typical Name
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GW fines	Well-graded gravels and gravel-sand mixtures, little or no
GP fines	Poorly graded gravels and gravel-sand mixtures, little or no
SW	Well-graded sands and gravelly sands, little or no fines
SP	Poorly graded sands and gravelly sands, little or no fines

- E. Suitable Backfill: Suitable backfill shall be the following soils, classified by the Unified Soil Classification System, ASTM D-2487:

Group Symbols	Typical Name
GW fines	Well-graded gravels and gravel-sand mixtures, little or no
GP fines	Poorly graded gravels and gravel-sand mixtures, little or no
GM	Silty gravels, gravel-sand-silt mixtures
GC	Clayey gravels, gravel-sand-clay mixtures
SW	Well-graded sands and gravelly sands, little or no fines
SP	Poorly graded sands and gravelly sands, little or no fines
SM	Silty sands, sand-silt mixtures
SC	Clayey sands, sand-clay mixtures
ML sands	Inorganic silts, very fine sands, rock flour, silty or clayey fine
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays

- F. Unsuitable Materials: Materials which are unsuitable for backfill include stones greater than 6-inches in their largest dimension, pavement, rubbish, debris, wood, metal, plastic, and the following soils, classified by the Unified Soil Classification System, ASTM D-2487:

Group Symbols	Typical Name
OL	Organic silts and organic silty clays of low plasticity
MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
CH	Inorganic clays of high plasticity, fat clays
OH	Organic clays of medium to high plasticity
PT	Peat, muck, and other highly organic soils

PART 3 EXECUTION

3.01 PROTECTION OF EXISTING FACILITIES

- A. Support and protect all poles, fences, utility pipes, wire, conduits, buildings and structures.
- B. Proceed with caution during excavation so the exact location of underground utilities and structures, both known and unknown, may be determined. Contractor

shall be responsible for the repair of utilities and structures when broken or otherwise damaged.

- C. Wherever water, or other pipes or conduits cross the excavation, the Contractor shall support said pipes and conduits without damage to them and without interrupting this Contract. The manner of supporting such pipes, or similar items, shall be subject to the approval of the Engineer.
- D. When utilities that have to be removed or relocated are encountered within the areas of operations, the Contractor shall notify the Owner in ample time for the necessary measure to be taken to prevent interruption of the service.
- E. The Contractor shall so conduct the work that no equipment, material, or debris will be placed or allowed to fall upon private property in the vicinity of the work, unless he shall have first obtained the property Owner's written consent to do so and shall have shown said written consent to the Owner.
- F. All excavated material shall be piled in a manner that will not obstruct driveways. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Drainage ways shall be kept clear or other satisfactory provisions made for drainage.
- G. Natural watercourses shall not be obstructed, except where specifically permitted for the construction of outfall and subaqueous crossings.

3.02 CLEARING

- A. Before excavating, clear and remove logs, stumps, brush, vegetation, rubbish, and other perishable matter from the project site.
- B. Do not remove or damage trees that do not interfere with the finished work. Completely remove trees required to be removed, including stumps and roots. Replace trees removed unnecessarily. Properly treat damaged trees which can be saved.

3.03 STRIPPING AND STOCKPILING TOPSOIL

- A. Strip topsoil and vegetation from the areas to be excavated. Clean topsoil may be stockpiled for reuse; the Contractor shall coordinate with the Owner for location of excavated stockpiled materials.

3.04 EXCAVATING

- A. Make excavations to elevations and dimensions necessary to permit bracing, sheeting, erection of forms, inspection of foundation and installation of piping or conduits. Excavate trenches to the required alignment, depth and width. Excavate trenches in advance of pipe and conduit installation only as far as necessary to provide proper alignment and grade. Plan trenching operations to cause a

minimum of danger to adjacent property and a minimum of inconvenience to the public.

- B. The width of trenches at the top of the pipe shall be ample to permit the pipe to be laid and joined properly and to allow the backfill to be placed and compacted as specified. Maximum trench width shall be such that design loadings on pipe will not be exceeded. Trenches shall be of such extra width, when required, to permit the placement of supports, sheeting, bracing, and appurtenances.
- C. Depth of trenches shall be such as to allow installation of pipelines at the grades or elevations shown.
- D. Trees, boulders, and other surface encumbrances, located so as to create a hazard to anyone involved in the excavation work or who is in the vicinity of the work at any time during operations, shall be removed or made safe before excavating is begun.
- E. Contractor shall be responsible for the determination of the angle of repose of the soil in which the excavating is to be done. Excavate all slopes to at least the angle of repose except for areas where solid rock allows for line drilling or presplitting.
- F. Sides, slopes, and faces of all excavations shall meet accepted engineering requirements by scaling, benching, barricading, rock bolting, wire meshing or other equally effective means. Give special attention to slopes which may be adversely affected by weather or moisture content.
- G. Flatten the excavation sides when an excavation has water conditions, silty materials, loose boulders, and areas where erosion and slide planes appear.
- H. Shore or otherwise support sides of excavations in hard or compact soil when the excavation is more than five feet in depth. In lieu of shoring, the sides of the excavation above the five-foot level may be sloped to preclude collapse, but shall not be steeper than a one-foot rise to each 1/2-foot horizontal.
- I. Use diversion ditches, dikes, or other suitable means to prevent surface water from entering an excavation and to provide adequate drainage of the area adjacent to the excavation. Do not allow water to accumulate in an excavation. If possible, the grade should be away from the excavation.
- J. Excavations shall be inspected by a competent Contractor's representative after every rainstorm or other hazard-increasing occurrence, and the protection against slides and cave-ins shall be increased if necessary.
- K. Do not store excavated or other material nearer than four feet from the edge of any excavation. Store and retain materials as to prevent materials from falling or sliding back into the excavation. Install substantial stop log or barricades when mobile equipment is utilized or allowed adjacent to excavations.

3.05

DEWATERING

- A. Keep excavations free from water until foundations, structures, and piping are completed and will safely with stand forces generated by water. Provide sufficient dewatering equipment and make proper arrangements for the disposal of water from dewatering operation. Dewatering shall not damage property, create nuisances, or interfere with other work. Do not use sanitary sewers for the disposal of water from dewatering operations.

3.06 SHEETING

- A. The Contractor has the option of sheeting excavations.
- B. Supporting systems, such as piling, cribbing, shoring, and bracing shall be designed by a qualified Contractor's representative and meet accepted engineering requirements. When tie rods are used to restrain the top of sheeting or other retaining systems, securely anchor the tie rods well back of the angle of repose. When tight sheeting or sheet piling is used, assume full loading due to groundwater table, unless prevented by weep holes or drains or other means. Provide additional stringers, ties, and bracing to allow for any necessary temporary removal of individual supports.
- C. Materials used for sheeting, sheet piling, cribbing, bracing, shoring and underpinning shall be in good, serviceable condition. Timbers shall be sound, free from large or loose knots, and of proper dimensions.
- D. Take special precautions in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation or a fill, particularly when the separation is less than the depth of the excavation. Pay particular attention to joints and seams of material comprising a face and to the slope of such seams and joints.
- E. If it is necessary to place or operate power shovels, derricks, trucks, materials, or other heavy objects on a level above or near an excavation, sheet-pile, shore, and brace the side of the excavation as necessary to resist the extra pressure due to such superimposed loads.
- F. If the stability of adjoining buildings or walls is endangered by excavations, provide shoring, bracing, or under pinning as necessary to ensure the safety of adjoining buildings or walls. Such shoring, bracing or under pinning shall be inspected daily or more often, as conditions warrant, by a competent Contractor's representative and the protection effectively maintained.
- G. The Contractor shall be held responsible for the sufficiency of all sheeting and bracing used, and for all damage to persons or property resulting from the improper quality, strength, placing, maintaining, or removing of the same. This includes damage to trees, sidewalks, and other property on the project site as well as on the private grounds.
- H. Drive sheeting ahead of excavation. Do not remove sheeting until the excavation backfill has reached within two feet of the top of the excavation, except that the lower course of sheeting may be removed from a double sheeted excavation. When sheeting is drawn, completely fill all cavities remaining in or adjoining the

excavation. When sheeting is left in place, completely fill all cavities behind such sheeting.

3.07 ROCK REMOVAL

- A. Rock, boulders or other hard, lumpy or unyielding materials encountered in trench bottoms shall be removed to a depth at least 12-inches below the bottom of any pipes to be installed. All rock and other hard foundation material under structures shall be freed of all loose material, cleaned, and cut to a firm surface; either level, stepped vertically and horizontally or serrated, as may be directed. All seams shall be cleaned out and filled with concrete or mortar.
- B. Blasting of rock or other hard to remove materials will not be permitted on this project.

3.08 SUBGRADES

- A. Do not construct foundations, footings, slabs, or piping on loose soil, mud, or other unstable or unsuitable soil.
- B. Fill excess cuts under foundations, footings, and slabs with concrete.
- C. Fill excess cuts under piping with compacted bedding as specified in this Section.

3.09 FOUNDATION SOILS REMOVAL AND COMPACTION

- A. In areas where buildings, structure foundations, and precast concrete tanks are located just below the surface, the site shall be proof rolled using a large vibratory roller (Dynapac CA-25 or equivalent). Proof rolling shall consist of at least ten overlapping passes. Water shall be added in order to achieve moisture content near optimum to facilitate compaction. Purpose of the proof rolling is to detect any areas of unstable or unsuitable soils as well as to density the near-surface soils. Materials which yield excessively during the proof rolling shall be undercut and replaced with well-compacted structural fill.
- B. The Owner will retain a Soils Engineer to be present during proof rolling operations to observe the proof rolling and recommend the nature and extent of any remedial work.
- C. In areas where foundations and pre stressed concrete tanks are located, preparation of the subgrade prior to pond backfilling will necessitate removal and replacement of pond bottom silts as well as the very loose silty soils on the flanks of the pond (see the Geotechnical Report for further requirements). The entire tank footprint, plus a margin of at least 5 feet outside the foundation perimeter should be stripped down to the existing pond bottom elevation including over-excavation of any accumulated sediments, followed by proof-rolling with heavy vibratory compaction equipment. The contractor should anticipate the excavation would extend to approximate EL +15 feet. Compaction should consist of no less than ten

(10) complete coverages throughout the entire tank area plus a margin of not less than 5 feet beyond the tank perimeters. The perimeter foundation area for the tank structures should be densified at the bottom of footing elevation. Compaction should continue so as to develop a uniform density of not less than 95% of the modified proctor maximum dry density per ASTM D-1557. Compaction tests should be conducted at intervals of no less than 1 test for each 2500 square feet and each 50 foot of foundation perimeter at a depth of 1 foot and at the compacted subgrade elevation.

- D. Any fill required to achieve finished grade in structural areas or used as structural compact fill shall be inorganic, non-plastic granular soil containing less than 10% material passing a No. 200 sieve. Fill shall be placed in level lifts not to exceed 12-inches loose thickness and compacted to a minimum of 95% of the modified Proctor maximum dry density as determined by ASTM Specification D-1557. In-place density tests will be performed on each lift to verify that the specified degree of compacting has been achieved.

3.10 BACKFILLING FOUNDATION AND STRUCTURE EXCAVATIONS

- A. Remove debris and other unstable or unsuitable materials from excavations before backfilling is started.
- B. Backfill excavations in areas to be paved with Special Backfill. Place Special Backfill in 12-inch lifts. Compact each lift of backfill to not less than 100% of the maximum dry density as determined in accordance with AASHTO T99, Method A. Compaction shall be by hand tamping or approved mechanical tamping devices, or in larger excavations by approved rollers. Do not compact backfill by puddling, unless permitted by the Engineer.
- C. Backfill excavations not requiring Special Backfill with Suitable Material. Place backfill and fill materials in lifts no greater than 12-inches in loose depth. Place backfill and fill materials in lifts no greater than four inches in loose depth where hand tampers are used. Backfill and fill shall be within 2% of optimum moisture content. For soils containing less than 5% material passing a No. 200 sieve, moisture content may be increased to within 3% of optimum. Compact backfill and fill to not less than 95% of the maximum dry density. Compact backfill and fill for restoration of dirt driveways shall be not less than 100% of the maximum dry density for last lift. Tests for determination of maximum dry density shall meet the requirements of ASTM D698 Method C. Use compaction equipment which is suited to the soil being compacted.
- D. If suitable, use stored excavated material for backfill and fill. Provide additional material, if required, to complete backfill and fill. Additional backfill and fill material shall be provided at no additional cost to the Owner.
- E. Do not use the following materials for backfill:
 - 1. Unsuitable materials
 - 2. Materials which are too wet or too dry to be compacted to the densities specified in this Section

- F. Place the backfill and fill in a manner which will not overload foundations or structures. Place backfill and fill evenly on all sides of foundations and structures. Do not use equipment that will overload foundations or structures during filling or backfilling.
- G. Do all cutting, filling, and grading necessary to bring the entire area around foundations and outside of structures to the following subgrade levels:
 - 1. To the underside of the respective surfacing for walks and pavement
 - 2. To finished grade for lawns and planted areas within the project site.

3.11 BACKFILLING PIPING TRENCHES

- A. Do not backfill trenches and excavations until all utilities have been inspected by the Owner's representative and until all underground utilities and piping systems are installed in accordance with the requirements of the specifications and the drawings.
- B. Remove debris and other unsuitable materials from excavations before backfilling is started.
- C. Place and tamp bedding and backfilling in a manner which will not damage pipe coating, wrapping, or encasement.
- D. Bedding procedures shall be as specified in the particular Section for the applicable pipe material.
- E. If bedding does not cover the pipe, place pipe cover material from the top of bedding to 12-inches over the pipe. Compact pipe cover material to the density required to allow backfill over the pipe cover material to be compacted to the density specified.
- F. Do not use the following materials for backfilling:
 - 1. Unsuitable Materials
 - 2. Materials which are too wet or too dry to be compacted to the densities specified in this Section.
- G. If suitable, use stored excavated material for backfill and fill. Provide additional material, if required, to complete backfill and fill. Additional backfill and fill material shall be provided at no additional cost to the Owner. Backfill excavations in areas to be paved with Special Backfill. Place Special Backfill in 12-inch lifts. Compact each lift of backfill to not less than 100% of the maximum dry density as determined in accordance with AASHTO T99, Method A. Compaction shall be by hand tamping or approved mechanical tamping devices, or in larger excavations by approved rollers. Backfill and fill materials shall be within 2% of optimum moisture content. Do not compact backfill by puddling, unless permitted by the Engineer.

- H. Backfill trenches not requiring Special Backfill with Suitable Material. Place backfill and fill materials in lifts no greater than 12-inches in loose depth and compact to produce an adequate foundation for seeding. The top 4-inches of backfill shall not contain stones or other objects larger than 1-inch in maximum dimension. Mound backfill above finish grade to allow for settlement. Fill and restore any settlement of the backfill. Grade area to be restored to finish grade after settlement of backfill and immediately before restoration of vegetated areas.

3.12 SHELL BASE

- A. Construction of a base course composed of shell shall be as specified in Section 250 of the FDOT Standard Specifications.

3.13 FINISH GRADING

- A. Shape the surface of all earthwork to conform to the lines, grades, contours and cross-sections shown on the drawings. Hand dressing may be required in certain areas or in confined areas where equipment operation is restricted.
- B. In final shaping of the surface of the earthwork a tolerance of 0.1 foot above or below the plan elevation will be allowed with the following exceptions:
 1. Earthwork shall be shaped to slope away from all buildings and structures.
 2. Earthwork shall be shaped to match adjacent pavement, curb, sidewalks, and similar appurtenances.
 3. Ditch bottoms and swales shall be shaped so that no water will be impounded except in areas designated for impoundment.

3.14 CLEANUP AND MAINTENANCE

- A. Cleanup the job site as grading is completed. Remove excess earth, rock, bedding, materials, and backfill materials. Remove unused piping materials, structure components, and appurtenances. Restore items moved, damaged, or destroyed during construction.
- B. Maintain the job site until the work has been completed and accepted. Fill excavations which settle when settlement is visible. Restore items damaged by construction or improper restorations. Keep dust conditions to a minimum.

3.15 STORAGE AND REMOVAL OF EXCAVATED MATERIAL

- A. Suitable excavated material required for filling and backfilling operations may be stockpiled on the jobsite.
- B. Remove unsuitable materials from the job site as unsuitable materials are excavated. Remove surplus suitable materials from the job site as excavations are backfilled.

- C. Excavated suitable surplus materials shall remain the Owner's property and shall be stockpiled at the location(s) designated by the Owner.

3.16 DUST CONTROL

- A. The Contractor shall take all steps possible to prevent and reduce dust arising from the construction activity. The Contractor shall have adequate water trucks on the site at all times and water, as necessary, the areas where dust may arise. He shall cooperate fully with the Owner's Representative and water immediately when instructed to do so.

END OF SECTION

SECTION 02220 EXCAVATION, BACKFILL, FILL AND GRADING FOR STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Structural excavation shall consist of the removal of material for the construction of foundations for structures and other excavation designated on the drawings or in these specifications.
- B. Structural excavation and backfill shall consist of furnishing material, if necessary and placing and compacting backfill material around structures to the lines and grades designated on the drawings, as specified or directed by the County.
- C. Structural excavation and backfill shall include the furnishing of all materials, equipment and other facilities which may be necessary to perform the excavations, place and compact the backfill, install sheeting and bracing, and carry out any necessary dewatering. It shall also include the wasting or disposal of surplus excavated material in a manner and in locations approved by the County.
- D. The Contractor is responsible for the protection of every tree which is scheduled to remain in the project area. This includes trees which may or may not be shown on the plans. Every tree shall be adequately protected in place at no additional cost to the County. This includes, but is not limited to, protecting the root systems and adjusting grades as necessary for tree/root protection.

1.02 QUALITY ASSURANCE

- A. Testing Agency:
 - 1. In place soil compaction tests shall be performed by a qualified testing laboratory.
 - 2. Compaction tests shall be taken every 500 feet, except in the road crossings or road shoulders. Tests are to be taken according to current FDOT Standards.
- B. Reference Standards:
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM D1557, Moisture-Density Relations of Soils Using 10-lb. (4.5-kg) Rammer and 18-in. (457-mm) Drop.

1.03 JOB CONDITIONS

- A. The Contractor shall provide, operate and maintain all necessary pumps, discharge lines, well points, etc., in sufficient number and capacity to keep all excavation, bases, pits, etc., free from seepage, standing or running water at all times throughout the period of construction.

- B. The Contractor shall assume all responsibility for the security of the excavation required, employing bracing, lining or other accepted means necessary to accomplish same.
- C. Excavated areas shall be cleared of all debris, water, slush, muck, clay and soft or loose earth and shall be conditioned to the entire satisfaction of the County.
- D. All excavated material unsuitable for use or which will not be used shall be disposed of in a manner consistent with State and County regulation.
- E. All unsuitable organic materials, roots, logs, etc., found during excavation shall be removed by the Contractor and the trench shall be refilled with suitable material.

PART 2 PRODUCTS

2.01 MATERIAL FOR CONTROLLED FILL

- A. Composition: Only approved material free from organic matter and lumps of clay, shall be used for backfill. Excavated earth free from debris or organic material may be used for backfilling foundations or fill.
- B. Crushed stone and shell shall meet or exceed current FDOT Standards.

2.02 UNSUITABLE MATERIAL

Unsuitable material shall be defined as highly organic soil per ASTM D2487 Group PT. This includes, but is not limited to, such items as topsoil, roots, vegetable matter, trash, debris, and clays that cannot be dried sufficiently to obtain specified compaction.

PART 3 EXECUTION

3.01 INSPECTION

- A. The Contractor shall verify that work preceding the affected work of this Section has been satisfactorily completed.
- B. Conditions adversely affecting the work of this Section shall be corrected to the satisfaction of the County.

3.02 REMOVAL OF UNSUITABLE MATERIALS

- A. The Contractor shall remove unsuitable material from within the limits of the Work.
- B. Materials meeting requirements for controlled fill shall be stockpiled as necessary and in such a manner satisfactory to the County.
- C. All material excavated shall be placed so as to minimize interference with public travel and to permit proper access for inspection of the work.

3.03 EXCAVATION

- A. When concrete or shell subbase footing is to rest on an excavated surface, care shall be taken not to disturb the natural soil. Final removal and replacement of the foundation material and subbase compaction to grade shall not be made until just before the concrete or masonry is placed.
- B. When any structural excavation is completed, the Contractor shall notify the County who will make an inspection of the excavation. No concrete or masonry shall be placed until the excavation has been approved by the County.
- C. The elevations of the footing bottom and the base slab as shown on the Drawings, shall be considered as approximate and the County may order in writing, such changes in dimensions or elevations of the footings and slab base as necessary to secure satisfactory foundations.
- D. All excavation shall be made within an area bounded by lines five feet outside and parallel to the exterior walls of the structure to allow for correct forming, shoring and inspection of foundation work. Pouring of concrete against earth side walls shall not be permitted.
- E. If the ground is excavated below the grade called for by the Drawings or becomes unstable due to the Contractor's carelessness or operations, the ground shall be excavated to undisturbed native soil before continuing concreting operations.
- F. If in the opinion of the County, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the County and if so directed, replaced by crushed stone or washed shell.

3.04 STRUCTURAL BACKFILL

- A. Structural backfill shall not be placed until the footings or other portions of the structure or facility have been inspected by the County and approved for backfilling.
- B. A minimum of 1-1/2" layer of lean concrete shall be placed as a working mat for the concrete base slabs and footings if required by the County.
- C. Fill shall be placed in uniform layers not more than 12" thick and compacted to a minimum of 98 percent of the maximum density determined by ASTM D1557, Method A or C, or as directed by the County. The Contractor shall securely tamp the backfill with pneumatic rammer around all wall foundations. The method of compaction shall be satisfactory to the County.
- D. Compaction of structural backfill by ponding and jetting may be permitted when, as determined by the County: the backfill material is of such character that it will be self-draining when compacted; foundation materials will not soften or be otherwise damaged by the applied water; no damage from hydrostatic pressure will result to the structure. Ponding and jetting within two feet below finished subgrade shall not be permitted in roadway areas. At the discretion of the County, ponding and jetting may be permitted with compaction layers not to exceed four feet.

- E. Surplus material not used on-site shall be removed and disposed of off-site by the Contractor. In no case shall surplus material be deposited on adjacent lands. Fill used for grading shall be placed in layers not to exceed 12 inches in thickness and shall be compacted to a density equal or greater to that of the surrounding natural ground.

3.05 BACKFILLING AROUND STRUCTURES

- A. Common fill and structural fill are specified for use as backfill against the exterior walls of the structures. Fill shall be placed in layers having a maximum thickness of eight (8) inches in loose state and shall be compacted sufficiently to prevent settlement. If compaction is by rolling or ramming, material shall be wetted down as required. Where material can be suitably compacted by jetting or puddling, the Contractor may use one of these methods. No boulders shall be allowed to roll down the slopes and hit the walls.
- B. Backfilling shall be carried up evenly on all walls of an individual structure simultaneously. A variation of two (2) feet in elevation will be the maximum allowable. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength. Backfilling shall be subjected to approval by the County.
- C. In locations where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the refill up to an elevation of at least one foot above the bottom of the pipes:
 - 1. Place structural fill in such areas for a distance of not less than three feet either side of the center line of the pipe in level layers not exceeding 6-inches in depth.
 - 2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the County.
 - 3. Structural fill shall be of the quality specified under Part 2 of this Section.
- D. The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the grading plan. No soft spots or uncompacted areas shall be allowed in the work.
- E. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

3.06 FIELD QUALITY CONTROL

- A. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM test 1557-70T, Method A or C.

END OF SECTION

SECTION 02221 TRENCHING, BEDDING AND BACKFILL FOR PIPE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all dewatering, excavation, backfill, fill, grading, trench protection or other related work required to complete the piping work shown on the Drawings and specified herein. The work shall include, but not be limited to: vaults; duct conduit; pipe; roadways and paving; backfilling; required fill or borrow operations; grading; disposal of surplus and unsuitable materials; and all related work such as sheeting, bracing and dewatering.
- B. Prior to commencing work, the Contractor shall examine the site and review test borings if available, or undertake his own subsurface investigations and take into consideration all conditions that may affect his work.
- C. The Contractor is responsible for the protection of every tree which is scheduled to remain in the project area. This includes trees which may or may not be shown on the plans. Every tree shall be adequately protected in place at no additional cost to the County. This includes, but is not limited to protecting the root systems and adjusting grades as necessary for tree/root protection.

1.02 PROTECTION

- A. Sheeting and Bracing in Excavations:
 - 1. In connection with construction of underground structures, the Contractor shall properly construct and maintain cofferdams. These shall consist of: sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction and to protect adjacent structures, existing yard pipe and/or foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.
 - 2. Trench sheeting for pipes: no sheeting is to be withdrawn if driven below, mid-diameter of any pipe and no wood sheeting shall be cut off at a level lower than one foot above the top of any pipe unless otherwise directed by the County. During the progress of the work, the County may direct the Contractor in writing to leave additional wood sheeting in place. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given for an alternate method of removal.
 - 3. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping, or property. Unless otherwise approved or indicated on the Drawings or in the Specification, all sheeting and bracing shall be removed after completion of the piping or structure, care being taken not to disturb

or otherwise injure the pipeline or finished masonry. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools specifically made for that purpose, by watering, or as may otherwise be directed.

4. The Contractor shall construct, to the extent he deems it desirable for his method of operation, the cofferdams and sheeting outside the neat lines of the pipeline trench or foundation unless otherwise indicated on the Drawings or directed by the County. Sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing and cofferdams shall be adequate to withstand all pressures to which the pipeline or structure will be subjected. Pumping, bracing and other work within the cofferdam shall be done in a manner to avoid disturbing any construction of the pipeline or the enclosed masonry. Any movement or bulging which may occur shall be corrected by the Contractor at his own expense so as to provide the necessary clearances and dimensions.
5. Drawings of the cofferdams and design computations shall be submitted to the County and approved prior to any construction. However, approval of these drawings shall not relieve the Contractor of the responsibility for the cofferdams. The drawings and computations shall be prepared and stamped by a Registered Professional Engineer in the State of Florida and shall be in sufficient detail to disclose the method of operation for each of the various stages of construction, if required, for the completion of the pipeline and substructures.

B. Dewatering, Drainage and Flotation

1. The Contractor shall construct and place all pipelines, concrete work, structural fill, bedding rock and limerock base course, in-the-dry. In addition, the Contractor shall make the final 24" of excavation for this work in-the-dry and not until the water level is a minimum of 18 below proposed bottom of excavation.
2. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavation and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations. At all times during the construction operations, the groundwater levels shall be maintained at an elevation 18 inches below the lowest level where structures are being installed.
3. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
4. Wellpoints may be required for dewatering the soil prior to final excavation for deeper in-ground structures or piping and for maintaining the lowered groundwater level until construction has been completed to avoid the

structure, pipeline, or fill from becoming floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from wellpoints shall be continuous and standby pumps shall be provided.

5. The Contractor shall furnish all materials and equipment to perform all work required to install and maintain the proposed drainage systems for handling groundwater and surface water encountered during construction of structures, pipelines and compacted fills.
6. Where required, the Contractor shall provide a minimum of two operating groundwater observation wells at each structure to determine the water level during construction of the pipeline or structure. Locations of the observation wells shall be at structures and along pipelines as approved by the County prior to their installation. The observation wells shall be extended to 6 inches above finished grade, capped with screw-on caps protected by 24" x 24" wide concrete base and left in place at the completion of this Project.
7. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the County for approval. Such approval shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The Contractor shall be responsible for correcting any disturbance of natural bearing soils for damage to pipeline or structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.
8. As part of his request for approval of a dewatering system, the Contractor shall demonstrate the adequacy of the proposed system and wellpoint filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one quart sample. Discharge water shall not flow directly into wetlands or Waters of the State as defined by FDEP and SWFWMD.
9. During backfilling and construction, water levels shall be measured in observation wells located as directed by the County.
10. Continuous pumping will be required as long as water levels are required to be below natural levels.

PART 2 PRODUCTS

2.01 MATERIALS

A. General

1. Materials for use as fill and backfill shall be described below and shall be from an FDOT certified pit. For each material, the Contractor shall notify the County of the source of the material and shall furnish the County, for

approval, a representative sample weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of such material.

2. Additional materials shall be furnished as required from off-site sources and hauled to the site.
- B. Bedding - shall conform to FDOT Standard Specifications for Road and Bridge Construction, Section 901 Coarse Aggregate, and shall be either coarse aggregate of Size No. 57 or coarse sand of Size No. 9. Washed shell size No.57 may be used as an alternate bedding material.
- C. Structural Fill
1. Structural fill in trenches shall be used below spread footing foundations, slab-on-grade floors and other structures as backfill within three feet of the below grade portions of structures.
 2. Shall be either soil classification A-1, A-2 or A-3, per AASHTO M-145, and shall be free of organic matter, lumps of clay or marl, muck, compressible materials, and rock exceeding 2.5 inches in diameter. Broken concrete, masonry, rubble or other similar materials shall not be used as backfill. Minimum acceptable density shall be 98 percent of the maximum density as determined by AASHTO T-180.
- D. Selected Common Fill - shall have the same material classification and requirements as Structural Fill, as described above.
- E. Common Fill
1. Shall be either soil classification A-1, A-2, A-3, A-4, A-5 or A-6, per AASHTO M-145, and shall be free of organic matter, lumps of clay or marl, muck, compressible materials and rock exceeding 2.5 inches in diameter. Broken concrete, masonry, rubble or other similar materials shall not be used as backfill.
 2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the County, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials by the Contractor.
- E. Unsuitable Material - soil classification A-7 and A-8, per AASHTO M-145, shall not be used as backfill material.

PART 3 EXECUTION

3.01 EXCAVATION

- A. Excavate trenches and pits for structures to the elevations indicated on the construction drawings. Take special care to avoid over-excavating or disturbing the bottom of the trench or pit, so that the soil at the bottom of the hole remains in a naturally compacted condition. Excavate to widths sufficient to provide adequate

working room to install the required structures. Do not excavate the final layer of soil to the designed grade until just before placing the bedding, foundation, pipe, structure, or masonry work required. Remove boulders, rocks, logs or any unforeseen obstacles encountered.

- B. In case the foundation soil found at the bottom of the trench or pit is soft, plastic or mucky, or does not conform to the soils classification specified as suitable foundation material, over-excavation to a greater depth will be required. Soils not meeting the classification required for foundation material shall be removed to a depth at least four inches below the bottom of the pipe, bedding or structure bottom elevation. Rock, boulders or other hard or lumpy material shall be removed to a depth 12 inches below the bottom of the pipe, bedding or structure bottom elevation. Remove muck, clay or other soft material to a depth as needed to establish a firm foundation.
- C. Where possible, the sides of trenches should be vertical up to at least the spring line of the installed pipe.
- D. Trench excavation shall be performed in accordance with Florida Statute Title XXXIII, Chapter 553, Part III, Trench Safety Act.

3.02 BACKFILLING

- A. Backfill materials shall be placed on solid, firm, naturally compacted or compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180, dry or dewatered in place soil foundations.
- B. Where over-excavation is required due to nonconforming soil classification or rocky, unstable, or otherwise undesirable soil conditions, place Structural Fill or Selected Common Fill in the over-excavated zone up to the base of the bedding material layer. Compact the over-excavated zone to 98 percent of the maximum dry density of the material as determined by AASHTO T-180.
- C. When backfilling in an over-excavated zone where moist or watery conditions exist, backfill shall be coarse No. 9 sand or a mixture of No. 57 coarse aggregate with either No. 9 coarse sand, A-1, or A-3 material.
- D. After compaction, backfill material in the over-excavation zone shall form a solid and firm foundation on which to build up successive layers of backfill and structures.
- E. Bedding materials shall be placed on solid, firm soil foundations and shall be compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180.
- F. Concrete and masonry structures shall be backfilled using Structural Fill. Backfilling and compaction shall be underneath the structure and carried up evenly on all walls of an individual structure simultaneously. The maximum allowable difference in backfill elevations shall be two feet. No backfilling shall be allowed against concrete or masonry walls until the walls and their supporting slabs have been in place at least seven days or until the specified 28-day strength has been

attained. Compaction of Structural Fill underneath the base and along the walls shall be 98 percent of the maximum dry density of the material as determined by AASHTO T-180. The Structural Fill shall be either dried or shall have water added so that the moisture content of the material is within a range that will allow the required density to be achieved.

- G. Trenching backfill for pipe installation shall be Selected Common Fill for the pipe bedding zone. The pipe bedding envelope shall begin at the level four inches, six inches, or nine inches, depending on pipe diameter, below the bottom of the pipe, and shall extend vertically up to a level 12 inches above the top of the pipe. Where the in-place soil material within the four inch, six inch, or nine inch pipe bedding zone beneath the bottom of the pipe meets the soil classification for Selected Common Fill, undercutting of the trench below the bottom of the pipe will not be required. In this case, loosen the soil in the bottom of the trench immediately below the middle third of the pipe diameter, and place the pipe upon it. Where the in-place soil material within the pipe bedding zone does not meet the soil classification for Selected Common Fill, undercutting shall be required, and the bedding zone shall be backfilled with Selected Common Fill. In this case, place the pipe bedding material and leave it in a moderately firm uncompacted condition under the middle third of the pipe diameter, and compact the outer portions of the trench bottom to 98 percent of the maximum dry density. Soils that were over-excavated due to rocky, soft or otherwise unsuitable soil foundation conditions shall also be replaced with Selected Common Fill. Compaction of Selected Common Fill shall be 98 percent of the maximum dry density as determined by AASHTO T-180. Such backfill material shall have an optimized moisture content that will allow the required density to be achieved.
- H. Pipe sections for gravity flow systems shall be laid with spigots downstream and bells upstream. Excavate for pipe bells before laying pipe. Lay pipe true to the lines and grades indicated on the construction plans. Place backfill material on both sides of the pipe and compact to 98 percent of the maximum dry density of the material as determined by AASHTO T-180. Take special care to effectively fill and compact the material in the haunch areas under the sides of the pipe.
- I. For pipes that are not installed under roadways or driveways, trenching backfill for pipe installation shall be Common Fill above the pipe envelope zone, and shall be compacted to 95 percent of the maximum dry density of the material as determined by AASHTO T-180, and shall have moisture content optimized to allow the required density. For pipes that are installed under roadways or driveways, trenching backfill for pipe installation shall be Selected Common Fill above the pipe envelope zone, and shall be compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180, and shall have moisture content optimized to allow the required density. Selected Common Backfill shall be placed in layers not to exceed 6 inches. Common Backfill shall be placed in layers not to exceed 12 inches.
- J. Backfill compaction tests shall be performed every 500 feet in pipe line trenches and for every utility structure. Test reports shall be presented to the County Inspector.

3.03 GRADING AND CLEAN UP

- A. Surplus and unsuitable soil materials not used on-site shall be removed and disposed of off-site in a manner that is consistent with state and local regulations. In no case shall surplus or unsuitable material be deposited on-site or on adjacent lands.
- B. The surface of backfilled areas shall be graded smooth and true to the lines and grades indicated on the construction plans. No soft spots or uncompacted areas shall be allowed in the work.
- C. Upon completion of the work, leave the work areas and all adjacent areas in a neat and presentable condition, clear of all temporary structures, rubbish and surplus materials. Pile any salvageable materials that have been removed in neat piles for pickup by County crews, unless otherwise directed.

END OF SECTION

SECTION 02223 EXCAVATION BELOW GRADE AND CRUSHED STONE OR SHELL REFILL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. If in the opinion of the County, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the County and replaced by crushed stone or washed shell.

PART 2 PRODUCTS (NOT USED)

PART 3 MATERIALS

3.01 EXCAVATION AND DRAINAGE

- A. Whatever the nature of unstable material encountered or the groundwater conditions, trench stabilization shall be complete and effective.
- B. Should the Contractor excavate below the grade shown on the Contract drawings because of negligence or for his own convenience; due to failure in properly dewatering the trench; disturbs the subgrade before dewatering is sufficiently complete; he shall be directed by the County to excavate below grade. The work of excavating below grade and furnishing and placing the approved refill material shall be performed at the Contractor's expense.

3.02 REFILL

- A. Soils not meeting the classification required for foundation material shall be removed to a depth at least four inches below the bottom of the pipe, bedding or structure bottom elevation. Rock, boulders or other hard or lumpy material shall be removed to a depth 12 inches below the bottom of the pipe, bedding or structure bottom elevation. Remove muck, clay or other soft material to a depth as needed to establish a firm foundation.

END OF SECTION

SECTION 02260 FINISH GRADING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall finish grade sub-soil.
- B. The Contractor shall cut out areas to receive stabilizing base course materials for paving and sidewalks.
- C. The Contractor shall place, finish grade and compact top soil.

1.02 PROTECTION

The Contractor shall prevent damage to existing fencing, trees, landscaping, natural features, bench marks, pavement and utility lines. Damage shall be corrected at no cost to the County.

PART 2 PRODUCTS

- A. Topsoil: Shall be friable loam free from subsoil, roots, grass, excessive amount of weeds or other organics, stones, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. The Contractor may use topsoil stockpiles on site if they conform to these requirements.

PART 3 EXECUTION

3.01 SUB-SOIL PREPARATION

- A. The Contractor shall rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Uneven areas and low spots shall be eliminated. Debris, roots, branches or other organics, stones, and sub-soil shall be removed by the Contractor and disposed of in a manner consistent with the latest Manatee County Standards as well as any affected regulatory agency. Should contaminated soil be found, the Contractor shall notify the County.
- B. The Contractor shall cut out areas to sub-grade elevation to stabilize base material for paving and sidewalks and shall be compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180, and shall have moisture content optimized to allow the required density.
- C. The Contractor shall bring sub-soil to required profiles and contour grades gradually; and blend slopes into level areas.
- D. The Contractor shall slope the structure grade a minimum of two (2) inches in ten (10) feet unless indicated otherwise on the Drawings.
- E. The Contractor shall cultivate sub-grade to a depth of 3 inches where the topsoil is to be placed. He shall repeat cultivation in areas where equipment use has

compacted sub-soil.

- F. The Contractor shall not make grade changes which causes water to flow onto adjacent lands.

3.02 PLACING TOPSOIL

- A. The Contractor shall place topsoil in areas where seeding, sodding and planting is to be performed. He shall place from the following minimum depths, up to finished grade elevations:
 - 1. 6 inches for seeded areas
 - 2. 4-1/2 inches for sodded areas
 - 3. 24 inches for shrub beds
 - 4. 18 inches for flower beds
- B. The Contractor shall use topsoil in a dry state as determined by the County. He shall place the material during dry weather.
- C. The Contractor shall use fine grade topsoil eliminating rough and low areas to ensure positive drainage. He shall maintain levels, profiles and contours of the sub-grades.
- D. The Contractor shall remove stone, roots, grass, weeds, debris, and other organics or foreign material while spreading the material.
- E. The Contractor shall manually spread topsoil around trees, plants and structures to prevent damage which may be caused by grading equipment.
- F. The Contractor shall lightly compact and place the topsoil.

3.03 SURPLUS MATERIAL

- A. The Contractor shall remove surplus sub-soil and topsoil from site at his expense.
- B. The Contractor shall leave stockpile areas and entire job site clean and raked, ready for landscaping operations.

END OF SECTION

SECTION 02276 TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work specified in this Section consists of the design, provision, maintenance and removal of temporary erosion and sedimentation controls as necessary.
- B. Temporary erosion controls include, but are not limited to: grassing, mulching, netting, watering, and the reseeding of on-site surfaces and spoil and borrow area surfaces, interceptor ditches at ends of berms and other such work at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the County.
- C. Temporary sedimentation controls include, but are not limited to: silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which shall ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the County.
- D. The Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

1.02 REFERENCE DOCUMENTS

- A. Florida Building Code.
- B. FDEP/COE Dredge and Fill Regulations and/or Permit as applicable.
- C. SWFWMD Permit Regulations and/or Permit as applicable.
- D. Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual.

PART 2 PRODUCTS

2.01 EROSION CONTROL

- A. Netting - fabricated of material acceptable to the County.
- B. Seed and sod.

2.02 SEDIMENTATION CONTROL

- A. Bales - clean, seed free cereal hay type.
- B. Netting - fabricated of material acceptable to the County.
- C. Filter stone - crushed stone conforming to Florida Dept of Transportation specifications.

- D. Concrete block - hollow, non-load-bearing type.
- E. Concrete - exterior grade not less than one inch thick.

PART 3 EXECUTION

3.01 EROSION CONTROL

- A. Minimum procedures for grassing shall be:
 - 1. Scarify slopes to a depth of not less than six inches and remove large clods, rock, stumps, roots larger than 1/2 inch in diameter and debris.
 - 2. Sow seed within twenty-four (24) hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.
 - 3. Apply mulch loosely and to a thickness of between 3/4-inch and 1-1/2 inches.
 - 4. Apply netting over mulched areas on sloped surfaces.
 - 5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.

3.02 SEDIMENTATION CONTROL

- A. The Contractor shall install and maintain silt dams, traps, barriers, and appurtenances as shown on the approved descriptions and working drawings. Deteriorated hay bales and dislodged filter stone shall be replaced by the Contractor at his expense.

3.03 PERFORMANCE

- A. The Contractor, at his own expense, shall immediately take whatever steps are necessary to correct any deficiencies of the temporary erosion and sediment control measures employed if they fail to produce results or do not comply with the requirements of the State of Florida or any other federal, governmental or regulatory agency.

END OF SECTION

SECTION 02444 FENCING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, material, equipment and incidentals necessary for complete installation of vinyl coated chain link fence system with privacy decorative slatting. The fencing shall be installed according to manufacturer's specifications unless otherwise directed or authorized by the County.
- B. The Contractor's security fencing is at his expense and option and is not covered in this Section.

1.02 QUALITY ASSURANCE

- A. Standards of Manufacture shall comply with the standards of the Chain Link Fence Manufacturer's Institute for "Galvanized Steel Chain Link Fence Fabric" and as herein specified.
- B. Provide each type of steel fence and gates as a complete unit produced by a single manufacturer, including, but not limited to accessories, fittings, fasteners and appurtenances complete and ready for use.
- C. Acceptable Manufacturers: Anchor, Cyclone, or approved equal
- D. Erector Qualifications: The Contractor or approved subcontractor, must have a minimum of two years experience in similar fence installation.

1.03 SUBMITTALS

- A. Product Data:

For Steel Fences and Gates, the Contractor shall submit for review and approval to the County, five (5) copies of the manufacturer's technical data, details of fabrication, installation instructions and procedures for steel fences and gates. The Contractor shall be responsible for a copy of each instruction to be given to the Installer.

- B. Samples:

The Contractor shall submit two samples approximate size 6-inches long, or 6-inches square of fabric material, framework members and typical accessories to the County for review and approval.

- C. Certificates:

The Contractor shall provide manufacturer's certification that materials meet or exceed the Contract Document requirements.

PART 2 PRODUCTS

2.01 GENERAL

- A. The pipe sizes indicated are commercial pipe sizes.
- B. The tube sizes indicated are nominal outside dimension.
- C. Framework and appurtenances shall be finished with not less than minimum weight of zinc per sq. ft. and shall comply with the following:
 - 1. Pipe: ASTM A53 (1.8 oz. zinc psf)
 - 2. Square tubing: ASTM A 123 (2.0 oz. zinc psf)
 - 3. Hardware and Accessories: ASTM A 153 (zinc weight per Table I).
- D. All fence components shall be galvanically compatible.
- E. Vinyl coatings for fabric, posts, rails, gates, and all other fittings and components shall be thermally fused polyvinyl chloride; heavy mil coating per ASTM F 668.

2.02 FABRIC

Fabric shall be 0.148 inch (9 gage) steel wire, 2-inch diamond mesh and both top and bottom salvages shall be twisted and barbed for fabric over 60-inches high. Finish shall be hot dipped galvanized, ASTM A 392, Class II.

2.03 POSTS, RAILS AND BRACES

- A. End, Corner and Pull Posts:

The Contractor shall furnish end, corner and pull posts of the minimum size of 3" (2-1/2-inch min. OD) pipe weighing 3.65 pounds min. per linear ft.
- B. Line Post:

The Contractor shall furnish line posts of the minimum size of 2.5" Post (2-3/8-inch min. OD) pipe weighing 2.72 pounds min. per linear foot. Post shall be spaced 8 foot o.c. maximum, unless otherwise indicated:
- C. Gate Posts:

The Contractor shall furnish 4" (3-1/2-inch min. OD) gate posts for supporting a 6 feet wide, single gate leaf, or one leaf of a double gate installation, for nominal gate width; weighing 5.79 pounds min. per linear foot.
- D. Top Rails:

The Contractor shall furnish 1-5/8-inch min. Sch 40 vinyl coated top rail pipe weighing 2.27 pounds min. per linear, unless otherwise indicated.
- E. Post Brace Assembly:

The Contractor shall furnish bracing assemblies at the end, gate, at both sides of corner and pull posts, with the horizontal brace located at mid-height of the fabric. Use 1-5/8-inch min. OD pipe weighing 2.27 pounds min. per linear foot for horizontal brace and 3/8-inch diameter rod with turnbuckles for diagonal truss.

F. Tension Wire:

The Contractor shall furnish tension wire consisting of galvanized 0.177 inch (7 gage) coiled spring wire as per ASTM A824 at the bottom of the fabric only.

G. Barbed Wire Supporting Arms (only when specified):

The Contractor shall furnish pressed steel, wrought iron, or malleable iron barbed wire supporting arms, complete with provisions for anchorage to posts and attaching three rows of barbed wire to each arm. Supporting arms may be attached either to posts or integral with post top weather cap. The Contractor shall provide a single 45 degree arm for each post where indicated.

H. Barbed Wire (only when specified):

The Contractor shall furnish barbed wire. It shall be 2 strand, 12-1/2 gauge wire with 14 gauge, 4-point barbs spaced 5-inch o.c., galvanized, complying with ASTM A121, Class 3.

I. Post Tops:

The Contractor shall furnish post tops. Tops shall be pressed steel, wrought iron, or malleable iron of ASTM F626 designed as a weathertight closure cap (for tubular posts). The Contractor shall furnish one cap for each post unless equal protection is afforded by a combination of post top cap and barbed wire supporting arm. The Contractor shall furnish caps with openings to permit through passage of the top rail.

J. Stretcher Bars:

The Contractor shall furnish stretcher bars. Bars shall be one piece lengths equal to the full height of the fabric, with a minimum cross-section of 3/16-inch x 3/4-inch. The Contractor shall provide one stretcher bar for each gate and end post and two bars for each corner and pull post, except where fabric is integrally woven into the post.

K. Stretcher Bar Bands:

The Contractor shall furnish stretcher bar bands. Bands shall be steel, wrought iron, or malleable iron, a maximum space of 15-inch o.c. to secure stretcher bars to end, corner, pull and gate posts.

2.04 GATES

A. The Contractor shall provide a 6 feet high, 6 feet wide fabricated gate perimeter

frames of 1-5/8-inch min. OD pipe tubular members weighting 2.27 pounds min. per linear foot. Additional horizontal and vertical members shall ensure proper gate operation and attachment of fabric, hardware and accessories. The maximum space of the frame members shall not be more than 8-inches apart.

- B. The Contractor shall assemble gate frames by welding or with special malleable or pressed steel fittings and rivets for rigid connections. He shall use the same fabric width as for the fence, unless otherwise indicated in the Contract Documents or authorized by the County. He shall install the fabric with stretcher bars at vertical edges. The bars may also be used at the top and bottom edges. The contractor shall attach stretchers to the gate frame at a maximum spacing of 15-inch o.c. He shall attach the hardware with rivets or by other means which will prevent removal or breakage.
- C. The Contractor shall install diagonal cross-bracing consisting of 3/8-inch diameter adjustable length truss rods on gates as necessary to ensure frame rigidity without sag or twist.
- D. The Contractor shall install barbed wire above the gates, (only when specified). He shall extend the end members of gate frames 12-inches above the top member which will be prepared for three strands of wire. The Contractor shall provide necessary clips for securing wire to extensions.
- E. Gate Hardware:
 - 1. The Contractor shall furnish the following hardware and accessories for each gate.
 - a. Hinges: Pressed or forged steel or malleable iron to suit gate size, non-lift-off type, offset to permit 180 degrees gate opening. Provide 1-1/2 pair of hinges for each leaf over six feet nominal height.
 - b. Latch: Forked type of plunger-bar type to permit operation from either side of gate with padlock eye as integral part of latch.
 - c. Keeper: Provide keeper for all vehicle gates, which automatically engages the gate leaf and holds it in the open position until manually released.
 - d. Double Gates: Provide gate stops for double gates, consisting of mushroom type of flush plate with anchors. Set in concrete to engage the center drip drop rod or plunger bar. Include locking device and padlock eyes as an integral part of the latch, using one padlock for locking both gate leaves.
 - e. Where gates are between masonry piers, provide "J" with 4-inch square anchor plate to masonry contractor for building in.

2.05 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Wire Ties: The Contractor shall tie fabric to line posts. He shall use 9 gauge wire ties spaced 12-inches o.c. For tying fabric to rails and braces, he shall use 9 gauge wire ties spaced 24-inches o.c. For tying fabric to tension wire, he shall use 11

gauge hog rings spaced 24-inches o.c. The finish of ties shall match the fabric finish.

- B. Concrete: The Contractor shall provide portland cement concrete in compliance with ASTM C-150 and the Contract Documents. Aggregates shall comply with ASTM C-33. The Contractor shall mix the materials to obtain a minimum 28-day compressive strength of 3,000 psi, using a minimum of 4 sacks of cement per cubic yard, a maximum size aggregate of 1-inch, a maximum 3-inch slump and air entrainment of 2 percent to 4 percent.
- C. Privacy Decorative Slating (PDS) shall be PVC, bottom locking, non-fin type, sized to match the fabric height and color in both the fence and gates.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor shall not start the fence installation prior to the final grade completion, and the finish elevations established, unless otherwise authorized by the County.
- B. The Contractor shall repair damaged coatings in the shop or in the field by recoating utilizing manufacturers recommended repair compounds and as applied per manufacturer's recommendations.
- C. Excavation:
 - 1. For post footings, the Contractor shall drill holes in firm, undisturbed or compacted soil of the diameters and spacings shown or called out in the Contract Documents.
 - a. For holes not shown or called out on the Contract Documents, the Contractor shall excavate minimum diameters recommended by the fence manufacturer.
 - b. Post holes shall be in true alignment and of sufficient size to provide a permanent concrete foundation. Concrete shall be poured against undisturbed earth sides and bottom. All holes shall be 48-inches deep with posts and corner posts placed in the concrete to a depth of 36-inches. The gate posts shall be set in the concrete to a depth of 42-inches below the surface in firm, undisturbed soil. Holes shall be well centered on the posts. A minimum diameter of 12-inches shall be required for all corner and line post holes; 18-inches min. shall be required for all gate post holes.
 - c. Excavated soil shall be removed from the County's property.
 - d. If solid rock is encountered near the surface, the Contractor shall drill into rock at least 12-inches for line posts and at least 18-inches for end, pull, corner or gate posts. Hole shall be drilled to at least 1-inch greater diameter than the largest dimension of the post to be place.
 - e. If the Contractor encounters solid rock below solid overburden, he

shall drill to the full depth required; however, rock penetration need not exceed the minimum depths specified.

D. Setting Posts:

1. The Contractor shall remove loose and foreign materials from the sides and bottoms of holes, and moisten soil prior to placing concrete.
 - a. Center and align posts in holes above bottom of excavation.
 - b. Place concrete around posts in a continuous pour and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations. The top of concrete shall extend 2-inches above finish grade.
 - c. Trowel finish tops of footings and slope or dome to direct water away from posts. Extend footings for gate posts to the underside of bottom hinge. Set keeps, stops, sleeves and other accessories into concrete as required.
 - d. Keep exposed concrete surfaces moist for at least 7 days after placement, or cure with membrane curing materials, or other acceptable curing method.
 - e. Grout-in posts set into sleeved holes, concrete constructions, or rock excavations with non-shrink portland cement grout, or other acceptable grouting material.

E. Concrete Strength:

The Contractor shall allow the concrete to attain at least 75% of its minimum 28-day compressive strength no sooner than 7 days after placement, before rails, tension wires, barbed wire, or fabric is installed. The Contractor shall not stretch and tension fabric or wires and shall not hang gates until the concrete has attained its full design strength.

F. Top Rails:

The Contractor shall run the rail continuously through post caps or extension arms and bend to radius for curved runs. He shall provide expansion coupling as recommended by fencing manufacturer.

G. Brace Assemblies:

The Contractor shall install braces so that posts are plumb when diagonal rod is under proper tension.

H. Tension Wire:

The Contractor shall install tension wires by weaving through the fabric and tying to each post with not less than 0.177 inch (7 gage) galvanized wire, or by securing the wire to the fabric.

I. Fabric:

The Contractor shall leave approximately 3-inches between finish grade and bottom salvage, except where the bottom of the fabric extends into the concrete. He shall pull the fabric taut and tie it to posts, rails and tension wires. He shall install fabric on the security side of the fence and anchor it to the framework so that the fabric remains in tension after the pulling force is released.

J. Stretcher Bars:

The Contractor shall thread through or clamp the bars to the fabric 4-inches o.c. and secure them to posts with metal bands spaced 15-inches o.c.

K. Barbed Wire (only when specified):

The Contractor shall install 3 parallel wires on each extension arm on the security side of fence, unless otherwise indicated. He shall pull the wire taut and fasten securely to each extension arm.

L. Gate:

The Contractor shall install gates plumb, level and secure for full opening without interference. He shall install ground-set items in concrete for anchorage, as recommended by the fence manufacturer. He shall adjust hardware for smooth operation and lubricate where necessary.

M. Tie Wires:

The Contractor shall use U-shaped wire, conforming to the diameter of the attached pipe, and shall clasp the pipe and fabric firmly with twisted ends of at least 2 full turns. He shall bend the end of the wire to minimize hazard to persons or clothing.

N. Fasteners:

The Contractor shall install nuts for tension band and hardware bolts on the side of fence opposite the fabric side. Pen ends of bolts or score threads to prevent removal of nuts.

3.02 INSTALLATION

Fence shall be constructed such that each run of fence between corner posts or gate posts has equal spacing between the line posts. Spacing shall not exceed 8 feet.

END OF SECTION

SECTION 02485 SEEDING AND SODDING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials and equipment necessary to satisfactorily return all construction areas to their original conditions or better.
- B. Work shall include furnishing and placing seed or sod, fertilizing, planting, watering and maintenance until acceptance by County.

1.02 RELATED WORK NOT INCLUDED

Excavation, filling and grading required to establish elevation shown on the Drawings are included under other sections of these Specifications.

1.03 QUALITY ASSURANCE

- A. It is the intent of this Specification that the Contractor is obliged to deliver a satisfactory stand of grass as specified. If necessary, the Contractor shall repeat any or all of the work, including grading, fertilizing, watering and seeding or sodding at no additional cost to the County until a satisfactory stand is obtained. For purposes of grassing, a satisfactory stand of grass is herein defined as a full lawn cover over areas to be sodded or seeded, with grass free of weeds, alive and growing, leaving no bare spots larger than 3/4 square yard within a radius of 8 feet.
- B. All previously grassed areas where pipelines are laid shall be sodded. All sodding and grassing shall be installed in accordance with these Specifications or as directed by the County.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fertilizer: The fertilizer shall be of the slow-release type meeting the following minimum requirements: 12 percent nitrogen, 8 percent phosphorus, 8 percent potassium; 40 percent other available materials derived from organic sources. At least 50 percent of the phosphoric acid shall be from normal super phosphate or an equivalent source which will provide a minimum of two units of sulfur. The amount of sulfur shall be indicated on the quantitative analysis card attached to each bag or other container. Fertilizer shall be uniform in composition, dry and free flowing delivered to sites in original unopened containers bearing manufacturer's statement or guarantee.
- B. Seeding/Grassing: The Contractor shall grass all unpaved areas disturbed during construction which do not require sod. All grassing shall be completed in conformance with FDOT Specifications, Sections 570 and 981. The grassed areas shall be mulched and fertilized in accordance with FDOT Specifications, except that no additional payment will be made for mulching, fertilizing and/or watering.

- C. Sodding: Sod shall be provided as required on the construction drawings or at locations as directed by the County in accordance with Florida Department of Transportation, Specifications Section 575 and 981. The Contractor shall furnish bahia grass sod or match existing sod. Placement and watering requirements shall be in accordance with FDOT Specifications Section 575, except that no additional payment will be made for placement and/or watering. This cost shall be included in the Contract price bid for sodding.
- D. Topsoil: Topsoil stockpiled during excavation may be used as necessary. If additional topsoil is required to replace topsoil removed during construction, it shall be obtained off site at no additional cost to the County. Topsoil shall be fertile, natural surface soil, capable of producing all trees, plants and grassing specified herein.
- E. Water: It is the Contractor's responsibility to supply all water to the site, as required during seeding and sodding operations and through the maintenance period and until the work is accepted. The Contractor shall make whatever arrangements that may be necessary to ensure an adequate supply of water to meet the needs for his work. He shall also furnish all necessary hose, equipment, attachments and accessories for the adequate irrigation of lawns and planted areas as may be required. Water shall be suitable for irrigation and free from ingredients harmful to plant life.

PART 3 EXECUTION

3.01 INSTALLATION

- A. When the trench backfill has stabilized sufficiently, the Contractor shall commence work on lawns and grassed areas, including fine grading as necessary and as directed by the County.
- B. Finish Grading: Areas to be seeded or sodded shall be finish graded, raked, and debris removed. Soft spots and uneven grades shall be eliminated. The County shall approve the finish grade of all areas to be seeded or sodded prior to seed or sod application.
- C. Areas to be sodded shall be excavated or cut-down to accept the approximate 2” thick sod, so finish grade matches existing. Sod shall not be thrown over top of existing sod or debris.
- D. Protection: Seeded and sodded areas shall be protected against traffic or other use by placing warning signs or erecting barricades as necessary. Any areas damaged prior to acceptance by the County shall be repaired by the Contractor as directed by the County.

3.02 CLEANUP

Soil or similar materials spilled onto paved areas shall be removed promptly, keeping those areas as clean as possible at all times. Upon completion of seeding and sodding operations, all excess soil, stones and debris remaining shall be removed from the construction areas.

3.03 LANDSCAPE MAINTENANCE

- A. Any existing landscape items damaged or altered during construction by the Contractor shall be restored or replaced as directed by the County.
- B. Maintain landscape work for a period of 90 days immediately following complete installation of work or until County accepts project. Watering, weeding, cultivating, restoration of grade, mowing and trimming, protection from insects and diseases, fertilizing and similar operations as needed to ensure normal growth and good health for live plant material shall be included at no additional cost to the County.

3.04 REPAIRS TO LAWN AREAS DISTURBED BY CONTRACTOR'S OPERATORS

Lawn areas planted under this Contract and all lawn areas damaged by the Contractor's operation shall be repaired at once by proper soil preparation, fertilizing and sodding, in accordance with these Specifications.

END OF SECTION

SECTION 02513 ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials and equipment necessary to complete all milling asphalt pavement and asphalt concrete paving (including restoration of driveways) as called out on the Contract Documents or as shown on the Drawings.

1.02 QUALITY ASSURANCE

- A. Qualifications of Asphalt Concrete Producer: The only materials permitted shall be furnished by a bulk asphalt concrete producer exclusively engaged in the production of hot-mix, hot-laid asphalt concrete.
- B. Qualification of Testing Agency: The County may employ a commercial testing laboratory to conduct tests and evaluations of asphalt concrete materials and design. The Contractor shall:
 - 1. Provide asphalt concrete testing and inspection service acceptable to County.
 - 2. Include sampling and testing asphalt concrete materials proposed, and tests and calculations for asphalt concrete mixtures.
 - 3. Provide field testing facilities for quality control testing during paving operations.
- C. Requirements of Regulatory Agencies: The Contractor shall comply with the applicable requirements of:
 - 1. Manatee County Utility Operations Department
 - 2. Manatee County Transportation Department
 - 3. State of Florida Dept. of Transportation

1.03 PAVING QUALITY REQUIREMENTS

- A. General: In addition to other specified conditions, the Contractor shall comply with the following minimum requirements:
 - 1. In-place asphalt concrete course shall be tested for compliance with requirements for density, thickness and surface smoothness.
 - 2. Final surface shall be provided of uniform texture, conforming to required grades and cross sections.
 - 3. A minimum of four inch diameter pavement specimens for each completed course shall be taken from locations as directed by the County.
 - 4. Holes from test specimens shall be repaved as specified for patching defective work.
- B. Density:

1. When subjected to 50 blows of standard Marshall hammer on each side of an in place material specimen, densities shall be comparable to a laboratory specimen of same asphalt concrete mixture.
 2. The minimum acceptable density of in-place course material shall be 98% of the recorded laboratory specimen density.
- C. Thickness: In-place compacted thicknesses shall not be acceptable if less than the minimum thicknesses shown on the Drawings.
- D. Surface Smoothness:
1. Finished surface of each asphalt concrete course shall be tested for smoothness, using a 10 ft. straightedge applied parallel to and at right angles to centerline of paved areas.
 2. Surface areas shall be checked at intervals directed by County.
 3. Surfaces shall not be acceptable if they exceed the following:
 - a. Base Course: 1/4 in. in 10 ft.
 - b. Surface Course: 3/16 in. in 10 ft.
 - c. Crowned Surfaces:
 - (1) Test crowned surfaces with a crown template, centered and at right angles to the crown.
 - (2) Surfaces will not be acceptable if varying more than 1/4 in. from the template.

1.04 SUBMITTALS

- A. Samples: The Contractor may be required to provide samples of materials for laboratory testing and job-mix design.
- B. Test Reports: The Contractor shall submit laboratory reports for following materials tests:
1. Coarse and fine aggregates from each material source and each required grading:
 - a. Sieve Analysis: ASTM C 136 (AASHTO T 27).
 - b. Unit Weight of Slag: ASTM C29 (AASHTO T 19).
 - c. Soundness: ASTM C 88 (AASHTO T 104) for surface course aggregates only.
 - d. Sand Equivalent: ASTM D 2419 (AASHTO T 176).
 - e. Abrasion of Coarse Aggregate: ASTM C131 (AASHTO T 96), for surface course aggregates only.
 2. Asphalt cement for each penetration grade:
 - a. Penetration: ASTM D5 (AASHTO T49).
 - b. Viscosity (Kinematic): ASTM D2170 (AASHTO T 201).
 - c. Flash Point: ASTM D92 (AASHTO T 48).
 - d. Ductility: ASTM D 113 (AASHTO T 51).
 - e. Solubility: ASTM D 4 (AASHTO T 44).
 - f. Specific Gravity: ASTM D 70 (AASHTO T 43).
 3. Job-mix design mixtures for each material or grade:
 - a. Bulk Specific Gravity for Coarse Aggregate: ASTM C 117(AASHTO T 85).

- b. Bulk Specific Gravity for Fine Aggregate: ASTM C 128(AASHO T 84).
- 4. Uncompacted asphalt concrete mix: Maximum Specific Gravity: ASTM D 2041 (AASHO T 209).
- 5. Compacted asphalt concrete mix:
 - a. Bulk Density: ASTM D 1188 (AASHO T 166).
 - b. Marshall Stability and Flow: ASTM D 1559.
- 6. Density and voids analysis:
 - a. Provide each series of asphalt concrete mixture test specimens, in accordance with A.I. MS-2 "Mix Design Methods for Asphalt Concrete".
 - b. Use Marshall method of mix design unless otherwise directed or acceptable to the County.
 - c. Report the quantity of absorbed asphalt cement in pounds of dry aggregate, percent air voids, and percent voids in mineral aggregate.
- 7. Sampling and testing of asphalt concrete mixtures for quality control during paving operations:
 - a. Uncompacted asphalt concrete mix.
 - (1) Asphalt Cement Content: ASTM D 2172 (AASHO T 164).
 - (2) Penetration of Recovered Asphalt Cement: ASTM D 5(AASHO T 49).
 - (3) Ductibility of Recovered Asphalt Cement: ASTM D 113(AASHO T 51).
 - b. Compacted asphalt concrete mix:
 - (1) Bulk Density: ASTM D 1188 (AASHO T 166).
 - Marshall Stability and Flow: ASTM D1559).
 - c. Perform at least one test for each day's paving.
- 8. Asphalt plant inspection: ASTM D 290.
- 9. Additional testing:
 - a. Retesting shall be required if previous tests indicate insufficient values, or if directed by the County.
 - b. Testing shall continue until specified values have been attained.
- 10. Asphalt concrete materials which do not comply with specified requirements shall not be permitted in the work.

1.05 JOB CONDITIONS

A. Weather Limitations:

- 1. Apply bituminous prime and tack coats only when the ambient temperature in the shade is 50 degrees F. and when the temperature has not been below 35 degrees F. for 12 hours immediately prior to application.
- 2. Do not apply when the base surface is wet or contains an excess of moisture which would prevent uniform distribution and the required penetration.
- 3. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees F., when the underlying base is dry, and when weather is not rainy.
- 4. Base course may be placed when air temperature is not below 30 degrees F. and rising, when acceptable to the County.

- B. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.
- C. Traffic Control: Maintain vehicular and pedestrian traffic during paving operations, as required for other construction activities.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Soil Cement or Shell Base Course: as specified in FDOT Section 270, "Material for Base and Stabilized Base", and as called for in the Contract Documents.
- B. Aggregate for Asphalt Concrete, General:
 - 1. Sound, angular crushed stone, crushed gravel, or crushed slag: ASTM D 692.
 - 2. Sand, stone, or slag screening: ASTM D 1073.
 - 3. Provide aggregate in gradations for various courses to comply with local highway standards.
- C. Surface Course Aggregates:
 - 1. Provide natural sand, unless sand prepared from stone, slag, or gravel or combinations are required to suit local conditions.
- D. Asphalt Cement: Comply with ASTM D 946 for 85-100 penetration grade.
- E. Prime Coat:
 - 1. Cut-back liquid asphalt.
 - 2. Medium-Curing type: ASTM D 2027, Grade MC-70.

2.02 ASPHALT-AGGREGATE MIXTURES

- A. Job-mix criteria:
 - 1. Provide job-mix formulas for each required asphalt-aggregate mixture.
 - 2. Establish a single percentage of aggregate passing each required sieve size, a single percentage of asphalt cement to be added to aggregate, and a single temperature at which asphalt concrete is to be produced.
 - 3. Comply with the mix requirements of local governing highway standards.
 - 4. Maintain material quantities within allowable tolerances of the governing standards.

2.03 TRAFFIC AND PARKING MARKING MATERIALS

- A. Traffic lane marking paint with chlorinated rubber base.
- B. Factory mixed, quick drying and non bleeding, FS TT-P-115C, Type III.

- C. Color: Driving Lane Dividers - White
No Parking Zone - Yellow
Parking Dividers - White

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Subbase Preparation:

1. The Contractor shall remove from the area all organic substance encountered to a depth of six or eight inches (6" or 8"), or to such depth and width as directed by the County. The entire area shall be plowed and dragged prior to placing a stabilizing additive, if required to meet minimum bearing value.
2. Subbase shall be compacted to a minimum density of 98 percent of the maximum as determined by the Modified Proctor Density AASHTO T180, and shall have a minimum bearing value of 40 pounds per square inch as determined by the Florida Bearing Test.

B. Base Course:

1. Check subgrade for conformity with elevations and section immediately before placing base material.
2. Place base material in compacted layers not more than 6 inches thick, unless continuing tests indicate the required results are being obtained with thicker layers.
3. In no case will more than 8-inches of compacted base be placed in one lift.
4. Spread, shape, and compact all base material deposited on the subgrade during the same day.
5. Compact base course material to be not less than 98% of maximum density: ASTM D 1557, Method D (98 percent maximum density: AASHTO T-180).
6. Test density of compacted base course: ASTM D 2167.
7. Conduct one test for each 250 sq. yds. of in-place material, but in no case not less than one daily for each layer.

C. Loose and Foreign Material:

1. Remove loose and foreign material from compacted subbase surface immediately before application of paving.
2. Use power brooms or blowers, and brooming as required.
3. Do not displace subbase material.

D. Prime Coat:

1. Uniformly apply at rate of 0.20 to 0.5 gal. per sq. yd. over compacted and cleaned subbase surface.
2. Apply enough material to penetrate and seal, but not flood the surface.
3. Allow to cure and dry as long as required to attain penetration and evaporation of volatile, and in no case less than 24 hours unless otherwise

- acceptable to the County.
- 4. Blot excess asphalt with just enough sand to prevent pick-up under traffic.
- 5. Remove loose sand before paving.

E. Tack Coat:

- 1. Dilute material with equal parts of water and apply to contact surfaces of previously constructed asphalt concrete or portland cement concrete and similar surfaces.
- 2. Apply at rate of 0.05 to 0.15 gal. per sq. yd. of surface.
- 3. Apply tack coat by brush to contact surfaces of structures projecting into or abutting asphalt concrete pavement.
- 4. Allow surfaces to dry until material is at condition of tackiness to receive pavement.

3.02 MANHOLE FRAME / VALVE BOX ADJUSTMENTS (IF APPLICABLE)

A. Placing Manhole frames:

- 1. Surround manhole frames set to elevation with a ring of compacted asphalt concrete base prior to paving.
- 2. Place asphalt concrete mixture up to 1 in. below top of frame, slope to grade, and compact by hand tamping.

B. Adjust manhole frames to proper position to meet paving.

C. If permanent covers are not in place, provide temporary covers over openings until completion of rolling operations.

D. Set cover manhole frames to grade, flush with surface of adjacent pavement.

3.03 PREPARING THE MIXTURE

A. Comply with ASTM D 995 for material storage, control, and mixing, and for plant equipment and operation.

B. Stockpiles:

- 1. Keep each component of the various-sized combined aggregates in separate stockpiles.
- 2. Maintain stockpiles so that separate aggregate sizes shall not be intermixed.

C. Heating:

- 1. Heat the asphalt cement at the mixing plant to viscosity at which it can be uniformly distributed throughout mixture
- 2. Use lowest possible temperature to suit temperature-viscosity characteristics of asphalt.
- 3. Do not exceed 350 degrees F. (176.6 degrees C.).

- D. Aggregate:
 1. Heat-dry aggregates to reduce moisture content to not more than 2.0%.
 2. Deliver dry aggregate to mixer at recommended temperature to suit penetration grade and viscosity characteristics of asphalt cement, ambient temperature, and workability of mixture.
 3. Accurately weigh or measure dry aggregates and weigh or meter asphalt cement to comply with job-mix formula requirements.

- E. Mix aggregate and asphalt cement to achieve 90-95% of coated particles for base mixtures and 85-90% of coated particles for surface mixture, when tested in accordance with ASTM D 2489.

- F. Transporting:
 1. Transport asphalt concrete mixtures from mixing site in trucks having tight, clean compartments.
 2. Coat hauling compartments with a lime-water mixture to prevent asphalt concrete mixture from sticking.
 3. Elevate and drain compartment of excess solution before loading mix.
 4. Provide covers over asphalt concrete mixture when transporting to protect from weather and to prevent loss of heat.
 5. During periods of cold weather or for long-distance deliveries, provide insulation around entire truck bed surfaces.

3.04 EQUIPMENT

- A. Provide size and quantity of equipment to complete the work specified within project time schedule.

- B. Bituminous Pavers: Self-propelled that spread hot asphalt concrete mixtures without tearing, shoving or gouging surfaces, and control pavement edges to true lines without use of stationary forms.

- C. Rolling Equipment:
 1. Self-propelled, steel-wheeled and pneumatic-tired rollers that can reverse direction without backlash.
 2. Other type rollers may be used if acceptable to the County.

- D. Hand Tools: Provide rakes, lutes, shovels, tampers, smoothing irons, pavement cutters, portable heaters, and other miscellaneous small tools to complete the work specified.

3.05 PLACING THE MIX

- A. Place asphalt concrete mixture on prepared surface, spread and strike-off using paving machine.

- B. Spread mixture at a minimum temperature of 225 degrees F. (107.2 degrees C.).
- C. Inaccessible and small areas may be placed by hand.

- D. Place each course at thickness so that when compacted, it will conform to the indicated grade, cross-section, finish thickness, and density indicated.
- E. Paver Placing:
 - 1. Unless otherwise directed, begin placing along centerline of areas to be paved on crowned section, and at high side of sections on one-way slope, and in direction of traffic flow.
 - 2. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.
 - 3. Complete base courses for a section before placing surface courses.
 - 4. Place mixture in continuous operation as practicable.
- F. Hand Placing:
 - 1. Spread, tamp, and finish mixture using hand tools in areas where machine spreading is not possible, as acceptable to County.
 - 2. Place mixture at a rate that will insure handling and compaction before mixture becomes cooler than acceptable working temperature.
- G. Joints:
 - 1. Carefully make joints between old and new pavements, or between successive days' work, to ensure a continuous bond between adjoining work.
 - 2. Construct joints to have same texture, density and smoothness as adjacent sections of asphalt concrete course.
 - 3. Clean contact surfaces free of sand, dirt, or other objectionable material and apply tack coat.
 - 4. Offset transverse joints in succeeding courses not less than 24 inches.
 - 5. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.
 - 6. Offset longitudinal joints in succeeding courses not less than 6 inches.
 - 7. When the edges of longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back unsatisfactory sections to expose an even, vertical surface for full course thickness.

3.06 COMPACTING THE MIX

- A. Provide sufficient rollers to obtain the required pavement density.
- B. Begin rolling operations as soon after placing when the mixture will bear weight of roller without excessive displacement.
- C. Do not permit heavy equipment, including rollers to stand on finished surface before it has thoroughly cooled or set.
- D. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

- E. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement. Roll to slightly different lengths on alternate roller runs.
- F. Do not roll centers of sections first under any circumstances.
- G. Breakdown Rolling:
 - 1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.
 - 2. Operate rollers as close as possible to paver without causing pavement displacement.
 - 3. Check crown, grade, and smoothness after breakdown rolling.
 - 4. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.
- H. Second Rolling:
 - 1. Follow breakdown rolling as soon as possible, while mixture is hot and in condition for compaction.
 - 2. Continue second rolling until mixture has been thoroughly compacted.
- I. Finish Rolling:
 - 1. Perform finish rolling while mixture is still warm enough for removal of roller marks.
 - 2. Continue rolling until roller marks are eliminated and course has attained specified density.
- J. Patching:
 - 1. Remove and replace defective areas.
 - 2. Cut-out and fill with fresh, hot asphalt concrete.
 - 3. Compact by rolling to specified surface density and smoothness.
 - 4. Remove deficient areas for full depth of course.
 - 5. Cut sides perpendicular and parallel to direction of traffic with edges vertical.
 - 6. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.

3.07 MARKING ASPHALT CONCRETE PAVEMENT

- A. Cleaning:
 - 1. Sweep surface with power broom supplemented by hand brooms to remove loose material and dirt.
 - 2. Do not begin marking asphalt concrete pavement until acceptable to the County.
- B. Apply paint with mechanical equipment.
 - 1. Provide uniform straight edges.

2. Not less than two separate coats in accordance with manufacturer's recommended rates.

3.08 CLEANING AND PROTECTION

- A. Cleaning: After completion of paving operations, clean surfaces of excess or spilled asphalt materials to the satisfaction of the County.
- B. Protection:
 1. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened, and in no case sooner than 6 hours.
 2. Provide barricades and warning devices as required to protect pavement.
 3. Cover openings of structures in the area of paving until permanent coverings are placed (if applicable).

END OF SECTION

SECTION 02575 PAVEMENT REPAIR AND RESTORATION

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment, obtain County or State right-of-way permits and incidentals required and remove and replace pavements over trenches excavated for installation of water or sewer lines and appurtenances as shown on the Contract Drawings.

1.02 GENERAL

- A. The Contractor shall take before and after photographs.
- B. The Contractor shall repair in a manner satisfactory to the County or State, all damage done to existing structures, pavement, driveways, paved areas, curbs and gutters, sidewalks, shrubbery, grass, trees, utility poles, utility pipe lines, conduits, drains, catch basin, flagstones, or stabilized areas or driveways and including all obstructions not specifically named herein, which results from this Project.
- C. The Contractor shall keep the surface of the backfilled area of excavation in a safe traffic bearing condition and firm and level with the remaining pavement until the pavement is restored in the manner specified herein. All surface irregularities that are dangerous or obstructive to traffic are to be removed. The repair shall conform to applicable requirements of Manatee County Transportation Department requirements for pavement repair and as described herein, including all base, subbase and asphalt replacement.
- D. All materials and workmanship shall meet or exceed the County requirements and as called for in the Contract Documents and nothing herein shall be construed as to relieve the Contractor from this responsibility.
- E. All street, road and highway repair shall be made in accordance with the FDOT and County details indicated on the Drawings and in accordance with the applicable requirements and approval of affected County and State agencies.

PART 2 PRODUCTS

2.01 PAVEMENT SECTION

- A. Asphaltic concrete shall consist of asphalt cement, coarse aggregate, fine aggregate and mineral filler conforming to FDOT Type S-III Asphalt. Pavement replacement thickness shall match that removed but in no case shall be less than 1-1/2" compacted thickness. All asphalt concrete pavement shall be furnished, installed and tested in accordance with FDOT Specifications for Road and Bridge Construction.
- B. Asphalt or crushed concrete or approved equal base material shall be furnished and installed under all pavement sections restored under this Contract. Asphalt base shall have a minimum 6" compacted thickness, meet requirements for FDOT

ABC III (Minimum Marshall Stability of 1000) and be furnished, installed and tested in accordance with the requirements of the FDOT Standards. Crushed concrete base shall be 8" minimum compacted thickness. Crushed concrete aggregate material shall have a minimum LBR of 140 compacted to 98% T-180 AASHTO density. Asphalt base and crushed concrete base are acceptable. Other bases shall be submitted for approval.

- C. Prime and tack will be required and applied in accordance with Section 300 - FDOT Specifications: Prime and Tack Coat for Base Courses.

PART 3 EXECUTION

3.01 CUTTING PAVEMENT

- A. The Contractor shall saw cut in straight lines and remove pavement as necessary to install the new pipelines and appurtenances and for making connections to existing pipelines.
- B. Prior to pavement removal, the Contractor shall mark the pavement for cuts nearly paralleling pipe lines and existing street lines. Asphalt pavement shall be cut along the markings with a rotary saw or other suitable tool. Concrete pavement shall be scored to a depth of approximately two (2) inches below the surface of the concrete along the marked cuts. Scoring shall be done by use of a rotary saw, after which the pavement may be broken below the scoring with a jackhammer or other suitable equipment.
- C. The Contractor shall not machine pull the pavement until it is completely broken and separated along the marked cuts.
- D. The pavement adjacent to pipe line trenches shall neither be disturbed nor damaged. If the adjacent pavement is disturbed or damaged, irrespective of cause, the Contractor shall remove and replace the pavement. In addition, the base and sub-base shall be restored in accordance with these Specifications, Florida Dept. of Transportation Standard Specifications and as directed by the County.

3.02 PAVEMENT REPAIR AND REPLACEMENT

- A. The Contractor shall repair, to meet or exceed original surface material, all existing concrete or asphaltic pavement, driveways, or sidewalks cut or damaged by construction under this Contract. He shall match the original grade unless otherwise specified or shown on the Drawings. Materials and construction procedures for base course and pavement repair shall conform to those of the Florida Dept. of Transportation.
- B. The Contractor's repair shall include the preparation of the subbase and base, place and maintain the roadway surface, any special requirements whether specifically called for or implied and all work necessary for a satisfactory completion of this work. Stabilized roads and drives shall be finished to match the existing grade. Dirt roads and drives shall have the required depth of backfill material as shown on the Contract Drawings.

- C. The asphaltic concrete repairs shall be in accordance with the Manatee County Public Works Standards, Part I Utilities Standards Manual, Detail UG-12. The asphaltic concrete repairs shall extend the full width and length of the excavation or to the limits of any damaged section. The edge of the pavement to be left in place shall be cut to a true edge with a saw or other approved method so as to provide a clean edge to abut the repair. The line of the repair shall be reasonably uniform with no unnecessary irregularities. The existing asphalt beyond the excavation or damaged section shall be milled 25' back from the saw cut. Final overlay shall match existing with no discernable "bump" at joint.

3.03 MISCELLANEOUS RESTORATION

Sidewalks or driveways cut or damaged by construction shall be restored in full sections or blocks to a minimum thickness of four inches. Concrete curb or curb and gutter shall be restored to the existing height and cross section in full sections or lengths between joints. RCP pipe shall be repaired or installed in accordance with manufacturer's specifications. Grassed yards, shoulders and parkways shall be restored to match the existing sections with grass sod of a type matching the existing grass.

3.04 SPECIAL REQUIREMENTS

The restoration of all surfaces, as described herein, disturbed by the installation of pipelines shall be completed as soon as is reasonable and practical. The complete and final restoration of both paved and shell stabilized roads within a reasonable time frame is of paramount importance. To this end, the Contractor shall, as part of his work schedule, complete the restoration of any area of road within five weeks after removing the original surface. Successful leak testing shall be performed prior to restoring any area of road. All restoration and replacement or repairs are the responsibility of the Contractor.

3.05 CLEANUP

After all repair and restoration or paving has been completed, all excess asphalt, dirt and other debris shall be removed from the roadways. All existing storm sewers and inlets shall be checked and cleaned of any construction debris.

3.06 MAINTENANCE OR REPAIR

All wearing surfaces shall be maintained by the Contractor in good order suitable for traffic prior to completion and acceptance of the work.

END OF SECTION

SECTION 02615 DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install ductile iron pipe and restrained joint ductile iron pipe and cast iron or ductile iron restrained joint fittings, complete, as shown on the Drawings and specified in these Standards.
- B. Fittings are noted on the drawings for the Contractor's convenience and do not relieve him from laying and jointing different or additional items where required.
- C. The Contractor shall furnish all labor, materials, equipment and incidentals required to install push-on joint or restrained joint ductile iron pipe, complete as shown on the Drawings and Specifications.
- D. Newly installed pipe shall be kept clean and free of all foreign matter. All DI pipe, fittings, and external thrust restraints installed underground shall be poly wrapped unless noted otherwise on the plans.

1.02 SUBMITTALS

- A. The Contractor shall submit to the County, within ten days after receipt of Notice to Proceed, a list of materials to be furnished, the names of the suppliers and the appropriate shop drawings for all ductile iron pipe and fittings.
- B. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Ductile iron pipe shall conform to AWWA C150 and AWWA C151. Pipe shall be Pressure Class 350 for sizes 4" through 36". All ductile iron pipe used in above ground applications shall be Special Thickness Class 53. All pipe materials used in potable water systems shall comply with NSF Standard 61.
- B. Unrestrained joint pipe shall be supplied in lengths not to exceed 21 ft. and shall be either the Fastite/Tyton push-on joint and shall be furnished as manufactured by American Cast Iron Co., US Pipe, or McWane Ductile.
- C. Rubber gaskets shall conform to AWWA C111 for push-on and restrained joints. Gaskets shall be Ethylene Propylene Diene Monomer (EPDM) rubber for potable water and reclaimed water pipelines. Acrylonitrile butadiene (NBR) gaskets shall be used for potable water mains that are located in soil that is contaminated with low molecular-weight petroleum products or non-chlorinated organic solvents or non-aromatic organic solvents. Fluorocarbon (FKM) gaskets shall be used for potable water mains that are located in soil that is contaminated with aromatic

hydrocarbons or chlorinated hydrocarbons. Fluorocarbon (FKM) gaskets shall be used where both classes of contaminants are found.

- D. Thrust restraint devices shall be provided at all bends and fittings, in casings under roads and railroads, and at other locations specifically indicated on the construction drawings. Thrust restraint devices shall be either concrete thrust blocks, ductile iron external restraining glands, or restrained joint rubber gaskets or segments. Refer to Section 02640 of these Specifications for details.
- E. Restrained joint pipe shall be supplied in lengths not to exceed 21 ft. and shall use an internal restrained joint rubber gasket or external thrust restraints as recommended by the manufacturer. Piping with internal restrained joint rubber gaskets shall be marked with weather resistant, minimum 6-mil thick, 4-inch wide, solid red PVC marking tape on pipe exterior. For pipe up to 24" in diameter, the restrained joint pipe and rubber gaskets shall be furnished per US Pipe (Tyton Joint with Field Lok 350 Gasket), or McWane Ductile (Tyton Joint with Sure Stop 350 Gasket).
- F. Restrained joint rubber gasket material shall be per 2.01C of this Section. The gasket shall have special grade of corrosion-resistant, hardened, stainless steel locking segments vulcanized into the rubber gasket.
- G. Restrained joints, where used, shall be installed at all bends and fittings, and at pipe joint locations both upstream and downstream from the bends or fittings at distances as required by the Contract Drawings. Restrained joint pipe fittings shall be designed and rated for the following pressures:
 - 350 psi for pipe sizes up to and including 24" diameter
 - 250-psi for pipe sizes 30" and larger
- H. All mechanical joint fittings shall be pressure rated for 350 psi for sizes 4-24 inches and 250 psi for pipe sizes 30" and larger. All flanged fittings shall be pressure rated for 250 psi for all sizes. All fittings shall meet the requirements of AWWA C110 or AWWA C153.
- I. Water Main and Reclaimed Water Main Coatings:
 - 1. All buried ductile iron pipe used in water and reclaimed water systems shall have a standard thickness cement lining on the inside in accordance with AWWA C104 and a standard 1-mil asphaltic exterior coating per AWWA C151. All aboveground ductile iron pipe shall have a standard thickness cement lining on the inside in accordance with AWWA C104 and a factory applied epoxy primer on the outside.
 - 2. All buried ductile iron fittings used in water and reclaimed water systems shall have double standard thickness cement lining on the inside per AWWA C104 and a standard 1-mil asphaltic exterior coating per AWWA C151. All aboveground ductile iron fittings shall have double standard double thickness cement lining on the inside in accordance with AWWA C104 and a factory applied epoxy primer on the outside.
- J. Wastewater Main Coatings:
 - 1. All ductile iron pipe and fittings used in wastewater sewer systems shall

have a factory applied 40-mil dry-film thickness of a modified polyamine ceramic epoxy interior lining as manufactured by Tnemec Series 431 Perma-Shield PL or amine cured novolac epoxy as manufactured by Permite Permax-CTF. The interior lining application is to be based on the manufacturer's recommendation for long-term exposure to raw sewage.

2. To ensure a holiday-free interior lining and exterior coating, documentation must be provided, prior to shipment, showing each section of pipe has passed holiday testing at the time of production per ASTM G62. The interior lining shall have a minimum three (3) year warranty covering failure of the lining and bond failure between liner and pipe.
3. The Contractor shall take extreme care when handling pipe and fittings to ensure the interior lining does not get damaged during construction. Lined pipe and fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. The pipe shall not be dropped or unloaded by rolling.
Care should be taken not to let the pipe strike sharp objects while swinging or being off loaded. Ductile iron pipe should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers.
4. A County representative shall have the right to deny any pipe/fitting that shows coat cracks due to improper handling/storage of the pipe/fittings or failure to provide a holiday-free certification letter.
5. Exterior coatings for ductile iron pipe and fittings used in wastewater systems shall be either a standard 1-mil asphaltic coating per AWWA C151 or a factory-applied epoxy coating per AWWA C550.

2.02 DETECTION

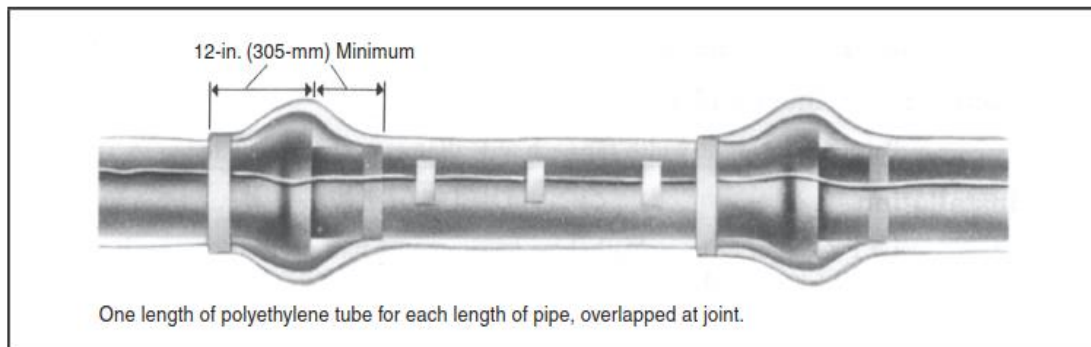
- A. Pipe shall have a 6-inch wide electronic detectable warning/path marking tape, color-coded per service type, placed directly above the pipe center. The tape shall be placed at least 16 inches below finished grade to a maximum depth of 48 inches below finished grade.
- B. The electronic detectable warning/path marking tape shall have detectable markers embedded in the tape and spaced adequately to provide a near continuous path to allow for easy detection at any point along the pipe. The embedded markers shall be spaced every 8-feet along the warning tape. The electronic marking tape shall be supplied as manufactured by 3M, Series 7600XR.
- C. Tracer wire shall be required for all buried pipeline construction.

2.03 IDENTIFICATION

- A. Each length of pipe and each fitting shall be marked with the name of the manufacturer, size and class, lining type, and shall be clearly identified as ductile iron pipe. All gaskets shall be marked with the name of the manufacturer, size and

proper insertion direction.

- B. All ductile iron pipe and fittings, appurtenances, and valves shall be entirely polyethylene-tube wrapped blue for water mains, purple for reclaimed water mains or green for sewer mains, per AWWA C105 and sized per manufacturer's recommendations.
- C. Contractor shall ensure that no soil or embedment material is trapped between the pipe, fitting, appurtenance, or valves and the polyethylene wrap. The polyethylene film shall be snugly fitted to the contour of the pipe barrel with sufficient slack to prevent stretching the polyethylene where it bridges irregular surfaces such as bell-spigot interfaces, bolted joints, or fittings. The tube-form polyethylene should be used with both ends thoroughly sealed with adhesive tape or plastic tie straps at the joints overlap. The wraps shall overlap at the joints as shown below.



- D. The polyethylene shall have circumferential wraps of tape placed at 2 ft intervals at the pipe barrel.
- E. When it is not practical to wrap valves, tees, crosses, or other odd-shaped pieces in a tube, wrap with a polyethylene flat sheet or split length of polyethylene tube by passing the sheet under the piece and wrap around the body. Make seams by bringing the edge of the polyethylene sheet together, folding them over twice, and taping them.
- F. Provide openings in the encasement for branches, service taps, blowoffs, valves, and similar appurtenances by cutting an "X" in the polyethylene and temporarily folding back the film. After the device is installed, tape the slack securely to the appurtenance with tape.
- G. Service lines of dissimilar metals shall be wrapped with polyethylene for a minimum clear distance of 3 feet away from the ductile-iron pipe.
- H. Polyethylene encasement shall be furnished as manufactured by Trumbull or T Criste.
- I. All aboveground mains and appurtenances shall be painted safety blue for potable water, Pantone 522C for reclaimed water, and green for sanitary sewer.
- F. All integral restrained gasket joint pipe shall have a weather-resistant, min. 6 mil thick, 4" wide, solid red PVC marking tape around bell.

PART 3 EXECUTION

3.01 INSTALLATION

- A. 36-Inch ductile iron pipe shall be installed using Type 5 Trench laying condition when depth of cover is 24 feet or more. Type 4 trench laying condition shall be used when depth of cover is less than 24 feet.

END OF SECTION

SECTION 02617 INSTALLATION AND TESTING OF PRESSURE PIPE

PART 1 GENERAL

Reference Section 1.8, Installation of Pipelines in the Manatee County Public Works Utility Standards Part 1-Utility Standards Manual.

1.01 GENERAL

- A. Furnish and install pipe, fittings, valves, fire hydrants, services, and all other appurtenances and incidentals complete and in-place as required by the construction drawings.
- B. Where potable or reclaimed water mains are to be installed under pavement, in parking lots, etc., the main shall be DI or protected by a steel casing pipe.
- C. All pipe crossing state or federal roads or local arterials & thoroughfares shall be installed in a casing pipe.
- D. Services under any kind of pavement shall be Type "L" copper or Schedule 40 stainless steel.
- E. Water mains 16-inches and larger shall be ductile iron. High density polyethylene or PVC (for 16" only). The use of HDPE pipe must be authorized by the County prior to ordering and installation.
- F. Soil testing in accordance with AWWA C105 shall be performed during the design phase to determine if the soil is corrosive to ductile iron pipe. One (1) soil test shall be performed for pipe lengths under 500 lineal feet, with an additional soil test every 500 of additional ductile iron pipe to be installed. The soil testing shall be performed by a Florida licensed geotechnical engineering and signed and sealed report shall be supplied to the County for review prior to installation of the ductile iron pipe for evaluation. The soil testing results shall be used to determine if additional requirements for the installation of ductile iron pipe and/or the restrained joints is warranted.
- G. Ductile iron pipe, with gasket materials as required in these Standards, shall be used in soil that is contaminated with low molecular-weight petroleum products, aromatic hydrocarbons, chlorinated hydrocarbons or organic solvents.
- H. Trees shall not be planted or located within 10 feet of any potable water main, reclaimed water main, sanitary force main or gravity sanitary sewer main that is owned and maintained by County. With prior approval, an approved root barrier may be used with 5 feet of clearance.
- I. All distribution waterlines that enter private property become private lines and shall have a back-flow preventer installed at the right-of-way. BFP can be part of a meter assembly or a BFP / detector check assembly.
- J. Installation tolerances of Pipe Lines:

1. Direct Bury:
 - a. Vertical Alignment = ± 0.5 feet
 - b. Horizontal Alignment = ± 1.0 feet
2. Horizontal Directional Drill (Trenchless Technologies):
 - a. Vertical Alignment:
 - 1) max. slope shall not exceed 2% (2.0 feet within a length of 100 feet).
 - 2) No reverse curvature within 200 feet
 - 3) No vertical deviation greater than ten (10) percent of the proposed depth of cover at that specific station.
 - b. Horizontal Alignment:
 - 1) max. rate of deviation shall not exceed 1.5% (1.5 feet within a length of 100 feet
 - 2) No reverse curvature
 - 3) Total deviation not to exceed 2.0 feet

1.02 HANDLING AND STORAGE

- A. Prior to installation, all pipe and fittings shall be inspected. Cracked, broken, or otherwise defective materials not in compliance with these standards shall not be used and shall be removed from the project site.
- B. The pipeline installer shall take care in the handling, storage and installation of the pipe and fittings to prevent injury to the materials or coatings. Use proper implements, tools and facilities for the safe and proper protection of the work. Lower the pipe and fittings from the truck to the ground and from the ground into the trench in a manner to avoid any physical damages. Under no circumstances shall the pipe or fittings be dropped onto the ground or into the trenches.
- C. The pipeline installer shall not distribute material on the job site faster than it can be used to good advantage. Unless otherwise approved by the County, installer shall not distribute more than one week's supply of material in advance of laying. Any materials not to be installed within two weeks of delivery shall be protected from the sunlight, atmosphere and weather by suitable enclosures or protective wrapping until ready for installation. Stored PVC pipe shall be placed on suitable racks with bottom tiers raised above the ground to avoid damage. Storage of pipe on the job site shall be done in accordance with the pipe manufacturer's written instructions.

1.03 SURVEY MARKINGS

- A. As a marker for the Surveyor, a PVC pipe marker or 2" x 4" marker shall be inserted by the Contractor on the top of pipe for potable water mains, reclaimed water mains and sanitary force mains at intervals no greater than 200 feet apart and at locations where there is a substantial grade change. The pipe markers shall indicate the pipe diameter and shall be labeled PWM in "safety" blue, RWM in purple, and FM in green, for potable water mains, reclaimed water mains and sanitary force mains,

respectively. The Contractor is responsible for making the aforementioned markers available to the Surveyor. The Contractor shall field locate the mains and fittings when markers are not made available to the Surveyor.

- B. As a marker for the Surveyor, a PVC pipe marker or 2" x 4" marker shall be inserted by the Contractor on the top of all pipe fittings (other than sanitary sewer service wyes, potable water saddles and reclaimed water saddles). The markers for fittings shall indicate the type of fitting and shall be labeled PWF in "safety" blue, RWF in purple, and FMF in green, for potable water fittings, reclaimed water fittings, and sanitary force main fittings, respectively. The Contractor is responsible for making the aforementioned markers available to the Surveyor. The Contractor shall field locate the mains and fittings when markers are not made available to the Surveyor.
- C. A PVC pipe marker or 2" x 4" marker shall be inserted by the Contractor at the beginning and end of each horizontal directional drill (HDD). The HDD Contractor shall provide a certified report and bore log indicating the horizontal and vertical location every 25 linear feet or less along the pipe.
- D. A 2" PVC pipe marker with a painted end cap shall be inserted by the Contractor at the ROW line indicating each individual new service location or stub out. The marker shall be a 6 foot length of PVC pipe inserted 2 feet into the ground and shall be painted "safety" blue for potable water, purple for reclaimed water, and green for sewer.

1.04 PROCEDURE FOR TESTING WATER LINES, FORCE MAINS AND RECLAIMED WATER LINES

- A. A 48-hour notice is needed prior to testing. A letter stating the reasons testing should be scheduled ahead of other jobs must accompany all emergency testing requests.
- B. County and Contractor must be present for all testing, except for testing tapping valves and sleeves.
- C. HYDROSTATIC TESTING
 1. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.7.

1.05 INSPECTION/TESTING PROCEDURE COVERING BORED PIPE LINES OR CASING AND CONDUITS INSTALLED ACROSS PREVIOUSLY TESTED AND/OR COUNTY ACCEPTED WATER AND SEWER PIPE WITHIN DEVELOPMENT PROJECTS UNDER ACTIVE CONSTRUCTION

- A. Prior to testing water and sewer lines, every effort will be made to install sleeves for underground utilities that will cross these water and sewer lines or services.
- B. Where it has not been possible to pre-install sleeves prior to testing and bores or conduits are required, it is the responsibility of the utility company and/or their Contractor performing the work to provide Manatee County Utility Operations Department or the Engineer of Record with accurate horizontal and vertical as-built information of the sleeves, bores and conduits installed by said utility company.

This applies to all bores and conduits crossing water and sewer lines.

- C. Procedures to be followed for installation of conduits, pipe lines and bores that will cross, or be closer than 5'-0" horizontally and 18 inches vertically to, previously tested water and sewer lines that are still under the ownership of the developer/contractor.
1. Notify the County and obtain the best as-built information available. Allow sufficient time for the County to field locate the existing pipe lines.
 2. Submit drawings of proposed location to the County and Manatee County Utility Operations Dept. Utility Locations Section for review.
 3. Obtain a County Right-of-Way Use Permit if the work area is within a dedicated area of right-of-way.
 4. Perform installation in the presence of a County representative. Call (941) 792-8811, ext. 5061 or ext. 5069 with at least two (2) working days notice.
 5. Submit two (2) copies of as-built information to the County to incorporate into the record drawings to be submitted to the County.
 6. Failure to follow steps 2) thru 5) will result in additional charges for retesting the previously tested water and sewer lines.
- D. Procedures to be followed for installation of conduits, pipe lines and bores crossing or closer than 5'-0" horizontally and 18 inches vertically to previously tested water and sewer lines that have been previously accepted by Manatee County:
1. Obtain record drawing information from the County.
 2. If roadway has been dedicated to Manatee County, obtain Right-of-Way Use Permit and copy the Project Management Department Locations Section with proposed location drawing.
 3. Follow procedures in "Sunshine State One-Call", paying special attention to the requirements of Section VII.
- E. Should water or sewer lines be damaged during the bore pipe line or casing installation, the cost of any repairs and retesting will be paid for by the utility company that installed the bore. The actual clearance between a bored casing crossing a water or sewer pipe should not be less than 18 inches.

1.06 DETECTION

- A. Direct buried pipe shall have 3" detectable metallic tape of the proper color placed directly above the pipe and 12" below finished grade or 6" detectable tape between 12" and 24" below finished grade.
- B. Direct buried or horizontal directional drilled non-metallic pipe shall also have tracer wire installed along the pipe alignment. The tracer wire to be used shall be a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color manufactured by Copperhead Industries or Manatee County approved equal.

END OF SECTION

SECTION 02618 PIPELINE CLEANING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required to clean all new lines 4" and larger, and existing pipelines as specified in this specification and as indicated on the Drawings.
- B. This work shall include the furnishing and installation of all pig launching and retrieval devices and the appropriate pigs for the cleaning procedure, and all necessary excavations, shutdowns, fittings and valves required.

1.02 RELATED WORK

- A. The contractor is responsible for all necessary supply water.
- B. The contractor is responsible for all necessary bypass pumping.
- C. The contractor is responsible for the proper disposal of any materials removed from the pipe lines as a result of the cleaning procedure.

1.03 SUBMITTALS

- B. The Contractor shall submit prior to construction, a cleaning plan, Shop Drawings, and layout diagram for approval to the County.
- B. The Contractor shall submit to the County a list of materials to be furnished, and the names of suppliers.

1.04 QUALIFICATIONS

- A. The Contractor performing this work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner.
- B. The Contractor shall also be capable of providing crews as needed to complete this work without undue delay.
- C. The County reserves the right to approve or disapprove the Contractor, based on the submitted qualifications.

PART 2 PRODUCTS

2.01 GENERAL

- A. The contractor shall be responsible for furnishing pigs in sufficient numbers and sizes, of appropriate densities, coatings and configurations to properly clean the piping systems.
- B. All pigs used for the cleaning of sewer or reclaimed water lines shall not be used

in the cleaning of potable water lines.

2.02 MATERIALS

- A. The pig launching and retrieval equipment shall be of the latest design and construction and shall include the means to maintain constant monitoring of the in-line flows and pressures of the system being cleaned and the constant location of the cleaning pigs in the system. Launching and retrieval systems shall be fabricated, designed and manufactured according to ANSI standards and capable of withstanding working pressures of 150 psi. Launching and receiving devices shall be sized one diameter larger than the system to which it will be attached with a minimum length of 2.5 times the diameter.
- B. The contractor shall have available for immediate use an electronic pig detector for use in the system being cleaned to provide a means of tracking the passage of the pig in the system to locate areas of potential or suspected blockage and other disparities in the system.
- C. The pig shall be constructed of elastomer polyurethane with an open cell construction and a density equal to or suitable for use in the piping system being cleaned. Pig configuration shall consist of a parabolic nose with a concave base and coated with a resilient surface material that will maintain a peripheral seal and will effectively clean the piping system without over abrading the interior pipe wall. Pig characteristics shall include the ability to navigate through 90 degree bends, 180 degree turns, bi-directional fittings, full port valves, reduce its cross sectional area and return to its original design configuration and be propelled by hydraulic pressure.

PART 3 EXECUTION

3.01 PIPELINE CLEANING

- A. The cleaning of the pipe line shall be done by the controlled and pressurized passage of a polyurethane pig of varying dimensions, coatings and densities as determined by the County through the piping system.
- B. A series of pigs shall be entered into the system at a point as near to the beginning as is logistically and mechanically feasible.
- C. A launching assembly shall be used as the entrance point for the pig. This assembly shall allow for the following:
 - 1. The entering of pigs into the system by providing the means to induce flow from an external source, independent of the flows and pressures immediately available from the system, on the back of the pig to develop sufficient pressure to force the pig through the system.
 - 2. A means to control and regulate the flow.
 - 3. A means to monitor the flows and pressures.
 - 4. A means to connect and disconnect from the system without any disruption to the operation of the system.

- D. The pig shall be removed or discharged from the system at a point as near to the end as is logistically and mechanically feasible.
- E. The contractor shall be responsible for the retrieval of the pig at the discharge point. This may include setting a trap that will not disrupt normal flow and operations but will capture the pig and any debris. A retrieval assembly may also be used but said assembly shall be able to connect and disconnect from the system without any disruption to the operation of the system.
- F. Alternative launching and retrieval methods shall be done with the prior approval of the County.
- G. Any pig that cannot progress through the piping system shall be located by the contractor and removed by excavation of the pipe in order to remove the blockage. All pipe repairs shall be the responsibility of the contractor and shall be performed with as little disruption to the system as possible.
- H. Any increase in pressure that cannot be accounted for, i.e. fittings or valves or additional cleaning runs, shall be investigated, per the Engineers' approval, by locating the pig at the beginning of the increased pressure and excavating to determine the cause of the pressure increase. All pipe repairs shall be the responsibility of the contractor and shall be performed with as little disruption to the system as possible.
- I. Final flushing of the cleansed lines shall be performed after the last successful run of the pig as determined by the County. The contractor shall be responsible for all applicable flushing and disinfection requirements for potable water lines.

3.02 ACCEPTANCE

- A. The contractor shall maintain and provide a report at the end of the cleaning procedure containing the following:
 - 1. The pressures in the pipe during the pigging procedure.
 - 2. Any inline problems encountered during the procedure including all excavations with detailed locations, reason for the excavation and any corrective measures taken to the pipeline.
 - 3. A record of the pigs used, their sizes, styles and other pertinent information regarding what materials were used during the cleaning.
 - 4. An analysis of the condition of the pipeline before and after the cleaning procedure.

END OF SECTION

**SECTION 02622 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS
(AWWA SPECIFICATIONS C-900 & C-905)**

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to install the PVC piping, iron fittings and other appurtenances complete and ready for use as indicated on the construction drawings.
- B. Provide and install complete all fittings and appurtenances not noted specifically on the construction plans as required to complete the utility system in accordance with these Standards.

1.02 DESCRIPTION OF SYSTEM

The Contractor shall install the piping in the locations as shown on the Drawings.

1.03 QUALIFICATIONS

All plastic pipe, fittings and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, qualified and specializes in the manufacture of the items to be furnished. The pipe and fittings shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications.

1.04 SUBMITTALS

- A. The Contractor shall submit shop drawings to the County including, but not limited to, dimensions and technical specifications for all piping.
- B. The Contractor shall submit to the County, samples of all materials specified herein.
- C. The Contractor shall submit and shall comply with pipe manufacturer's recommendation for handling, storing and installing pipe and fittings.
- D. The Contractor shall submit pipe manufacturer's certification of compliance with these Specifications.

1.05 TOOLS

The Contractor shall supply special tools, solvents, lubricants, and caulking compounds required for proper installation.

PART 2 PRODUCTS

2.01

MATERIALS

- A. Polyvinyl chloride (PVC) pressure pipe, 4 - 12 inches in diameter, shall be Class 235, DR 18, meeting the requirements of AWWA C900 used for potable and reclaimed water. Mains shall be cast-iron-pipe-equivalent outside diameters (also known as ductile iron pipe size (DIPS)). Each length of pipe shall be hydrostatically tested to four times its pressure class of the pipe by the manufacturer in accordance with AWWA C900.
- B. Polyvinyl chloride (PVC) pressure pipe, 14 inches in diameter, shall be ductile iron pipe size (DIPS) outside diameter and shall meet the requirements of AWWA C905. Pipe used in water, sewer, and reclaimed water service shall be DR 18 and Pressure Class 235. Each length of pipe shall be hydrostatically tested at twice its pressure class in accordance with AWWA C905. Pipe shall be furnished in standard lengths of approximately 20 feet.

PVC pipe shall not be used for potable and reclaimed water mains 16 inches and larger.
- C. Polyvinyl chloride (PVC) pressure pipe, 2-3 inches in diameter, shall be Pressure Rated 200, SDR21, conforming to ASTM D2241, and shall have Iron Pipe Size (IPS) outside diameters. SDR 21 PVC pipe 2-3 inches in diameter shall not be used for working pressures greater than 125 psi. PVC pipe shall not be used in applications, which require pipes that are less than 2 inches in diameter for wastewater force mains. PVC Pipe shall not be used in applications which require pipes that are less than 3 inches in diameter for potable water piping and reclaimed water piping.
- D. Standard PVC pressure pipe joints shall be bell and spigot push-on type with elastomeric ring seals. Ring seal gaskets used at push-on joints shall conform to ASTM F 477 and shall be EPDM rubber for potable and reclaimed water pipes.
- E. Lubricant furnished for lubricating the push-on joints in potable water pipes shall be nontoxic, water soluble, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material, and shall not impart color, taste, or odor to the water, and shall be an approved substance per NSF 61.
- F. Thrust restraint devices shall be provided at all horizontal and vertical bends and fittings, in casings under roads and railroads and at other locations as indicated on the construction drawings. Thrust restraint devices for PVC pipe and fittings shall be either concrete thrust blocks or restraining glands as manufactured by Star Pipe Products, Stargrip 3000 and 3100, Allgrip 3600, or as manufactured by EBAA Iron Sales, Megaflange, 2000PV or other approved equal restraining gland products. Restrained joints, where used, shall be installed at bend and fitting locations and at pipe joint locations both upstream and downstream from bends or fittings at distances as required by these Standards.
- G. All fittings for PVC pipe shall be ductile iron or gray iron with mechanical joints and shall conform to AWWA C110 or AWWA C153 and to the applicable sections of these Standards for ductile iron and gray iron fittings.

- H. All pipe materials used in potable water systems shall comply with NSF Standard 61.

PART 3 EXECUTION

3.01 INSTALLATION

The Contractor shall install the plastic pipe in strict accordance with the manufacturer's technical data and printed instructions.

3.02 DETECTION

- A. Direct buried pipe shall have 3" warning tape of the proper color placed directly above the pipe 12" below finished grade or 6" warning tape between 12" and 24" below grade.
- B. PVC pipe shall have a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color installed along the pipe alignment as detailed in these standards. Tracer wire shall be manufactured by Copperhead Industries or Manatee County approved equal.

3.03 IDENTIFICATION

- A. PVC pipe shall bear identification markings in accordance with AWWA C900, AWWA C905 or ASTM D2241.
- B. PVC pipe shall be color coded blue for water, purple (Pantone purple 522C) for reclaimed water or green for pressure sewer using a solid pipe color pigment.

3.04 INSPECTION AND TESTING

All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipelines shall be subjected to a hydrostatic pressure and leak testing. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.7. Prior to testing, the pipe lines shall be supported in a manner approved by the County to prevent movement during tests.

END OF SECTION

SECTION 02640 VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.
- B. All of the types of valves and appurtenances shall be products of well established reputable firms who are fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these standards as applicable. Valves used in waterworks applications shall comply with Section 8 of NSF Standard 61 for mechanical devices.
- C. All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of potable water, reclaimed water, wastewater, etc., depending on the applications.
- D. All valves and appurtenances shall be of the size shown on the drawings and, to the extent possible, all equipment of the same type on the project shall be from a single manufacturer.
- E. All valves and appurtenances shall have the name of the manufacturer, year of the valve and the working pressure for which they are designed cast in raised letters upon some visible part of the body.
- F. Special tools, if required for the normal operation or maintenance, shall be supplied with the equipment.
- G. All hand actuated buried valves shall have three-piece adjustable valve boxes and 2-inch square AWWA operating nuts. Provide stainless steel extension stems and alignment rings where needed to bring the operating nut to within 4 feet below the box lid.
- H. Water and reclaimed water system isolation valves shall be gate valves for sizes 2-inch through 12-inch and shall be butterfly valves for sizes 16-inch and larger.
- I. Isolation valves for sewer force main pipelines shall be gate valves, unless otherwise noted on the plans. Tapping valves shall be used for tapping force mains. Plug valves shall be full port, have a 100% circular cross section, and must have prior written authorization from the County for use.
- J. Valves shall open when turning the operating nut or wheel counterclockwise and shall close when turning clockwise.
- K. All bonnet bolts, gland bolts, flange connection bolts, nuts, washers, and other trim hardware exposed to the outside environment shall be 316 stainless steel. Thrust

collar tie-rod bolts shall be 316 stainless steel. All MJ-type underground bolts, nuts, and washers shall be 316 stainless steel.

- L. All valves shall have a factory applied, holiday free, fusion bonded epoxy coating on the interior and exterior unless otherwise noted in the plans or the following specification. All other painted items exposed to sunlight, including field painted box lids, etc., shall be painted the appropriate color with an epoxy type paint.
- M. No valves with a break-way stem shall be allowed.
- N. The equipment shall include, but not be limited to, the following:
 - 1. Gate valves (Sec. 2.01)
 - 2. Combination Pressure Reducing and Pressure Sustaining with Check Valves Option (Sec. 2.02)
 - 3. Ball Valves (Sec. 2.03)
 - 4. Butterfly Valves (Sec. 2.04)
 - 5. Plug Valves (Sec. 2.05)
 - 6. Valve Actuators (Sec. 2.06)
 - 7. Air Release Valves (Sec. 2.07)
 - 8. Valves Boxes (Sec. 2.08)
 - 9. Corporation Stops and Saddles (Sec. 2.09)
 - 10. Flange Adapters, Plain End Couplings and Transition Couplings (Sec. 2.10)
 - 11. Hose Bibs (Sec. 2.11)
 - 12. Swing Check Valves (Sec. 2.12)
 - 13. Hydrants (Sec. 2.13)
 - 14. Restrained Joints (Sec. 2.14)
 - 15. Tapping Sleeves and Tapping Valves (Sec. 2.15)
 - 16. Tracer Wire Boxes (Sec. 2.16)

1.02 SUBMITTALS

- A. Submit to the County within 30 days after execution of the contract a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.
- B. Complete shop drawings of all valves and appurtenances shall be submitted to the County for approval in accordance with the Specifications.

1.03 TOOLS

Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

PART 2 PRODUCTS

2.01 GATE VALVES

- A. Where indicated on the drawings or necessary due to locations, size, or inaccessibility, chain wheel operators shall be furnished with the valves. Such

operators shall be designed with adequate strength for the valves with which they are supplied and provide for easy operation of the valve. Chains for valve operators shall be galvanized.

- B. Gate valves installed underground shall be provided with a box cast in a concrete pad and a box cover. Stainless steel or equivalent valve extension stems shall be provided to place the valve operating nut no more than 4 feet deep. One valve wrench, 6 feet in length, shall be provided for every 15 valves installed.
- C. Gate valves 2 inches to 24 inches in diameter shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C515 and shall be UL listed and FM approved where applicable. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.
- D. The valves shall have a non-rising 316 stainless steel stem to eliminate lead content. All bolts, nuts and washers shall be 316 stainless steel to eliminate exterior corrosion and maintain fastener strength. Manufacturer shall use Never-Seez or equivalent during assembly of bolt and nut sets to prevent galling of similar metals. Stem seals shall be provided and shall be of the O-ring type, two above and one below the thrust collar. Valves that are located above grade and located in valve vaults shall be OS&Y with flanged joints.
- E. The wedge shall be ductile iron fully encapsulated with an EPDM rubber. The Elastomer type shall be permanently indicated on the disc or body of the valve. The resilient sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.
- F. The valve body, bonnet, and bonnet cover shall meet or exceed all the requirements of AWWA C515.
- G. Valves meeting AWWA C515 requirements shall be rated for an operating pressure of 250 psi and shall be tested in accordance with AWWA C515.
- H. The valves are to have 2-inch cast or ductile iron AWWA operating nuts and shall open left or counterclockwise.
- I. The valves shall be covered by a Manufacturer's 10 year warranty on manufacturer's defects and reasonable labor costs for replacement. Warranty shall become effective from the date of purchase by the end user and delivered within 30 days from the receipt of the purchase order. For publicly owned and maintained utilities, the end user is Manatee County Government.
- J. Gate valves shall be assembled and tested in a certified ISO 9001:2000 manufacturing facility within the United States and provide their certification of meeting internationally recognized quality control procedures.

2.02 COMBINATION PRESSURE REDUCING & PRESSURE SUSTAINING WITH CHECK VALVE OPTION

- A. Pressure sustaining and check valve shall be pilot operated diaphragm actuated valve with cast iron body, bronze trim, and 125-pound flanged ends. The valve shall be hydraulically operated, diaphragm type globe valve. The main valve shall have a single removable seat and a resilient disc, of rectangular cross section, surrounded on three and a half sides. No external packing glands are permitted and there shall be no pistons operating the main valve or any controls. The valve shall be equipped with isolation valves to service the pilot system while permitting flow if necessary. Main valve and all pilot controls shall be manufactured in the United States of America. Valve shall be single chamber type, with stainless steel stem.
- B. Valve shall automatically reduce pressure for the downstream distribution network and sustain a minimum pressure in the high pressure main regardless of distribution demand, and as an option, shall also close when a pressure reversal occurs for check valve operations. The pilot system shall consist of two direct acting, adjustable, spring loaded diaphragm valves.
- C. Valve shall be cast iron or ductile iron with main valve trim of brass and bronze. The pilot control valves shall be cast brass with 303 stainless steel trim. Valve shall be similar in all respects to Cla-Val Company, Model 92-01 or a similar control valve such as Bernad Model 723, GA Industries Model 4700 or an approved equal.

2.03 BALL VALVES

- A. Ball valves for water and reclaimed water, in sizes 3/4-inch through 2-inch, shall be brass body, stem and ball per ASTM B 62, alloy 85-5-5-5, full port, full flow, 1/4-turn check, ball curb valves, rated for 300 psi, Mueller 300 (as specified in the table below), Ford B-Series, or approved equal, with compression, pack joint, flare, threaded or flanged ends as required. Ball valves for wastewater, 2-inch through 3-inch, shall be 316 stainless steel body, cap, stem and ball per ASTM A351, full port, full flow, 1/4-turn check, ball valves, steam rated for 150 psi, pressure rating 1,000 psi CWT, Apollo 76F or approved equal, with threaded or flanged ends as required.

Curb Stops for Water and Reclaimed Water

Pipe Material	Type of Connection	Model
HDPE	Compression x FIP	B-25170 *
HDPE	Pack Joint x FIP	P-25170 *
Copper	Compression x FIP	B-25170
Copper	Flare x FIP	B-25166
Stainless Steel	FIP x FIP Thread	B-20200
* Insert required, part number per manufacturer product information		

- B. All valves shall be mounted in such a position that valve position indicators are plainly visible. Above grade ball valves shall have a vinyl coated lever handle. Lever handle, handle nut, and lever packing gland shall be 304 or 316 stainless steel.
- C. Potable plastic service pipe material and compression and pack joint connectors

shall not be used in soil that is contaminated with low molecular-weight petroleum products, aromatic hydrocarbons, chlorinated hydrocarbons or organic solvents. Appropriate service tubing shall apply.

2.04 BUTTERFLY VALVES

- A. Butterfly valves shall conform to AWWA C504, Class 250 B, Mueller Lineseal XP11, DeZurik AWWA, Pratt HP-250II, or an approved equal.
- B. Valve seats shall be an EPDM elastomer. Valve seats 24 inches and larger shall be field adjustable and replaceable without dismounting operator disc or shaft and without removing the valve from the line. Valves 20 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C504.
- C. All valves shall be subject to hydrostatic and leakage tests at the point of manufacture. The hydrostatic test for Class 250 valves shall be performed with an internal hydrostatic pressure equal to 500 psi applied to the inside of the valve body of each valve. During the hydrostatic test, there shall be no leakage through the metal, the end joints or the valve shaft seal. The leakage test for the Class 250 valves shall be performed at a differential pressure of 250 psi and against both sides of the valve. No adjustment of the valve disc shall be necessary after pressure test for normal operation of valve. All valves shall be leaktight in both directions.
- D. Butterfly valve actuators shall conform to AWWA C504. Gearing for the actuators shall be totally enclosed in a gear case. Actuators shall be capable of seating and unseating the disc against the full design pressure and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.
- E. The valve shaft shall be constructed of 18-8, ASTM A-276, Type 304 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one piece unit extending full size through the valve disc and valve bearing or it may be of a stub shaft design. Shaft bearings shall be teflon or nylon, self-lubricated type.
- F. Gearing for the operators shall be totally enclosed in a gear case in accordance with paragraph 3.8.3 of the above mentioned AWWA Standard Specification.
- G. Operators shall be capable of seating and unseating the disc against the full design pressure of velocity, as specified for each class, into a dry system downstream and shall transmit a minimum torque to the valve. Operators shall be rigidly attached to the valve body.
- H. The manufacturer shall certify that the required tests on the various materials and on the completed valves have been satisfactory and that the valves conform with all requirements of this Specification and the AWWA standard.
- I. Where indicated on the Drawings, extension stems, floor stands, couplings, stem guides, and floor boxes as required shall be furnished and installed.

2.05 PLUG VALVES

- A. Plug valves shall be eccentric, non-lubricating type with integral plug and shafts and shall be furnished with end connections and with actuating mechanisms as called for on the construction plans or as otherwise required. Valves shall seal bubble-tight or water drop-tight in both directions when tested according to the Leakage Test method of AWWA C504 with a hydrostatic pressure of 150 psi.
- B. Plug valves shall also be subjected to the internal, full body Hydrostatic Test of AWWA C504 at a pressure two times the rated pressure or a minimum pressure of 300 psi, whichever is greater. During the test, there shall be no leakage through the metal, or through the end joints or shaft seal, nor shall any part of the valve be deformed.
- C. Flanged valve ends shall be faced and drilled according to ANSI B 16.1, Class 125. Mechanical joint valve ends shall conform to AWWA C111. Threaded ends shall conform to the NPT requirements of ANSI B1.20.1.
- D. The plug valve body, bonnet and gland shall be ductile iron per ASTM A 126, Class B. The integral plug and shafts shall be cast iron ASTM A 126, Class B, or 316 stainless steel. The entire plug, except for the shafts, shall be covered with nitrile (Buna N) rubber. The rubber compound shall have been vulcanized to the metal plug and shall have a peel strength of not less than 75 pounds per inch when tested according to ASTM D 429, method B. The valve seat shall be at least 90 percent pure nickel, welded-in overlay into the cast iron body. The top and bottom bearings shall be 316 stainless steel.
- E. Plug valves shall have a full port area of 100 percent of the nominal pipe size area.
- F. Valves shall have worm gear type actuators with 2-inch square operating nuts.
- G. Plug valves shall be installed side-ways with plug shaft horizontal so that the plug rotates upward when it opens, with the flow entering the seat end of the valve.
- H. Plug valves shall be coated inside with two-part epoxy suitable for sanitary sewer service which has been approved by Manatee County.

2.06 VALVE ACTUATORS

- A. Butterfly valve and plug valve actuators.

Butterfly valve and plug valve actuators shall conform to the requirements for actuators presented in AWWA C 504 and shall be either manual or motor operated. Actuators shall be capable of seating and unseating the disc against the full design pressure and velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.

- B. Manual Actuators.

Manual actuators shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities. Actuators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. They shall turn counter-clockwise to open valves. Manual actuators shall be of the traveling nut, self-locking type or of the worm gear type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Valves located above grade shall have handwheel and position indicator, and valves located below grade shall be equipped with a 2-inch square AWWA operating nut located at ground level and cast iron extension type valve box.

C. Motor Actuators (Modulating)

- (1) The motor actuated valve controller shall include the motor, actuator unit gearing, limit switch gearing, limit switches, position transmitter which shall transmit a 4-20 mA DC signal, control power transformer, electronic controller which will position the valve based on a remote 4-20 milliamp signal, torque switches, bored and key-wayed drive sleeve for non-rising stem valves, declutch lever and auxiliary handwheel as a self-contained unit.
- (2) The motor shall be specifically designed for valve actuator service using 480 volt, 60 Hertz, three phase power as shown, on the electrical drawings. The motor shall be sized to provide an output torque and shall be the totally enclosed, non-ventilated type. The power gearing shall consist of helical gears fabricated from heat treated alloy steel forming the first stage of reduction. The second reduction stage shall be a single stage worm gear. The worm shall be of alloy steel with carburized threads hardened and ground for high efficiency. The worm gear shall be of high tensile strength bronze with hobbed teeth. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout. Preference will be given to units having a minimum number of gears and moving parts. Spur gear reduction shall be provided as required.
- (3) Limit switches and gearing shall be an integral part of the valve control. The limit switch gearing shall be made of bronze and shall be grease lubricated, intermittent type and totally enclosed to prevent dirt and foreign matter from entering the gear train. Limit switches shall be of the adjustable type capable of being adjusted to trip at any point between fully opened valve and fully closed valve.
- (4) The speed of the actuator shall be the responsibility of the system supplier with regard to hydraulic requirements and response compatibility with other components within the control loop. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing. The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Gear limit switches must be geared to the driving mechanism and in step at all times whether in motor or manual operation. Provision shall be made for two additional rotors as described above, each to have two normally open and two normally closed contacts. Each valve controller shall be equipped with a double torque switch. The

torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve, should excessive load be met by obstructions in either direction of travel. The torque switch shall be provided with double-pole contacts.

- (5) A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operations, but must be responsive to manual operation at all times except when being electrically operated. The motor shall not rotate during hand operation nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running. The gear limit switches and torque switches shall be housed in a single easily accessible compartment integral with the power compartment of the valve control. All wiring shall be accessible through this compartment. Stepping motor drives will not be acceptable.
- (6) The motor with its control module must be capable of continuously modulating over its entire range without interruption by heat protection devices. The system, including the operator and control module must be able to function, without override protection of any kind, down to zero dead zone.
- (7) All units shall have strip heaters in both the motor and limit switch compartments.
- (8) The actuator shall be equipped with open-stop-close push buttons, an auto-manual selector switch, and indicating lights, all mounted on the actuator or on a separate locally mounted power control station.
- (9) The electronics for the electric operator shall be protected against temporary submergence.
- (10) Actuators shall be Limatorque L120 with Modutronic Control System containing a position transmitter with a 4-20MA output signal or equal.

D. Motor Actuators (Open-Close)

- (1) The electronic motor-driven valve actuator shall include the motor, actuator gearing, limit switch gearing, limit switches, torque switches, fully machined drive sleeve, declutch lever, and auxiliary handwheel as a self-contained unit.
- (2) The motor shall be specifically designed for valve actuator service and shall be of high torque totally enclosed, nonventilated construction, with motor leads brought into the limit switch compartment without having external piping or conduit box.

- (3) The motor shall be of sufficient size to open or close the valve against maximum differential pressure when voltage to motor terminals is 10% above or below nominal voltage.
- (4) The motor shall be prelubricated and all bearings shall be of the anti-friction type.
- (5) The power gearing shall consist of helical gears fabricated from heat treated steel and worm gearing. The worm shall be carburized and hardened alloy steel with the threads ground after heat treating. The worm gear shall be of alloy bronze accurately cut with a hobbing machine. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout.
- (6) Limit switches and gearing shall be an integral part of the valve actuator. The switches shall be of the adjustable rotor type capable of being adjusted to trip at any point between fully opened valve and fully closed valve. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing (influent valves require additional contacts to allow stopping at an intermediate position). The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Additional switches shall be provided if shown on the control and/or instrumentation diagrams. Limit switches shall be geared to the driving mechanism and in step at all times whether in motor or manual operation. Each valve actuator shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve should excessive load be met by obstructions in either direction of travel. Travel and thrusts shall be independent of wear in valve disc or seat rings.
- (7) A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operation except when being electrically operated. The motor shall not rotate during hand operation, nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve actuator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. Movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running.
- (8) Valve actuators shall be equipped with an integral reversing controller and three phase overload relays, Open-Stop-Close push buttons, local-remote-manual selector switch, control circuit transformer, three-phase thermal overload relays and two pilot lights in a NEMA 4X enclosure. In addition to the above, a close coupled air circuit breaker or disconnect switch shall be mounted and wired to the valve input power terminals for the purpose of disconnecting all underground phase conductors.

- (9) The valve actuator shall be capable of being controlled locally or remotely via a selector switch integral with the actuator. In addition, an auxiliary dry contact shall be provided for remote position feedback.
- (10) Valve A.C. motors shall be designed for operation on a 480 volt, 3-phase service. Valve control circuit shall operate from a fuse protected 120 volt power supply.
- (11) Motor operators shall be as manufactured by Limitorque Corporation, Type L120 or approved equal.

2.07 AIR RELEASE VALVES

- A. Air release valves shall be automatic float operated, GA Industries Fig-929 or an approved equal, with inlet size and working pressure ratings as required and NPT connections.
- B. Valve bodies shall be ductile iron per ASTM A 126, Class B. The orifice, float and linkage shall be 316 stainless steel. The seat shall be (Buna N) nitrile elastomer.

2.08 VALVE BOXES

- A. Buried valves shall have adjustable cast iron or HDPE valve boxes. Lids shall be cast iron drop type, and shall have "WATER", "SEWER", or "RECLAIM", as applicable, cast into the top. Lids will be painted "safety" blue for potable, purple for reclaimed, and green for sanitary sewer.
- B. Cast iron boxes shall be two-piece, or three-piece, as required, screw type, Tyler Pipe, 6850 Series, Box 461-S through 668-S, with extensions, as required to make the desired box length, or an approved equal. Bottom barrel shall be 5-1/4 inches inside diameter, with a flanged bottom with sufficient bearing area to prevent settling.
- C. HDPE boxes shall be two-piece, adjustable, 1/4-inch thick minimum heavy wall, high density polyethylene, with cast iron top and stainless steel adjustable stem, Trench Adapter, as manufactured by American Flow Control, or an approved equal. Bottom barrel shall have flanged bottom to prevent settling. All bolts, screws and pins shall be stainless steel.
- D. Reclaimed Valve Boxes shall be square 9-inch x 9-inch load bearing marked "Reclaimed Water" and painted Pantone 522C purple.
- E. All valves shall either have operating nuts within 4 feet below the top of the lid or shall have extension stems with centering guides to provide an extended operating nut within 4 feet below the lid. Extension stems shall be fixed to the valve operating nut with a stainless steel fastener.
- F. All potable water, sewer, and reclaimed water grade-adjustment risers shall be cast iron material just like the valve box. No plastic or steel risers shall be allowed.

- G. A centering device BoxLok or equal shall be installed in the valve box.
- H. Stand pipe shall match color code of the system being installed, (blue for potable, Pantone purple 522 C for reclaimed, and green for sanitary sewer).

2.09 CORPORATION STOPS AND SADDLES

- A. Corporation stops for connections to ductile iron and PVC water and reclaimed water mains shall be all red brass, alloy 85-5-5-5, per ASTM B 62, and shall conform to AWWA C800. 1-inch through 2-inch corporation stops shall be ball type, 300 psi working pressure rated, with AWWA MIP threaded inlets and compression, pack joint, flare, or FIP threaded joint outlets, Mueller as shown in the table below, or an approved equal. All joints made to CTS size HDPE tubing shall use stainless steel insert stiffeners.

Corporation Stops

Pipe Material	Type of Connection	Mueller 300 Model
HDPE	Compression x AWWA IP Thread	B-25028 (Saddle) *
HDPE	Compression x AWWA Taper Thread	B-25008 (Direct Tap) *
HDPE	Pack Joint x AWWA IP Thread	P-25028 (Saddle) *
HDPE	Pack Joint x AWWA Taper Thread	P-25008 (Direct Tap) *
Copper	Compression x AWWA IP Thread	B-25028 (Saddle)
Copper	Pack Joint x AWWA Taper Thread	B-25008 (Direct Tap)
Copper	Pack Joint x AWWA IP Thread	P-25028 (Saddle)
Copper	Pack Joint x AWWA Taper Thread	P-25008 (Direct Tap)
Copper	Flare x AWWA IP Thread	B-25028 (Saddle)
Copper	Flare x AWWA Taper Thread	B-25008 (Direct Tap)
Stainless Steel	FIP Thread x AWWA IP Thread	B-20046 (Saddle)
Stainless Steel	FIP Thread x AWWA Taper Thread	B-20045 (Direct Tap)

* Insert required, part number per manufacturer product information

- B. Potable plastic service pipe material and compression and pack joint connectors shall not be used in soil that is contaminated with low molecular-weight petroleum products, aromatic hydrocarbons, chlorinated hydrocarbons or organic solvents. Appropriate service tubing shall apply.
- C. Water and reclaimed water service connections to PVC and DIP mains shall be made using red brass saddles, alloy 85-5-5-5, per ASTM B 62. Straps, washers and nuts shall be brass or stainless steel. No ductile iron, cast iron or steel saddles will be allowed. Saddles shall be Smith Blair 325 Bronze saddles with Stainless Steel or brass extra wide strap or equivalent.
- D. Connections to PVC sanitary force mains for services up to 2 inches shall be made using Romac Style 306 double bolt stainless steel service saddles or equivalent.
- E. Service and air release valve (ARV) connections to HDPE water, reclaimed water and sewer mains may be made using Romac Style 306H saddle or approved equal. All saddles shall be properly sized per the manufacturer product information and be installed according to the manufacturer's written instructions. Connections

to HDPE mains shall not be made using narrower saddles similar to the Smith-Blair 325.

2.10 FLANGED ADAPTERS AND PLAIN END COUPLINGS

Plain end couplings and adapters shall be fusion-bonded epoxy coated carbon steel with Ethylene Propylene Diene Monomer (EPDM) rubber gaskets and 316 stainless steel nuts, bolts and spacers. Acrylonitrile butadiene (NBR) gaskets shall be used for potable water mains that are located in soil that is contaminated with low molecular-weight petroleum products or non-chlorinated organic solvents or non-aromatic organic solvents. Fluorocarbon (FKM) gaskets shall be used for potable water mains that are located in soil that is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons. Fluorocarbon (FKM) gaskets shall be used for potable water mains if the soil is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons, and is also contaminated with low molecular-weight petroleum products or organic solvents. Couplings shall be Dresser Style 38, or another approved equal. Flange adapters shall have a plain end compression seal similar to the style 38, with an ANSI 125 Class flange on the opposite end, and shall be Dresser Style 128W or an approved equal. Stainless steel backup rings shall be used for force mains that are located in corrosive environments including wetwells and valve vaults. Transitions couplings shall be Roman Style RC400 or another approved equal.

2.11 HOSE BIBS

Hose bibs shall be 3/4" or 1" brass, polished chromium plated brass, with vacuum breaker as noted on the drawings.

2.12 SWING CHECK VALVES

- A. Check valves shall be swing type, weighted lever, conforming to AWWA C508. Valves shall be iron-body, bronze-mounted, single disk, 175 psi working pressure for 2- through 12-inch, 150 psi for 14- through 30-inch, with ANSI B16.1 Class 125 flanged ends, by Mueller; No. A-2602-6-01BB (water), or AVK Series 41, or an approved equal.
- B. When there is no flow through the line, the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.
- C. Check valves shall have bronze seat and body rings, 316 stainless steel hinge pins and 316 stainless steel nuts and bolts on bolted covers.
- D. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight.

2.13 HYDRANTS

Hydrants shall be dry barrel, nostalgic style, and shall be AVK Series 2780, American Darling B-84-B, Mueller Super Centurian 250, or approved equal and shall conform to

AWWA C502 and UL/FM certified, and shall in addition meet the specific requirements and exceptions which follow:

- A. Hydrants shall be according to manufacturer's standard pattern or nostalgic style and of standard size, and shall have one 5-inch Storz connection or equivalent with two 2½-inch hose nozzles.
- B. Hydrant inlet connections shall have mechanical joints for 6-inch pipe.
- C. Hydrant valve opening shall have an area at least equal to that area of a 5 1/4-inch minimum diameter circle and be obstructed only by the valve rod. Each hydrant shall be able to deliver 500 gpm minimum through its two 2 1/2 -inch hose nozzles when opened together with a loss of not more than 2 psi in the hydrant per AWWA C502.
- D. The upper and lower stem rod shall be stainless steel and shall have a breakable stem-rod coupling of stainless steel, or cast iron or ductile iron with a fusion bonded epoxy coating, with stainless steel pins and clips.
- E. Hydrants shall be hydrostatically tested as specified in AWWA C502 and shall be rated at 250 psi minimum.
- F. The operating nut shall be 1½ -inch pentagon shaped with a protective weather cover, and open counter clockwise.
- G. All nozzle threads shall be American National Standard.
- H. Each nozzle cap shall be provided with a Buna N rubber washer.
- I. All hydrants shall be traffic break away type and allow for 360 degree rotation to position the Storz connection/nozzle in the desired direction after installation.
- J. Hydrants must be capable of being extended without removing any operating parts.
- K. Hydrant extensions shall be fusion bonded epoxy coated inside and outside with a stainless steel stem. The breakaway coupling can be fusion bonded epoxy coated or stainless steel. Only one hydrant extension is allowed per hydrant.
- L. Weepholes shall be excluded from fire hydrants.
- M. Hydrant main valve closure shall be of the compression type opening against the pressure and closing with the pressure. The main valve shall be faced or covered with EPDM elastomer, which shall seat on a bronze ring.
- N. Hydrant bonnets, weather cover, nozzle section, caps and shoe shall be cast iron or ductile iron, and shall be holiday free fusion-bonded epoxy coated at the factory, per AWWA C550, inside and outside. Lower barrel shall be fusion bonded epoxy coated inside and outside. Aboveground parts shall also have a top coat of Sherwin-Williams Acrolon 218 HS acrylic polyurethane or approved equal; color Safety Yellow for fire hydrants that are connected to the potable water system or

Pantone 522C purple for fire hydrants that are connected to the reclaimed water system.

- O. Exterior nuts, bolts and washers shall be stainless steel. Bronze nuts may be used below grade.
- P. All internal operating parts shall be removable without requiring excavation.

2.14 RESTRAINED JOINTS

- A. Pipe joints shall be restrained by poured-in-place concrete thrust block, external thrust restraints, or integral restrained gasket. All external thrust restraint devices with 350 psi rating shall be allowed for pipe up to 24" and 250 psi rating for pipe larger than 24". Allowed external thrust restraint models are Stargrip Series 3100S/3100P/3000S as manufactured by Star Pipe Products and Series 1700/1100 by EBAA Iron. Flanged joints may be used above ground.
- B. All internal restrained gaskets shall be allowed up to 24" such as Sure Stop 350 by McWane Ductile, or Field Lok 350 by US Pipe. Restrained gaskets shall have 350 psi rating.
- C. Restrained joints may also be Flex-Ring Joint as manufactured by American Cast Iron Pipe Company, TR Flex Joint by US Pipe or McWane Ductile. These joints shall be rated for 350 psi for pipe up to 24" and 250 psi for pipe larger than 24". All pipe directly exposed to storage pond water shall use one of the internal restraints models identified in this Section 02640, 2.14C.
- D. All T-bolts, bolts, nuts, washers, and all thread rods shall be 316 stainless steel. The use of rebar with welded thread is prohibited.
- E. Restrained joint designs, which require wedges and/or shims to be driven into the joints in order to disassemble the pipe shall not be allowed.

2.15 TAPPING SLEEVES AND VALVES

- A. Tapping valves shall meet the requirements of AWWA C509/C515 with ductile iron body and shall be rated for a pressure of 250 psi. The valves shall be flanged with alignment ring by mechanical joint with a nonrising stainless steel stem. All bolts, nuts and washers shall be stainless steel. Manufacturer shall use Never-Seez or equivalent during assembly of bolt and nut sets to prevent galling of similar metals. Stem seals shall be provided and shall be of the O-ring type, two above and one below the valve's thrust collar. Valve shall be designed for vertical burial and shall open counterclockwise. Operating nut shall be AWWA standard 2-inch square for valves 2 inches and up. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve to accommodate full size shell cutter. Gaskets shall cover the entire area of the flange surface and be 1/8-inch minimal thickness of red rubber. The wedge shall be ductile iron fully encapsulated with EPDM rubber. All bolts, nuts and washers between the sleeve and valve shall be stainless steel.
- B. Tapping sleeves and saddles shall seal to the pipe by the use of a confined "O"

ring gasket, and shall be able to withstand a pressure test of 180 psi for water lines or 150 psi for sewer force mains for one hour with no leakage in accordance with AWWA C110. A stainless steel 3/4-inch NPT test plug shall be provided for pressure testing. All bolts joining the two halves shall be stainless steel and shall be included with the sleeve or saddle. Sleeves and saddles shall be fusion applied epoxy coated, or be made of 18-8 Type 304 stainless steel. Saddle straps shall be 18-8 Type 304 stainless steel.

2.16 TRACER WIRE TEST STATION BOXES

Tracer wire test station boxes shall be provided at plug valves, butterfly valves, blowoff valves, gate valves, fire hydrants and backflow preventers as indicated in these Standards. Tracer wire test station boxes for yard service shall be 2 ½ inch diameter, 15 inch length, ABS plastic with a cast iron rim and lid, P200NFGT as manufactured by Bingham & Taylor, or equal approved by Manatee County. Where test boxes will be in streets or subject to vehicular traffic, use B&T Model P525RD, 5 ¼ -inch diameter or equal, centered in a separate concrete pad similar to a valve box pad.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All valves and appurtenances shall be installed in the location shown, true to alignment and rigidly supported. Any damage occurring to the above items before they are installed shall be repaired to the satisfaction of the County.
- B. After installation, all valves and appurtenances shall be tested at least two hours at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the County.
- C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.
- D. Pipe for use with flexible couplings shall have plain ends as specified in the respective pipe sections.
- E. Flanged joints and mechanical joints shall be made with 316 stainless steel bolts, nuts and washers.
- F. Prior to assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought to the correct position, the gasket shall be centered properly over the pipe

ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.

- G. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8". Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6" from the end.
- H. Valve boxes with concrete bases shall be installed as shown on the Drawings. Mechanical joints shall be made in the standard manner. Valve stems shall be vertical in all cases. Place cast iron box over each stem with base bearing on compacted fill and the top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on cover shall be parallel to pipe. Remove any sand or undesirable fill from valve box.

3.02 HYDRANTS

- A. Hydrants shall be set at the locations designated by the County and/or as shown on the Drawings and shall be bedded on a firm foundation. A drainage pit on crushed stone as shown on the Drawings shall be filled with gravel or crushed stone and satisfactorily compacted. During backfilling, additional gravel or crushed stone shall be brought up around and 6" over the drain port. Each hydrant shall be set in true vertical alignment and shall be properly braced. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the plans. Felt paper shall be placed around the hydrant elbow prior to placing concrete. CARE MUST BE TAKEN TO INSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS. Concrete used for backing shall be as specified herein.
- B. When installations are made under pressure, the flow of water through the existing main shall be maintained at all times. The diameter of the tap shall be a minimum of 2" less than the inside diameter of the branch line.
- C. The entire operation shall be conducted by workmen thoroughly experienced in the installation of tapping sleeves and valves, and under the supervision of qualified personnel furnished by the manufacturer. The tapping machine shall be furnished by the Contractor if tap is larger than 12" in diameter.
- D. The Contractor shall determine the locations of the existing main to be tapped to confirm the fact that the proposed position for the tapping sleeve will be satisfactory and no interference will be encountered such as the occurrence of existing utilities or of a joint or fitting at the location proposed for the connection. No tap will be made closer than 30" from a pipe joint.
- E. Tapping valves shall be set in vertical position and be supplied with a 2" square operating nut for valves 2" and larger. The valve shall be provided with an oversized seat to permit the use of full sized cutters.
- F. Tapping sleeves and valves with boxes shall be set vertically or horizontally as indicated on the Drawings and shall be squarely centered on the main to be tapped.

Adequate support shall be provided under the sleeve and valve during the tapping operation. Sleeves shall be no closer than 30" from water main joints. Thrust blocks shall be provided behind all tapping sleeves. Proper tamping of supporting earth around and under the valve and sleeve is mandatory. After completing the tap, the valve shall be flushed to ensure that the valve seat is clean.

3.03 SHOP PAINTING

Ferrous surfaces of valves and appurtenances shall receive a coating of shop rust-inhibitive primer. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

3.04 FIELD PAINTING

All metal valves and appurtenances specified herein and exposed to view shall be painted per Specification Section 09900.

3.05 INSPECTION AND TESTING

All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipelines shall be subjected to a hydrostatic pressure and leak testing. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.7. Prior to testing, the pipe lines shall be supported in a manner approved by the County to prevent movement during tests.

All leaks shall be repaired and lines retested as approved by the County.

END OF SECTION

SECTION 02800 MICROTUNNELING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section establishes the minimum requirements for installing pipe by microtunneling at locations indicated on the Drawings. Jacking pipe shall be provided in accordance with the applicable ASTM A-1097 Standard Specification for Steel Casing Pipe, Electric-Fusion Arc Welded. The Contractor shall furnish all labor, equipment, power, water, and materials necessary for microtunneling pipe installation and other associated Work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02220 - Excavation, Backfill, Fill and Grading for Structures
- B. Section 02221 - Trenching, Bedding and Backfill for Pipe

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. The publications listed below form a part of this Specification to the extent referenced. Where conflicts between these Specifications and the referenced specification, code, or standard occur, the more restrictive specification shall govern. The latest edition available on the date of issue of Contract Documents shall be used.
- B. Safety Codes:
 - 1. Occupational Safety and Health Administration (OSHA) Regulations and Standards for Underground Construction, 29 CFR Part 1926, Subpart S, Underground Construction, and Subpart P, Excavations.

1.04 DEFINITIONS

- A. Microtunneling: A remotely controlled, guided, pipejacking process that provides continuous support to the excavation face and uses a pressurized slurry spoil removal system. The microtunneling process does not require routine personnel entry into the tunnel. A key element of microtunneling is the ability to control the stability of the face by applying fluid and mechanical pressure to balance the earth and groundwater pressures.
- B. Microtunnel Boring Machine (MTBM): Remote-controlled, guided slurry shield that can provide continuous support to the excavation face. The MTBM is operated from a control container located on the ground surface. Soil excavation is achieved by a rotating cutterwheel. Excavated soil enters a slurry chamber where it is mixed with water to form a slurry. Pumps cycle the slurry to the surface where a separation plant removes the solids from the slurry. The recycled slurry is then returned to the face in a closed system of pumps and hoses. Slurry used to convey spoil may be water; however, it may contain additives such as bentonite that allow it to carry more solids and provide gel strength to prevent the slurry from permeating the soils at the heading. The guidance system consists of a laser or theodolite and EDM device mounted in the

- jacking shaft communicating a reference line to a target mounted in the MTBM's articulated steering head. The target in an MTBM provides the operator with information about the machine's accuracy to design line and grade, and can allow for accurate steering control.
- C. Jacking Pipe: Pipe jacked behind the microtunneling machine. The jacking pipe shall be a pipe specifically designed to be installed by pipejacking using microtunneling equipment.
 - D. Carrier Pipe: Permanent pipe for operational use that is used to convey flows. Carrier pipes may be installed inside a casing pipe, or direct-jacked, if designed for direct jacking and permitted for the crossing.
 - E. Launch/Retrieval Seal or Entry/Exit Seal: A mechanical seal usually comprised of one or more rubber flanges attached to a steel housing that is mounted to the wall of the jacking/receiving shaft. The microtunneling machine distends the flange seal as it passes through, reducing water, slurry, or lubrication inflows into the shaft during microtunneling operations.
 - F. Lubrication/Grout Port: A port located within the MTBM or in the jacking pipe fitted with a one-way valve for injection of lubrication material or grout into the annular space between the jacking pipe and the ground.
 - G. Jacking Record: A computer-generated or manually recorded report that contains information on microtunneling operations and may include: date, time, name of operator, tunnel drive identification, installed tunnel length, rate of advance, jacking forces, cutterhead speed and torque, slurry inflow and outflow rates and pressures, bypass valve position, use of any cutting or high-pressure nozzles, face pressure, steering jack positions, line and grade offsets, any movement of the guidance system, machine inclination and roll, intermediate jacking station use and jacking forces, pressure, volume, and location of any lubricant pumped, problems encountered with the tunneling machine or other components or equipment, and durations and reasons for delays.
 - H. Settlement Point: A point with elevation and spatial location established by survey prior to construction. The point is re-surveyed periodically to monitor ground movements. The point may be a nail, pin, subsurface settlement rod, borehole extensometer, or other device that can be readily located and surveyed.
 - I. Obstruction: Object(s) located wholly or partially within the cross-sectional area excavated by the microtunneling machine that prevent the forward movement of the microtunneling machine after all diligent efforts to advance past the object by the Contractor have failed.

1.05 DESIGN CRITERIA

- A. Microtunneling Equipment:
 - 1. Only pressurized, closed-face, remotely operated microtunneling equipment using slurry spoil removal, shall be used for all microtunneling Work required for this project as defined in this Section. Open-shield machines are not acceptable for this project. The microtunneling machine shall be manufactured by Akkerman,

Herrenknecht, Iseki, Lovat, Wirth/Soltau, or approved equal that specializes in the design and fabrication of this type of equipment. The machine shall be capable of fully supporting the face during both excavation and shutdown periods, and shall have the capability of exerting a continuous, measurable, controllable stabilizing pressure at the face as required to prevent loss of ground and groundwater inflows. The system shall be capable of adjustment required to counterbalance the groundwater and soil pressures at the tunnel face to an accuracy of \pm one foot of equivalent hydrostatic pressure (i.e., \pm 62.4 psf). A pressure gage shall be provided so the operator can monitor the pressure exerted at the heading.

2. Microtunneling equipment selected for the project shall be suitable for and capable of efficiently advancing through the geologic conditions anticipated by the Contractor. The microtunneling machine shall be capable of crushing or excavating boulders or other objects up to 25% of the outside diameter of the MTBM and up to an unconfined compressive strength of 15,000 psi.
 3. The machine shall have a watertight articulation joint between two segments of the shield. The shield shall be steerable in both the vertical and horizontal directions to allow the operator to maintain line and grade within the specified tolerances. The guidance system shall be designed to function at the maximum required drive length without loss of accuracy or reliability of function. A display showing the position of the machine in relation to design line-and-grade shall be provided at the control panel to allow the operator to continuously monitor line and grade deviations.
 4. The cutterhead shall be bi-directional so that it can rotate in either direction and shall have other suitable provisions to minimize rotation or roll of the machine or pipe during installation.
 5. The maximum radial overcut shall be one (1.0) inch. The minimum radial overcut shall be one-half (1/2) of one inch. The radial overcut shall be determined as the difference between the maximum diameter created by the overcut band on the machine and the outer diameter of the pipeline or casing, divided by two.
 6. A lubrication injection system shall be provided and used to inject pipe lubricant around the MTBM and jacking pipe to decrease frictional resistance. Lubrication materials may include a mixture of bentonite and/or polymers and water. Lubrication ports shall be provided in the MTBM and jacking pipe to allow for lubrication along the pipe string.
 7. The MTBM shall be equipped with a computerized data acquisition system for collecting information for the jacking record. Means of providing electronic copies of the data will also be required for production of a daily jacking record and transfer of electronic data. As a supplement to the computerized data acquisition system, the Contractor shall also use manual data acquisition for collecting information for the jacking record. If a computerized system is not available, the contractor shall use a manual data acquisition for collecting information for the jacking record.
 8. Where there is a potential for flammable or noxious gases to be encountered, or if required by OSHA, the machine shall have an automatic shut-off switch and provisions for continuous gas monitoring.
- B. Methods and equipment shall control surface settlement and heave above the pipeline to prevent damage to existing utilities, facilities, and improvements. Ground movements (settlement/heave) shall be limited to values that do not cause damage or distress to surface features, utilities, or improvements. The Contractor shall be responsible for any damage to existing features, improvements, or utilities, and shall

repair any damage to the satisfaction of the Owner, at no additional cost to the Owner, and without schedule extension.

- C. The slurry separation plant shall be designed to achieve the rates of spoil separation and slurry cleaning required for the Contractor's planned production rates. Shaker screens, hydrocyclones and centrifuges will likely be required for efficient separation of spoils. The separation plant must fit within the allowable work areas shown on the Drawings. Excavated slurry pits or ponds will not be allowed. Additionally, all excavated materials and slurry must be discharged into, and completely contained within tanks, trucks, or other containers at all times. On-site disposal shall not be permitted.
- D. Pipe design for jacking loads and acceptable fabrication tolerances is the responsibility of the Contractor. Maximum jacking loads applied to the jacking pipe shall not exceed fifty percent (50%) of the ultimate compressive strength of the pipe material or the maximum design strength of the pipe as established by the manufacturer, whichever is lower.
- E. A thrust block shall be used to transfer jacking loads to the soil behind the jacking shaft. The thrust block face shall be constructed perpendicular to the proposed pipe alignment. The thrust block shall be designed to withstand 1.5 times the calculated maximum jacking force, without excessive deflection or displacement. Forces applied to the soil shall not exceed the allowable passive earth pressure described in Contractor's approved submittal, with a minimum factor of safety of 1.5, or the strength of the ground support system with consideration of passive soil resistance and allowable deformations of the support system and soil mass.
- F. Provide launch and retrieval seals at all shaft exit and entry locations. Provide stabilization to prevent loss of ground and uncontrolled inflows at entry and exit seal locations.

1.06 QUALITY CONTROL

- A. Failure to meet the qualification requirements is failure to fulfill the Contract and the Contractor will be required to obtain a subcontractor that meets the qualification requirements. The microtunneling contractor shall meet the qualification stated below.
- B. The site safety representative and personnel responsible for air quality monitoring shall be experienced in tunnel construction.
- C. The Contractor shall use a surveyor who shall be responsible for establishing line-and-grade control. The surveyor responsible for line-and-grade control shall be a Licensed Surveyor registered in the State of Florida
- D. The Contractor shall provide at least 72 hours advance written notice to Owner of the planned launch of the MTBM.
- E. All Work by the Contractor shall be done in the presence of the Owner or Owner's Representative unless the Owner or Owner's Representative grants prior written approval to perform such Work in Owner's absence.

- F. The Contractor shall immediately notify the Owner or Owner's Representative, in writing, when any problems are encountered with equipment or materials, or if the Contractor believes the conditions encountered are materially and significantly different than those indicated by the Contract Documents.
- G. The Contractor shall allow access to the Owner or Owner's Representative and shall furnish necessary assistance and cooperation to aid the Owner or Owner's Representative in observations, measurements, data and sample collection, including, but not limited to the following:
 - 1. The Owner or Owner's Representative shall have reasonable access to the operator control container prior to, during, and following all microtunneling operations. This shall include, but not be limited to, providing visual access to real-time operator control screens, gauges, and indicators.
 - 2. The Owner or Owner's Representative shall have reasonable access to the jacking and reception shafts prior to, during, and following all jacking operations. This shall include, but not be limited to, visual inspection of installed pipes, launch and retrieval seals, and verification of line and grade. The Contractor shall provide safe access in accordance with all safety regulations.
 - 3. The Owner or Owner's Representative shall have reasonable access to the slurry separation plant prior to, during, and following all microtunneling operations. This shall include, but not be limited to, reasonable access to shaker screens, hydrocyclones, conveyor belts, centrifuge equipment, and slurry and spoil holding tanks. The Owner or Owner's Representative shall be allowed to collect soil samples from the shaker screens and/or spoil holding tanks on the slurry separation plant a minimum of once per installed pipe section, or every ten (10) feet, whichever is more often, and at any time when soil conditions change or debris or foreign objects are apparent or suspected.
 - 4. The Owner or Owner's Representative shall have reasonable access to the bentonite lubrication plant prior to, during, and following all jacking operations. This shall include, but not be limited to, reasonable access to visually inspect storage and mixing tanks, lubricant pressures and pumping rates, and amount and type of lubricants on site.

1.07 SUBMITTALS

- A. Submittals shall be made in accordance with these Specifications. Provide sufficient detail to allow the Owner or Owner's Representative to compare whether the proposed equipment, materials, and procedures will meet the Contract requirements. All drawings shall be legible with dimensions accurately shown and clearly marked in English. Poor quality drawings and photographs will not be accepted. Review and acceptance of the Contractor's submittals by the Owner shall not be construed in any way as relieving the Contractor of its responsibilities under the Contract.
- B. The Contractor shall prepare and submit to the Owner or Owner's Representative, the following:
 - 1. Qualifications: Submit the name of the Contractor that will perform the microtunneling Work and written documentation summarizing the qualifications of the firm, description of reference projects including owner's name and contact information, project superintendent, machine operators, and site safety representative. Submit personnel qualifications in accordance with Paragraphs

1.06 B through F. Provide qualifications and training records for site safety representative, personnel responsible for air quality monitoring, and licensed surveyor.

2. Microtunneling Equipment: Submit the following describing the microtunneling equipment and construction methods to be employed:
 - a. A detailed description of the equipment to be used for each microtunnel drive.
 - b. Manufacturer's literature describing the microtunneling system(s) including the machine(s) and all ancillary equipment. Provide descriptions of projects on which this system has been successfully used including names, addresses, and telephone numbers of owner's representatives for these projects as well as length, diameter, and pipe material used. Include the following information concerning the MTBM:
 - 1) Dimensions and weights
 - 2) Torque, rotation speed range, and no-load or "dry" torque reading
 - 3) Cutter types, number, configuration, and gauge cutter setting for overcut, (include photographs or drawings)
 - 4) Articulation and steering capability
 - 5) Cutterhead jets/ports
 - 6) Face/excavation chamber pressure gauge locations and types
 - c. The excavation diameter based upon the outermost dimensions of the shield. Also provide the radial overcut which shall be determined as the difference between the maximum shield/overcut band diameter and the outer diameter of the jacking pipe, divided by two.
 - d. A description of the alignment control systems including manufacturer's literature and drawings showing setup, support provisions, and other details for the guidance system. Submit a description of surveying methods used to set the guidance system positions and a description of procedures to check and reset or realign guidance system during construction. Submit a description of methods to ensure that thrust block, exit and entry seals, and jacking frame are installed on proper line and grade. Submit results of line and grade survey to ensure that the thrust block, jacking frame, guide rails, entry seal, and exit seals are installed properly prior to launch of each drive. Confirm that these systems can achieve the required pipeline line and grade within the specified tolerances.
 - e. Capacity, number, and arrangement of main jacks including details of the thrust ring, thrust block, jacking frame, pressure gauges, and jack calibration data (pressure vs. force relationship for each stage of the jacks).
 - f. Details of intermediate jacking stations, including material of IJS sleeve, number of hydraulic cylinders per IJS, thrust capacity, quantity to be used, and anticipated placement within the pipe string,
 - g. Submit drawings and details of microtunneling entry and exit seals including materials, dimensions, arrangement, and installation procedures.
 - h. Details of pipe lubrication injection system and pipe lubricants to be used during microtunneling, including manufacturer's literature. Include a description of proposed lubrication procedures during jacking, including estimated volumes of lubricant that will be pumped.
 - i. Details of spoil and slurry handling, separation, transport, and disposal equipment and procedures including details of slurry additives, slurry separation plant, and the location of slurry and spoil disposal sites. Confirm

- that slurry and spoils shall be contained at all times. Provide manufacturer's description for slurry additives.
- j. Ventilation and air quality monitoring system, including monitors for MTBM deactivation and alarm activation.
3. Work Area Layout Drawings: The Contractor shall submit shaft layout drawings detailing dimensions and locations of all equipment, including overall work area boundaries. Shaft layout drawings will be required for jacking and receiving shaft locations and shall be to scale, or show correct dimensions. The Contractor's layout drawings shall show that all equipment and operations shall be completely contained within the allowable construction zones shown on the Drawings.
 4. Submit details on the methods to be used to protect existing utilities from damage that may result from microtunneling operations. Specific plans shall be submitted for locating, monitoring, and protecting in place each existing utility crossed with less than eight (8) feet of clearance between the outside of the pipe and the outside of the existing utility. Protection methods may include exposure and direct monitoring, ground improvement, and/or direct support from the ground surface, in addition to the best practices of filling the annular space with lubricant during jacking. followed by contact grouting immediately after pipejacking is complete.
 5. Schedule: Provide a schedule for all microtunneling Work, identifying all major construction activities as independent items. The schedule shall include, as a minimum, the following activities: mobilization, groundwater control at jacking and receiving shafts, shaft excavation and support, working slab construction, thrust wall construction, jacking equipment setup, ground stabilization, entry ring installation for launch of machine, microtunneling, retrieval of the MTBM, removal of shaft supports and shaft backfill, site restoration, cleanup, and demobilization. The schedule shall also include the work hours and workdays for each activity. The schedule shall be updated and resubmitted by the Contractor every two (2) weeks, or more frequently if requested by the Owner or Owner's Representative.
 6. Daily Records: The following daily records shall be submitted to the onsite Owner's representative by noon on the day following the shift for which the data or records were taken.
 - a. Jacking Records: The Contractor shall provide complete jacking records to the Owner or Owner's Representative. These records shall include, at a minimum: date, time, name of operator, tunnel drive identification, installed pipe number and corresponding tunnel length, rate of advance, jacking forces, cutterhead RPM and torque, slurry flow rates and pressures, bypass valve position, use of any cutting or high-pressure nozzles, face pressure, steering jack positions, location of MTBM target as compared to design line and grade, any movement of the guidance system, machine inclination and roll, intermediate jacking station use and jacking forces, problems encountered with the tunneling machine or other components or equipment, and durations and reasons for delays. Computer-recorded data should be referenced to time and distance and should be recorded at time intervals of one minute or less. Manually recorded observations should be made at intervals of not less than three times per pipe, whenever conditions change, and as directed by the Owner or Owner's Representative. The Contractor shall submit samples of the automated and manual jacking records for Owner or Owner's Representative's

- approval. Samples shall include electronic data and any necessary programs to interpret data, and the manual logs or records to be used.
- b. Lubrication Records: The Contractor shall provide lubrication records to the Owner or Owner's Representative. These records shall include the injection locations along the pipe string, lubrication type and additives, and amount, in gallons, of lubricant pumped throughout a drive.
 - c. Slurry Additives: The Contractor shall provide records of all slurry additives including any bentonite and polymers. The time and volume, or weight, of the additive shall be noted. Measurements of mud weights, specific gravity, and viscosity shall be made at the beginning, middle, and end of each shift, and submitted with the daily logs. Measurements shall be made on slurry samples taken from the slurry tanks and noted accordingly.
7. Calculations: Calculations shall be submitted in a neat, legible format. Assumptions used in calculations shall be clearly stated and shall be consistent with anticipated ground conditions. All calculations shall be prepared by or under the direct supervision of a Professional Engineer licensed in State of Florida,
- a. calculations demonstrating that the proposed jacking pipe is capable of supporting the maximum stresses to be imposed during jacking. The calculations shall take into account earth and hydrostatic loads, jacking forces, external loads such as live loads due to traffic, and any other loads that may be reasonably anticipated during jacking and during the service life of the pipe. All loads shall be shown and described. Include assumed maximum drive length.
 - b. Provide an estimate of the maximum jacking force expected to complete each drive, accounting for both face pressures and frictional resistance along the pipe string.
 - c. Calculations demonstrating that the soils behind the thrust block can transfer the maximum planned jacking forces exerted by the main jacks to the ground during pipe installation with a factor of safety of at least 1.5, without excessive deflection or displacement. (See also Section 02261 - Shaft Excavation and Support, Paragraph 1.06 Submittals.) The thrust block capacity submittal shall be coordinated between the General Contractor and microtunneling subcontractor.
8. Intermediate Jacking Stations: Drawings and design details for intermediate jacking stations including dimensions, shell materials, seals, proposed spacing, method of operation, number of stations, method of abandonment, and final seal configuration.
9. Contingency Plans: The following list includes problem scenarios that may be encountered during the microtunneling operations. The Contractor shall submit contingency plans for dealing with each problem scenario while satisfying the specifications. These plans shall include the observations and measurements required to clearly identify the cause of the problems.
- a. Machine unable to advance:
 - 1) Possible obstructions (including boulders, old foundations, well & pipe casing, metallic debris, or reinforced concrete).
 - 2) Insufficient jacking capacity.
 - 3) Machine or component malfunction.
 - b. Slurry separation problems:

- 1) Cuttings are not adequately separated using the slurry separation plant.
 - 2) Cuttings settle out in the slurry lines before reaching the separation plant.
 - c. Strong hydrocarbon smell is detected in the slurry returns, MTBM, tunnel, or in the shaft. Combustible gas meters at MTBM or in tunnel exceed 10% of LEL for methane or possible volatile organic compounds.
 - d. Laser distorted by heat, humidity, or physical disturbance.
 - e. Jacking Forces:
 - 1) Jacking forces increase dramatically or suddenly.
 - 2) Jacking forces reach design capacity of pipe, jacking frame, or thrust wall (treat these scenarios as separate incidents).
 - f. Settlement and Subsidence:
 - 1) Excavated volumes significantly exceed pipe volume installed.
 - 2) Slurry face pressures and/or torque on head decrease suddenly and significantly.
 - g. Groundwater inflows to shaft increase significantly and/or transport fines into shaft in measurable quantities.
 - h. Steering or guidance/tracking system difficulties result in line and grade tolerances being exceeded.
 - i. Pipe has been damaged or has been found to be out of compliance with specifications:
 - 1) Before installation.
 - 2) During, or after installation.
 - j. Thrust block deforms excessively under jacking loads, or provides insufficient capacity to advance pipe.
 - k. Control signal is lost. Cannot monitor position, torque, thrust, steering jack position, or other performance parameters
 - l. Excessive pipe separation at joints or pipe string movement into shaft is experienced when jacks are retracted.
10. Safety Plan: A Safety Plan for the microtunneling operations including air monitoring equipment and procedures, and provisions for lighting, ventilation, and electrical system safeguards.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. 3/4" Thick Permalok Steel Pipe in accordance with ASTM A1097 or approved equal to be installed by microtunneling. Piping must be able to withstand 1.5 times the maximum microtunneling force to be exerted.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Microtunneling shall not begin until the following tasks have been completed:
 - 1. Contractor has requested locates from all utility owners, in accordance with Sunshine 811 Laws, and all requested utility locates have been made, or area marked clear.
 - 2. Contractor shall conduct visual site inspection and records search of as-builts to investigate potential unmarked, mismarked, and abandoned utilities.

3. Contractor shall confirm locates of all marked and discovered utilities, using vacuum potholing or other soft dig techniques for all crossing utilities and all adjacent utilities within the tolerance zone defined by Sunshine 811 Laws.
 4. Contractor has implemented appropriate measures to monitor and protect existing utilities and sensitive features.
 5. All required submittals have been provided, reviewed, and accepted.
 6. Jacking shaft and receiving shaft excavations and support systems for each drive have been completed in accordance with approved submittals. Elevations of working slab surfaces have been surveyed to confirm that Work can be completed in accordance with alignment and grade shown on Drawings.
 7. The Contractor has stabilized the soils at entry and exit locations as required. The Contractor has confirmed that the ground has been stabilized to the extent that ground will remain stable without movement of soil or water while the entry/exit location shoring is removed and while the machine is being launched or received into a shaft or during jacking operations.
 8. All settlement monitoring instruments have been installed, surveyed, and baseline survey measurements have been provided to and accepted by the Owner or Owner's Representative.
 9. The location, orientation and grade of the jacking frame or guide rails and entry/exit seals have been surveyed to ensure they are on the proper line and grade and to verify that they are properly supported.
 10. Guide rails or jacking frame shall be securely attached to the shaft supports and concrete working slab to prevent movement or shifting during the Work.
 11. A start-up inspection of all mechanical and hydraulic systems associated with the microtunneling operations has been completed. The system shall be tested on the surface to ensure that the microtunneling machine and supporting equipment are functioning properly. The Owner or Owner's Representative shall be notified at least 72 hours prior to the start-up inspection and a site inspector representing the Owner or Owner's Representative will be present during the start-up inspection. Key machine performance data will be measured and recorded by the Contractor during this inspection, including no-load cutterhead rotational torque, functionality of main and steering jacks, laser/theodolite/water level, and target, and other components. The records of the start-up inspection will be submitted to the Owner or Owner's Representative within 24 hours of the completed inspection.
 12. Site safety representative has prepared a code of safe practices and an emergency plan in accordance with the Safety Plan. Provide the Owner or Owner's Representative with a copy of each prior to starting microtunneling. Hold safety meetings and provide safety instruction for new employees. Conduct a pre-construction safety conference. Arrange this conference and inform the Owner or Owner's Representative of the time and place of the conference at least seven (7) days in advance.
- B. The Contractor shall properly manage and dispose of groundwater inflows to the shafts in accordance with all permit conditions. The Contractor shall not discharge groundwater inflows into storm sewers, sanitary sewers, water bodies, or streets without proper permits/approvals.
- C. The Contractor shall furnish all necessary equipment, power, water, and utilities for pipejacking, pipe lubricant mixing and pumping, spoil removal and disposal, grouting, and other associated work required for the Contractor's methods of construction.

- D. Conduct all operations such that trucks and other vehicles do not interfere with traffic or create a mud, dust, or noise nuisance in the streets and to adjacent properties. Promptly clean up, remove, and dispose of mud, spoils and slurry spillage, and any slurry discharges.
- E. All Work shall be done so as not to disturb roadways, adjacent structures, landscaped areas, or existing utilities. Any damage shall be immediately repaired to original or better condition and to the satisfaction of Owner or Owner's Representative at no additional cost to the Owner.
- F. Whenever there is a condition that is likely to endanger the stability of the excavation or adjacent structures, the Contractor shall operate with a full crew 24 hours a day, including weekends and holidays, without interruption, until those conditions no longer jeopardize stability.

3.02 JACKING OPERATIONS

- A. Provide a suitable jacking frame and thrust block to carry out the Work. Provide, install, and operate intermediate jacking stations as necessary to complete the microtunneling drives indicated on the Drawings and in accordance with design criteria.
- B. The Contractor shall install and use IJSs if jacking forces for any segment reach or exceed 70% of the safe design capacity of the jacking pipe, , jacking frame, or thrust block, whichever is lowest. The Contractor may elect to use IJSs before jacking forces reach the threshold values.
- C. Transport the jacking pipe from storage to the jacking shaft without damage. Transport methods shall be acceptable to pipe manufacturer. Damaged jacking pipe shall not be used in the Work, unless permitted in writing by the Owner or Owner's Representative. Set the pipe to be jacked on properly braced and supported guide rails or jacking frame.
- D. The axial forces from the thrust jacks shall be distributed to the jacking pipe uniformly through a thrust ring to prevent damage to the ends of the pipe. Jacking forces applied to the pipe shall not exceed the specified allowable compressive stresses stated in Paragraph 1.05 E of this Specification.
- E. Jacking pipe sections shall be jacked into position following the design line and grade without damaging the pipe. In the event a section of pipe is damaged during the jacking operation, the Contractor, with written approval from the Owner or Owner's Representative, shall make temporary repairs to the pipe and shall jack the pipe through to the next shaft for removal. Other methods of repairing the damaged pipe may be used if approved in writing by the Owner or Owner's Representative.

3.03 MICROTUNNELING

- A. Microtunneling shall be completed in accordance with approved submittals, and all applicable permit conditions.
- B. Microtunneling operations shall control surface settlement and heave above the pipeline to prevent damage to existing utilities, facilities, and improvements. The

Contractor shall repair any damage resulting from construction activities, at no additional cost to Owner and without extension of schedule for completion. The Contractor shall grout any voids caused by or encountered during the shaft construction or microtunneling. The Contractor shall modify equipment and procedures as required to avoid recurrence of excessive settlements, heave, or damage.

- C. Provide a lubrication system, and inject pipe lubricants through injection ports at the rear of the microtunneling machine and ports in the jacking pipe, to minimize pipe friction. Pipe lubricants shall be injected continuously as the pipe is advanced and in sufficient volume to completely fill the calculated annulus volume.
- D. Pressure shall be applied at the tunnel face to maintain face stability and shall be monitored continuously. Face pressure shall be maintained between the calculated active earth pressure and passive earth pressure including groundwater pressure.
- E. The microtunneling machine shall be operated to restrict the excavation of the materials to a volume equal to the MTBM and pipe jacked, to prevent loss of ground and settlement or possible damage to overlying structures. Control the advance rate and monitor the volume of material excavated and adjust advance rate, as required, to avoid loss of ground, over-excavation, or surface heave.
- F. Control slurry pressure and avoid excessive pumping pressures to prevent the discharge of slurry at the ground surface or into any water body. Contain and clean up any slurry discharges immediately. Wash any paved areas with water to avoid the tracking of slurry away from the discharge area.
- G. Completely contain, transport, and dispose of all excavated materials, waste slurry, and drilling fluids away from the construction site. All spoils and slurry must be contained in trucks, tanks, or other containers at all times. Dumping of spoil or slurry on the ground, discharge into sewers, or discharge into the shafts is not permitted. Slurry shall be disposed of at acceptable facilities in accordance with current State regulations for disposal of these materials. Only use the disposal sites identified in approved submittals for muck and slurry disposal.

3.04 CONTROL OF LINE AND GRADE

- A. The Contractor shall verify survey benchmarks prior to the start of construction, and shall confirm positions or report any errors or discrepancies in writing to the Owner or Owner's Representative.
- B. After confirming all established benchmarks, use these benchmarks to furnish and maintain all reference lines and grades for microtunneling. The Contractor shall use these lines and grades to establish the exact location of the MTBM as it is being advanced using a laser and/or theodolite guidance system and water level. Submit to Owner or Owner's Representative copies of field notes used to establish all lines and grades and allow Owner or Owner's Representative to check guidance system setup prior to beginning each microtunneling drive. Provide access for Owner or Owner's Representative to perform survey checks of guidance system and line-and-grade of jacking pipe on a daily basis during microtunneling operations. The Contractor is fully responsible for the accuracy of the Work and the correction of it, as required.

- C. The jacking pipe shall be installed in accordance with the following tolerances:
 - 1. Variations from design line: +/- Three (3) inch maximum.
 - 2. Variations from design grade: +/- Two (2) inch maximum.
- D. The machine shall be steered to maintain line and grade within the tolerances specified by continuously monitoring and adjusting line, grade, machine inclination, roll, and steering attitude during the operation. If the installation deviates from line or grade, make the necessary corrections, and return to the design alignment and grade at a rate of not more than one inch (1) per twenty-five (25) feet.
- E. The guidance system shall be mounted independently from the thrust block and jacking frame to maintain alignment if there is movement of equipment during jacking. Stop microtunneling operations and reset guidance system if its alignment shifts or is moved off design alignment and grade for any reason. Check guidance system setup at least once per shift. Guidance system should only be reset by experienced, competent surveying personnel in accordance with approved procedures outlined in the submittals.
- F. Monitor line and grade continuously during microtunneling operations. Record deviation with respect to design line and grade as specified and submit records to Owner or Owner's Representative. Control line and grade of the jacking pipe to within the specified tolerances.
- G. If the pipe installation does not meet the specified tolerance, the Contractor shall correct the installation including any necessary redesign of the pipeline or structures and acquisition of necessary easements. All corrective work shall be performed by the Contractor at no additional cost to the Owner and without schedule extension, and is subject to the written approval of the Owner or Owner's Representative.

3.05 SAFETY

- A. The Contractor is responsible for safety on the job site. Methods of construction shall be such as to ensure the safety of the Work, Contractor's and other employees on site, and the public. Perform all work in accordance with all current applicable regulations and safety requirements of the Federal, State, and local agencies. Comply with all applicable provisions by OSHA. In the event of conflict, comply with the more stringent requirements.
- B. No gasoline powered equipment shall be permitted in jacking and receiving shafts. Diesel, electrical, hydraulic, and air powered equipment is acceptable, subject to applicable local, State, and Federal regulations.
- C. Furnish and operate a temporary ventilation system in accordance with applicable safety requirements when personnel are in the shaft or in the pipe. Perform all required air and gas monitoring. Ventilation system shall provide a sufficient supply of fresh air and maintain an atmosphere free of toxic or flammable gasses in all underground work areas.

3.06 OBSTRUCTIONS

- A. If the microtunneling operations should encounter an object or condition that impedes

the forward progress of the machine along the design alignment within the specified horizontal and vertical tolerances, the Contractor shall notify the Owner or Owner's Representative immediately. The Contractor shall submit a plan to correct the condition, and remove, clear, or otherwise make it possible for the microtunneling machine and jacked pipe to advance past any and all objects or obstructions that impede forward progress of the machine along the design alignment within the specified horizontal and vertical tolerances. Upon written notification of the Owner or Owner's Representative, the Contractor shall immediately proceed with removal of the object or obstruction by means of an obstruction removal shaft or by other approved methods, as submitted by the Contractor. An obstruction removal shaft shall consist of a small excavation for the purpose of removing the obstruction. The Contractor will receive compensation for removal of obstructions, as defined as metallic debris, reinforced concrete, whole trees, rocks and other hard objects which prevent forward movement and cannot be broken up by the cutting tools with diligent effort, and that are partially or wholly within the cross-sectional area of the bore. It shall be the responsibility of the contractor to provide clear evidence that the obstruction is of the variety that warrants compensation. Compensation will be on a per each basis, and will include all activities incidental to the obstruction removal

3.07 CLEANUP

- A. After completion of microtunneling and carrier pipe installation, all construction debris, slurry, oil, grease, and other materials will be removed from the microtunneled pipe, jacking and receiving shafts, and all Contractor work areas. Cleaning shall be incidental to the construction. No separate payment shall be made for cleanup.
- B. Restoration shall follow construction as the Work progresses, and shall be completed as soon as possible. Restore and repair any damage resulting from surface settlement caused by shaft excavation, or pipejacking. Any property damaged or destroyed, shall be restored to a condition equal to or better than existing prior to construction. Restoration shall be completed no later than thirty (30) days after the microtunneling is complete. The restoration shall include all property affected by the construction operations.

END OF SECTION

SECTION 02999 MISCELLANEOUS WORK AND CLEANUP

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes items and operations which are not specified in detail as separate items, but may be sufficiently described as to the kind and extent of work involved. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to complete all work under this Section.
- B. The work of this Section may include, but is not limited to the following:
1. Restoration of roads, sidewalks, driveways, curbing and gutters, fences, guardrails, lawns, shrubbery and any other existing items damaged or destroyed.
 2. Crossing utilities.
 3. Relocation of existing water, reclaim water, or sewer lines less than four inches diameter, water and sanitary sewer services, low pressure gas lines, telephone lines, electric lines, cable TV lines as shown on the Contract Drawings.
 4. Restoring easements (servitudes) and rights-of-way.
 5. Clean up.
 6. Incidental work (project photographs, testing, shop drawings, traffic control, record drawings, etc.).
 7. Excavation and Embankment - As defined in the Florida Department of Transportation Standard Specifications for Road and Bridge Construction (1991 Edition or latest revision).
 8. Stormwater and erosion control devices.

1.02 SUBMITTAL OF LUMP SUM BREAKDOWN

Contractor shall submit to the County, a breakdown of the lump sum bid for Miscellaneous Work and Cleanup Item in the Proposal within 10 days after date of Notice to Proceed.

1.03 WORK SPECIFIED UNDER OTHER SECTIONS

All work shall be completed in a workmanlike manner by competent workmen in full compliance with all applicable sections of the Contract Documents.

PART 2 PRODUCTS

2.01 MATERIALS

Materials required for this Section shall equal or exceed materials that are to be restored. The Contractor may remove and replace or reuse existing materials with the exception of paving.

PART 3 EXECUTION

3.01 RESTORING OF SIDEWALKS, ROADS, CURBING, FENCES AND GUARDRAILS

- A. The Contractor shall protect existing sidewalks & curbing. If necessary, sidewalks & curbing shall be removed from joint to joint and replaced after backfilling. Curbing damaged during construction because of the Contractor's negligence or convenience, shall be replaced with sidewalks & curbing of equal quality and dimension at no cost to the County.
- B. At the locations necessary for the Contractor to remove, store and replace existing fences and guardrails during construction, the sections removed shall be only at the direction of the County. If any section of fence is damaged due to the Contractor's negligence, it shall be replaced at no cost to the County with fencing equal to or better than that damaged and the work shall be satisfactory to the County.
- C. Guardrails in the vicinity of the work shall be protected from damage by the Contractor. Damaged guardrails shall be replaced in a condition equal to those existing
- D. Road crossings shall be restored in accordance with the Contract Documents and current FDOT Standards. Compensation for road restoration shall be included under the Road Restoration Bid Item if specified or under Miscellaneous Cleanup if it is not specified.

3.02 CROSSING UTILITIES

This item shall include any extra work required in crossing culverts, water courses, drains, water mains and other utilities, including all sheeting and bracing, extra excavation and backfill, or any other work required or implied for the proposed crossing, whether or not shown on the Drawings.

3.03 RELOCATIONS OF EXISTING GAS LINES, TELEPHONE LINES, ELECTRIC LINES AND CABLE TV LINES

The Contractor shall notify the proper utility involved when relocation of these utility lines is required. The Contractor shall coordinate all relocation work by the utility so that construction shall not be hindered.

3.04 RESTORING THE EASEMENTS AND RIGHTS-OF-WAY

The Contractor shall be responsible for all damage to private property due to his operations. He shall protect from injury all walls, fences, cultivated shrubbery, pavement, underground facilities, including water, sewer and reclaimed water lines and services, or other utilities which may be encountered along the easement. If removal and replacement is required, it shall be done in a workmanlike manner, at his expense, so that the replacement are equivalent to that which existed prior to construction.

3.05 STORMWATER AND EROSION CONTROL DEVICES

The Contractor shall be responsible for, provide, and install all stormwater and erosion control devices necessary to insure satisfactory compliance with the Florida Department of Environmental Protection Stormwater, Erosion, and Sedimentation Control Inspector's Manual.

END OF SECTION

DIVISION 3 CONCRETE

SECTION 03100 CONCRETE FORMS

PART 1 GENERAL

1.01 SECTION INCLUDES

General formwork, forms, form liners, and coatings, form ties.

1.02 RELATED SECTIONS

Section 03150 - Concrete Accessories

1.03 REFERENCES

American Concrete Institute (ACI) latest edition:

ACI 301 - Structural Concrete for Buildings
ACI 318 - Building Code Requirements for Reinforced Concrete
ACI 347 - Guide to Formwork for Concrete
ACI SP-4 - Formwork for Concrete

1.04 SYSTEM DESCRIPTION

Provide formwork to produce members of the size, shape, and exterior finish required, for the structural adequacy of the forms to carry construction loads without excessive deflection, and for the safe use of forms in connection with completion of the concrete work. The Contractor shall be responsible for any injury or damage arising from inadequate forms or from premature removal of formwork.

1.05 SUBMITTALS

Submit samples of patterned concrete form liner panels and form ties.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Form ties shall be a watersealing snap-in type. For patterned concrete, use stainless steel snap ties.
- B. Plywood forms and liners shall be minimum grade B-B High Density Overlay Concrete Form Panels, Class I.

Formwork lumber shall be straight and clean. All nails shall be withdrawn

and surfaces in contact with concrete shall be thoroughly cleaned before reuse

Metal forms shall be in accordance with ACI SP-4.

2.02 PATTERNED CONCRETE FORM LINERS

The special liners shall be configured in such a manner as to produce patterned finish concrete that will duplicate the surface appearance of the cut limestone building panels. The location, extent, and configuration of the surface treatment shall be as indicated on the Drawings. In addition to form release agents, rustication may be slightly beveled, approximately 1 to 8 maximum, to facilitate form release.

Produce the patterned concrete with a smooth finish by using either plywood and/or tempered hardboard, complying with requirements for Grade A Forms, in conjunction with finished lumber, or approved fiberglass liners; or an approved equal liner. Liner joint marks shall not be apparent.

PART 3 EXECUTION

3.01 GENERAL

Coordinate with other trades and properly place and locate in position all necessary dowels, bolts, anchors, anchor slots, inserts, sleeves, openings, hangers, metal ties and other fastening devices required for attachment and support of adjacent work. Securely anchor all embedded items.

Formwork shall comply with ACI 347 and to shape, lines and dimensions of the members as indicated on the Drawings. Joints in forms shall be horizontal or vertical. Forms shall be properly braced or tied to maintain position and shape under all dead and live loads and to prevent leakage. Forms shall be assembled so their removal will not damage the concrete. Tolerances for formed surfaces shall be in compliance with ACI 301.

Lumber formwork may be used for surfaces which will not be exposed to view. Use plywood or metal forms for exposed surfaces.

Provide temporary openings at the base of forms greater than 4 feet high, if necessary, to facilitate cleaning and inspection immediately before depositing concrete.

All external corners of concrete exposed to view shall be chamfered by using 3/4 inch by 3/4 inch by 45 degree wood stripping, except as otherwise indicated on the Drawings.

3.02 GRADE A FORMS

Unless otherwise indicated, Grade A forms shall be used for all exposed concrete.

Grade A forms shall consist of steel forms lined with 3/16 inch thick tempered hardboard or 1/4 inch thick plywood, or by using plywood forms.

Full sized sheets shall be used wherever possible. The edges of all sheets shall be straightened to insure tight, close fitting joints. Bulges or depressions more than 1/8 inch in 4 feet will not be permitted. Open joints which would permit leakage shall be sufficient cause for rejection of forms. Other tolerances shall be as allowed by ACI 347.

3.03 GRADE B FORMS

Use lumber, plywood or metal forms. All joints shall be solidly backed, aligned and made leakproof.

Unless otherwise indicated, Grade B Forms are intended for use where concrete will not be exposed to view, such as below grade, below normal liquid levels in water-retaining structures, or inside manholes, boxes, vaults, etc.

3.04 SURFACE TREATMENT OF FORMWORK

The inside surface of lumber forms shall be soaked with clean water prior to placing concrete. All other forms shall be treated with an approved form oil or lacquer. If oil is used, all excess oil shall be wiped off.

3.05 INSPECTION OF FORMWORK

Concrete shall not be placed until the forms have been inspected by the E/A to assure surfaces in conformance with the Drawings and Specifications. The inspection of formwork by the E/A does not relate to the structural adequacy or the safety of the formwork.

3.06 REMOVAL OF FORMS

Forms shall be removed in accordance with requirements of ACI 318, without damaging the concrete. Leave shoring in place until concrete will safely support its own weight plus any live loads that may be placed upon it.

END OF SECTION

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SECTION 03150 CONCRETE ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

Construction joints, anchors and inserts, waterstops

1.02 RELATED SECTIONS

- A. Section 03100 - Concrete Forms

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM) latest edition:
 1. ASTM D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
 2. ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

1.04 SUBMITTALS

Provide samples and certifications of all proposed materials.

PART 2 PRODUCTS

2.01 JOINT FILLERS

- A. Joint fillers shall be products of the following manufacturers, or equal
 1. W. R. Meadows, Inc., Elgin, Illinois
 2. W. R. Grace and Co., Cambridge, Massachusetts
- B. Preformed sponge rubber joint filler shall conform to ASTM D1752, Type I.
- C. Preformed cork joint filler shall conform to ASTM D1752, Type II.
- D. Preformed bituminous fiber joint filler shall be non_extruding type conforming to ASTM D1751.
- E. Control joint strips shall have a minimum depth of 25 percent of slab thickness and a minimum thickness of 1/8 inch.

2.02 WATERSTOP

- A. Waterstop shall be either rubber (SBR or Neoprene) or PVC and shall be dense, homogeneous and uniform. PVC is preferred. Holes and imperfections shall be cause for rejection.
- B. Waterstops for construction joints shall be 4 inch by 3/16 inch minimum split waterstop or 6 inch by 3/8 inch minimum with hollow center bulb. Waterstops for expansion joints shall be 9 inch by 3/8 inch with 3/4 inch hollow center bulb. Multiple rib type of waterstop is preferred, if available. Where size and type of waterstop are not indicated, 6 inch by 3/8 inch minimum with hollow center bulb shall be used.
- C. Provide prefabricated tees, crosses, and other configurations as required for all intersections of waterstop.

PART 3 EXECUTION

3.01 PREPARATION

Remove existing concrete and provide openings for installation of new work as indicated on Drawings. Repair all damage to existing work caused by concrete removal.

3.02 GENERAL

- A. Arrange construction joint bulkheads to allow concrete to be placed between construction joints in one continuous operation.
- B. Provide construction joints with shear transfer keyways and waterstops as indicated. Unless otherwise indicated on the Drawings, spacing of construction joints for walls shall not exceed 75 feet.
- C. Erect bulkheads where shown on the Drawings or where approved by the E/A. Bulkheads shall be at right angles to the main reinforcement and shall produce a tongue and grooved joint of the configuration indicated on the Drawings. Install waterstop as indicated.
- D. Obtain the E/A's approval if it becomes necessary to eliminate or relocate construction joints shown on the Drawings.
- E. Tops of edge forms, bulkheads and screeds shall be set to the finished elevations and to provide uniform pitch to drains as indicated on Drawings.

3.03 HORIZONTAL JOINTS

Provide methods of achieving a leakproof joint. No horizontal construction joints will be permitted in slabs, beams, or girders

3.04 VERTICAL JOINTS

Joints in reinforced slabs, beams, and girders shall be perpendicular to the axis or plane of the members joined.

3.05 EXPANSION JOINTS

- A. Provide expansion joints and waterstops where indicated. Joint fillers shall be placed on each side of waterstops.
- B. Unless otherwise indicated, provide preformed sponge rubber or preformed cork filler.
- C. For drives, pavements, parking areas, walks and slabs on grade, provide preformed non-extruding asphalt strip or bituminous fiber joint filler set 1/8_inch below finished surface unless otherwise indicated. Tool concrete edges on each side of joint. No sealant is required.

3.06 WATERSTOPS

- A. Provide continuous waterstops where so indicated on the Drawings
- B. Embed approximately half of the waterstop on each side of the joint. Field splice and joint PVC waterstop by heat sealing butt joints. Rubber waterstop shall be spliced or jointed with solid web rubber unions and the manufacturer's approved cold applied cement.
- C. All splices and joints shall be in accordance with the manufacturer's recommendations to produce a water-tight joint. Lap splices will not be permitted. Support and protect the waterstop during construction. Repair or replace all damaged waterstop.

END SECTION

SECTION 03200 CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Reinforcing steel bars and welded steel wire fabric for cast-in-place concrete, complete with tie wire.
- B. Support chairs, bolsters, bar supports and spacers, for reinforcing.

1.02 QUALITY ASSURANCE

Perform concrete reinforcing work in accordance with ACI 318 unless specified otherwise in this Section.

1.03 REFERENCES

- A. ACI 318 - Building Code Requirements for Reinforced Concrete.
- B. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- C. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- D. CRSI 63 - Recommended practice for placing reinforcing bars.
- E. CRSI 65 - Recommended practice for placing bar supports, specifications and nomenclature.
- F. ACI 315 - American Concrete Institute - Manual of Standard Practice.

1.04 SHOP DRAWINGS

- A. Submit shop drawings in accordance with Contract Documents.
- B. Indicate bar sizes, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules and supporting and spacing devices.
- C. Manufacturer's Literature: Manufacturer's specifications and installation instructions for splice devices.

PART 2 PRODUCTS

2.01 REINFORCING

- A. Reinforcing steel: Grade 60, Minimum Yield Strength 60,000 psi, deformed billet steel bars, ASTM A615; plain finish.
- B. Welded steel wire fabric: Deformed wire, ASTM A497; smooth wire ASTM A185 in flat sheets; plain finish.

2.02 ACCESSORY MATERIALS

- A. Tie wire: Minimum 16 gauge annealed type, or patented system accepted by County.
- B. Chairs, bolsters, bar supports, spacers: Sized and shaped for strength and support of reinforcing during construction conditions.
- C. Special chairs, bolsters, bar supports, spacers (where adjacent to architectural concrete surfaces): Stainless steel type sized and shaped as required.

2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI 315.
- B. Locate reinforcing splices, not indicated on Drawings, at points of minimum stress. Location of splices shall be reviewed by County.
- C. Where indicated, weld reinforcing bars in accordance with AWS D12.1.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Reinforcing shall be supported and secured against displacement. Do not deviate from true alignment.
- B. Before placing concrete, ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings which would reduce bond to concrete.

3.02 QUALITY ASSURANCE

- A. Acceptable Manufacturers: Regularly engaged in manufacture of steel bar and welded wire fabric reinforcing.
- B. Installer Qualifications: Three years experience in installation of steel bar and welded wire fabric reinforcing.

C. Allowable Tolerances:

- 1. Fabrication:
 - a. Sheared length: +1 in.
 - b. Depth of truss bars: +0, -1/2 in.
 - c. Stirrups, ties and spirals: $\pm 1/4$ in.
 - d. All other bends: ± 1 in.
- 2. Placement:
 - a. Concrete cover to form surfaces: $\pm 1/4$ in.
 - b. Minimum spacing between bars: 1 in.
 - c. Top bars in slabs and beams:
 - (1) Members 8 in. deep or less: $\pm 1/4$ in.
 - (2) Members more than 8 in.: $\pm 1/2$ in.
 - d. Crosswise of members: Spaced evenly within 2 in. of stated separation.
 - e. Lengthwise of members: Plus or minus 2 in.

3. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 1 bar diameter.

3.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.
- B. Handle and store materials to prevent contamination.

3.05 INSTALLATION

- A. Placement:
 1. Bar Supports: CRSI 65.
 2. Reinforcing Bars: CRSI 63.
- B. Steel Adjustment:
 1. Move within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items.
 2. Do not move bars beyond allowable tolerances without concurrence of County.
 3. Do not heat, bend, or cut bars without concurrence of County.
- C. Splices:
 1. Lap splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
 2. Splice devices: Install in accordance with manufacturer's written instructions.
 3. Do not splice bars without concurrency of County, except at locations shown on Drawings.
- D. Wire Fabric:
 1. Install in longest practicable length.
 2. Lap adjoining pieces one full mesh minimum, and lay splices with 16 gauge wire.
 3. Do not make end laps midway between supporting beams, or directly over beams of continuous structures.
 4. Offset end laps in adjacent widths to prevent continuous laps.
- E. Cleaning: Remove dirt, grease, oil, loose mill scale, excessive rust, and foreign matter that will reduce bond with concrete.
- F. Protection During Concreting: Keep reinforcing steel in proper position during concrete placement.

END OF SECTION

SECTION 03300 CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

Poured-in-place concrete slabs, thrust blocks, pile caps and pipe support cradles.

1.02 QUALITY ASSURANCE

Perform cast-in-place concrete work in accordance with ACI 318, unless specified otherwise in this Section.

1.03 TESTING LABORATORY SERVICES

- A. Inspection and testing will be performed by the testing laboratory currently under contract to Manatee County in accordance with the Contract Documents.
- B. Provide free access to work and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of work.
- D. Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.
- E. Three concrete test cylinders will be taken for every 100 cu. yds. or part thereof of each class of concrete placed each day. Smaller pours shall have cylinders taken as directed by the County.
- F. One slump test will be taken for each set of test cylinders taken.

1.04 REFERENCES

- A. ASTM C33 - Concrete Aggregates
- B. ASTM C150 - Portland Cement
- C. ACI 318 - Building Code Requirements for Reinforced Concrete
- D. ASTM C260 - Air Entraining Admixtures for Concrete
- E. ASTM C94 - Ready-Mixed Concrete
- F. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
- G. ACI 305 - Recommended Practice for Hot Weather Concreting

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cement: Moderate-Type II, High early strength-Type III, Portland type, ASTM C150.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material.

2.02 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical: ASTM C494 Type A - water reducing admixture.

2.03 ACCEPTABLE MANUFACTURERS

Acceptable Products:

1. Pozzolith
2. WRDA

2.04 ACCESSORIES

Non-shrink grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 2 days and 7000 psi in 28 days.

2.05 CONCRETE MIXES

- A. Mix concrete in accordance with ASTM C94.
- B. Provide concrete of following strength:
 1. Required concrete strengths as determined by 28 day cylinders shall be as shown on the Drawings, but shall not be less than 3000 psi.
 2. Select proportions for normal weight concrete in accordance with ACI 301 3.8 Method 1, Method 2, or Method 3. Add air entraining agent to concrete to entrain air as indicated in ACI 301 Table 3.4.1.
 3. All mixes shall be in accordance with FDOT Specifications.
- C. Use set-retarding admixtures during hot weather only when accepted by County.
- D. Add air entraining agent to concrete mix for concrete work exposed to exterior.

2.06 FORMS

- A. Forms shall be used for all concrete masonry, including footings. Form shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, appearance and to the elevations indicated on the Drawings.
- B. Forms shall be made of wood, metal, or other approved material. Wood forms shall be

constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots; where used for expose surfaces, boards shall be dressed and matched. Plywood shall be sanded smooth and fitted with tight joints between panels. Metal forms shall be of an approved type for the class of work involved and of the thickness and design required for rigid construction.

- C. Edges of all form panels in contact with concrete shall be flush within 1/32-inch and forms for plane surfaces shall be such that the concrete will be plane within 1/16-inch in four feet. Forms shall be tight to prevent the passage of mortar and water and grout.
- D. Forms for walls shall have removable panels at the bottom for cleaning, inspection and scrubbing-in of bonding paste. Forms for walls of considerable height shall be arranged with tremies and hoppers for placing concrete in a manner that will prevent segregation and accumulation of hardened concrete on the forms or reinforcement above the fresh concrete.
- E. Molding or bevels shall be placed to produce a 3/4-inch chamfer on all exposed projecting corners, unless otherwise shown on the Drawings. Similar chamfer strips shall be provided at horizontal and vertical extremities of all wall placements to produce "clean" separation between successive placements as called for on the Plans.
- F. Forms shall be sufficiently rigid to withstand vibration, to prevent displacement or sagging between supports and constructed so the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.
- G. Forms, including new pre-oiled forms, shall be oiled before reinforcement is placed, with an approved nonstaining oil or liquid form coating having a non-paraffin base.
- H. Before form material is re-used, all surfaces in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn, all protrusions smoothed and in the case of wood forms pre-oiled.
- I. Form ties encased in concrete shall be designed so that after removal of the projecting part, no metal shall be within 1-inch of the face of the concrete. That part of the tie to be removed shall be at least 1/2-inch diameter or be provided with a wood or metal cone at least 1/2-inch in diameter and 1-inch long. Form ties in concrete exposed to view shall be the cone-washer type equal to the Richmond "Tyscru". Throughbolts or common wire shall not be used for form ties.

PART 3 EXECUTION

3.01 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304.
- B. Notify County minimum 24 hours prior to commencement of concreting operations.
- C. Verify anchors, seats, plates and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete. Rectify same and proceed with work.
- D. Maintain records of poured concrete items. Record date, location of pour, quantity, air

temperature and test samples taken.

- E. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- F. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.
- G. Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.
- H. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solidly with non-shrink grout.
- I. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify County upon discovery.
- J. Conform to ACI 305 when concreting during hot weather.

3.02 SCREEDING

Screed surfaces level, maintaining flatness within a maximum deviation of 1/8" in 10 feet.

3.03 PATCHING

Allow County to inspect concrete surfaces immediately upon removal of forms. Patch imperfections as directed. All patching procedures shall be submitted to and approved by the County prior to use.

3.04 DEFECTIVE CONCRETE

- A. Modify or replace concrete not conforming to required lines, details and elevations.
- B. Repair or replace concrete not properly placed resulting in excessive honeycomb and other defects. Do not patch, fill, touch-up, repair, or replace exposed architectural concrete except upon express direction of County for each individual area.

3.05 CONCRETE FINISHING

Provide concrete surfaces to be left exposed, columns, beams and joists with smooth rubbed finish.

3.06 CURING AND PROTECTION

Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for a period of 7 days or until concrete strengths reaches 75% of the 28 day design strength.

Protection against moisture loss may be obtained with spray on curing compounds or plastic sheets. Protection against heat or cold may be obtained with insulated curing blankets or

forms.

3.07 CONCRETE DRIVEWAY RESTORATION

Concrete driveways shall be restored with 6 inches of 3,000 psi concrete with W2.5 X W2.5, 6X6 wire mesh. Place ½ inch expansion joint between back of curb and new concrete. Area beneath restoration shall be mechanically tamped prior to placing concrete.

3.08 CONCRETE SIDEWALK RESTORATION

Concrete sidewalks across driveways shall be restored with 6 inches of 3,000 psi concrete with W2.5 X W2.5, 6X6 wire mesh. Place ½ inch expansion joint between back of curb and new concrete. Area beneath restoration shall be mechanically tamped prior to placing concrete.

Concrete sidewalks outside of driveways shall be restored with 4 inches of 3,000 psi concrete per FDOT Design Standards, Sections 522 & 310

END OF SECTION

SECTION 03350 CONCRETE FINISHES

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required to finish cast-in-place concrete surfaces as specified herein.

1.02 SUBMITTALS

Submit to the County as provided in the Contract Documents, the proposed chemical hardener manufacturer's surface preparation and application procedures.

1.03 SCHEDULE OF FINISHES

- A. Concrete for the Project shall be finished in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material under another Section.
- B. The base concrete for the following conditions shall be finished as noted and as further specified herein:
 - 1. Exterior, exposed concrete slabs and stairs - broomed finish.
 - 2. Interior, exposed concrete slabs - steel trowel finish.
 - 3. Concrete on which process liquids flow or in contact with sludge - steel trowel finish.
 - 4. Concrete where not exposed in the finished work and not scheduled to receive an additional applied finish or material - off-form finish.
 - 5. Provide concrete surfaces to be left exposed such as walls, columns, beams and joists with smooth rubbed finish.

1.04 RESPONSIBILITY FOR CHANGING FINISHES

- A. The surface finishes specified for concrete to receive additional applied finishes or materials are the finishes required for the proper application of the actual products specified under other Sections. Where different products are approved for use, it shall be the Contractor's responsibility to determine if changes in finishes are required and to provide the proper finishes to receive these products.
- B. Changes in finishes made to accommodate product different from those specified shall be performed at no additional cost to the County. Submit the proposed new finishes and their construction methods to the County for approval.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland cement and component materials required for finishing the concrete surfaces shall be as specified in the Contract Documents.
- B. Hardener shall be Lapidolith as manufactured by Sonneborn Building Products or approved

equal. Hardener shall be used on all floors, stair treads and platforms.

PART 3 EXECUTION

3.01 FORMED SURFACES

- A. Forms shall not be stripped before the concrete has attained a strength of at least 50 percent of the ultimate design strength. This is equivalent to approximately five "100 day-degrees" of moist curing.
- B. Care shall be exercised to prevent damaging edges or obliterating the lines of chamfers, rustications, or corners when removing the forms or doing any work adjacent thereto.
- C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the County.
- D. Off-form finish. Fins and other projections shall be removed as approved. Tie cone holes and other minor defects shall be filled with non-shrink grout specified under the Contract Documents.

3.02 FLOORS AND SLABS

- A. Floors and slabs shall be screeded to the established grades and shall be level with a tolerance of 1/8-inch when checked with a 10 foot straight edge, except where drains occur, in which case floors shall be pitched to drains as indicated. Failure to meet either of above shall be cause for removal, grinding, or other correction as approved by the County.
- B. Following screeding as specified above, power steel trowel as follows:
 - 1. Immediately after final screeding, a dry cement/sand shake in the proportion of 2-sacks of portland cement to 350-pounds of coarse natural concrete sand shall be sprinkled evenly over the surface at the rate of approximately 500 pounds per 1,000 square feet of floor. Neat, dry cement shall not be sprinkled on the surface. This shake shall be thoroughly floated into the surface with an approved disc type power compacting machine weighing at least 200 pounds if a 20-inch disc is used or 300 pounds if a 24-inch disc is used (such as a "Kelly Float" as manufactured by the Weisner-Rapp Corporation of Buffalo, New York). A mechanical blade-type float or trowel is not acceptable for this work.
NOTE: This operation (application of the cement/sand shake) may be eliminated at the discretion of the County if the base slab concrete exhibits adequate fattiness and homogeneity.
 - 2. In lieu of power steel troweling, small areas as defined by the County shall be compacted by hand steel troweling with the dry cement/sand shake as ordered.
 - 3. The floor or slab shall be compacted to a smooth surface and the floating operation continued until sufficient mortar is brought to the surface to fill all voids. The surfaces shall be tested with a straight edge to detect high and low spots which shall be eliminated.
 - 4. Compaction shall be continued only until thorough densification is achieved and a small amount of mortar is brought to the surface. Excessive floating shall be avoided.
- C. After Paragraph 3.02 A and B procedures are accomplished, floors and slabs for particular

conditions shall be completed as scheduled in one of the following finishes:

1. Wood float finish. Hand wood float, maintaining the surface tolerance to provide a grained, nonslip finish as approved.
 2. Broomed finish. Hand wood float maintaining the surface tolerance and then broom with a stiff bristle broom in the direction of drainage to provide a nonslip finish as approved.
 3. Steel trowel finish. Hand steel trowel to a perfectly smooth, hard even finish free from high or low spots or other defects as approved.
- D. Floors, stair treads and platforms shall be given a floor hardener. Application shall be according to manufacturer's instructions.

3.03 APPROVAL OF FINISHES

- A. All concrete surfaces will be inspected during the finishing process by the County.
- B. Surfaces which, in the opinion of the County, are unsatisfactory shall be refinished or reworked until approved by the County.

END OF SECTION

SECTION 03410 PRECAST PORTLAND CONCRETE STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all materials, labor and equipment and construct valve vaults, meter vaults, concrete pipe and accessory items, consisting of precast sections as shown on the Drawings and as specified herein.
- B. The forms, dimensions, concrete and construction methods shall be approved by the County in advance of construction.
- C. These Specifications are intended to give a general description of what is required, but do not purport to cover all of the structural design details which will vary in accordance with the requirements of the plans. It is, however, intended to cover the furnishing, shop testing, delivery and complete installation of all precast structures whether specifically mentioned in these Specifications or not.
- D. The supplier of the precast items shall coordinate his work with that of the Contractor to insure that the units will be delivered and installed in the excavation provided by the Contractor, in accordance with the Contractor's construction schedule.
- E. The Contractor will ensure coordination of the precast structures fabrication with the supplier to achieve the proper structural top slab openings, spacings and related dimensions for the selected equipment frames and covers. The top slabs, frames, covers, and subsurface structures outside of roadways shall be capable of live load of 300 pounds per square foot unless noted otherwise.
- F. All interior surfaces of valve vaults and meter vaults shall be painted with two coats of coal tar epoxy paint dry film thickness of 8-mils each coat, as approved by the County.

1.02 SUBMITTALS

- A. Submit to the County in accordance with the Contract Documents, shop drawings showing details of construction, reinforcing, and joints.
- B. Shop Drawings
 - 1. Content
 - a. Dimensions and finishes.
 - b. Estimated camber.
 - c. Reinforcing and connection details.
 - d. Lifting and erection inserts.
 - e. Other items cast into members.
 - 2. Show location of unit by same identification mark placed on member.
 - 3. Include design calculations.
- C. Manufacturer's Literature: Manufacturer's recommended installation instructions.
- D. Manufacturer's certificates of material conformance with Specifications.

- E. Test Reports: Reports of tests on concrete. A minimum of three compression test cylinders will be required for each pour.

1.03 INSPECTION

- A. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection and approval by the County, or other representatives of the County. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places and the sections shall be subject to rejection at any time due to failure to meet any of the Specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the project site shall be marked for identification and shall be removed from the project site at once. All sections, which have been damaged after delivery will be rejected and if already installed, shall be acceptably repaired, if permitted, or removed and replaced entirely at the Contractor's expense.

- B. At the time of inspection, the sections will be carefully examined for compliance with the applicable ASTM designation and these Specifications and with the approved manufacturer's drawings.

- 1. All sections shall be inspected for general appearance, dimension, "scratch-strength", blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.
- 2. All sections shall meet the manufacturing tolerance requirements of ASTM C-478 or the following casting tolerances, whichever are more severe:

Wall Thickness	$\pm 3/8"$
Inside Diameter	$\pm 3/8"$
Outside Diameter	$\pm 1/2"$
Height or Length	$\pm 3/8"$

- C. Imperfections may be repaired, subject to the approval of the County, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of 7 days and 5,000 psi at the end of 28 days, when tested in 3-inch by 6-inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the County.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE SECTIONS

- A. Precast concrete manhole grade rings, flat slab tops, conical tops, risers and base sections shall be fabricated in accordance with the material and design standards of ASTM C478, except as modified herein.
- B. Portland cement shall conform to ASTM C150, Type II, and concrete shall have a minimum compressive 28-day strength of 4,000 psi.

- C. The manufacturer shall make a minimum of four standard test cylinders for each 100 cubic yards of concrete (or part thereof) that is cast each day. These test cylinders, along with sections cast that day, shall be marked in such a way that the test results can be matched with the appropriate castings. Two cylinders shall be cured with the product until the forms are stripped. At this time, one cylinder shall be broken to ascertain that a minimum strength of 2000 psi has been reached prior to moving the product from the forming location. The remaining two cylinders shall be cured and tested in accordance with ASTM C192 and C39. The average compressive strength for each day's production shall be greater than 4000 psi with no more than 10% of the tested cylinders falling below 4000 psi. In no case shall any cylinder strength fall below 3500 psi. All cylinder strengths shall be certified by a Florida Licensed Professional Engineer. Failure to meet these requirements for any day's production is cause for rejection of all sections cast that day.
- D. Minimum wall thickness for manholes shall be 8 inches or 1/12 the inside diameter of the manhole, whichever is greater. The minimum thickness for the bottom of the base section shall be 8 inches.
- E. Reinforcing steel shall be as specified in ASTM C478.
- F. Precast manhole structures shall be free of cracks, holes, voids, blisters or rough surfaces. Manholes shall be water-tight, and shall be generally sound and free of defects of any sort. Lift holes shall not penetrate through the wall of any manhole tops, risers or base sections. Holes passing part-way through the manhole section walls for lifting devices shall be filled with cement or epoxy grout after the manhole has been set in place.
- G. Pipe openings shall meet the recommended tolerances of the individual manufactured pipe to manhole connectors; however, the horizontal location shall be within +/- 2 degrees of arc of that detailed on the shop drawings.

2.02 MANHOLE INVERTS

- A. Benched inverts shall be provided and shall be monolithically cast or shall be a secondary casting in a cured base section as per ASTM C478.
- B. The width of the invert channel shall be the same as the inside diameter of the connected sewer pipes and shall have a "U" - shaped cross-section with the bottom of the channel shaped to correspond with the lower half of the pipe. The depth of the channel shall be a minimum of half the inside diameter of the connected pipes.
- C. The channel shall be formed smooth and streamlined, and, where the flow changes directions, shall have true curves of the largest radius possible within the manhole base. The maximum change of direction of flow within a manhole shall be 90 degrees.
- D. The channel invert slope shall be uniform through the manhole and shall have a minimum vertical drop of 1 inch from the inlet(s) to the outlet.
- E. For all manholes with pipes 16 inches in diameter and larger, the base section and invert channels shall have a pre-molded plastic liner as described in subsection 1.12.6, "Concrete Manholes and Wetwells with Protective Liners."

2.03 RESILIENT PIPE CONNECTORS

- A. Connections of manholes to pipes shall be made using resilient boot or seal connectors manufactured in accordance with ASTM C923 and shall maintain a resilient, hydrostatic seal between the pipe and the connector and between the connector and the manhole structure.
- B. Connectors shall be installed in strict accordance with the written installation instructions of the manufacturer. Non-shrink grout shall be placed in the gap between the boot or seal and the manhole invert channel, to make a smooth transition, unless otherwise directed by the manufacturer's instructions.

2.04 MANHOLE AND WET WELL JOINTS

- A. Joints between manhole sections and wet well sections shall be modified tongue and groove, or modified bell and spigot, with a continuous elastomeric ring gasket (o-ring) joint conforming to the requirements of ASTM C443. In addition to the ring gasket, an additional sealing device shall be provided as follows:
 - (1) A minimum of six-inches wide of Rub'R-Nek RU116 elastomeric based plastic joint wrap shall be centered over the joint, on the outside of the manhole, or
 - (2) A minimum of ½-inch x ¾-inch bead of Adeka Ultra Seal P-201 hydrophilic urethane paste applied to the interior of the joint just before manhole section assembly.
- B. In addition to the requirements in subsection A, above, all joints between manhole sections, for manholes receiving turbulent flow and wet wells with a liner, shall also have a continuous strip of liner material that is a minimum of 6 inches wide weld-fused all around the inside face of the joint, per manufacturer's recommendations, or they shall have the joint filled at the inside face with a butyl rubber sealant meeting Fed. Spec A-A-272B to form a bead across the joint, so that no bare concrete inside the joint is left exposed.
- C. For standard manholes without liners, fill the joint at the inside face with non-shrink grout and strike the joint smooth and uniform with the manhole interior walls.
- D. For manholes with and without plastic liners and with concrete grade-adjustment rings, joints between the top section and the grade ring, and between grade rings, and between the grade ring and the cast iron ring frame shall be made with non-shrink cement mortar.

2.05 CONCRETE MANHOLES AND WET WELLS WITH PROTECTIVE LINERS

- A. Drop manholes, manholes with opposing flows, manholes immediately upstream of a lift station wet well, manholes with gravity sewers greater than 12 inches in diameter, force main termination manholes and the first two manholes downstream from a force main termination manhole, and pumping station wet wells shall have a full plastic liner. The liners shall be integrally cast into the concrete tops, risers and base sections, which shall be in all other respects manufactured in accordance with ASTM C478 using Type II Portland Cement per ASTM C150. The plastic liner shall be generally chemically resistant to the wastewater environment and shall be mechanically affixed to the precast concrete manhole sections so that there can be no separation of the liner from the manhole sections during the service lifetime.

- B. The plastic liner shall have no surface degradation when exposed to nitric acid, hydrochloric acid, ammonia, sodium hydroxide, sulfuric acid, acetone, unleaded gasoline and turpentine in accordance with test method ASTM D1308, and shall not be attacked when immersed in acetone according to test method ASTM D2152.
- C. The manhole liner shall be FRP GU Liners, as manufactured by GU Florida or an approved equal. The base liner for manholes shall have preformed flow channels with water-tight gasketed pipe bell connections or boot holes that extend to the outside profile of the precast concrete structure. FRP GU, HDPE AGRU, or PVC DURA-PLATE liners shall be installed with the remaining sections, including the cone section of the manhole.
- D. The wall thickness for manholes and wet wells with liners, including the liner thickness, shall be 8 inches minimum or 1/12 of the inside diameter, whichever is greater. The minimum thickness of the bottom of the base section shall be 8 inches under the bottom of the flow channel.
- E. Manhole cast iron frames shall be adjusted to grade with concrete grade rings same as for un-lined manholes. Lined manholes shall be equipped with a GU Liner Convertible Collar as manufactured by GU Florida or an approved equal. The collar shall form a water-tight seal to the manhole top with a GU Lip Seal rubber gasket, or approved equal. The collar shall be sealed water-tight against the base of the cast iron frame using a butyl rubber sealant.

2.06 MANHOLE RINGS AND COVERS

Rings and covers shall be gray iron castings, conforming to ASTM A48, Class 30B, and shall be pattern USF 170-CE-1, as manufactured by U.S. Foundry, with the words "MANATEE COUNTY", "SANITARY SEWER", and "(YEAR)" cast into them. Frame and cover castings shall be dense and even grained, and shall be free of blowholes, warping, or any other defects not true to pattern. Seating surfaces of covers and frames shall be machined true to prevent rocking. Castings shall be designed and tested to bear an AASHTO H-20 wheel loading with and added 30 percent impact factor and shall be Class Heavy Duty traffic bearing.

2.07 MANHOLE INSERTS

Watertight manhole inserts shall be stainless steel and are required for all sanitary sewer manholes installed. Neoprene gaskets shall be installed under the insert lip to insure a leak proof seal.

2.08 PRECAST CONCRETE MANHOLE INSTALLATION

- A. Manholes shall be installed at the end of each line; at all change in grade, size, or alignment; at all intersections; and at distances not greater than 400 feet for sewers 15 inches or less and 500 feet for sewers 18 inches or larger. Cleanouts may be used only for special conditions with approval by the County and shall not be substituted for manholes.
- B. Drop manholes shall be provided for sewers entering a manhole at an elevation 24 inches or more above the manhole lowest invert. Where the drop is less than 24 inches, the invert shall have an elevated U-channel to prevent solids deposition. Drop manholes shall be constructed with an outside drop connection and the entire outside drop connection shall be encased in concrete.

- C. Precast concrete sections shall be set vertical and in true alignment as indicated by the construction plans. Excavation, bedding foundation and backfill shall be done in accordance with the Trenching and Excavation section of these Standards. All manholes shall meet the following installation tolerances:
1. The finished manholes shall not be out of plumb by more than 3/8 inch per 10 feet of height.
 2. Any jog or offset of the inside wall surface at a joint shall not exceed 1/2 inch.
 3. Variation in the joint width around the circumference of the manhole shall not exceed 1/4 inch.

2.09 SETTING MANHOLE RINGS

Manhole rings and covers shall be set to conform accurately to the finished ground or pavement grade as indicated on the construction drawings or as directed by the County. Rings on manholes shall be set concentric with the adjusting rings and sealed so that the space between the top of the adjustment rings and the bottom flanges of the rings will be made watertight. A ring of mortar shall be placed around the outside of the bottom flange at least one inch thick and pitched to shed water away from the frame. Mortar shall be extended to the outer edge of the masonry and finished smooth and flush with the top of the flange.

2.10 SPRAY-APPLIED MANHOLE LINERS

Existing concrete or brick and mortar manhole structures that are to be modified or rehabilitated by adding a manhole liner shall have a spray-applied liner installed according to the material and procedural requirements of the "Modifications to Existing Structures, Piping and Equipment," Section 1.2 of this Manual. All recommendations of the product's manufacturer shall be followed.

2.11 PROTECTION FROM FLOODWATER INFLOW

Wastewater sewer systems shall be designed to prevent flood or surface waters from entering the collection system. Manhole rims and clean-out tops shall be elevated 4 inches above the 100-year flood level, or 8 inches above the 25-year flood level, or 4 inches above the surrounding unpaved ground surface within a 20-foot radius, whichever is highest, or the manhole covers and clean-out lids shall be designed and installed with factory-made watertight, tamper proof, sealing devices. Manholes with rims less than the above required elevations shall be PAMTIGHT as manufactured by CertainTeed, or equal as approved by Manatee County.

Cleanouts not at or above the required elevations shall have the clean-out adapter solvent welded watertight to the clean-out riser. Plugs are to be recessed square key with Teflon plumber's tape wrapped on threads to make a watertight seal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor shall be responsible for handling ground water to provide firm, dry subgrade for the structure, shall prevent water rising on new poured-in-place concrete or grouted joint sections within 24 hours after placing and shall guard against flotation or other damage

resulting from ground water or flooding.

- B. A minimum of an 8-inch shell base compacted layer of washed shell or crushed stone shall be placed as a foundation for the structure's base slabs and valve and/or meter vault pits.
- C. Backfill materials around the structures and above the pipe bedding shall be select material as specified in the Contract Documents.
- D. Precast bases, conforming to all requirements of ASTM C478 and above listed requirements for precast sections, may be used.
- E. The structure shall not be set into the excavation until the installation procedure and excavation have been approved by the County.
- F. The base may be cast-in-place concrete placed on a thoroughly compacted crushed rock subbase, (98 percent of the maximum density as determined by AASHTO T-180. The tops of the cast-in-place bases shall be shaped to mate with the precast barrel section and shall be adjusted in grade so that the top slab section is at the approximately correct elevation.
- G. Precast concrete structure sections shall be set so as to be vertical and with sections in true alignment with a 1/4-inch maximum tolerance to be allowed. The joints shall be prepared as in 2.04 above and finished flush with the adjoining surfaces. Allow joints to set for 24 hours before backfilling. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. The Contractor shall install the precast sections in a manner that will result in a watertight joint. Leaking joints are not acceptable.
- H. Holes in the concrete sections required for handling or other purposes shall be plugged with a non-shrink grout or by grout in combination with concrete plugs.
- I. Where holes must be cut in the precast sections to accommodate pipes, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may loosen the mortar joints.
- J. Frames and hatches specified and furnished shall be cast in the cover slab prior to setting. Normal installation shall include 6" to 12" of concrete grade rings between the top of the cone section and the cover plate ring slab.

ASTM A48-74, or most recent revision, Specification for Gray Iron Castings, Class 30 or Grade 60-45-10 Ductile Iron meeting the requirements of ASTM A536-72, or most recent revision, Specification for Ductile Iron Castings. Cast in a true symmetrical pattern of tough, dense and even grained iron, free from warping, scales, lumps, blisters, sandholes, or any defects of any kind. Provide indented pattern lids with lettering as shown on the Drawings. Machine or grind frames and lids at touching surfaces to provide firm seats and prevent rocking. Remove and replace any set not matching perfectly. All frames and covers shall be designed to withstand an HS20-44 wheel loading as defined by AASHTO specifications.

- K. Manhole inserts: Watertight manhole inserts shall be 316 stainless steel and are required for all sanitary sewer manholes installed. Inserts shall be as manufactured by FRW Industries, Conroe, Texas, or approved equal. Neoprene gaskets shall be installed under the insert lip to insure a leakproof seal.

- L. Penetrations and connections into precast or existing structures shall be accomplished by rotary core boring.
- M. Cast in place liners shall be repaired, fitted around penetrations, sealed at joints, etc. in accordance with the manufacturer's recommendations for that liner. As a general rule, repairs, sleeves and patches shall be welded in place, glues and sealants shall not be used unless approved by the manufacturer.

3.04 TESTING

- A. After constructed to its finished height and before being backfilled, each manhole must be visually inspected and shall meet the satisfaction of the County.
- B. If the visual inspection reveals defects, poor workmanship, or suspect installation, it shall be at the sole discretion of the County to have the structure vacuum tested for water tightness.
 - 1. Plug pipelines and perform vacuum test. Observing all recommended safety measures induce a backpressure of 5.0 p.s.i. equivalent to 10" Hg (mercury). The manhole assembly is considered satisfactory if the vacuum loss is less than 1" Hg for the length of time listed in the following table:

Depth Feet	Time of Test in Seconds		
	Manhole Diameter in Feet		
	4	5	6
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
T	5	6.5	8

Note: Add "T" seconds for each additional 2'- of depth.

- C. Failure to pass this test requires the Contractor to correct the problems and retest. The Contractor will replace leaking gaskets and/or concrete sections and retest the completed manhole. No manhole will be accepted without successfully passing this test.

END OF SECTION

SECTION 03500 LIFT STATION SPECIFICATION

PART 1 GENERAL

Furnish all labor, materials, equipment and incidentals required to install complete automatic, underground lift stations with all required equipment installed in a polymer concrete wet well and adjacent above-ground valve assembly (and meter). The principal items of equipment shall include two submersible motor-driven sewage pumps, valves, internal piping, automatic pumping level controls, control panel and telemetry (most current model). All materials shall be new, without defects and of the best quality. All materials furnished and all work done shall be in strict accordance with the National Electrical Code and all local requirements and codes.

All lift stations that re-pump sewage from four (4) other upstream lift stations or has a discharge flow 500 gpm or greater shall have an on-site back-up diesel pump equipped with a transducer level controls, and backup float switches. Re-pump station may require an in-line submersible magnetic flow meter (as determined by County), and a force main pressure transducer. Onsite full tanks shall not exceed 540 gallons.

Alternatively, at the discretion of the County, an electric generator equipped with an automatic power transfer switch may be installed.

1.01 STRUCTURES AND EQUIPMENT

A. Pump Station Wet Well.

All wet wells 6 feet diameter and larger, and all pump stations that are owned and maintained by Manatee County, shall be precast polymer concrete, in accordance with Section 03420, designed to accommodate the peak hour development flow from all contributing areas. The wet well shall have a minimum of 4 feet from the lowest invert to the wet well bottom. The pump station wet well size shall be determined using the following formula to determine the minimum volume between the off-level elevation and the influent invert elevation:

$$\text{MIN. VOLUME (GALS.)} = \text{PUMP CAPACITY (G.P.M.)} \times 4$$

Wet well diameters shall be 6 feet or larger. 4-foot and 5-foot diameter wet wells shall be used only for special grinder pump applications as approved by the County on a case-by-case basis. The minimum wall thickness for polymer concrete wet wells shall be per Specification Section 03420.

The pump station wet well size and control equipment shall be designed to limit the pumping cycles of each pump to a maximum of 5 starts per hour for duplex stations and 3 starts per hour for triplex stations. Pump stations discharging through pipes 12 inches or larger shall have more than two variable speed pumps. The pump cycle off level shall be no lower than the top of the sewage pumps. The lead pump on level shall be no higher than 18 inches below the invert elevation of the influent pipe for duplex stations, and no higher than 24 inches below the invert for triplex stations.

All pump stations shall have a single gravity-flow influent pipe discharging into the wet well. Multiple gravity pipelines and force mains upstream shall all terminate at a separate polymer concrete manhole before flowing into the pump station wet well. The influent gravity sewer

shall be aligned, so that the inflowing stream drops into the front side of the wet well opposite from the riser side, within an angle of 25 degrees on either side of the centerline passing between both pumps in a duplex station, or between two of the three pumps in a triplex station. As an option to the to the influent gravity sewer main entering the wet well directly between the pumps, a plastic composite/fiberglass drop bowl and pipe (Reliner/Duran, Inc. or equal) shall be installed, as shown on Detail US-20.

B. Above-ground Valve Assembly

An above-ground valve assembly and concrete pad with three gate valves, two weighted lever swing check valves, and a pump-out connection shall be constructed adjacent to the wet well. Tri-plex stations have four gate valves and three check valves. The pump-out connection shall be equipped with a gate valve and an male aluminum quick-coupler; 4-inch for 4 inch or smaller valve assemblies; 6 inch for all others, unless otherwise specified on the plans. All valves shall have factory applied, fusion bonded epoxy coating on interior and exterior. All bolt, nuts & washers in or on the wet well or valve assembly shall be 316 stainless steel

The valve assembly shall be supported by 316 stainless steel adjustable, flange-type, pipe supports anchored to the structure/valve pad. 6-#5 rebar shall be epoxy doveled into the wet well 3-4 inches and cast into the valve assembly slab 3-4 feet.

C. Entrance Hatches

The lift station wet well shall be equipped with an aluminum access cover of adequate size to permit easy removal and installation of sewage pumps and equipment. The wet well access cover shall be a minimum 36" x 48" single (preferred) or double door. The dimensions of the hatch will vary depending on the internal discharge pipe size and internal configuration, the actual required dimensions of the hatch shall be confirmed with the pump manufacturer prior to ordering. The access covers shall be constructed of aluminum with a minimum load rating of 300 lbs/sq. ft. and equipped with 316 stainless steel hinges, a recessed lifting handle which lies flush with the door surface, and a 316 stainless steel staple which may be used to secure the door with a padlock when closed. The doors shall have a raised diamond thread pattern to provide a skid-resistant surface and shall open to 90 degrees and lock automatically in that position, with a handle to release the doors for closing.

D. Sewage Pump Assemblies

Each pumping station shall have a minimum of two identical, totally submersible sewage pump assemblies which are rated and suitable for continuous duty, underwater operation. These units and their associated power and signal cables shall have watertight integrity to a depth of 65 feet. The pump, pump motor and associated components shall all be the products of the same manufacturer. Pump assemblies shall be painted after assembly with an approved air dry enamel which will adequately protect the exterior housings from the corrosive environment in the wastewater sewer system. Coating thickness shall be a minimum of 4 mils.

Pumps shall be selected to operate within 10 percent of the Best Efficiency Point (BEP). The overall lift station system shall be designed to allow for the selected pumps to operate within 10 percent of their BEP.

Factory testing of the pump assemblies shall be required and as a minimum, shall include:

- (1) All tests recommended by the manufacturer.
- (2) Verify the integrity of assembly and connections (no leaks, tightness of hardware, proper alignment, assembly, etc.) and that the nameplate and specified pump and pump motor (HP, Voltage, Phase and HZ) correspond.
- (3) The motor windings and seal housing chambers shall be hi-potted to test for insulation defects and moisture content. Check the resistance of the stator windings with a bridge to verify that the readings of all three phases are basically equal and within tolerance.
- (4) Energize pump motor, verify direction of rotation and that it corresponds to the nameplate.
- (5) Provide a written report of all testing with the shipped pump.

All pump assemblies shall be warranted against defects in workmanship and materials for whichever is the greater of: a 5-year pro-rated warranty from the date of purchase or as provided in the Defect Security Agreement with the County.

Month 0 -18 = 100% Month 19-31 = 75% Month 32-45 = 50% Month 46-60 = 25%

Pump motors shall have the following electrical characteristics: 230 -volt for 20 HP and lower or 460 -volt for greater than 20 HP, 3 phase, 60 hertz, minimum service factor of 1.15, continuous duty, maximum NEMA LRA/HP code of J, and NEMA Design B. Pump motors shall be non-overloading throughout the entire range of operation. The pump motors are to be induction motors which are built with moisture resistant Class F insulation. Each motor shall be capable of a minimum of 10 starts per hour without degradation of the windings. The pump motor shaft shall be made from a single, solid, forging of 303 (or better grade) stainless steel, tapered, keyed, and supported by a minimum of one heavy duty upper radial ball bearing and a minimum of one heavy duty lower thrust bearing. The bearings shall have a minimum B-10 life rating of 60,000 hours. The shaft and shaft extension shall be of minimum length and maximum diameter to reduce shaft deflection and prolong bearing life. The pump motor shall be designed for pumping at a maximum sump ambient of 40 degrees C (104 degrees F). The stator of the pump motor shall be copper wound (aluminum stator windings are not permitted) and equipped with at least two heat sensors (klixons installed in the stator end turns) which will shut the motor off in case of excessive heat built up. The heat sensors shall be connected in series with the motor starter coil so the starter is tripped if the heat sensor opens. The pump motor housing shall be oil or air filled type for cooling purposes. Oil filled motors shall use pure dielectric insulating oil. The pump motor shall be capable of operating at +/- 10% of rated voltage and +/- 5% of rated frequency without excessive heating. The pump motor shall not exceed a rise by resistance of 90 degrees C at full load over the entire performance curve. It shall be able to operate intermittently a full load while unsubmerged without damage. Power cables and signal cables shall be continuous (without splices from the pump motor to the power supply). Power cables shall be sized for operation at the rated service factor. The power cable shall be a single, multi-conductor, STW-A type that is epoxy potted and compression fitted for water tight sealing into the pump cable entry. As a minimum, the nameplate for the pump motor shall include: MODEL/SERIAL NUMBER, HORSEPOWER, VOLTAGE, FULL LOAD AMPS, FULL LOAD RPM, PHASES, FREQUENCY, NEMA LRA CODE, NEMA DESIGN, INSULATION CLASS, AMBIENT TEMPERATURE, LEAD CONNECTIONS FOR DIRECTION OF ROTATION, TYPE OF DUTY, TYPE OF BEARINGS, and PUMP IMPELLER SIZE. All electrical components used

in or in conjunction with the sewage pump assembly shall be UL approved when UL approval is available for that type component.

The pumps shall be capable of pumping raw, unscreened sewage and able to pass a minimum 3-inch solid. Each pump shall have an enclosed cast iron or ductile iron impeller and shall be equipped with a bronze wear ring. The pump lifting cover, stator housing, and volute casing shall be gray cast iron, ASTM A48, Class 30. Castings shall have smooth surfaces that are devoid of blow holes or other casting defects. The pump lifting bail shall have a minimum of 4-inch diameter clear opening and shall be cast as part of the motor cover or fabricated from 316 stainless steel. All fasteners exposed to raw sewage shall be 316 stainless steel. The backside of the impeller shall have pump-out vanes to keep contaminants out of the seal area. The impeller shall be dynamically balanced, and shall be single - or multi-vaned, with an enclosed or recessed, non-clogging design. There shall be a maximum clearance of .125 inches between the seal housing and the top of the impeller. The pump shall have a minimum of two mechanical seals mounted in tandem with an oil chamber between the two seals. The oil chamber of each pump shall be equipped with an electric seal fail sensor which shall be connected to an indicating light at the control panel to announce a seal failure and a set of relay contacts for purposes of remote notification via the County RTU system. The unit shall be designed so that when the outer seal fails, the contaminants that enter shall not enter the bearing housing and cause damage to the bearings. The inner seal shall be replaceable without disassembly of the motor housing and without the need for special tools. As a minimum, the rotating seal faces shall be carbon and the stationary seal faces shall be ceramic. All pumps shall be center-line discharge type constructed so that the discharge flange supports the full weight of the pump. Pump assemblies shall be complete with ductile iron or gray cast iron BPIU discharge base elbows that are bolted directly to a base plate which is bolted directly to the wet well floor, guide flange adapter and guide rails. The discharge elbow shall have an automatic coupling end facing the pump and an ANSI Class 125 flanged end ready for connection to the flange of the riser pipe. The design of the pump assembly installation shall be such that the pump will be automatically connected to the discharge piping when lowered into place along the guide rails, and shall seal leak-tight to the discharge base elbow by the weight of the pump assembly resting in the installed position. The pump base elbow shall be mounted on an ASTM A588 (COR-TEN) steel mounting plate that is level and is bolted to the wet well floor using 3/4-inch 316 stainless steel threaded rods with Hilti HVA anchors or approved equal anchors and shall have base ell mounting bolts of 3/4-inch 316 stainless steel that are mounted in place and welded to the plate. The pump guide rails for each pump shall be constructed of two separate whole length sections of 2 inch Schedule 40, 316 stainless steel pipe set 4 inches on center.

The pump assemblies shall be easily removed for inspections or service, requiring no fasteners to be removed or disconnected, and no need for personnel to enter the confined space of the wet well, by simply hauling up on the lift chains. The lifting chains shall be type 316 stainless steel, and shall be 1/4-inch for pumps less than 25 HP and 3/8-inch for pumps 25 HP and greater, or as required by the pump assembly weight. Chains shall be attached to the pump lifting bails using stainless steel shackles and shall extend to the inside top of the wet well. All rails and mounting hardware shall be 316 stainless steel.

E. Riser and Fittings

All force main piping and fittings within the wet well from the pump base elbow to the check valve, shall be DR-11 HDPE; only molded HDPE fittings shall be used upstream of the check

valves. The HDPE discharge piping from the pump base ells (in the wet well) and to the valve assembly check valves shall be connected using HDPE flange adapters with 316 stainless steel backup rings. No ductile iron bodied fittings shall be located between the pump base elbow and the check valves. All HDPE connections shall be thermal fused. All piping downstream of the tee/cross in the valve assembly to the first underground fitting shall be ductile iron pipe, after which PVC DR-18 shall be used.

All flanged fittings shall use 316 stainless steel bolts, nuts and washers. All threads shall be treated with Bostik Never-Seez anti-seizing compound or approved equal. All bolts on the flange connection at the pump base ells shall have two nuts with a lock washer between them or a nylon lock nut.

All stainless steel fasteners shall be treated with Never-Seez prior to assembly and torque according to the fitting manufacturer's recommendation.

The riser pipes shall be attached to riser pipe brackets by 316 stainless steel U-bolts. The U-bolts shall be tightened to secure the riser pipe as to grip the pipe without deforming the pipe when bolted to the brackets. The riser pipe brackets shall be constructed of 316 stainless steel 2 inch tubing (or 2 inch 316 stainless steel angle) with 6"x6"x1/4" 316 stainless steel plates welded to each end and attached to the wet well walls by two (min) 316 stainless steel anchors.

F. Hardware

A multi hook stainless steel hanger shall be installed inside the wet well access opening for supporting the float switches and pump electric cables. The multi hook hanger shall be constructed from 1/4-inch x 2-inch type 316 stainless steel flat stock with individual hooks constructed of 1/4-inch type 316 stainless steel rod stock. Individual hangers shall be installed on each side of the upper guide rail bracket for each pump to support the pump lifting chain and power cable. The lifting chain hook shall be constructed from 3/8-inch type 316 stainless steel rod stock. The pump power cable hook shall be constructed from 1/4-inch x 1-inch type 316 stainless steel flat stock.

G. Painting and Coating

All paint and other coatings shall be applied in accordance with the product manufacturer's specifications for the surfaces being coated. All ductile iron body valves shall have a factory applied fusion bonded epoxy coating inside and outside. All ductile iron fittings shall have an approved factory applied epoxy coating inside and outside. No field-applied paintings or coatings shall be applied to the valves or fittings.

H. Stilling Well (where required)

A stilling well may be required, and if so, shall be a 6" PVC stilling well mounted such that the top is available to an open hatch cover. The bottom of the stilling well shall have two 316 stainless steel bolt all the way through both sides, passing through the center of the pipe, approximately 4" from the base of the pipe. It shall have 1/2-inch diameter holes drilled around the circumference at a rate of one hole per inch of length for at least the full wetted height. All mounting hardware shall be 316 stainless steel.

I. Magnetic Flow Meter (where required)

A flow meter may be required, and if so, shall be rated for continuous submergence, 0.05% accuracy with a polyurethane liner, flush electrodes, FM Class 1, Division 2, Groups A, B, C & D and shall be constructed for a flanged mount. Meter shall be supplied with a like size spool piece. The exterior control module/transmitter shall be mounted either inside or adjacent to the lift station control panel on the same support structure per the Lift Station Supervisor.

2.01 ELECTRICAL

A. Service and Metering

The Contractor shall be responsible and shall pay for any permits, fees, and inspections required by the local power company for service installations. Three phase power shall be used unless otherwise approved by the County. Service for pump motors of 20 horsepower or smaller shall be 230 volts. For motors greater than 20 horsepower, the service voltage shall be 460. No phase converters will be accepted. All lift stations shall be equipped with a knife-type fused safety switch in a NEMA 4X stainless steel enclosure, lockable in the ON and OFF position, between the service meter and the control panel to permit servicing of the main breaker without removing the service meter. All meter bases shall be aluminum. Minimum service size shall be 100 amp. Conduit connections to the disconnect shall be sealed using Myers conduit hub connectors (disconnect side).

B. Conductors

All power conductors shall be single conductor, 600 volt, type THW or THHN stranded copper. Minimum conductor size shall be #12 AWG. ALUMINUM WIRE IS NOT PERMITTED. All control wiring shall be single conductor #14 AWG, 600 volt, type THHN stranded copper. All terminations and interconnections of control wiring shall be by means of compression-type lugs of the nylon self insulated type with an inner bronze insulation grip sleeve on identified terminal strips. All control wiring shall be color coded as indicated on the standard details.

C. Conduit

All power conductors from the utility source to the service meter shall be enclosed in PVC Schedule 80 conduit below ground and aboveground (NO I.M.C. ALLOWED). All lift stations shall be equipped with one conduit to the wet well for each pump power cables and a separate conduit to the wet well for the control (floatball) and signal cables. In lift stations with large horsepower pumps and pumps equipped with sensor cables, the conduit size and quantity shall be determined by the County. All conduit to the lift station wet well shall be minimum 2" Schedule 80 PVC and shall be run by the shortest route possible. All terminations shall be made inside the electrical control panel. All flexible conduit shall be non-metallic.

D. Control Panel

All pump stations shall have one automatic control panel, one telemetry control unit enclosure with specified TCU (most current model) with assigned radio frequency and one junction control box for motor control, floats, seal fail and transducer. The control panel will be ordered through Barney's Pump of Lakeland, FL. The telemetry control cabinet will be

ordered through Data Flow Systems (DFS), part# RJ1816HPL. Specify if 480V 3 phase is needed. Enclosure must be ordered with 'NO" tower mounting brackets.

All cabinets shall be white in color unless specified otherwise. The 304 S.S. control cabinet and junction box shall be powder coated white.

The Order Numbers and specification are listed below.

Barney's Pumps approved panels by Manatee County

Part#	STD. FLA	MCB/ECB	PCB	Starter	Size (Starter or OL)	Note:
ManCoCP240_1_3_VFD	24 (Input)	100	40	FRN003E1S-7U	N/A	11A Max Pump FLA (VFD)
ManCoCP240_1_5_VFD	42.7 (Input)	125	70	FRN010E1S-2U	N/A	19A Max Pump FLA (VFD)
ManCoCP240_3_2_SSC	8.3	100	15	SSR	3-12A	Solid State Starter
ManCoCP240_3_3_SSC	9.5	100	15	SSR	3-12A	Solid State Starter
ManCoCP240_3_5_SSC	15.3	100	25	SSR	10-40A	Solid State Starter
ManCoCP240_3_7.5_SSC	25.2	100	40	SSR	10-40A	Solid State Starter
ManCoCP240_3_10_SSC	29.5	100	50	SSR	10-40A	Solid State Starter
ManCoCP240_3_15_SSC	44.2	125	70	SSR	25-100A	Solid State Starter
ManCoCP240_3_20_FVNR	54.4	175	90	14HUG32AF	Size 3	Elect-mech starter
ManCoCP240_3_25_FVNR	68	200	100	14HUG32AF	Size 3	Elect-mech starter
ManCoCP480_3_2_SSC	4.1	100	15	SSR	3-12A	Solid State Starter
ManCoCP480_3_3_SSC	4.8	100	15	SSR	3-12A	Solid State Starter
ManCoCP480_3_5_SSC	7.8	100	15	SSR	3-12A	Solid State Starter
ManCoCP480_3_7.5_SSC	12.6	100	20	SSR	10-40A	Solid State Starter
ManCoCP480_3_10_SSC	14.7	100	25	SSR	10-40A	Solid State Starter
ManCoCP480_3_15_SSC	22.1	100	40	SSR	10-40A	Solid State Starter
ManCoCP480_3_20_SSC	27.2	100	50	SSR	10-40A	Solid State Starter
ManCoCP480_3_25_SSC	34	100	60	SSR	10-40A	Solid State Starter
ManCoCP480_3_30_SSC	40.1	110	70	SSR	25-100A	Solid State Starter
ManCoCP480_3_40_FVNR	52.2	125	80	14HUG32AF	Size 3	Elec-mech Starter
ManCoCP480_3_50_FVNR	70.5	175	110	14HUG32AF	Size 3	Elec-mech Starter
<p>All part numbers include junction box Fuji Inverters/VFD's only Part number for cabinets that are single phase does not include inverters - sold seperately.</p>						

The control panel, telemetry control cabinet, and motor cable junction box along with the safety switch box and electric utility power meter, shall be attached to horizontal support channels with stainless steel fastening systems designed for use with the support channel. The horizontal channels shall be 1-5/8 inch, 12 gage (or thicker) solid stainless steel channels (Uni-strut, B-Line or County approved equal), attached with stainless steel 3/8-inch all thread rod with stainless steel flat washers and nuts to two vertical 3 inch diameter stainless steel, schedule 40 posts. The 3 inch vertical pipe shall have plastic end caps or stainless steel end caps at the top and shall be anchored in concrete adjacent to the pump station wet well. See County Standard, "Sewage Pump Station Meter & Electrical Details". No fittings shall enter from the top or back of the control panel. All fittings shall enter the side or bottom of the control panel and shall penetrate the control panel with Myers Hubs.

The overall control panel shall be a minimum of 30"x 36"x 12" deep and of adequate size to completely cover (without crowding) all wiring and components mounted inside it. It shall have provisions for the mounting of all basic and optional controls and instrumentation. Install engraved nameplates defining door mounted hardware. The electrical control panel shall have a complete wiring schematic which is laminated in plastic and attached to the inside of the outer control panel door.

All components shall be installed per the most current NEMA and NEC regulations and standards. The components shall be industrial NEMA rated (I.E.C. is not acceptable) and UL approved when UL approval is available for that particular type component. The components of the panel shall be held in place with stainless steel, slotted, pan head machine screws with star type washers. The panel shall be tapped to accept the mounting screws of the components and no self-tapping type screws shall be used. The control panel shall have the following items installed on the back plane or on aluminum "high hats" attached to the back plane, so the body of the component is flush with the dead front door to allow operation and reset of the components without opening the dead front door: main power breaker, emergency power circuit breaker, individual pump circuit breakers, control circuit breaker and G.F.I. duplex receptacle circuit breaker. The control panel shall have the following items installed directly to the back plane: individual motor starters, power distribution blocks, neutral bar assembly, grounding bar/lugs, terminal strips, 2 inch PVC conduit for control and telemetry wiring and fuses, and surge suppressor. The control panel shall have one G.F.I. duplex receptacle installed on the dead front door. The exterior of the control panel shall have one emergency generator receptacle, one flashing red light, and one audible alarm with reset button. The individual placement of all the components of the control panel shall be installed as indicated in the standard details.

E. Ratings

The controls shall be rated for the supply voltage (230 or 460 volts), 3 phase, 60 hertz. In the event that three phase power is not available at the location of the control panel, the cabinet shall be either ManCOCP240 1 3 VFD (3 hp) or ManCoCP240 1 5 VFD (5 hp) inverters. All control voltage to the wet well shall not exceed 24 volts DC.

F. Wiring Method

All power conductors from the main circuit breaker to all other circuit breakers shall be connected via a Square D model LBA363206, Marathon #1333555, or equal power distribution block. All electrical panel components shall have individual neutral wires. All neutral wiring shall be connected via a Square D model SN12-125 neutral assembly. Wiring

is to be continuous with no splices between connections. Provide a Square D model PK9GTA grounding bar at the bottom of the backplate. This grounding bar will be the central connection point of all ground wires for the system with the exception of the pump power cords and surge arresters. The pump power cords and surge arresters shall be grounded via individual ground lugs that are to be attached to the control panel back plane. Provide two 12 terminal, Ideal Model 89-208 terminal strips to make electrical connections in the control panel. One terminal strip shall be used exclusively for 24 volt connections (TB-1) and the other shall be used exclusively for 120 volt connections (TB-2). The power distribution block, neutral assembly, grounding bar and terminal strips shall be located as indicated in the standard details. Use stainless steel screws and fasteners for all wiring connections.

G. Circuit Breakers

The panels shall be equipped with main and emergency circuit breakers for a minimum size of service of 100 amps. The main and emergency circuit breakers shall be interlocked so that when one is in the open position, the other circuit breaker must be in the closed position. There shall also be an individual circuit breaker for each pump, a control circuit breaker, a 20 amp circuit breaker for site lighting, a 20 amp circuit breaker for the flow meter (re-pump stations only) and a minimum 20 amp circuit breaker for the 120 volt GFI protected convenience outlet that is mounted on the inner control panel door. All circuit breakers shall be mounted in the control panel per the standard details. The circuit breakers shall be of the heavy duty thermal magnetic trip variety. For circuit breakers up to 100 amps, use Square D series QOU or County approved equal. For circuit breakers greater than 100 amps, use Square D "Mag Guard" series with adjustable trip for the pumps, main and emergency breakers shall be Square D QBL, HGL, or JGL.

H. Motor Starters

Pump motors shall each have a NEMA-rated, solid state or magnetic starter sized as called for on the construction plans. No starter smaller than NEMA size 1 shall be used. Starters shall be solid state, full voltage, non-reversing type. These starters shall be Siemens series ESP-100 or County approved equal with special phase loss protection and a special factory coating of the solid state circuit boards which prevents hydrogen sulfide damage. The starters shall be equipped with under voltage release and overload protection on all three phases. The motor starter contacts (if used) shall be constructed so that they may be easily replaced without removing the starter unit from its mounted position. The overload reset device shall be operable without having to open the inner swing panel.

I. Lightning Arresters

There shall be a Ditek DTK Series lightning arrester/surge suppressor installed on the incoming power source. It shall be mounted on the bottom exterior or placed inside of the safety switch enclosure and connected to the LOAD SIDE of the safety switch and overload reset.

The main circuit breaker and the RTU circuit breaker shall also each have a Ditek CM+Series lightning arrester/surge suppressor connected to the load side of the breaker wiring. These lightning arresters/surge suppressors shall be mounted with the supplied adhesive strip on the back of the "high hat" supporting the breakers. The exact model lightning arresters/surge suppressors shall be based on the voltage and number of phases of the protected circuits.

J. Liquid Level Switches and Sensors

A minimum of four float switches are to be installed in the wet well to monitor and control liquid level height. The switches shall be a single pole mechanical type switch (as manufactured by MDI, Connery Manufacturing, or County approved equal). They shall be designed to actuate when the longitudinal axis of the float is horizontal, and deactuate when the liquid level falls one inch below the actuation elevation. The switching arrangement shall be normally open when deactivated. The output leads shall be connected in the control panel as shown in the standard details. The control voltage to the level switches shall be 24 volts DC and the switches shall be sized to operate at that voltage. In addition to the above, pump stations that re-pump sewage flows (directly or indirectly) from other pump stations shall have a Dylux model GXS3-PP300-A49-B49(50)-C01 pressure transmitter mounted inside a stilling well as the primary level sensor.

The wiring connecting the cable junction box to the wet well floats shall be a continuous length (no splices) of flexible rate 600 volt, minimum diameter of #18, type S.O. cable. The float switches shall have all connections made inside the junction box using crimp on spade terminals that are landed to the terminal strip. The wiring shall be installed so there is a minimum of four feet, and a maximum of 6 feet, of excess cable in the wet well for relocation of the float switches.

K. Alarms

Each pump station shall have one flashing red light to signal high level conditions. A flasher unit shall be installed and mounted in the control panel enclosure to operate the led flashing light attached to the unistrut.

L. Generator Receptacle

A generator receptacle to permit the installation of a portable emergency generator as the power source when the local utility power company power supply is lost shall be installed on the outside of the control panel as indicated on the standard details. It shall be directly connected to the emergency circuit breaker inside the control panel. The emergency and main circuit breakers shall have a mechanical interlink between them which shall allow only one source to supply power to the control panel at any given period of time. The generator receptacles shall be:

<u>Power Supply</u>	<u>Required Receptacle</u>
0-100 Amp, 230 Volt	Russell Stoll JR SB1044FR
100-200 Amp, 230 Volt	Russell Stoll JR SB2044FR
0-200 Amp, 460 Volt	Russell Stoll JR SB2034HR

M. Seal Leak Moisture Detector

Provide for each pump a moisture sensing sensor which will detect when moisture has penetrated the seal chamber. The moisture seal detector shall be connected to the County RTU system to notify lift station maintenance personnel when a seal has allowed moisture to enter the oil chamber of the pump. An indicating lamp is to be mounted in the control panel as illustrated in the standard details to also signal the seal failure.

N. Telemetry Control Unit

The remote terminal/pump control unit shall be a complete TAC Pack TCU system as manufactured by Data Flow Systems, Inc. The unit is to be a fully programmable, dual function device. It shall be used to monitor and control SCADA equipment and it shall have all the necessary hardware and software to control three pump motor starters. Its operation is based on level inputs from a minimum of four float ball switches in the wet well. It shall have the ability to control pump alternation, activate and deactivate remote and local alarms, and communicate with the HT3 SCADA System. It shall be equipped with RTU surge protection and a transient filter shield. The unit shall have an uninterruptible power source and contain all the components and be electrically connected as indicated in the standard details. It shall be equipped with an antenna tower with supporting mast and coaxial cable that is required by the manufacturer for that particular system. The battery backup will be contained with the TCU in its own enclosure. The installation shall include the required FCC licensing. The antenna and mast shall be rated for 150 MPH winds. Tower heights above 20 feet must be Rohn RG-45 series.

Pump stations that re-pump sewage flows (directly or indirectly) from other pump stations will also require an Analog Monitor Module to receive input from the force main pressure transducer and flow meter.

Telemetry control and remote terminal/pump control units are not required for privately owned and maintained pump stations.

O. Grounding

Install a 5/8" x 10' copper-clad ground rod for each electrical service. Connect to the ground rod a #6 bare copper wire to connect with the electrical panel grounding bar. Provide another, separate ground rod, tower clamp, and #6 bare copper wire to connect directly to the antenna tower, control cabinet/TCU cabinet, polyphaser, and ground. The ground rods and #6 bare copper wires shall be connected by an exothermic weld (cad weld).

P. Site Lighting

A minimum 6000 lumens LED shall be mounted on the system tower for illumination of the pump station area. The manually operated light shall be mounted on 3/4-inch aluminum rigid conduit connected to the RTU tower using 90 degree korn clamps.

3.01 GRINDER PUMP (LIFT) STATIONS

A. Grinder pumps shall be used where the required discharge rate is low and the discharge pipe is required to be smaller than 4-inch diameter. Grinder pumping stations shall be constructed essentially to the same standards as the larger standard pumping stations, with full plastic liners, dual pumps with guide rails, control panels, RTUs, antennas and masts, etc., but sized smaller to accommodate the lesser capacity. Wet well diameters may be smaller than 6 feet, but shall be no smaller than 4 feet. Riser pipes shall be no smaller than 1.25 inches diameter, and force mains shall be no smaller than 2 inches diameter. Ball check valves shall not be used.

B. Grinder pumps will not be required to pass a 3-inch solid, but shall rather be capable of grinding all materials normally found in domestic raw wastewater into a pumpable slurry. The grinder cutters shall be made of 440C stainless steel hardened to Rockwell 60C. Motors shall

be 230 volt, 3 phase, 60 hertz, 3450 or 1750 RPM speed, and shall otherwise meet the same requirements as for the larger standard sewage pump motors. Minimum hatch cover sizes for grinder pump station wet wells shall be 30 x 36 inches.

- C. There shall be an approved shut-off valve (tapping gate valve) installed at the connection of a grinder pump station pipeline to a County force main, and where the grinder pump station is maintained by a private entity, there shall be another approved shut-off valve (gate valve) installed at the point where the grinder pump pipeline enters the public right-of-way or public utility easement. The force main shall be at least 18 inches below the top slab within the valve vault. A 90 degree bend, which is turned down, shall be installed 18 inches outside of the valve vault to lower the force main to obtain a minimum 3 feet of cover.

Wet wells and valve vaults for grinder lift stations may be fiberglass or HDPE plastic. If fiberglass, the resins used shall be a commercial grade unsaturated polyester or vinyl ester resin. The reinforcing materials shall be commercial Grade "E" type glass in the form of continuous roving and chop roving, and shall have a coupling agent that will provide a suitable bond between the glass reinforcement and the resin. The inner surface exposed to the chemical environment shall be a resin-rich layer of 0.010 to 0.020 inches thick. The inner surface layer exposed to the corrosive environment shall be followed with a minimum of two passes of chopped roving of minimum length 0.5 inch (13 mm) to maximum length of 2.0 inches (50.8 mm) and shall be applied uniformly to an equivalent weight of 3 oz/ft². Each pass of chopped roving shall be well-rolled prior to the application of additional reinforcement. The combined thickness of the inner surface and interior layer shall not be less than 0.10 inch (2.5 mm). The interior surface shall be free of crazing, delamination, blisters larger than 0.5-inch in diameter and wrinkles of 0.125-inch or greater in depth. Surface pits may be permitted if they are less than 0.75-inch in diameter and less than 0.0625-inch deep. Voids that may not be broken with finger pressure and that are entirely below the resin surface shall be permitted if they are less than 0.5-inch in diameter and less than 0.0625-inch thick. After inner layer has been applied, the wet well and valve vault wall shall be constructed with chop and continuous strand filament wound manufacturing process which insures continuous reinforcement and uniform strength and composition. Wet well and valve vaults may require resin fiber-reinforced bottoms.

Wet well bottom shall have a minimum 3-inch anti-flotation ring. Wet well and valve vault bottom shall be designed to resist all pressures induced by water, soil and wheel loads with a maximum deflection of 1/4-inch.

No hardware shall penetrate the wet well walls. The wet well wall shall include built / molded in channel supports for every 8 feet of vertical discharge piping for mounting pipe support braces and for mounting both guide rails and hooks to hang float balls, pump lifting chains, etc. at the top of the wet well. All pipe openings shall have resilient pipe to wet well seals.

The 1:1 bottom fillet may be molded or formed fiberglass or plastic or concrete. Concrete also may be used on the top of anti-flotation ring and as required to resist buoyancy. The wet well and valve shall resist flotation with ground water level assumed to be at finished grade. The Engineer of Record shall submit flotation calculations to Manatee County when submitting Construction Drawing approval.

All fiberglass and plastic wet wells and valve vaults located such that a vehicle may run over it shall have a minimum dynamic-load rating of 16,000 lbs. when tested in accordance with ASTM D3753. To establish this rating, the complete wet well and valve vault shall not leak,

crack, or suffer other damage when load tested to 40,000 lbs. and shall not deflect vertically downward more than 0.25 in. at the point of load application when loaded to 24,000 lbs. Thickness of fiberglass and plastic wet wells and valve vaults shall be determined by calculations submitted when submitting construction drawings for approval. The Engineer of Record shall perform the calculations or shall submit a certification that he or she reviewed calculations prepared by others and that the aforementioned requirements have been met.

The wet well cylinder shall have the minimum pipe-stiffness values shown in table below when tested in accordance with ASTM D3753 Table 1.

<u>WET WELL LENGTH (FT.)</u>	<u>PIPE-STIFFNESS F/AY, [PSI (k Pa)]</u>
3 - 6.5	0.72 (4.96)
7 - 12.5	1.26 (8.69)
13 - 20.5	2.01 (13.86)
21 - 25.5	3.02 (20.82)
26 - 35	5.24 (36.13)

The exterior surface shall be relatively smooth with no sharp projections, free of blisters larger than 0.5-inch in diameter, delamination or fiber show.

Each wet well and valve vault shall be designed and built to meet all required ASTM D3753 designations for dimensional requirements, hardness, chemical resistance, and workmanship. Test records shall be provided to the County.

The Contractor shall set sections vertical and in true alignment. The finished wet well and valve vault shall not be out of plumb by more than 3/8-inch per 10 feet of height.

Each wet well and valve vault shall be marked on the inside and outside with the following information: Manufacturer's name or trademark, factory location, serial or model number and total length.

4.01 WATER SERVICE

All pump stations shall be equipped with a 3/4-inch water service (hose bib). Each water service shall be equipped with a 5/8-inch water meter, a reduced-pressure principle backflow prevention assembly (Wilkins 975XL2, Apollo RPLF4A, or Equal) and a 3/4-inch brass hose bib. The water meter and backflow prevention assembly shall be located within two feet of the pump station easement (or property) line. All water meters shall be obtained from the Manatee County Water Meter Department. Reclaimed water shall be used where available.

5.01 PERMITS

The Contractor shall be responsible for obtaining and shall pay for any permits and/or inspections required.

6.01 SHOP DRAWINGS AND INSPECTIONS

When calling for inspection, the Contractor shall have these approved shop drawings available on-site for review by the inspectors. The Contractor shall also deliver to the Lift Station Section inspector, the pump manufacturer's technical manual with the model number, serial number, and certified pump curve, for each pump prior to acceptance by the

County for maintenance.

7.01 EASEMENTS

An easement for ingress and egress to the lift station and an easement for the lift station must be granted and recorded before the lift station can be accepted by the County for operation and maintenance.

8.01 SITING

- A. The siting of all pump station facilities shall be subject to review and approval by Manatee County. All pump stations shall be located on a separate parcel of land or within a utility easement in common open space. The station shall be properly sited with due consideration of the neighborhood, surrounding site features, landscaping, aesthetics, safety and security. The station and associated landscaping shall not be sited on a right-of-way, private road, median, front yard of a residence, or within a visibility triangle. The pump station wet well, valve vault, control panel, and telemetry antenna shall not be sited within 20 feet of overhead power lines.
- B. Each pump station site shall have a vehicular access drive paved with a concrete surface course over a base course. The drive shall be designed to allow a service truck to park off of the right-of-way or roadway easement and to also allow the service truck to back up to the wet well such that the wet well is directly to the rear of the truck or adjacent to the side of the truck. The pump station control panel, telemetry antenna and hose bib shall not be located between the vehicular access driveway and the wet well, valve assembly, and/or valve vault.
- C. There shall be at least a 20-foot easement in all directions from the pump station site equipment. There shall be no obstructions within the easement such as buildings, walls, fences, etc., other than those that are part of the pump station and identified in these standards. A minimum setback of 5 ft shall be provided between pump station structures/equipment and the security fence. Pump station easement shall extend a minimum of 15 ft beyond all four sides of the security fence. If the pump station is adjacent to the street's right-of way, the pump station easement shall extend to the ROW line. The lift station site shall be made accessible with a minimum 30 ft wide corridor/easement.
- D. Surface stormwater flow shall be directed around the pump station site. The site shall be graded to provide sheet flow of site runoff away from the equipment and direct it to a suitable swale or drainage outfall. The construction drawings shall include a pump station site plan with a grading plan and landscaping plan.

9.01 FLOODING

Wastewater pumping station structures and electrical and mechanical equipment shall be fully protected from physical damage from flood water intrusion by the 100-year flood. Wastewater pumping stations shall remain fully operational and accessible during the 25-year flood. Regulations of state and federal agencies regarding obstructions of the pumping station site by flood waters shall be observed during the design of the development.

10.01 ENTRANCE HATCH ELEVATIONS

The wet well and valve vault top and entrance hatches shall be set at least 4 inches above the 100-year flood plain elevation, or 8 inches above the 25-year flood plain elevation, or 6 inches above the surrounding grade, or 12 inches above the adjacent roadway crown elevation, whichever is highest. Where this is not practical, deviation from the above must be approved by the County on a case-by-case basis.

11.01 ACCESSIBILITY AND SECURITY

The pumping station shall be readily accessible by maintenance vehicles during all weather conditions. A fully functional paved travelway shall be provided to the lift station driveway. The facility shall be located off the traffic way of streets and alleys.

All hatches, electrical panel and irrigation panel doors shall be provided with lockable hasps or staples.

Security fences with lockable gates shall be provided for all lift stations that are owned and maintained by Manatee County. Lift stations shall have a 6-foot high vinyl coated chain link security fence with privacy decorative slatting (color matched). Chain link security fencing shall be #9 gauge core, galvanized with vinyl coating, with 1 5/8 inch top rails, 2 3/8 inch Schedule 40 line posts, 2 1/2 inch Schedule 40 corner posts and 3 1/2 inch Schedule 40 gate posts for swing gates. Gate posts and track line posts shall be 4 inch Schedule 40 for cantilever slide gates. Maximum line posts spacing shall be equally spaced, not to exceed 8 feet.

For private lift stations, the Engineer of Record shall evaluate the location of the proposed lift station and determine whether a security fence is necessary.

12.01 FORCE MAIN FLOW METER

Lift stations that re-pump sewage flows (directly or indirectly) from other lift stations shall be equipped with a submersible electromagnetic flow meter. The flow meter shall be mounted on an above-ground force main. The flow meter shall be a McCrometer Ultra Mag Model UM06 or an approved equal. The meters, gauges and all connections and wiring shall be rated fully submersible. The flow meter shall transmit 4-20 mA signals to the telemetry system via the Analog Monitor Module mounted inside the control panel. The signal cables shall be run through 1-inch PVC conduit from the meter to the control panel. The meter display unit shall be weather-proof and mounted on an aluminum stand adjacent to the meter.

13.01 LANDSCAPING & IRRIGATION

A. Landscape trees and shrubs.

The pump station site shall have shrubs planted around the perimeter of the pump station security fence in a hedge-like placement. Shrubs shall have a minimum spacing of 3 feet between the centers of the shrub's base stem. For private pump stations that are located in nonresidential areas, shrubs are optional for the sides that are not adjacent to thoroughfare roads, nonthoroughfare roads, and residential areas. For pump stations that are located adjacent to thoroughfare roads and non-thoroughfare roads, a minimum of two small understory trees or palm trees shall be planted between the pump station security fence and the right of way line. For pump stations within residential areas or

located adjacent to residential areas, a minimum of two additional understory trees or palm trees; for a total of at least four understory trees or palm trees shall be planted around the pump station (these landscaping requirements are not applicable to pump stations that only serve one single family residence.) A minimum setback of 5 feet shall be provided between the shrub's base stem and the security fence to provide an access way for service personnel. A minimum setback of 10 feet shall be provided between the trunk of understory trees/palm trees and the security fence.

Understory trees shall not have a mature height exceeding 30 feet. Small understory trees, palm trees and shrubs shall not have evasive roots. The minimum height of understory trees shall be six (6') feet at time of placement. The minimum height of palm trees shall be fifteen (15') feet at time of placement. The minimum height of shrubs shall be two (2') feet at time of placement. Shrubs shall have three gallon root balls. Shrub growth habits shall be upright, globose, or columnar. Shrub growth habits shall not be spreading or broad spreading. The understory trees and palm trees shall be planted to accent the shrub placement. Tops of root balls of plants shall be set at or slightly above existing grade. All plant material to be Florida Grade #1 or better, as defined in "Grades and Standards for Nursery Plants," State of Florida Dept. of Agriculture. Plants shall be sound, healthy, vigorous, and free from plant diseases, insects, pests, or their eggs and shall have healthy normal root systems. Plants shall be nursery grown stock, freshly dug. No heeled in, cold storage, or collected stock shall be accepted. Ground covers shall have sturdy fibrous root systems. Staking and bracing shall be done on all trees using Arbor tape and the Duckbill anchor system, in accordance with sound nursery practices.

The shrubs, understory trees and palm trees shall be of the drought tolerant, low maintenance varieties. Plant selection shall be based on soil water retention as well as soil pH.

Examples of acceptable vegetation are as follows:

PLANT NAME	SOIL CONDITIONS WHERE PLANT WILL GROW		pH RANGE	
	Damp to poorly drained soils w/ low percolation	Well drained sands w/ high percolation	Plant tolerates acidic & alkaline soils	Plant tolerates acidic soils only
UNDERSTORY TREES (Mature height not exceeding 30 feet)				
Little Gem Magnolia (Magnolia grandiflora)	X			X
Southern Wax Myrtle (Myrica cerifera)	X	X	X	
Peregrina (Jatropha intergerrima)		X	X	
Bottle Brush Tree (Callistemon citrinus)		X		X
Crape Myrtle Tree (Lagerstroemia Indica)		X		X
Feijoa		X	X	

(Feijoa sellowiana)				
PALMS				
Cabbage Palms (Sabal palmetto)	X	X	X	
Pindo Palms (Butia capitata)		X	X	
Dwarf Royal (aka Christmas) Palm (Veitchia merrillii)		X	X	
SHRUBS & BUSHES				
Cocoplum (Chrysobalanus icaco)		X	X	
Pipestem (Agarista Populafollia)	X	X	X	
Sweet Viburnum (Viburnum odoratisimum)		X	X	
Yew podocarpus (Podocarpus macrophyllus)		X	X	

The following plant species shall not be planted at the lift station site:

Melaleuca quinquenervia (commonly known as Punk tree, Malaleuca); Schinus terebinthifolius (commonly known as Brazilian Pepper); Casuarina species (commonly known as Australian Pine); Rhodomyrtus tomentosa (commonly known as Downy Rose Myrtle); Mimosa pigra (commonly known as the Catclaw Mimosa); Dalbergia sissoo (commonly known as the Indian Rosewood); and Cupaniopsis anacardioides (commonly known as the Carrotwood).

B. Ground cover.

There shall be no vegetation within the lift station fencing. Site shall include a polypropylene weed barrier fabric that is covered with a minimum of 2-inches of washed shell, or rock within lift station fencing. Landscaping stones shall be inert and nonleaching. Crushed lime rock shall not be acceptable. Site shall include a polypropylene weed barrier fabric that is covered with 3 to 4-inches of shredded wood-type mulch that is located under the shrubs and up to the outside of the security fence. Polypropylene weed barrier fabric that is covered with 3 to 4-inches of shredded wood-type mulch shall be located under the trees for a minimum distance of 3 feet from the tree. Bahia, St. Augustine or Floritam sod or shredded wood-type mulch with a polypropylene weed barrier fabric shall be extended from the shrubs to the lift station easement line.

C. Irrigation.

An irrigation system shall be connected to a non-potable water source. A weather-tight time clock with built-in transformer, minimum of four zones (Rainbird ESP-4M, Toro CC-M-9, or equal) and a rain sensor (Mini-Clik, or equal) shall be furnished and installed. The irrigation controller shall be in a lockable control panel and attached with stainless steel two piece pipe clamps or stainless steel U-bolts to two vertical 3 inch diameter stainless steel, schedule 40 pipes or equal pipe support. The pipe clamp or U-bolt ends shall be covered with plastic caps to prevent injury to personnel. The 3 inch vertical pipe shall have plastic end caps or stainless steel end caps at the top and shall be anchored in concrete. The irrigation system control panel recommended location is outside of the fence and behind the shrubs. The Contractor

shall furnish the County a padlock with a set of two keys for the irrigation control panel. The number of zones shall be based on the proposed site, planting configuration, watering distribution, irrigation system demand, and type of vegetation to be irrigated. The irrigation system shall be installed to irrigate the trees, shrubs and grassed areas; and designed to provide three-fourths (3/4") to one (1") inch of water per week and be in conformance with irrigation restrictions established by the Southwest Florida Water Management District (not restricted if using reclaimed water). The irrigation system shall adhere to the requirements of the Manatee County Land Development Code and to the "Standards and Specifications for Turf and Landscape Irrigation Systems", latest edition, as published by the Florida Irrigation Society, Inc. A permanent sprinkler system with distribution lines underground with mist and/or bubbler nozzles, as appropriate, above the ground are acceptable. A micro-irrigation system located within the planting beds of shrubs and trees is acceptable for that type of installation. In each accent, isolated or separate tree planting bed, a tree bubbler (Toro 514-20 or equal), shall be installed at each tree. In addition, a four (4') foot section of flexible PVC shall be provided for the tree bubbler at each tree. Drip line hoses shall have built-in emitters (Toro DL2000 or equal).

D. Radio signal interference.

Landscape buffer plantings are to be field adjusted in coordination with the siting of the lift station's radio antenna to eliminate signal interference. The antenna for the existing or proposed radio telemetry unit at the lift station requires direct line-of-sight signaling capability to the Utilities Department office that will receive the signal. There shall be an unobstructed horizontal angle of fifteen (15°) degrees from the antenna mast (7 1/2 degrees on both sides of the direct line-of-sight azimuth). No tree shall be planted within the designated unobstructed angle for a twenty (20') foot horizontal distance measured from the mast.

14.01 BACK-UP DIESEL PUMPS OR EMERGENCY GENERATOR SET

Back-up Diesel Pumps:	See Section 11215
Emergency Generators:	See Section 16231

END OF SECTION

DIVISION 5 METALS

SECTION 05500 MISCELLANEOUS METAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, equipment and incidentals required and install covers, grates, frames and other miscellaneous metals as shown on the Drawings and specified herein. The miscellaneous metal items include but are not limited to the following:
1. All metal frames, ladders, stairs, stair rails, floor opening frames including gratings and supports.
 2. Prefabricated access hatches and frames.
 3. Anchors and anchor bolts except those specified to be furnished with all equipment.
 4. Railings, posts and supports both interior and exterior.
 5. Cast iron frames, covers, grates, drain leaders and drains.
 6. Bridge crane track supports.
 7. Stair nosings, steel plates, overhead steel door frames, angle frames, plates and channels.
 8. Exterior H.V.A.C. hoods.
 9. Pump guide rail system.

1.02 COORDINATION

- A. The work in this Section shall be completely coordinated with the work of other Sections. Verify at the site both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.
- B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.

1.03 SHOP DRAWINGS AND SAMPLES

- A. Detail drawings, as provided for in the Contract Documents, showing sizes of members, method of assembly, anchorage, and connection to other members shall be submitted to the County for approval before fabrication.
- B. Samples shall be submitted at the request of the County for concurrent review with Shop Drawings.

1.04 FIELD MEASUREMENTS

- A. Field measurements shall be taken at the site to verify or supplement indicated dimensions and to insure proper fitting of all items.

1.05 REFERENCED SPECIFICATIONS

- A. Unless otherwise specified, materials shall conform to the following:

Structural Steel	ASTM A36
Welded & Seamless Steel Pipe	ASTM A53
Gray Iron Castings	ASTM A48, Class 30
Galvanizing, general	ASTM A123
Galvanizing, hardware	ASTM A153
Galvanizing, assemblies	ASTM A386
Aluminum (Extruded Shapes)	6061-T6 (Alum. alloy)
Aluminum (Extruded Pipe)	6061-T6 (Alum. alloy)
Aluminum Bar Structural	6061-T6 (Alum. alloy)
Bolts and Nuts	ASTM, A307
Stainless Steel Bolts, Fasteners	AISI, Type 316
Stainless Steel Plate and Sheet, Wire	AISI, Type 316
Welding Rods for Steel	AWS Spec. for Arc Welding

PART 2 PRODUCTS

2.01 ANCHORS, BOLTS AND FASTENING DEVICES

- A. Anchors, bolts, etc., shall be furnished as necessary for installation of the work of this Section.
- B. Compound masonry anchors shall be of the type shown or required and shall be equal to Star Slug in compounded masonry anchors manufactured by Star Expansion Industries, equal by Phillips Drill Co., Rawlplug, or equal. Anchors shall be minimum "two unit" type.
- C. The bolts used to attach the various members to the anchors shall be the sizes shown or required. Stainless steel shall be attached to concrete or masonry by means of stainless steel machine bolts and iron or steel shall be attached with steel machine bolts unless otherwise specifically noted.
- D. For structural purposes, unless otherwise noted, expansion bolts shall be Wej-it "Ankr-Tite", Phillips Drill Co. "Wedge Anchors", or Hilti "Kwik-Bolt". When length of bolt is not called for on the Drawings, the length of bolt provided shall be sufficient to place the wedge portion of the bolt a minimum of 1-inch behind the reinforcing steel within the concrete. Material shall be as noted on the Drawings. If not listed, all materials shall be stainless steel.

2.02 ALUMINUM ITEMS

- A. Aluminum gratings shall be of serrated I-Bar Aluminum Alloy 6061-T6, fabricated to the depths and thicknesses shown on the Drawings and shall be Reliance Steel Products Company, I-Lok Type 7/8 R4 Aluminum Grating; IKG Industries, "Galok" Aluminum I-Bar Grating Type S194-I, or equal. All openings 2 inches and greater in diameter shall be banded with a bar of the same depth and thickness as the main bearing bars of the grating, or furnished with continuous cross bridges. Each cut bar shall be welded to the band if banding is utilized. The ends of all grating sections shall be likewise banded. Clamps and bolts used for attaching grating to supporting members shall be stainless steel. All grating shall be clamped unless noted otherwise. Clamps shall be as recommended by the manufacturer.
- B. Stair treads shall be as specified above for grating and shall have abrasive nonslip nosing.
- C. Aluminum nosing at concrete stairs shall be an extrusion of 4-inch minimum width with

abrasive filled and shall be Wooster Products, Inc., Alumogrit Treads, Type 116; equal by Barry Pattern and Foundry Co.; Andco; or equal. Embedded anchors shall be furnished with a minimum of three anchors per tread.

- D. Aluminum ladders shall be fabricated to the dimensions and details and installed as shown on the Drawings. Treads to be of cast aluminum by Dixie Metals, Inc. of Fort Lauderdale, Florida or equal.
- E. Aluminum Handrails, Mechanically Fastened Type:
1. All aluminum mechanically fastened type pipe handrails and guardrails shall be clear anodized aluminum finish and installed as specified herein and indicated on the Drawings. Handrails shall be made of nominal 1-1/2 inches inside diameter pipe (Schedule 40) fabricated or seamless 6063-T6 alloy. The supplier of the handrail system shall supply all necessary fittings, rackets, transition, corner and connector pieces, toeboards, protective gaskets, etc., for a complete job at the locations, indicated on the Drawings. All mounting hardware including bolts, studs, nuts, etc., shall be stainless steel Type 316. Bends shall be smooth and accurate to the details shown. Railings shall be the "Rigid Rail System" as manufactured by Reynolds Aluminum of Reynolds Metal Company as Reynolds II pipe railing system or the "Connectorail System" as manufactured by Julius Blum & Co., Inc., Carlstadt, New Jersey. The handrail systems shall comply with all OSHA and D Section 1208.2 of the Standard Building Code.
 2. Spacing of posts where posts are required shall be as noted on shop drawings, but in all cases, shall be uniform and shall not exceed the requirements of OSHA and Section 1208.2 of the Standard Building Code. Shorter spacing may be used where required to maintain the maximum spacing. The fabricator of the aluminum handrail and guardrail system shall be responsible for the design and preparation of shop drawings and design calculations (signed and sealed by Florida Registered Engineer) to meet OSHA requirements and Section 1208.2 of Standard Building Code.
 3. All railings shall be erected in line and plumb. Field splicing and expansion compensation shall be accomplished using internal splice sleeves. Make provisions for removable railing sections as detailed and where shown on the Drawings.
 4. Where handrail or guardrail posts are set in concrete as per the manufacturer's requirements the posts shall be set into aluminum sheeves cast in the concrete and firmly cemented with 1651 epoxy resin by E-Bond Epoxies, Oakland Park, Florida, Moulded Reinforced Plastics, Inc., Fort Lauderdale, Florida or equal. Collars shall be placed on the posts and fastened in place, as shown and as detailed on approved shop drawings.
 5. Where handrail is supported from structural members, it shall be done by the use of approved sockets, flanges, brackets, or other approved means which will provide neat and substantial support for the pipe railing.
 6. All railing shall be properly protected by paper, or by an approved coating or by both against scratching, splashes or mortar, paint, or other defacements during transportation and erection and until adjacent work by other trades has been completed.
- F. Toeboards: Contractor shall furnish and install aluminum toeboards conforming to latest OSHA requirements on all railings and other locations where indicated on the Drawings.

1. Toeboards shall consist of an extruded 6063-T6 aluminum shape bolted by means of a pipe clamp to the railing posts without requiring any drilling or welding of the toeboard to the railing posts as manufactured by Reynolds Aluminum, Julies Blum & Company, Thompson Fabricating Company or equal. Toeboards shall have pitched top and tear drop bottom to prevent accumulation of dirt, or other material.
 2. All fastening hardware shall be Type 316 stainless steel.
- G. Kickplates, if required, shall be fabricated and installed as shown on the Drawings.
- H. Aluminum safety gate shall be fabricated of extruded aluminum.
- I. Prefabricated checkerplate aluminum floor hatches shall be Type "JD", or "KD" as manufactured by Bilco Co., Babcock-Davis Associates, Inc.; Type "AM" Inland-Ryerson Construction Products Co., Milcor Division; or equal, sized as shown. Hatches with either dimension over 3 feet-6 inches shall be double leaf type. Hatches shall be designed for a live load of 300 pounds per square foot. Hatches shall be watertight.
- J. Ship ladders shall be of all aluminum construction as detailed. Treads shall have abrasive nosing as manufactured by Reliance Steel Products Co., IKG Industries, or equal.
- K. Checkplate aluminum cover plates shall be fabricated to the details shown and installed at the locations shown.
- L. Structural aluminum angle and channel door frames shall be provided as shown on the Drawings and shall be anodized. Frames shall be fabricated with not less than three anchors on each jamb.
- M. Miscellaneous aluminum shapes and plates shall be fabricated as shown. Angle frames for hatches, beams, grates, etc., shall be furnished complete with welded strap anchors attached. Furnish all miscellaneous aluminum shown, but not otherwise detailed. Structural shapes and extruded items shall conform to the detail dimensions on the Plans within the tolerances published by the American Aluminum Association.

2.03 STEEL ITEMS

- A. Sleeves shall be steel or cast iron pipe in walls and floors with end joints as shown on the Drawings. All pipe sleeves shall have center anchor around circumference as shown.
- B. Miscellaneous steel pipe for sleeves and lifting attachments and other uses as required shall be Schedule 40 pipe fabricated according to the details as shown on the Drawings.
- C. Miscellaneous steel shall be fabricated and installed in accordance with the Drawings and shall include: beams, angles, support brackets, closure angles in roof at edge of T-beams; base plates to support ends of T-beams; door frames; splice plates, anchor bolts; lintels and any other miscellaneous steel called for on the Drawings and not otherwise specified.

2.04 CAST IRON ITEMS

- A. Outside pipe clean-out frames and covers shall be heavy duty, R-6013-R-6099 series as manufactured by Neenah Foundry Co., or equal. All outside pipe clean-outs shall be 6-inch diameter.

- B. Frames and covers for valve vaults and manholes shall be of a good quality, strong, tough even grained cast iron except as otherwise specified below. Castings shall be as manufactured by the U. S. Foundry, Neenah Foundry, Mechanics Iron Foundry, or equal. Covers to have letters "WATER", "SEWER" or "DRAIN", as applicable, embossed on top.

PART 3 EXECUTION

3.01 FABRICATION

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.
- B. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Steel accessories and connection to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fitting.
- C. Welded joints shall be rigid and continuously welded or spot welded as specified or shown. The face of welds shall be dressed flush and smooth. Exposed joints shall be close fitting and jointed where least conspicuous.
- D. Welding of parts shall be in accordance with the Standard Code of Arc and Gas Welding in Building Construction of the AWS and shall only be done where shown, specified, or permitted by the County. All welding shall be done only by welders certified as to their ability to perform welding in accordance with the requirements of the AWS Code. Component parts of built-up members to be welded shall be adequately supported and clamped or held by other adequate means to hold the parts in proper relation for welding.
- E. Welding of aluminum work shall be on the unexposed side as much as possible in order to prevent pitting or discoloration.
- F. All aluminum finish exposed surfaces, except as specified below, shall have manufacturer's standard mill finish. Aluminum handrails shall be given an anodic oxide treatment in accordance with the Aluminum Association Specification AA-C22-A41. A coating of methacrylate lacquer shall be applied to all aluminum shipment from the factory.
- G. Castings shall be of good quality, strong, tough, even-grained, smooth, free from scale, lumps, blisters, sand holes, and defects of any kind which render them unfit for the service for which they are intended. Castings shall be thoroughly cleaned and will be subjected to a hammer inspection in the field by the County. All finished surfaces shown on the Drawings and/or specified shall be machined to a true plane surface and shall be true and seat at all points without rocking. Allowances shall be made in the patterns so that the thickness specified or shown shall not be reduced in obtaining finished surfaces. Castings will not be acceptable if the actual weight is less than 95 percent of the theoretical weight computed from the dimensions shown. The Contractor shall provide facilities for weighing castings in the presence of the County showing true weights, certified by the supplier.
- H. All steel finish work shall be thoroughly cleaned, in accordance with the Contract Documents, of all loose mill scale, rust, and foreign matter before shipment and shall be given one shop

coat of primer compatible with finish coats specified in Painting Section after fabrication but before shipping. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spread and well worked into joints and other open spaces. Abrasions in the field shall be touched up with primer immediately after erection. Final painting is specified in the Contract Documents.

- I. Galvanizing, where required, shall be the hot-dip zinc process after fabrication. Following all manufacturing operations, all items to be galvanized shall be thoroughly cleaned, pickled, fluxed, and completely immersed in a bath of molten zinc. The resulting coating shall be adherent and shall be the normal coating to be obtained by immersing the items in a bath of molten zinc and allowing them to remain in the bath until their temperature becomes the same as the bath. Coating shall be not less than 2 oz. per sq. ft. of surface.

3.02 INSTALLATION

- A. Install all furnished items imbedded in concrete or other masonry. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted. All dimensions shall be verified at the site before fabrication is started.
- B. All steel surfaces to come in contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation or provide a 1/32-inch neophrene gasket between the steel surface and the concrete or masonry.
- C. Where aluminum is embedded in concrete, apply a heavy coat of approved bitumastic troweling mastic in accordance with the manufacturer's instructions prior to installation.
- D. Where aluminum contacts masonry or concrete, provide a 1/32-inch neophrene gasket between the aluminum and the concrete or masonry.
- E. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer and provide a 1/32-inch neoprene gasket between the aluminum and the dissimilar metal.

Where aluminum contacts wood, apply two coats of aluminum metal and masonry paint to the wood.

END OF SECTION

SECTION 05550 AIR RELEASE ENCLOSURE

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and incidentals required to install the above ground air release enclosure as listed in the specifications and as shown on the Drawings.

1.02 RELATED WORK

The contractor shall be responsible for any related work necessary for the proper installation of enclosure. This shall include, but is not limited to, any required bypass pumping, any required earthwork and any required concrete work.

1.03 SUBMITTALS

- A. Submit to the County shop drawings and schedules of all enclosure systems and appurtenances required. Submit design data and specification data sheets listing all parameters used in the enclosure system design.
- B. Submit to the County the name of the enclosure supplier and a list of materials to be furnished.

1.04 REFERENCE STANDARDS

- A. American Water Works Association (AWWA).
- B. American Society for Testing and Materials (ASTM).
- C. Where reference is made to the above standard, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

The enclosure manufacturer shall be a company specializing in the manufacture of such enclosures with at least five (5) years of successful field experience and being lab certified as meeting A.S.S.E 1060 requirements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Care shall be taken in shipping, handling and placing to avoid damaging. Any material damaged in shipment shall be replaced as directed by the County.
- B. Any material showing deterioration, or which has been exposed to any other adverse storage condition that may have caused damage, even though no such damage can be seen, shall be marked as rejected and removed at once from the work.

PART 2 PRODUCTS

2.01 GENERAL

All enclosures shall comply with the standard detail for shape and size and shall include a 22" square by 39" tall enclosure with a hasp for a padlock. The enclosure shall be securely attached to a concrete base with anchor brackets installed on the interior of the enclosure, through the flange base of the enclosure itself or through a 316 stainless steel anchor hinge.

2.02 ALUMINUM ENCLOSURE

- A. The roof, walls and access panels shall be constructed of mill finish aluminum, ASTM B209, solid sheet construction, with a wall thickness of one eighth inch.
- B. All structural members shall be aluminum. No wood or "particle board" shall be allowed in assembly.
- C. Multi-sectional enclosures shall fit together with overlapping "tongue and groove" joints and be secured internally with mechanical fasteners.
- D. All assembly fasteners shall be stainless steel or aluminum.

2.03 STAINLESS STEEL ENCLOSURE

- A. The roof, walls and access panels shall be constructed stainless steel, type 316, solid sheet construction, with a wall thickness of one eighth inch.
- B. All structural members shall be stainless steel. No wood or "particle board" shall be allowed in assembly.
- C. Multi-sectional enclosures shall fit together with overlapping "tongue and groove" joints and be secured internally with mechanical fasteners.
- D. All assembly fasteners shall be stainless steel.

2.04 FIBERGLASS ENCLOSURE

- A. Enclosure shall be a one-piece molded fiberglass/resin enclosure with polyester coating; a base flange for mounting to the concrete slab and a full recessed door opening with a lip. Enclosure shall be by Allied Molded Products, or equivalent. Color shall be as directed by the County.
- B. Full length piano style hinge, door latch, padlock hasp and all bolts and other hardware shall be of stainless steel.

PART 3 EXECUTION

3.01 INSTALLATION

Enclosure shall be assembled and mounted plumb, level and square on the concrete pad

according to the manufacturer's instructions and the contract drawings.

END OF SECTION

DIVISION 7 THERMAL AND MOISTURE PROTECTION

SECTION 07100 WATERPROOFING, DAMPPROOFING AND CAULKING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all materials, labor, equipment, and incidentals required to perform all through wall flashing work, waterproofing, dampproofing, caulking, and related work necessary for the proper completion of the project as required by the Drawings and as specified herein.
- B. Dampproof the exterior surfaces of all exterior poured- in-place concrete walls or concrete masonry foundation walls from the top of the footings up to 6 inches below finished grade.

1.02 APPLICABLE SCHEDULE

- A. Deliver all materials in original manufacturer's packages with labels and seals intact. Handle and store in accordance with manufacturer's instructions.
- B. Inspect job conditions for defects which would prevent proper installation of caulking. Do not proceed until defects have been corrected.
- C. Caulk all exterior wall joints between metal wall panels and adjacent materials, between frames in openings and adjacent materials, between masonry and cast-in-place concrete, brick paver expansion and control joints and all other joints shown on the Drawings or required for the completion of the Work.
- D. Caulk all interior joints between frames and masonry, at tops of masonry walls, between masonry and structural concrete, expansion and control joints in ceramic tile and brick pavers, exterior window and door frames, louvers, and all other joints shown on the drawings or required for the completion of the Work.
- E. Joints noted as "caulk", "caulking", or "sealant" shall be caulked with the sealant specified herein.
- F. Furnish and place through wall flashing in exterior masonry walls as shown on the Drawings.
- G. Furnish and place vapor barrier under all building structure slabs contacting soil as specified herein.

1.03 SUBMITTALS

Submit two representative samples of any or all other proposed materials and installation method required for the work of this Section as requested by the County.

PART 2 PRODUCTS

2.01 DAMPPROOFING

- A. Dampproofing shall be Sealmastic Solvent by W.R. Meadows or equal.

2.02 CAULKING

- A. Caulking Compound: One component, synthetic rubber base sealant, soft curing, nonstaining, conforming to F.S. TT-S-00230 and Thiocol's Building Trade Performance Specifications for Type 1 Class B sealants. Colors shall match material receiving caulking, as directed by the County.
- B. Interior Silicone Sealant: F.S. TT-001543 for perimeter of plumbing fixtures against walls and floors and joints between laminated plastic counters and walls shall be transparent.
- C. Primer: As recommended by caulking compound manufacturer.
- D. Back-up Material: Closed cell foam polyethylene, or similar nonbituminous material as recommended by manufacturer of caulking compound and completely compatible with selected compound.

2.03 HYDRAULIC CEMENT

- A. Material for quick-set hydraulic cement shall be DRYLOK FastPlug as manufactured by United Gilsonite Laboratories (UGL), or equal.

2.04 VAPOR BARRIER

- A. Vapor barrier shall be 10 mil thick polyethylene sheet with a vapor transmission rating of 0.20 perms. Laps between adjacent sheets shall be 10 inches minimum. Vapor barrier shall be carefully inspected by the County prior to concrete placement. Additional polyethylene sheet required for repair or replacement of damaged vapor barrier shall be furnished and installed by the Contractor as directed by the County at no additional cost to the County.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation of Dampproofing
 - 1. Surface to be treated shall be free from oil and dirt and shall be in the proper condition as indicated by the manufacturer prior to the application of the dampproofing material. The concrete shall be dry and free from frost at the time of application. Dampproofing installation will be allowed after concrete has cured for 7 days or it has reached 75% of its 28-day design strength. Backfill shall be done within 24-48 hours after the coatings have been applied.
 - 2. Surfaces to be dampproofed shall receive two (2) heavy coats 10 mils thick, the first coat being carefully applied so that "holidays" or untreated air-bubble depressions in the surface shall be completely filled and the second coat will guarantee a 100% coating of the surface.
 - 3. Particular care shall be given to the application of dampproofing at all construction joints which are encountered.
 - 4. The number of coats specified is in addition to primer coats as recommended by the manufacturer.

B. Installation of Caulking

1. Surface Preparation: Clean metal surfaces free of grease, oil, wax, lacquer, and other foreign residue by wiping with a clean cloth moistened with a suitable solvent. Scrape or brush masonry surfaces clean. Apply appropriate primer to contact surfaces.
2. Joint Preparation: Joints to be caulked having a depth in excess of 3/8-inch shall be packed with back-up material. Round back-up material shall be sized to require 20 percent to 5 percent compression upon insertion. In joints not of sufficient depth to allow packing, install polyethylene bond-breaking tape at back of joint. Avoid lengthwise stretching of back-up material. Cut all corners, avoid wrapping around corners.
3. Application: Apply compound with pressure flow gun with nozzle of proper size and shape to suit width of joint, promptly after mixing and with sufficient pressure to fill joint. Apply as a continuous operation horizontally in one direction and vertically from bottom to top, except joints having excessive widths where compound might sag, the joints shall be built up with excessive beads. Finish joints smooth and slightly covered.
4. Cleaning: Immediately clean adjacent material which may be soiled by caulking operation.

C. Installation of Quick-Set Hydraulic Cement

1. The surface shall be cleaned and free of dirt, loose mortar particles, paints, films, protective coatings, efflorescence, laitance, form treatments, curing compounds, and other materials.
2. Cut out crack at least 3/4 inches wide and deep, cutting back into wall slightly. Flush away all cuttings and dirt. Force water-plug into prepared crack with a round tool and smooth out. Form cove at junction.
3. To be applied under manufacturer's recommendations.

END OF SECTION

DIVISION 9 PAINTING

SECTION 09865 SURFACE PREPARATION AND SHOP PRIME PAINTING

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required for the surface preparation and application of shop primers on ferrous metals, excluding stainless steels, as specified herein.

1.02 SUBMITTALS

- A. Submit to the County for approval, as provided in the Contract Drawings for shop drawings, manufacturer's specifications and data on the proposed primers and detailed surface preparation, application procedures and dry mil thickness.
- B. Submit representative physical samples of the proposed primers, if required by the County.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Submerged Services: Shop primer for ferrous metals which will be subject to splash action or which are specified to be considered submerged service shall be sprayed with one coat of Koppers 654 epoxy Primer or Koppers Inertol Primer 621-FDA, dry film thickness 3.5 to 4.5 mils by Koppers Co., Inc., or equal.
- B. Nonsubmerged Services: Shop primer for ferrous metals other than those covered by paragraph 2.01 A shall be sprayed with one coat of Koppers Pug Primer, dry film thickness 3.0 to 4.0 mils by Koppers Co., Inc. or equal.
- C. Nonprimed Surfaces: Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during all periods of storage and erection and shall be satisfactory to the County up to the time of the final acceptance.
- D. Compatibility of Coating Systems: Shop priming shall be done with primers that are guaranteed by the manufacturer to be compatible with their corresponding primers and finish coats specified in the Contract Documents for use in the field and which are recommended for use together.

PART 3 EXECUTION

3.01 APPLICATION

- A. Surface Preparation and Priming:
 - 1. Non submerged components scheduled for priming, as defined above, shall be

sandblasted clean in accordance with SSPC-SP-6, Commercial Grade, immediately prior to priming. Submerged components scheduled for priming, as defined above, shall be sandblasted clean in accordance with SSPC-SP-10. Near White, immediately prior to priming.

2. Surfaces shall be dry and free of dust, oil, grease, dirt, rust, loose mill scale and other foreign material before priming.
3. Shop prime in accordance with approved paint manufacturer's recommendations.
4. Priming shall follow sandblasting before any evidence of corrosion has occurred and within 24 hours.

END OF SECTION

SECTION 09900 PAINTING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, tools, materials, equipment, scaffolding or other structures and incidentals necessary to complete this Contract in its entirety.
- B. The work includes painting and finishing of all new interior and exterior exposed items above and below grade and surfaces, such as structural steel, miscellaneous metals, ceilings, walls, floors, doors, frames, transoms, roof fans, construction signs, guardrails, posts, fittings, valves, tanks, equipment and all other work obviously required to be painted unless otherwise specified herein or on the Drawings. The omission of minor items in the Schedule of Work shall not relieve the Contractor of his obligation to include such items where they come within the general intent of the Specification as stated herein.
- C. The following items shall not be painted:
 - 1. Any code-requiring labels, such as Underwriter's Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.
 - 2. Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts, unless otherwise indicated.
 - 3. Aluminum handrails (except where in contact with concrete) walkways, windows, louvers and grating unless otherwise specified herein.
 - 4. Signs and nameplates.
 - 5. Finish hardware.
 - 6. Chain link fence.
 - 7. Piping buried in the ground or embedded in concrete.
 - 8. Concealed surfaces of pipe or crawl space.
 - 9. Nonferrous metals, unless specifically noted otherwise.
 - 10. Electrical switchgear and motor control centers.
 - 11. Stainless steel angles, tubes, pipe, etc.
 - 12. Products with polished chrome, aluminum, nickel or stainless steel finish.
 - 13. Plastic switch plates and receptacle plates.
 - 14. Flexible couplings, lubricated bearing surfaces, insulation and metal and plastic pipe interior.
 - 15. Sprinkler heads.
 - 16. Lifting chain on cranes and hoists
 - 17. Electrical cable, festooned conductor system, cables, collector pole brackets, etc.
- D. All work shall be done in strict accordance with this Specification, the Design Drawings and the painting package, including manufacturer's printed instructions.
- E. The Contractor will obtain, at its own expense, all permits, licenses and inspections and shall comply with all laws, codes, ordinances, rules and regulations promulgated by authorities having jurisdiction which may bear on the Work. This compliance will include Federal Public Law 91-596 more commonly known as the "Occupational Safety and Health Act of 1970".

1.02 DEFINITIONS

- A. Field Painting is the painting of new or rebuilt items at the job site. Field painting shall be the responsibility of the Contractor.
- B. Shop Painting is the painting of new or rebuilt items in the shop prior to delivery to the jobsite.
- C. Abbreviations The abbreviations and definitions listed below, when used in this specification, shall have the following meanings:
 - 1. SSPC - Steel Structures Painting Council
 - 2. Exterior - Outside, exposed to weather
 - 3. Interior Dry - Inside, concealed or protected from weather
 - 4. Interior Wet - Inside, subject to immersion services
 - 5. ASTM - American Society of Test Materials
 - 6. NACE - National Association of Corrosion Engineers
 - 7. NSF - National Sanitation Foundation
 - 8. AWWA - American Water Works Association
- D. Dry Film Thickness shall be in Mils.

1.03 RESOLUTION OF CONFLICTS

- A. It shall be the responsibility of the Contractor to arrange a meeting prior to the start of painting, or flooring installation between the Contractor, the Paint Manufacturer, whose products are to be used, and the County. All aspects of surface preparation, application and coating systems as covered by this Specification will be reviewed at this meeting.
- B. Clarification shall be requested promptly from the County when instructions are lacking, conflicts occur in the Specifications, or the procedure seems improper or inappropriate for any reason.
- C. Copies of all manufacturer's instructions and recommendations shall be furnished to the County by the Painting Contractor.
- D. It shall be the responsibility of the Coating Manufacturer to have their factory representative meet in person with the Contractor and County a minimum of three times during the job as a consultant on surface preparation, mil thickness of coating and proper application of coating unless meeting is determined to be unnecessary by the County.

1.04 SUBMITTALS

- A. Contractor shall submit catalog data and cut sheets for the painting system being used if not the TNEMEC materials specified.
- B. Samples as detailed in 3.01 B shall be submitted regardless of system being used, showing each color to be used.
- C. Hazardous Material Disposal documentation shall be submitted if applicable.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Effective oil and water separators shall be used in all compressed air lines serving spray painting and sandblasting operations to remove oil or moisture from the air before it is used. Separators shall be placed as far as practicable from the compressor.
- B. All equipment for application of the paint and the completion of the work shall be furnished by the Contractor in first-class condition and shall comply with recommendations of the paint manufacturer.
- C. Contractor will provide free of charge to the County a "Nordson-Mikrotest" or "Positest" dry film thickness gauge for ferrous metal and an OG232 "Tooke" gauge or equal for non-ferrous and cementitious surface, to be used to inspect coatings by the County and Contractor. The gauges may be used by the Contractor and returned each day to the County. County will return gauges to Contractor at completion of job.

2.02 MATERIALS

- A. All materials specified herein are manufactured by the TNEMEC Company, Inc., North Kansas City, Missouri. These products are specified to establish standards of quality and are approved for use on this Project.
- B. Equivalent materials of other manufacturers may be substituted on approval of the County. Requests for substitution shall include manufacturer's literature for each product giving the name, generic type, descriptive information and evidence of satisfactory past performance and an independent laboratory certification that their product meets the performance criteria of the specified materials.
- C. Abrasion - Fed. Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load.
- D. Adhesion - Elcometer Adhesion Tester.
- E. Exterior Exposure - Exposed at 45 degrees facing the ocean (South Florida Marine Exposure)
- F. Hardness - ASTM D3363-74
- G. Humidity - ASTM D2247-68
- H. Salt Spray (Fog) - ASTM B117-73
- I. Standard practice for Operating the Severe Wastewater Analysis Testing Apparatus ASTM G210-13
- I. Substitutions which decrease the total film thickness, change the generic type of coating, or fail to meet the performance criteria of the specified materials shall not be approved. Prime and finish coats of all surfaces shall be furnished by the same manufacturer.
- J. All coatings to be shop applied must meet the requirements for volatile organic compounds

(VOC) of not more than 3.5 lbs/gallon after thinning.

- K. Colors, where not specified, shall be as selected by the County or their Representative.
- L. All coatings in contact with potable water need to be NSF Certified in accordance with ANSI/NSF Standard 61.
- M. All above ground potable water mains and appurtenances shall be painted safety blue.

PART 3 EXECUTION

3.01 INSPECTION OF SURFACES

- A. Before application of the prime coat and each succeeding coat, all surfaces to be coated shall be subject to inspection by the County. Any defects or deficiencies shall be corrected by the Contractor before application of any subsequent coating.
- B. Samples of surface preparation and of painting systems shall be furnished by the Contractor to be used as a standard throughout the job, unless omitted by the County.
- C. When any appreciable time has elapsed between coatings, previously coated areas shall be carefully inspected by the County, and where, in his opinion, surfaces are damaged or contaminated, they shall be cleaned and recoated at the Contractor's expense. Recoating times of manufacturer's printed instructions shall be adhered to.
- D. Coating thickness shall be determined by the use of a properly calibrated "Nordson-Mikrotest" "Positest" Coating Thickness Gauge (or equal) for ferrous metal or an OG232 "Tooke" Paint Inspection gauge (or equal) for non-ferrous and cementitious surfaces. Please note that use of the "Tooke" gauge is classified as a destructive test.

3.02 SURFACE PREPARATION

The surface shall be cleaned as specified for the paint system being used. All cleaning shall be as outlined in the Society for Protective Coatings (SSPC) Surface Preparation Specification, And the International Concrete Repair Institute (ICRI) unless otherwise noted. If surfaces are subject to contamination, other than mill scale or normal atmospheric rusting, the surfaces shall be pressure washed, and acid or caustic pH residues neutralized, in addition to the specified surface preparation.

3.03 STANDARDS FOR SURFACE PREPARATION

- A. Chemical and/or Solvent Cleaning: Remove all grease, oil, salt, acid, alkali, dirt, dust, wax, fat, foreign matter and contaminates, etc. by one of the following methods: steam cleaning, alkaline cleaning, or volatile solvent cleaning.
- B. Hand Tool Cleaning: Removal of loose rust, loose mill scale and loose paint to a clean sound substrate by hand chipping, scraping, sanding and wire brushing.
- C. Power Tool Cleaning: Removal of loose rust, loose mill scale and loose paint to a clean sound substrate by power tool chipping, descaling, sanding, wire brushing and grinding.

- D. Flame Cleaning: Dehydrating and removal of rust, loose mill scale and some light mill scale by use of flame, followed by wire brushing.
- E. White Metal Blast Cleaning: Complete removal of all mill scale, rust, rust scale, previous coating, etc., leaving the surface a uniform gray-white color.
- F. Commercial Grade Blast Cleaning: Complete removal of all dirt, rust scale, mill scale, foreign matter and previous coating, etc., leaving only shadows and/or streaks caused by rust stain and mill scale oxides. At least 66% of each square inch of surface area is to be free of all visible residues, except slight discoloration.
- G. Brush-Off Blast Cleaning: Removal of rust scale, loose mill scale, loose rust and loose coatings, leaving tightly-bonded mill scale, rust and previous coatings. On concrete surfaces, brush-off blast cleaning shall remove all laitance, form oils and solid contaminates. Blasting should be performed sufficiently close to the surface so as to open up surface voids, bugholes, air pockets and other subsurface irregularities, but so as not to expose underlying aggregate.
- H. Pickling: Complete removal of rust and mill scale by acid pickling, duplex pickling or electrolytic pickling (may reduce the resistance of the surface to corrosion, if not to be primed immediately).
- I. Near-White Blast Cleaning: Removal of all rust scale, mill scale, previous coating, etc., leaving only light stains from rust, mill scale and small specks of previous coating. At least 95% of each square inch of surface area is to be free of all visible residues and the remainder shall be limited to slight discoloration.
- J. Power Tool Cleaning to Bare Metal: Complete removal of rust, rust scale, mill scale, foreign matter and previous coatings, etc., to a standard as specified on a Commercial Grade Blast Cleaning (SSPC-SP-6, NACE-3) by means of power tools that will provide the proper degree of cleaning and surface profile.
- K. Surface Preparation of Concrete (SSPC-SP13)
- L. Visual standards "Pictorial Surface Preparation Standards for Painting Steel Surfaces", and the National Association of Corrosion Engineer, "Blasting Cleaning Visual Standards" TM-01-70 and TM-01-75 shall be considered as standards for proper surface preparation.
- M. Oil, grease, soil, dust, etc., deposited on the surface preparation that has been completed shall be removed prior to painting according to Solvent Cleaning under this Specification.
- N. Weld flux, weld spatter and excessive rust scale shall be removed by Power Tool Cleaning as per these Specifications.
- O. All weld seams, sharp protrusions and edges shall be ground smooth prior to surface preparation or application of any coatings.
- P. All areas requiring field welding shall be masked off prior to shop coating, unless waived by the County.
- Q. All areas which require field touch-up after erection, such as welds, burnbacks, and

mechanically damaged areas, shall be cleaned by thorough Power Tool as specified in these Specifications.

- R. Touch-up systems will be same as original specification except that approved manufacturer's organic zinc-rich shall be used in lieu of inorganic zinc where this system was originally used. Also strict adherence to manufacturer's complete touch-up recommendations shall be followed. Any questions relative to compatibility of products shall be brought to the County's attention; otherwise, Contractor assumes full responsibility.

3.03 PRETREATMENTS

When specified, the surface shall be pretreated in accordance with the specified pretreatment prior to application of the prime coat of paint.

3.04 STORAGE

Materials shall be delivered to the job site in the original packages with seals unbroken and with legible unmutated labels attached. Packages shall not be opened until they are inspected by the County and required for use. All painting materials shall be stored in a clean, dry, well-ventilated place, protected from sparks, flame, direct rays of the sun or from excessive heat. Paint susceptible to damage from low temperatures shall be kept in a heated storage space when necessary. The Contractor shall be solely responsible for the protection of the materials stored by himself at the job site. Empty coating cans shall be required to be neatly stacked in an area designated by the County and removed from the job site on a schedule determined by the County. County may request a notarized statement from Contractor detailing all materials used on the Project.

3.05 PREPARATION OF MATERIALS

- A. Mechanical mixers, capable of thoroughly mixing the pigment and vehicle together, shall mix the paint prior to use where required by manufacturer's instructions; thorough hand mixing will be allowed for small amounts up to one gallon. Pressure pots shall be equipped with mechanical mixers to keep the pigment in suspension, when required by manufacturer's instructions. Otherwise, intermittent hand mixing shall be done to assure that no separation occurs. All mixing shall be done in accordance with SSPC Vol. 1, Chapter 4, "Practical Aspects, Use and Application of Paints" and/or with manufacturer's recommendations.
- B. Catalysts or thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction.

3.06 APPLICATION

- A. Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather, unless otherwise allowed by the paint manufacturer. Except as provided below, painting shall not be permitted when the atmospheric temperature is below 50 deg F, or when freshly painted surfaces may be damaged by rain, fog, dust, or condensation, and/or when it can be anticipated that these conditions will prevail during the drying period.
- B. No coatings shall be applied unless surface temperature is a minimum of 5 Degrees above dew point; temperature must be maintained during curing.

- C. See coating schedule for actual coating systems to be used on this project.

3.07 DEW POINT CALCULATION CHART

DEW POINT CALCULATION CHART

Ambient Air Temperature - Fahrenheit

Relative Humidity	20	30	40	50	60	70	80	90	100	110	120
90%	18	28	37	47	57	67	77	87	97	107	117
85%	17	26	36	45	55	65	76	84	95	104	113
80%	16	25	34	44	54	63	73	82	93	102	110
75%	15	24	33	42	52	62	71	80	91	100	108
70%	13	22	31	40	50	60	68	78	88	96	105
65%	12	20	29	38	47	57	66	76	85	93	103
60%	11	20	27	36	45	55	64	73	83	92	101
55%	9	17	25	34	43	53	61	70	80	89	98
50%	6	15	23	31	40	50	59	67	77	86	94
45%	4	13	21	29	37	47	56	64	73	82	91
40%	1	11	18	26	35	43	52	61	69	78	87
35%	-2	8	16	23	31	40	48	57	65	74	83

SURFACE TEMPERATURE AT WHICH CONDENSATION OCCURS

Dew Point

Temperature at which moisture will condense on surface. No coatings should be applied unless surface temperature is a minimum of 5deg above this point. Temperature must be maintained during curing.

Example

If air temperature is 70 deg F and relative humidity is 65%, the dew point is 57 deg F. No coating should be applied unless surface temperature is 62 deg F minimum.

- A. No coating shall be applied unless the relative humidity is below 85%.
- B. Suitable enclosures to permit painting during inclement weather may be used if provisions are made to control atmospheric conditions artificially inside the enclosure, within limits suitable for painting throughout the painting operations.
- C. Field painting in the immediate vicinity of, or on, energized electrical and rotating equipment, and equipment and/or pipes in service shall not be performed without the approval of the County.
- D. Extreme care shall be exercised in the painting of all operable equipment, such as valves, electric motors, etc., so that the proper functioning of the equipment will not be affected.
- E. The Contractor's scaffolding shall be erected, maintained and dismantled without damage to

structures, machinery, equipment or pipe. Drop cloths shall be used where required to protect buildings and equipment. All surfaces required to be clear for visual observation shall be cleaned immediately after paint application.

- F. Painting shall not be performed on insulated pipe within three (3) feet of insulation operations or on insulation whose covering and surface coat have not had time to set and dry. Painting shall not be performed on uninsulated pipe within one (1) foot of any type of connection until the connection has been made, except as directed by the County.
- G. The prime coat shall be applied immediately following surface preparation and in no case later than the same working day. All paint shall be applied by brushing, paint mitt and roller, conventional spraying, or airless spraying, using equipment approved by the paint manufacturer.
- H. Each coat of paint shall be recoated as per manufacturer's instructions. Paint shall be considered recoatable when an additional coat can be applied without any detrimental film irregularities such as lifting or loss of adhesion.
- I. Surfaces that will be inaccessible after assembly shall receive either the full specified paint system or three shop coats of the specified primer before assembly.
- J. Finish colors shall be in accordance with the COLOR SCHEDULE and shall be factory mixed (i.e., there shall be no tinting by the Contractor, unless authorized by the County).
- K. All edges and weld seams in immersion service shall receive a "stripe coat" (applied by brush) of the 2nd coat prior to application of the full 2nd coat.
- L. All open seams in the roof area of tanks shall be filled after application of the topcoat with a flexible caulking such as Sika Flex 1A.

3.08 WORKMANSHIP

- A. The Contractor must show proof that all employees associated with this Project shall have been employed by the Contractor for a period not less than six (6) months.
- B. Painting shall be performed by experienced painters in accordance with the recommendations of the paint manufacturer. All paint shall be uniformly applied without sags, runs, spots, or other blemishes. Work which shows carelessness, lack of skill, or is defective in the opinion of the County, shall be corrected at the expense of the Contractor.
- C. The Contractor shall provide the names of at least three other projects of similar size and scope that they have successfully completed under their current company name.

3.09 APPLICATION OF PAINT

- A. By Brush and/or Rollers
 - 1. Top quality, properly styled brushes and rollers shall be used. Rollers with a baked phenol core shall be utilized.
 - 2. The brushing or rolling shall be done so that a smooth coat as nearly uniform in thickness as possible is obtained. Brush or roller strokes shall be made to smooth

- the film without leaving deep or detrimental marks.
3. Surfaces not accessible to brushes or rollers may be painted by spray, by dauber or sheepskins, and paint mitt.
 4. It may require two coats to achieve the specified dry film thickness if application is by brush and roller.

B. Air, Airless or Hot Spray

1. The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied and shall be equipped with suitable pressure regulators and gauges.
2. Paint shall be applied in a uniform layer, with a 50% overlap pattern. All runs and sags should be brushed out immediately or the paint shall be removed and the surface resprayed.
3. High build coatings should be applied by a cross-hatch method of spray application to ensure proper film thickness of the coating.
4. Areas inaccessible to spray shall be brushed; if also inaccessible to brush, daubs or sheepskins shall be used, as authorized by the manufacturer.
5. Special care shall be taken with thinners and paint temperatures so that paint of the correct formula reaches the receiving surface.
6. Nozzles, tips, etc., shall be of sizes and designs as recommended by the manufacturer of the paint being sprayed.
7. The first coat on concrete surfaces in immersion service should be sprayed and back rolled.

3.10 PROTECTION AND CLEANUP

- A. It shall be the responsibility of the Contractor to protect at all times, in areas where painting is being done, floors, materials of other crafts, equipment, vehicles, fixtures, and finished surfaces adjacent to paint work. Cover all electric plates, surface hardware, nameplates, gauge glasses, etc., before start of painting work.
- B. At the option of the County during the course of this project, the Contractor will contain all spent abrasives, old paint chips, paint overspray and debris by means suitable to the County, including, but not limited to, full shrouding of the area.
- C. If shrouding is required, the Contractor must provide a complete design of the intended shroud or cover. Care must be taken not to modify or damage the structure during the use of the shroud. If damage should occur, the Contractor is held responsible for all repairs.
- D. At completion of the work, remove all paint where spilled, splashed, spattered, sprayed or smeared on all surfaces, including glass, light fixtures, hardware, equipment, painted and unpainted surfaces.
- E. After completion of all painting, the Contractor shall remove from job site all painting equipment, surplus materials and debris resulting from this work.
- F. The Contractor is responsible for the removal and proper disposal of all hazardous materials from the job site in accordance with Local, State and Federal requirements as outlined by the Environmental Protection Agency.

- G. A notarized statement shall be presented to the County that all hazardous materials have been disposed of properly including, but not limited to: name of disposal company, disposal site, listing of hazardous materials, weights of all materials, cost per pound and EPA registration number.

3.11 TOUCH-UP MATERIALS

The Contractor shall provide at the end of the Project at least one (1) gallon of each generic topcoat in each color as specified by the County for future touch-up. Two gallons may be required for (2) component materials.

3.12 ON-SITE INSPECTION

During the course of this Project, the County will reserve the option of incorporating the services of a NACE Level III inspection service. The inspection service will be responsible for assuring the proper execution of this Specification by the successful Contractor.

3.13 STEEL - STRUCTURAL, TANKS, PIPES AND EQUIPMENT

A. EXTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 1095-1: Epoxy/High Build Urethane

This system is highly resistant to abrasion, wet conditions, corrosive fumes and chemical contact. Provides 3-4 times the color and gloss retention of conventional paints. Second coat to be close to finish color but not the same color. This system should be used for above ground exterior steel surfaces that are neither submerged, nor buried.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 66HS-1211 Epoxoline Primer	3.0 - 4.0
2nd Coat: 66HS-Color Hi-Build Epoxoline	2.0 - 3.0
3rd Coat: 1095-Endura-Shield III	<u>2.0 - 3.0</u>
	Dry Film Thickness 7.0 - 10.0
	Minimum 8.0 Mils

2. System No. 1095-2: High Build Urethane for Marginally Cleaned Surfaces or Topcoating Existing System

This system can be used over factory finish paint or cover non-sandblasted steel and offer the high performance of a urethane coating. Specify Series 1074U Endura-Shield for gloss finish.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning or SSPC-SP3 Power Tool Cleaning

Shop Coat: Manufacturer Standard Primer (or existing coating)	3.0-5.0
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2nd Coat: 135 Chembuild	3.0 - 5.0	
3rd Coat: 1095-Color Endura-Shield	<u>2.0 - 3.0</u>	
	Dry Film Thickness	8.0 - 13.0
	Minimum	9.5 Mils

4. System 90-97: Zinc/Epoxy/Urethane

This system offers the added corrosion protection of a zinc rich primer. Series 90-97 Tneme-Zinc is an organic zinc-rich primer that can be used for field touch up of a zinc primer or for touch up of galvanized surfaces that are damaged.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 90-97 Tneme-Zinc	2.5 - 3.5	
2nd Coat: 66HS-Color Hi-Build Epoxoline	2.0 - 3.0	
3rd Coat: 1095 Endurashield	<u>2.0 - 3.0</u>	
	Dry Film Thickness	6.5 - 9.5
	Minimum	8.0 Mils

B. INTERIOR EXPOSURE (NON-IMMERSION)

1. System No.66HS-1: High Build Epoxy

This system will provide chemical and corrosion resistance against abrasion, moisture, corrosion fumes, chemical contact and immersion in non-potable water. Primer coat must be touched-up before second coat is applied. Substitute Series 161HS for low temperature cure or quick recoats. Use this system for interior exposed, non submerged metals.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 66HS-1211 Epoxoline Primer	3.0 - 5.0	
2nd Coat: 66HS-Color Hi-Build Epoxoline	<u>4.0 - 6.0</u>	
	Dry Film Thickness	7.0 - 11.0
	Minimum	9.0 Mils

2. System No. 66HS-2: High Build Epoxy (Over OEM Finishes)

This system is to be used over standard manufacturer's primer to offer a high performance epoxy finish. Excellent for areas of rust not able to be completely cleaned.

Surface Preparation: Spot SSPC-SP6 Commercial Blast Cleaning or SSPC- SP11 Power Tool Cleaning to Bare Metal

Shop Coat: Manufacturer's Standard (or existing coating)	1.0 - 2.0	
2nd Coat: 27WB	2.5 - 4.0	
3rd Coat: 66HS-Color Hi-Build Epoxoline	<u>2.0 - 4.0</u>	
	Dry Film Thickness	5.5 - 10.0
	Minimum	7.0 Mils

C. IMMERSION

1. System No. 104-1: High Solids Epoxy (Non-Potable Water)

This system will provide chemical and corrosion resistance for protection against abrasion, moisture, corrosive fumes, chemical contact and immersion in *mild to moderate* Wastewater, such as clarifiers, chlorine contact basins, aeration basins, settling basins and other open top (aerobic) structures. Primer coat must be touched-up before second coat is applied. Scarify the surface before topcoating if the Series 66HS has been exterior-exposed for 60 days or longer. Substitute Series 161HS for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat: 66HS-1211 Epoxoline Primer	3.0 - 5.0	
2nd Coat: 104-Color Hi-Build Epoxoline	6.0-8.0	
3rd Coat: 104-Color Hi-Build Epoxoline	<u>6.0-8.0</u>	
	Dry Film Thickness	15.0 - 21.0
	Minimum	11.0 Mils

2. System No. 20HS-1: Epoxy-Polyamide (Potable Water)

This system meets American Water Works Association AWWA D 102 Inside Paint System Number 1. Series 20HS meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Substitute Series FC20HS for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat:20HS-WH02 Pota-Pox (Tank White)	3.0 - 5.0	
2nd Coat: 20HS-1255 Pota-Pox (Beige)	4.0 - 6.0	
3rd Coat: 20HS-WH02 Pota-Pox (Tank White)	<u>4.0 - 6.0</u>	
	Dry Film Thickness	11.0 - 17.0
	Minimum	12.0 Mils

3.14 OVERHEAD METAL DECKING, JOIST

A. INTERIOR EXPOSURE

System No. 115-1: Uni-Bond

This system should be used on ceiling areas where a one-coat system is desired. Can be applied over steel, galvanized and aluminum decking, joist, shop primed beams, conduits and concrete.

Surface Preparation: Surfaces must be dry, clean and free of oil, grease and other contaminates. Allow concrete to cure 28 days.

Coating: 115-Color Uni-Bond Dry Film Thickness 2.5 - 4.0

B. EXTERIOR EXPOSURE

System No. 1029-1: Enduratone

This system can be applied over a wide variety of coatings and factory finishes. It can also be applied direct to galvanized aluminum decking, joists, & conduits

Surface Preparation: Pressure clean to remove all dirt, oil, grease, chemicals and foreign contaminates. Remove loose paint and all rust by hand and power tool cleaning (SSPC-SP 2 & 3)

1st Coat:	1029-Color Endura-tone	2.0-3.0
2 nd Coat:	1029-Color Enduratone	<u>2.0-3.0</u>
		Dry Film Thickness 4.0-6.0

3.16 GALVANIZED STEEL - PIPE AND MISCELLANEOUS FABRICATIONS

A. EXTERIOR / (NON-IMMERSION)

System No. 1095-3: Epoxy/High Build Urethane

Series 66HS has excellent adhesion to galvanized steel. This system is highly resistant to abrasion, wet conditions, corrosive fumes and chemical contact. Provides 3-4 times the color and gloss retention of conventional paints. First coat to be same color as or close to the finish color. Specify Series 1074U Endura-Shield for gloss finish.

Surface Preparation: SSPC-SP1 Solvent Cleaning, followed by Sweep Abrasive Blasting (SSPC-SP7)

1st Coat: 66HS-Color Hi-Build Epoxoline	2.0 - 4.0
2nd Coat: 1095-Color Endura-Shield	<u>2.0 - 4.0</u>
	Dry Film Thickness 4.0 - 8.0
	Minimum 5.0 Mils

B. INTERIOR EXPOSURE (NON IMMERSION) AND ALUMINUM IN CONTACT WITH CONCRETE

System No. 66HS-3: Polyamide Epoxy

Surface Preparation: SSPC-SP1 Solvent Cleaning

1st Coat: 66HS-Color Hi-Build Epoxoline	2.0 - 4.0
2nd Coat: 66HS-Color Hi-Build Epoxoline	<u>2.0 - 4.0</u>
	Dry Film Thickness 4.0 - 8.0
	Minimum 5.0 Mils

3.18 CONCRETE

A. EXTERIOR - ABOVE GRADE

1. System No. 1026-1: Acrylic Emulsion Low Sheen

If semi-gloss finish is desired, use Series 1029 Tneme-Cryl SG as the second coat.

Surface Preparation: Allow new concrete to cure for 28 days. Surface must be clean and dry.

1st Coat: 1026-Color Tneme-Cryl	2.0 - 3.0	
2nd Coat: 1026-Color Tneme-Cryl	<u>2.0 - 3.0</u>	
	Dry Film Thickness	4.0 - 6.0
	Minimum	5.0 Mils

2. System No. 156-1: Modified Acrylic Elastomer

If texture is needed, use 157 Enviro-Crete TX (medium texture) For application over previously applied coatings, use TNEMEC Series 151 Elasto-Grip at 1.0 - 2.5 mils DFT prior to the application of Series 156 Enviro-Crete.

Surface Preparation: Surface must be clean and dry.

1st Coat: 156-Color Enviro-Crete	4.0 - 8.0	
2nd Coat: 156-Color Enviro-Crete	<u>4.0 - 8.0</u>	
	Dry Film Thickness	8.0 - 16.0
	Minimum	10.0 Mils

B. EXTERIOR - BELOW GRADE

1. System No. 46-31: Coal Tar-Epoxy

Surface Preparation: Surface shall be clean and dry.

One Coat: 46H-413 Hi-Build Tneme-Tar

Dry Film Thickness	14.0 - 20.0
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C. EXTERIOR/INTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 1026-2: Acrylic Emulsion, Low Sheen (Interior/Exterior)

This system will provide a decorative coating with good exterior durability, color retention, and a high vapor transmission rate. ***For Semi-Gloss finish, use 1029-Color Tneme-Cryl S/G.***

Surface Preparation: Surface shall be clean and dry. Allow concrete to cure for 28 days.

Block Filler (CMU only): 1254 Epoxoblock
1st Coat: 1026-Color Tneme-Cryl
2nd Coat: 1026-Color Tneme-Cryl

125 SF/GL	
2.0 - 3.0	
<u>2.0 - 3.0</u>	
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

*Does not include Block Filler

2. System No. 66HS-4: Epoxy-Polyamide

(Interior)

Series 66HS provides excellent protection from abrasion, moisture, corrosive fumes and chemical contact..

Surface Preparation: Surfaces shall be clean and dry. Allow concrete to cure for 28 days. All surfaces must be clean and dry.

Block Filler (CMU only): 1254 Epoxoblock	125 SF/GL
1st Coat: 66HS-Color Hi-Build Epoxoline	3.0 - 5.0
2nd Coat: 66HS-Color Hi-Build Epoxoline	<u>4.0 - 6.0</u>
Dry Film Thickness	7.0 -11.0*
Minimum	9.0 Mils

*(Does not include Block Filler)

D. IMMERSION - POTABLE & NON-POTABLE WATER

1. System No. 104-2: High Solids Epoxy (Non-Potable Water). This system will provide chemical and corrosion resistance for protection against abrasion, moisture, corrosive fumes, chemical contact and immersion in ***mild to moderate*** Wastewater, such as clarifiers, chlorine contact basins, aeration basins, settling basins and other open top (aerobic) structures.

Surface Preparation: Allow new concrete to cure for 28 days. Sweep abrasive blast per SSPC-SP13 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

1st Coat: 104-1255 H.S. Epoxy Primer	6.0 - 8.0
2nd Coat: 104 Color H.S. Epoxy	<u>6.0 - 8.0</u>
3 rd Coat: 104 Color H.S. Epoxy	<u>6.0-8.0</u>
Dry Film Thickness	18.0 - 240.0
Minimum	20.0 Mils

2. System No. 20HS-2 Epoxy-Polyamide (Potable Water)

This system meets American Water Works Association AWWA D 102 Inside System No. 1. Series 20HS meets the requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61.

Surface Preparation: Allow new concrete to cure for 28 days. Sweep abrasive blast per SSPC-SP13 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, and to create a monolithic, paintable surface.

1st Coat: 20HS-15BL Pota-Pox	4.0 - 6.0	
2nd Coat: 20HS-1255 Pota-Pox Finish	<u>4.0 - 6.0</u>	
3rd Coat: 20HS -15BL	<u>4.0-6.0</u>	
	Dry Film Thickness	12.0 - 17.0
	Minimum	13.0 Mils

E. INTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 66HS-5: High Solids Epoxy

This system will produce a slick, tile-like finish that has excellent chemical and water resistance. Surface will be easy to clean.

Surface Preparation: Allow new concrete to cure for at least 28 days. Surface to be clean and dry.

1st Coat: 66HS-Color H.S. Epoxy	6.0 - 8.0	
2nd Coat: 66HS-Color H.S. Epoxy	<u>6.0 - 8.0</u>	
	Dry Film Thickness	12.0 - 16.0
	Minimum	14.0 Mils

2. System No. 113-1: Acrylic-Epoxy Semi-Gloss

This system will provide high performance and can be applied directly over existing coatings without lifting. Can be used when low odor is required during application. Specify Series 114 Tneme-Tufcoat for Gloss Finish.

Surface Preparation: Allow new concrete to cure for at least 28 days. Surface must be clean and dry.

One or Two Coats: 113-Color Tneme-Tufcoat	Dry Film Thickness	4.0 - 6.0
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3.19 CONCRETE FLOORS

A. EPOXY FLOOR COATINGS

1. System No. 290-1: Epoxy- Chemical Resistant Urethane

This system will provide a durable, long-wearing coating that bonds tightly to concrete and stands up under heavy foot traffic, frequent cleaning, spillage of water, oil, grease, or chemical, and UV Exposure.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade or Sweep Abrasive Blast Cleaning

Moisture vapor transmission should not exceed three lbs per 1,000 sq ft in a 24 hour

period. (Reference ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.") Relative humidity should not exceed 80%. (Reference ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes.")

Note: For moisture content up to 10 lbs per 1,000 sq ft or relative humidity up to 90%, Series 208 may be substituted for Series 201 as the primer.

1st Coat: 201- Epoxoprime	5.0-7.0
2nd Coat: 237-Color Tneme-Glaze	<u>8.0-10.0</u>
3 rd Coat: 290 CRU	<u>2.0-3.0</u>
	Dry Film Thickness 15.0- 20.0
	Minimum 17.0 Mils

For a non-skid finish, broadcast 30-50 mesh clean, dry silica sand into the 2nd coat at a rate of 5 lbs per 150 square feet.

2. System No. 241/222: Decorative Quartz Flooring (Non-Slip)

This system provides a decorative, chemical, abrasion, impact resistant, non-slip, seamless flooring system with a moisture mitigating base coat that resists up to 20 lbs of moisture vapor pressure.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade or Sweep abrasive Blast to provide a minimum surface profile equal to ICRI CSP3

1st Coat: 241 Ultra-Tread MVT	70 square feet per small kit
2nd Coat: 222 Deco-Tread	(1 ct. @ 1/16" ea.)
3rd Coat: 284 Tneme-Glaze (clear)	<u>8.0 - 12.0</u>
	Minimum Dry Film Thickness 1/8"+

3.20 POROUS MASONRY

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 156-2: Modified Epoxy - Sand Texture

Modified Waterborne Acrylate. This system offers long term protection against wind-driven rain, mold/mildew growth, chalking & fading, and bridges hairline cracks.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 157-Color Envirocrete	6.0-9.0
2nd Coat: 157 Envirocrete	6.0-9.0
	Dry Film Thickness 12.0-18.0
	Minimum DFT: 14.0 mils

2. System No. 104-3: High Solids Epoxy (Interior Only)

This system will produce a film thickness of 16 mils. The surface will be tile-like for easy cleaning and will provide protection against chemical attack, corrosive fumes,

high humidity and wash down. Backroll first coat to fill porosity.

Surface Preparation: Surface to be clean and dry.

1st Coat: 104-Color H.S. Epoxy	8.0 - 10.0
2nd Coat: 104-Color H.S. Epoxy	<u>8.0 - 10.0</u>
Dry Film Thickness	16.0 - 20.0
Minimum	18.0 Mils

3. System No. 113-2: Acrylic-Epoxy Semi-Gloss (Interior Only)

Series 113 Tneme-Tufcoat has very low odor and can be used when painting in occupied areas.

Specify Series 114 Tneme-Tufcoat for a gloss finish.

Surface Preparation: Surface must be clean and dry.

1st Coat: 1254 Epoxoblock WB	125 SF/Gal
2nd Coat: 113-Color Tneme-Tufcoat*	<u>4.0 - 6.0</u>
	**4.0 - 6.0

* ***Two coats may be required if applied by roller***

** ***Total Dry Film Thickness of Topcoats Only***

4. System No. 156-3: Modified Acrylic Elastomer

If texture is needed, use 157 Enviro-Crete TX For application over previously applied coatings, use TNEMEC 151 Elasto-Grip at 1.0 - 2.5 mils DFT in lieu of Series 1254.

Surface Preparation: Surfaces must be clean and dry.

1st Coat: 1254 Epoxoblock WB	125 SF/Gal
2nd Coat: 156-Color Enviro-Crete	4.0 - 8.0
3rd Coat: 156-Color Enviro-Crete	<u>4.0 - 8.0</u>
Dry Film Thickness	8.0 - 16.0
Minimum	10.0 Mils

3.21 GYPSUM WALLBOARD

A. INTERIOR EXPOSURE

1. System No. 113-3: Acrylic-Epoxy

Surface Preparation: Surface must be clean and dry.

1st Coat: 51PVA Sealer	1.0 - 2.0
2nd Coat: 113 H.B. Tneme-Tufcoat*	<u>4.0 - 5.0</u>
Dry Film Thickness	5.0 - 7.0
Minimum	6.0 Mils

*Two coats may be required if application is by brush and roller.

2. System No. 66HS-5: Hi-Build Epoxoline

Surface Preparation: Surface must be clean and dry.

1st Coat: 51PVA Sealer

1.0 - 2.0

2nd Coat: 66HS-Color Hi-Build Epoxoline*

4.0 - 6.0

Dry Film Thickness 5.0 - 8.0
Minimum 5.0 Mils

*Two coats may be required if applied by roller

3. System No. 1026--3: Acrylic Emulsion, Low Sheen
(Interior/Exterior Exposure)

This system is designed for mild use areas like office walls, laboratory ceilings, stairwells, etc. For Semi-Gloss finish, use 1029-color Tneme-Cryl S/G.

Surface Preparation: Surface must be dry and clean.

1st Coat: 1026-Color Tneme-Cryl

2.0 - 3.0

2nd Coat: 1026-Color Tneme-Cryl

2.0 - 3.0

Dry Film Thickness 4.0 - 6.0
Minimum 5.0 Mils

3.22 WOOD

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 1029-2: Acrylic Emulsion Semi-Gloss

Specify Series 1028 Hi-Build Tneme-Gloss for High Gloss finish.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 10-99W Undercoater

2.0-3.0

2nd Coat: 1029 Enduratone

1.5 - 3.5

3rd Coat: 1029 Enduratone

1.5 - 3.5

Dry Film Thickness 5.0 - 10.5
Minimum 6.0 Mils

3.23 PVC PIPE

A. EXTERIOR OR INTERIOR

System No. 1095-4: Acrylic Polyurethane

Surface Preparation: SSPC-SP1 followed by hand or power sanding to scarify / degloss surface.

Two Coats: 1095 Endurashield Dry Film Thickness 2.0-3.0 mils per coat.

3.24 INSULATED PIPE

A. INTERIOR EXPOSURE

System No. 1026-4: Acrylic Emulsion, Low Sheen

For semi-gloss finish, use 1029-Color Tneme-Cryl S/G.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 1026-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 1026-Color Tneme-Cryl	<u>2.0 - 3.0</u>
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3.25 HIGH HEAT COATING

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 1528-1: Inert Multipolymeric Matrix (1200 deg F Maximum)

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning - 1.5 Mil Surface Profile

1st Coat: 1528-Color Endura-Heat DTM	2.0-4.0
2nd Coat: 1528-Color Endura-Head DTM	<u>2.0-4.0</u>
Dry Film Thickness	4.0-6.0

3.26 SURFACES EXPOSED TO H2S/H2SO4 (SEVERE EXPOSURE/IMMERSION)

A. CEMENTITIOUS SURFACES

System No. 434-1: Polyamine Epoxy Mortar system

Surface Preparation: Allow new concrete to cure for 28 days. Sweep abrasive blast per SSPC-SP13 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

1st Coat: 434 Perma-Shield	125 mils
2nd Coat: 435 Perma-Glaze	<u>18.0-20.0</u>
Dry Film Thickness	143-145
Minimum	144.0

B. FERROUS METAL SURFACES

System No. 142-1: Flake /Aluminum Oxide Filled Polyamine Epoxy

Surface Preparation: SSPC-SP-10 Near White Metal Blast Cleaning (1.5 Mil Profile)

1st Coat: Series 1 Omnithane
2nd Coat: 142 Epoxoline

2.5-3.5
14 - 18.0
Dry Film Thickness 16.0 - 23.5.0
Minimum 20.0 Mils

3.27 EXTERIOR OF PRESTRESSED CONCRETE TANKS

A. System No. 156-4: New Tanks

Surface Preparation: Allow new concrete to cure for at least (3) days. Surface to be clean and dry.

1st Coat: 156-Color Envirocrete
2nd Coat: 156-Color Envirocrete

4.0 - 6.0
4.0 - 6.0
Dry Film Thickness 8.0 - 12.0
Minimum 10.0 Mils

B. System No. 156-5: Existing Tanks (Previously Painted)

Surface Preparation: Remove all dirt, oil, grease, chalk, and loose paint per high pressure water blast (min. 3500 psi).

1st Coat: 151 Elasto-Grip
Stripe Coat: Stripe all hairline cracks with a brushed coat
of Series 156 Envirocrete
Topcoat: 156-Envirocrete

1.0 - 2.5
3.0 - 5.0
4.0 - 6.0
Dry Film Thickness (Cracks) 8.0 - 13.5
Dry Film Thickness (Other) 5.0 - 8.5

3.28 SECONDARY CONTAINMENT AREAS

A. System No. 239SC-1: Modified Novolac Epoxy

This system offers superior chemical resistance to a wide range of aggressive chemicals, including Sulfuric Acid, Hydrofluosilicic Acid, Sodium Hydroxide, Sodium Hypochlorite, Polymer Emulsion, and hydrocarbons.

Surface Preparation: Allow new concrete to cure for 28 days. Sweep abrasive blast per SSPC-SP13 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Moisture vapor transmission should not exceed three lbs per 1,000 sq ft in a 24 hour period. (Reference ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.") Relative humidity should not exceed 80%. (Reference ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes.") Note: For moisture content up to 10 lbs per 1,000 sq ft or relative humidity up to 90%, Series 241 may be substituted for the primer. Refer to the Series 241 product data sheet for more information.

Apply Tnemec Series 218 to all vertical surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, and to create a monolithic, paintable surface.

Apply Tnemec Series 215 or 218 as needed to fill voids in horizontal surfaces.

Primer: Tnemec Series 239SC RCK	6.0-8.0
Basecoat: Tnemec Series 239SC MCK	60.0-80.0
Fiberglass Mat: Tnemec Series 211-0215SC	NA
Saturant Coat: Tnemec Series 239SC RCK	10.0-12.0
Top Coat: Tnemec Series 282	<u>8.0-10.0</u>
Dry Film Thickness	84.0-110.0

Notes:

1. See Tnemec's *Fiberglass Mat Reinforced Mortar Application Guide for System details*
2. Series 282 is not color stable. For extended color and gloss retention, apply a finish coat of Tnemec Series 290 CRU @ 2.0-3.0 mils DFT

B. System No. 61-1: Cycloaliphatic Amine Epoxy

This system offers superior resistance to gasoline, diesel fuel, and other hydrocarbons. Use TNEMEC Series 215 between coats as a filler and surfacer wherever it is required.

Surface Preparation: Allow new concrete to cure for 28 days. Sweep abrasive blast per SSPC-SP13 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Moisture vapor transmission should not exceed three lbs per 1,000 sq ft in a 24 hour period. (Reference ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.") Relative humidity should not exceed 80%. (Reference ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes.") Note: For moisture content up to 10 lbs per 1,000 sq ft or relative humidity up to 90%, Series 241 may be applied prior to the "Primer" coat. Refer to the Series 241 product data sheet for more information.

Apply Tnemec Series 218 to all *vertical* surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

Apply Tnemec Series 215 or 218 as needed to fill voids in *horizontal* surfaces.

Primer: 61-5002 Tneme-Liner (Beige)	8.0 - 12.0
Topcoat: 61-5001 Tneme-Liner (Gray)	<u>8.0 - 12.0</u>
Dry Film Thickness	16.0 - 24.0

3.29 CLEAR WATER REPELLENT FOR CONCRETE, MASONRY AND BRICK

A. Silane /Siloxane Sealer (Min. 42% Solids)

Surface Preparation: Allow new concrete to cure 28 days. All surfaces must be clean, dry,

and free of oils, curing compounds, form release oils, and other contaminants that might interfere with the penetration of the sealer.

COATING: BRICK, CONCRETE
Tnemec Series 662Two Coats @ 75-200 SF/GAL

SPLIT FACED OR POROUS MASONRY
Tnemec Series 662..... Two Coats @ 35-100 SF/GAL

3.30

3.31 CANAL PIPE (AERIAL) CROSSINGS

- A. System 701-1: NEW. Zinc/Epoxy/Fluoropolymer for New Pipe or Existing Pipe Requiring Removal of Existing Coatings

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Primer: 90-97 Tneme-Zinc	2.5 - 3.5	
2nd Coat: 66HS-Color Hi-Build Epoxoline	2.0 - 3.0	
3rd Coat: 701-Color Hydroflon	<u>2.0 - 3.0</u>	
	Dry Film Thickness	6.5 - 9.5
	Minimum	8.0 Mils

- B. System No. 701-2: EXISTING. High Build, Semi- Gloss Fluoropolymer for Marginally Cleaned Surfaces or Topcoating Over Existing Systems

Surface Preparation: High Pressure Water Blast (min. 3500 psi) or Solvent Clean (SSPC-SP1) and Spot Hand or Power Tool Clean (SSPC-SP 2 - 3) or Brush Blast (SSPC-SP7). Existing coatings must be clean, dry and tightly adhering prior to application of coatings.

Spot Coat: 135-Color Chembuild	3.0 - 5.0	
Prime Coat: 135-Color Chembuild	3.0-5.0	
2nd Coat: 701-Color Hydroflon	<u>2.0 - 3.0</u>	
	Minimum Dry Film Thickness (NIC Spot Coat)?	6.0

3.32 PROJECT DESIGNER SYSTEMS REFERENCE GUIDE

- A. STEEL

EXTERIOR (NON-IMMERSION)

- A.1 System No. 1095-1-1: Epoxy/High Build Urethane
- A.2 System No. 1095-2: High Build Urethane
- A.4 System 90-97: Zinc/Epoxy/Urethane

INTERIOR EXPOSURE (NON-IMMERSION)

- B.1 System No. 66HS-1: High Solids Epoxy
- B.2 System No. 66HS-2: High Build Epoxy

IMMERSION

- C.1 System No. 104-1: High Solids Epoxy (Non-Potable)
- C.2 System No. 20HS-1: High Build Epoxy (Non-Potable)
- C.3

B. OVERHEAD METAL DECKING, JOIST (INTERIOR EXPOSURE)

System No. 115-1: Uni-Bond

C. OVERHEAD METAL DECKING, JOINT (EXTERIOR EXPOSURE)

System No. 1029-1 Enduratone

D. GALVANIZED STEEL-PIPE AND MISCELLANEOUS FABRICATORS

System No. 1095-3: Epoxy/High Build Urethane

E. GALVANIZED STEEL-INTERIOR EXPOSURE (NON-IMMERSION) AND ALUMINUM IN CONTACT WITH CONCRETE

System No. 66HS-3: Polyamide Epoxy

F.

G.

I. CONCRETE

EXTERIOR-ABOVE GRADE

- A.1 System No. 1026-1: Acrylic Emulsion Low Sheen
- A.2 System No. 156-1: Modified Acrylic Elastomer

EXTERIOR-BELOW GRADE

- B.1 System No. 46-61: Coal Tar Pitch Solution
- B.3

EXTERIOR/INTERIOR EXPOSURE (NON-IMMERSION)

- C.1 System No. 1026-2: Acrylic Emulsion Low Sheen
- C.2 System No. 66HS-4: Epoxy-Polyamide

IMMERSION (POTABLE & NON-POTABLE)

- D.1 System No. 104-2: High Solids Epoxy (Non-Potable)
- D2 System No. 20HS-2: Epoxy Polyamide (Potable)

INTERIOR EXPOSURE (NON-IMMERSION)

- E.1 System No. 66HS-5: High Solids Epoxy
 - E.2 System No. 113-1: Acrylic Epoxy Semi-Gloss
- J. CONCRETE FLOORS
- A.1 System No. 290-1: Epoxy-Polyamide
 - A.5 System No. 241/222: Decorative / Functional Flooring (Non-Slip)
- K. POROUS MASONRY - EXTERIOR/INTERIOR EXPOSURE
- A.1 System No. 156-2: Modified Epoxy-Sand Texture
 - A.2 System No. 104-3: High Solids Epoxy (Interior Only)
 - A.3 System No. 113-2: Acrylic Epoxy Semi-Gloss (Interior Only)
 - A.4 System No. 156-3: Modified Acrylic Elastomer
- L. GYPSUM WALLBOARD
- A.1 System No. 113-3: Acrylic Epoxy
 - A.2 System No. 66HS-5: Hi-Build Epoxoline
 - A.3 System No. 1026-3: Acrylic Emulsion, Low Sheen
- M. WOOD EXTERIOR/INTERIOR EXPOSURE
- A.1 System No. 1029-2: Acrylic Emulsion Semi-Gloss
 - A.2 System No. 6-5: Acrylic Latex
- N. PVC PIPE EXTERIOR/INTERIOR EXPOSURE
- A.1 System No. 1095-5: Acrylic Polyurethane
- O. INSULATED PIPE-INTERIOR EXPOSURE
- A.1 System No. 1026-4: Acrylic Emulsion, Low Sheen
- P. HIGH HEAT SURFACES-FERROUS METAL
- A.1 System No. 1528-1: Silicone Aluminum (1200deg F Maximum)
- Q. SURFACES EXPOSED TO H₂S/H₂SO₄ (SEVERE EXPOSURE/IMMERSION)
- A.1 System No. 434-1: Polyamine Epoxy Mortar Systems
 - A.2 System No. 142-1: Flake / Aluminum Oxide Filled Polyamine Epoxy
- R. EXTERIOR OF PRESTRESSED CONCRETE TANKS
- A. System 156-4 New Tanks
 - B. System 156-5: Existing Tanks (Previously Painted)
- S. SECONDARY CONTAINMENT AREAS

- A. System No. 239SC-1: Modified Novolac Epoxy
- B. System No. 61-1: Cycloaliphatic Amine Epoxy

T. CLEAR WATER REPELLENT FOR CONCRETE, MASONRY AND BRICK

- A. Silane /Siloxane Sealer (Min. 42% Solids)

V. CANAL PIPE (AERIAL) CROSSINGS

- A. System No. 701-1: Zinc/Epoxy/Fluoropolymer
- B. System No. 701-2: High Build/Fluoropolymer
- C. Ductile Iron Pipe Above Grade: Series 66 High Build Epoxy

3.33 COATING SCHEDULE - TO BE DEVELOPED BY PROJECT AS NEEDED

END OF SECTION

SECTION 09902 PIPE AND EQUIPMENT PAINTING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section includes pipe painting and identification as required for this project.

1.02 SUBMITTALS

- A. All submittals shall be in accordance with Specification 01340 - Shop Drawings, Project Data and Samples.

PART 2 PRODUCTS

2.01 PAINTING AND IDENTIFICATION

- A. Exposed piping (except stainless steel) shall be painted. Metal, ductile Iron, and plastic pipe shall be coated per Specification 09900 - Painting.
- B. General Notes and Guidelines:
 1. All color numbers and names herein refer Tnemec to master color card. Colors of specified equal manufacturers may be substituted with approval of the Engineer.
 2. Pipe lines, equipment, or other items which are not listed here shall be assigned a color by the Engineer and shall be treated as an integral part of the Contract.
 3. When color coding is specified or directed by the Engineer, it shall consist of color code painting and identification of all exposed conduits, through lines and pipelines for the transport of gases, liquids, or semi-liquids including all accessories such as valves, insulated pipe coverings, fittings, junction boxes, bus bars, connectors and any operating accessories which are integral to a whole functional mechanical pipe and electrical conduit systems.
 4. Description on titles (Abbreviated Code on Pipe/Equipment) to be lettered on pipes or equipment will be black or white to contrast with color of pipes and equipment and shall be stenciled applied, as approved by the Engineer.
 5. All moving parts, drive assemblies, and covers for moving parts which are potential hazards shall be Safety Orange 04SF.
 6. All safety equipment shall be painted in accordance with OSHA standards.
 7. All inline equipment and appurtenances not assigned another color shall be painted the same base color as the piping. The pipe system shall be painted with the pipe color up to but not including the flanges attached to pumps and mechanical equipment assigned another color.
 8. All pipe hangers and pipe support floor standards shall be painted.

9. All conduits shall be painted to match its background surface.
10. Building surface colors shall be painted as scheduled in the Finish Schedule or as selected by the Engineer.
11. Doors and frames shall be painted as scheduled in The Finish Schedule or as selected by the Engineer.
12. Wood casework, frames, doors, etc. shall be finished with urethane as specified except as specifically noted otherwise.

2.02 PAINT COLOR CODE SCHEDULE

- A. In situations where two colors do not have sufficient contrast to easily differentiate between them, a six-inch band of contrasting color should be painted on one of the pipes at approximately 30-inch intervals. The name of the liquid or gas should also be painted (stenciled) on the pipe in a contrasting color. In some cases, it may be advantageous to paint arrows indicating the direction of flow.

COLOR OF PIPE AND EQUIPMENT

DESCRIPTION OF TITLE TO BE LETTERED ON PIPES AND EQUIPMENT	TITLE LETTERS	COLOR NAME	COLOR NUMBER
<u>EQUIPMENT</u>			
CONVEYORS, SLUDGE HOPPERS, & RELATED EQUIP.	WHITE	SAFETY ORANGE	04SF
BAR SCREENS	WHITE	SAFETY ORANGE	04SF
GRIT COLLECTOR HOUSING AND SCREW CONVEYORS	WHITE	SAFETY ORANGE	04SF
SUMP PUMPS	WHITE	LIGHT GRAY	A0385
BRIDGE CRANES, MONORAILS AND TRACK	WHITE	SAFETY ORANGE	04SF
BLOWERS	BLACK	CYPRESS GREEN	G0383
SLUICE GATE OPERATORS	WHITE	SAFETY ORANGE	04SF
SCUM PUMPS	WHITE	APRIL GREEN	J8187
PNEUMATIC EJECTORS	WHITE	APRIL GREEN	J8187
AIR COMPRESSORS	WHITE	PALM GREEN	G3102
WASTE SLUDGE PUMPS	WHITE	TAN BARK	J6512
AIR FILTER HOUSINGS	WHITE	CYPRESS GREEN	G0383

SODIUM HYPCHLORITE PUMPS	BLACK	SAFETY YELLOW	02SF
EFFLUENT REUSE PUMPS	WHITE	PANTONE PURPLE	522-C
FILTER AND EFFLUENT SAMPLE PUMPS	WHITE	AQUAMARINE	G0427
FLASH MIXERS	WHITE	SAFETY ORANGE	04SF
FLOBBULATOR DRIVES	WHITE	SAFETY ORANGE	04SF
CLARIFIER BRIDGES AND PUMPS	WHITE	SAFETY ORANGE	04SF
ODOR CONTROL SYSTEM AND BLOWERS	BLACK	EGG SHELL	J6963
DESCRIPTION OF TITLE TO BE LETTERED ON PIPES AND EQUIPMENT	TITLE LETTERS	COLOR NAME	COLOR NUMBER
ALUM FEED SYSTEM	BLACK	SAFETY ORANGE	04SF
POLYMER FEED SYSTEM	BLACK	ORIENTAL YELLOW	D0852
POLYMER TANKS AND MIXERS	BLACK	ORIENTAL YELLOW	D0852
POLYMER PUMPS	BLACK	ORIENTAL YELLOW	D0852
GRIT SCREW CONVEYOR	WHITE	SAFETY ORANGE	04SF
SLUDGE PUMPS	WHITE	ANTIQUÉ BROWN	L9398
CONDUIT	WHITE	CYPRESS GREEN	G0383
CONDUIT TRAYS	WHITE	CYPRESS GREEN	G0383
FANS	WHITE	EGG SHELL	J6963
<u>PIPES</u>			
RAW WASTEWATER PIPE	WHITE	LIGHT GRAY	A0385
S. STEEL AIR PIPE APPURTENANCES	BLACK	SILVER	MATCH S. STEEL
SCUM PIPE	WHITE	APRIL GREEN	J8187
WASTE SLUDGE PIPE	WHITE	TAN BARK	J6512
SUMP PUMP PIPE	WHITE	LIGHT GRAY	A0385
CHLORINE PIPE AND HEADER	BLACK	SAFETY YELLOW	02SF

EFFLUENT REUSE PIPE	WHITE	PANTONE PURPLE	R3910
CHLORINE SAMPLE PIPE	BLACK	SAFETY YELLOW	02SF
POLYMER PIPE	BLACK	ORIENTAL YELLOW	D0852
THICKENED WASTE SLUDGE PIPE	WHITE	ANTIQUE BROWN	L9398
COLD WATER	BLACK	AZURE	J8162
HOT WATER	BLACK	AZURE	J8162
SOIL PIPES	WHITE	LIGHT GRAY	A0385
FUEL PIPE	WHITE	SAFETY RED	06SF
DESCRIPTION OF TITLE TO BE LETTERED ON PIPES AND EQUIPMENT	TITLE LETTERS	COLOR NAME AND NUMBER	
WASTE AND VENT PIPES (INTERIOR)	WHITE	MATCH BACKGROUND	

2.02 PAINTING OF EXISTING STRUCTURES, PIPING, VALVING AND EQUIPMENT

- A. Touch up existing structures and equipment where finish has been damaged by new construction.

PART 3 EXECUTION (NOT USED)

END OF SECTION

DIVISION 11 EQUIPMENT

SECTION 11288 STAINLESS STEEL SLIDE GATES

PART 1 GENERAL

1.1 SUMMARY

- A. The Contractor shall provide all labor, materials, equipment, and incidentals required to furnish and install slide gates, operating stems, and operating floor stands, complete and operational with all necessary accessories as shown on the Contract Drawings, as specified herein, or as required for complete operation. Slide gates shall be provided at the following locations:
- B. The Contractor shall obtain all equipment specified in this Section from one manufacturer to ensure proper coordination and functionality. The manufacturer shall have responsibility for performance and compatibility of the entire system. This does in no way relieve the Contractor for ultimate responsibility under this Contract for equipment, coordination, installation, operation and guarantee.
- C. The Contract Drawings are for purpose of guidance and to show functional features and required external connections. They do not necessarily show all components necessary to accomplish the desired results nor do they necessarily show all components required to interface with the equipment. The Contractor shall provide all parts, equipment, and devices necessary to meet the functional requirements of the system.

1.2 REFERENCES

- A. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:
 - 1. American Water Works Association (AWWA C561)
 - 2. American National Standards Institute (ANSI)
 - 3. American Society for Testing and Materials (ASTM)

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. The slide gates shall be manufactured in accordance with the latest version of AWWA C561, shall be constructed of stainless steel ASTM 316L.
 - 2. Liberal safety factors will be used in the design of all equipment. Gate, frame, and yoke design shall be such that the flexural stress does not exceed 18,750 psi or that the minimum safety factor is 4-to-1 based on the ultimate strength of the material used.

3. Slide gates shall be provided in accordance with the Schedule below:

Location	Operating Head (Seating/Unseating)	Design Head (Seating/Unseating)	Operat or Type
Central Reclaimed Pump Back Station	40 feet	40 feet	Manual

1.4 SUBMITTALS

A. For approval: Submit the following shop drawings for approval:

1. Manufacturer's information, specifications, and data showing dimensions, materials of construction, and weight of all major items of equipment.
2. Installation diagrams showing location, arrangement, and size of all fasteners required for the equipment.
3. Setting drawings, templates, and instructions for installation of frames, thimbles, etc.
4. Certification that all components were designed based upon the maximum seating and unseating heads described herein.

B. Upon completion of installation, submit three (3) copies of the Operation and Maintenance Manual for this equipment. A final copy of this manual shall be approved by the Engineer prior to distribution and as a minimum shall contain the following:

1. Operational and maintenance manuals shall include all approved shop drawings associated with this Section, complete instructions for installation, and parts list for all components.
2. Include a list and frequency of specific maintenance activities.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide slide gates as manufactured by the following:

1. WACO Products
2. Mueller Hydro Gate
3. Approved equal

2.2 EQUIPMENT MATERIALS

A. All slide gates shown on the plans and listed in the specifications shall conform in all respects to the latest version of AWWA C561, with the noted changes and additions:

Materials used in construction of slide gates and appurtenances will be best suited for the application and will conform to the following specifications:

1. Frame, Slide, Yoke, and Reinforcing: Stainless Steel, ASTM A240/A240M, Type 316L.
 2. Stainless Steel for stems: ASTM A-276, Alloy matched to 2.2.A.1.
 3. Stainless Steel for fasteners: F-593/F-594, Alloy Group 1, 2, Alloy matched to 2.2.A.1.
 4. Invert seals and compression cords: Neoprene, ASTM D2000, 60 Durometer.
 5. Side Seal: Ultra High Molecular Weight (UHMW) Polymer, ASTM D4040
- B. Gate frame shall be wall face mounted flange back, as indicated on plans. Spigot-back frames are not acceptable. The frame shall be an integral unit of brake form and structural shapes, rigidly assembled to form the waterway openings. Holes shall be provided in the frame flanges for mounting on anchor bolts, except for embedded frame gates. The head channels shall be welded or bolted to the gate frame. The head channels are to be sufficiently spaced to allow removal of the gate slide. The side guide frames shall be true one-piece formed shapes that support the self-adjusting seal system and shall not require tapped or through holes in the side frames that are potential leak points. Side guides that are made up of multiple bolted or welded pieces, or that create hollow sections that can collect water and become susceptible to internal corrosion are not acceptable. Side guide frames shall be of the dual-slot type and the primary slot of the frame extrusion shall support the gate plate vertical and horizontal stiffeners.
- C. Gate slide shall conform to the safety factors stated under "General", but shall, in no case, be less than ¼-in. thickness. Deflection under full head shall be limited to 1/720 of the span. The gate plate shall be stiffened by both horizontal and vertical stiffeners welded together, with a minimum of two vertical stiffeners welded at each outer edge of the horizontal stiffeners. The stem connector clips or stem block pocket shall be welded to the slide and except for open channel gates shall also be supported by at least two horizontal stiffeners.
- D. Flush Bottom: Slide gates shall incorporate a flush-bottom seal that is mechanically fastened to the bottom frame invert member. The seal shall be of the materials shown in "Materials of Construction." Seals attached to the slide or "press fit seals" are not acceptable.
- E. Side Seals: UHMW self-adjusting seals shall be provided. Seals shall be securely fastened to the frame with formed 316 stainless steel retainers and shall be replaceable without removing gate structural components or removing the gate from the installed position. A compression cord fitting into an integral retainer groove in the UHMW shall allow for a self-adjusting seal system. The UHMW shall be an extruded shape with integral flex reliefs; saw cut UHMW material or seals without flex relief shall not be allowed.
- F. The operating stem shall be of a size to safely withstand, without buckling or permanent distortion, the stresses induced by normal operating forces. In addition, the stem shall be designed to transmit in compression at least 2 times the rated output of the floor stand or bench stand with a 40-pound effort on the crank or handwheel. The threaded portion of the stem shall have Acme type threads with a minimum surface finish of 24 micro-inches. 316 Stainless Steel couplings, threaded and keyed to the stems, will join stems of more than

one section. All threaded and keyed couplings of the same size will be interchangeable. All gate stems will be provided with adjustable stop collars on the stem to prevent over travel of the gate.

- G. On weir or slide gates, when the width is greater than twice the height and the width is greater than 48 in., a tandem stem arrangement should be used.
- H. Stem guides will be UHMW bushed two piece type, mounted on stainless steel brackets of the same alloy as the gate to allow for installation after the stem is placed. They will be adjustable in two directions and will be spaced at sufficient intervals to adequately support the stem. Stem guide spacing will not exceed an L/r ratio of 200.
- I. Gate lifts shall be geared crank type as shown in the plans. Lifts shall operate the gate with a maximum pull of 40 lb on the crank. Crank shall be located approximately 36 in. above grating or walkway. All lifts shall have thrust bearings, bronze lift nuts. All geared lifts shall have cast or ductile iron housings and pedestals. All lifts shall be rising stem type. Lifts shall be grease lubricated and regreasable through grease zerks. Oil bath lifts are not acceptable.
- J. A clear, impact resistant plastic stem cover and indicator shall be provided on each slide gate operator. Clarity of the stem cover shall be guaranteed for a minimum of 5 years. Stem indication shall be provided to denote gate level at quarter, half, three-quarter, and full open or in ¼" and 1" increments. A aluminum adaptor shall be used to mount the cover to the lift. The covers shall be capped, vented, and of sufficient length to allow full travel of the gate.

PART 3 EXECUTION

3.1 INSTALLATION

- A. The slide gate equipment and appurtenances shall be installed in accordance with the Installation Manual furnished by the gate manufacturer. Extreme care should be used in handling, storage, and installation of this equipment to prevent damage or distortion of the equipment and to insure proper performance.

3.1 FIELD QUALITY CONTROL

- A. Field testing shall be performed after installation of the equipment. The field testing shall demonstrate the following:
 - 1. The equipment has been properly installed in accordance with manufacturer's instructions and recommendations.
 - 2. The equipment has been installed in the specified location and orientation or as shown on the Contract Drawings.
 - 3. The equipment has been aligned.
 - 4. There are no mechanical defects in any of the parts.
 - 5. The slide gates shall undergo a leakage test following installation. The leakage test shall be in accordance with the latest version of AWWA C561.

END OF SECTION

SECTION 11300 JOHNSON INTAKE SCREENS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section of the specifications covers the furnishing and installation of the Johnson Intake Screens and appurtenances as shown on the drawings and specified herein.
- B. The following items are a part of this section and shall be furnished by one manufacturer to ensure a properly designed and integrated intake system.
 - 1. (2) Johnson Intake Screen assembly of all-welded continuous slot Vee-Wire® construction.

1.02 QUALITY ASSURANCE

- A. The entire intake screen system shall be furnished by a single manufacturer who shall comply with the following:
 - 1. The equipment manufacturer must maintain an ongoing quality assurance program, including ISO-9000 certification.
 - 2. All welders must maintain certification to ASME Section IX. Copies of certifications shall be provided upon request.
 - 3. The single manufacturer supplying this equipment must be able to furnish proof of over (100) installations and (20) years of manufacturing equipment of similar technology.

1.03 SUBSTITUTIONS

- A. Manufacturers other than that which is specified and/or not meeting EVERY provision of the specification shall be required to submit a complete and detailed PRE-QUALIFICATION PACKAGE to the engineer at least (15) days prior to the bid. Any PRE-QUALIFICATION PACKAGE must contain as a minimum:
 - 1. Detailed layout drawings
 - 2. Supporting flow distribution data via a CFD (Computational Fluid Dynamics) analysis.
 - 3. Weld certifications
 - 4. Evidence of a recognized ongoing quality assurance program.
 - 5. Detailed component specifications and catalog cuts as required.
 - 6. Detailed list of ALL VARIATIONS required from the original design, referencing appropriate sections of the specifications and locations on the drawings.
 - 7. Full installation reference list of at least (50) customers that includes similar proposed equipment.

- B. Manufacturers qualifying will be recognized by addendum a minimum of (5) days prior to the bid. Contractors shall include all costs associated with any redesign required with their bid.
- C. Manufacturers not meeting this specification in EVERY WAY or are not PRE-QUALIFIED and approved by the engineer as outlined above will not be considered for use in this project.

PART 2 PRODUCTS

2.01 GENERAL

- A. All system components and equipment utilized in the intake screen system, including the system described in Section 1.01 shall be furnished as a complete integrated system by one manufacturer; Johnson Screen, New Brighton, MN.

2.02 CAPACITY

- A. The intake assembly capacity shall be 10 MGD at a maximum through-slot velocity, as a result of water withdrawal, of 0.5 feet per second. The corresponding average through-slot velocity shall be 80% - 90% of the maximum velocity. Pressure drop through the entire intake assembly shall be approximately 0.314 psi at the rated flow. The hydraulic design of this system is based on this maximum headloss - screens that exceed this headloss are not acceptable. The manufacturer's clean screen assembly headloss must be stated in the bid documents.
- B. The total intake assembly capacity of 10 MGD shall be handled by (1), Johnson Screens Model T-36HC intake tee screen assemblies.
- C. Evidence of the intake assembly capacity and flow distribution shall be proven by a Computational Fluid Dynamic (CFD) analysis, supplied by the manufacturer. The CFD Analysis Method must be verified by actual physical testing.

2.03 STRENGTH

- A. The intake assembly shall be designed to a maximum 4.33 psi (0.3 bar) negative pump pressure or differential headloss.
- B. Design stress used for determining strength of the assembly shall be no more than 90% of the published yield strength of the material used. Strength calculations verifying compliance with these criteria shall be provided upon request.

2.04 CONSTRUCTION

- A. The intake screen surface wire shall be Johnson Screens Vee-Wire® number 69.
- B. The surface wire, support beam and stiffener structure shall be an all-welded matrix designed to provide the specific strength with minimal interference with the through screen flow pattern.

- C. End plates and tee body shall be a minimum of 0.105 inches thick. All structural butt welds shall be full penetration fillet welds and shall be the thickness of the thinner component.

2.05 SLOT OPENING SIZE

- A. The screen slot size shall be 0.50 inches. The open area for this slot opening shall be 87.57%.
 - 1. Slot size shall be controlled and continuously monitored during manufacture.
 - 2. For slot openings of 0.040" through 0.100" the mean slot size shall be within +/- 0.002" with a standard deviation no greater than 0.002" throughout the assembly.
 - 3. For slot openings greater than 0.100" the mean slot size shall be within +/- 0.003" with a standard deviation no greater than 0.003" throughout the entire assembly.

2.06 MATERIALS

- A. The main outlet flange shall mate with a 24 inch flange with a flange pattern equal to AWWA C-207, Table 2, Class D.
- B. The air connection shall be 3 inch diameter.
- C. The intake screen material shall be manufactured of 304 Stainless Steel material.

2.07 SCREEN SUBMITTALS

- A. The intake screen manufacturer shall submit:
 - 1. Drawing(s) showing screen diameter, screen length, assembly length, interface dimensions for outlet and air backwash dimensions, materials of construction and assembly weight.
 - 2. Weld Certifications.
 - 3. Evidence of a statistical control program.
 - 4. Provide supporting flow distribution data where calculation methods are verified by physical flow distribution tests. This includes a CFD Analysis of the flow distribution of the screen at the design flow.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Field testing shall be performed after installation of the equipment. The field testing shall demonstrate the following:
 - 1. The equipment has been properly installed in accordance with manufacturer's instructions and recommendations.

2. The equipment has been installed in the specified location and orientation or as shown on the Contract Drawings.
3. The equipment has been aligned.
4. There are no mechanical defects in any of the parts.

END OF SECTION

SECTION 11930 PUMPS-GENERAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The work covered by this section and the related sections consists of providing all labor, material, equipment and performing all construction required to install pumps, motors, and pump control valves, including all accessories as specified and shown on the drawings.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Drawings and general provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification sections, apply to this section.
- B. Section 01340 - Shop Drawings, Project Data, and Samples
- C. Section 01720 - Project Record Documents
- D. Section 01730 - Operating and Maintenance Data
- E. Section 11931 - Submersible Wastewater Pumps

1.03 PUMP PERFORMANCE DATA

- A. Certified pump performance data (curves) are to be submitted to the Engineer for the pumps prior to delivery and pump installation. Performance data must be the results of actual pump operation of a complete pump assembly before shipment of pump. Also report amperage and voltage of each power leg, efficiency, horsepower.
- B. Pump shall not overload the motor across the entire operating curve of the pump.

1.04 QUALITY ASSURANCE

- A. Provide shop drawings in accordance with Section 01340.
- B. Provide operation and maintenance material and record drawings in accordance with Section 01720 and 01730.
- C. Provide manufacturer's certification of correct installation after manufacturer's inspection.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

- 3.01 Install all equipment in strict conformance with the manufacturer's specifications and industry standards. Perform all work in a workmanlike manner.

- 3.02 Manufacturer's representative for pumps and valves shall inspect installation for correctness and compliance with manufacturer's specifications and submit written certification that equipment is ready to be placed in service.
- 3.03 No piping connecting for any of the equipment will be jacked, pried or forced into position in any way. All piping must mate perfectly with the equipment it is attaching prior to installation of flange bolts or other connecting devices.
- 3.04 Clean and then flush thoroughly before making final connections to any assembly.
- 3.05 Field test pumps for conformance to specified operating conditions. Record initial flow, head, voltage and amperage for each power leg, ramp time to speed, full load speed. Adjust tolerances, if necessary and retest. Test pump and motor for amplitude and frequency of vibration. Measure noise (dBA) adjacent, at 10 ft., at 50- ft. Tests shall be performed to the satisfaction of the Engineer and meet the requirements of the Hydraulic Institute.
- 3.06 Store spare pumps, parts, drivers, etc. in strict accordance with manufacturer's recommendations. Notify the owner in writing of any special storage maintenance required, and provide such maintenance until final acceptance of contract.
- 3.07 Provide seal water piping as appropriate from nearest supply, including cut-off valve, and/or solenoid valve. All seal water piping to be installed by the qualified pump manufacturer.
- 3.08 Provide seal drain piping to nearest drain, as appropriate.
- 3.09 Pump impellers, bowl assemblies, tee head piping and all material of pump assembly must have smooth finish to minimize pitting corrosion potential.
- 3.10 All pumps shall meet or exceed the standards of the National Hydraulic Institute.

END OF SECTION

SECTION 11931 SUBMERSIBLE WASTEWATER PUMPS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The work covered by this section and the related sections consists of providing all labor, material, equipment and performing all construction required to purchase and install three (3) non-clog submersible wastewater pumps in a wetwell, complete with pump bases and pedestals, and all accessories as specified herein and shown on the drawings. This section includes electric wet-pit pump(s) to be supplied with motor, volute, mounting brackets, power cable and accessories.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification sections, apply to this section.
- B. Section 01340 - Shop Drawings, Project Data, and Samples
- C. Section 02615 - Ductile Iron Pipe and Fittings
- D. Section 11930 - Pumps - General
- E. Section 16050 - Electrical General Provisions

1.03 PUMP PERFORMANCE DATA & CERTIFIED TEST RESULTS

- A. Factory testing in accordance with the standards of the Hydraulic Institute shall be required for each pump.
- B. Certified pump performance curves shall be submitted for approval by the Engineer on the wastewater pumps prior to shipment. The certified pump performance curves shall be submitted, including head, capacity, brake horsepower, and pump efficiency for each pump supplied.
- C. The pump shall be tested through the specified range of flow, and head/capacity/efficiency curves plotted at maximum output speed. During each test, the pump shall be run at each head condition for sufficient time to accurately determine discharge, head, power input, and efficiency.
- D. If any pump tested fails to meet any specification requirement it will be modified until it meets all specification requirements. If any pump tested fails to meet the efficiency requirements at any of the listed flow or head conditions as specified and all reasonable attempts to correct the inefficiency are unsuccessful, the pump(s) shall not be accepted and shall be replaced with unit(s) which meets the specified requirements. Performance data must be the results of project pump. Also report amperage and voltage of each power leg, efficiency, and horsepower.

1.04 QUALITY ASSURANCE

- A. Provide shop drawings in maintenance material in accordance with Section 01340. Shop drawings shall be provided to show compliance with these specifications, plans or other specifications that will influence the proper operation of the pump(s). Shop drawings for approval must consist of:
1. Pump Performance Curves.
 2. Pump Outline Drawing.
 3. Station Drawing for Accessories.
 4. Electrical Motor Data.
 5. Control Drawing and Data.
 6. Access Frame Drawing.
 7. Typical Installation Guides.
 8. Technical Manuals.
 9. Parts List.
 10. Printed Warranty.
 11. Manufacturer's Equipment Storage Recommendations.
 12. Manufacturer's Standard Recommended Start-Up Report Form.
- Lack of the above requested submittal data is cause for rejection.
- B. Provide operation and maintenance material and record drawings in accordance with Section 01730.
- C. Provide manufacturer's certification of correct installation after manufacturer's inspection.

PART 2 PRODUCTS

2.01 SUBMERSIBLE WASTEWATER PUMPS

- A. Requirements
1. The pump(s) shall be heavy duty, electric submersible rated, centrifugal, self-cleaning, semi open or enclosed impeller design, non-clog units designed for handling raw, unscreened sewage and wastewater and shall be fully guaranteed for this use.
 2. The pumps provided shall be capable of continuous operating in ambient outdoor conditions. The use of shower systems, secondary pumps or cooling fans to cool the motor shall not be acceptable.

The pump, mechanical seals and motor units provided under this specification shall be from the same manufacturer in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.

Pump performance shall be non-overloading across the entire performance curve and shall not exceed 125 HP across normal operating conditions. Each pump shall meet the following design conditions:

Flow (gpm)	Head (ft)	Max Hp
0	104	-
1500	85	80
3000	73	95
4500	63	110
6000	43	110

Pump and motor shall be Hydromatic model S12L, impeller diameter 11.5 in, 3470 GPM @ 71 TDH, 125 HP, 60 HZ utilizing a non-clogging design for wastewater handling or approved equal.

Each pump shall be equipped with a 125 HP submersible electric motor, connected for operation on 480 volts, 3 phase, 60 hertz, 4 wire service with 50 feet of cable suitable for outdoor pump applications. The power cable shall be sized according to NEC and ICEA standards and also meet with P-MSHA Approval.

Acceptable pump manufacturers shall be Hydromatic, Sulzer, or Flygt.

B. Pump Design

The pump(s) shall be designed for a vertical, in-line installation as shown on the drawings with a quick disconnect flange engagement arrangement. Each pump is tested and approved in accordance with national and international standards (IEC 34-1, HI, CSA).

C. Pump Construction

Major pump components shall be of grey cast iron or ductile, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. All exposed nuts or bolts shall be AISI type 316 stainless steel construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or Viton rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

D. Cable Entry Seal

The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of a single cylindrical

elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable. The assembly shall provide ease of changing the cable when necessary using the same entry seal. The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the interior from foreign material gaining access through the pump top.

E. Motor

The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air or oil filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31. The motor shall be designed for continuous duty handling pumped media of 40°C (104°F) and capable of no less than 15 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum. Thermal switches set to open at 125°C (260°F) shall be embedded in the stator end coils to monitor the temperature of each phase winding. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The junction chamber containing the terminal board, shall be hermetically sealed from the motor by an elastomer compression seal. The motor and the pump shall be produced by the same manufacturer.

The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for operation up to 40°C (104°F) ambient and with a temperature rise not to exceed 80°C. A performance chart shall be provided upon request showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics.

The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 50 feet or greater.

The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

F. Bearings

The pump shaft shall rotate on two bearings. Motor bearings shall be permanently lubricated. The upper bearing shall be a single deep groove ball bearing. The lower bearing shall be a two row angular contact bearing to compensate for axial thrust and radial forces. Single row lower bearings are not acceptable.

G. Mechanical Seal

Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in an lubricant reservoir that hydrodynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, corrosion resistant ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, corrosion resistant tungsten-carbide seal ring. Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment nor depend on direction of rotation for sealing. The position of both mechanical seals shall depend on the shaft. Mounting of the lower mechanical seal on the impeller hub will not be acceptable. For special applications, other seal face materials shall be available.

The following seal types shall not be considered acceptable nor equal to the dual independent seal specified: shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces. No system requiring a pressure differential to offset pressure and to affect sealing shall be used.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. The motor shall be able to operate dry without damage while pumping under load.

Seal lubricant shall be FDA Approved, nontoxic.

H. Pump Shaft

Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The shaft shall be stainless steel.

I. Impeller

The impeller(s) shall be of gray cast iron Class 35B or ductile iron Class 40, dynamically and hydraulically balanced, non-clog design capable of handling materials typically found in domestic sewage. Impellers shall be locked to the shaft and held by an impeller bolt.

J. Volute

The pump volute shall be of A48 Class 35B gray cast iron.

The casing shall be of the end suction volute type having sufficient strength and thickness to withstand all stress and strain from service at full operating pressure and load. The casing shall be of the centerline discharge type equipped with an automatic pipe coupling arrangement for ease of installation and piping alignment. The design shall be such that the pumps will be automatically connected to the discharge piping

when lowered into position with the guide rails. The casing shall be accurately machined and bored for register fits with the suction and casing covers.

A volute case wearing ring shall be provided to minimize impeller wear. The wear ring shall be alloy 230 brass, ASTM B-43 and held by 316 stainless steel fasteners. The wear ring shall be easily replaceable in the field. Wear rings of any other material shall not be acceptable.

L. Protection

All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. The thermal switches shall open at 125°C (260°F), stop the motor and activate an alarm.

PART 3 EXECUTION

3.01 SUBMERSIBLE WASTEWATER PUMPS

- A. Install all equipment in strict conformance with the manufacturer's specifications and industry standards.
- B. Manufacturer's representative for pump shall inspect installation for correctness and compliance with manufacturer's specifications and submit written certification that equipment is ready to be placed in service.
- C. No piping connecting any of the equipment will be jacked, pried or forced in to position in any way. All piping must mate perfectly with the equipment it is attaching prior to installation of flange bolts or other connecting devices.
- D. Spare Parts shall include one seal of mechanical seals per pump
- E. Store spare pumps, parts, drivers, etc. in strict accordance with manufacturer's recommendations. Notify the owner in writing of any special storage maintenance required, and provide such maintenance until final acceptance of contract.

3.02 TESTING

- A. Testing performed upon each pump shall include the following inspections:
 - 1. Impeller, motor rating and electrical connections shall be checked for compliance with this specification.
 - 2. Prior to submergence, each pump shall be run dry to establish correct rotation.
 - 3. Motor and cable insulation shall be tested for moisture content or insulation defects.
- B. A written quality assurance record confirming the above testing/inspections shall be supplied with each pump at the time of shipment.
- C. Each pump (when specified) shall be tested in accordance with the latest test code of the Hydraulic Institute (H.I.) at the manufacturer to determine head vs. capacity

and kilowatt draw required. Witness tests shall be available at the factory upon request.

D. The pump(s) shall be rejected if the above requirements are not satisfied.

3.03

START-UP SERVICE

A. The equipment manufacturer shall furnish the services of a qualified factory trained field service engineer for 8-hour working day(s) at the site to inspect the installation, perform start-up and instruct the owner's personnel on the operation and maintenance of the pumping units. After the pumps have been completely installed and wired, the contractor shall have the manufacturer do the following:

1. Megger stator and power cables.
2. Check seal lubrication.
3. Confirm for proper rotation.
4. Confirm power supply voltage.
5. Confirm pump flow as measured by existing flow meter.
6. Confirm pump discharge pressures as measured by calibrated gauges, converted to feet of liquid pumped.
7. Based on field test data, confirm pump performance corresponds to the pump performance curve.
8. Measure motor operating load and no load current.
9. Check pressure control operation and sequence.

3.04

FACTORY SERVICE

Factory-Approved service facilities with qualified factory-trained mechanics shall be available for prompt emergency and routine service.

3.05

GUARANTEE

In addition to the general guarantee required elsewhere in these specifications, the pump manufacturer shall furnish the Owner with a written warranty to cover the pump(s) and motor(s) against defects in workmanship and material for a period of five (5) years or 10,000 hours of operation under normal use and service. The pump manufacturer will pay a pro-rated cost of all replacement parts and repair labor from the date of shipment of the pump unit. Pumps repaired under warranty will be returned to the owner freight prepaid. The warranty shall be in printed form and previously published as the manufacturer's standard warranty for all similar units manufactured.

END OF SECTION

DIVISION 13 CONTROLS AND INSTRUMENTATION

SECTION 13300 CONTROLS AND INSTRUMENTATION GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, devices, equipment, appurtenances, and incidentals required for a complete electrical system as hereinafter specified and/or shown on the Contract Drawings. This work may necessarily include interfacing with and/or completely installing devices and/or equipment furnished under other sections of these Specifications.

- B. The Contractor, shall subcontract a SYSTEMS INTEGRATOR to provide programming of any/all Programmable Logic Controllers (PLC's). The SYSTEMS INTEGRATOR shall also be responsible for the radio communications from the PLC at the new SEWRF Pump Back Station to the existing Master Radio Station located at the SEWRF Administration Building. The SYSTEMS INTEGRATOR shall also be required to perform any and all modifications as required to the existing SCADA System's Human Machine Interface (HMI) screens, database, alarms, level indication, flow indication, history trending, etc. as required. The SYSTEMS INTEGRATOR shall coordinate all SCADA system work with Manatee County.

- C. The SYSTEMS INTEGRATOR shall also be responsible for any/all programming required to integrate the Biosolids Main Circuit Breaker into the existing SCADA system. Refer also to Division 16 specifications.

- D. It is the intent of these Specifications that the electrical systems required for the SCADA System's new Inputs and Outputs (I/O) be suitable in every way for the service required. All materials and all work/labor which may be reasonably implied as being incidental to the requirements of this Section shall be furnished at no additional cost to the County.

- E. All interruptions to the existing control system shall be at the County's convenience. Each interruption shall have prior approval. Request(s) for control system interruption(s) shall be made at least forty-eight (48) hours in advance.

- F. The work shall include complete testing of all electrical components, including wiring.

- G. All workmanship shall be of the highest quality. Substandard work will be rejected and it shall be replaced entirely at the Contractor's expense with no cost to the County.

- H. It shall be the responsibility of each bidder or his authorized representative to physically visit the job site in order that he may be personally acquainted with the area(s), buildings and/or structures intended for use in the installation/construction under this Specification. The submittal of a proposal/bid by a bidder shall be considered evidence that he has complied with this requirement and accepts all responsibility for a complete knowledge of all factors governing his work. Therefore, failure to comply with this requirement of the Specifications will NOT be grounds for the successful bidder (Contractor) to request approval of change orders and/or additional monetary compensation.

1.02 APPROVED SYSTEMS INTEGRATORS

- A. Approved SYSTEMS INTEGRATORS for this project include:
1. BCI Technologies.
 2. Revere Control Systems.
 3. CEC Control Systems.
 4. Commerce Controls, Inc.
 5. Curry Controls Company
- B. All efforts required to supply the required Control and Instrumentation Hardware shall be provided by the SYSTEMS INTEGRATOR. Therefore, the SYSTEMS INTEGRATOR shall be responsible for any and all programming required by the specification and as shown on the Contract Drawings, as well as, supplying any and all Control and Instrumentation Hardware as specified and as shown on the Contract Drawings.

1.03 DIVISION OF WORK

- A. The Electrical Contractor shall be responsible for, and his/her scope of work shall include:
1. Providing and installing all conduit, fittings, conductors, and raceways as indicated on the drawings and as defined in Division 16 Specifications.
 2. Physical installation of Hardware Supplier provided PLC Control panel. This installation shall include all conduit, fittings, conductors and structural rack(s) as required.
 3. Terminate all power wiring to supplied control panels, existing control panels and field elements. The electrical subcontractor shall mark on the record drawings the field wire numbers used for each termination point.
 4. Physical installation of Instrumentation (except where such devices shall be installed by the Mechanical Contractor). This installation shall include all conduit, fittings, conductors, structural rack(s) and sun shields as required.
 5. Providing conduit, fittings and conductors as required to accommodate the new flow meters, float switches any/all new field devices that are supplier or installed by others.
 6. Coordinating all interface requirements with mechanical and electrical system suppliers and furnish any devices that might be required in order to insure compatibility between all equipment.
- B. The Hardware Supplier shall be responsible for, and his/her scope of work shall include:

1. Provide the Pump Control Cabinet and all associated hardware as indicate on the drawings. The Motor Control Cabinet shall be fabricated and provided by ICON Technologies
 2. Providing accessory devices including furnishing and installation of interposing relays, surge protection devices, terminal blocks, etc. necessary to perform the intent as described by the control strategies and services necessary to achieve a fully integrated and operational system as shown on the Contract Drawings and defined in the Specifications.
 3. Terminate all control and communications wiring to supplied control panels, and field elements. The Hardware Supplier shall mark on the record drawings the field wire numbers used for each termination point.
 4. Calibrate of all field instruments.
 5. Provide all Submittals as indicated in Section 1.04 of this Specification.
 6. Provide function testing for all PLC I/O, instruments and communications.
 7. Obtaining, in writing, a final acceptance from the SYSTEMS INTEGRATOR to indicate that all conductors and their terminations, as well as, all field devices and their associated I/O are in proper working order. The Hardware Supplier shall make any and all corrections as necessary, at no charge to the County, for items identified as unsatisfactory by the SYSTEMS INTEGRATOR.
- C. The Mechanical Contractor shall be responsible for, and his/her scope of work shall include:
1. Included within the mechanical subcontractor's scope installation of any in-line instrumentation. This instrumentation shall include the new Pump Back Station Flow Meter and Level Transmitter, as well as the leachate piping Flow Meter.
- D. The SYSTEM INTEGRATOR shall be responsible for, and his/her scope of work shall include:
1. Programming of Pump Back Station PLC.
 2. Modifications as required to the SCADA System's Human Machine Interface (HMI) screens as required for the integration of the Pump Back Station.
 3. This programming shall include the operation of the Pump Back Station.
 4. Configuration, programming and testing of the new Pump Back Station radio and associated radio communications.
 5. Configuration, programming and testing of all Ethernet communication.

1.04 SUBMITTALS

- A. Furnish, as prescribed under the General Requirements, all required submittals covering

the items included under this section and its associated sections of the work.

- B. Submit complete, neat, orderly, and indexed submittal packages. Handwritten diagrams are not acceptable and all documentation submittals shall be made using CADD generated utilities as specified herein.
- C. Partial submittals or submittals that do not contain sufficient information for complete review or are unclear will not be reviewed and will be returned by the ENGINEER as not approved.
- D. Provide all shop-drawing submittals on disk in AutoCad format.
- E. Design Related Submittals: Provide individual shop drawing submittals as further defined in each specification section defining the SCADA System. Provide the following additional submittals covering the complete system:
 - 1. HMI screens modifications : The SYSTEM INTEGRATOR shall submit 11" x 17" color shop drawings depicting the proposed modifications to the associated HMI screen(s) to the County for review. No screen development or modification will be allowed prior to the documented approval of all HMI shop drawings by the County.
 - 2. Loop diagrams, consisting of complete wiring and/or plumbing diagrams for each control loop showing all terminal numbers, the location of the dc power supply, surge arrestors, etc. The loop diagrams shall meet the minimum requirements of ISA S5.4 plus divide each loop diagram into four areas for identification of element locations: SCADA System I/O point(s), panel face, back-of-panel, and field, respectively. On each diagram present a tabular summary of:
 - a. The output capability of the transmitting instruments
 - b. The input impedance of each receiving instrument
 - 3. System interconnect diagram that shows all connections required between component parts of the items covered in this section and between the various other systems specified in this Contract. Number all electrical terminal blocks and field wiring. Identify each line at each termination point with the same number. Do not use this number again for any other purpose in the complete control scheme.
 - 4. Test Procedures: Submit the procedures proposed to be followed during all system testing. Procedures shall include test descriptions, forms, and check lists to be used to control and document the required tests.
- F. Instrument Installation Details Submittal
 - 1. The Electrical Contractor shall develop and submit for review, complete installation details for each field mounted device and panel furnished prior to shipment and installation. Common details may be referenced by an index showing the complete instrument tag number, service, location, and device description. Installation details shall be provided as required to adequately define the installation of the components. Drawings may be included in the Control Panel Submittal when only a few are required.

G. System Calibration and Test Documentation Submittal

1. The Electrical Contractor shall submit an example of each type of Instrument Calibration Report and Loop Functional Test Report that will be used to verify that all preliminary calibration and testing has been performed and the system is considered, by the supplier, to be ready for testing.
2. After approval of the examples, the Electrical Contractor shall prepare Loop Functional Test Report(s) for each loop and an Instrument Calibration Sheet for each active element (except simple hand switches, lights, etc.). These sheets shall be completed and submitted to the Engineer after completion of the operational availability field tests.
3. An Instrument Calibration report shall be used to certify that each instrument requiring calibration has been calibrated to its published specified accuracy shall be submitted to the Engineer. This report shall include all applicable data as listed below plus an area to identify any defects noted, corrective action required, and corrections made. This report shall include:
 - i. Facility identification (Name, location, etc.)
 - b. Loop identification (Name or function)
 - c. Scale ranges and units
 - d. Actual readings at 0, 10, 25, 50, 75, 90 and 100 percent of span
 - e. Tester's certification with name and signature
4. Upon completion of all preliminary calibration and functional testing, the Electrical Contractor, shall submit a certified report for each control panel and its associated field instruments certifying that the equipment (1) had been properly installed under his or her supervision, (2) is in accurate calibration, (3) was placed in operation, (4) has been checked, inspected, calibrated, and adjusted as necessary, (5) has been operated under maximum power variation conditions and operated satisfactorily, and (6) is fully covered under the terms of the warranty.

1.05 STANDARDS

- A The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable state and local requirements. UL listing and labeling shall be adhered to under this Contract.
- B Any equipment that does not have a UL, FM CSA, or other approved testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that the equipment furnished has been manufactured in accordance with the National Electric Code and OSHA requirements.

- C Any additional work needed resulting from any deviation from codes or local requirements shall be at no additional cost to the OWNER.
- D Instrument Society of America (ISA) and National Electrical Manufacturers Association (NEMA) standards shall be used where applicable in the design of the Control System.
- E All equipment used on this project to test and calibrate the installed equipment shall be in calibration at the time of use. Calibration shall be traceable to National Institute of Standards (NIS - formally NBS) calibration standards.

1.06 TESTS

- A. The Hardware Supplier shall test all items individually and as a system for proper operation.
- B. The Hardware Supplier shall, at his expense, make all the requisite repairs, adjustments and/or alterations to correct any shortcomings found as a result of the tests performed under Item 1.03.B.7 above.
- C. A representative of the County shall be present during all testing. The County shall be notified at least five (5) days prior to any testing.

1.07 GUARANTEES AND WARRANTIES

- A. All items furnished under the Electrical Specifications shall be guaranteed and/or warranted, in writing, against defects in materials, construction and workmanship as specified under Section 01740 of these Specifications.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. All SCADA System equipment shall produce or be activated by signals, which are established standards for the water and wastewater industries. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission. No zero based signals will be allowed.
- B. All equipment and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The System shall contain products of a single MANUFACTURER, insofar as possible, and shall consist of equipment models that are the latest design currently in production.
- C. All equipment shall be designed to operate on a 60-Hertz alternating current power source at a normal 120 volts, plus or minus 10 percent, except where specifically noted. All regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.
- D. Materials and equipment used shall be U.L. approved wherever such approved equipment and materials are available.

- E. All SCADA System equipment shall be designed and constructed so that in the event of a power interruption, the equipment shall resume normal operation without manual resetting when power is restored.

2.02 MATERIALS

A. Pump Back Station Pump Control Cabinet:

1. Enclosure: 48" x 36" x 16", NEMA 4X, 316 Stainless Steel enclosure powder coated white with 3-point latching system and door stop kit. Hoffman A48H3616SS6LP3PT. Provide Stainless Steel backpanel Hoffman A48P36SS6.
2. Cabinet Light and Switch: Provide 24V DC LED cabinet light Hoffman LED24V15. Provide custom bracket to mount fixture to backpanel if required. Remote door switch and associated door switch cable shall be Hoffman ALFSWD.
3. Exhaust Grilles: Provide 6" x 6" Stainless Steel exhaust grilles as required. Hoffman TEP6SS.
4. PLC Components: PLC Processor, Allen Bradley 1769-LI18ER-BB1B; Point I/O current input analog module, Allen Bradley 1734-IE4C; 24VDC Point I/O mounting base, Allen Bradley 1734-TB.
5. Normal power fail relay: Provide Square D Class 8501, type R relay with 10A contact and 120V AC coil.
6. Cat 6 Surge Protection Devices: Provide Phoenix Contact Part Number #2858991.
7. Ethernet Switch: Provide Phoenix Contact Part Number #2891929.
8. 120VAC-24VDC Power Supplies: Provide Allen Bradley 1606-XLE80E and Phoenix Contact Part Number #2866750 as indicated on the drawings.
9. Incoming 120V AC power surge protection devices: Provide Phoenix Contact Part Number #2905228.
10. Circuit Breakers: Provide 120V AC, single pole, 15A circuit breakers Allen Bradley 1489-M1C150.
11. Fused terminal blocks: Provide fused terminal blocks with led indicator, 24V DC Square D AB1FUSE435U5XB. Provide fuses for terminal blocks. Each fuse shall be Bussmann 5 x 20mm GMC series. Refer to drawings for required amperages.
12. Terminal Blocks: Provide Automation Direct Part Number DN-T10B-A or equal.
13. Thermal Circuit Breakers: Provide thermal circuit breakers rated for 120V AC. Automation Direct DN-SUPP-2-1. Provide each breaker with an Automation Direct DN-FE EURO F series socket. Refer to drawings for amperages required.
14. Duplex Receptacles: Provide duplex receptacles rated for 20A, 120V AC Phoenix Contact #5600525.

15. Analog Isolator Power: Provide power terminal block MINI MCR-SL-PTB for analog isolators. Phoenix Contact Part Number #2864134. Provide din rail bus connectors as required, Phoenix Contact #2869728.
16. Analog Isolator: Analog Isolators shall be Phoenix Contact MINI MCR-2-RPSS-I-I, Phoenix Contact Part Number #2902014. Refer to loop diagrams on drawings for wiring connections based on transmitter type.
17. Analog surge protection devices: Provide Phoenix Contact PT 2x2-24DC-ST, Part Number #2838228 with base element PT 2x2-BE, Phoenix Contact Part Number #2839208 for each unit.
18. Uninterruptible Power Supply (UPS): Provide APC Pro 700, 120V AC output, 700VA available power. APC BR700G.
19. Radio: Provide ECR Orbit 900 Mhz radio, GE DSECRU91NNNNNS1S1USUNNN.
20. Coaxial Cable Protection: Provide 698-2700 Mhz coaxial cable protection ipolyphaser tsx-nff. Include single barrel one-hole copper grounding lug, Panduit HL1-25-X. Provide custom 2"W X 5"L x 1/4"D copper grounding plate.
21. Equipment Ground Bar System: Provide Panduit UGB2/0-414-18. Provide with bonding standoffs, Panduit UGB-B-S0.
22. Signal Ground Bar System: Provide Panduit UGB2/0-414-12. Provide with isolation standoffs, Panduit UGB-IN-S0.
23. Wiring Duct: Provide 2" x 3" slotted wiring duct Panduit G2X3LG6.

B. Antenna Subsystem

1. The contractor shall provide a radio survey to obtain the required gain, direction and height of the antenna at the new Pump Back Station. The Master Radio Station is located at the SEWRF Administration Building. The antenna shall be used to transmit and receive data from the associated Pump Back Station to the Master Radio Station.
2. The antenna shall be supported on a mast/pole and have DC grounding for lightning protection. The antenna mast/pole shall be hot dipped galvanized for corrosion protection. All mounting hardware shall be made of stainless steel. The mast shall meet or exceed the quality and reliability of units manufactured by Rohn (height to be determined by the Contractor). The coax cable shall be the type that utilizes an inert semi-liquid compound to flood the copper braid. The coax cable shall meet or exceed the quality, reliability and performance of VB-8 manufactured by DB Products, Inc. of Dallas, Texas. Type N connectors shall be utilized at both ends of the coax. The Type N connectors shall be sealed with 3 inch sections of Alpha FIT321-1-0 sealant shrink tubing. The coax cable shall be secured to the mast/pole with E.V.A.-coated 316 stainless steel cable ties. The cable ties shall meet or exceed the quality, reliability and performance of AE112 cable ties manufactured by Band-It. The antenna shall be constructed with heavy-wall tubing elements and large, rugged-machined aluminum blocks for the boom-to-element junctions. The antennas shall meet or exceed the

quality, reliability and performance of the PLC-4510N manufactured by Cushcraft/Signals of Manchester, New Hampshire. The antenna/tower shall be designed to meet 150 MPH wind loading without damage. Sealed engineering drawings from a Florida professional engineer shall be submitted to the Engineer to verify the design. The contractor shall coordinate all grounding requirements with the supplier.

PART 3 EXECUTION

3.01. PRODUCT HANDLING

- A. Store and protect equipment until installation following the storage and handling instructions recommended by the equipment manufacturers. Place special emphasis on proper anti-static protection of sensitive equipment.
- B. Protection During Construction: Throughout this Contract, provide protection for materials and equipment against loss or damage and from the effects of weather. Prior to installation, store items in indoor, dry locations. Provide heating in storage areas for items subject to corrosion under damp conditions. Provide covers for panels and other elements that may be exposed to dusty construction environments.
- C. Corrosion Protection: Protect all consoles, panels, enclosures, and other equipment containing electrical or instrumentation and control devices, including spare parts, from corrosion through the use of corrosion-inhibiting vapor capsules. Prior to shipment, include capsules in the shipping containers, and equipment as recommended by the capsule manufacturer. During the construction period, periodically replace the capsules in accordance with the capsule manufacturer's recommendations. Replace all capsules just prior to Final Acceptance.
- D. ESD Protection: Provide for the proper handling, storage, and environmental conditions required for the components deemed static sensitive by the equipment manufacturer. The components of the SCADA System shall be protected in particular. Utilize anti-stat wrist straps and matting during installation of these items to prevent component degradation.
- E. Adequately pack manufactured material to prevent damage during shipping, handling, storage and erection. Pack all material shipped to the project site in a container properly marked for identification. Use blocks and padding to prevent movement.
- F. Ship materials that must be handled with the aid of mechanical tools in wood-framed crates.
- G. Ship all materials to the project site with at least one layer of plastic wrapping or other approved means to make it weatherproof. Anti-stat protection shall be provided for all sensitive equipment.
- H. Inspect the material prior to removing it from the carrier. Do not unwrap equipment until it is ready to be installed. If any damage is observed, immediately notify the carrier so that a claim can be made. If no such notice is given, the material shall be assumed to be in undamaged condition, and any subsequent damage that is discovered shall be repaired and replaced at no additional expense to the OWNER.

- I. The Contractor shall be responsible for any damage charges resulting from the handling of the materials.

3.02. INSTALLATION

- A. Install materials and equipment in a workmanlike manner utilizing craftsmen skilled in the particular trade. Provide work, which has a neat and finished appearance. Coordinate work with the OWNER and work of other trades to avoid conflicts, errors, delays, and unnecessary interference with operation of the existing plant during construction.
- B. Provide finish on instruments and accessories that protects against corrosion by the elements in the environment in which they are to be installed. Finish both the interior and exterior of enclosures. Provide extra paint of each color used in the material from the manufacturer for touch-up purposes.
- C. Ground each analog signal shield on one end at the receiver end only. Properly ground all surge and transient protection devices. Coordinate grounding system with Division 16, Electrical.
- D. For the purposes of uniformity and conformance to industry standard, provide analog signal transmission modes of electronic 4-20 ma DC. No other signal characteristics are acceptable.
- E. Fully isolate outputs for transmitted electronic signals between transmitters and receivers, equipment of different manufacturers and between control panels to conform to ISA Standard S 50. 1.
- F. Discrete signal are two-state logic signals. Use 120V ac sources on all discrete signals unless otherwise noted or shown.
- G. Surge Protection: Provide appropriately sized electrical transient protection devices for all electrical elements of the system to protect the SCADA System equipment and equipment which interfaces with the SCADA System from transient surges in power and signal wiring (from lightning and other ground potential differences). Locate and properly ground surge suppressors at: any connection between power sources and electrical equipment including panels, assemblies, and field devices; and at both ends of all analog signal circuits.

3.03. TESTING

- A. All elements of the SCADA System shall be tested to demonstrate that the total system satisfies all of the requirements of the Contract Documents
- B. As a minimum, the testing shall include shop tests, operational check-out tests, and Demonstration Tests.
- C. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and, upon the system producing the correct result (effect), the specific test requirements will have been satisfied.

- D. All tests shall be conducted in accordance with, and documented on, prior approved procedures, forms, and checklists. Each specific test to be performed shall be described and a space provided after it for signoff by the appropriate party after its satisfactory completion. Copies of these signoff test procedures, forms, and checklists will constitute the required test documentation.
- E. Provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment, and data, provide suitable means of simulation. Define these simulation techniques in the test procedures.
- F. The Electrical Contractor shall coordinate all of their testing with the SYSTEMS INTEGRATOR, the ENGINEER, all affected suppliers, and the OWNER.
- G. The SYSTEMS INTEGRATOR shall reserve the right to test or retest any and all specified functions whether or not explicitly stated in the approved test procedures. The SYSTEM INTEGRATOR's decision shall be final regarding the acceptability and completeness of all testing.

END OF SECTION

DIVISION 15 MECHANICAL

SECTION 15094 PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals and install pipe hangers, supports, concrete inserts and anchor bolts including all metallic hanging and supporting devices for supporting exposed piping.

1.02 QUALIFICATIONS

- A. Hangers and supports shall be of approved standard design where possible and shall be adequate to maintain the supported load in proper position under all operating conditions. The minimum working factor of safety for pipe supports shall be five (5) times the ultimate tensile strength of the material.

Note: Lift Stations have their own pipe support hanger and support design and detail, shown in the Utility Standards if not shown on the plans.

- B. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the Contractor shall submit a certification stating that such requirements have been complied with.

1.03 SUBMITTALS

- A. Submit to the County for approval, as provided in the Contract Documents, shop drawings of all items to be furnished under this Section.
- B. Submit to the County, for approval, samples of all materials specified herein.
- C. All pipe hangers, supports, hanger rods, clamps, concrete inserts and wall brackets, etc., whether specified or not, shall be submitted (together with load calculations) to the County for approval, if requested.

PART 2 PRODUCTS

2.01 GENERAL

- A. All pipe and tubing shall be supported as required to prevent significant stresses in the pipe or tubing material, valves, and fittings and to support and secure the pipe in the intended position and alignment. All supports shall be designed to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe, and personnel contact. All pipe supports shall be approved prior to installation.
- B. All materials used in manufacturing hangers and supports shall be capable of meeting the respective ASTM Standard Specifications with regard to tests and physical and chemical

properties, and be in accordance with MSS SP-58.

- C. Hangers and supports shall be spaced in accordance with ANSI B31.1.0 except that the maximum unsupported span shall not exceed 10 feet unless otherwise specified herein.
- D. Unless otherwise specified herein, pipe hangers and supports shall be as manufactured by Grinnell Co., Inc., Carpenter and Patterson, Inc., or equal. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary. Any item comparable in type, style, quality, design and performance will be considered for approval.

2.02 PIPE HANGERS AND SUPPORTS FOR METAL PIPE

- A. Suspended single pipes shall be supported by hangers suspended by steel rods from galvanized concrete inserts, beam clamps, or ceiling mounting bolts.

The following sizes are minimum requirements and are subject to the County's approval:

- 1. Hanger rods shall be rolled steel machine threaded with load ratings conforming to ASTM Specifications and the strength of the rod shall be based on root diameter. Hanger rods shall have the following minimum diameters:

<u>Pipe Size, Inches</u>	<u>Min. Rod Diameter, In.</u>
Less than 2-1/2	3/8
2-1/2 through 4	1/2
4	5/8
6	3/4
8-12	7/8
14-18	1
20-30	1-1/4
Above 30	See SPECIAL SUPPORTS Paragraph 2.04

- 2. Where applicable, structural attachments shall be beam clamps. Beam clamps, for rod sizes 1/2-inch through 3/4-inch shall be equal to Grinnell Fig. No. 229, and for rod sizes 7/8-inch through 1-1/4 inches shall be equal to Grinnel Fig. No. 228, or equal.
- 3. Concrete inserts for pipe hangers shall be continuous metal inserts designed to be used in ceilings, walls or floors, spot inserts for individual pipe hangers, or ceiling mounting bolts for individual pipe hangers and shall be as manufactured by Unistrut Corp., Wayne, Michigan; Carpenter and Patterson, Inc., Laconia, New Hampshire; Richmond or equal and shall be as follows:
 - a. Continuous concrete inserts shall be used where applicable and/or as shown on the Drawings and shall be used for hanger rod sizes up to and including 3/4-inch diameter. Inserts to be used where supports are parallel to the main slab reinforcement shall be Series P3200 by Unistrut Corp., Fig. 1480 Type 2 by Carpenter and Patterson, Inc. or equal. Inserts to be used where supports are perpendicular to the main slab reinforcement shall be Series P3300 by Unistrut Corp., Fig. 1480 Type I by Carpenter and Patterson, Inc., or equal.
 - b. Spot concrete inserts shall be used where applicable and shall be used for hanger sizes up to and including 7/8-inch diameter. Inserts shall be Fig. 650 by Carpenter and Patterson, Inc. for hanger rod sizes 1/2-inch through and

- including 3/4-inch and Fig. 266 by Carpenter and Patterson, Inc., for 7/8-inch hanger rods.
- c. Ceiling mounting bolts shall be used where applicable and be for hanger rod sizes 1-inch through and including 1-1/4 inches shall be Fig. 104M as manufactured by Carpenter and Patterson, Inc. or equal.
 - d. All pipe hangers shall be capable of vertical adjustment under load and after erection. Turnbuckles, as required and where applied, shall be equal to Grinnell Fig. No. 230.
4. Wall or column supported pipes shall be supported by welded steel brackets equal to Grinnell Fig. 194, 195 and 199 as required, for pipe sizes up to and including 20-inch diameter. Additional wall bearing plates shall be provided where required.
 - a. Where the pipe is located above the bracket, the pipe shall be supported by an anchor chair and U-bolt assembly supported by the bracket for pipes 4-inches and larger or by a U-bolt for pipes smaller than 4-inches. Anchor chairs shall be equal to Carpenter & Patterson Fig. 127. U-bolts shall be equal to Grinnell Fig. 120 and 137.
 - b. Where the pipe is located below the bracket, the pipes shall be supported by pipe hangers suspended by steel rods from the bracket. Hangers and steel rods shall be as specified above.
 - c. Wall or column supported pipes 2-inches and smaller may be supported by hangers equal to Carpenter and Patterson Figures 74, 179 or 237 as required.
 5. Floor supported pipes 3-inches and larger in diameter shall be supported by either cast-in-place concrete supports or adjustable pipe saddle supports as directed by the County. In general, concrete supports shall be used when lateral displacement of the pipes is probable (unless lateral support is provided), and adjustable pipe saddle type supports shall be used where lateral displacement of the pipes is not probable.
 - a. Each concrete support shall conform to the details shown on the Drawings. Concrete shall be poured after the pipe is in place with temporary supports. Top edges and vertical corners of each concrete support shall have 1-inch bevels. Each pipe shall be secured on each concrete support by a wrought iron or steel anchor strap anchored to the concrete with cast-in-place bolts or with expansion bolts. Where directed by the County, vertical reinforcement bars shall be grouted into drilled holes in the concrete floor to prevent overturning or lateral displacement of the concrete support. Unless otherwise approved by the County, maximum support height shall be five (5) feet.
 - b. Concrete piers used to support base elbows and tees shall be similar to that specified above.
Piers may be square or rectangular.
 - c. Each adjustable pipe saddle support shall be screwed or welded to the corresponding size 150 lb. companion flanges or slip-on welding flanges respectively. Supporting pipe shall be of Schedule 40 steel pipe construction. Each flange shall be secured to the concrete floor by a minimum of two (2) expansion bolts per flange. Adjustable saddle supports shall be equal to Grinnell Fig. No. 264. Where used under base fittings, a suitable flange shall be substituted for the saddle.
 - d. Floor supported pipes less than 3-inches shall be supported by fabricated steel supports.
 6. Vertical piping shall be supported as follows:
 - a. Where pipes change from horizontal to vertical, the pipes shall be supported on the horizontal runs within two feet of the change in direction by pipe supports as previously specified herein.

- b. For vertical runs exceeding 15 feet, pipes shall be supported by approved pipe collars, clamps, brackets, or wall rests at all points required to insure a rigid installation.
- c. Where vertical piping passes through a steel floor sleeve, the pipe shall be supported by a friction type pipe clamp which is supported by the pipe sleeve. Pipe clamps shall be equal to Grinnell Fig. 262.
- 7. Anchor bolts shall be equal to Kwik-Bolt as manufactured by Hilti Fastening Systems, Tulsa, Oklahoma or Wej-it manufactured by Wej-it Expansion Products, Inc., Bloomfield, Colorado.
- 8. All rods, hangers, inserts, brackets, and components shall be furnished with galvanized finish.

2.03 PIPE HANGERS AND SUPPORTS FOR PLASTIC PIPE

- A. Single plastic pipes shall be supported by pipe supports as previously specified herein.
- B. Multiple, suspended, horizontal plastic pipe runs, where possible, and rubber hose shall be supported by ladder type cable trays such as the Electray Ladder by Husky-Burndy, the Globetray by the Metal Products Division of United States Gypsum, or equal. Ladder shall be of mild steel construction. Rung spacing shall be approximately 18 inches for plastic pipe and 12 inches for rubber hose. Tray width shall be approximately 6-inch for single runs of rubber hose and 12 inches for double runs of rubber hose. Ladder type cable trays shall be furnished complete with all hanger rods, rod couplings, concrete inserts, hanger clips, etc. required for a complete support system. Individual plastic pipes shall be secured to the rungs of the cable tray by strap clamps or fasteners equal to Globe Model M-CAC, Huskey-Burndy Model SCR or equal. Spacing between clamps shall not exceed 9 feet. The cable trays shall provide continuous support along the length of the pipe.
- C. Individual clamps, hangers, and supports in contact plastic pipe shall provide firm support, but not so firm as to prevent longitudinal movement due to thermal expansion and contraction.

2.04 SPECIAL SUPPORTS

- A. The pipes shall be supported by means of a supporting framework suitably anchored into the floor or curbing. The vertical piping shall be suitably secured to horizontal support members connected at each end to vertical support members and spaced as required to provide a rigid installation.
 - 1. The complete supporting system shall be as manufactured by the Unistrut Corporation, Globe-Strut as manufactured by the Metal Products Division of U.S. Gypsum, or equal.
 - 2. Vertical and horizontal supporting members shall be U-shaped channels similar to Unistrut Series P1000. Vertical piping shall be secured to the horizontal members by pipe clamps or pipe straps equal to Unistrut Series P1100M and Series P2558. All components shall be of mild steel.
 - 3. The assemblies shall be furnished complete with all nuts, bolts, and fittings required for a complete assembly.
 - 4. The design of each individual framing system shall be the responsibility of the Contractor. Shop drawings shall be submitted and shall show all details of the installation including dimensions and types of supports.

- B. Any required pipe supports for which the supports specified in the Section are not applicable, including pipe supports for above 30-inch pipe, shall be fabricated or constructed from standard aluminum shapes in accordance with Specifications, concrete and anchor hardware similar to items previous specified herein and shall meet the minimum requirements listed below and be submitted to the approval of the County.
 - 1. Pipe support systems shall meet all requirements of this Section and all related Sections of this Specification.
 - 2. Complete design details of the entire pipe support systems shall be provided by the Contractor, for approval by the County.
 - 3. The pipe support system shall not impose loads on the supporting structures, in excess of the loads for which the supporting structure is designed.
 - 4. Hanger rods for above 30-inch pipe shall be a minimum of 1-1/2 inch diameter and shall not exceed the manufacturer's standard maximum recommended safe load.
- C. Pipe supports in lift stations shall be as shown in the Utility Standards details.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All pipes, horizontal and vertical, shall be rigidly supported from the building structure by approved supports. Supports shall be provided at changes in direction and elsewhere as shown in the Drawings or specified herein. No piping shall be supported from other piping or from metal stairs, ladders, and walkways, unless it is so indicated on the Drawings, or specifically directed or authorized by the County.
- B. All pipe supports shall be designed with liberal strength and stiffness to support the respective pipes under the maximum combination of peak loading conditions to include pipe weight, liquid weight, liquid movement, and pressure forces, thermal expansion and contraction, vibrations, and all probable externally applied forces. Prior to installation, all pipe supports shall be approved by the County.
- C. Pipe supports shall be provided to minimize lateral forces through valves, both sides of split type couplings, and sleeve type couplings and to minimize all pipe forces to pump housings. Pump housings shall not be utilized to support connecting pipes.
- D. Pipe supports shall be provided as follows:
 - 1. Cast iron and ductile iron shall be supported at a maximum support spacing of 10 feet-0-inches with a minimum of one support per pipe section at the joints.
 - 2. Supports for multiple PVC pipes shall be continuous wherever possible. Individually supported PVC pipes shall be supported as recommended by the manufacturer except that support spacing shall not exceed five (5) feet.
 - 3. Support spacing for galvanized steel pipe and copper tubing shall not exceed five (5) feet.
 - 4. All vertical pipes shall be supported at each floor or at intervals of at least 15 feet by approved pipe collars, clamps, brackets, or wall rests and at all points necessary to insure rigid construction.

- E. Pipe supports shall not result in point loadings, but shall distribute pipe loads evenly along the pipe circumference.
- F. Effects of thermal expansion and contraction of the pipe shall be accounted for in pipe support selection and installation.
- G. Inserts for pipe hangers and supports shall be installed on forms before concrete is poured. Before setting these items, all drawings and figures shall be checked which have a direct bearing on the pipe locations. Responsibility for the proper location of pipe supports is included under this Section.
- H. Continuous metal inserts shall be embedded flush with the concrete surface.

3.02 PRIME COATING

- A. Prior to prime coating, all pipe hangers and supports shall be thoroughly clean, dry, and free from all mill-scale, rust, grease, dirt, paint, and other foreign substances to the satisfaction of the County.
- B. All submerged pipe supports shall be prime coated with TNEMEC 69-1211 Epoxy Primer or equal. All other pipe supports shall be prime coated with TNEMEC 66-1211, or equal.
- C. Finish coating shall be compatible with the prime coating used and shall be applied as specified in the Contract Documents.

END OF SECTION

DIVISION 16 ELECTRICAL

SECTION 16050 ELECTRICAL - GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, devices, equipment, appurtenances, and incidentals required for a complete electrical system as hereinafter specified and/or shown on the Contract Drawings. This work may necessarily include interfacing with and/or completely installing devices and/or equipment furnished under other sections of these Specifications.
- B. It is the intent of these Specifications that the electrical system be suitable in every way for the service required. All materials and all work/labor which may be reasonably implied as being incidental to the requirements of this Section shall be furnished at no additional cost to the County.
- C. All power interruptions to existing equipment shall be at the County's convenience. Each interruption shall have prior approval. Request(s) for power interruption(s) shall be made at least forty-eight (48) hours in advance.
- D. The work shall include complete testing of all electrical components, including wiring.
- E. All workmanship shall be of the highest quality. Substandard work will be rejected and it shall be replaced entirely at the Contractor's expense with no cost to the County.
- F. It shall be the responsibility of each bidder or his authorized representative to physically visit the job site in order that he may be personally acquainted with the area(s), buildings and/or structures intended for use in the installation/construction under this Specification. The submittal of a proposal/bid by a bidder shall be considered evidence that he has complied with this requirement and accepts all responsibility for a complete knowledge of all factors governing his work. Therefore, failure to comply with this requirement of the Specifications will NOT be grounds for the successful bidder (Contractor) to request approval of change orders and/or additional monetary compensation.

1.02 TEMPORARY ELECTRICAL SERVICE

- A. The Contractor shall make the requisite arrangements for securing temporary electrical power for his use in accordance with Section 01510 of these Specifications.

1.03 CODES, INSPECTIONS AND FEES

- A. All materials and installations shall be in accordance with the National Electrical Code (latest edition) and the latest editions of all applicable national, state, county and local codes.
- B. To the extent that any item is routinely tested and rated by the Underwriter's Laboratories, Inc., that item shall bear the U.L. label. Additionally, all items shall be manufactured to the applicable NEMA standards.
- C. The Contractor shall make the necessary arrangements for obtaining all requisite permits

and inspections and pay any applicable fees.

1.04 TESTS

- A. The Contractor shall test all items individually and as a system for proper operation.
- B. The Contractor shall, at his expense, make all the requisite repairs, adjustments and/or alterations to correct any shortcomings found as a result of the tests performed under Item 1.04.A above.
- C. A representative of the County shall be present during all testing. The County shall be notified at least two (2) days prior to any testing.

1.05 SLEEVES AND FORMS FOR OPENINGS

- A. Provide and place all sleeves for conduits penetrating floors, walls, partitions, etc. Locate all necessary slots for electrical work and form before concrete is poured.

1.06 CUTTING AND PATCHING

- A. All cutting and patching shall be done in a thoroughly workmanlike manner - i.e., care shall be taken when cutting not to damage or mar surrounding areas, and when patching to match the original finish as closely as possible while providing a watertight seal. Refer to Item 1.01.E above.

1.07 INTERPRETATION OF DRAWINGS

- A. The layouts and arrangements as shown on the Contract Drawings are indicative of the physical arrangements desired; however, they are not intended to restrict the Contractor's freedom to accommodate the exact conditions as found in the field. Any deviations from the arrangements shown must be approved by the County prior to the final placement of the item(s) in question.
- B. The Contract Drawings are not intended to show exact locations of conduit runs.
- C. Circuit and conduit layouts shown are not intended to indicate the exact installation details. The Contractor shall furnish and install all requisite items, including all fittings, junction boxes, etc., to insure that the electrical system operates in conformance with the Specifications and the specific requirements of an individual piece of equipment.
- D. Where circuits are shown as "home-runs", all necessary fittings and boxes shall be provided for a complete conduit installation.
- E. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Contract Drawings.
- F. Surface mounted items such as panelboards, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between the equipment and the mounting surface.
- G. The County shall make the final decision in determining the exact location(s) and mounting

height(s) of any item(s) or piece(s) of equipment in question.

- H. All connections to equipment shall be made in accordance with the approved shop and manufacturer's drawings, regardless of the number of conductors shown on the Contract Bid Drawings.
- I. The Contractor shall coordinate the work of the different trades in order to prevent interferences between conduit(s), piping and other non-electrical equipment. In case any interference develops, an authorized representative of the County shall decide which equipment, conduit(s) or piping must be relocated, regardless of which was installed first. Any such interferences shall be remedied solely at the Contractor's expense without any additional cost to the County.

1.08 EQUIPMENT SIZING AND HANDLING

- A. The Contractor shall thoroughly check all entryways, doors, hallways, stairways, buildings and structures through which equipment must be transported to reach its final location.
- B. If necessary for safe passage of the equipment, the manufacturer shall be required to ship his material in sections sized to pass through the restricted areas. This requirement holds even if such equipment sizing differs from the manufacturer's standard shipping section.
- C. To the extent possible, the equipment shall be kept upright at all times. If equipment has to be tilted for ease of passage through restricted areas, the manufacturer shall provide specific handling instructions as well as any requisite bracing in order to assure both the functional integrity of the equipment and the validity of the equipment warranty.

1.09 SUBMITTALS

- A. As specified under Section 01340 of these Specifications, the Contractor shall submit shop drawings and/or manufacturer's cut sheets for approval of all materials, equipment, devices, apparatus, and other items as required by the County.
 - 1. Prior to submittal by the Contractor, all shop drawings shall be checked for accuracy and Contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to the Specifications and Contract Drawings. This statement shall also list all discrepancies with the Specifications and Contract Drawings. Shop drawings not so checked and noted shall be returned unchecked by the County.
 - 2. The County's check shall be only for conformance with the design concept of the Project and compliance with the Specifications and Contract Drawings. The responsibility for, or the necessity of, furnishing materials and workmanship required by the Specifications and Contract Drawings which may not be indicated on the shop drawings is included under the work of this Section.
 - 3. No material shall be ordered, no equipment manufacturing shall be started, nor shall any shop work/fabrication commence until the County has approved the shop drawings. Any deviation from this requirement of the Specifications shall be entirely at the risk and expense of the Contractor without any additional cost to the County.

- B. Record Drawings: As the work progresses, the Contractor shall legibly record all field changes on a set of Contract Drawings. When the project is completed, the Contractor shall furnish the County with a complete set of reproducible "as-built" drawings.

1.10 MANUFACTURER'S SERVICES

- A. The Contractor shall arrange for an authorized manufacturer's representative who shall be an experienced field service engineer to be present for the inspection, installation, testing, calibration, adjusting and start-up of any item(s) or piece(s) of equipment as deemed necessary by the County.
- B. In addition to the duties of Item 1.11.A above, the manufacturer's representative shall also instruct the County's personnel in the proper operation and maintenance of the item(s) in question.

1.11 MATERIALS

- A. All materials used shall be new, unused and as hereinafter specified. Where not specifically called out, all materials shall be of the very best quality of their respective kinds. Unless specifically otherwise approved in writing by the County, only material manufactured in the United States shall be used!
- B. Where applicable, all materials and equipment shall conform with the requirements of Item 1.03.B above.
- C. Electrical equipment shall at all times during construction be adequately protected against both mechanical injury and damage by water. Electrical equipment shall be stored indoors in dry shelters. Any damaged equipment shall be replaced by the Contractor at his own expense.
- D. All items shall be manufactured from the materials specified - substitute materials will NOT be acceptable.
- E. Only the specified manufacturer's equipment shall be used unless an "or approved equal" is noted. The County shall be the sole determiner of what constitutes an "approved equal".

1.12 GUARANTEES AND WARRANTIES

- A. All items furnished under the Electrical Specifications shall be guaranteed and/or warranted, in writing, against defects in materials, construction and workmanship as specified under Section 01740 of these Specifications.

END OF SECTION

SECTION 16075 ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Requirements for providing materials for the identification of electrical equipment, components, conduits, cables and wiring, and furnishing and installing safety signs.
- B. Related Work Specified in Other Sections Includes:
 - 1. Section 16050 - Basic Electrical Materials and Methods

1.02 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ANSI C2 - National Electrical Safety Code (NESC)
 - 2. ANSI Z535.1 - Safety Color Code
 - 3. ANSI Z535.2 - Environmental and Facility Safety Signs
 - 4. ANSI Z535.3 - Criteria for Safety Symbols
 - 5. OSHA - Occupational Safety and Health Act

1.03 SUBMITTALS

- A. General: Furnish all submittals, including the following, as specified in the Specific/General Provisions.
- B. Product Data and Information: Furnish manufacturer's catalog data for safety signs, nameplates, labels and markers.
 - 1. Furnish manufacturer's instructions indicating application conditions and limitations of use; and storage, handling, protection, examination and installation of product.
- C. CONTRACTOR's Record Drawings: Furnish CONTRACTOR's record drawings accurately showing actual location of markers for underground ducts, handholes and manholes, at completion of the Project.

1.04 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle all products and materials as specified in the Specific/General Provisions.

1.05 SPARE PARTS

- A. General: Furnish the following spare parts.
 - 1. Ten safety signs of each size and wording.
- B. Packaging: Package spare parts in containers bearing labels clearly designating

contents. Identify all spare parts with information needed for reordering. Deliver spare parts in original factory packages.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers: Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for review.

1. W. H. Brady Company
2. Seton
3. Thomas & Betts

2.02 MATERIALS AND COMPONENTS

A. General: Provide identification materials listed and classified by UL or tested by an acceptable Electrical Testing Company certifying the equivalence of the materials to UL listing requirements and OSHA approved.

B. Laminated Plastic Nameplates: Provide engraved three layer laminated plastic nameplates with black letters on white background and fastened with corrosion-resistant screws. Do not use mounting cement for fastening nameplates.

1. Provide nameplates with 1-inch high lettering for motor control center, Methanol Pump Control Panels, automatic transfer switch, mini power-zone, panelboard, and similarly grouped equipment, transformers and disconnect switches.
2. Provide nameplates with 1/2-inch high lettering for individual components of a group such as main breakers, motor control center units and similar devices.
3. Provide nameplates for each motor identifying service or function and lettering of an appropriate size to suit each motor.
5. Provide approved laminated directories of circuits with typewritten designations of each branch circuit in each panelboard.
6. Provide smaller lettering for a neat, legible nameplate where the amount of lettering causes excessively large nameplates.

C. Wire Markers: Identify wire bundles and each individual wire.

1. Wire bundles: Provide a brass or rigid fiber identifying tag attached with nylon self locking "Ty-Raps".
2. Wire identification markers: Provide a printed white, heat-shrink, seamless tubing type with black bold lettering for wires size No. 10 AWG and smaller. Provide a printed self-laminating white, vinyl type with black bold lettering for wires No. 8 AWG and larger.

D. Safety Signs: Provide safety signs in accordance with OSHA standard meeting the

requirements of ANSI C2, ANSI Z535.1, ANSI Z535.2 and ANSI Z535.3.

1. Provide safety signs manufactured from vinyl having a minimum thickness of 60 mils with red and black letters and graphics on a white background.
2. Size: 10 inches by 14 inches except signs 7-inch by 10-inch may be provided where the larger size cannot be applied.
3. Mount safety signs using corrosion-resistant screws. Do not use mounting cement.

PART 3 EXECUTION

3.01 PREPARATION

- A. Surface Preparation: Degrease and clean surfaces to receive nameplates, labels and marking paint.

3.02 INSTALLATION

- A. General: Install nameplates on the front of equipment, parallel to the equipment lines and secured with corrosion resistant screws.
 1. Install laminated nameplates identifying:
 - a. Each electrical equipment enclosure
 - b. Individual equipment and devices
- B. Wire Markers: Identify wire bundles and each individual wire with identification tags as follows:
 1. Wire Bundles: Install an identifying tag engraved with the conduit number where conduits enter motor control centers, switchgear, switchboards, control panels, terminal boxes and the like.
 2. Wire identification markers: Provide wire identification markers on each wire at all termination points.
 - a. On power and lighting circuits: The branch circuit or feeder number as indicated on drawings
 - b. On control circuits terminated in motor control center, control panels and alike: The field device and terminal number of the opposite end connection.
 - c. On control circuits at each field device: The panel or compartment number and terminal number of the opposite end connection.
 3. Oversize wire markers so that after heat shrinking the wire marker can be rotated on the wire. Rotate wire markers so that wire identification number is visible.

END OF SECTION

SECTION 16108 MISCELLANEOUS EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish and install all miscellaneous equipment as hereinafter specified and/or shown on the Drawings.
- B. Installation shall be in the locations described herein and/or shown on the Drawings and/or where directed by Manatee County's authorized personnel.
- C. Section Includes: Requirements for providing, wiring devices and appurtenances as indicated, in accordance with the Contract Documents.

PART 2 PRODUCTS

2.01 MATERIALS

A. LIGHTING TOGGLE SWITCHES

- 1. Acceptable Manufacturers: Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for review.

Hubbell Inc. Wiring Device/Kellems Division
Pass and Seymour
Cooper Wiring Devices
Leviton
Appleton Electric Company
Crouse-Hinds Company
Thomas & Betts

- a. General: Provide toggle switches of specification grade rated 20- amperes, 120-277 volts ac conforming to Fed. Spec. WS 896 and UL Standard 20. Manufacture switches with back and side wired binding screw type terminals, one piece spring contact arm and terminal plate with silver alloy contacts, one piece steel mounting strap with an assured grounding clip, thermoset body color coded for identification by amperage and a brown toggle. Provide ivory toggles in finished areas.

b. Types:

DESCRIPTION	HUBBELL CAT. NO.
Single pole	HBL1221

B. CIRCUIT BREAKERS

1. The circuit breakers for mini-power zone shall be the molded case bolt-on type, shall have poles as indicated in the contract documents, shall be rated as indicated in the contract documents at 120/240 VAC and shall have an interrupting rating of 10,000-amperes. The circuit breakers shall be the Square "D" Catalog No. Q0B120 (or as required) with "VISI-TRIP" indicator for use on a Square "D" mini-power zone panelboard, NO SUBSTITUTIONS.

D. WET WELL FLOAT SWITCHES

1. Wet Well shall be provided with one (1) High level and one (1) Low level float switch. The Float Switches shall have the following specifications:
 - a. Shall be hermetically sealed
2. The Float Switches Level Transmitters shall be BW Controls Series 7010 or approved equal.

E. WET WELL LEVEL TRANSMITTER

1. Level transmitter shall output shall be 4-20mA via 2 wire 24V DC (loop powered).
2. Level transmitter shall be provided with 2" DN50 horn antenna.
3. Level transmitter shall be Nivelco Integrated PiloTrek Radar type, Model # WPP-15N-4 rated for a Class I, Division 2 location.

F. BIOSOLIDS BUILDING MCC-1 MAIN CIRCUIT BREAKER

1. Motor Control Center Details
 - a. Power System Type: Wye, 3-phase, 3-wire with solidly grounded neutral
 - b. Voltage: 480 Volts / 60 Hertz
 - c. Available Fault Current: 42,001 to 50,000 A
 - d. Unit Nameplate Type: Acrylic - Black letters on white - Stainless Steel Screws
 - e. Wiring Type: B-T Control and Power Terminal Blocks
 - f. Wiring Diagram Location: Within each unit
 - g. IntelliCENTER Network: DeviceNet

2. Incoming Line Details
 - a. MCC Connection Type: Main Circuit Breaker
 - b. Incoming Line Cable Entry: Bottom Mounted
3. Bus Details
 - a. Main Bus Rating: 1600A
 - b. Main Bus Material: Copper / Tin Plated Main Bus
Bracing: 65kA (rms symmetrical) Insulated Bus: None Selected
 - c. Horizontal Ground Bus Size: 1/4" X 1"
 - d. Horizontal Ground Bus Plating: Unplated
 - e. Copper Horizontal Ground Bus Location: Bottom
 - f. Vertical Ground Bus Type: Plug-in Zinc Plated Steel
Incoming Ground Lug Size: #6 AWG - 250 kcmil (2 Supplied as Standard)
 - g. Incoming Ground Cable Size: #4/0 AWG
4. Enclosure Details
 - a. Enclosure Type: 1G - with Gasketed Doors. Bottom Plates Included
 - b. NEMA 3R/4 Lifting Angle: No
 - c. Section Depth: Front Mounted, 20" Deep
 - d. Section Height: 90" High
 - e. Stab Opening Protection: Automatic Shutters
 - f. External Mounting Channel: Yes
 - g. Total Shipping Block(s): 1
 - h. Total Section(s): 1
 - i. Total Unit(s): 1
5. Network Information
 - a. Network Cabling: Yes
 - b. Network Node Addressing: Yes
 - c. IntelliCENTER® Software: No
 - d. Number of Network(s): 1
 - e. NETWORK 01 Network 01
 - f. Network Speed: 500 kbps
 - g. Total Number of Network Node(s): 0

- on top, front and back. Provide aluminum backplate (and stiffeners if required).
- B. Cabinet Light: Provide 120V AC cabinet lights Hoffman LEDA1S35. Provide custom bracket to mount fixture to backpanel if required.
 - C. Cabinet Fans: Provide UL type 12, 368 CFM, 115V, 50/60 HZ with filter. Pfannenberg PF 67000-11667154055.
 - D. Cabinet Exhaust Filters: Provide Pfannenberg PFA 6000-11740004055.
 - E. Washdown Shrouds: Provide Stainless Steel washdown shrouds Pfannenberg PF-RH-60000-1818200020
 - F. IEEE 519 compliant filter to be provided by ICON technologies
 - G. Output Filters: Provided by ICON Technologies
 - H. Cat 6 Surge Protection Devices: Provide Phoenix Contact Part Number #2858991.
 - I. Incoming 120V AC power surge protection devices: Provide Phoenix Contact Part Number #2905228.
 - J. Circuit Breaker: Provide power circuit breakers 120V, 5 ampere Allen Bradley type 1489M.
 - K. Control Relays: Provide fan control relays 10A contacts with 120V AC coils. Square D class 8501, type R.
 - L. Receptacle: Provide duplex GFI receptacle, 120V AC, 20A. Hubbell GFR5352IA.
 - M. Terminal Blocks: Provide Automation Direct Part Number DN-T10B-A or equal.
 - N. Equipment Ground Bar System: Provide Panduit UGB2/0-414-18. Provide with bonding standoffs, Panduit UGB-B-S0.
 - O. Wiring Duct: Provide 2" x 3" slotted wiring duct Panduit G2X3LG6.
 - P. For Variable Frequency Drive (VFD) requirements and ancillary devices refer to Section 16370 of these specifications.
 - Q. The Motor Control Cabinet shall be fabricated and provided by ICON Technologies.

PART 3 EXECUTION
(NOT USED)

END OF SECTION

SECTION 16110 CONDUITS AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish and install the conduits, fittings, devices and appurtenances as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

The requirements of Section 01340 and Section 16050 shall be met.

1.03 APPLICATIONS

- A. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all wiring shall be run in rigid conduits.
- B. PVC Sch 80 or rigid aluminum conduits shall be used at all locations aboveground and within structures and buildings, except where otherwise shown on the Contract Drawings.
- C. PVC Sch 80 or rigid aluminum conduits shall be used at all locations for shielded instrumentation and shielded control wiring, except where otherwise shown on the Contract Drawings.
- D. Schedule 80 PVC conduits shall be used for all underground, under-slab and in-slab applications except where otherwise shown on the Contract Drawings.
- E. Schedule 80 PVC conduits shall be used in highly corrosive areas such as chlorine storage areas, digesters, fluoride storage and handling areas, etc.
- F. All conduits of a given type shall be the product of one manufacturer.
- G. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all boxes shall be metal.
- H. Flush mounted switch, receptacle and control station boxes shall be pressed steel.
- I. Surface mounted switch, receptacle and control station boxes shall be cast or malleable iron.
- J. Devices designated as NEMA Type 4 shall be 316 stainless steel, gasketed.
- K. Devices designated as NEMA Type 4X shall be fiberglass, gasketed, except as otherwise shown on the Contract Documents.
- L. Combination expansion-deflection fittings shall be used where conduits cross structural expansion joints.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Rigid Conduit
 - 1. Rigid aluminum conduit shall be approved equal.
 - 2. Rigid PVC conduit shall be Carlon Plus 80 rigid PVC non-metallic conduit (extra heavy wall EPC-80) as manufactured by Carlon, or approved equal.

- B. Liquidtight, Flexible Conduit
 - 1. Liquidtight, flexible metal conduits shall be Sealtite, Type UA, as manufactured by Anaconda, American Flexible Conduit Co., Inc., or approved equal.
 - 2. Liquidtight, flexible non-metallic conduits shall be Carflex Liquidtight Flexible Non-Metallic Conduit as manufactured by Carlon, or approved equal.

- C. Rigid Conduit Fittings
 - 1. Rigid Aluminum Conduit Fittings:
 - a. Aluminum elbows, bends, sweeps, nipples, couplings, etc., approved equal.
 - 2. Rigid Non-Metallic Conduit Fittings: PVC elbows, bends, sweeps, nipples, couplings, device boxes, etc., shall be Plus 80 fittings as manufactured by Carlon, or approved equal.

- D. Flexible Conduit Fittings
 - 1. Flexible Metal Conduit Fittings: Fittings used with flexible metal conduit shall be of the screw-in type as manufactured by Thomas and Betts Company, or approved equal.
 - 2. Flexible Non-Metallic Conduit Fittings: Fittings used with flexible non-metallic conduit shall be Carflex Liquidtight Non-metallic Fittings as manufactured by Carlon, or approved equal.

- E. Flexible Couplings: Flexible couplings shall be as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.

- F. Wall Seals: Conduit wall seals shall be type "WSK" as manufactured by the O.Z. Electrical Manufacturing Company, or approved equal.

- G. Expansion Fittings: Combination expansion-deflection fittings shall be type "XD" as manufactured by Crouse-Hinds, or approved equal.

- H. Boxes
 - 1. Device Boxes
 - a. Flush mounted wall device boxes shall be galvanized pressed steel as manufactured by the Raco Manufacturing Company, or approved equal.
 - b. Surfaced mounted wall device boxes shall be cast or malleable iron as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.
 - c. Flush mounted in-floor device boxes shall be cast metal, shall be watertight, shall have adjustable cover frames, and shall be as manufactured by Russell & Stoll Company, Steel City Electric, or approved equal.
 - 2. Other Boxes

- a. Terminal boxes, junction boxes, pull boxes, etc., except as otherwise specified and/or shown on the Contract Drawings, shall be PVC or 316 S.S.
 - b. The boxes shall have continuously welded seams and shall be ground smooth.
 - c. The box bodies shall be flanged, shall be not less than 14-gauge metal, and shall not have holes or knockouts.
 - d. The box covers shall be not less than 12-gauge metal, shall be gasketed, and shall be fastened to the box bodies with stainless steel screws.
- I. Conduit Mounting Devices: Hangers, rods, channel, backplates, clips, straps, beam clamps, etc., shall be 316 stainless steel as manufactured by Unistrut Corp., or approved equal.
 - J. Fixture Support System
 - 1. The fixture support system shall be the channel type and shall be furnished complete with all requisite mounting hardware and appurtenances.
 - 2. The channel, mounting hardware and related appurtenances shall be 316 stainless steel.
 - 3. The fixture support system shall be as manufactured by the Unistrut Corp., or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. No conduit smaller than 3/4-inch electrical trade size shall be used nor shall either 1-1/4-inch conduit or 3-1/2-inch conduit be used. Minimum size underground, under slab or in-slab shall be 1-inch.
- B. No wires shall be pulled until the individual conduit runs are complete in all details. Additionally, each conduit shall be cleaned and reamed and certified clear of all burrs and obstructions before any wire is pulled.
- C. The ends of all conduits shall be tightly capped to exclude dust and moisture during construction.
- D. Conduits shall be supported at intervals of 8-feet or less, as required to obtain a rigid installation.
- EF. Exposed conduits shall be run parallel with and/or perpendicular to the surrounding surface(s). No diagonal runs will be allowed.
- F. Single conduits shall be supported by one-hole pipe clamps in combination with one-screw backplates to provide space between the conduits and the mounting surface.
- G. Multiple horizontal runs of conduits shall be supported by trapeze type hangers (channel) suspended by threaded rod, 3/8-inch minimum diameter.
- HI. Multiple vertical runs of conduits shall be supported by structurally mounted channel in combination with conduit clamps.
- I. Conduit support devices shall be attached to structural steel by welding or beam or channel clamps as indicated on the Contract Drawings.

- J. Conduit support devices shall be attached to concrete surfaces by "spot type" concrete inserts.
- K. Conduits terminating in pressed steel boxes shall have double locknuts and insulated bushings.
- L. Conduits terminating in gasketed enclosures shall be terminated with conduit hubs.
- M. Conduit wall seals, waterproof type, shall be used at all locations where conduits penetrate walls.
- N. Liquidtight, flexible conduit - metal or non-metallic as shown on the Contract Drawings - shall be used for all motor terminations and for all connections/terminations where vibration is anticipated.
- O. Flexible couplings shall be used in hazardous locations for all motor terminations and for all connections/terminations where vibration is anticipated.
- P. Conduit stubouts for future construction shall be capped at both ends with threaded PVC conduit caps.
- Q. The cement used for PVC conduit installations shall be as manufactured by Carlon, or approved equal.
- R. Rigid aluminum conduits entering manholes and/or below grade pull boxes shall be terminated with grounding type bushings which shall be connected to a 5/8-inch by 10-foot long driven ground rod with No. 6 AWG bare copper wire.
- S. Rigid aluminum conduit shall be used for all risers. The underground portion of the riser and a 12-inch section of the riser immediately above the ground or slab/floor level shall be painted with a bitumastic coating.
- T. The use of electrical metallic tubing shall be restricted to low voltage applications (600V or less) in non-process areas where specifically approved by the County on a "per installation" basis - e.g., above suspended ceilings in office areas.

3.02 GUARANTEES AND WARRANTIES

The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16120 WIRES AND CABLES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish and install all wires, cables and appurtenances as described hereinafter and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

- A. The requirements of Section 01340 and Section 16050 shall be met.
- B. Samples of the actual wires and cables proposed for use shall be submitted for approval. There shall be a sample for each size and type of wire and cable proposed for use. The samples shall be of sufficient length to show the maximum rated voltage, insulation type and class, conductor size, the manufacturer's name, trademark or identifying logo, and the U.L. listing number.
- C. The wires and cables as approved for use shall be compared with the wires and cables actually installed. If any unapproved wires and cables are installed, they shall be removed and replaced solely at the Contractor's expense with no additional cost to the County.

1.03 APPLICATIONS

- A. The wire for lighting and receptacle circuits shall be type THHN/THWN, stranded.
- B. The wire for all power circuits and motor leads shall be type THHN/THWN, stranded.
- C. Single conductor wires for control, indication and metering shall be type THHN/THWN, No. 14 AWG, stranded.
- D. Multiconductor control cable shall be No. 14 AWG, stranded.
- E. The wire for process instrumentation shall be No. 16 AWG, stranded.

1.04 MINIMUM SIZES

- I. Except for control and signal leads, no conductor smaller than No. 12 AWG shall be used.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Wire and cables shall be made of annealed, 98% conductivity, soft drawn copper conductors.
- B. All conductors shall be stranded except that the uninsulated copper grounding conductors shall be solid.

2.02 600 VOLT WIRE AND CABLE

- A. Type THHN/THWN insulation shall be used for all 600 Volt wires and cables. The insulation

shall be a flame-retardant, heat-resistant thermoplastic, and shall have a nylon, or equivalent, jacket.

- B. The 600 Volt wires and cables shall be as manufactured by Anixter, Rome Cable, Southwire, or approved equal.

2.03 INSTRUMENTATION AND CONTROL WIRING

- A. Process instrumentation wiring shall be No. 16 AWG stranded twisted pair, 600 Volt, cross-linked polyethylene insulated, aluminum tape shielded, PVC jacketed. Multiconductor cables with individually twisted pairs shall be installed where shown on the Contract Drawings.
- B. Multiconductor control cables shall be No. 14 AWG, stranded, 600 Volt, cross-linked polyethylene insulated, PVC jacketed.
- C. Instrumentation and control wiring shall be as manufactured by Belden, Alpha, or approved equal.

2.04 5KV CABLES

- A. All 5KV cables shall be manufactured and tested in accordance with ICEA Publication No. 5066-524 and AEIC No. 5, latest revisions.
- B. 5KV cables shall be single conductor, stranded, shielded, cross-linked polyethylene insulated, PVC jacketed, 133% insulation level, ungrounded.
- C. 5KV cables shall be as manufactured by Anixter, or approved equal.

2.05 5KV CABLE TERMINATIONS AND SPLICES

- A. Both ends of 5KV cables shall be terminated in accordance with IEEE Standard 48, Class 1.
- B. Terminations shall be of the preformed stress cone type, shall be approved by the cable manufacturer for use with his cable, and shall be as manufactured by Anixter, or approved equal.
- C. Unless otherwise shown or indicated on the Contract Drawing, no splices may be made in the 5KV cables without the prior written approval of the County.
- D. Where splicing is permitted, the splicing methods and materials shall be approved by the cable manufacturer for use with his cable and shall be as manufactured by Anixter, or approved equal.
- E. All 5KV cable terminations and splices shall be made by a qualified and certified high/medium voltage cable splicer whose qualifications shall be submitted to the County for approval before any work is begun.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wires and cables shall be sized as shown on the Contract Drawings and/or, where applicable,

sized to match existing wiring.

- B. All conductors shall be carefully handled to avoid kinks or damage to the insulation.
- C. Lubricants or pulling compounds shall be used to facilitate wire pulling. Such lubricants/compounds shall be U.L. listed for use with the insulation specified.
- D. Use pulling means - fish-tape, cable, rope, basket weave wire/cable grips, etc. - which will not damage the wire/cable insulation or the raceway.
- E. Shielded instrumentation wire shall be installed from terminal to terminal with no splicing at any intermediate point.
- F. Shielded instrumentation wire shall be installed in rigid steel conduit and pull boxes that contain only instrumentation cables. Instrumentation cables shall be separated from control cables in manholes.
- G. Shielding on instrumentation cables shall be grounded at the transmitter end only.
- H. All new wires and cables shall be continuous and without splices between points of connection to equipment terminals. However, the County will permit a splice provided that the length between the connection points exceeds the greatest standard shipping length available from the submitted manufacturer and no other manufacturer acceptable to the County is able to furnish wires or cables of the required length.
- I. All 600 volt wire and cable connections shall be made using compression type connectors. Insulated connectors shall be used for all terminations. The connections shall be made so that both the conductivity and the insulation resistance shall be not less than that of the uncut conductor.
- J. All 5KV cable connections shall be made using approved terminators.
- K. 5KV cables exposed in manholes, vaults, pull boxes, switchgear and other areas where the cables are not protected by conduits shall be fireproofed using fireproof tape and/or glass tape in accordance with the manufacturer's recommendations and instructions. Fireproofing using asbestos tape shall not be used.
- L. All wires shall be numbered at both ends and at all intermediate junction points. Screw type terminations shall be made with forked tongue (spade), self-insulated, crimp terminals. All other wire terminations shall be made on appropriate terminal strips.

3.02 TESTS

- A. Upon the completion of the pulling-in of and prior to the terminating/connecting of the 600 Volt wiring, all wires shall be individually checked and tested for continuity and short circuits, and each wire/cable shall be meggered to check insulation resistance. The test voltage shall be not less than 500 Volts. Three (3) copies of these test results shall be submitted to the County.
- B. Similarly, the 5KV cables shall also be tested, except that a 15 minute test shall also be made using a DC voltage not less than 80% of that used for the factory tests. A plot of leakage current versus voltage shall be made and three (3) copies of the test results shall be submitted to the

County.

- C. An authorized representative(s) of the County shall witness all testing. The County shall be notified at least two (2) days in advance of the testing.
- D. Any faulty conditions and/or shortcomings found during the testing shall be corrected at no cost to the County. However, a retest to demonstrate compliance shall be conducted before any hook-ups or terminations are made. Any such requisite retesting shall be witnessed by an authorized representative(s) of the County.

3.03 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16160 PANELBOARDS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, devices, and incidentals required and install all panelboards as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

- A. The requirements of Section 01340 and Section 16050 shall be met.

PART 2 PRODUCTS

2.01 RATING

- A. All panelboards shall be rated for the intended voltage. Panelboard ratings shall be as shown on the Contract Drawings.
- B. Panelboards shall be U.L. listed.

2.03 CONSTRUCTION

A. Interiors

1. Interiors shall be completely factory assembled with main breakers, bus bars, branch circuit breakers, wire connectors, etc.
2. All wire connectors, except screw terminals, shall be of the anti-turn solderless type.
3. All wire connectors shall be suitable for use with copper wires of the size(s) indicated on the Contract Drawings.
4. Branch circuits shall be arranged using double row construction except where narrow column panels are called for on the Contract Drawings.
5. Branch circuits shall be numbered by the panelboard manufacturer.
6. Interiors shall be so designed that circuits may be changed without machining, drilling or tapping; without disturbing adjacent units; and without removing the main bus connectors.
7. Interiors shall be durably marked by the manufacturer with the voltage, current rating and number of phases for which the panelboards are designed. The markings, which shall be visible after installation without disturbing the interior parts or wiring, shall also include the manufacturer's name or trademark.
8. All current carrying parts, including cross connectors, shall be copper.

B. Bus Bars

1. The bus bars for the mains shall be copper and shall be sized as shown on the Contract Drawings.
2. Both a full-capacity neutral bus and a separate ground bus shall be provided. Neutral bus bars shall have a suitable lug for each outgoing feeder requiring a neutral connection.
3. Phase bus bars shall be full height without reduction.

4. Bus bar taps for panelboards with single pole branches shall be arranged for sequence phasing of the branch circuit devices.
5. Bus bars shall be braced to conform to industry standards for short circuit stresses in panelboards.

C. Circuit Breakers

1. The panelboards shall be equipped with circuit breakers, main and branch, with trip settings as shown on the Contract Drawings.
2. The circuit breakers shall be of the molded case, bolt-on type with the number of poles as shown on the Contract Drawings.
3. Circuit breakers used in 120/240 Volt and 120/208 Volt panelboards shall have a minimum interrupting rating of 10,000 Amperes RMS symmetrical.
4. Three-pole circuit breakers used in 480 Volt panelboards shall have a minimum interrupting rating of 14,000 Amperes RMS symmetrical.
5. Main circuit breaker shall be 600V, 600A, 3-pole, 35kA with ALSI trip unit and Maintenance Mode. Model #CHKD3600FT38W as manufactured by Eaton specified - substitute materials will NOT be acceptable.

D. GFCI (Ground Fault Circuit Interrupter)

1. GFCI units shall be provided for all circuits where shown on the Contract Drawings.
2. The GFCI units shall be 1-pole, 120 Volt, molded case, bolt-on circuit breakers incorporating a solid state ground fault interrupter circuit which shall be insulated and isolated from the breaker mechanism.
3. The GFCI units shall be U.L. listed Class A, Group I devices (5 milliamp sensitivity, 25 millisecond trip time), and shall have an interrupting capacity of 10,000 Amperes RMS symmetrical.

E. Enclosures, Covers and Trim

1. The enclosures shall be of the NEMA Type (1, 3R, 4, 4X, 12), material (code gauge steel, stainless steel, fiberglass), and mounting configuration (flush, surface) as shown on the Contract Drawings.
2. Enclosures shall be of sufficient size to provide a minimum 4-inch gutter space on all sides. At least four (4) interior mounting studs shall be provided for each enclosure. Enclosures shall be furnished without conduit knockouts. Enclosures shall have hinged doors which cover all circuit breaker handles.
3. Stainless steel enclosures and covers shall have a natural metal finish. Enclosures and covers shall be joined together with a concealed piano type stainless steel hinge. Conduit openings in the enclosures shall be field drilled and, if applicable, tapped.
4. Fiberglass enclosures and covers shall be the manufacturer's standard color. Enclosures and covers shall be joined together with a concealed piano type stainless steel hinge. Conduit openings in the enclosures shall be field drilled and, if applicable, tapped.
5. Code gauge steel enclosures and covers shall be galvanized steel finished as per Item 2.03.E.7 below. Enclosures and covers shall be joined together with a concealed piano type hinge. Conduit openings in the enclosures shall be field punched.
6. Code gauge steel enclosures shall have panel trims of code gauge sheet steel. Trims for flush mounted enclosures shall overlap the enclosures by at least 3/4-inch all around. Surface mounted enclosures shall have trims the same height and width as the

- enclosures. Trims shall be fastened to the enclosures with quarter-turn clamps or screws.
7. All interior and exterior surfaces of the panelboards, enclosures and trims shall be properly cleaned, painted with a rust inhibitor (two coats), and over-coated with ANSI Z55.1, No. 61 light gray paint. The finish paint shall be of a type to which field applied paint will adhere.
 8. The inside surface of each cover shall have a directory frame with a transparent cover and a directory card.
 9. Covers shall have semi-flush type cylinder locks and catches, except that covers over 48-inches in height shall have vault handles and 3-point catches, complete with lock, arranged to fasten at top, bottom and center. Two (2) keys shall be furnished for each lock and all locks shall be keyed alike.

F. Manufacturer

1. 120/240 Volt and 120/208 Volt panelboards shall be type NQOD with QOB bolt-on circuit breakers as manufactured by the Square "D" Company, or approved equal.
2. 480 Volt panelboards shall be the I-Line type as manufactured by the Square "D" Company, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Surface mounted panelboards shall be installed using spacers so that there is an air space between the enclosure and the mounting surface.
- B. Unless otherwise shown on the Contract Drawings, the tops of the enclosures shall be mounted at a height of 6-feet above the floor. The enclosures shall be properly aligned, true-and-square, and shall be adequately supported independently of the connecting conduits.
- C. All panelboard wiring shall be neatly formed, grouped, laced, and identified to provide a neat and orderly appearance.
- D. The Contractor shall type on the directory card the description/use of each active circuit. "Spare" shall be indicated in erasable pencil!

3.02 TESTS

- A. Each individual circuit breaker, including the main breaker and the GFCI breaker(s), shall be tested for proper operation under the appropriate overload/ground fault conditions.

3.03 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16370 VARIABLE FREQUENCY DRIVES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish three (3) variable frequency drives as specified hereinafter.

1.02 DRIVE APPLICATION

- A. The variable frequency drives will be used to control the speed of NEMA B design squirrel cage induction motors driving pumps in wastewater effluent pumping service. The motors will be rated 85 HP.

1.03 DRIVE PARAMETERS

- A. The variable frequency drives shall be designed and sized for the loads intended, shall not exceed their full-rated capacity when the driven pumps are operating at maximum capacity, shall not overload under any operating condition of the pumps, and shall be provided with an integral bypass motor starter package.

1.04 SPARE PARTS

- A. As a minimum, each of the variable frequency drives shall be furnished with the following spare parts:
 - 1. One (1) circuit board of each type used.

1.05 MANUFACTURER'S QUALIFICATIONS

- A. The variable frequency drives shall be the products of a single manufacturer who has been in the business of designing and manufacturing variable frequency drives for a period of at least ten (10) years.
- B. The manufacturer shall have a factory authorized representative (s) and/or a certified repair shop(s) located within the State of Florida staffed with factory trained service personnel capable of providing installation and start-up assistance, routine and 24-hour emergency repair services (including parts), and training for the County's personnel in operating and maintenance procedures associated with the specific variable frequency drives furnished.
- C. The manufacturer shall offer both standard and extended period service contracts as part of his normal operating policy.
- C. The Variable Frequency Drive shall have a minimum of 28 years documented mean time between failure (MTBF). MTBF to be based on the Bellcore TR-322 standard. A certification that this standard is met is to be provided with the bid.

1.06 MANUFACTURER'S REPRESENTATIVE

- A. A factory trained authorized representative(s) of the manufacturer shall be available to perform the following functions:

1. Provide installation assistance to the County's personnel on an "as needed" basis, one (1) scheduled day minimum.
 2. Provide checkout and start-up services as well as conduct the final acceptance tests, two (2) scheduled days.
 3. Provide training for the County's personnel in the proper operation and maintenance techniques to be used with the specific AFD's furnished, two (2) scheduled days.
- B. The manufacturer's representative shall be ICON Technologies (813-936-2030) associated with providing the services listed in Item 1.06.A.1, 2 and 3 above.

1.07 SUBMITTALS

- A. Within six (6) weeks of receiving the order, the manufacturer shall furnish the County with certified dimension prints which clearly show the nameplate data and outline dimensions.
- B. Prior to start of manufacture of the variable frequency drives, the manufacturer shall submit sets of drawings which shall include, but not necessarily be limited to, enclosure drawings showing the location of both internally and externally mounted components, master wiring diagrams showing all interconnections to the discrete component level, elementary or control schematics including coordination with other external control devices operating in conjunction with the variable frequency drives, and outline drawings with sufficient details to allow for locating conduit stub-ups and field wiring. In addition, documentation certifying compliance with the MTBF standard listed in 1.05,D is to be provided.
- C. Failure to comply with Item 1.06.B above shall be entirely at the manufacturer's risk. Any changes required as a result of the County's review will be solely at the manufacturer's expense with no cost to the County.

1.08 WARRANTY

- A. The manufacturer shall warrant that the variable frequency drives shall be free from defects in all materials and workmanship for a period of two (2) years from date of final acceptance.
- B. During the Warranty period, any and all covered defects shall be corrected by the manufacturer solely at his own expense with no cost to the County.

PART 2 PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES

A. GENERAL

1. The variable frequency drives shall be the adjustable frequency (AF), variable torque (VT), pulse width modulated (PWM) type designed to provide continuous speed adjustment of 3-phase NEMA B squirrel cage induction motors.
2. The variable frequency drives (VFD's) shall be designed to control 85 HP motors respectively, and shall be rated for the horsepower (HP), full-load current (Amps), and speed (RPM) of the motors actually supplied.

B. CONSTRUCTION

1. The VFD's shall be microprocessor based solid state devices consisting of three (3) basic sections:
 - a. A rectifier section to change the constant frequency AC input voltage to a DC voltage. Internal fast acting semiconductor fuses shall be installed to preclude the necessity for having external AC line fuses. 6-pulse technology is to be used. Other multi-pulse systems utilizing autotransformer technology or requiring separate rectifiers are not allowed. Passive harmonic filters utilizing capacitors are not acceptable.
 - b. A DC bus/link section to interconnect the rectifier section and the inverter section. A DC line reactor and capacitors shall be used to smooth the DC bus/link operation, improve displacement power factor, lower harmonic distortion, and eliminate the need for an isolation transformer.
 - c. An inverter section to convert the DC voltage to a variable frequency AC voltage. Insulated gate bipolar transistors (IGBT's) shall be used as output switching devices to allow "tripless" operation, reduce motor noise, provide smoother motor operation, assure reliable and safe shutdowns under fault conditions, and increase drive efficiency; specifically, SCR's, GTO's, and Darlington Transistors are not acceptable as switching devices under this Specification.
2. The VFD's shall be capable of operating from a 3-phase input voltage of 480 Volts \pm 10% over a frequency range of 48-63 Hertz while providing a constant volts per Hertz excitation to the motors.
3. The VFD's shall have a one minute overload rating of 110%, minimum.
4. The VFD's shall employ surface mount technology for reduced size, high reliability, ease of maintenance, and resistance to vibration.
5. The VFD's shall incorporate full internal protection against short circuits, ground faults, over- and undervoltage, over- and undercurrent, and temperature extremes.
6. The VFD's shall contain an adjustable electronic motor overload (I^2t) circuit to eliminate the need for an external motor overload relay.
7. The VFD's shall utilize advanced diagnostic techniques to simplify trouble shooting and correcting problems.
8. The VFD's shall have a minimum drive efficiency of 97% at full speed and full load.
9. The VFD's shall have a minimum fundamental power factor of 0.98 at all speeds and loads.
10. The VFD's shall be able to operate under the following environmental conditions without

modification or derating:

- a. Temperature: 0 to 40EC.
 - b. Altitude: Up to 3,300' above sea level.
 - c. Humidity: 0 to 95%, non-condensing.
11. The VFD's shall be UL listed and shall comply fully with the applicable standards and provisions of ANSI, NEMA, IEEE, IEC, and NEC, latest revisions.

C. STANDARD FEATURES

1. The VFD's shall, as a minimum, have the standard features and adjustments listed below:
 - a. The VFD's shall have the same customer interface regardless of horsepower rating, including keypad, digital display, and user connections. The keypad and the digital display shall be accessible without opening the main door of the drive enclosures.
 - b. The keypad shall be the seven (7) button touch type and shall be used for start-up, for setting all parameters, for stepping through the displays and menus, and for local control, including speed adjustments.
 - c. The digital display shall be the LCD alphanumeric type with 40-character, 2-line capability. The LCD display shall be backlit to provide easy viewing at any angle in any light condition. The display shall have adjustable contrast.
 - d. The display shall utilize plain English - i.e., all set-up parameters, indications, faults, warnings, and other such information must be displayed in words for easy user understanding; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification.
 - e. A door keypad mounting kit, Yaskawa UUX000527, removal keypad for VFD control shall be provided for each VFD.
 - f. The VFD's shall incorporate pre-programmed application macros for ease of start-up. To reduce programming time, the macros shall provide one command operation to reprogram all parameters and user interfaces for a particular application.
 - g. The VFD's shall provide a user selectable option of either displaying a fault or running at a preset speed if a reference input is lost.
 - h. The VFD's shall be capable of a "flying start" into a rotating load and accelerating to setpoint without safety tripping or damage to the drives or driven equipment.

- i. The user terminal strip shall be isolated from both the line and ground.
- j. The VFD's shall have the ability to automatically restart after an overcurrent, overvoltage, undervoltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable. If the time between reset attempts is greater than zero, the time remaining until reset occurs shall count down on the display to warn an operator that a restart will occur.
- k. The VFD's shall be equipped with an automatic extended power loss ride-through circuit which will utilize the inertia of the load to keep the drive powered. Minimum power loss ride-through shall be two seconds, based on full load and no inertia. Removing power from the motor will not be an acceptable method of increasing power loss ride-through under this Specification.
- l. The VFD's shall be optimized for a 3 kHz carrier frequency to reduce motor noise.
- m. The VFD's shall incorporate the following three (3) separate current limit circuits to provide "trip free" operation:
 - 1) A slow current regulation limit circuit which shall be an adjustable percentage of the VFD's variable torque current rating, minimum setting of 125%. This adjustment shall be made via the keypad and shall be displayed in actual amperes, not as a percentage of full load.
 - 2) A rapid current regulation limit circuit which shall be an adjustable percentage of the VFD's variable torque current rating, minimum setting of 170%.
 - 3) A current switch-off limit circuit which shall be a fixed percentage of the VFD's variable torque current rating, minimum setting of 255% instantaneous.
- n. In addition to any software items listed above, the VFD's shall, as a minimum, contain the following built-in software features:
 - 1) Automatic slip-compensation for maintaining motor speed under varying load conditions.
 - 2) A motor under-load function to protect the pumps.
 - 3) Starting torque up to 180% of full load torque.
 - 4) User selectable manual or automatic IR compensation for torque increases over a selected frequency range.
 - 5) Five (5) adjustable/selectable critical frequency lock-out bands to avoid load resonance points during ramp-up or ramp-down.
 - 6) Two (2) acceleration and two (2) deceleration ramps, adjustable from

0.1 seconds to 1800 seconds.

- 7) Three (3) adjustable S-curve acceleration and deceleration patterns.
 - 8) User selectable linear, squared, or automatic control of the Volts-per-Hertz shape to assure maximum energy efficiency.
 - 9) Precise full range frequency resolution adjustable in 0.01 Hertz increments.
 - 10) Integral kilowatt-hour and elapsed-time displays.
 - 11) Integral PI and sequential control functions.
 - 12) Local-Off-Remote function for local control through the integral keypad and remote control via pushbuttons and/or potentiometers.
- o. The VFD's shall have seven (7) programmable preset speeds as well as unidirectional rotation and coast-to-a-stop features.
- p. The VFD's shall have two (2) programmable analog inputs capable of accepting either a current or a voltage signal. Inputs shall be filtered and shall have adjustable gain and offset.
- q. The VFD's shall have six (6) programmable digital inputs.
- r. The VFD's shall have two (2) programmable analog outputs proportional to the chosen reference (frequency, motor speed, etc.).
- s. The VFD's shall have three (3) programmable digital outputs. Outputs must be true Form C relays; specifically, open collector outputs will not be acceptable under this Specification.
- t. The VFD's shall be equipped with an RS-485 serial port capable of communicating with external PLC's, DCS's, DDC's, and touch-screen graphic operator panels.
- u. The VFD's digital display shall contain, as a minimum, the following information shown in complete English words; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification:

Output Frequency	DC Bus Voltage
Output Voltage	Heatsink Temperature
Motor Speed	Analog Input Values
Motor Current	Keypad Reference Values
Calculated Motor Torque	Elapsed Time
Calculated Motor Power	Kilowatt-hours

- v. The VFD's shall, as a minimum, incorporate the following protective circuits which, in the case of a protective trip, shall stop the drive and announce the fault condition in complete English words; specifically, alphanumeric code numbers

requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification:

- 1) Overcurrent: Trip set at 315% instantaneous (225% RMS) of the VFD's variable torque current rating.
 - 2) Overvoltage: Trip set at 130% of the VFD's rated voltage.
 - 3) Undervoltage: Trip set at 65% of the VFD's rated voltage.
 - 4) Overtemperature: Trip set at +70EC or +85EC dependent upon drive furnished.
 - 5) Ground Fault: Both "running" and "at start".
 - 6) Adaptable Electrical Motor Overload (I^2t): Motor protection shall be based on motor speed and load; specifically, circuits which are not speed dependant will not be acceptable under this Specification.
- w. The VFD's shall incorporate a parameter lock feature which will prevent unauthorized personnel from altering the drive parameters without entering a programmable password or combination number. The parameter lock shall also be settable to a digital input.

D. FACTORY INSTALLED OPTIONS

1. In addition to the Remote Keypad mentioned hereinabove, the VFD's shall include the following factory installed options:
 - a. Ethernet IP card, Yaskawa Part #SI-EN3.
 - b. Conformal coated circuit boards.

- E. ACCEPTABLE MANUFACTURERS: The VFD's shall be manufactured Yaskawa, Model Number CIMR-PW4A139A rated for 480V AC with a 139 amp output capacity for the 85 HP pumps.

PART 3 EXECUTION

3.01 FACTORY TESTING

- A. Prior to assembly in the VFD's, all printed circuit boards shall be thoroughly factory tested and given a minimum eight (8) hour burn-in.
- B. After assembly, the drives shall be given a minimum eight (8) hour load test using a driven motor. The load shall be continuously cycled from no-load to full rated load to induce maximum stress and thermal variations in the drive components.
- C. During the load test, the major drive parameters (input volts, output volts, output current, output speed, output frequency, percent load, etc.) shall be recorded and a copy of the test results shall be reviewed by the County prior to the shipment of the VFD's. Similarly, any failure(s) of

the drives during the load test shall be recorded, analyzed, corrected, and reported to the County before shipment of the VFD's.

3.02 SHIPPING

- A. The VFD's shall be so packaged for shipment that they are maximally protected from both physical and environmental damage.
- B. The VFD's shall be transported to the County's job sites utilizing the manufacturer's customary method of shipment.

3.03 INSTALLATION

- A. The VFD's shall be installed by the County's personnel in accordance with the recommendations and procedures set forth in the installation manual furnished by the manufacturer.
- B. An authorized factory trained representative(s) of the manufacturer shall be available to assist the County's personnel on an "as needed" basis.

3.04 CHECKOUT AND START-UP

- A. Prior to start-up, a factory trained representative(s) of the manufacturer shall be on hand to assure that the VFD's have been properly installed and that all field wiring is correctly terminated.
- B. After checkout, the manufacturer's representative(s) shall then conduct a certified factory start-up using procedures and forms established by the manufacturer of the VFD's.
- C. A copy of the certified start-up form(s) for each drive shall be provided to the County, and a copy shall be kept on file by the manufacturer.

3.05 FIELD TESTING

- A. After satisfactory completion of the checkout and start-up procedures, the manufacturer's representative(s) shall begin an eight (8) hour acceptance test using actual plant loads.
- B. Any and all short-comings discovered and/or failures occurring during the acceptance test shall be remedied by the manufacturer solely at his own expense with no cost to the County.
- C. Any time after four (4) hours of acceptance testing, the County may, at his option, curtail further testing and take acceptance of the VFD's.

3.06 TRAINING

- A. As set forth in Items 1.05.B and 1.06.A above, a factory trained authorized representative(s) of the manufacturer shall be available at such a time(s) and place(s) established by the owner to train the County's personnel in the proper operation and maintenance procedures required by the specific VFD's furnished.

3.07 WARRANTY

- A. The manufacturer shall furnish to the County a written warranty which complies with the requirements set forth in Item 1.08 above.

END OF SECTION

SECTION 16421 MINI POWER-ZONE

PART 1 GENERAL

1.01 INCLUDED

- A. Mini Power-Zone

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. Install complete grounding system in accordance with the National Electrical Code.

1.03 REFERENCE STANDARDS

- A. The following specifications and standards, except as hereinafter modified, are incorporated herein by reference and form a part of this specification to the extent indicated by the references thereto. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of Invitation for Bids shall be applicable. In text such specifications and standards are referred to by basic designation only.

1. National Electrical Manufacturer's Association (NEMA) Publications:
2. Underwriter's Laboratories, Inc., (UL) Publications:

1.04 SHOP DRAWINGS

- A. Mini Power-Zone shop drawings shall contain layout of equipment, nameplate, schedule, electrical characteristics of components, overall weight and dimensions, conduit space in top, voltage rating, ampacity of all bus bracing, and information that indicates that function requirements of the specification have been met.

PART 2 PRODUCTS

2.01 MINI POWER-ZONE

- A. Transformer/Panelboard
 1. The Distribution Panelboard shall be dead-front type, metal enclosed. Panelboard shall be NEMA 4X enclosure for operation at 120/240V, single-phase. A minimum of 10 single-pole spaces shall be provided. All panelboard circuit breakers shall be type QOB bolt-on circuit breakers as manufactured by the Square "D" Company.
 2. Unit shall be provided with a 30 Ampere main breaker installed on the primary side of the transformer. A 60 Ampere secondary breaker shall be provided for the 120/208V, three-phase distribution panelboard.
 3. The transformer section shall convert 480V, single-phase power into 120/240V, single-phase power. The transformer shall be a minimum of 10 KVA.

2.02 APPROVED MANUFACTURERS

- A. Mini Power-Zone
 - 1. Square-D

PART 3 EXECUTION

3.01 INSTALLATION OF MIN POWER-ZONE

- A. Install and Mini Power-Zone per manufacturer's recommendations.

3.02 FIELD QUALITY CONTROL

- A. Inspections: Inspect, adjust and check the installation for physical alignment, cable terminations and ventilation.
- B. Tests: Perform the following field tests:
 - 1. Close and open each circuit breaker to test operation.

3.03 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16445 MOTOR CONTROL CENTERS

PART 1 GENERAL

1.01 SCOPE

- A. This section includes the requirements for 600V-class Low Voltage Motor Control Centers (MCCs) for use on alternating current power systems.
- B. The MCCs shall be furnished and installed as specified in this section and as shown on the contract drawings.

1.02 REFERENCES

- A. The MCC shall meet or exceed the requirements within the following standards for MCCs.
 - 1. NEMA ICS 18 - Industrial Control and Systems: Motor Control Centers
 - 2. UL 845 - UL Standard for Safety for Motor Control Centers
NOTE: UL 845 is a harmonized standard consisting of:
 - a) Underwriters Laboratories Inc. (UL) UL 845
 - b) Canadian Standards Association (CSA) C22.2 No. 254-05
 - c) Association of Standardization and Certification (ANCE) NMX-J-353-ANCE-2006
 - 3. NFPA 70 - National Electrical Code
- B. The MCC shall be designed, manufactured, and tested in facilities registered to ISO 9001.
- C. Arc Resistant or Arc Containing Low Voltage MCCs shall be tested, rated, and labeled in accordance with the requirements of IEEE C37.20.7 'IEEE Guide for Testing Metal-enclosed Switchgear Rated up to 38 kV for Internal Arcing Faults'.

1.03 DESIGN REQUIREMENTS

- A. Provide MCC based upon applicable NEMA and UL standards and in accordance with the detailed contract specifications and drawings.
- B. The contractor shall confirm motor full-load amperage ratings and provide those to the MCC manufacturer to ensure proper sizing of the motor branch circuit and overload protection.

1.04 PRE-MANUFACTURE SUBMITTALS

- A. The requirements of Section 16050 shall be met.
- B. Manufacturer Drawings.
 - 1. MCC elevations showing dimensional information including details such as, but not limited to, the following:
 - a) MCC height (less any removable lifting angles or eyes)
 - b) MCC width
 - c) MCC depth

- d) Location of shipping splits
2. Structure descriptions showing the following:
 - a) Bus ratings
 - b) Enclosure ratings
 - c) Short-circuit withstand ratings
 - d) Other information as required for approval
 3. Conduit locations
 4. Required bus splices
 5. Unit descriptions including information such as, starter sizes, circuit breaker frame sizes, circuit-breaker continuous ampere ratings, and pilot devices
 6. Nameplate information
 7. Schematic wiring diagrams
 8. Manufacturer drawings shall be provided in PDF format
 9. Manufacturer drawings do not need to be stamped if a drawing schedule is provided that lists the drawing numbers, version levels, and status of drawings (such as, Preliminary, Approval, and Final)
- C. Product Data.
1. Data sheets and publications on all major components including, but not limited to, the following:
 - a) Motor starters
 - b) Overload relays
 - c) Circuit breaker and fuse information including time current characteristics
 - d) Control power transformers
 - e) Pilot devices
 - f) Relays
- D. Specification Response.
1. All clarifications and exceptions must be clearly identified
- E. Installation Instructions.
1. Provide a copy of the manufacturer's installation instructions that includes the following:
 - g) Receiving, handling, and storage instructions
 - h) General description for reading nameplate data, serial numbers, UL markings, and short circuit ratings
 - i) Installation procedures including splicing procedures
 - j) Conduit and cable installation
 - k) Installing and removing plug-in units
 - l) Operation of operator handles and unit interlocks
 - m) Checklist before energizing
 - n) Procedure for energizing equipment
 - o) Maintenance procedures

1.05 FINAL SUBMITTALS

- A. The contractor shall provide certification that the MCC has been installed in accordance with the manufacturer's instructions and with local codes and standards that govern MCC installations.
- B. The contractor shall provide certification that all circuit breaker settings have been adjusted per field requirements.
- C. The contractor shall provide certification that all power fuses have been selected and installed per field requirements.
- D. The contractor shall provide certification that all solid-state motor overload settings have been adjusted per installed motor characteristics.
- E. The contractor shall provide certification that all settings for solid state devices such as reduced voltage solid-state controllers and variable frequency drives have been adjusted per the specific application requirements.
- F. The contractor shall provide certification that any timing devices have been properly adjusted.
- G. Final Drawings.
 - 1. The manufacturer shall provide final drawings reflecting the 'As-Shipped' state of the MCC documents previously submitted
 - 2. Manufacturer drawings shall be provided in PDF format
 - 3. Manufacturer drawings do not need to be stamped if a drawing schedule is provided that lists the drawing numbers, version levels, and status of drawings (such as, Preliminary, Approval, Final)
 - 4. The contractor shall be responsible for making any changes to the 'As-Shipped' drawings from the manufacturer to reflect any field modifications
- H. Test reports indicating manufacturer's standard testing was performed.
- I. Maintenance Data.
 - 1. MCC installation instructions
 - 2. Installation/operation instructions for major components such as, automatic transfer switch and circuit breakers
 - 3. MCC spare parts listing and pricing

1.06 QUALITY ASSURANCE

- A. The manufacturer of the MCC shall have a minimum of 35-years experience in the manufacturing and assembly of NEMA Low Voltage motor control centers.
- B. The manufacturer shall have ISO 9001 registered facilities for the design, manufacture, and testing of MCCs.

- C. MCC sections and individual MCC units shall be designed and manufactured in accordance with UL 845 requirements.
- D. MCC sections and individual MCC units shall be UL listed, where possible.

1.07 REGULATORY REQUIREMENTS

- A. Contractor shall ensure that the installation conforms to the requirements of the latest edition of the NFPA 70 'National Electrical Code' and/or other applicable installation standards.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The contractor shall coordinate the shipping splits with the MCC manufacturer for entry into the building.
- B. Shipping splits shall be noted on the MCC manufacturer drawings.
- C. The contractor shall store the MCCs in a clean, dry, and heated space.
- D. The contractor shall protect the units from dirt, water, construction debris, and traffic.
- E. During storage the contractor shall connect internal space heaters (if specified) with temporary power.
- F. MCCs are to be shipped with external lifting angles at the top and running continuously for each shipping split. Lifting eyelets are not acceptable.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. The MCC enclosure rating shall be appropriate for the environment where the MCC is to be located.

1.11 FIELD MEASUREMENTS

- A. The contractor shall verify all field measurements prior to the fabrication of the MCC.

1.12 WARRANTY

- A. The manufacturer shall provide their standard parts warranty for 12 months from the date of invoice.
- B. The manufacturer shall confirm this warranty as part of the submittal.

1.13 SPARE MATERIALS

- A. The contractor shall review the manufacturer's recommended spare parts list and discuss it with the owner to determine requirements for spare parts.
- B. The contractor is to provide the quotation for spare parts to the owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. MCCs shall be Allen-Bradley® CENTERLINE® 2100 motor control centers.

2.02 RATINGS

- A. The MCC shall be rated for the system voltage as indicated on the contract drawings.
- B. The MCC horizontal and vertical power bus bracing shall not be less than 65,000 A rms symmetrical.
- C. All MCC units shall have a full rated short-circuit rating that meets or exceeds the available fault current as shown on the contract drawings.
 - 1. The use of series short-circuit ratings shall be permitted only for panelboards; series short-circuit ratings for other types of units is not acceptable
- D. All circuit breakers used in the motor control center shall have full-rated short-circuit interrupting ratings based on the applied MCC voltage.
 - 1. Slash rated short-circuit interrupting ratings for circuit breakers are not acceptable except for branch circuit breakers in panelboards, and then only if the power system specified in the contract drawings is a Wye with a solidly grounded neutral
- E. The MCC shall provide (Type 2) accessibility as defined by IEEE C37.20.7 'IEEE Guide for Testing Metal-enclosed Switchgear Rated up to 38 kV for Internal Arcing Faults'.

2.03 ENCLOSURE

- A. The MCC enclosure shall be NEMA Type 1.
- B. Each section shall be equipped with two full-metal side sheets to isolate each vertical section and to help reduce the likelihood of fault propagation between sections.
- C. All interior and exterior surfaces shall be painted ANSI 49 medium-light gray. The vertical wireways and unit back plates shall be painted high-visibility gloss white.
- D. All unpainted parts shall be plated for corrosion resistance.
- E. Removable closing plates on each end of the MCC shall cover all horizontal bus and horizontal wireway openings.
- F. Insulating sheets shall be provided on the inside of end closing plates for horizontal bus openings to help prevent burn-through of the end closing plate in the event that an internal arcing fault occurs in the horizontal bus compartment.

2.04 STRUCTURE

- A. The MCC shall be of dead front construction and shall consist of one or more vertical sections bolted together to form a rigid, free-standing assembly. The systems shall

be designed to allow for the addition of future sections at either end and to permit the interchanging of units.

- B. Vertical sections shall be rigid, free-standing structures.
 - 1. Vertical sections shall have internal mounting angles running continuously within the shipping block
 - 2. An external mounting channel that is required to maintain structure integrity is not acceptable
 - 3. Vertical sections shall be 90 in. high, 20 in. deep and 20 in. Wide, except where larger dimensions are required
 - 4. 71 in. high, reduced height sections shall be provided, if specified on the contract drawings
 - 5. Vertical sections shall be provided with a removable steel lifting angle on all shipping blocks. The angle shall run the length of the shipping block
 - 6. Lifting eyes are not acceptable
 - 7. Each standard section shall be capable of being subdivided into 12 usable, unit spaces
 - 8. Two unit spaces shall constitute one space factor and shall be 13 in. in height
 - 9. One unit space shall constitute one-half space factor and shall be 6.5 in. in height
- C. Horizontal wireways.
 - 1. Horizontal wireways shall be located at the top and bottom of the MCC
 - 2. Horizontal wireways shall be 6 in. in height and extend the full depth of the vertical section to allow maximum flexibility in locating conduit for MCC feeds and loads
 - a) Pull-boxes to extend the height of the top horizontal wireway by 12 in. shall be provided, if specified on the contract drawings
 - 3. Horizontal wireways shall be continuous across the length of the MCC, except where access needs to be denied due to electrical isolation requirements
 - 4. The horizontal wireways shall be isolated from the power bus
 - 5. The horizontal wireways shall have removable covers held in place by captive screws
- D. Provide a full height vertical wireway, independent of the plug-in units, in each standard vertical section.
 - 1. The vertical wireway shall be isolated from the vertical and horizontal buses
 - 2. The vertical wireway shall be covered with a hinged and secured door
 - 3. Wireway tie bars shall be provided
 - 4. Isolation between the wireway and units shall be provided
 - 5. Vertical wireway doors shall be provided with arc resistant latches to help keep the door latched in the event that an internal arcing fault occurs

2.05 BUS BARS

- A. Horizontal Power Bus.
 - 1. The horizontal bus shall be rated as shown on the drawings
 - 2. The horizontal bus material shall be copper with tin plating
 - 3. The horizontal bus shall be supported, braced and isolated from the vertical bus with a high strength, non-conductive, non-tracking, glass polyester material
 - 4. For standard sections the horizontal bus shall be continuous within each shipping

- block and shall be braced within each section
5. Horizontal bus splices shall have at least two bolts on each side

B. Vertical Bus.

1. The vertical power bus shall have an effective rating of 600 A. If a center horizontal bus construction is utilized, then the rating shall be 300 A above and below the horizontal bus for an effective rating of 600 A. If a top or bottom mounted horizontal bus is utilized, then the full bus must be rated for 600 A
2. The vertical bus material shall be copper with tin plating
3. The vertical bus shall attach to the horizontal bus with at least two bolts
4. The vertical bus shall be continuously braced by a high strength, non-conductive, non-tracking, glass-filled polyester material and isolated from the unit spaces by a non-conductive, polycarbonate molded cover
5. The vertical bus shall be isolated from the horizontal power bus except where necessary to connect the vertical power bus to the horizontal power bus
6. Automatic shutters shall cover plug-in stab openings when units are removed

C. Ground Bus.

1. Provide a ground bus system consisting of a horizontal ground bus connected to vertical ground buses mounted in each section
2. Provide an tin-plated copper 0.25 x 2 in. horizontal ground bus mounted in the bottom of the MCC unless otherwise specified in the drawings
3. Provide a pressure-type mechanical lug mounted on the ground bus in the incoming line section
4. Provide a unit ground stab on all unit inserts. The ground stab shall establish unit insert grounding to the vertical ground bus before the plug-in power stabs engage the power bus. The grounding shall be maintained until after the plug-in power stabs are disengaged

2.06 UNIT INFORMATION

- A.** The minimum compartment height shall be 6.5 in. and this shall be considered one-half space factor.

B. Plug-in units.

1. Plug-in units shall consist of a unit assembly, unit support pan, and unit door assembly
2. Units shall be supplied with removable doors. The unit doors shall be fastened to the structure so that the doors can be closed when the unit is removed
3. A unit support pan shall be provided for support and guiding units. Unit support pans shall remain in the structure when units are removed to provide isolation between units
4. A service position shall be provided for plug-in units that allows for the unit to be supported, but disengaged from the bus. The unit shall be capable of being padlocked in the service position. This position is to be used to isolate a unit from the bus to allow service to be performed on the connected load equipment

C. Power Stabs.

1. Unit stabs for engaging the power bus shall be tin-plated copper and provided with stainless back-up springs to provide and maintain a high pressure 4-point connection to the vertical bus
2. Wiring from the unit disconnecting means to the plug-in stabs shall not be exposed

on the rear of the unit. A separate isolated pathway shall be provided for each phase to minimize the possibility of unit fault conditions reaching the power bus system

3. Power cable termination at the plug-in stab shall be a maintenance-free crimp type connection

D. Withdrawable Power Stabs.

1. Plug-in units shall have the capacity of withdrawing the power stabs, allowing the primary voltage to be disconnected with the unit door closed
2. The withdrawable assembly shall accept a standard 1/4' hex-style drive socket
 - a) A complete power engagement shall occur when turning the mechanism ¼ turn in clockwise direction
 - b) Complete power disengagement shall occur when turning the mechanism ¼ turn in counter-clockwise direction
3. The withdrawable stabs design shall include a set of stab assembly-mounted shutters
 - a) shutters shall automatically open before the power stabs can extend and connect to the vertical bus
 - b) shutters shall close as soon as the power stabs are disconnected from the vertical bus and are completely inside the stab housing
4. The withdrawable stabs design shall include interlock mechanisms
 - a) A through-the-door mechanism shall allow the unit to be locked in the 'Power Stabs Disconnected' position
 - i. This mechanism shall be such that it can be padlocked to prevent the connection of the stabs to the vertical bus even when the unit is inserted into the vertical section
 - ii. Unit door shall be capable of opening with the padlock and lockout engaged
 - b) Unit disconnect handle must be in the OFF position (load side of the disconnect device removed from line power) before the stabs can be disconnected from the vertical bus
 - i. Mechanism shall also allow the removal of the unit from the vertical section but only after the disconnect handle has been turned OFF and the power stabs have been disconnected from the vertical bus
 - ii. Unit stabs have to be disconnected (withdrawn) before the unit can be re-inserted into the vertical section
5. The withdrawable stabs design shall include feedback mechanisms that are verifiable with the unit door closed
 - a) A two-position indication system shall be provided (Power Stabs Connected/Disconnected) and shall be visible from the door
 - i. Connected with Red Indication-Primary voltage stabs fully engaged and connected to the vertical bus
 - ii. Disconnected with Green Indication-Primary voltage stabs fully disconnected from the vertical bus
 - b) A set of test points shall be located on the front of the unit for identification of:

- i. Power stabs position: a positive continuity check between these probes shall verify that all three power stabs have been disconnected from the vertical bus and completely withdrawn inside the stabs housing
 - ii. Stab-mounted shutters position: a positive continuity check between these probes shall verify that the shutters are closed, meaning that all three power stabs have been disconnected and withdrawn inside the stab housing
- 6. Withdrawable power stabs with door closed mechanism shall not increase the original unit height design so total space in the motor control center is optimized
- 7. A remote operating device shall be supplied to allow the connection and disconnection of the power stabs with the door closed
 - a) The minimum distance shall be not less than three times the minimum default value recommended by the NFPA 70E (Arc Flash Protection Boundary-AnnexD)

E. Disconnect Handle.

- 1. Plug-in units shall be provided with a heavy-duty, non-conductive, industrial duty, flange mounted handle mechanism for control of each disconnect switch or circuit breaker
- 2. Use of rotary operators is not acceptable
- 3. Disconnect handles may pivot in the vertical or horizontal plane
- 4. On-off condition shall be indicated by the handle position, red and green color indicators with the words ON and OFF, and the international symbols 1 and O along with a pictorial indication of the handle position
- 5. Handles shall be capable of being locked in the OFF position with up to three padlocks
- 6. Plug-in units shall be provided with interlocks per NEMA and UL requirements Interlocks shall be provided for the following:
 - a) Prevention of unit insertion or withdrawal with the disconnect in the ON position
 - b) Prevention of the unit door from being opened when the disconnect is in the ON position
 - i. A feature for intentionally defeating this interlock by qualified personnel shall be provided
 - c) Prevention of the disconnect switch from being moved to the ON position if the unit door is open
 - i. A feature for intentionally defeating this interlock by qualified personnel shall be provided

F. Pilot Devices.

- 1. Where specified, units shall be furnished with pushbuttons, selector switches, or pilot lights as shown on the contract drawings
- 2. Pilot devices shall be rated NEMA Type 4/13 water tight/oil tight
- 3. For units with vertically operated disconnect handles:
 - a) When three or less pilot devices are utilized, they shall be Allen-Bradley Bulletin 800T or 800H 30.5mm devices or approved equal
 - b) When more than three devices are required, the use of Allen-Bradley Bulletin 800F 22.5mm devices (or approved equal) is permitted

4. For units with horizontally operated disconnect handles:
 - a) The devices shall be Allen-Bradley Bulletin 800F

G. Terminal Blocks.

1. Control terminal blocks shall be provided on all contactor and starter units.
 - a) Control terminal blocks shall be a pull-apart design on all plug-in units for easy removal of the unit from the structure
2. Control terminal blocks on non-plug-in contactor and starter units shall be fixed type.
3. Power terminal blocks shall be provided on all contactor and starter units, rated NEMA size 3 (100 A) and below that utilize vertically operated disconnects
 - a) Power terminal blocks shall be pull-apart for NEMA size 1 and 2 (30 A and 60 A contactors)
 - b) Power terminal blocks for NEMA size 3 starters (100 A contactors) shall be non- pull-apart
4. Terminal blocks shall not be located adjacent to or inside the vertical wireway

H. Doors.

1. Each unit shall be provided with a removable door mounted on removable pin-type hinges
2. The unit doors shall be capable of being opened at least 110 degrees
3. The unit doors shall be removable from any location in the MCC without disturbing any other unit doors
4. The unit door shall be fastened to the structure so it can be closed to cover the unit space when the unit is removed
5. The unit doors shall be held closed with quarter-turn latches
6. Unit door latches shall be provided with arc resistant latches to help keep the door latched in the event that an internal arcing fault occurs

2.07 DISCONNECTS

A. Main Disconnect.

1. If no overcurrent protection is indicated, provide a main incoming-line lug compartment
 - a) Lugs to accommodate the incoming power conductors as indicated on the contract drawings shall be provided by MCC Manufacturer.
2. Main Circuit Breaker Disconnect
 - a) Lugs to accommodate the incoming power conductors as indicated on the contract drawings shall be provided by the MCC manufacturer
 - b) Size the circuit breaker frame and trip rating as shown on the drawings
 - c) The interrupting capacity rating shall meet or exceed 65kA
 - i. Interrupting capacity based on a slash rating is not acceptable
 - d) Provide a circuit breaker with thermal magnetic trip unit for 250 A and smaller frames
 - e) Provide electronic trip unit for 400 A and larger frames. Electronic trip units

for main circuit breakers and Tie Circuit Breakers shall be provided with Maintenance Mode capability.

- f) Provide a removable protective barrier to reduce the possibility of incidental contact with the line terminals
- g) Provide one normally open and one normally closed circuit breaker auxiliary contact that follows the position of the circuit breaker main contacts for indication of 'On' or 'Off/Tripped'

A. Feeder Disconnects

- 1. Disconnecting means for feeders shall be circuit breakers with thermal-magnetic trip units for 250 A and smaller frames; provide an electronic trip unit for 400 A and larger frames
- 2. Interrupting capacity rating shall meet or exceed 65kA
 - a) Interrupting capacity based on a slash rating is not acceptable
- 3. Minimum frame size shall be 125 A
- 4. Provide one normally open and one normally closed circuit breaker auxiliary contact which follows the position of the circuit breaker main contacts for indication of 'On' or 'Off/Tripped'

2.11 COMBINATION NEMA ACROSS THE LINE STARTERS

- A. Starters shall meet applicable NEMA and UL requirements.
- B. Starters shall be minimum NEMA Size 1.
 - 1. Fractional NEMA sizes are not acceptable
- C. The motor starter shall be Allen-Bradley Bulletin 500 or 300 or approved equal.
- D. Starters shall be provided with a 3-pole solid state overload relay that includes the following features:
 - 1. Selectable trip classes of 10, 15, 20, or 30
 - 2. Set for class 20 unless otherwise indicated on the contract drawings
 - 3. Overload protection
 - 4. Phase loss protection
 - 5. Visual trip status indication
 - 6. Test/Reset button
 - 7. Bipolar latching relay with one normally open and one normally closed contact, rated NEMA B600 for use in motor contactor control circuits
 - 8. Thermal memory circuit to model the heating and cooling effects of motor on and off periods
 - 9. The overload relay shall be Allen-Bradley 193-EE or 592-EE 'E1 Plus'
- E. Provide a control power transformer with a rated secondary voltage of 120V AC. The control power transformer shall be provided with primary and secondary fusing.
- F. Overload relays shall have a reset button located on the outside of the unit door.
- G. Provide a door mounted selector switch for Hand-Off-Auto operation. The Hand mode

shall provide local control at the MCC unit door. In the Auto mode, control shall be provided through a remote contact.

- H. Provide door mounted 120V AC push-to-test pilot lights with LED lamps for On (Red) and Off (Green) status indication.

2.12 MOTOR STARTER UNITS.

- A. Electro-mechanical NEMA starters:

1. Disconnecting means for the across the line starters shall be motor circuit protectors
2. unit short circuit rating shall be greater than or equal to the available fault current as shown on the contract drawings
3. Units shall be supplied based upon the rules/requirements set forth in the UL 845, NEMA ICS-18, and NFPA 70
4. Contractor shall field adjust the units based upon the particular motor application.
5. Minimum MCP frame size shall be 125 A
6. Provide one normally open and one normally closed circuit breaker auxiliary contact that follows the position of the circuit breaker main contacts for indication of 'On' or 'Off/Tripped'

PART 3 EXECUTION

3.01 INSTALLATION

- A. Contractor shall install MCC in accordance with manufacturer's instructions.
- B. Contractor shall tighten accessible bus connections and mechanical fasteners to the manufacturer's torque requirements.
- C. Contractor shall select and install fuses in fusible switches based upon field requirements.
- D. Contractor shall adjust circuit breaker settings based upon field requirements.
- E. Contractor shall adjust solid state overloads to match the installed motor characteristics.
- F.

MANUFACTURER'S GUARANTEES AND WARRANTIES

The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

3.02 ICES

- A. Manufacturer of the MCC shall be capable of providing the programming for the programmable logic controller and the operator interface if provided within the MCC.
- B. Manufacturer of the MCC shall be capable of providing start-up services as part of the supply of the MCC.

3.03 TRAINING

- A. A course outline shall be submitted as part of the MCC submittals.

- B. The manufacturer shall offer off-site training on the concepts, knowledge and tools necessary to design, specify, install, troubleshoot, and use a networked MCC.

3.04 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16450 GROUNDING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish and install a complete grounding system in strict accordance with Article 250 of the National Electrical Code and/or as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

- A. The requirements of Section 01340 and Section 16050 shall be met.
- B. Test results as indicated in 3.02 C shall be submitted.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Ground Rods: The ground rods shall be solid copper or copper-clad steel having a diameter of 5/8-inch and a length of 10-feet. The ground rods shall be as manufactured by Copperweld, or approved equal.
- B. Grounding Conductors
 - 1. All grounding conductors shall be copper. Aluminum or copper-clad aluminum grounding conductors will not be allowed.
 - 2. The grounding conductors shall be sized in accordance with the latest edition of the National Electrical Code, Table 250-94 or Table 250-95, whichever is applicable to the particular grounding conductor.
- C. Ground Rod Clamps: The ground rod clamps shall be malleable iron or cast bronze fittings suitable for use with copper conductors. The ground rod clamps shall be as manufactured by Bridgeport Fittings, Inc.; ITT Blackburn, Inc.; or approved equal.
- D. Dissimilar Metals Junctions: Connections between different metals shall be sealed using NO-OXIDE paint, Grade A, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wherever possible, the Contractor shall connect to an existing plant, area or building grounding grid. Where no such grounding grid exists, the Contractor shall provide grounding as hereinafter specified and/or as shown on the Contract Drawings.
- B. Building grounding grid conductors shall be embedded in backfill material around the structures.
- C. All underground conductors shall be laid slack and, where exposed to mechanical injury, shall be protected by pipes or other substantial guards. If guards are iron pipe or other magnetic material, conductors shall be electrically connected to both ends of the guard.

- D. Grounding electrodes shall be driven as required. Where rock is encountered, grounding plates may be used in lieu of grounding rods.
- E. All equipment enclosures, motor and transformer frames, conduit systems, cable armor, exposed structural steel and similar items as required by Article 250 of the NEC shall be grounded.
- F. All steel building columns shall be bonded together and connected to the building ground grid.
- G. Exposed connections shall be made utilizing approved grounding clamps. Buried connections shall be Cadweld, or approved equal, welding process.
- H. The ground bus of service entrance equipment shall be connected to the plant, area or building ground grid, whichever is applicable.
- I. For reasons of mechanical strength, grounding conductors extending from the plant, area or building grounding grid or service entrance ground bus, whichever is applicable, to the ground buses of motor control centers and/or unit substations shall be No. 1/0 AWG bare copper.
- J. Lighting transformer neutrals shall be grounded to the nearest grounding electrode.
- K. Conduits stubbed-up below a motor control center shall be fitted with insulated grounding bushings and connected to the motor control center ground bus. Boxes mounted below motor control centers shall be bonded to the motor control center ground bus. The grounding wire shall be sized in accordance with Table 250-95 of the National Electrical Code, except that a minimum No. 12 AWG shall be used.
- L. Motors shall be grounded in accordance with Section 16150, Item 3.01.A of these Specifications.
- M. The Contractor shall exercise care to insure good ground continuity, in particular between conduits and equipment frames and enclosures. Where necessary, jumper wires shall be installed.

3.02 TESTS

- A. The Contractor shall test the ground resistance of the system. The Contractor shall provide all test equipment of which the County shall have approval.
- B. The dry season resistance of the system shall not exceed five (5) ohms. If a single driven rod does not produce this value, the Contractor shall drive additional rods and/or take other measures as directed by the County without any cost to the County.
- C. The Contractor shall furnish to the County three (3) copies of the test report certifying that the system is in compliance with the ohmic value requirement. The certified test report shall include, but not necessarily be limited to, the following:
 - 1. Description of the test.
 - 2. Type of test equipment used.
 - 3. Moisture content of the soil.
 - 4. Date and time of the test.
 - 5. Resistance measurement of each rod cluster.

6. Name of individual(s) performing the test.
7. Contractor's certification stamp or seal.

3.03 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16500 LIGHTING FIXTURES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The work included under this section of the specifications consists of furnishing all materials and equipment and performing all labor and services necessary for the complete installation of lighting fixtures, including all related systems and accessories, as shown on the drawing or hereinafter specified.

PART 2 PRODUCTS

2.01 LIGHTING FIXTURES

- A. Materials.
 - 1. Lighting Fixtures shall be as specified in the lighting fixture schedule on the drawings and as specified herein.
 - 2. All lighting fixtures shall use LED technology.
 - 3. All fixtures shall bear the U.L. label.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Lighting fixture shall be installed as indicated on drawings.
- B. Fasten fixtures securely to provide adequate support.
- C. Ensure that lighting fixtures are plumb.

END OF SECTION

SECTION 16950 TESTS AND INSPECTIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall arrange for all inspections required by the local authority having jurisdiction. Approval of the installation by any such local authority shall not relieve the CONTRACTOR of any portion of his responsibility for adequate performance of the completed installation.

1.02 SUBMITTALS

- A. The CONTRACTOR shall furnish at least two copies of test records to the ENGINEER. At the completion of all tests specified herein and any others required to make operational all equipment, all records shall be viewed by the CONTRACTOR, then transmitted directly to the ENGINEER. All prints shall be corrected and verified for corrections of in-field changes by the CONTRACTOR prior to submittal.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 PREPARATION

- A. After completion and prior to being energized, the electrical installation shall be tested to the extent necessary to demonstrate that all systems are complete and ready for operation. The CONTRACTOR shall notify the ENGINEER and the OWNER for the final inspection prior to energizing the system.
- B. The CONTRACTOR shall furnish all necessary test equipment to satisfactorily perform all tests specified herein or required by applicable codes and standards.

3.02 TESTING

- A. The CONTRACTOR shall test all wire, cable, equipment, and systems installed or connected under the Agreement to assure proper installation, settings, connection, and functioning in accordance with the Drawings, Specifications and the manufacturer's recommendations.
- B. When conducting tests the CONTRACTOR shall:
 - 1. Include all tests and inspections recommended by the equipment manufacturer and applicable Codes and Standards.
 - 2. Include any additional tests required by the ENGINEER that he deems necessary because of field conditions to determine that equipment, material, and systems meet the requirements of the Specifications.
 - 3. Maintain in quadruplicate a written record of all tests showing date, personnel conducting tests, equipment or material tested, tests performed, manufacturer and serial number of testing equipment and results.

- C. Tests to be accomplished as a minimum are as follows:
1. Control Panels/Panelboards : provide temporary power source to all control/power circuits and check for proper operation prior to energizing equipment served.
 2. Wires and Cables:
 - a. The 600-volt insulated cables shall be factory tested prior to shipment in accordance with IPCEA standards for the insulation specified.
 - b. The following 600-volt wires and cable shall be tested after installation but before final connections are made up:
 - i. All feeders from motor control centers to motors 10 horsepower and larger.
 - ii. All feeders from variable speed drive units.
 - iii. All feeders from motor control centers to lighting panels and dry-type transformers.
 - c. For the above listed cables, a test voltage of 500 volts ac shall be applied for a period of 1 minute between all conductors in the same conduit, and between each conductor and ground.
 - d. All tests shall be made at the Contractor's expense, and certification of the tests shall be submitted to the Engineer. If any failures occur during the tests, the Contractor shall replace the cable.
 3. Motor Test: Motor rotation will be checked by momentary energizing of motor. Correction of rotation shall be made by changing leads on the motor. Motors shall only be energized in the presence of a representative of the OWNER.
 4. Check phase rotation on all bussing. Phasing shall be A-B-C, left to right, top to bottom, front to rear, as viewed from the front.
- D. CONTRACTOR shall be responsible for any damage to equipment or material due to improper test procedures or test apparatus handling, and shall replace or restore to original condition any damaged equipment or material.
- E. CONTRACTOR shall furnish and use safety devices such as rubber gloves and blankets, protective screens, barriers, and danger signs to adequately protect and warn all personnel in the vicinity of the tests.

3.04 DEMONSTRATION OF COMPLETED ELECTRICAL SYSTEMS

- A. Upon the completion of the installation and testing, the CONTRACTOR shall demonstrate and familiarize representatives of the OWNER with the system.

END OF SECTION

**APPENDIX A:
FDEP ENVIRONMENTAL RESOURCE
PERMIT**



FLORIDA DEPARTMENT OF Environmental Protection

Southwest District Office
13051 North Telecom Parkway #101
Temple Terrace, Florida 33637-0926

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Noah Valenstein
Secretary

July 2, 2019

Manatee County Public Works
c/o Sia Mollanazar
1022 26th Ave. East
Bradenton, FL 34208
Sia.mollanazar@mymanatee.org

File No.: 41-0149008-010-EM
Project Name: Southeast Water Reclamation Facility Lake Expansion Project

Dear Mr. Mollanazar:

Your request to modify permit number 41-0149008-009-EI has been reviewed by Department staff. The modifications are to conduct the following activities:

1. Remove the expansion of the East and South Reclaimed Storage Lakes from the project (including all wetland or other surface water impacts, or permanent ditch impacts);
2. Install 270 linear feet of 36-inch steel pipe with 135 linear feet installed under wetlands associated with Cypress Strand Creek, a Class III Florida Waterbody, via jack-and-bore (this is a reduction of the previously authorized 42-inch steel pipe with approximately 210 linear feet under wetlands which ultimately connects the East Lake to South Lake 2). Approximately 0.02 acres of upland-cut ditch will be temporarily filled due to the installation of the pipe. The ditch will be restored to original contours after installation is complete;
3. Install a 24-inch reclaimed water main within uplands for connection to the new 36-inch intake pipe.

No adverse impacts to wetlands or the FEMA Floodplain are proposed or authorized. Authorized activities are depicted on the attached exhibits.

The above changes are not expected to adversely affect water quality and will not be contrary to the public interest provided the following activity description and permit specific conditions are amended/added (~~strike throughs~~ are deletions and underlines are additions) to the permit as issued:

PROJECT DESCRIPTION

The permittee is authorized to construct the Southeast Water Reclamation Facility Reclaimed Water Lake Expansion Project. The purpose of the project is to reconfigure ~~and expand~~ the capacity of the reclaimed water storage lakes at the facility. This system is regulated under the NPDES Permitting Program. The project includes the following activities:

- ~~Excavation of approximately 0.11 acres of upland cut ditches (FLUCCS 510), and the filling of 0.05 acres of upland cut ditches for the purpose of expanding (by 15 acres) an existing lake (East Lake) used to store reclaimed water;~~
- ~~Filling of 0.02 acres of mixed forested wetlands (FLUCCS 630) as part of the East Lake expansion;~~
- Installation of a ~~36~~ 42-inch steel pipe under ~~135~~ 240 linear feet of wetlands associated with Cypress Strand Creek, a Class III Florida Waterbody, via jack and bore (trenchless method, all bore pits will be located in uplands), to provide hydraulic connection between East Lake and South Lake,
- ~~Filling of 15.04 acres of open water (FLUCCS 530) and recontouring and excavation of 31.4 acres of lake bottom in the South Reclaimed Storage Lake;~~
- ~~Recontouring of lake bottom and excavation of 3.96 acres of upland pine flatwoods (FLUCCS 411) to expand within the East Reclaimed Storage Lake;~~
- Installation of a 24-inch reclaimed water main within uplands for connection to the new 36-inch intake pipe.

The ~~0.02 acres of fill impacts to moderate quality forested wetland (FLUCCS 630) for the construction of a portion of the berm on the East Lake expansion are considered to be de minimis in nature.~~ An active bald eagle's nest (MN051) occurs in the southwest corner of the project area. The permittee shall abide by U.S. Fish and Wildlife Service Permit Number MB33468C-0 which expires 9/30/2021 concerning any activities within 660 feet of the eagle nest. The activities proposed or authorized for this project and site construction will occur outside of the FEMA 100-year floodplain. No net loss or other adverse impacts to the floodplain are proposed or authorized. Authorized activities are depicted on the attached exhibits.

SPECIFIC CONDITIONS

1. Submittals required herein (e.g. as-built drawings, etc.) shall be submitted electronically (via e-mail, CD or DVD, or through a file transfer site) when practicable and shall include the permittee's name and permit number (41-0149008-~~009-EF-10-EM~~). Email submittals shall be sent to SW_ERP@floridadep.gov with a subject line of "Compliance: Permit Number 41-0149008-~~009-EF-10-EM~~", or by mail to:

Department of Environmental Protection
 Southwest District
 ATTN: Compliance Assurance (ERP)
 13051 North Telecom Parkway, Suite 101
 Temple Terrace, FL 33637-0926

SPECIFIC CONDITIONS- CONSTRUCTION ACTIVITIES

Lake Excavation

20. ~~Excavation~~ Recontouring of the lakes is limited to permitted design specifications as depicted on the attached permit drawings. If limestone bedrock is encountered during construction, the permittee shall notify the Department immediately and shall cease construction in the affected area. The permittee shall submit a design revision to the Department for review and approval that will demonstrate compliance with Rule 5.4.1.b. of the SWFWMD Applicant's Handbook, Volume II prior to proceeding with construction.

SPECIFIC CONDITIONS- CONSTRUCTION COMPLETION

23. The permittee shall submit one set of signed, dated and sealed as-built drawings to the Department via email at SW_ERP@dep.state.fl.us for review and approval within 30 days of completion of construction. (Please contact the Department for files that are too large to email)

for alternative means of submitting electronically.) The as-built drawings shall be based on the Department permitted construction drawings and any pertinent specific conditions, which should be revised to reflect changes made during construction. Both the original design and constructed elevations must be clearly shown. The plans must be clearly labeled as "as-built" or "record" drawings. Surveyed dimensions and elevations required shall be verified and signed, dated and sealed by a Florida registered professional. *As-builts shall be submitted to the Department regardless of whether deviations are present or not. In addition, the permittee shall submit the "As-Built Certification and Request for Conversion to Operation Phase" form (Ch. 62-330.310(1), F.A.C.); as required in General Condition #6.*

The following information shall be verified on the as-built drawings from the engineering drawings signed and sealed by William Wade Wood III, P.E., #69051, on November 19, 2018, ~~June 13, 2018~~:

Plan View/Cross Section Name	Drawing Number(s)
Proposed Overall Site Plan <u>Proposed Site Plan</u> Proposed Overall Site Plan <u>Lake Expansion Plan</u>	1

Since the proposed modification with the above permit conditions is not expected to result in any adverse environmental impact or water quality degradation, the permit is hereby modified as requested. By copy of this letter and the attached drawings, we are notifying all necessary parties of the modification(s).

This letter of approval does not alter the original construction phase expiration date, or the remaining Specific Conditions or General Conditions of the permit. This letter and accompanying drawings must be attached to the original permit.

RIGHTS OF AFFECTED PARTIES

This permit modification is hereby granted. This action is final and effective on the date filed with the Clerk of the Department unless a sufficient petition for an administrative hearing is timely filed under sections 120.569 and 120.57 of the Florida Statutes as provided below. If a sufficient petition for an administrative hearing is timely filed, this action automatically becomes only proposed agency action on the application, subject to the result of the administrative review process. Therefore, on the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because an administrative hearing may result in the reversal or substantial modification of this action, the applicant is advised not to commence construction or other activities until the deadlines noted below for filing a petition for an administrative hearing or request for an extension of time have expired.

Mediation is not available.

A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received by the clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000.

Under rule 62-110.106(4) of the Florida Administrative Code, a person whose substantial interests are affected by the Department's action may also request an extension of time to file a petition for an administrative hearing. The Department may, for good cause shown, grant the request for an extension of

time. Requests for extension of time must be filed with the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, before the applicable deadline. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon. If a request is filed late, the Department may still grant it upon a motion by the requesting party showing that the failure to file a request for an extension of time before the deadline was the result of excusable neglect.

If a timely and sufficient petition for an administrative hearing is filed, other persons whose substantial interests will be affected by the outcome of the administrative process have the right to petition to intervene in the proceeding. Intervention will be permitted only at the discretion of the presiding officer upon the filing of a motion in compliance with rule 28-106.205 of the Florida Administrative Code.

In accordance with rule 62-110.106(3), Florida Administrative Code, petitions for an administrative hearing by the applicant must be filed within 21 days of receipt of this written notice. Petitions filed by any persons other than the applicant, and other than those entitled to written notice under section 120.60(3) of the Florida Statutes must be filed within 21 days of publication of the notice or within 21 days of receipt of the written notice, whichever occurs first. Under section 120.60(3) of the Florida Statutes, however, any person who has asked the Department for notice of agency action may file a petition within 21 days of receipt of such notice, regardless of the date of publication.

The petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition for an administrative hearing within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57 of the Florida Statutes.

A petition that disputes the material facts on which the Department's action is based must contain the following information:

- (a) The name and address of each agency affected and each agency's file or identification number, if known;
- (b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests are or will be affected by the agency determination;
- (c) A statement of when and how the petitioner received notice of the agency decision;
- (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
- (e) A concise statement of the ultimate facts alleged, including the specific facts that the petitioner contends warrant reversal or modification of the agency's proposed action;
- (f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed action; and
- (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wishes the agency to take with respect to the agency's proposed action.

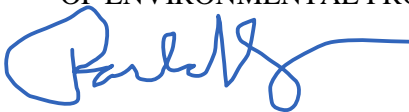
A petition that does not dispute the material facts on which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by rule 28-106.301.

Under sections 120.569(2)(c) and (d) of the Florida Statutes, a petition for administrative hearing must be dismissed by the agency if the petition does not substantially comply with the above requirements or is untimely filed.

This permit modification constitutes an order of the Department. Subject to the provisions of paragraph 120.68(7)(a) of the Florida Statutes, which may require a remand for an administrative hearing, the applicant has the right to seek judicial review of the order under section 120.68 of the Florida Statutes, by the filing of a notice of appeal under rule 9.110 of the Florida Rules of Appellate Procedure with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida, 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days from the date when the order is filed with the Clerk of the Department. The applicant, or any party within the meaning of section 373.114(1)(a) or 373.4275 of the Florida Statutes, may also seek appellate review of the order before the Land and Water Adjudicatory Commission under section 373.114(1) or 373.4275 of the Florida Statutes. Requests for review before the Land and Water Adjudicatory Commission must be filed with the Secretary of the Commission and served on the Department within 20 days from the date when the order is filed with the Clerk of the Department.

Executed in Hillsborough County, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION



Pamala Vazquez
Program Administrator
Permitting and Waste Cleanup Program
Southwest District

Copies furnished to:
Lee Cook, Quest Ecology Inc., lee@questecology.com

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this permit modification, including all copies, were mailed before the close of business on July 2, 2019, to the above listed persons.

FILING AND ACKNOWLEDGMENT

FILED, on this date, under 120.52(7) of the
Florida Statutes, with the designated Department Clerk,
receipt of which is hereby acknowledged.

Barbara Browning

Clerk

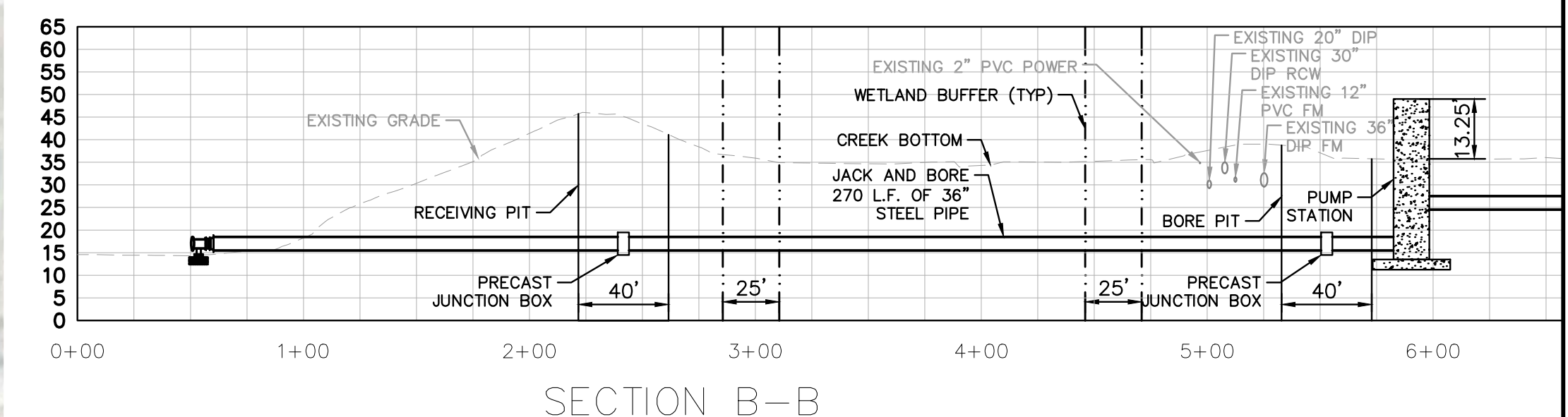
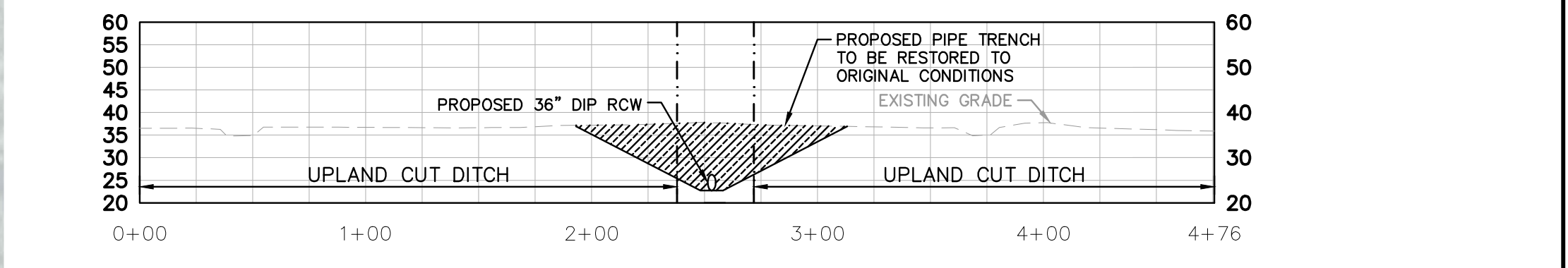
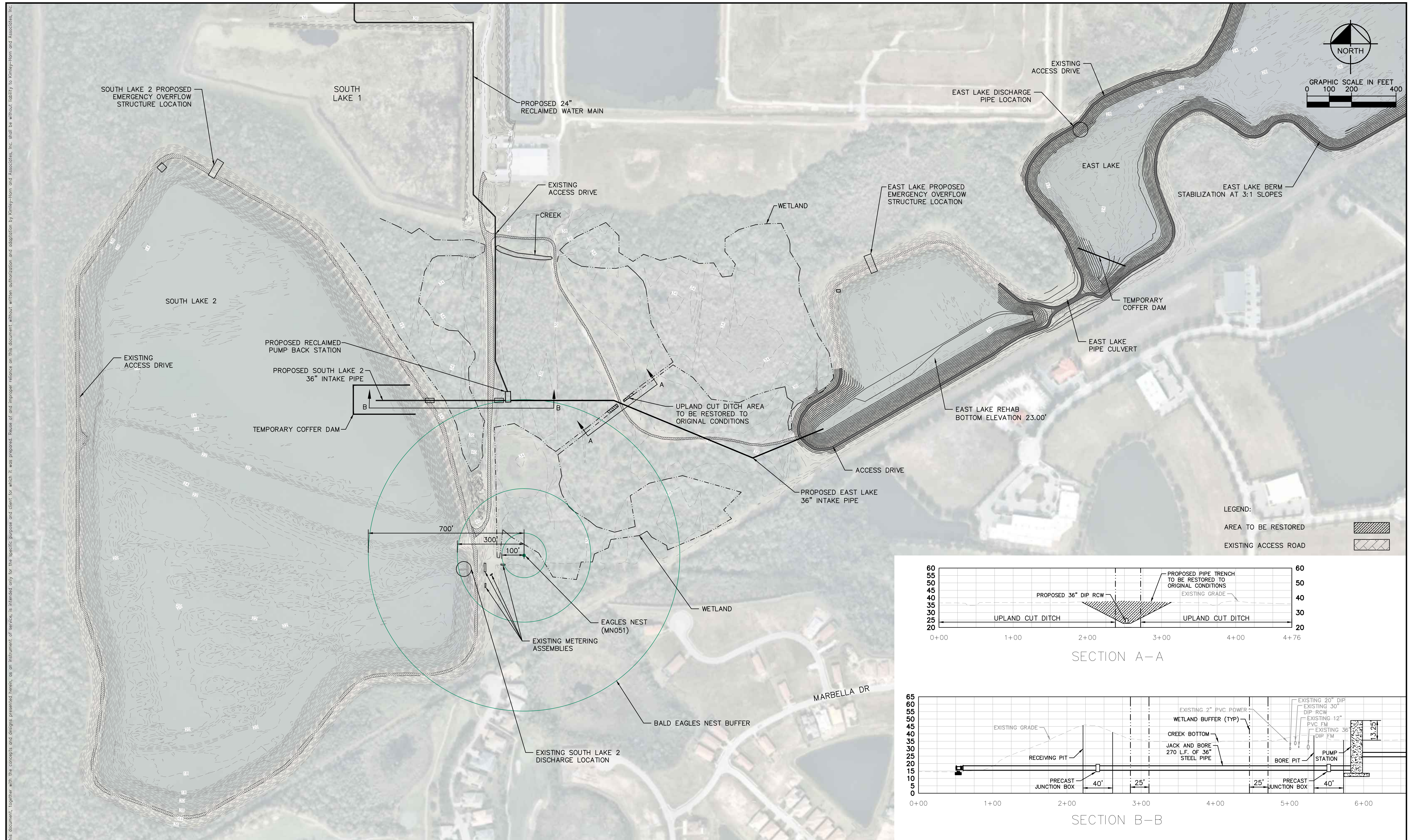
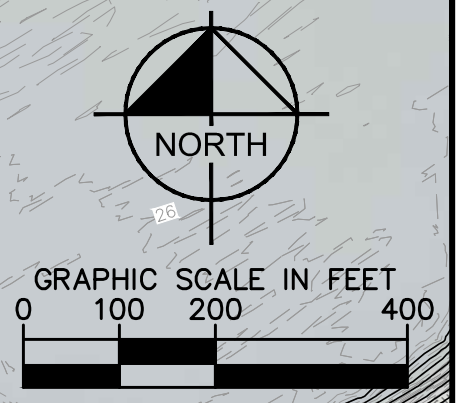
July 2, 2019
Date

Attachments:

Project Drawings (1 page)

Environmental Resource Permit No. 41-0149008-009-EI (original permit) (52 pages)

This document, together with the concepts and designs presented herein, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.



No.	REVISIONS	DATE	BY

Kimley»Horn

© 2018 KIMLEY-HORN AND ASSOCIATES, INC.
 655 NORTH FRANKLIN STREET, SUITE 150, TAMPA, FL 33602
 PHONE: 813-620-1460
 WWW.KIMLEY-HORN.COM CA 00000696

KHA PROJECT
148400015

DATE
11/19/2018

SCALE AS SHOWN

DESIGNED BY WWW

DRAWN BY ASR

CHECKED BY WEW

Manatee County
FLORIDA

**SEWRF RECLAIMED
PUMP BACK STATION**

MANATEE COUNTY

LICENSED PROFESSIONAL

W. WADE WOOD, P.E.

FL LICENSE NUMBER
69051

FL DATE:

SHEET NUMBER

PROPOSED SITE PLAN



Florida Department of Environmental Protection

Southwest District Office
13051 North Telecom Parkway, Suite 101
Temple Terrace, FL 33637-0926

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

June 22, 2018

Manatee County Public Works
c/o Sia Mollanazar
1022 26th Ave. E
Bradenton, FL 34208
Sia.mollanazar@mymanatee.org

Dear Mr. Mollanazar:

Enclosed is the Environmental Resource Permit, DEP Project No. 41-0149008-009-EI, issued pursuant to Part IV of Chapter 373, Florida Statutes, and Title 62, Florida Administrative Code.

Appeal rights for you and for any affected third party are described in the text of the permit along with conditions that must be met when authorized activities are undertaken.

You, as the applicant, are responsible for all aspects of permit compliance. You should therefore review this permit document carefully to ensure compliance with the general conditions and specific conditions contained herein.

Please be aware of permit General Condition number 4, which states, "At least 48 hours prior to beginning the authorized activities, the permittee shall submit to the Agency a fully executed Form 62-330.350(1), "Construction Commencement Notice"."

If you have any questions about this document, please contact me at mark.langford@dep.state.fl.us or (813) 470-5793.

Thank you for your participation in the permit process and in managing the natural resources of the State of Florida.

Sincerely,

A handwritten signature in blue ink, appearing to read "Mark Langford".

Mark Langford
Environmental Consultant
Permitting and Waste Cleanup Program

cc: Lee Cook, Quest Ecology Inc., lee@questecology.com

Enclosure: Environmental Resource Permit with Attachments (54 pages)



Florida Department of Environmental Protection

Southwest District Office
13051 North Telecom Parkway, Suite 101
Temple Terrace, FL 33637-0926

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

Permittee/Authorized Entity:

Manatee County Public Works
c/o Sia Mollanazar
1022 26th Ave. E
Bradenton, FL 34208

Southeast Water Reclamation Facility Lake Expansion Project

Authorized Agent:

Quest Ecology Inc.
c/o Lee Cook
735 Lakeview Dr.
Wimauma, FL 33598

Individual Environmental Resource Permit

State-owned Submerged Lands Authorization – Not Applicable

U.S. Army Corps of Engineers Authorization – Not Approved

Permit No.: 41-0149008-009-EI

Permit Issuance Date: June 22, 2018

Permit Construction Phase Expiration Date: June 22, 2023

Environmental Resource Permit

Permittee: Manatee County Public Works
Permit No: 41-0149008-009-EI

PROJECT LOCATION

The activities authorized by this permit are located at the Manatee County Southeast Water Reclamation Facility at 3331 Lena Road, Bradenton, FL 34211, in Sections 6 and 7 Township 35 South, Range 19 East, and Sections 1 and 12, Township 35 South, Range 18 East, in Manatee County, at approximate latitude 27° 27' 41.1719" /longitude -82° 26' 43.4311".

PROJECT DESCRIPTION

The permittee is authorized to construct the Southeast Water Reclamation Facility Reclaimed Water Lake Expansion Project. The purpose of the project is to reconfigure and expand the capacity of the reclaimed water storage lakes at the facility. This system is regulated under the NPDES Permitting Program. The project includes the following activities:

- Excavation of approximately 0.11 acres of upland-cut ditches (FLUCCS 510), and the filling of 0.05 acres of upland-cut ditches for the purpose of expanding (by 15 acres) an existing lake (East Lake) used to store reclaimed water,
- Filling of 0.02 acres of mixed forested wetlands (FLUCCS 630) as part of the East Lake expansion,
- Installation of a 42-inch steel pipe under 210 linear feet of wetlands associated with Cypress Strand Creek, a Class III Florida Waterbody, via jack and bore (trenchless method, all bore pits will be located in uplands), to provide hydraulic connection between East Lake and South Lake,
- Filling of 15.04 acres of open water (FLUCCS 530) and recontouring and excavation of 31.4 acres of lake bottom in the South Reclaimed Storage Lake,
- Recontouring of lake bottom and excavation of 3.96 acres of upland pine flatwoods (FLUCCS 411) to expand the East Reclaimed Storage Lake.

The 0.02 acres of fill impacts to moderate-quality forested wetland (FLUCCS 630) for the construction of a portion of the berm on the East Lake expansion are considered to be de minimis in nature. An active bald eagle's nest (MN051) occurs in the southwest corner of the project area. The permittee shall abide by U.S. Fish and Wildlife Service Permit Number MB33468C-0 which expires 9/30/2021 concerning any activities within 660 feet of the eagle nest. The activities proposed or authorized for this project and site construction will occur outside of the FEMA 100-year floodplain. No net loss or other adverse impacts to the floodplain are proposed or authorized. Authorized activities are depicted on the attached exhibits.

AUTHORIZATIONS

Southeast Water Reclamation Facility Lake Expansion Project

Environmental Resource Permit

The Department has determined that the activity qualifies for an Environmental Resource Permit. Therefore, the Environmental Resource Permit is hereby granted, pursuant to Part IV of Chapter 373, Florida Statutes (F.S.), and Chapter 62-330, Florida Administrative Code (F.A.C.).

Sovereignty Submerged Lands Authorization

As staff to the Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees), the Department has determined the activity is not on submerged lands owned by the State of Florida. Therefore, your project is not subject to the requirements of Chapter 253, F.S., or Rule 18-21, F.A.C.

Federal Authorization

This permit does not include federal authorization or imply the presence or limits of Waters of the United States (WOTUS) on the subject property. Activities that may impact WOTUS shall require a separate permit from the Corps. It is recommended that you contact your local Corps office to determine whether your project site contains WOTUS and/or if a Department of the Army permit is needed. A map of local Corps offices and the federal application form (ENG 4345) are available online at the Jacksonville District Regulatory Division website.

Authority for review - an agreement with the USACOE entitled “Coordination Agreement Between the U. S. Army Corps of Engineers (Jacksonville District) and the Florida Department of Environmental Protection, or Duly Authorized Designee, State Programmatic General Permit”, Section 10 of the Rivers and Harbor Act of 1899, and Section 404 of the Clean Water Act.

Coastal Zone Management

Issuance of this authorization also constitutes a finding of consistency with Florida's Coastal Zone Management Program, as required by Section 307 of the Coastal Zone Management Act.

Water Quality Certification

This permit also constitutes a water quality certification under Section 401 of the Clean Water Act, 33 U.S.C. 1341

Other Authorizations

You are advised that authorizations or permits for this activity may be required by other federal, state, regional, or local entities including but not limited to local governments or municipalities. This permit does not relieve you from the requirements to obtain all other required permits or authorizations.

The activity described may be conducted only in accordance with the terms, conditions and attachments contained in this document. Issuance and granting of the permit and authorizations herein do not infer, nor guarantee, nor imply that future permits, authorizations, or modifications will be granted by the Department.

PERMIT CONDITIONS

The activities described must be conducted in accordance with:

- **The Specific Conditions**
- **The General Conditions**
- **The limits, conditions and locations of work shown in the attached drawings**
- **The term limits of this authorization**

You are advised to read and understand these conditions and drawings prior to beginning the authorized activities, and to ensure the work is conducted in conformance with all the terms, conditions, and drawings herein. If you are using a contractor, the contractor should also read and understand these conditions and drawings prior to beginning any activity. Failure to comply with these conditions, including any mitigation requirements, shall be grounds for the Department to revoke the permit and authorization and to take appropriate enforcement action. Operation of the facility is not authorized except when determined to be in conformance with all applicable rules and this permit, as described.

SPECIFIC CONDITIONS

1. Submittals required herein for compliance (e.g. as-built drawings, etc.) shall be submitted electronically (via e-mail, CD or DVD, or through a file transfer site) when practicable and shall include the permittee's name and permit number (41-0149008-009-EI). Email submittals shall be sent to SW_ERP@floridadep.gov with a subject line of "Compliance: Permit Number 41-0149008-009-EI", or by mail to:

Department of Environmental Protection
Southwest District
ATTN: Compliance Assurance (ERP)
13051 North Telecom Parkway, Suite 101
Temple Terrace, FL 33637-0926

2. The work authorized by this permit shall not be placed/conducted on any property other than that owned by the permittee, without the prior written approval of that property owner.
3. In the event the permittee files for bankruptcy prior to completion of work permitted and required by this permit, the permittee must notify the Department within 30 days of filing. The notification shall identify the bankruptcy court and case number and shall include a copy of the bankruptcy petition.

SPECIFIC CONDITIONS - PRIOR TO ANY CONSTRUCTION

4. Prior to construction, the limits of impact shall be clearly marked in a way which is visible and obvious to anyone performing work on-site, including someone operating heavy equipment. Orange construction fence or tall flagged stakes along the construction limits are possible methods.
5. Best management practices for erosion control shall be implemented prior to construction commencement and shall always be maintained during construction to prevent siltation and turbid discharges in excess of State water quality standards pursuant to Rule 62-302, F.A.C. Methods may include, but are not limited to, the use of staked hay bales, staked filter cloth, sodding, seeding, staged construction and the installation of turbidity screens around the immediate project site.
6. Prior to initiation of any work authorized by this permit, all wetlands and surface waters outside the specific limits of construction authorized by this permit shall be protected from erosion, siltation, sedimentation, and/or scouring, including the placement of staked erosion control devices around the project area and staging area(s) that are located outside of any authorized impact areas.

7. The following boundaries, as shown on the approved construction drawings, shall be clearly delineated on site prior to initial clearing or grading activities:
 - a. wetland buffers

SPECIFIC CONDITIONS – CONSTRUCTION ACTIVITIES

Erosion & Sedimentation Control

8. Areas of exposed soils shall be isolated from wetlands or other surface waters to prevent erosion and deposition of these soils into wetlands or other surface waters during permitted activities.
9. The permittee shall be responsible for ensuring erosion control devices/procedures are inspected and maintained daily during all phases of construction authorized by this permit until areas disturbed during construction are sufficiently stabilized to prevent erosion, siltation, and turbid discharges.
10. Staked filter cloth shall be positioned at the edge of the permitted fill slopes adjacent to wetlands to prevent turbid run-off and erosion.
11. Grass seed, or sod shall be installed and maintained on exposed slopes and disturbed soil areas within 48 hours of completing final grade, and at other times as necessary, to prevent erosion, sedimentation or turbid discharges into waters of the state and adjacent wetlands. A vegetative cover that stabilizes and prevents erosion of the fill material shall be established within 60 days of sodding or seeding. Turbidity barriers/erosion control devices shall be removed upon establishment of a substantial vegetative cover.
12. The following measures shall be taken immediately by the permittee when turbidity levels within waters of the State surrounding the project site exceed 29 NTUs above background:
 - a. Immediately cease work contributing to the water quality violation.
 - b. Stabilize exposed soils contributing to the violation. Modify the work procedures responsible for the violation, install additional turbidity containment devices and repair non-functioning turbidity containment devices.
 - c. Notify the Department within 24 hours of the time the violation is first detected.
13. Wetland areas or waterbodies that are outside the specific limits of construction authorized by this permit, must be protected from erosion, sedimentation, siltation, scouring, excess turbidity, and/or dewatering. There shall be no discharge in violation of the water quality standards in Chapter 62-302, F.A.C. Turbidity/erosion controls shall be installed prior to clearing, excavation or placement of fill material, shall be maintained until construction is completed, disturbed areas are stabilized, and turbidity levels have fallen to less than 29 NTU's above background. The turbidity and erosion control devices shall be removed within 14 days once these conditions are met.

14. The following construction sequence and reporting requirements shall be followed for temporary placement of fill in laydown areas or other stockpile areas:
 - a. Prior to the placement of fill material for temporary access, the permittee shall flag and stake the areas to be filled and photograph the areas to show the pre-construction conditions. Photograph locations shall be identified on a permit drawing. The photographs and location drawing shall be submitted to the Department prior to placement of fill in these areas.
 - b. Prior to placement of the temporary fill, best management practices (i.e., hay bales, silt fences, etc.) shall be installed along the perimeter of the fill area to prevent erosion of the material into surface waters or wetlands.
 - c. Within 14 days of the completion of construction, the temporary fill shall be removed, and the ground elevation contours shall be restored to pre-existing elevations to promote natural re-vegetation of the area.
 - d. Photographs of the area shall be taken from the same locations as required in (a) within 72 hours of grading of the fill area. These photographs shall be combined with the photographs required in (a) and the location map required in (a) and shall be submitted to the Department within 14 days of the completion of the regrading.
 - e. Photographs of the area shall be taken from the same locations as required in (a), to show the condition of vegetation and substrate within the temporary fill areas one year after grading has been completed. The photographs and a map showing the photograph locations shall be submitted to the Department within 14 days of being taken.

Wetlands and Wetland Buffers

15. Wetland buffers shall remain in an undisturbed condition unless otherwise specified in this permit. Wetland buffer boundaries, as shown on the approved construction drawings, shall be clearly flagged or otherwise delineated on site prior to initial clearing or grading activities. The delineation shall endure throughout the construction period and be readily discernible to construction and Department personnel.
16. Unauthorized impacts to wetlands resulting from authorized construction shall be reported to the Department within 24 hours.
17. This permit does not authorize the installation of water, sewer, cable or utility lines within wetlands or waterbodies.
18. Storage or stockpiling of tools and materials (i.e., lumber, pilings, debris) within wetlands or other surface waters is prohibited.
19. The permittee shall abide by U.S. Fish and Wildlife Service Permit Number MB33468C-0 which expires 9/30/2021 concerning any activities within 660 feet of the eagle nest.

Lake Excavation

- 20. Excavation of the lakes is limited to permitted design specifications as depicted on the attached permit drawings. If limestone bedrock is encountered during construction, the permittee shall notify the Department immediately and shall cease construction in the affected area. The permittee shall submit a design revision to the Department for review and approval that will demonstrate compliance with Rule 5.4.1.b. of the SWFWMD Applicant's Handbook, Volume II prior to proceeding with construction.
- 21. The permittee shall notify the Department of any sinkhole development in the lakes within 24 hours after discovery and must submit a detailed sinkhole evaluation and repair plan for Department approval within 30 days of discovery.

SPECIFIC CONDITIONS- CONSTRUCTION COMPLETION

- 22. Any temporary laydown areas must be reclaimed (as applicable), decompacted, and seeded.
- 23. The permittee shall submit one set of signed, dated and sealed as-built drawings to the Department via email at SW_ERP@dep.state.fl.us for review and approval within 30 days of completion of construction. (Please contact the Department for files that are too large to email for alternative means of submitting electronically.) The as-built drawings shall be based on the Department permitted construction drawings and any pertinent specific conditions, which should be revised to reflect changes made during construction. Both the original design and constructed elevations must be clearly shown. The plans must be clearly labeled as "as-built" or "record" drawings. Surveyed dimensions and elevations required shall be verified and signed, dated and sealed by a Florida registered professional. *As-builts shall be submitted to the Department regardless of whether deviations are present or not. In addition, the permittee shall submit the "As-Built Certification and Request for Conversion to Operation Phase" form (Ch. 62-330.310(1), F.A.C.); as required in General Condition #6.*

The following information shall be verified on the as-built drawings from the engineering drawings signed and sealed by William Wade Wood III, P.E., #69051, on June 13, 2018:

Plan View/Cross Section Name	Drawing Number(s)
Overall Site Plan – Lake Expansion Plan	1

GENERAL CONDITIONS FOR INDIVIDUAL PERMITS

- 1. All activities shall be implemented following the plans, specifications and performance criteria approved by this permit. Any deviations must be authorized in a permit modification in accordance with Rule 62-330.315, F.A.C. Any deviations that are not so authorized may subject the permittee to enforcement action and revocation of the permit under Chapter 373, F.S.
- 2. A complete copy of this permit shall be kept at the work site of the permitted activity during the construction phase and shall be available for review at the work site upon request by the Agency staff. The permittee shall require the contractor to review the complete permit prior to beginning construction.

3. Activities shall be conducted in a manner that does not cause or contribute to violations of state water quality standards. Performance-based erosion and sediment control best management practices shall be installed immediately prior to, and be maintained during and after construction as needed, to prevent adverse impacts to the water resources and adjacent lands. Such practices shall be in accordance with the *State of Florida Erosion and Sediment Control Designer and Reviewer Manual (Florida Department of Environmental Protection and Florida Department of Transportation June 2007)*, and the *Florida Stormwater Erosion and Sedimentation Control Inspector's Manual (Florida Department of Environmental Protection, Nonpoint Source Management Section, Tallahassee, Florida, July 2008)*, which are both incorporated by reference in subparagraph 62-330.050(9)(b)5., F.A.C., unless a project-specific erosion and sediment control plan is approved or other water quality control measures are required as part of the permit.
4. At least 48 hours prior to beginning the authorized activities, the permittee shall submit to the Agency a fully executed Form 62-330.350(1), "Construction Commencement Notice," [October 1, 2013], which is incorporated by reference in paragraph 62-330.350(1)(d), F.A.C., indicating the expected start and completion dates. A copy of this form may be obtained from the Agency, as described in subsection 62-330.010(5), F.A.C. If available, an Agency website that fulfills this notification requirement may be used in lieu of the form.
5. Unless the permit is transferred under Rule 62-330.340, F.A.C., or transferred to an operating entity under Rule 62-330.310, F.A.C., the permittee is liable to comply with the plans, terms and conditions of the permit for the life of the project or activity.
6. Within 30 days after completing construction of the entire project, or any independent portion of the project, the permittee shall provide the following to the Agency, as applicable:
 - a. For an individual, private single-family residential dwelling unit, duplex, triplex, or quadruplex – "Construction Completion and Inspection Certification for Activities Associated with a Private Single-Family Dwelling Unit" [Form 62-330.310(3)]; or
 - b. For all other activities – "As-Built Certification and Request for Conversion to Operational Phase" [Form 62-330.310(1)].
 - c. If available, an Agency website that fulfills this certification requirement may be used in lieu of the form.
7. If the final operation and maintenance entity is a third party:
 - a. Prior to sales of any lot or unit served by the activity and within one year of permit issuance, or within 30 days of as-built certification, whichever comes first, the permittee shall submit, as applicable, a copy of the operation and maintenance documents (see sections 12.3 thru 12.3.3 of Volume I) as filed with the Department of State, Division of Corporations and a copy of any easement, plat, or deed restriction needed to operate or maintain the project, as recorded with the Clerk of the Court in the County in which the activity is located.

- b. Within 30 days of submittal of the as-built certification, the permittee shall submit “Request for Transfer of Environmental Resource Permit to the Perpetual Operation Entity” [Form 62-330.310(2)] to transfer the permit to the operation and maintenance entity, along with the documentation requested in the form. If available, an Agency website that fulfills this transfer requirement may be used in lieu of the form.
8. The permittee shall notify the Agency in writing of changes required by any other regulatory agency that require changes to the permitted activity, and any required modification of this permit must be obtained prior to implementing the changes.
9. This permit does not:
 - a. Convey to the permittee any property rights or privileges, or any other rights or privileges other than those specified herein or in Chapter 62-330, F.A.C.;
 - b. Convey to the permittee or create in the permittee any interest in real property;
 - c. Relieve the permittee from the need to obtain and comply with any other required federal, state, and local authorization, law, rule, or ordinance; or
 - d. Authorize any entrance upon or work on property that is not owned, held in easement, or controlled by the permittee.
10. Prior to conducting any activities on state-owned submerged lands or other lands of the state, title to which is vested in the Board of Trustees of the Internal Improvement Trust Fund, the permittee must receive all necessary approvals and authorizations under Chapters 253 and 258, F.S. Written authorization that requires formal execution by the Board of Trustees of the Internal Improvement Trust Fund shall not be considered received until it has been fully executed.
11. The permittee shall hold and save the Agency harmless from any and all damages, claims, or liabilities that may arise by reason of the construction, alteration, operation, maintenance, removal, abandonment or use of any project authorized by the permit.
12. The permittee shall notify the Agency in writing:
 - a. Immediately if any previously submitted information is discovered to be inaccurate; and
 - b. Within 30 days of any conveyance or division of ownership or control of the property or the system, other than conveyance via a long-term lease, and the new owner shall request transfer of the permit in accordance with Rule 62-330.340, F.A.C. This does not apply to the sale of lots or units in residential or commercial subdivisions or condominiums where the stormwater management system has been completed and converted to the operation phase.
13. Upon reasonable notice to the permittee, Agency staff with proper identification shall have permission to enter, inspect, sample and test the project or activities to ensure conformity with the plans and specifications authorized in the permit.

14. If any prehistoric or historic artifacts, such as pottery or ceramics, stone tools or metal implements, dugout canoes, or any other physical remains that could be associated with Native American cultures, or early colonial or American settlement are encountered at any time within the project site area, work involving subsurface disturbance in the immediate vicinity of such discoveries shall cease. The permittee or other designee shall contact the Florida Department of State, Division of Historical Resources, Compliance and Review Section, at (850) 245-6333 or (800) 847-7278, as well as the appropriate permitting agency office. Such subsurface work shall not resume without verbal or written authorization from the Division of Historical Resources. If unmarked human remains are encountered, all work shall stop immediately, and notification shall be provided in accordance with Section 872.05, F.S.
15. Any delineation of the extent of a wetland or other surface water submitted as part of the permit application, including plans or other supporting documentation, shall not be considered binding unless a specific condition of this permit or a formal determination under Rule 62-330.201, F.A.C., provides otherwise.
16. The permittee shall provide routine maintenance of all components of the stormwater management system to remove trapped sediments and debris. Removed materials shall be disposed of in a landfill or other uplands in a manner that does not require a permit under Chapter 62-330, F.A.C., or cause violations of state water quality standards.
17. This permit is issued based on the applicant's submitted information that reasonably demonstrates that adverse water resource-related impacts will not be caused by the completed permit activity. If any adverse impacts result, the Agency will require the permittee to eliminate the cause, obtain any necessary permit modification, and take any necessary corrective actions to resolve the adverse impacts.
18. A Recorded Notice of Environmental Resource Permit may be recorded in the county public records in accordance with subsection 62-330.090(7), F.A.C. Such notice is not an encumbrance upon the property.

NOTICE OF RIGHTS

This action is final and effective on the date filed with the Clerk of the Department unless a petition for an administrative hearing is timely filed under Sections 120.569 and 120.57, F.S., before the deadline for filing a petition. On the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because the administrative hearing process is designed to formulate final agency action, the hearing process may result in a modification of the agency action or even denial of the application.

Petition for Administrative Hearing

A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, F.S. Pursuant to Rule 28-106.201, F.A.C., a petition for an administrative hearing must contain the following information:

- (a) The name and address of each agency affected and each agency's file or identification number, if known;

- (b) The name, address, any email address, any facsimile number, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests are or will be affected by the agency determination;
- (c) A statement of when and how the petitioner received notice of the agency decision;
- (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
- (e) A concise statement of the ultimate facts alleged, including the specific facts that the petitioner contends warrant reversal or modification of the agency's proposed action;
- (f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes; and
- (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wishes the agency to take with respect to the agency's proposed action.

The petition must be filed (received by the Clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. Also, a copy of the petition shall be mailed to the applicant at the address indicated above at the time of filing.

Time Period for Filing a Petition

In accordance with Rule 62-110.106(3), F.A.C., petitions for an administrative hearing by the applicant must be filed within 21 days of receipt of this written notice. Petitions filed by any persons other than the applicant, and other than those entitled to written notice under Section 120.60(3), F.S., must be filed within 21 days of publication of the notice or within 21 days of receipt of the written notice, whichever occurs first. Under Section 120.60(3), F.S., however, any person who has asked the Department for notice of agency action may file a petition within 21 days of receipt of such notice, regardless of the date of publication. The failure to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, F.A.C.

Extension of Time

Under Rule 62-110.106(4), F.A.C., a person whose substantial interests are affected by the Department's action may also request an extension of time to file a petition for an administrative hearing. The Department may, for good cause shown, grant the request for an extension of time. Requests for extension of time must be filed with the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, before the applicable deadline for filing a petition for an administrative hearing. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

Mediation

Mediation is not available in this proceeding.

FLAWAC Review

The applicant, or any party within the meaning of Section 373.114(1)(a) or 373.4275, F.S., may also seek appellate review of this order before the Land and Water Adjudicatory Commission under Section 373.114(1) or 373.4275, F.S. Requests for review before the Land and Water Adjudicatory Commission must be filed with the Secretary of the Commission and served on the Department within 20 days from the date when this order is filed with the Clerk of the Department.

Judicial Review

Once this decision becomes final, any party to this action has the right to seek judicial review pursuant to Section 120.68, F.S., by filing a Notice of Appeal pursuant to Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, M.S. 35, Tallahassee, Florida 32399-3000; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this action is filed with the Clerk of the Department.

Executed in Hillsborough County, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION



Pamala Vazquez
Program Administrator
Permitting and Waste Cleanup Program
Southwest District

Attachments:

- Project Drawings and Design Specifications (1 page)
- USFWS Bald Eagle Permit No. MB33468C-0 (31 pages)
- Florida State Historic Preservation Office Review Comments (1 page)
- Construction Commencement Notice/Form 62-330.350(1) (1 page)
- Operation and Maintenance Inspection Certification 62-330.311(1) (2 pages)
- As-built Certification & Request for Conversion to Operational Phase/Form 62-330.310(1) (2 pages)
- Request for Transfer to the Perpetual Operation Entity/Form 62-330.310(2) (1 page)
- Request to Transfer Permit/Form 62-330.340(1) (2 pages)

Copies furnished to:

Lee Cook, Quest Ecology Inc., lee@questecology.com

CERTIFICATE OF SERVICE

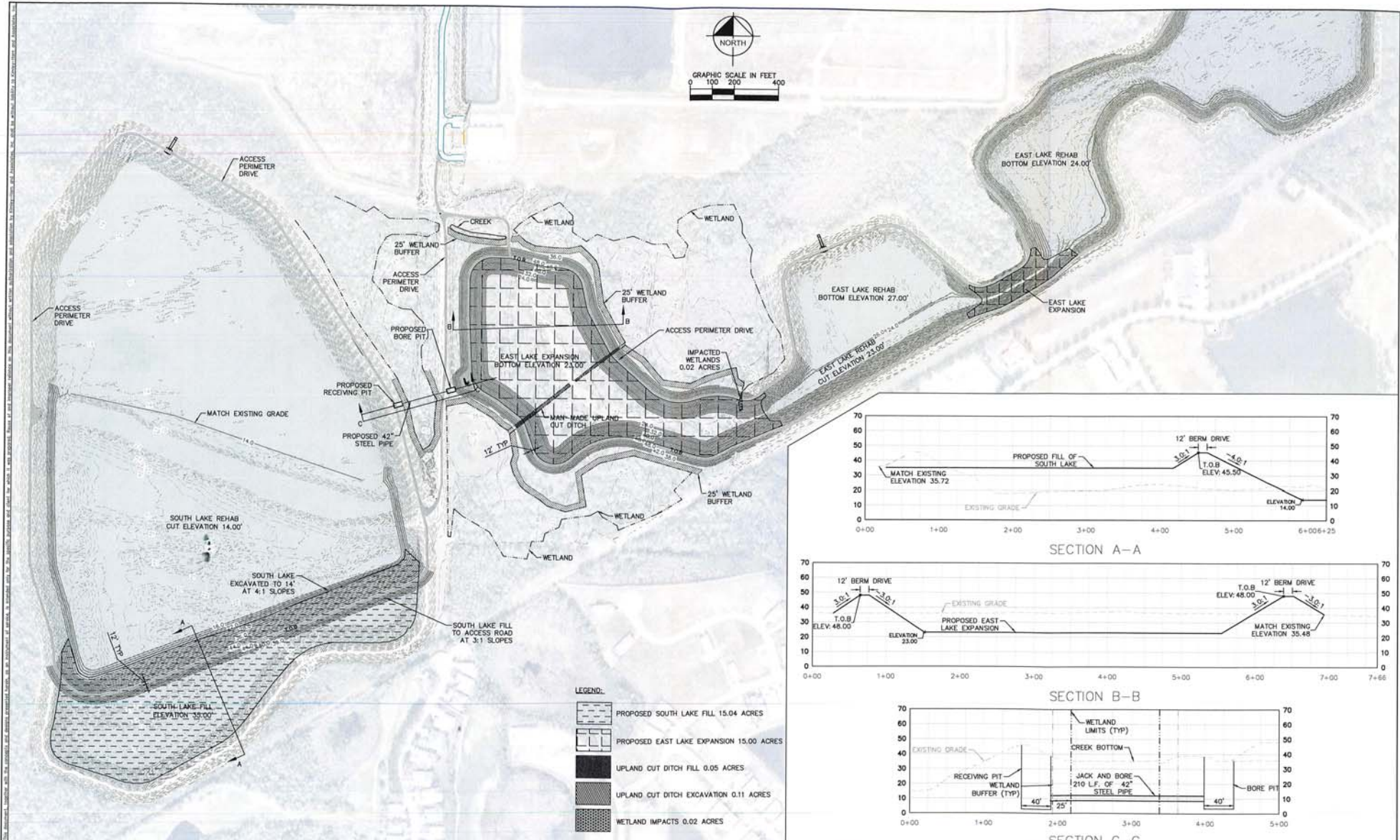
The undersigned hereby certifies that this permit, including all copies, were mailed before the close of business on June 22, 2018, to the above listed persons.

FILING AND ACKNOWLEDGMENT

FILED, on this date, under 120.52(7) of the Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.


Clerk

June 22, 2018
Date



No.	REVISIONS	DATE	BY

Kimley»Horn

© 2018 KIMLEY-HORN AND ASSOCIATES, INC.
 655 NORTH FRANKLIN STREET, SUITE 130, TAMPA, FL 33602
 PHONE: 813-620-1450
 WWW.KIMLEY-HORN.COM CA 00000696

KHA PROJECT
 148400015
 DATE
 3/20/2018
 SCALE AS SHOWN
 DESIGNED BY WWJ
 DRAWN BY MAS
 CHECKED BY WEW
 MANATEE COUNTY

Manatee County

SEWRf RECLAIMED PUMP BACK STATION

Professional Engineer Seal: William Wade Wood, P.E., No. 69651, State of Florida, License No. 69651, Date: 2018.06.13/07.29.22

LAKE EXPANSION PLAN

SHEET NUMBER
1



Forested wetlands associated with Cypress Strand Creek. Horizontal directional drilling is proposed under the creek and associated wetlands. Bore pits will be in uplands. No wetland impacts are proposed.



Cypress Strand Creek.

APPENDIX C

EAGLE TAKE DOCUMENTS



Permit Number: MB33468C-0
Effective: 08/24/2017 Expires: 09/30/2021

Issuing Office:

Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Migratory Bird Permit Office
1875 Century Boulevard, NE
Atlanta, GA 30345
Tel: 404-679-7070 Fax: 404-679-4180

AUG 24 2017
Carmen P. Simenton
CHIEF, MIGRATORY BIRD PERMIT OFFICE - REGION 4

Permittee:

MANATEE COUNTY GOVERNMENT
dba MANATEE COUNTY PUBLIC WORKS
1022 26TH AVENUE EAST
BRADENTON, FL 34206
U.S.A.

Name and Title of Principal Officer:

SIA MOLLANAZAR - DEPUTY DIRECTOR OF ENGINEERING SERVICES

Authority: Statutes and Regulations: 16 USC 668a; 50 CFR 13, 50 CFR 22.26, 50 CFR 22.27.

Location where authorized activity may be conducted:

See Condition D.

Reporting requirements:

Eagle Nest Take: Monitoring requirements are outlined in Condition F and in Condition I. Monitoring Requirements. Reporting requirements are outlined in Conditions D, E, F and in Condition I.3. Eagle Nest Take Reporting Requirements.

Eagle Take Disturbance: Reporting requirements are outlined in Conditions D, E, and in Condition J.12. Monitoring Requirements. Eagle reporting requirements are outlined in Conditions D and E and in J.13. Eagle Take Disturbance Reporting Requirements.

Authorizations and Conditions:

A. General conditions set out in Subpart B of 50 CFR 13, and specific conditions contained in Federal regulations cited above, are hereby made a part of this permit. All activities authorized herein must be carried out in accord with and for the purposes described in the application submitted. Continued validity, or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.

B. The validity of this permit is also conditioned upon strict observance of all applicable foreign, state, local tribal, or other federal law.

C. Valid for use by permittee named above.

D. You are authorized to take (2) pairs of nesting Bald Eagles known as MN023 and MN051 by means of disturbance and take (1) pair of nesting Bald Eagles known as MN972 by means of disturbance caused by removal of the inactive eagle nest and the nest tree. Disturbance includes the loss of productivity of eggs or young due to potential abandonment of these Bald Eagle nests during the course of the following activity: the Three Segment 44th Avenue East public roadway expansion project, including stormwater management facilities, located in Manatee County, Florida, where the take is necessary to protect an interest in a particular locality and the mitigation for the take will, with reasonable certainty, provide a clear and substantial benefit to eagles.

The Western Segment contains MN023, the Middle Segment contains MN972 and the Eastern Segment contains MN051.



You are authorized to remove and destroy by burial, mulching or incineration, the inactive Bald Eagle nest MN972 from the Middle Segment once your monitoring determines that the nest is inactive. An inactive nest is defined as a Bald Eagle nest that is not currently being used by eagles as determined by the continuing absence of any adult, egg, or dependent young at the nest for at least 10 consecutive days immediately prior to, and including, at present. An inactive nest may become active again and remains protected under the Eagle Act.

Manatee County eagle nest MN023, authorized for disturbance is located at latitude 27°27' 37.095"N and longitude -82° 29' 12.848" W.

Manatee County eagle nest MN051, authorized for disturbance is located at latitude 27°27' 35"N and longitude -82° 26'48.65" W.

Manatee County eagle nest MN972, authorized for nest take/disturbance is located at latitude 27°27' 40.15"N and longitude -82° 27'55.47"W.

If a new eagle nest is built at or adjacent to the location described above, you must report that new eagle nest location within 10 days to the Southeast Region Eagle Biologist at (321) 972-9089. A permit amendment to authorize take (disturbance) at this new nest location may be required.

To disturb/disturbance means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

E. This permit does not authorize lethal take or injury of any eagles, excluding take of eggs or young by nest abandonment as described in Condition D, nor does it authorize take of any Bald Eagle nest other than eagle nest MN972.

You must contact the migratory bird permit issuing office at (404) 679-4163 immediately upon discovery of any unanticipated take or regarding any apparent injury or death occurring to any eagle for any reason during project activities.

F. Inactive Bald Eagle Nest Removal: You are required to determine that the eagle nest is inactive prior to your requested nest removal activities. You are required to monitor the eagle nest for activity or use of the area for 10 consecutive days to insure that the nest is inactive.

If an eagle is observed at the nest or if another migratory bird species occupies the eagle nest and has eggs or young during this 10 day monitoring period, you are required to notify the Southeast Region Eagle Biologist immediately at (321) 972-9089 and you must cease all nest removal activity.

G. You are authorized to salvage eagle carcasses, feathers and parts including nonviable eggs found in the eagle nest and on the ground in the vicinity of the nest. Any salvaged items must be shipped within 30 days to the National Eagle Repository. Contact: U.S. Fish and Wildlife Service National Eagle and Wildlife Repository, RMA, Bldg. 128, 6550 Gateway Road, Commerce City, CO, 80022-1798, (303) 287-2110.

Nonviable eagle eggs must be destroyed or donated to a qualified federally permitted public museum, public scientific society, or public zoological park, as defined in 50 CFR 10.12 and with prior approval by the migratory bird permit issuing office.

H. You must comply with all avoidance, minimization, or other mitigation measures prescribed by this permit for the eagle(s) and eagle nest(s) identified in Condition D. All minimization measures, unless noted otherwise, are applicable during the Bald Eagle nesting season (October 1-May 15), or when any eagles are present at the nest site, which may be before October 1 or after May 15:

1. Conservation Easement.

- a. You will establish a Conservation Easement over approximately 24 acres of suitable bald eagle habitat adjacent to the Duette Preserve in Manatee County. The Easement must be recorded with the Clerk of Manatee County, Florida, within 6 months of initiating construction activities on the Project Site. Permittee shall provide a copy of the Easement to the migratory bird permit issuing office at 1875 Century Boulevard NE, Atlanta, Georgia, 30345.
- b. All habitat management activities within the Conservation Easement will be for the conservation, protection and enhancement of natural resources only and will be conducted outside of eagle nesting season (October 1-May15) or when the eagles are present unless the lead land manager and the permittee have deemed it necessary during the nesting season. Written justification for the decision must be kept on file with the permittee. Noise and equipment used for land management activities must be minimized during the eagle nesting season,



- c. You may remove all exotic and/or invasive species of vegetation outside of nesting eagle or when eagles are not present. Native vegetation will not be removed within the Conservation Easement/Eagle Nest Buffer Area unless it is deemed necessary to best manage the habitat for eagles. Utilize the removal of exotic and/or invasive species to ensure proper management of the timber stands containing any eagle nest.
- d. You will provide written notification to the migratory bird permit issuing office within 30 days regarding any proposed Assignment or Modifications to the Conservation Easement. The U.S. Fish and Wildlife Service is required to be a signatory 3rd party on any changes made to the Conservation Easement.

2. Protected Species Management.

If you have any questions regarding the following minimization measures 2.a-c, please contact the U.S. Fish and Wildlife Service North Florida Ecological Services Office (FWS NFESO) at (904) 731-3336.

- a. Implement the August 12, 2013, Standard Protection Measures for the Eastern Indigo Snake on the entire project property. The measures can be found at https://www.fws.gov/northflorida/indigosnakes/20130812_eastern_indigo_snake_standard_protection_measures.htm.
- b. You must follow all provisions prescribed by any U.S. Fish and Wildlife Service Biological Opinion or Technical Assistance letter or correspondence pertaining to the Audubon Crested Caracara and any other migratory bird species that were issued or provided prior to the issuance of this Eagle Take permit. If any caracaras or nests are observed within the project area during construction, all construction must be halted and the FWS NFESO is to be notified immediately at (904) 731-3336.
- c. The Service recommends that the Standard Manatee Conditions for In-Water Work be applied during construction. The Manatee Conditions can be found at: https://www.fws.gov/northflorida/manatee/Manatee_Key_Programmatic/20130425_gd_Appendix%20B_2011_Standard%20Manatee%20Construction%20Conditions.pdf.

I. EAGLE NEST TAKE: MN972 only.

- 1. a. You must remove the inactive Bald Eagle nest MN972 and the nest tree once the nest is determined to be inactive, as defined above in condition F, and before September 30, 2018. Documentation of how you determined that the nest was inactive must be kept on file with your office.
- b. If eagles are observed at the nest during the 10 day monitoring period, you are required to cease all nest removal activities and notify the Southeast Region Eagle Biologist immediately at (321) 972-9089.

2. Eagle Nest Take Monitoring Requirements.

In addition to General Monitoring Requirements listed below, you must comply with the following:

- a. Monitoring is required to determine the nest is inactive.
- b. If you have sufficient monitoring records to indicate that the eagle nest has been inactive for 10 days prior to the nest removal, additional monitoring is not required prior to the nest removal. If you lack monitoring records that document the nest as inactive, you are required to monitor the eagle nest as follows:

Pre-Nest Removal	Time
Frequency: 10 consecutive days	60 - 90 minutes

Post-Nest Removal

If a new eagle nest is built at or adjacent to the location described above, you must report that new eagle nest location within 10 days to the Southeast Region Eagle Biologist at (321) 972-9089. Once nest occupancy by eagles is observed and eggs have been laid, monitoring must be conducted every other month for the remainder of the nesting season, or until fledging or nest failure is documented for the following time periods:

- i. A minimum of 1 monitoring period or until eagles return to the nesting territory and successfully produce young, not to exceed 2 monitoring periods, or
- ii. A minimum of 2 monitoring period if eagles do not return to the nesting territory or if eagles return to the nesting territory but do not successfully produce young.

Frequency	Schedule	Time
Once	Between December 15 and January 15	60 - 90 minutes
Once	Between February 15 and March 15	60 - 90 minutes
Once	April	60 - 90 minutes
Once	May	60 - 90 minutes
Once	Every month after until fledging or nest failure is documented	60 - 90 minutes



3. Eagle Nest Take Reporting Requirements.

- a. If eagles or other migratory birds are observed and eggs are present at any time at the nest before the nest is removed, you are required to cease all nest removal activities and notify the Southeast Region Eagle Biologist immediately at (321) 972-9089.
- b. You must submit a report of activities within 30 days following completion of the eagle nest removal to the migratory bird permit issuing office, U.S. Fish and Wildlife Service, 1875 Century Boulevard NE, Atlanta, Georgia, 30345. This report of activities must also include a statement that in the 10 days prior to the eagle nest removal, you documented that the eagle nest was inactive.
Form 3-202-16 (Eagle Nest Take Report) can be found online at <http://www.fws.gov/forms/3-202-16.pdf>.
- c. You may use Form 3-202-15 (Eagle Take Annual Report) found online at www.fws.gov/forms/3-202-15.pdf to report monthly and annual Bald Eagle monitoring activities. Use of this form is not mandatory, but the same information must be submitted.
- d. You must annually submit your monitoring reports, including your Eagle Take Annual Report (Form 3-202-15), by June 30 of each calendar year a report is required, as follows:
 - (1) Electronically to FW4eaglemonitoring@fws.gov. The email subject line for each report submittal must reference the permit number, project title or name, and month/year of report, and
 - (2) Mailed to the migratory bird permit issuing office at U.S. Fish and Wildlife Service, 1875 Century Boulevard NE, Atlanta, Georgia, 30345.

J. EAGLE TAKE/DISTURBANCE: MN023, MN051.

1. FOR ACTIVITIES WITHIN 660 FEET OF ANY EAGLE NEST:

- a. If any exterior construction or project activities outlined in Condition D are conducted when eagles are present during the nesting season (October 1-May 15), or when eagles are present, which may be before October 1 or after May 15, you must:
 - (1) Initiate a noise abatement program for construction personnel within 330 feet of any eagle nest, to include:
 - (a) No excessive and/or sudden loud noise, including tailgate banging, loud radios, shouting, singing, etc.;
 - (b) All motorized equipment, including saws or other hand held power tools, must be moved indoors if possible or placed behind a temporary structure to minimize noise at and reflect noise away from the direction of the eagle nesting area;
 - (c) Minimize the need for "reverse" indicator horns and utilize ground flag crews to the degree practicable to avoid using reverse indicator horns;
 - (d) Provide signage in English and Spanish (if applicable) indicating the need for quiet to the extent practicable; and
 - (e) Engine braking and tailgate banging are strictly prohibited.

2. FOR ACTIVITIES WITHIN 330 FEET OF ANY EAGLE NEST:

- a. Avoid exterior construction, heavy landscaping and associated activities within 330 feet of any eagle nest during the nesting season, (October 1 - May 15), or when eagles are present at the nest site, which may be before October 1 or after May 15.
- b. If any construction or project activities outlined in Condition D are conducted when eagles are present during the nesting season (October 1-May 15), or when eagles are present, which may be before October 1 or after May 15, you must:
 - (1) Initiate a traffic abatement program for construction personnel to include establishing off site parking/carpool locations outside of 330 feet from any eagle nest for construction personnel and equipment.

3. FOR ACTIVITIES WITHIN 100 FEET OF ANY EAGLE NEST:

- a. You must erect a temporary protective barrier to delineate the 100 foot Eagle Nest Buffer around each eagle nest, MN023 and MN051, to prevent construction personnel or heavy equipment from entering into this buffer while any construction or project activities outlined in Condition D are occurring.
- b. No use or placement of heavy equipment within 100 feet of any eagle nest tree at any time to prevent nest tree root impacts or damage.
- c. Exclude human access by foot or vehicle during the eagle nesting season within 100 feet of any eagle nest and if practicable, when eagles are present post-project completion.



4. Prior to conducting or while activities in Condition D are occurring, in the event an eagle is injured or an eaglet is found on the ground, you must provide educational materials that outline how to minimize disturbance to eagles, along with contact information for an eagle rehabilitator to the following:
 - a. The contractor and construction personnel; and
 - b. Maintenance personnel responsible for the post-project maintenance of the project area described in Condition D.
5. Retain the largest native pines and hardwoods for use as potential eagle roost or nest sites by preserving all native trees outside of project footprint.
6. Access roadways within project limits must be kept free of carcasses (roadkill) to minimize attraction or wildlife.
7. Maintain and/or create, enhance or expand the visual vegetation buffer between construction activities and the eagle nest by planting appropriate native pines or hardwoods
8. Site stormwater ponds no closer than 100 feet from any eagle nest. Ponds are to be constructed outside of eagle nesting season (October 1- May 15). Native pines and/or hardwoods and native groundcover must be planted outside of nesting season around the pond to create, enhance or expand the visual buffer between construction and any associated activities described in Condition D and any eagle nest.
9. Down-shield new permanent exterior lighting so that lights do not shine directly onto the eagle nest.
10. Follow state and federal guidelines, laws and label instructions at all times if using pesticides, herbicides, or other chemicals on property identified in Condition D.
11. If applicable, coordinate the design and construction or retrofitting of new or existing utility lines to be in compliance with the Avian PowerLine Interaction Committee (APLIC) Guidelines found at www.aplic.org to reduce the potential for any electrocution, collision and/or nesting of avian species.

12. Eagle Take/Disturbance Monitoring Requirements.

In addition to General Monitoring Requirements listed below, you must comply with the following:

Monitoring is required annually to determine nesting activity and/or nest failure. The required monitoring period is during each eagle nesting season, defined as October 1 through May 15, and for an additional 2 nesting seasons after project has been completed.

Once project activities have begun, including if construction activities have begun but are not occurring, monitoring must be conducted to determine nest occupancy and fledgling activity, according to the following schedule:

Frequency	Schedule	Time
Once	Between December 15 and January 15	60 - 90 minutes
Once	Between February 15 and March 15	60 - 90 minutes
Once	April	60 - 90 minutes
Once	May	60 - 90 minutes
Once	Every month after until fledgling or nest failure is documented	60 - 90 minutes

13. Eagle Take/Disturbance Reporting Requirements.

- a. You may use Form 3-202-15 (Eagle Take Annual Report) found online at www.fws.gov/forms/3-202-15.pdf to report monthly and annual Bald Eagle monitoring activities. Use of this form is not mandatory, but the same information must be submitted.
- b. You must annually submit your monitoring reports, including your Eagle Take Annual Report (Form 3-202-15), by June 30 of each calendar year a report is required, as follows:
 - (1) Electronically to FW4eaglemonitoring@fws.gov. The email subject line for each report submittal must reference the permit number, project title or name, and month/year of report, and
 - (2) Mailed to the migratory bird permit issuing office at U.S. Fish and Wildlife Service, 1875 Century Boulevard NE, Atlanta, Georgia, 30345.



K. Any person who is

1. employed by or under contract to you for the activities specified in this permit, or
2. otherwise designated a subpermittee by you in writing, may exercise the authority of this permit.

Any subpermittee who has been delegated this authority may not re-delegate to another individual/business.

Standard Conditions
Eagle Take Disturbance/Nest Take Permit
50 CFR 22.26, 22.27

All of the provisions and conditions of the governing regulations at 50 CFR part 13, 50 CFR part 22.26 and 50 CFR part 22.27 are conditions of your permit. Failure to comply with the conditions of your permit could be cause for suspension of the permit and/or citation. The standard conditions below are a continuation of your permit conditions. If you have any questions regarding these conditions, refer to the regulations and forms, or to obtain contact information for your migratory bird permit issuing office, visit: www.fws.gov/migratorybirds/mbpermits.html.

General Monitoring Requirements:

1. A qualified monitor is required to monitor eagle use of the nesting territory, which is defined as up to a 1.5 mile radius of the bald eagle nest identified in Condition D, on property that is accessible by you where the activities outlined in Condition D occur. The monitor must be experienced in recognizing specific patterns and changes of eagle behavior, and employed or contracted by the permittee, landowner, company or entity responsible for having the activity monitored. The monitor must also be as inconspicuous as possible, so not to cause a disturbance with their presence, and when applicable, a wildlife blind or viewing location out of direct sight of the eagles is recommended. Monitoring must not cause a disturbance as defined above in Condition D and must be conducted at a distance that allows for observation without an interruption in the eagle's normal breeding behavior.

If a new eagle nest is built at or adjacent to the location described in Condition D, you must report that new eagle nest location within 10 days to the Southeast Region Eagle Biologist at (321) 972-9089. Additional monitoring may be required based on the new eagle nest location.

2. Monitoring must occur at a time of day when eagles are most likely to be in the area, (e.g. early morning, beginning ½ hour before sunrise, or late afternoon, beginning ½ hour before sunset). You must assess whether or not the eagles return to the nesting territory as identified in Monitoring Requirements No. 1 and continue to nest, roost and/or forage there, and/or if the eagles attempt to build or occupy another nest.
3. The required monitoring period for each eagle nest MN023, MN051 and MN972 is during each eagle nesting season, defined as October 1 through May 15, and for an additional 2 nesting seasons after the project has been completed.

During each nesting season for any Bald Eagle nest, no additional monitoring is required once eaglets have fledged from the nest or nest failure is documented.

4. Monitoring must be able to provide data on the following:
 - a. Date and length of time eagles were observed;
 - b. Time of day;
 - c. Number and age of Bald Eagles observed (i.e. juvenile, immature, subadult, adult); if age is not known, provide description;
 - d. Observed behavior (e.g. perching, feeding, sitting on or attending nest, in flight);
 - e. If a new Bald Eagle nest is built on or adjacent to the property described in Condition D, you must provide the new location and whether the Bald Eagles produced young at that site;
 - f. If any eagle nesting attempt was successful, failed or the eagles abandoned the area; and
 - g. A description of any human activity at the time eagles are observed during each month of the monitoring period, (e.g. construction, road building, use of machinery, etc.).



If nesting activity is observed, monitoring must continue until successful fledging or nest failure/ abandonment is documented, which may be prior to or after May 15.

If no Bald Eagle activity is observed during monitoring, an Annual Report indicating "no activity observed" is still required.

If project activities were delayed or not conducted, an Annual Report indicating that "no activities occurred" is required.

General Conditions:

5. The authorizations granted by this permit apply only to take that results from activities conducted in accordance with the description contained in the permit application and the terms of the permit. If the permitted activity changes, you must immediately contact the Southeast Region Eagle Biologist at (321) 972-9089 to determine whether a permit amendment is required in order to retain take authorization.
6. This permit does not authorize you to conduct activities on Federal, State, Tribal, or other public or private property other than your own without additional prior written permits or permission from the agency/landowner.
7. You remain responsible for all outstanding monitoring requirements and mitigation measures required under the terms of this permit for take that occurs prior to cancellation, expiration, suspension, or revocation of this permit.
8. A subpermittee is an individual to whom you have provided written authorization to conduct some or all of the permitted activities in your absence. Subpermittees must be at least 18 years of age.

As the permittee, you are legally responsible for ensuring that your subpermittees are in compliance with the terms and conditions of this permit, are qualified to perform these authorized activities, and adhere to the terms of your permit. You are also responsible for maintaining current records of anyone you have designated as a subpermittee, including copies of letters you have provided to the subpermittees authorizing them to conduct the permitted activities on your behalf.

9. You and any subpermittees must carry a legible copy of this permit and display it upon request whenever exercising its authority. Subpermittees must also carry your written subpermittee designation letter.
10. You and any subpermittees may not conduct the activities authorized by this permit if doing so would violate the laws of any State, county, municipal, tribal or other government that apply to the permitted activity, and none of the privileges of this authorization are valid unless the permittee possesses all applicable permits, or other authorizations, if required.
11. You must maintain records as required in 50 CFR 13.46 and 50 CFR 22. Your records must also include the data gathered for monitoring and reporting purposes. All records relating to the permitted activities must be kept at the location indicated in writing by you to the migratory bird permit issuing office.
12. Acceptance of this permit authorizes the U.S. Fish and Wildlife Service to inspect any wildlife held or any activities authorized by this permit, and to audit or copy any permits, books, or records required to be kept by the permit and governing regulations.
13. You must allow Service personnel or other qualified persons designated by the Service access to the areas where eagles are likely to be affected by project activities outlined in Condition D, at any reasonable hour, and with reasonable notice from the Service, for purposes of monitoring Bald Eagles at the site while the permit is valid and for up to (3) years after it expires.
14. To renew this permit if the activities described in Condition D have not been completed by the expiration date of this permit, permittee must meet issuance criteria under applicable regulations at the time of renewal and must also have been in compliance with permit conditions, including all monitoring and reporting requirements of the original permit. Permit conditions may be modified based on changes in eagle or human use of the property surrounding the project described in Condition D.



Permit Number: MB33468C-0
Effective: 08/24/2017 Expires: 09/30/2021

15. The U.S. Fish and Wildlife Service is not liable for any damage or injury to any person(s), wildlife, or property that occurs as the result of carrying out the activities associated with this permit.

SECTION E¹
EAGLE TAKE – ASSOCIATED WITH BUT NOT THE PURPOSE OF AN ACTIVITY
(EAGLE NON-PURPOSEFUL TAKE)
(Bald and Golden Eagle Protection Act, 50 CFR 22.26)

- 1. The name and contact information for any U.S. Fish and Wildlife Service employee(s) who has provided technical assistance or worked with you on this project.**

Coordination for the 44th Avenue project regarding eagle nests has been ongoing since 2016. Ulgonia Kirkpatrick of the Migratory Bird Division in Atlanta, Georgia was initially contacted by Florida Fish and Wildlife Conservation Commission (FWC) Bald Eagle Plan Coordinator Michelle van Deventer via email during March 2016. Additional coordination with Mrs. Kirkpatrick subsequently occurred with the project's consultant team and FWC on March 3, 2017.

- 2. The species and number of eagles that are likely to be taken and the likely form of that take (e.g., disturbance, other take).**

A bald eagle permit is requested to impact three active bald eagle (*Haliaeetus leucocephalus*) nests to accommodate construction of three segments of one Manatee County public road.

The **Western Segment** is expected to result in the *non-purposeful take* of one active bald eagle nest (Nest ID MN023) under the **Bald and Golden Eagle Protection Act, 50 CFR 22.26**. The nest is not proposed for direct impact, but may be disturbed due to project proximity. No work is proposed within the 100-foot nest buffer.

The **Middle Segment** is expected to result in the take of one eagle nest. The proposed impacts to nest MN972 (Temp ID) will require nest removal under the **Bald and Golden Eagle Protection Act, 50 CFR 22.27**. This nest was constructed during the 2016 nest season and was deemed active in February 2017. **Please see Section E² for additional information on the proposed nest removal.**

The **Eastern Segment** is expected to result in the *non-purposeful take* of one active bald eagle nest under **Bald and Golden Eagle Protection Act, 50 CFR 22.26**. The proposed disturbance to bald eagle nest (Nest ID MNXXX) involves construction of a public road within approximately 150-feet of the nest tree. A mating pair and two fledglings were first observed at this nest during June 2015.

- 3. The dates the activity will start and is projected to end. If the project has begun, describe the stage of progress.**

Construction along 44th Avenue East is expected to occur from west to east. The estimated construction schedules are below.

Construction of the **Western Segment** will commence following ERP permit issuance and is anticipated to last approximately 24 months (2018-2020). Activities within 330-feet of the nest would occur outside of the nesting season in the months of May through September.

Construction of the **Middle Segment** is expected to occur in two phases and commence following permit issuance. Phase One is outside the 660 eagle buffer. It is anticipated that Phase One will begin in 2017; Phase Two is expected to be constructed concurrent with the western segment of 44th Ave. and last approximately 24 months (2018-2020). Manatee County has accelerated design of this segment to coincide with the western segment and accommodate the

new residential development to the south. Nest removal would occur upon permit issuance and would occur outside of nesting season. **Please see Section E² for additional information on the proposed nest removal.**

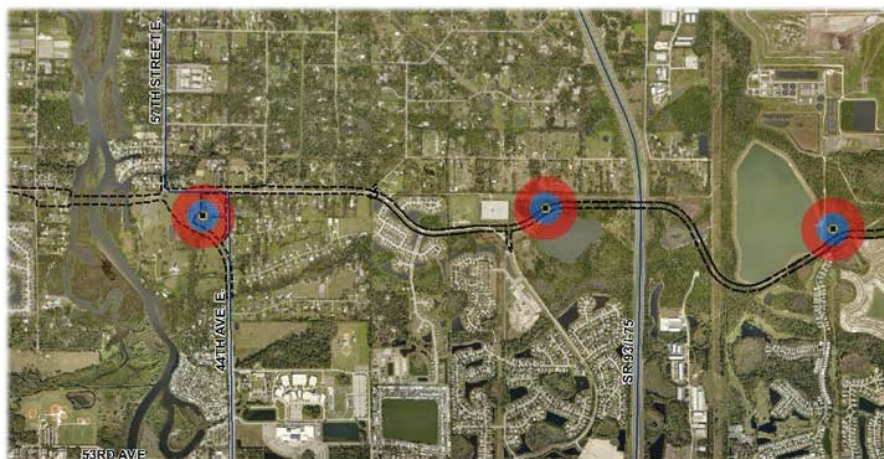
Construction of the **Eastern Segment** is expected to begin in 2018 or later and is anticipated to last approximately 24 months. The roadway is currently in the survey, design and permitting stage and state and federal permit coordination related to wetland habitat has started. Activities within 330-feet of the nest would occur outside of the nesting season in the months of May through September.

4. Detailed description of the activity that will likely cause the disturbance or other take of eagles.

Western Segment - Manatee County has proposed transportation infrastructure improvements, including a new bridge across the Braden River, between 45th Street East and 44th Avenue Plaza East in Manatee County. The project limits are from east of 45th Street East to 44th Avenue Plaza East, and along Morgan Johnson from south of 41st Avenue East along the new alignment connecting to Caruso Road north of 48th Avenue East, for a total length of approximately 2.13 miles. One of the three proposed stormwater management facilities (SMF) will be located just outside the 100-foot nest buffer. 44th Avenue East is located approximately 500 feet north and Caruso Road is located approximately 530 feet east of the nest.

Construction of the **Middle Segment** will begin at 44th Avenue Plaza East and extend to Interstate-75. A newly constructed eagle nest was reported in the project ROW during January 2017. This nest was given temporary ID MN972. This nest will not be able to be practically avoided due to residential homes to the south and a high power transmission lines to the north. **Please see Section E² for additional information on the proposed nest removal.**

Construction of the **Eastern Segment** will begin west of Interstate-75 and end at the existing 44th Avenue East near Lakewood Ranch Boulevard. This segment will involve transportation improvements including stormwater management ponds and a bridge over Interstate 75. An eagle nest was documented within the project ROW in June 2015. Through the course of an alignment study and field surveys, the road alignment for this segment was shifted to the extent practicable to minimize impacts to MNXXX. It was determined that the eagle nest could not be completely avoided due to multiple constraints (*i.e.* residential homes, reclaimed water lake, natural creeks, gas/water pipelines) and that an *incidental take* would occur as a result of the project. Specifically, the road alignment will come within approximately 150-feet of this nest.



5. An explanation of why the take of eagles is necessary, including what interests will be protected by the project or activity.

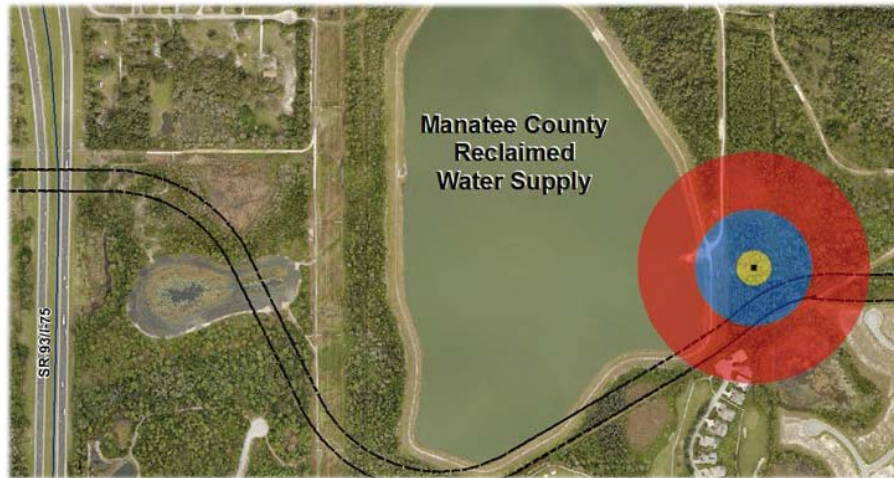
Western Segment - The purpose of the improvements at Caruso Road and 44th Avenue within the vicinity of the nest is to provide continuity with Morgan Johnson Road for north-south traffic. This realignment is also intended as a safety improvement, intending to decrease the number of crashes presently experienced at the intersection of Morgan Johnson Rd and 44th Ave. East, which in the recent past was a location of a fatality. The improvements will also decrease delay and travel time, and enhance mobility and flow. The proposed SMF is required to treat additional run off resulting from the increased impervious area and has been decided to avoid residential takes, wetland impacts, and removal of the eagle nest.



Middle Segment - This segment is an extension of 44th Avenue East. The purpose of the improvements between 44th Avenue Plaza East and I-75 are to construct 44th Avenue East along platted county ROW between existing residential homes to the south (not visible on available imagery) and a high power transmission corridor to the north. Nest MN972 was newly constructed within this platted ROW. This road segment is critical to providing access for this developing area, crossing I-75 and connecting to 44th Avenue East near Lakewood Ranch Boulevard. The improvements will protect the public interest by decreasing traffic delays and travel time and enhancing mobility and flow. **Please see Section E² for additional information on the proposed nest removal.**



Eastern Segment – The purpose of the improvements between Interstate-75 and Lakewood Ranch Boulevard is to construct 44th Avenue East along platted county ROW. The design brings the road within approximately 150-feet of eagle nest MNXXX. Previously the road alignment crossed the 100-foot buffer of this nest, but the design was shifted to the extent practicable to minimize impacts to MNXXX. It was determined that the eagle nest could not be completely avoided due to multiple constraints (*i.e.* residential homes, reclaimed water lake, natural creeks, gas/water pipelines). The improvements will protect the public interest by decreasing traffic delays and travel time and enhancing mobility and flow.



6. Maps, digital photographs, county/city information, and latitude/ longitude geographic coordinates of the proposed activity.

Western Segment - Nest MN023 is in a slash pine cluster located approximately 0.30 mile east of the Braden River south of 44th Avenue East in Bradenton, Manatee County, Florida. The surrounding land use consists of private open land to the west, a church directly northeast, and residential development north and east of the nest. 44th Avenue East is located approximately 500 feet north and Caruso Road is located approximately 530 feet east of the nest.



Nest MN023- December 2016



Bald eagle in nest MN023- December 2014

Nest MN023 is located along 44th Avenue East in Bradenton, Manatee County, Florida in Township 35 South, Range 18 East, Section 10 (27° 27' 37.095" N/82° 29' 12.848" W). The property tax ID is 1729310319.

The **Middle Segment** of 44th Avenue East is within Sections 11 and 12; Township 35S; Range 18E. The approximate central coordinates are -82.465W and 27.461N.



This eagle's nest is in a slash pine. It was constructed during the 2016/17 nest season. An adult eagle was observed on nest by Michelle van Deventer - January 6, 2017 and was again observed February 19, 2017 by Sherri Swanson (photo to right). The eagle was seemingly unfazed by adjacent construction; however, an approximate 100-ft vegetated buffer was present. The eagle nest is within the ROW for 44th Avenue East and is bordered by residential lots to the south and the FPL high power transmission corridor to the north. The proposed impacts to nest MN972 will involve nest removal for road construction. **Please see Section E² for additional information on the proposed nest removal.**



The **Eastern Segment** of 44th Avenue East is within Section 07; Township 35S; Range 19E. The approximate central coordinates are -82°27.26.86W and 27°27.39.60N. The nest is within Manatee County public-owned lands adjacent to the reclaimed water facility, south of the Manatee County Landfill and north of new and existing residential communities.

The nest was believed to be constructed in 2014, as a possible relocation of nest MN032. The nest was active during the 2014/2015 nest season and fledged two young. This nest is currently active and located within a mature slash pine along a cleared pipeline easement and adjacent to a forested hammock along Cypress Strand.



Empty Nest MNXXX- June 2015



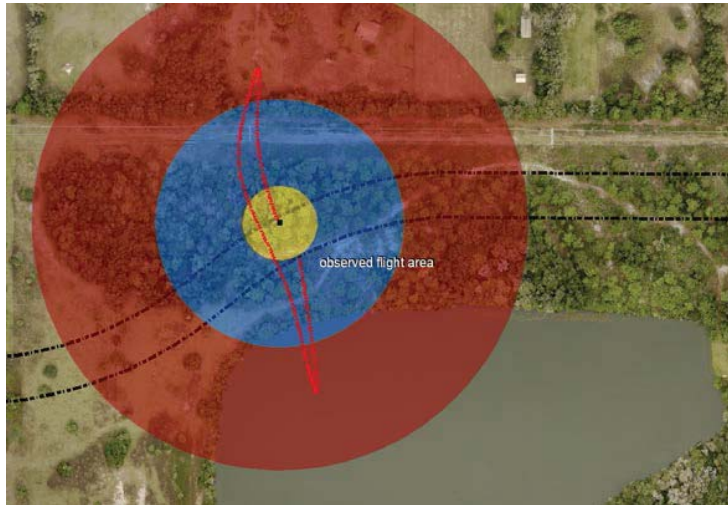
Adult Eagle on Nest MNXXX – Jan. 2016

7. **Maps, digital photographs, county/city information, and latitude/longitude geographic coordinates of eagle-use areas in the vicinity of the activity, including nest site(s), roost areas, foraging areas, and known migration paths. Provide the specific distance and locations of nests and other eagle-use areas from the project footprint.**

Western Segment - The Braden River is approximately 1,500 feet west of Nest MN023 where bald eagles have been observed roosting and foraging. From the project area, the Braden River connects to the Manatee River approximately 3.75 river miles north. The bald eagles occupying Nest MN023 are frequently observed perched on the power poles located directly south of the new bridge alignment over the Braden River. According to FWC's online database, 13 bald eagle nests are located within five miles of Nest MN023. The map below depicts the 2015 FWC eagle nests in the vicinity of the project area in relation to the Braden River (west) and the Manatee River (north).

Middle Segment – This newly constructed nest has only been recently documented. An eagle was observed on nest January 6, 2017 by FWC staff and the pair was observed hanging out on the powerlines on February 19, 2017. The eagles were observed flying north, but later returned to the nest to fend off an immature eagle flying overhead. The eagles have been observed foraging in the nest to the south (now within the residential development). **Please see Section E² for additional information on the proposed nest removal.**





Eastern Segment - An adult eagle has been regularly observed roosting in a pine tree approximately 215-feet NNW of the nest tree. A second roost tree has been observed, but infrequently, on the west side of the reclaimed water lake (~2,000ft). A juvenile eagle was observed landing in a pine tree south of the existing nest in June 2015. No juvenile eagles were observed in 2016. No other roost areas have been observed.

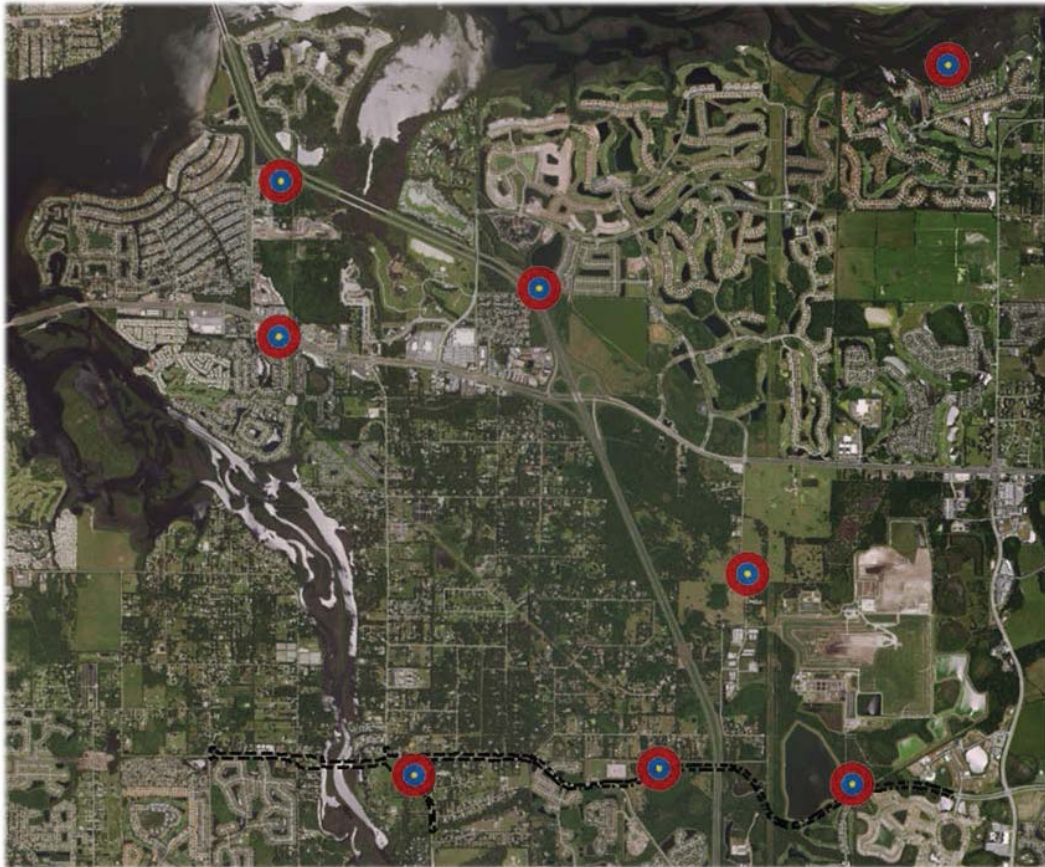


Adult eagle roosting near MNXXX; juvenile eagle roosting in tree west of lake - June 2015



Eagle Nest MNXXX and Observed Territory

The map below depicts the 2015 FWC eagle nests in this region in relation to the Braden River (west) and the Manatee River (north). The two new nests within the eastern 44th Avenue project limits have not been formally recorded by FWC, but have been mapped by HDR as part of the project.



8. If the projected take of eagles is in the form of disturbance, answer the following two questions:

a. Will the activity be visible to eagles in the eagle-use areas, or are there visual buffers such as screening vegetation or topography that blocks the view?

Western Segment - Existing canopy trees will remain within an upland buffer adjacent to the nest tree. Currently, the nest and canopy trees are surrounded by residential and roadway development.

Middle Segment – The eagle nest is within the 44th Ave. road ROW. The nest cannot be practicably avoided and will need to be removed. **Please see Section E² for additional information on the proposed nest removal.**

Eastern Segment – Existing canopy trees will remain around the nest tree. The nest tree is located along a cleared pipeline corridor, which serves as a maintenance access road for Manatee County. Construction of 44th Avenue E will occur outside the 100-foot buffer (yellow dashed line). Clearing will not occur within approximately 150-feet from the nest tree. The primary roost tree is located northwest of the nest tree and most flight activity has been observed north of the proposed road. A mature pine forest will visually shield the new road from the nest tree, as shown in the image below.



- b. **What is the extent of existing activities in the vicinity that are similar in nature, size, and use to your activity, and if so, what is the distance between those activities and the important eagle use areas.**

Western Segment - No other activities similar in nature, size, and use are occurring within 1,500 feet of the proposed activity.

Middle Segment – The eagle nest is within the 44th Ave. road ROW. The nest cannot be avoided and will need to be removed. Development of The Ridge is underway to the south. The nest is bound by a powerline easement to the north. **Please see Section E² for additional information on the proposed nest removal.**

Eastern Segment - While there is human activity in the vicinity of the nest tree, none is the same nature, size, or use that is proposed following road construction. However, no new development is expected as a result of the new road since this is county lands. Existing land use includes use and management of a large reclaimed water reservoir, including vehicle use and pipe maintenance, as well as new and existing residential development and an active golf course.

9. **A detailed description of all avoidance and minimization measures that you have incorporated into your planning for the activity that you will implement to reduce the likelihood of take of eagles.**

Western Segment - The proposed activity consists of the construction of an SMF 100-feet from the bald eagle nest as coordinated with FWC. The 100-foot buffer consists of additional pine trees adjacent to the nest. Exterior construction activities within 330-feet of the nest will occur outside of the nesting season in May through September to minimize disturbance. Direct take of bald eagles or their nest other than disturbance is not anticipated to occur as a result of the proposed activity.

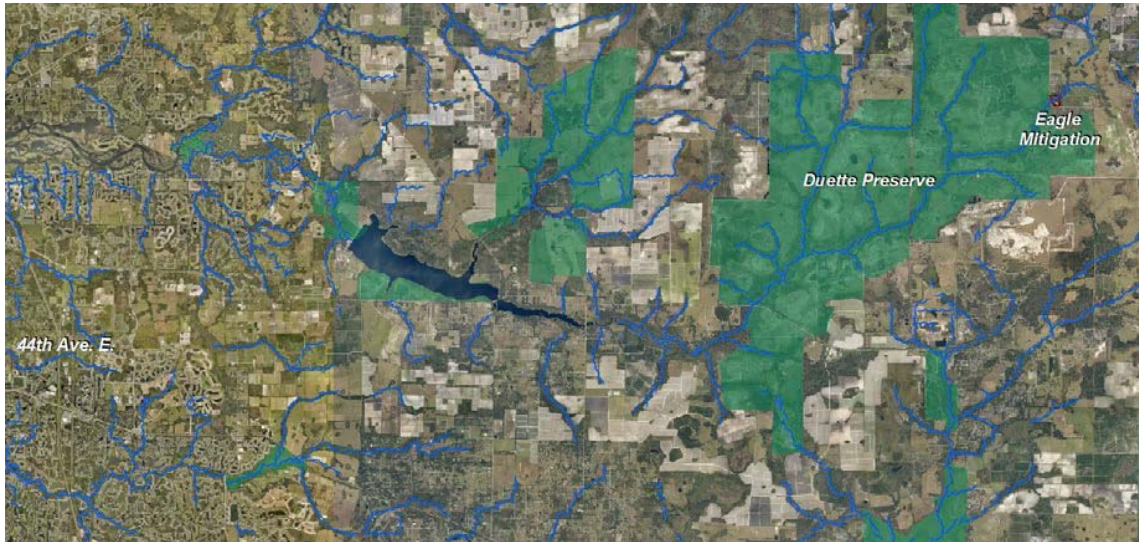
Middle Segment – The eagle nest is in the middle of the 44th Ave. road ROW. This nest could not be practicably avoided due to developing residential homes to the south and a high power transmission corridor to the north. The nest will need to be removed. **Please see Section E² for additional information on the proposed nest removal.**

Eastern Segment – The proposed activity involves construction of a new road approximately 150-feet from bald eagle nest MNXXX. The project design team realigned the road to avoid the nest tree. Specifically, the road alignment was shifted south to the extent practicable to minimize impacts to the nest. The eagle nest could not be completely avoided due to multiple constraints (i.e. residential homes, reclaimed water lake, natural creeks, gas/water pipelines). The previous road alignment bisected the lake in half and proposed to construct an elevated road. This shifted alignment avoids observed the roost trees and direct impacts to the water reservoir, which appears to be used for foraging by both the adult and immature eagles. Mature pines will remain within the 150-foot buffer and additional buffer trees around the nest will be unaffected. Exterior construction activities within 330 feet of the nest will occur outside of the nesting season in May through September to minimize disturbance. Direct take of bald eagles or their nest other than disturbance is not anticipated to occur as a result of the proposed activity.



Manatee County purchased suitable bald eagle habitat adjacent to the Duette Preserve. The site is located approximately 22-miles east of the 44th Ave. E. project and is proposed as compensation for the three nest impacts presented herein. The parcel is approximately 26-acres (formal survey has not been conducted), which is three (3) times the 330-foot buffer for the three nests (7.85 acres x 3 nests = 23.55 acres). The purchase of the conservation site creates an extension of the adjacent Duette Preserve (see location map below). **The county will record a conservation easement over a 24-acre portion of the property and will manage the site, in perpetuity.**

Michelle van Deventer of FWC conducted a site visit of this parcel prior to the purchase of the site. Given the suitability of the site for eagle conservation, Manatee County purchased the site. Additional details about the proposed conservation site are summarized in Section E² below.



Eagle Conservation Site – Location Map

- 10. You must retain records relating to the activities conducted under your permit for at least 5 years from the date of expiration of the permit. Please provide the address where these records will be kept.**

Records for all projects will be kept at:

Manatee County
 1022 26th Ave East
 Bradenton, Florida 33756

Western Segment - These records will be maintained by AECOM at:

7650 West Courtney Campbell Causeway
 Tampa, Florida 33607

Middle Segment – These records will be maintained by Manatee County

Manatee County
 1022 26th Ave East
 Bradenton, Florida 33756

Eastern Segment - These records will be maintained by HDR Engineering at:

2601 Cattlemen Road
 Sarasota, Florida 34232

- 11. Any permit issued as a result of this application is not valid unless you also have any required State or Tribal permits associated with the activity. Have you obtained all required State or Tribal permits or approvals to conduct this activity? Indicate “Yes,” “Have applied,” or “None Required.” If “Yes,” attach a copy of the approval(s). If “Have applied,” submit a copy when issued.**

Western Segment	Pending
Middle Segment	Phase one (pending); Phase two (in design)
Eastern Segment	Project in design. Will apply in 2017

12. If you have received technical assistance for your project from your State wildlife agency, please provide the name and contact information for the individual(s).

Western Segment - Coordination has been ongoing with the FWC Bald Eagle Plan Coordinator, Michelle van Deventer.

Middle Segment - Coordination has been ongoing with the FWC Bald Eagle Plan Coordinator, Michelle van Deventer

Eastern Segment - Coordination has been ongoing with the FWC Bald Eagle Plan Coordinator, Michelle van Deventer.

13. Disqualification factor. A conviction, or entry of a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act disqualifies any such person from receiving or exercising the privileges of a permit, unless such disqualification has been expressly waived by the Service Director in response to a written petition. (50 CFR 13.21(c)) Have you or any of the owners of the business, if applying as a business, been convicted, or entered a plea of guilty or nolo contendere, forfeited collateral, or are currently under charges for any violations of the laws mentioned above? Indicate "Yes" or "No." If you answered "Yes" provide: a) the individual's name, b) date of charge, c) charge(s), d) location of incident, e) court, and f) action taken for each violation.

Sia Mollanazar No

Sherri Swanson No

Tia Norman No

**SECTION E²
EAGLE NEST TAKE**

(Bald and Golden Eagle Protection Act, 50 CFR 22.27)

1. **The name and contact information for any U.S. Fish and Wildlife Service employee(s) who has provided technical assistance or worked with you on this project.**

Ulgonda Kirkpatrick of the Migratory Bird Division in Atlanta, Georgia was contacted by FWC Bald Eagle Plan Coordinator Michelle van Deventer and coordination with Mrs. Kirkpatrick subsequently occurred with the project consultant team and FWC on March 3, 2017.

2. **Describe the situation that necessitates removal of the eagle nest(s), including:**

(a) The number of nests proposed to be taken

A bald eagle permit is requested for the *non-purposeful take* of three active bald eagle (*Haliaeetus leucocephalus*) nests to accommodate construction of three project segments of one Manatee County public road. Only one nest is proposed for removal. The **Middle Segment** is expected to result in the removal of eagle nest MN972 (Temp ID). This nest was constructed during the 2016 nest season and was deemed active in February 2017.

(b) Whether the nest is a bald eagle or golden eagle nest

The nest proposed for removal is a bald eagle (*Haliaeetus leucocephalus*) nest.

(c) Whether the nest is active or inactive and how this was determined. (An active nest may only be taken to alleviate an immediate safety emergency. A “safety emergency” means “a situation that necessitates immediate action to alleviate a threat of bodily harm to humans or eagles.” An inactive nest is one that is not currently used by eagles as determined by the absence of any adult, egg, or dependent young at the nest during the 10 days before the nest is taken.)

An inactive nest is proposed for take.

(d) When you propose to take the nest

Nest take is proposed outside of eagle nesting season and only if no eagle has been present at the nest for at least 10-days.

3. **State whether the nest take necessary to alleviate a safety emergency.** No.

(a) If it is, provide the following:

(1) Describe the safety emergency and why the situation was not foreseeable NA

(2) Explain why removal of the nest is necessary to alleviate it NA

(b) If it is not, provide the following:

(1) Explain why removal of the nest(s) is necessary

The **Middle Segment** will result in the take of one eagle nest. This new nest was reported within the platted county road ROW during January 2017. This road segment is critical to providing access for this developing area, crossing I-75 and connecting to 44th Avenue East near Lakewood Ranch Boulevard. The improvements will protect the public interest by decreasing traffic delays and travel time and enhancing mobility and flow in this rapidly developing region. This nest will not be able to be practicably avoided due to existing residential homes to the south

and high power transmission lines to the north. The road ROW is unable to be shifted to avoid the nest in this segment.

(2) A calculation of the bald eagle or golden eagle area nesting population, including an appropriately scaled map or plat showing the location of each eagle nest used to calculate the area nesting population unless the Service has sufficient data to independently calculate the area nesting population.

Per a conversation with USFWS staff on March 3, 2017, a local area population analysis will be completed by USFWS upon submittal of this permit application. This analysis will compute cumulative impacts to the regional eagle population within an 86-mile radius.

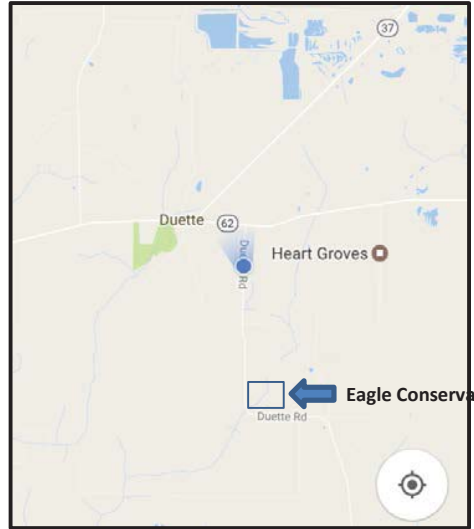
(3) A description of the avoidance, minimization, and mitigation measures you have used to reduce the need to take the nest, to offset the take, or in some situations (see 50 CFR 22.27(b)(7)) to provide a net benefit to eagles

The Duette Preserve Addition Eagle Conservation Site was purchased by Manatee County to provide mitigation (net benefit) for the non-purposeful *take* of two eagle nests and removal of one nest along 44th Avenue East associated with construction of the road and stormwater management facilities. The conservation site is located in eastern Manatee County, Florida, south of SR62 along Duette Road in Section 10; Township 34 South; Range 22 East.

Approximately 24-acres, of a 26.5-acre conservation site, are proposed for preservation and management to support eagle conservation. Pine forest with mature pine trees is abundant in the vicinity of the eagle conservation site, throughout the parcel, and on the adjacent Duette Preserve. The purchase of the conservation site creates an extension of the adjacent Duette Preserve. The site will be managed as part of the Duette Preserve. The Duette Preserve is a 21,000-acre Manatee County Preserve that contains the headwaters of Manatee River. The conservation site contains a portion of the east fork of the Manatee River (1,200ft) and riverine floodplain. This permanent water feature and floodplain support a canopy of mature bay trees and oaks. The canopied pine and floodplain border sandhill and citrus lands, which provide areas of unimpaired line of sight for eagles.

Few development features exist in the area and due to the extent of preservation lands surrounding the conservation site, future development is expected to be limited, in perpetuity. A portion of the site is bordered by Duette Road, which is two-lanes; power lines are present near the southeast corner of the parcel, but do not extend the length of the site. Private land use around the immediate area is predominantly agricultural.

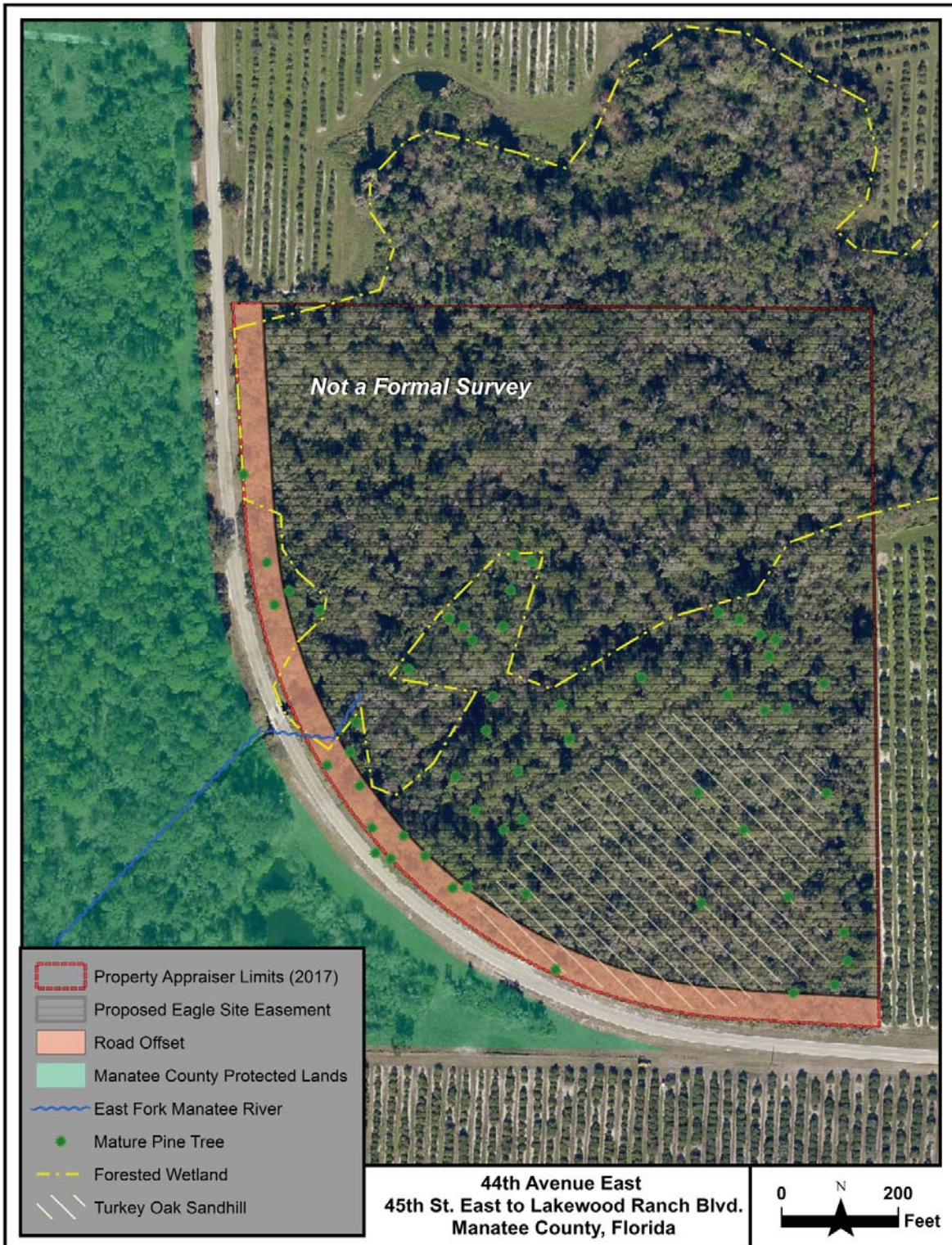
Although Manatee County is not within a bald eagle core nesting area, the proposed Duette Preserve Addition - Eagle Conservation Site is expected to benefit the bald eagle. The nearest bald eagle core nesting area is the Placida Peninsula located to the south in Sarasota County. A documented bald eagle nest (MN041) is established approximately 2.5 miles southeast of the site. In addition, a bald eagle was observed approximately two miles north of the site perched in an osprey nest along Duette Road (see photo and map below courtesy of Manatee County biologist).



Eagle along Duette Road 2-miles north of Proposed Eagle Conservation Site



Duette Preserve Addition Eagle Conservation Site



Duette Preserve Addition – Eagle Conservation Site



Live Oak Hammock with Saw Palmetto Understory



Pine Flatwoods with Saw Palmetto Understory



Pine Flatwoods with Saw Palmetto Understory



Turkey Oak Sandhill



Floodplain East Fork Manatee River



Bay Swamp

4. If the nest is built on a human-engineered structure, provide the following: NA

(a) A detailed description of the structure and how the nest renders the structure inoperable for its intended use

NA

(b) Maps, digital photographs and detailed description of the situation NA

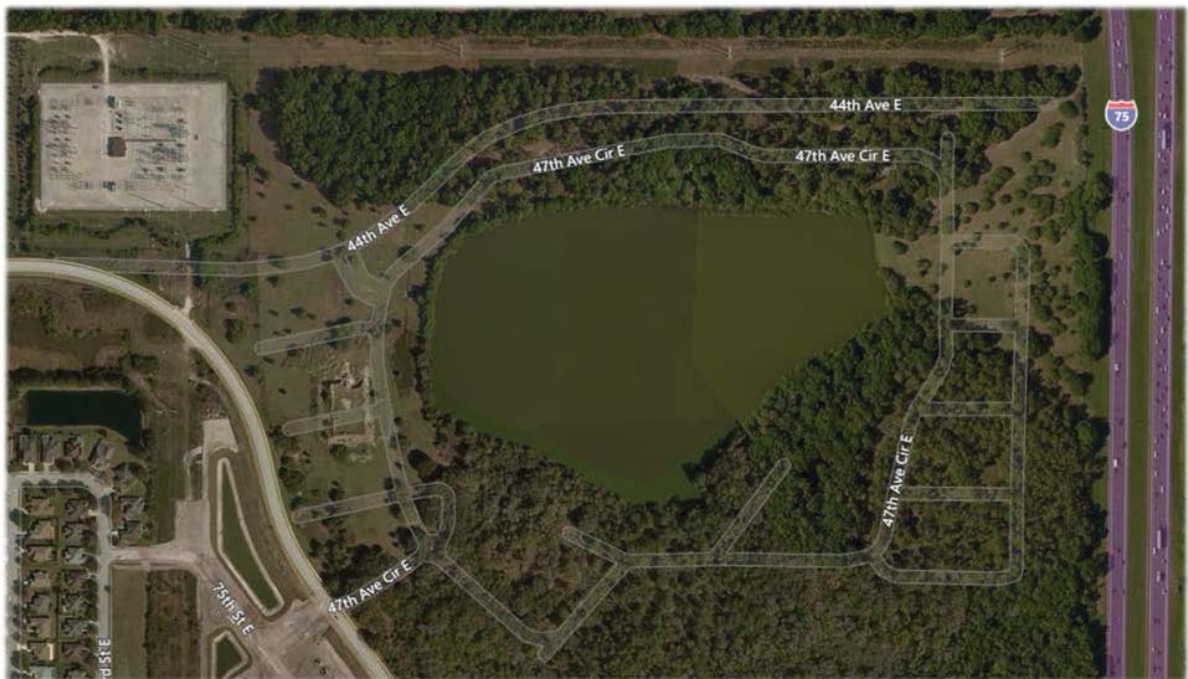
5. Provide a description of the property, including maps and digital photographs that show the location of the nest in relation to buildings, infrastructure, and human activities.

The project ROW proposed for impact within the 660, 330 and 100-foot nest buffers of eagle nest MN972 is mature pine flatwoods with an understory of saw palmetto. A high-power transmission sub-station is located approximately 750-feet to the west; a high-power transmission corridor is located approximately 250-feet to the north. The bald eagles were observed perched on the power poles. Interstate 75 is 1,800-feet to the east. Although not shown on current aerial imagery, a medium-density residential community is now located to the south with the nearest homes approximately 100-feet to the south. The residential community was cleared in 2016 and is now undergoing active home and road construction.



6. Provide the location of the property, including city, county and latitude and longitude geographic coordinates.

The **Middle Segment** of 44th Avenue East is within Sections 11 and 12; Township 35S; Range 18E. The approximate central coordinates are -82.465W and 27.461N. This eagle's nest is in a slash pine. It was constructed during the 2016/17 nest season. The nest is within the ROW for 44th Avenue East and is bordered by residential lots to the south (not shown on map) and the FPL high power transmission corridor to the north.



7. If the nest will be removed, how will you prevent future nesting on the same structure/in the area?

Following issuance of the nest removal permit, the 44th Ave. E. ROW will be cleared. The area will be maintained with sod until construction of the road project in 2018.

8. Provide the length of time for which the permit is requested, including beginning and ending dates.

The permit is requested to remove the nest following the current nest season (2016/17). Once the nest is removed, the road ROW will be cleared of all mature pines. The area will be maintained as open land with sod until construction of the road project t in 2018.

9. When an active nest must be removed under this permit, any take of nestlings or eggs must be conducted by a Service-approved, qualified, and permitted agent, and all nestlings and viable eggs must be immediately transported to foster/recipient nests or a rehabilitation facility permitted to care for eagles, as directed by the Service. Provide a statement outlining how the eagle's nest will be removed, indicating the intended disposition of the nest, and if active, a description of how the nestlings or eggs will be removed, including the recipient nest(s) or federally permitted rehabilitation facility that is authorized for the possession of live eagle(s) or eggs, and/or eagle nest(s).

The permit is requested to remove the nest following the current nest season. Removal of nestlings and viable eggs is not proposed.

10. If the nest will be removed or relocated (rather than destroyed in the course of an activity), provide the name, address, phone number, and e-mail address of the qualified party conducting the removal and/or relocation.

NA

11. You must retain records relating to the activities conducted under your permit for at least 5 years from the date of expiration of the permit. Please provide the address where these records will be kept.

All project records related to this nest will be kept at the following locations:

Manatee County
1022 26th Ave East
Bradenton, Florida 33756

HDR Engineering
2601 Cattlemen Road
Sarasota, Florida 34232

12. Any permit issued as a result of this application is not valid unless you also have any required State or Tribal permits or approvals associated with the activity. Indicate whether you have obtained all required State or Tribal permits or approvals to conduct this activity.

A state permit will be required. The FWC permit will be requested following the Florida commission meeting in April 2017.

13. Disqualification factor. A conviction, or entry of a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act disqualifies any such person from receiving or exercising the privileges of a permit, unless such disqualification has been expressly waived by the Service Director in response to a written petition. (50 CFR 13.21(c))

Have you or any of the owners of the business, if applying as a business, been convicted, or entered a plea of guilty or nolo contendere, forfeited collateral, or are currently under charges for any violations of the laws mentioned above? Indicate "Yes" or "No."

Sia Mollanazar No
Sherri Swanson No

AS-BUILT CERTIFICATION AND REQUEST FOR CONVERSION TO OPERATION PHASE

Instructions: Complete and submit this page within 30 days of completion of the permitted activities, as required by the permit conditions. **Any components of the permitted activities that are not in substantial conformance with the permit must be corrected or a modification of the permit will be required in accordance with Rule 62-330.315, Florida Administrative Code (F.A.C.).** The operation phase of the permit is effective when the construction certification for the entire permit/application is approved by the Agency. If the final operation and maintenance entity is not the permittee, the permittee shall operate the system, works or other activities temporarily until such time as the transfer to the operation entity is finalized (use Form 62-330.310(2)).

Permit No.:	Application No(s).	Permittee:
Project Name:		Phase (if applicable):

I HEREBY CERTIFY THAT (please choose accurately and check only one box):

- I hereby notify the Agency of the completion of construction of all the components of the system, works or other activities for the above referenced project and certify that it has been constructed in substantial conformance with the plans specifications and conditions permitted by the Agency. Any minor deviations will not prevent the system from functioning in compliance with the requirements of Chapter 62-330, F.A.C. Attached is documentary evidence of satisfaction of any outstanding permit conditions, other than long term monitoring and inspection requirements.
- At the time of final inspection, the works or activities were NOT completed in substantial conformance with the plans and specifications permitted by the Agency. (The registered professional shall describe the substantial deviation(s) in writing, and provide confirming depiction on the as-built drawings and information.)

If there were substantial deviations, plans must be submitted clearly labeled as “as-built” or “record” drawings reflecting the substantial deviations. If there are no substantial deviations, do not submit “as built” drawings.

For activities that require certification by a registered professional:

By: _____

Signature

Print Name

Fla. Lic. or Reg. No

! AFFIX SEAL !

Company Name

Company Address

Date

For activities that do not require certification by a registered professional:

By: _____

Signature

Print Name

Company Name

Company Address

Date



DRAWINGS AND INFORMATION CHECKLIST

Following is a list of information that is to be verified and/or submitted by the Registered Professional or Permittee:

1. All surveyed dimensions and elevations shall be certified by a registered Surveyor or Mapper under Chapter 472, F.S.
2. The registered professional's certification shall be based upon on-site observation of construction (scheduled and conducted by the registered professional of record or by a project representative under direct supervision) and review of as-built drawings, with field measurements and verification as needed, for the purpose of determining if the work was completed in accordance with original permitted construction plans, specifications and conditions.
3. If submitted, the as-built drawings are to be based on the permitted construction drawings revised to reflect any substantial deviations made during construction. Both the original design and constructed condition must be clearly shown. The plans need to be clearly labeled as "as-built" or "record" drawings that clearly highlight (such as through "red lines" or "clouds") any substantial deviations made during construction. As required by law, all surveyed dimensions and elevations required shall be verified and signed, dated and sealed by an appropriate registered professional. The following information, at a minimum, shall be verified on the as-built drawings, and supplemental documents if needed:
 - a. Discharge structures - Locations, dimensions and elevations of all, including weirs, orifices, gates, pumps, pipes, and oil and grease skimmers;
 - b. Detention/Retention Area(s) – Identification number, size in acres, side slopes (h:v), dimensions, elevations, contours or cross-sections of all, sufficient to determine stage-storage relationships of the storage area and the permanent pool depth and volume below the control elevation for normally wet systems,
 - c. Side bank and underdrain filters, or exfiltration trenches - locations, dimensions and elevations of all, including clean-outs, pipes, connections to control structures and points of discharge to receiving waters;
 - d. System grading - dimensions, elevations, contours, final grades or cross-sections to determine contributing drainage areas, flow directions and conveyance of runoff to the system discharge point(s);
 - e. Conveyance - dimensions, elevations, contours, final grades or cross-sections of systems utilized to divert off-site runoff around or through the new system;
 - f. Benchmark(s) - location and description (minimum of one per major water control structure);
 - g. Datum- All elevations should be referenced to a vertical datum clearly identified on the plans, preferably the same datum used in the permit plans.
4. Wetland mitigation or restoration areas - Show the plan view of all areas, depicting a spatial distribution of plantings conducted by zone (if plantings are required by permit), with a list showing all species planted in each zone, numbers of each species, sizes, date(s) planted and identification of source of material; also provide the dimensions, elevations, contours and representative cross-sections depicting the construction.
5. Any additional information or outstanding submittals required by permit conditions or to document permit compliance, other than long-term monitoring or inspection requirements.

REQUEST FOR TRANSFER OF ENVIRONMENTAL RESOURCE PERMIT TO THE PERPETUAL OPERATION ENTITY

Instructions: Complete this form to transfer to the permit to the operation and maintenance entity. This form can be completed concurrently with, or within 30 days of approval of the As-Built Certification and Request for Conversion to Operation Phase (Form 62-330.310(1)). Please include all documentation required under Section 12.2.1(b) of Applicant's Handbook Volume 1. (see checklist below). **Failure to submit the appropriate final documents will result in the permittee remaining liable for operation and maintenance of the permitted activities.**

Permit No.:	Application No(s).
Project Name:	Phase (if applicable):

A. **REQUEST TO TRANSFER:** The permittee requests that the permit be transferred to the legal entity responsible for operation and maintenance (O&M).

By: _____

Signature of Permittee	Name and Title
Company	Company Address
Phone	City, State, Zip

B. **AGREEMENT FOR SYSTEM OPERATION AND MAINTENANCE RESPONSIBILITY:** The below-named legal entity agrees to operate and maintain the works or activities in compliance with all permit conditions and provisions of Chapter 62-330, Florida Administrative Code (F.A.C.) and Applicant's Handbook Volumes I and II in perpetuity. Authorization for any proposed modification to the permitted activities shall be applied for and obtained prior to conducting such modification.

By: _____

Signature of Representative of O&M Entity	Name of Entity for O&M
Name and Title	Address
Email Address	City, State, Zip
Phone	Date

Enclosed are the following documents, as applicable:

- Copy of recorded transfer of title to the operating entity for the common areas on which the stormwater management system is located (unless dedicated by plat)
- Copy of all recorded plats
- Copy of recorded declaration of covenants and restrictions, amendments, and associated exhibits
- Copy of filed articles of incorporation and documentary evidence of active corporate status with the Department of State, Division of Corporations (for corporations)
- A completed, signed, and notarized affidavit attesting that the operating entity meets the requirements of Section 12.3 of Environmental Resource Permit Applicant's Handbook Volume I.(Note- this is optional, but aids in processing of this request)



REQUEST TO TRANSFER PERMIT

Instructions: Submit this form to the Agency within 30 days after any transfer of ownership or control of the real property where the permitted activity is located.

Note: Use of this form is not required when a valid permit is in the operation and maintenance phase. In such case, the owner must notify the Agency in writing within 30 days of a change in ownership or control of the entire real property, project, or activity covered by the permit. The notification may be letter, e-mail, or using this form, sent to the office that issued the permit. A processing fee is not required for this notice. The permit shall automatically transfer to the new owner or person in control, except in cases of abandonment, revocation, or modification of a permit as provided in Sections 373.426 and 373.429, F.S. (2012). If a permittee fails to provide written notice to the Agency within 30 days of the change in ownership or control, or if the change does not include the entire real property or activity covered by the permit, then the transfer must be requested using this form.

Permit No.: _____ Application No(s): _____ Date Issued: _____

Identification or Name of Surface Water Management System: _____

Phase of Surface Water Management System (if applicable): _____

PART 1: PROPOSED PERMIT HOLDER

The undersigned hereby notifies the Agency that I have acquired ownership or control of the land on which the permitted system is located through the sale or other legal transfer of the land. By signing below, I hereby certify that I have sufficient real property interest or control in the land in accordance with subsection 4.2.3 (d) of Applicant's Handbook Volume I; attached is a copy of my title, easement, or other demonstration of ownership or control in the land, including any revised plats, as recorded in the Public Records. I request that the permit be modified to reflect that I agree to be the new permittee. By so doing, I acknowledge that I have examined the permit terms, conditions, and drawings, and agree to accept all rights and obligations as permittee, including agreeing to be liable for compliance with all of the permit terms and conditions, and to be liable for any corrective actions required as a result of any violations of the permit after approval of this modification by the Permitting Agency. Also attached are copies of any recorded restrictive covenants, articles of incorporation, and certificate of incorporation that may have been changed as a result of my assuming ownership or control of the lands. As necessary, I agree to furnish the Agency with demonstration that I have the ability to provide for the operation and maintenance of the system for the duration of the permit in accordance with subsection 12.3 of Applicant's Handbook Volume I.

Name of Proposed Permit Holder: _____

Mailing Address: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____ Fax: _____ E-mail: _____



Signature of Proposed Permittee

Date

Title (if any)

PART 2: RESPONSIBLE REGISTERED PROFESSIONAL

Name of Registered Professional who will be responsible for system inspections and reporting as required by Chapter 62-330, F.A.C. (if applicable): _____

Mailing Address: _____

City: _____

State: _____

Zip Code: _____

Telephone: _____

Fax: _____

E-mail: _____

Enclosures:

Copy of recorded transfer of title for surface water management system

Copy of plat(s)

Copy of recorded restrictive covenants, articles of incorporation, and certificate of incorporation

Other _____

APPENDIX B: US ARMY CORPS OF ENGINEERS PERMIT



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS JACKSONVILLE DISTRICT
701 SAN MARCOS BOULEVARD
JACKSONVILLE, FLORIDA 32232

December 04, 2018

Regulatory Division
West Permits Branch
Tampa Permits Section
SAJ-2018-01566(NW-PTR)

Mr. Sia Mollanazar
Manatee County Public Works
1022 26th Ave. East
Bradenton, Florida 34206 Via Email – Sia.mollanazar@mymanatee.org

Dear Mr. Mollanazar:

The U.S. Army Corps of Engineers (Corps) assigned your application for a Department of the Army permit, which the Corps received on April 26, 2018, the file number SAJ-2018-01566. A review of the information and drawings provided indicates that the proposed work would result in a reconfiguration and capacity expansion of the reclaimed water storage lakes at the Manatee County Southeast Water Reclamation Facility. The project is located at 3331 Lena Road within Section 01, Township 35 S, Range 18 E, Bradenton, Manatee County, Florida.

Your project, as depicted on the enclosed drawings, is authorized by Nationwide Permit's (NWP) Number #18 and NWP #46. NWP #18 includes the 0.02 acre of fill for an associated berm for the East Lake expansion encroaching into jurisdictional wetlands. NWP #46 includes the 0.11 acre of excavation and 0.05 of filling associated with upland cut ditches.

In addition, project specific conditions have been enclosed. This verification is valid until **March 18, 2022**. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this nationwide permit. Please access the U.S. Army Corps of Engineers' (Corps) Jacksonville District's Regulatory Internet page to access Internet links to view the Final Nationwide Permits, Federal Register Vol. 82, dated January 6, 2017, specifically pages 1983 to 2008, and the table of Regional Conditions. The Internet page address is:

<http://www.saj.usace.army.mil/Missions/Regulatory.aspx>

Please be aware this Internet address is case sensitive and should be entered as it appears above. Once there you will need to click on "Source Book"; and, then click on

“Nationwide Permits.” These files contain the description of the Nationwide Permit authorization, the Nationwide Permit general conditions, and the regional conditions, which apply specifically to this verification for NWP #18 and NWP #46. Enclosed is a list of the six General Conditions, which apply to all Department of the Army authorizations. You must comply with all of the special and general conditions and any project specific condition of this authorization or you may be subject to enforcement action. In the event you have not completed construction of your project within the specified time limit, a separate application or re-verification may be required.

The following **Special Conditions** are included with this verification:

1. Reporting Address: The Permittee shall submit all reports, notifications, documentation and correspondence required by the general and special conditions of this permit to the following address:

a. For standard mail: U.S. Army Corps of Engineers, Regulatory Division, Special Projects and Enforcement Branch, 10117 Princess Palm Avenue, Suite 120, Tampa, FL 33610-8302.

b. For electronic mail SAJ-RD-Enforcement@usace.army.mil (not to exceed 10 MB).

The Permittee shall reference this permit number, SAJ-2018-01566(NW - PTR), on all submittals.

2. Erosion Control: Prior to the initiation of any work authorized by this permit, the Permittee shall install erosion control measures along the perimeter of all work areas to prevent the displacement of fill material outside the work area into waters of the United States. Immediately after completion of the final grading of the land surface, all slopes, land surfaces, and filled areas shall be stabilized using sod, degradable mats, barriers, or a combination of similar stabilizing materials to prevent erosion. The erosion control measures shall remain in place and be maintained until all authorized work is completed and the work areas are stabilized.

3. Turbidity Barriers: Prior to the initiation of any of the work authorized by this permit, the Permittee shall install floating turbidity barriers with weighted skirts that extend to the bottom around all work areas that are in, or adjacent to, surface waters. The turbidity barriers shall remain in place and be maintained until the authorized work has been completed and all suspended and erodible materials have been stabilized. Turbidity barriers shall be removed upon stabilization of the work area.

4. Agency Changes/Approvals: Should any other agency require and/or approve changes to the work authorized or obligated by this permit, the Permittee is advised a

modification to this permit instrument is required prior to initiation of those changes. It is the Permittee's responsibility to request a modification of this permit from the Tampa Permits Section. The Corps reserves the right to fully evaluate, amend, and approve or deny the request for modification of this permit.

5. Commencement Notification: Within 10 days from the date of initiating the work authorized by this permit/Within 10 days from the date of initiating the work authorized by this permit for each phase of the authorized project, the Permittee shall provide a written notification of the date of commencement of authorized work to the Corps.

6. Self-Certification: Within 60 days of completion of the work authorized by this permit, the Permittee shall complete the attached "Self-Certification Statement of Compliance" form (Enclosed) and submit it to the Corps. In the event that the completed work deviates in any manner from the authorized work, the Permittee shall describe the deviations between the work authorized by this permit and the work as constructed on the "Self-Certification Statement of Compliance" form. The description of any deviations on the "Self-Certification Statement of Compliance" form does not constitute approval of any deviations by the Corps.

7. Posting of Permit: The Permittee shall have available and maintain for review a copy of this permit and approved plans at the construction site.

8. Cultural Resources/Historic Properties:

a. No structure or work shall adversely affect impact or disturb properties listed in the *National Register of Historic Places* (NRHP) or those eligible for inclusion in the NRHP.

b. If during the ground disturbing activities and construction work within the permit area, there are archaeological/cultural materials encountered which were not the subject of a previous cultural resources assessment survey (and which shall include, but not be limited to: pottery, modified shell, flora, fauna, human remains, ceramics, stone tools or metal implements, dugout canoes, evidence of structures or any other physical remains that could be associated with Native American cultures or early colonial or American settlement), the Permittee shall immediately stop all work and ground-disturbing activities within a 100-meter diameter of the discovery and notify the Corps within the same business day (8 hours). The Corps shall then notify the Florida State Historic Preservation Officer (SHPO) and the appropriate Tribal Historic Preservation Officer(s) (THPO(s)) to assess the significance of the discovery and devise appropriate actions.

c. Additional cultural resources assessments may be required of the permit area in the case of unanticipated discoveries as referenced in accordance with the above

Special Condition ; and if deemed necessary by the SHPO, THPO(s), or Corps, in accordance with 36 CFR 800 or 33 CFR 325, Appendix C (5). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume on non-federal lands without written authorization from the SHPO for finds under his or her jurisdiction, and from the Corps.

d. In the unlikely event that unmarked human remains are identified on non-federal lands, they will be treated in accordance with Section 872.05 Florida Statutes. All work and ground disturbing activities within a 100-meter diameter of the unmarked human remains shall immediately cease and the Permittee shall immediately notify the medical examiner, Corps, and State Archeologist within the same business day (8-hours). The Corps shall then notify the appropriate SHPO and THPO(s). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume without written authorization from the State Archeologist and from the Corps.

9. Fill Material: The Permittee shall use only clean fill material for this project. The fill material shall be free from items such as trash, debris, automotive parts, asphalt, construction materials, concrete block with exposed reinforcement bars, and soils contaminated with any toxic substance, in toxic amounts in accordance with Section 307 of the Clean Water Act.

10. Eastern Indigo Snake Protection Measures and Inspection: Permittee shall comply with U.S. Fish and Wildlife Service's "Standard Protection Measures for the Eastern Indigo Snake" dated August 12, 2013 (enclosed). All gopher tortoise burrows, active or inactive, shall be evacuated prior to site manipulation in the vicinity of the burrow. If excavating potentially occupied burrows, active or inactive, individuals must first obtain state authorization via a Florida Fish and Wildlife Conservation Commission (FWC) Authorized Gopher Tortoise Agent permit. The excavation method selected shall minimize the potential for injury of an indigo snake. The Permittee shall follow the excavation guidance provided in the most current FWC Gopher Tortoise Permitting Guidelines found at <http://myfwc.com/gophertortoise>. If an indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Holes, cavities, and snake refugia other than gopher tortoise burrows shall be inspected each morning before planned site manipulation of a particular area, and if occupied by an indigo snake, no work shall commence until the snake has vacated the vicinity of the proposed work.

This letter of authorization does not give absolute Federal authority to perform the work as specified on your application. The proposed work may be subject to local building restrictions mandated by the National Flood Insurance Program. You should contact your local office that issues building permits to determine if your site is located in a flood-prone area, and if you must comply with the local building requirements mandated by the National Flood Insurance Program.

If you are unable to access the internet or require a hardcopy of any of the conditions, limitations, or expiration date for the above referenced NWP's, please contact me by telephone at 813-769-7072.

Based on information submitted to the U.S. Army Corps of Engineers (Corps) we have preliminarily determined there are waters of the United States, including wetlands onsite. The location(s) of waters of the United States or wetlands on your parcel are shown on the attached plans. A copy of the preliminary JD form and a copy of the Notification of Administrative Appeal Options and Process in support of our determination are enclosed.

Should you desire an official Corps determination that jurisdictional "waters of the United States," or "navigable waters of the United States," or both, are either present or absent on a particular site, the Corps will issue an approved JD when requested.

You are cautioned that work performed in areas which may be waters of the United States, as indicated in the preliminary JD, without a Department of the Army permit could subject you to enforcement action. Receipt of a permit from the Florida Department of Environmental Protection or the Water Management District does not obviate the requirement for obtaining a Department of the Army permit for such work prior to commencing work.

This preliminary JD has been conducted to identify the potential for Clean Water Act and/or Rivers and Harbors Act jurisdiction for the particular site identified in this request. This preliminary JD may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are U.S. Department of Agriculture (USDA) program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

Thank you for your cooperation with our permit program. The Corps Jacksonville District Regulatory Division is committed to improving service to our customers. We strive to perform our duty in a friendly and timely manner while working to preserve our environment. We invite you to complete our automated Customer Service Survey at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey. Please be aware

this Internet address is case sensitive; and, you will need to enter it exactly as it appears above. Your input is appreciated – favorable or otherwise.

Sincerely,

Peter Romano
Project Manager

Enclosures

1. "SEWRF Reclaimed Pump Back Station – Lake Expansion Plan," sheet 1, dated March 20, 2018, scale as shown, drawn by Kimley-Horn and Associates, Tampa, FL.
2. Self-Certification Statement of Compliance – 1 page
3. STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE - U.S. Fish and Wildlife Service August 12, 2013 – 3 pages
4. PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM (RGL 16-01 Appendix 2) – 5 pages
5. Notification of Administrative Appeal Options and Process and Request for Appeal – 1 page

Cc:

1. Ms. Lee Cook - lee@questecology.com

GENERAL CONDITIONS
33 CFR PART 320-330

1. The time limit for completing the work authorized ends on **March 18, 2022**.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.
4. If you sell the property associated with this permit you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.
5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.
6. You must allow a representative from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

DEPARTMENT OF THE ARMY PERMIT TRANSFER REQUEST

PERMIT NUMBER: SAJ-2018-01566 (NW-18)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. Although the construction period for works authorized by Department of the Army permits is finite, the permit itself, with its limitations, does not expire.

To validate the transfer of this permit and the associated responsibilities associated with compliance with its terms and conditions, have the transferee sign and date below and mail to the U.S. Army Corps of Engineers, Enforcement Section, Post Office Box 4970, Jacksonville, FL 32232-0019 or electronic mail at saj-rd-enforcement@usace.army.mil.

(TRANSFEREE-SIGNATURE)

(SUBDIVISION)

(DATE)

(LOT)

(BLOCK)

(NAME-PRINTED)

(STREET ADDRESS)

(MAILING ADDRESS)

(CITY, STATE, ZIP CODE)

DEPARTMENT OF THE ARMY PERMIT TRANSFER REQUEST

PERMIT NUMBER: SAJ-2018-01566 (NW-46)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. Although the construction period for works authorized by Department of the Army permits is finite, the permit itself, with its limitations, does not expire.

To validate the transfer of this permit and the associated responsibilities associated with compliance with its terms and conditions, have the transferee sign and date below and mail to the U.S. Army Corps of Engineers, Enforcement Section, Post Office Box 4970, Jacksonville, FL 32232-0019 or electronic mail at saj-rd-enforcement@usace.army.mil.

(TRANSFEREE-SIGNATURE)

(SUBDIVISION)

(DATE)

(LOT)

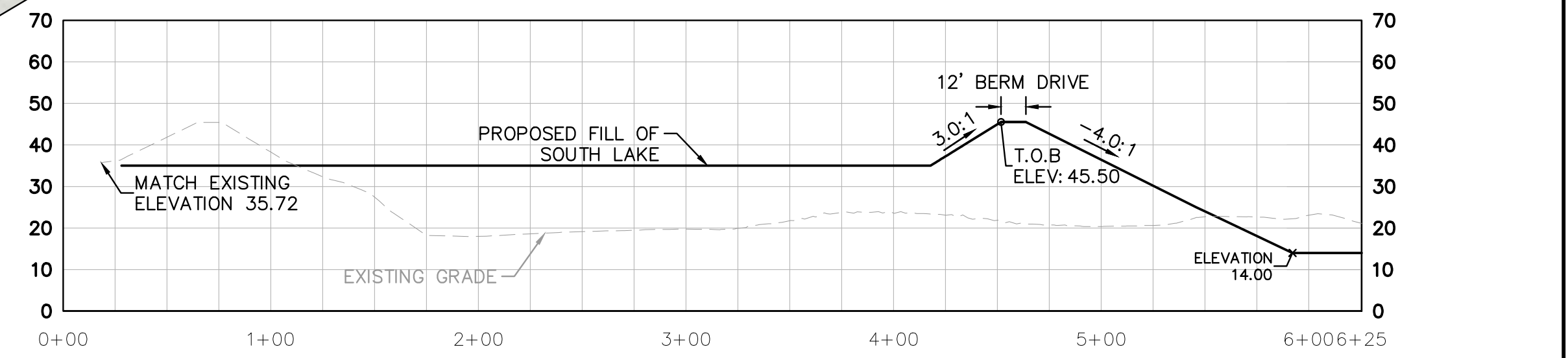
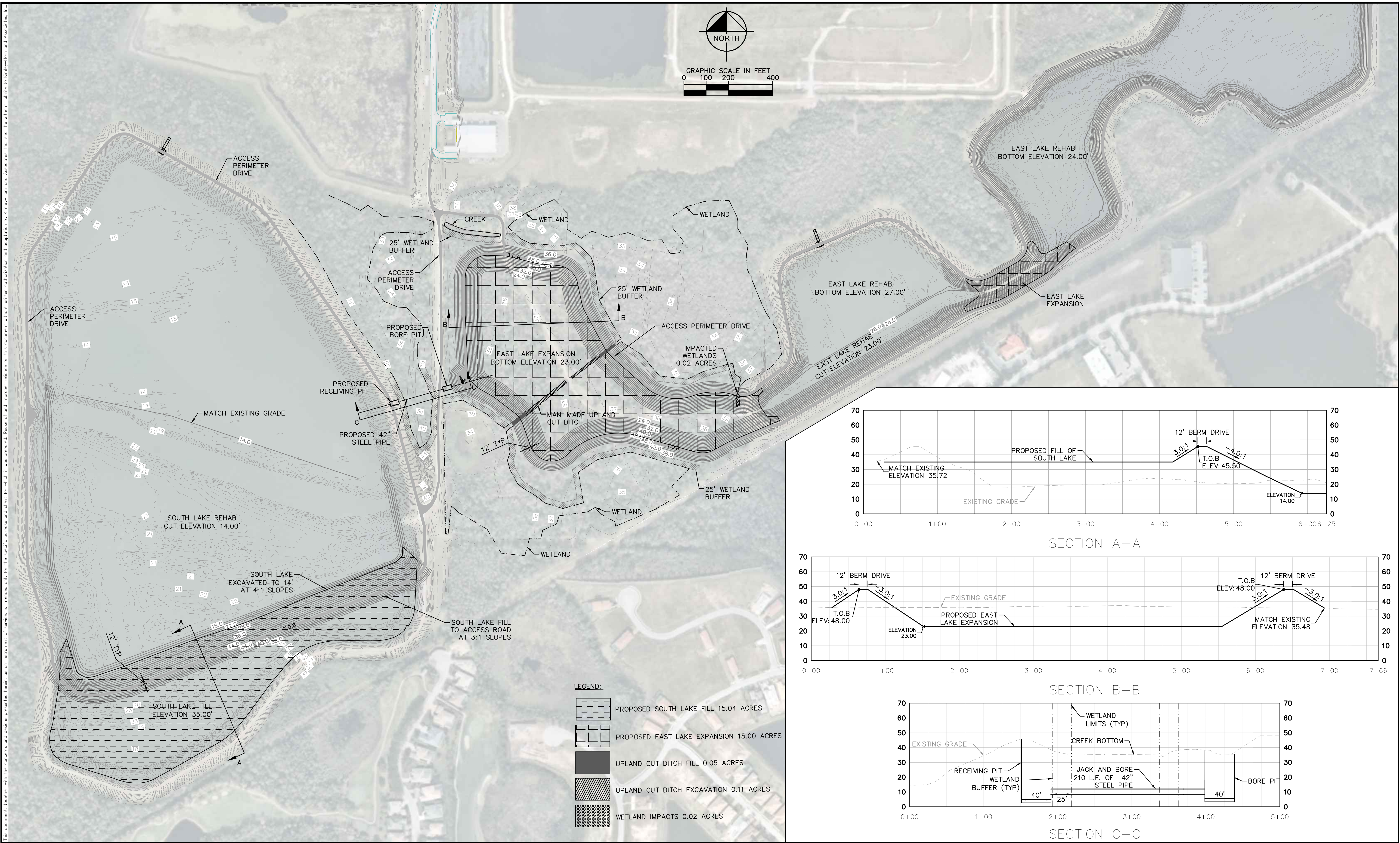
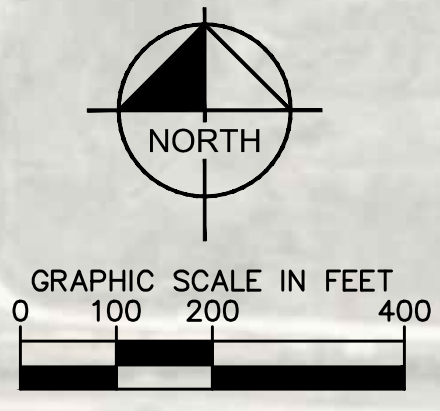
(BLOCK)

(NAME-PRINTED)

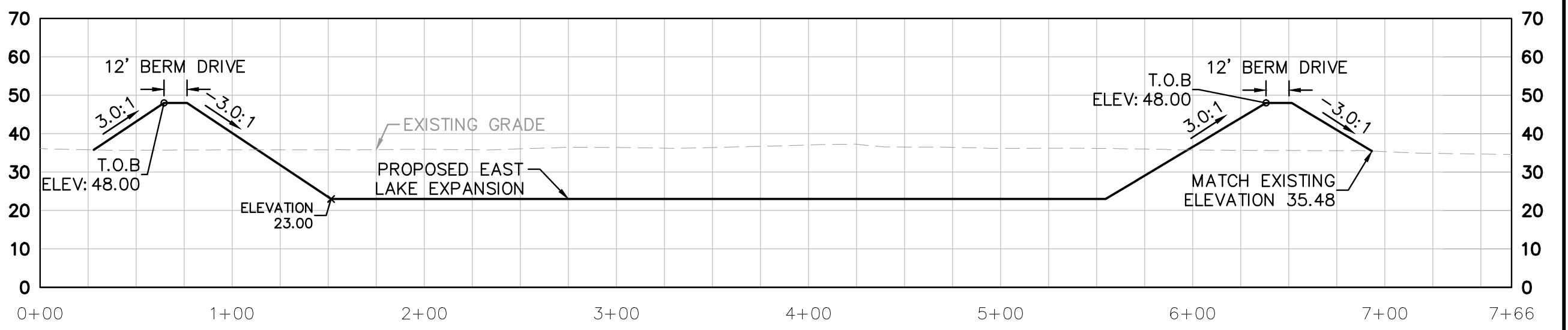
(STREET ADDRESS)

(MAILING ADDRESS)

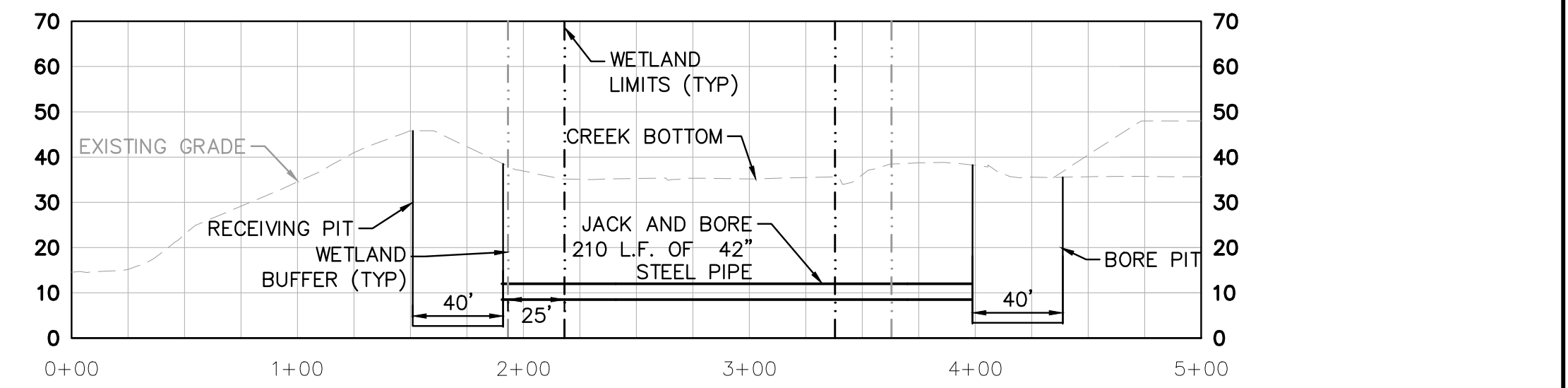
(CITY, STATE, ZIP CODE)



SECTION A-A



SECTION B-B



SECTION C-C

LEGEND:

	PROPOSED SOUTH LAKE FILL 15.04 ACRES
	PROPOSED EAST LAKE EXPANSION 15.00 ACRES
	UPLAND CUT DITCH FILL 0.05 ACRES
	UPLAND CUT DITCH EXCAVATION 0.11 ACRES
	WETLAND IMPACTS 0.02 ACRES

No.	REVISIONS	DATE	BY

Kimley»Horn

© 2018 KIMLEY-HORN AND ASSOCIATES, INC.
 655 NORTH FRANKLIN STREET, SUITE 150, TAMPA, FL 33602
 PHONE: 813-620-1460
 WWW.KIMLEY-HORN.COM CA 00000696

KHA PROJECT
148400015
 DATE
3/20/2018
 SCALE AS SHOWN
 DESIGNED BY WWW
 DRAWN BY MAS
 CHECKED BY WEW

Manatee County Florida

SEWRF RECLAIMED PUMP BACK STATION

MANATEE COUNTY

LICENSED PROFESSIONAL
 W. WADE WOOD, P.E.
 FL LICENSE NUMBER
69051
 FL DATE:

LAKE EXPANSION PLAN

SHEET NUMBER
1

SELF-CERTIFICATION STATEMENT OF COMPLIANCE

Permit Number: SAJ-2018-01566

Permittee's Name & Address (please print or type): _____

Telephone Number: _____

Location of the Work: _____

Date Work Started: _____ Date Work Completed: _____

PROPERTY IS INACCESSIBLE WITHOUT PRIOR NOTIFICATION: YES _____ NO _____

TO SCHEDULE AN INSPECTION PLEASE CONTACT _____
AT _____

Description of the Work (e.g. bank stabilization, residential or commercial filling, docks, dredging, etc.): _____

Acreeage or Square Feet of Impacts to Waters of the United States: _____

Describe Mitigation completed (if applicable): _____

Describe any Deviations from Permit (attach drawing(s) depicting the deviations):

I certify that all work, and mitigation (if applicable) was done in accordance with the limitations and conditions as described in the permit. Any deviations as described above are depicted on the attached drawing(s).

Signature of Permittee

Date

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE
U.S. Fish and Wildlife Service
August 12, 2013

The eastern indigo snake protection/education plan (Plan) below has been developed by the U.S. Fish and Wildlife Service (USFWS) in Florida for use by applicants and their construction personnel. At least **30 days prior** to any clearing/land alteration activities, the applicant shall notify the appropriate USFWS Field Office via e-mail that the Plan will be implemented as described below (North Florida Field Office: jaxregs@fws.gov; South Florida Field Office: verobeach@fws.gov; Panama City Field Office: panamacity@fws.gov). As long as the signatory of the e-mail certifies compliance with the below Plan (including use of the attached poster and brochure), no further written confirmation or “approval” from the USFWS is needed and the applicant may move forward with the project.

If the applicant decides to use an eastern indigo snake protection/education plan other than the approved Plan below, written confirmation or “approval” from the USFWS that the plan is adequate must be obtained. At least 30 days prior to any clearing/land alteration activities, the applicant shall submit their unique plan for review and approval. The USFWS will respond via e-mail, typically within 30 days of receiving the plan, either concurring that the plan is adequate or requesting additional information. A concurrence e-mail from the appropriate USFWS Field Office will fulfill approval requirements.

The Plan materials should consist of: 1) a combination of posters and pamphlets (see **Poster Information** section below); and 2) verbal educational instructions to construction personnel by supervisory or management personnel before any clearing/land alteration activities are initiated (see **Pre-Construction Activities** and **During Construction Activities** sections below).

POSTER INFORMATION

Posters with the following information shall be placed at strategic locations on the construction site and along any proposed access roads (a final poster for Plan compliance, to be printed on 11” x 17” or larger paper and laminated, is attached):

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands

and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTION UNDER FEDERAL AND STATE LAW: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. “Taking” of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. “Take” is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of \$25,000 for civil violations and up to \$50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the live eastern indigo snake sufficient time to move away from the site without interference;
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

Telephone numbers of USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida Field Office – (904) 731-3336
Panama City Field Office – (850) 769-0552
South Florida Field Office – (772) 562-3909

PRE-CONSTRUCTION ACTIVITIES

1. The applicant or designated agent will post educational posters in the construction office and throughout the construction site, including any access roads. The posters must be clearly visible to all construction staff. A sample poster is attached.
2. Prior to the onset of construction activities, the applicant/designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational brochure including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office (a final brochure for Plan compliance, to be printed double-sided on 8.5" x 11" paper and then properly folded, is attached). Photos of eastern indigo snakes may be accessed on USFWS and/or FWC websites.
3. Construction staff will be informed that in the event that an eastern indigo snake (live or dead) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Field Office. The contact information for the USFWS is provided on the referenced posters and brochures.

DURING CONSTRUCTION ACTIVITIES

1. During initial site clearing activities, an onsite observer may be utilized to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).
2. If an eastern indigo snake is discovered during gopher tortoise relocation activities (i.e. burrow excavation), the USFWS shall be contacted within one business day to obtain further guidance which may result in further project consultation.
3. Periodically during construction activities, the applicant's designated agent should visit the project area to observe the condition of the posters and Plan materials, and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.

POST CONSTRUCTION ACTIVITIES

Whether or not eastern indigo snakes are observed during construction activities, a monitoring report should be submitted to the appropriate USFWS Field Office within 60 days of project completion. The report can be sent electronically to the appropriate USFWS e-mail address listed on page one of this Plan.

**PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM
(RGL 16-01 Appendix 2)**

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD:

B. NAME AND ADDRESS OF PERSON REQUESTING PJD:

Lee Cook, M.S. P.W.S.
Senior Ecologist Quest Ecology Inc.
735 Lakeview Dr.
Wimauma, FL 33598 on behalf of Florida Power and Light Company

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: CESAJ-RD-WT 2018-01566-PTR
(MANATEE COUNTY PUBLIC WORKS / SOUTHEAST WATER RECLAMATION
FACILITY LAKE EXPANSION

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: This PJD is for the
SEWRF Lake Expansion Project located south of the Manatee County Landfill in
Bradenton, Manatee County, Florida.

**(USE THE TABLE BELOW TO DOCUMENT MULTIPLE
AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT
DIFFERENT SITES)**

State: **FL** County/parish/borough: **Manatee** City: **Lakewood Ranch**

Center coordinates of site (lat/long in degree decimal format):

Lat. N **26.460224** Long. W-**82.447469**

Universal Transverse Mercator: **17**

Name of nearest waterbody: **Cypress Strand**

REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT
APPLY):

- Office (Desk) Determination. Date:
- Field Determination. Date(s): **09/26/18**

- 1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

- 2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring “pre-construction notification” (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) that the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant’s acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as is practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there “*may be*” waters of the U.S. and/or that there “*may be*” navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for PJD (check all that apply)

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
Map: "SEWRF Reclaimed Pump Back Station, Lake Expansion Plan," dated March 20, 2018, scale 1"=400', sheet 1, no revisions, drawn by Kimley-Horn and Associates, Inc., Tampa, Fl.

Data sheets prepared/submitted by or on behalf of the PJD requestor.

Office concurs with data sheets/delineation report.

Office does not concur with data sheets/delineation report.

Data sheets prepared by the Corps:

Corps navigable waters' study: .

U.S. Geological Survey Hydrologic Atlas: .

USGS NHD data.

USGS 8 and 12 digit HUC maps.

U.S. Geological Survey map(s). Cite scale & quad name: Lorraine, Fl
1"=2000' .

Natural Resources Conservation Service Soil Survey. Citation:
NRCS Web Soil Survey

National wetlands inventory map(s).

Cite name: Lorraine, Fl. 1"=2000'

State/Local wetland inventory map(s):

FEMA/FIRM maps: .

100-year Floodplain Elevation is:(National Geodetic Vertical Datum of 1929)

Photographs: Applicant submitted

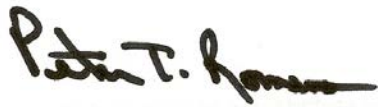
Aerial (Name & Date):.Google Earth, March 22, 2018

Other (Name & Date):

Previous determination(s). File no. and date of response letter: .

Other information (please specify): FNAI map

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.



11/09/18

Signature and date of
Regulatory staff member
completing PJD



9/27/18

Signature and date of
person requesting preliminary JD
(REQUIRED, unless obtaining the
signature is impracticable)¹

¹ Districts may establish timeframes for requestor to return signed PJD forms. If the requestor does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Manatee County Public Works		File Number: SAJ-2018-01566	Date: December 04, 2018
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
	APPROVED JURISDICTIONAL DETERMINATION		D
X	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/CECW/Pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:

Project Manager as noted in letter

If you only have questions regarding the appeal process you may also contact:

**Jason Steele
404-562-5137**

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent.

Date:

Telephone number:

APPENDIX C: GEOTECHNICAL REPORT

**SUBSURFACE SOIL EXPLORATION AND
GEOTECHNICAL ENGINEERING
EVALUATION, SEWRF, RECLAIMED
PUMP BACK STATION, LENA ROAD,
BRADENTON, MANATEE COUNTY,
FLORIDA**



Ardaman & Associates, Inc.

CORPORATE HEADQUARTERS

8008 S. Orange Avenue, Orlando, FL 32809 - Phone: (407) 855-3860 Fax: (407) 859-8121

Branch Office Locations

Florida: Bartow, Cocoa, Fort Myers, Miami, Orlando, Port St. Lucie, Sarasota, Tallahassee, Tampa, West Palm Beach
Louisiana: Baton Rouge, Monroe, New Orleans, Shreveport

MEMBERS:

ASTM International
American Concrete Institute
Geoprofessional Business Association
Society of American Military Engineers
American Council of Engineering Companies



Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

September 12, 2018
File No. 17-7261

TO: Kimley-Horn & Associates, Inc.
655 North Franklin Street, Suite 150
Tampa, Florida 33602

Attention: Mr. Wade Wood

SUBJECT: Subsurface Soil Exploration and Geotechnical Engineering Evaluation
SEWRF; Reclaimed Pump Back Station; Lena Road
Bradenton, Manatee County, Florida

Dear Mr. Wood:

As requested and authorized, Ardaman & Associates has completed a subsurface soil exploration program at the site referenced above. This report documents the results of a portion of the proposed explorations that were outlined in our proposal dated November 17, 2017. The purpose of these programs was to evaluate the subsurface soil conditions and provide recommendations for the foundation designs for proposed control structures. We have also provided analyses of a specific portion of the proposed earthen berms, as you requested.

This report documents our findings and presents our engineering recommendations. It has been prepared for the exclusive use of Kimley-Horn & Associates for specific application to the subject project, in accordance with generally-accepted geotechnical engineering practices.

PROJECT INFORMATION

We understand that the proposed construction includes the East Lake #1 expansion (multiple existing lakes will be connected, as well as a new portion of the lake to be excavated to the west), reconstruction of portions of the South Lake #2, and a pump control structure between the two lakes. The lakes will have earthen berms to hold water levels. Of particular interest is a critical section provided by Kimley-Horn near the center of the East Lake #1. The pond narrows at this section, so erosion due to flow through this section is of concern.

The maximum foundation loads for the proposed pump structure are not known at this time. We understand that the pump station is roughly 40 feet by 20 feet in footprint plan area and will be

Kimley-Horn & Associates, Inc.
File No. 17-7261
September 12, 2018

founded on reinforced concrete mat foundations. Based on our experience with similar projects, we have assumed a maximum load:

Mat Load: 1,500 pounds per square foot (lb/sq ft)

Based upon information provided by Kimley-Horn, we understand that the pump station is to be constructed near elevation +13 feet NAVD 88 (approximately 25 feet below the existing ground surface). If the loads and/or cut depth are greater than what we are assuming, the recommendations in this report may not be valid.

SITE LOCATION AND CONDITIONS

The subject site is located in Bradenton, Manatee County, Florida. More specifically, the ponds are located on the south side of the Lena Road Landfill.

At the time of our field explorations, both the east and south lakes were existing, although the shape of the existing lakes is to be modified and/or expanded. In the East Lake #1 area, several portions of the proposed lake expansion area are currently unexcavated, and have heavy underbrush and trees. The south lake area is not to be expanded, but its southern edge is to be moved to farther north.

To the north of both lakes is mostly wetland and forested areas, as well as the landfill and the Southeast Water Reclamation Facility (SEWRF). To the west and south of the lakes are pipeline easements.

The USGS topographic survey map for the site vicinity (Bradenton, Florida Quadrangle, dated 1964, photo-revised 1987) was reviewed for ground surface features at the proposed project location (presented as the attached Figure 1). Based on this review, the natural ground surface elevation is in the range of +30 to +40 feet National Geodetic Vertical Datum of 1929 (NGVD). The topographic survey map does not indicate any significant topographic features across the site, except that the elevation typically lowers from the east side of the site to the west side of the site.



REVIEW OF SOIL SURVEY MAPS

Based on the U.S. Department of Agriculture, Soil Conservation Service (now the Natural Resources Conservation Service, or NRCS) "Soil Survey of Manatee County, Florida," dated 1983, the site is predominantly located in an area mapped as the "EauGallie fine sand" soil series.

The "EauGallie fine sand" soil series consists of nearly level, poorly drained soil in broad areas of flatwoods. A typical soil profile consists of sandy soils to a depth of 42 inches underlain by sandy clay loam to a depth of 50 inches, underlain by fine sand, loamy fine sand, and fine sandy loam to a depth of 65 inches. According to the Soil Survey, during most years, the water table is at a depth of less than 10 inches for 2 to 4 months during wet seasons, and within a depth of 40 inches for more than 6 months out of the year.

The NRCS hydrologic soil group for this soil series is defined as "B/D". Series B indicates a moderately high infiltration rate of the soil when thoroughly wet and having a low runoff potential, while series D indicates a very slow infiltration rate of the soil when thoroughly wet and having a high runoff potential.

FIELD EXPLORATION PROGRAM

SPT and Auger Borings

Our field exploration program included conducting five (5) Standard Penetration Test (SPT) borings and two (2) hand auger borings at the locations shown on the attached Figure 2. Four (4) of the requested locations (locations 1 through 4) were not available to drill at the time of exploration, so will be explored at a later date. The SPT borings were performed to determine the nature and condition of the subsurface soils to depths of 20 to 40 feet below the existing ground surface. The SPT soil borings were initially drilled to a depth of 4.5 feet with a hand auger at the boring locations, in order to avoid damaging possible underground utilities. The equipment and procedures used in the borings are described in Appendix I of this report.

The two (2) auger borings were drilled using a handheld, 3.5-inch diameter bucket auger to depths of 7 and 8 feet below the water surface (penetrating approximately 2½ to 3½ feet below the lake



bottom). A summary of this field procedure is included in Appendix I. Representative soil samples were recovered from the auger borings and transported to our laboratory for further analysis.

Test Locations

Test borings were located in the field utilizing an aerial photograph of the site and visual reckoning to available landmarks. The locations should be considered accurate only to the degree implied by the method used. Should more accurate locations be required, a registered land surveyor should be retained.

LABORATORY TESTING

The field soil boring logs and recovered soil samples were transported to our Sarasota office following the completion of the field exploration activities. Each representative sample was examined by a geotechnical engineer in our laboratory for visual classification and assignment of laboratory tests.

The laboratory tests performed included determining the fines content of twenty-two selected samples. The test results are presented on the graphic soil profiles on Figures 3 through 5, at the depth from which the respective samples were recovered.

The tests were performed in general accordance with the applicable ASTM standards, which are listed in the Appendix. The soil descriptions shown on the soil profiles are based on the laboratory test results and a visual classification procedure in general accordance with the Unified Soil Classification System (ASTM D-2487 or D-2488).

SUBSURFACE SOIL CONDITIONS

The general subsurface soil conditions encountered during the field exploration programs are depicted on the graphic soil profiles (boring and test pit logs) on Figures 3 through 5. Soil stratification is based on examination of recovered soil samples and interpretation of field boring logs. The stratification lines represent the approximate boundaries between the soil types, while the actual transitions may be gradual.

A generalization of the subsurface soil conditions encountered in the SPT borings is described below:

DEPTH (feet)		SOIL DESCRIPTION
From	To	
0	4.5	Fine sand (SP), fine sand with silt (SP-SM), and fine sand with clay (SP-SC), occasionally with some roots.
4.5	12.5	Loose to very dense fine sand with varying amounts of silt and clay (SP, SP-SC, SM, SP-SM, SC).
12.5	17.5	Very loose to medium dense fine sand (SP), silty fine sand (SM), silty clayey fine sand (SC-SM) and clayey fine sand (SC)
17.5	22.5	Medium dense to very dense fine sands with varying amounts of silt to very stiff sandy clay (CL-CH). Some soils were cemented.
22.5	37.5	Medium dense to dense clayey fine sand (SC)
37.5	40	Stiff sandy clay (CL-CH)

A generalization of the subsurface soil conditions encountered in the hand auger borings is described below:

DEPTH (feet)		SOIL DESCRIPTION
From	To	
0	4.5	Water
4.5	5	Silt/sediment
5	8	Silty fine sand (SM), silty clayey fine sand (SC-SM) and clayey fine sand (SC)

GROUNDWATER LEVEL

At the time of our field exploration program, the measured water level in the SPT boreholes ranged from approximately 4 to 5 feet below the existing ground surface. These water level readings may differ from the actual groundwater table due to variations in the permeability of soil layers. The degree of accuracy of the reported water levels is also related to the time allowed for the borehole water level to reach equilibrium. In addition, the groundwater level will fluctuate over time, due to variations in seasonal rainfall and other factors.

In Boring 9, groundwater was not encountered in the top 10.5 feet and could not be measured below this due to the mudded condition of the borehole. Groundwater may be encountered within the top 10.5 feet of the borehole at some other time. This level was likely influenced by the nearby

lake levels and should not be considered representative of natural groundwater conditions in this area.

ENGINEERING EVALUATION AND RECOMMENDATIONS FOR PROPOSED PUMP STATION

Soil Evaluation

Based on the results of our exploration and our engineering analyses, the soils encountered at the subject site are capable of supporting the proposed pump structure on a structurally designed mat foundation system, if the soils are properly prepared. This analysis is related only to settlement. Other calculations including overturning, sliding, buoyancy and possible seepage failures will need to be analyzed as details of the structure become available.

We estimate that a total settlement of less than one inch will occur, with an estimated differential settlement of less than one-half inch, since the soil is being significantly unloaded during the excavation and the weight of the structure is less than the weight of the excavated soil that it replaces.

This soil evaluation assumes that the soils are prepared in accordance with the soil preparation recommendations of this report, that foundation loads are no greater than those indicated previously and that our foundation design recommendations are followed. The recommended site preparation program involves densification of the subgrade foundation surfaces to compress subgrade soils disturbed by site preparation procedures, if necessary, thereby creating a more uniform and less yielding soil mass. The created conditions will promote a more uniform settlement of the structure, thereby reducing the incidence and magnitude of differential settlement.

Foundation Design

Foundations for the proposed structure may be designed for an allowable soil contact pressure of 1,500 pounds per square foot (psf). All foundations should be designed for an equal dead load distribution in accordance with building code requirements.

All footings should be embedded so that the bottom of the foundation is a minimum of 12 inches below adjacent compacted ground surface grades on all sides. This minimum embedment is desired



to provide adequate confinement of the bearing soils, and to achieve the recommended bearing pressure.

The mat foundations should be designed by a structural engineer to withstand potential differential settlement. A subgrade reaction modulus of 100 pci (pounds per cubic inch) can be used for design provided that the site preparation recommendations (including compaction) are met.

Soil Preparation Recommendations

The existing surficial soils should be prepared, prior to placement of any structural fill and/or foundation construction on the soils, in accordance with the following site preparation recommendations. The recommended procedures should be covered in the project specifications and completed prior to construction of the foundation system.

1. The structure area, plus a margin of at least 5 feet outside structure lines, should be cleared (stripped) of all surface vegetation and organic debris. All existing slabs, abandoned utilities and underground structures should either be removed or filled with cement grout to reduce the possibility of soil erosion into the voids. After this, the soil should be excavated to final grade elevation.
2. If the soils at the base of the excavation are disturbed during excavation, the structure area (plus the 5 feet margin outside its perimeter) should be compacted with at least 6 passes with equipment capable of achieving the compaction requirements presented below. Each pass should overlap the preceding pass by at least 30 percent (%) and some of the passes should be made in a perpendicular direction. Sufficient passes should be made over the structure area, plus the 5 feet margin, to produce a density of at least 95% of Modified Proctor (ASTM D-1557) maximum density to a depth of 1 foot below the compacted surface. We note that the soil may need to be overexcavated and replaced with sandier soils to assist with compactive efforts.
3. After compaction and testing to verify that the desired compaction has been achieved at this elevation, fill consisting of clean fine sands containing no more than 12% passing the No. 200 sieve, and having a Unified Soil Classification (ASTM D-2487) of "SP" or "SP-SM," can be placed in level lifts not exceeding 12 inches loose thickness and compacted with the equipment described above. Each lift should be compacted to at least 95% of Modified Proctor maximum density prior to the placement of subsequent lifts and density tests to confirm compaction should be performed in each fill lift before the next lift is placed. We note that soils with more than 12% passing the No. 200 sieve can be used as fill in some applications,



but will be more difficult to moisture condition and compact due to their inherent nature to retain moisture.

During the compaction process, soil moisture contents may need to be controlled in order to facilitate proper compaction. If additional moisture is necessary to achieve compaction objectives of imported structural fill, then water should be applied in such a way that it will not cause erosion or removal of the subgrade soils. In the event that applied water does not penetrate sufficiently deep into natural soils to act as a lubricant in the compaction process, it will be necessary to disk or otherwise break up the soils before and during application of water. A moisture content within two percentage points of the optimum indicated by the modified Proctor test (ASTM D-1557) is recommended prior to compaction of the natural ground and structural fill.

Dewatering

The control of groundwater will be necessary to achieve the necessary stripping, excavation, proof-rolling, filling, compaction, and any other earthwork, sitework, or foundation subgrade preparation operations required for the project, the actual method(s) of dewatering should be determined by the contractor. Dewatering should be performed to lower the groundwater level to depths that are adequately below excavations and compaction surfaces. Adequate groundwater level depths below excavations and compaction surfaces vary depending on soil type and construction method, and are usually two feet or more. Dewatering solely with sump pumps may not achieve the desired results.

Existing Pump Station

We understand that the existing pump station that is located within the earthen berm on the east side of the south pond (Lake No. 2) is to be abandoned. Since hard structures such as this within berms are often the location of more extensive soil erosion from stormwater runoff and wave action, and the associated subsurface pipes through the berm can provide preferential seepage paths, we recommend that this structure be removed rather than being abandoned in-place (such as by filling with concrete). The associated pipes that extend through the berm should also be removed from within the berm area and to a distance of at least 10 feet outside the exterior toe of the berm embankment.



The following excavation and soil preparation procedures are recommended and should be covered in the project specifications and completed prior to construction of the foundation system.

1. The structure area, plus a margin of at least 5 feet outside structure lines and/or proposed excavation areas, should be cleared (stripped) of all surface vegetation and organic debris. All existing slabs, abandoned utilities and underground structures should be removed.
2. If the soils at the base of the excavation are disturbed during excavation, the excavation bottom area should be compacted with at least 6 passes with equipment capable of achieving the compaction requirements presented below. Each pass should overlap the preceding pass by at least 30 percent (%) and some of the passes should be made in a perpendicular direction. Sufficient passes should be made over the structure area, plus the 5 feet margin, to produce a density of at least 95% of Modified Proctor (ASTM D-1557) maximum density to a depth of 1 foot below the compacted surface.
3. After compaction and testing to verify that the desired compaction has been achieved at this elevation, fill consisting of soils having a Unified Soil Classification (ASTM D-2487) of "SP-SM" or "SM" and having a fines (percent passing the No. 200 sieve) in the range of 7% to 20% can be placed in level lifts not exceeding 12 inches loose thickness and compacted with the equipment described above. Each lift should be compacted to at least 95% of Modified Proctor maximum density prior to the placement of subsequent lifts and density tests to confirm compaction should be performed in each fill lift before the next lift is placed.

Dewatering may be necessary to complete the proposed excavation, backfilling and compaction. Recommendations on dewatering are presented previously in this report.

ENGINEERING EVALUATION AND RECOMMENDATIONS FOR EARTHEN BERMS

Using the provided critical cross section for the project prepared by KHA, undated (at section 12+00), we performed seepage and stability analyses for the interior and exterior section of the berm for this section (12+00) at East Lake #1. The results of SPT boring 9 were used in our analyses. The most relevant aspects of the proposed cross section are presented below:

Berm Top Elevation (ft)	+48
Approximate Pond Bottom Elevation (ft)	+22
Berm Crest Width (ft)	12
Interior Pond Slope (Horiz:Vert)	2:1
Exterior Pond Slope (Horiz:Vert)	3:1



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Exterior Surrounding Grade Approx Elevation (ft)	+41
Lowest Pumpdown Elevation (ft)	Pond Bottom*
Maximum Water Elevation (ft)	+45

*We understand that the pumpdown will lower the groundwater level at a relatively slow rate and, if pumped continuously, would take greater than 95 days to lower the water level to pond bottom. "Rapid drawdown" conditions are, therefore, not a concern.

Seepage through the berm under steady-state conditions was evaluated using the computer program SEEP/W, a generalized, two-dimensional, finite-element, seepage model. The analyses were performed using the high water level conditions presented from the table above. The results of the seepage analysis are included in Appendix II. The flow arrows indicate that water will seep to the downstream face of the berm. We note that water "daylighted" at the berm location in the seepage analyses, indicating that water will seep out of the berms near their base on the exterior side, if the pond water levels are high for a sufficiently long period of time.

Using the berm geometry provided by KHA, we performed global stability analyses on both the interior and exterior slopes provided to us. The global stability analyses were performed using the computer program Slope/W. Circular arc type failure modes were analyzed. Pore water pressures were imported into the model using the output from the SEEP/W program.

Strength parameters were selected for the different material types based on our experience with similar types of materials and are presented in the following table.

Material Type	Total Unit Weight (pcf)	Angle of Internal Friction ϕ (deg)	Cohesion (psf)
Berm Fill Soils (SP-SM, SP-SC, or SM)	110	32	--
Varying Natural Soils to a Depth of 22.5 feet (SP, SP-SM, SP-SC, SC)	110-112	32 - 34	--
Loose Silty Clayey Fine Sand to Clayey Sand (SC-SM, SC)	117	29	--

The results of the slope stability analyses are summarized in the following table.

Pond with 3H:1V Exterior Slope and 2H:1V Interior Slope	Factor of Safety for Rotational Failure
Interior	1.2
Exterior	1.5

As shown in the above table, the results of the stability analyses indicate that the proposed 3H:1V exterior berm slopes and 2H:1V interior berm slopes are stable for the design high water level and pumpdown events under steady-state conditions. The safety factor of 1.5 for the exterior slope is considered suitable for a permanent levee used to impound water.

The interior berm was analyzed with the understanding that any lowering of the pond level during pumpdown is occurring at a rate slow enough that the groundwater level in the area surrounding the pond is being lowered in conjunction with the pumpdown of the pond, and that the hydraulic gradient into the pond is negligible. A hydrogeological evaluation of the entire surrounding watershed would be necessary to determine the validity of this assumption, or regular visual assessment of the pond during pumpdown could be performed to verify that piping or sloughing failures are not occurring due to seepage into the pond during pumping.

We note that the factor of safety for the interior 2:1 slope is 1.2, which is relatively low and typically considered less than the standard of care for a permanent levee used to impound water, given that variations in soil properties can naturally occur in this area. Considering that this relatively low factor of safety only occurs when the pond is being pumped down (i.e., the pond water level is low and below the surrounding ground surface elevation) and the condition of the interior slope can be observed and repairs made, if needed, before refilling the pond, this is not considered a significant risk of an uncontrolled release of water from the pond. We also understand that the flow velocity of water through this narrow section during “pumpdown” events is of concern as it may erode the soils downstream, so erosion protection is being considered in this area to protect against failure and/or enhanced maintenance issues.

We understand that the remainder of the interior berms (i.e. other than in the narrow section at 12+00) are to have a 3:1 interior slope, and that flow through this area is not critical (i.e.

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significantly less than 0.6 feet/second). The results of our berm stability analyses indicate a safety factor exceeding 1.7 for the interior 3:1 slopes, which is considered suitable for design.

Please refer to Appendix II for graphical output from the Seep/W and Slope/W computer programs.

We note that the factors of safety presented above apply to relatively deep rotational type slope failures. Slightly lower factors of safety would apply to shallow “sloughing” type failures that may occur, particularly if vegetation or other forms of surface erosion protection are not established on the exterior slopes.

Depending on final grading, seepage may become problematic for properties and facilities adjacent to the proposed ponds. Underdrains, drainage ditches and/or seepage barriers may be necessary in sensitive areas or where seepage “daylighting” over curbs, footpaths or roadways could be a possibility. We would be pleased to discuss these issues with you in more detail, if requested.

Piping Failure

Piping failure of the soil can occur at the toe of the berm if exit velocities of any “daylighted” water exceeds a tolerable gradient. The hydraulic gradients for the exterior berm analyzed in the SEEP/W program indicate a maximum gradient on the order of 0.1, occurring where seepage water exits the lower portions or “toe” of the berm. This relatively low exit gradient indicates a suitable factor of safety against internal piping type erosion. The construction of the berms in accordance with our recommendations is important so that local areas of high hydraulic gradients are not created.

SITE PREPARATION AND EARTHWORK RECOMMENDATIONS (BERMS)

The following are our recommendations for overall site preparation and earthwork which we feel are best suited for the proposed pond berms and existing soil conditions.

Stripping and Grubbing

Prior to placing fill, it is recommended that the surface of the fill area plus a minimum margin of

five feet be stripped of all surface vegetation stumps, debris, organic topsoil, or other deleterious materials, as encountered.

After stripping, the site should be grubbed and root-raked such that roots with a diameter greater than ½-inch, stumps, or small roots in a dense state, are completely removed. The actual depth of stripping and grubbing must be determined by visual observation and judgment during the earthwork operation.

Proof-Rolling

We recommend proof-rolling the cleared surface to locate any unforeseen soft areas or unsuitable surface or near-surface soils, to increase the density of the soils within the top 3 to 4 feet and to prepare the existing surface for the addition of the fill soils (as required). Proof-rolling should consist of at least 3 passes of a compactor capable of achieving the required degree of compaction. Each pass should overlap the preceding pass by 30 percent to achieve complete coverage. If deemed necessary, in areas that continue to "yield", remove all deleterious material and replace with clean, compacted sand backfill. The proof-rolling should occur after cutting and before filling.

A density equivalent to or greater than 93 percent of the modified Proctor (ASTM D-1557) maximum dry density value for a depth of 1 foot in the pond berm areas must be achieved beneath the stripped and grubbed ground surface. Additional passes and/or over-excavation and recompaction may be required if these minimum density requirements are not achieved. The soil moisture should be adjusted as necessary during compaction.

Proof-rolling may cause upward movement or "pumping" of the groundwater. However, we recommend that the existing surface be level and firm prior to the addition of fill soils. Proof-rolling with a front-end loader may help achieve the desired surface and compaction condition before adding the fill soils. The site should be dewatered as necessary. Depending on the time of year, a 12- to 18-inch layer of fill may be required prior to proof-rolling.

Care should be exercised to avoid damaging any neighboring structures while the compaction operation is underway. Prior to commencing compaction, occupants of adjacent structures should



be notified and the existing condition (i.e. cracks) of the structures documented with photographs and survey (if deemed necessary). Compaction should cease if deemed detrimental to adjacent structures, and Ardaman & Associates should be notified immediately. Heavy vibratory compaction equipment should not be used within 100 feet of existing structures.

Suitable Fill Material and the Compaction of Fill Soils

All fill materials should be free of organic materials, such as roots and vegetation. Fill soils should have a Unified Soil Classification of SP-SM, SP-SC or SM with between 7 and 20 percent by dry weight of material passing the U.S. Standard No. 200 sieve size. We understand that soil from borings 7, 8, 10 and 11 is being considered for use as fill. The table below provides depths of encountered soils that were within the ideal range:

Boring Number	Ideal Soil Layer Depth (ft)
7	4.5 to 7.5 12 to 20
8	No ideal soils encountered
10	4.5 to 9 17 to 19.5
11	3.5 to 7.5 12 to 17

Given the highly variable of soils encountered on site, with some being too sandy to be ideal and some having too much silt, thoroughly mechanically mixing soils may be considered as an allowable option to allow for the use of more of the site soils. The soils would need to be thoroughly mechanically mixed until homogeneous and should not include any clayey fine sand (SC) silt (ML) or clay (CL-CH) soils in the mix. Should this option be utilized, the following soil depths may be considered:

Boring Number	Mixed Soil Layer Depth (ft)
7	0 to 20
8	0 to 17
10	0 to 12 17 to 19.5
11	0 to 17



Fill must be placed and compacted in a manner to prevent the possibility of localized high hydraulic gradients, which could result in internal erosion of the berm materials caused by piping. This condition occurs when relatively high permeability sandy soils (e.g.; Unified Classification System SP, SP-SM) are bounded by relatively low permeability soils (e.g.; Unified Classification System SM, SM-SC, SC). Therefore, the compacted material should be homogenized to prevent seepage concentration paths from developing.

All fill should be placed in level lifts not to exceed 12 inches in uncompacted thickness. Each lift should be compacted by suitable compaction equipment to achieve at least 93 percent of the modified Proctor (ASTM D-1557) maximum dry density value. The filling and compaction operations should continue in lifts until the desired elevation(s) is achieved. If hand-held compaction equipment is used, the lift thickness should be reduced to 6 inches. The material to be compacted should be of the proper moisture content to obtain the required density. Wetting or drying of the material and additional working to secure a uniform moisture content required for compaction should be performed. We recommend that each successive compacted layer be scarified to achieve good bonding between lifts.

It is important that the elevation of the berm crest be kept uniform with a maximum grade parallel to the axis of the berm no steeper than one percent. The intent of this requirement is to prevent rain water from running along the crest of the berm to low places where it can concentrate and cause severe erosion gullies on the berm slopes. Maintenance of the berm should be performed as needed.

We recommend establishing erosion control on the graded slopes as soon as possible using grass, sod and/or other material. If seeding rather than sodding is preferred, then additional temporary erosion control will likely be required until the grass becomes well established.

It is recommended that proper routine maintenance be carried out on the exterior and interior slopes to allow future observation for areas of seepage, erosion, animal burrowing, etc., along with routine berm inspection by maintenance personnel (at least monthly).

Interior Berm Erosion Protection (2:1 slope in high velocity area)

The interior of the berms in the area of the channel (i.e. critical section as provided by KHA) should be designed with erosion protection to reduce the likelihood of erosion due to the velocity of the waters through this narrow portion of the pond, as well as to increase the safety factor against a slope stability (circular slip surface) failure. The native soils encountered in our borings are likely susceptible to erosion if the water velocities are above 0.6 feet/second. The entire bank, including at least 2 feet above the high water line of the bank, should be covered with a non-woven geotextile that is secured to the underlying soils and then a 2 feet thick layer of gravel "rip-rap". At this time, the velocity through the critical channel section is unknown, so the following FDOT coarse aggregates could be used once the channel velocities are known, given the expected channel velocities:

FDOT Coarse Aggregate (All FDOT requirements must be met)	Maximum Allowable Channel Velocity (ft/s)
No. 57 Stone	2
No. 4 Stone	3½
No. 1 Stone	8½

This interior berm protection is not necessary in the low velocity areas with a 3:1 interior slope.

QUALITY ASSURANCE

We recommend establishing a comprehensive quality assurance program to verify that all site preparation and foundation construction is conducted in accordance with the appropriate plans and specifications. Since Ardaman & Associates has performed and interpreted the results of a geotechnical exploration for the site and has prepared earthwork and foundation design recommendations based upon this interpretation, Ardaman is best suited to provide quality assurance testing and inspection services to assure that the intent of our recommendations have been implemented during construction.

As a minimum, an on-site engineering technician should monitor all stripping and grubbing to verify that all deleterious materials have been removed and should observe the proof-rolling operation to verify that the appropriate number of passes are applied to the subgrade. In-situ density tests should be conducted during filling activities and below all footings and berm areas

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to verify that the required densities have been achieved. In-situ density values should be compared to laboratory Proctor moisture-density results for each of the different natural and fill soils encountered.

We also recommend inspecting and testing the construction materials for the foundations and other structural components.

In-Place Density Testing Frequency

In this region, earthwork testing is typically performed on an on-call basis when the contractor has completed a portion of the work. The test result from a specific location is only representative of a larger area if the contractor has used consistent means and methods and the soils are practically uniform throughout. The frequency of testing can be increased and full-time construction inspection can be provided to account for variations. We recommend that the following minimum testing frequencies be utilized.

Structure Test Location	Percent Compaction (ASTM D1557)	Depth (inches)	Recommended Minimum Test Frequency
Bottom of Footings	95	12	At column footings and every 75 l.f. of wall footing
Slab Subgrade	95	12	per 2,500 sq.ft. of structural area
Structural Fill	95	full depth	per 2,500 sq.ft. of structural area per lift
Earthen Berms	93	full depth	per 200 lineal feet of berm

If the plans and specifications for the project are more stringent than the requirements listed above, the requirements of the plans and specifications should be followed.

Representative samples of the various natural ground and fill soils should be obtained and transported to our laboratory for Proctor compaction tests. These tests will determine the maximum dry density and optimum moisture content for the materials tested and will be used in conjunction with the results of the in-place density tests to determine the degree of compaction achieved.

GENERAL COMMENTS

The analysis and recommendations submitted in this report are based upon the data obtained from seven (7) test borings performed at the locations indicated on the attached Figure 2. This report does not reflect any variations which may occur outside of or between the boring locations. While the borings are representative of the subsurface conditions at their respective locations and within their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The nature and extent of variations may not become evident until during the course of further exploration or a ground improvement program, if such a program is undertaken. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report, after performing on-site observations during the construction period and noting the characteristics of any variations. The boring logs and related information are based upon the driller's logs and visual examination of selected samples in the laboratory. The delineation between soil types shown on the logs is approximate, and the description represents our interpretation of the subsurface conditions at the designated boring location on the particular date drilled.

This report does not provide any evaluation relative to estimated seepage quantities from the ponds or their potential effects outside of the ponds. These effects should be addressed by others, particularly in the areas adjacent to the roadways and residences.

The groundwater table depths shown on the boring logs represent the groundwater surfaces encountered on the dates shown. Fluctuation of the groundwater table should be anticipated throughout the year.

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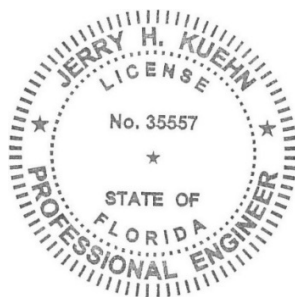
It has been a pleasure to be of assistance to you with this project. Please contact us when we may be of further service to you, or should you have any questions concerning this report.

Very truly yours,

ARDAMAN & ASSOCIATES, INC.
Certificate of Authorization No. 5950

signing for Gregory S. Stevens, P.E.
Project Engineer
Fl. License No. 71511

GSS/JHK:ly

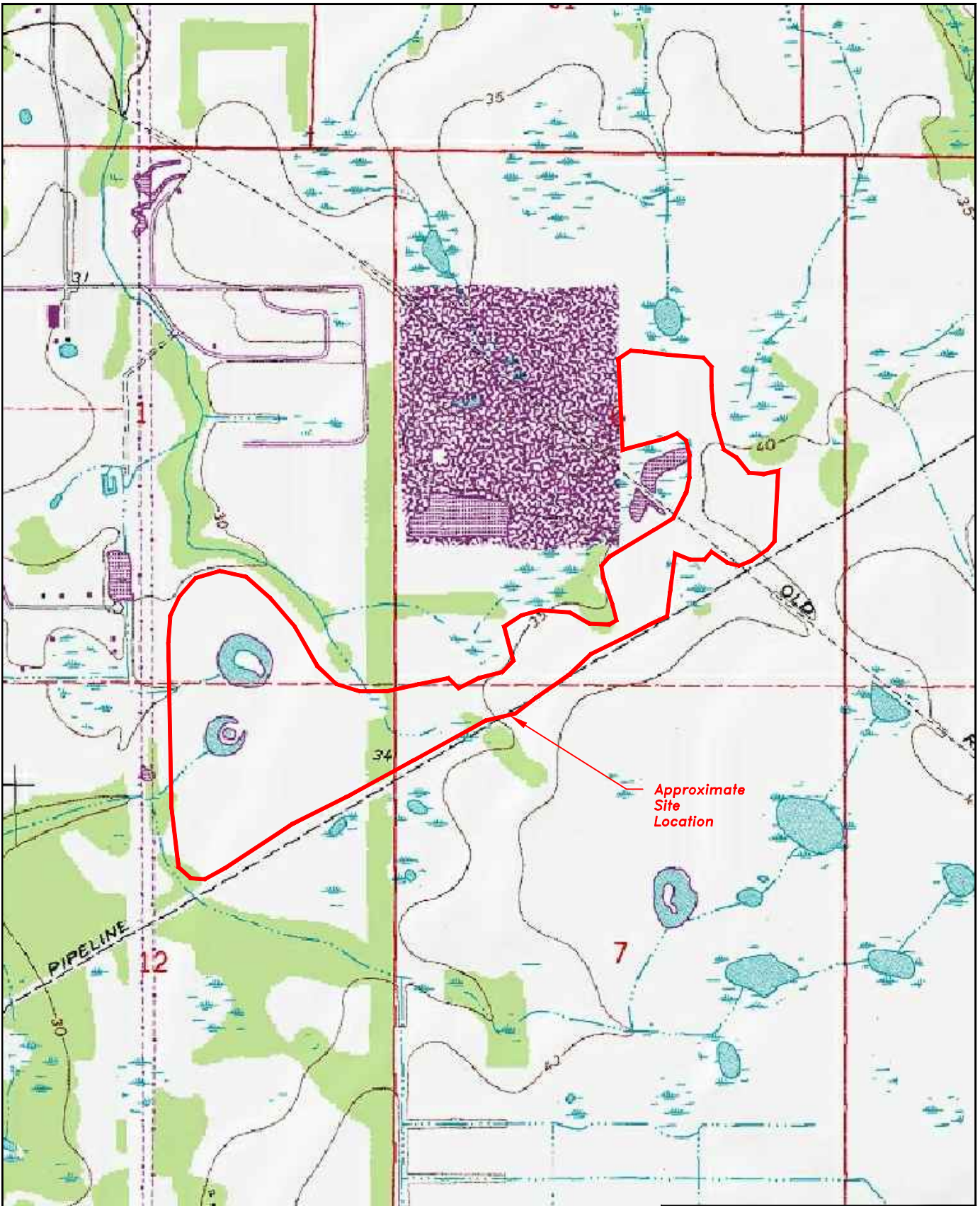


This document has been digitally signed and sealed by:

Printed copies of this document are not considered signed and sealed. The signature must be verified on electronic documents.

Jerry H. Kuehn, P.E.
Senior Project Engineer
Fl. License No. 35557

Note: An engineer's signature and seal date after the report date does not indicate that the report has been updated since the report date and does not indicate that Ardaman & Associates has reviewed site conditions or other project information since the report date.



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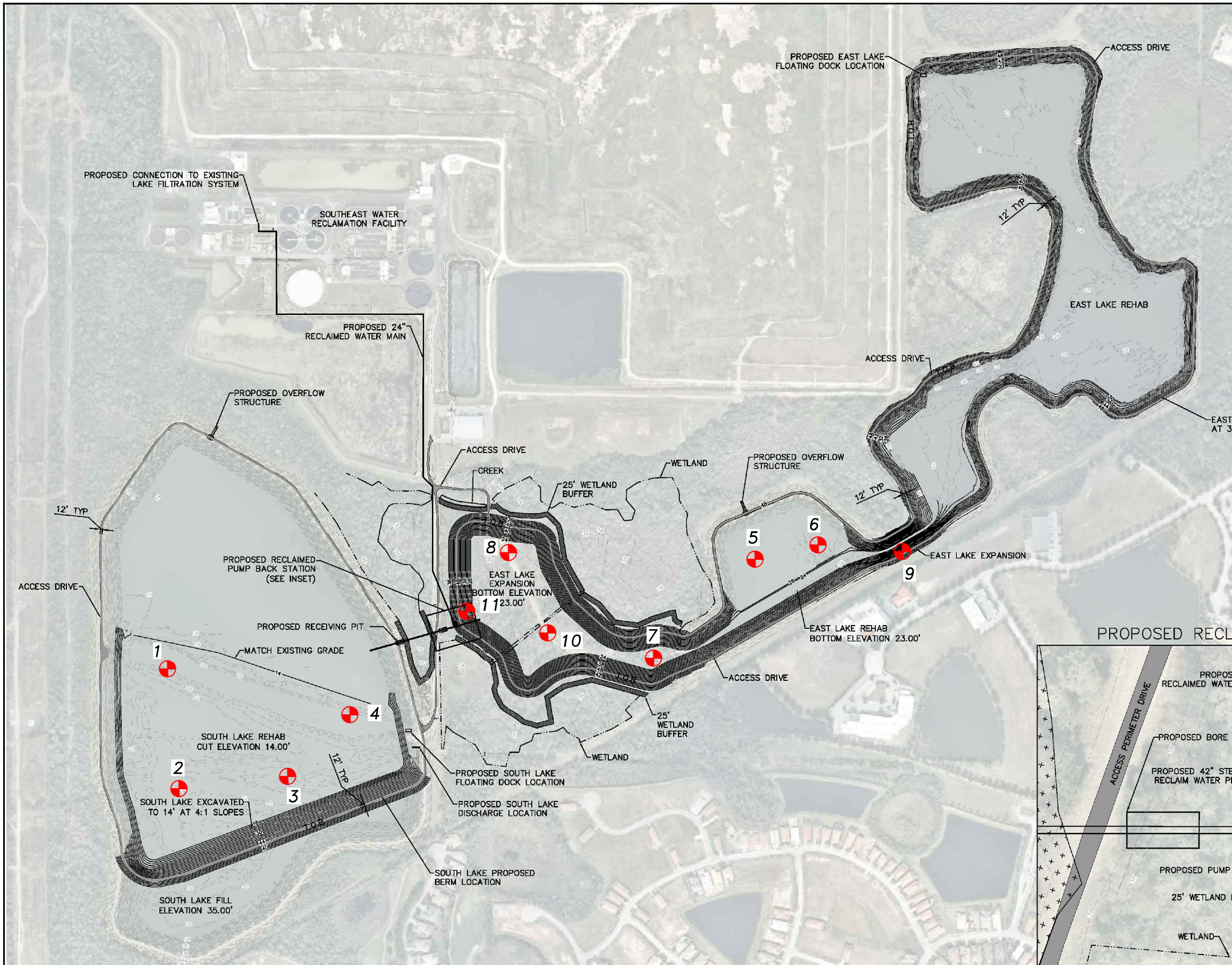
*Location of Site on USGS Map
 SEWRF Reclaimed Pump Back Station
 Lena Road, Bradenton
 Manatee County, Florida*


DRAWN BY: KGS	CHECKED BY:	DATE: 7/9/18
FILE NO. 17-7261	APPROVED BY:	FIGURE: 1



SCALE: 1"=1000'

Base Map From Delorme XMap




 SCALE: 1"=500'

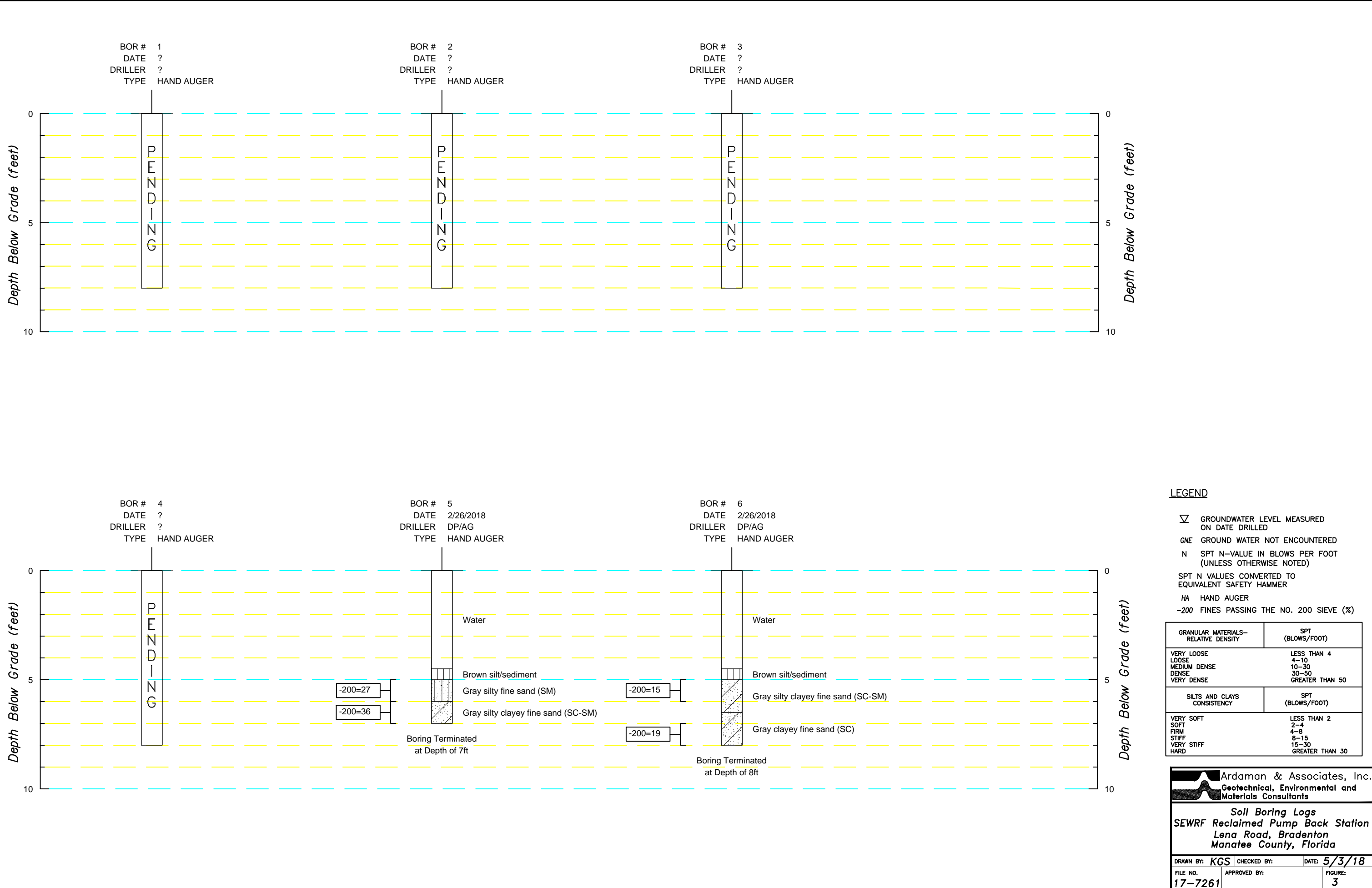
 TEST BORING LOCATIONS


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Test Locations
 SEWRF Reclaimed Pump Back Station
 Lena Road, Bradenton
 Manatee County, Florida

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FILE NO. 17-7261	APPROVED BY:	FIGURE: 2

Base PDF Image By: Kimley-Horn



BOR # 1
DATE ?
DRILLER ?
TYPE HAND AUGER

BOR # 2
DATE ?
DRILLER ?
TYPE HAND AUGER

BOR # 3
DATE ?
DRILLER ?
TYPE HAND AUGER

BOR # 4
DATE ?
DRILLER ?
TYPE HAND AUGER

BOR # 5
DATE 2/26/2018
DRILLER DP/AG
TYPE HAND AUGER

BOR # 6
DATE 2/26/2018
DRILLER DP/AG
TYPE HAND AUGER

- LEGEND**
- ▽ GROUNDWATER LEVEL MEASURED ON DATE DRILLED
 - GNE GROUND WATER NOT ENCOUNTERED
 - N SPT N-VALUE IN BLOWS PER FOOT (UNLESS OTHERWISE NOTED)
 - SPT N VALUES CONVERTED TO EQUIVALENT SAFETY HAMMER
 - HA HAND AUGER
 - 200 FINES PASSING THE NO. 200 SIEVE (%)

GRANULAR MATERIALS- RELATIVE DENSITY	SPT (BLOWS/FOOT)
VERY LOOSE	LESS THAN 4
LOOSE	4-10
MEDIUM DENSE	10-30
DENSE	30-50
VERY DENSE	GREATER THAN 50

SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FOOT)
VERY SOFT	LESS THAN 2
SOFT	2-4
FIRM	4-8
STIFF	8-15
VERY STIFF	15-30
HARD	GREATER THAN 30

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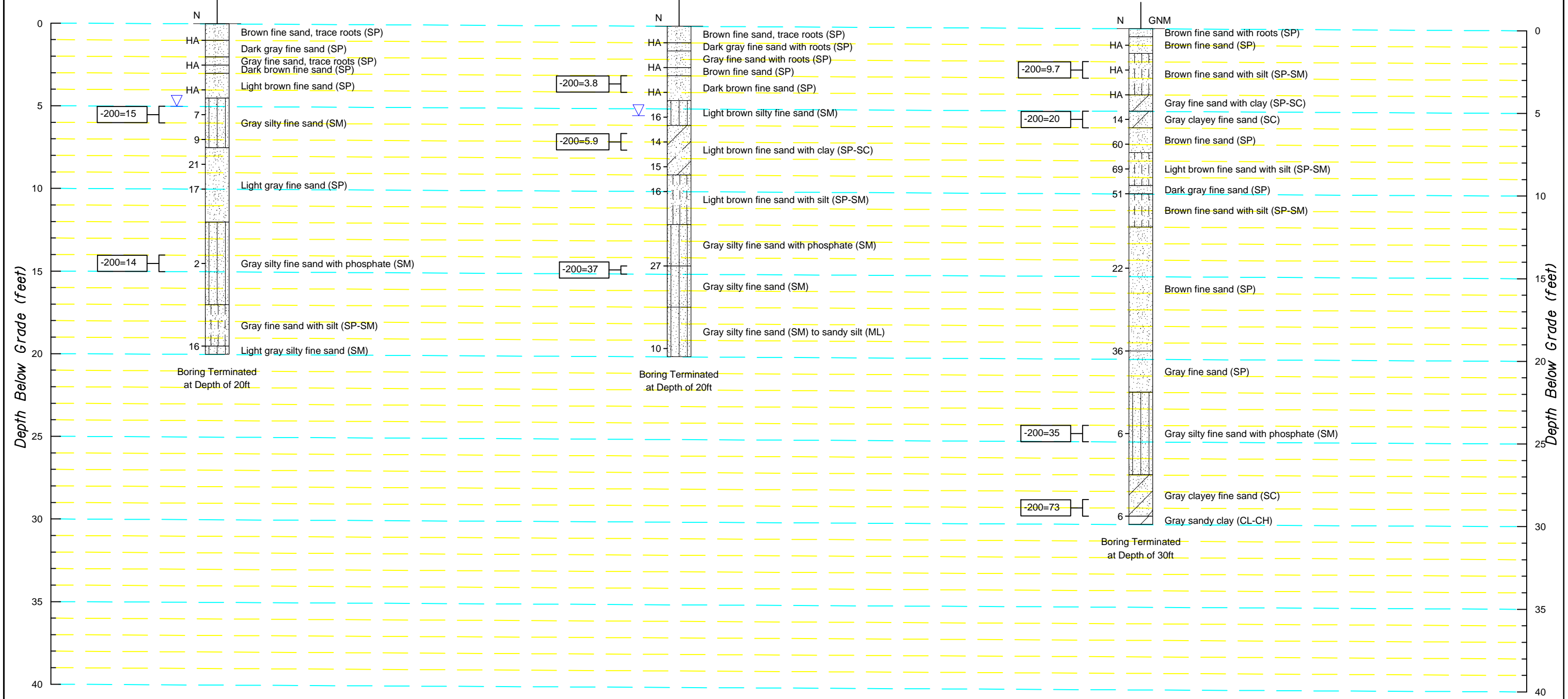
Soil Boring Logs
SEWRF Reclaimed Pump Back Station
Lena Road, Bradenton
Manatee County, Florida

DRAWN BY: KGS CHECKED BY: DATE: 5/3/18
FILE NO. 17-7261 APPROVED BY: FIGURE: 3

BOR # 7
 DATE 4/11/2018
 DRILLER DP/AG
 HAMMER Auto
 RIG CME-45

BOR # 8
 DATE 4/11/2018
 DRILLER DP/AG
 HAMMER Auto
 RIG CME-45

BOR # 9
 DATE 4/24/2018
 DRILLER DP/AG
 HAMMER Auto
 RIG CME-45



Cemented or calcareous soils were encountered within the borings. This material may behave as rock and may contain rock inclusions. Excavations into or through cemented or calcareous soils may be difficult and may require non-conventional construction techniques and specialized equipment.

LEGEND

- ▽ GROUNDWATER LEVEL MEASURED ON DATE DRILLED
- GNM GROUND WATER NOT ENCOUNTERED IN THE TOP 10.5 FEET AND COULD NOT BE MEASURED BELOW DUE TO THE MUDDIED CONDITION OF THE BOREHOLES
- N SPT N-VALUE IN BLOWS PER FOOT (UNLESS OTHERWISE NOTED)
- SPT N VALUES CONVERTED TO EQUIVALENT SAFETY HAMMER
- HA HAND AUGER
- 200 FINES PASSING THE NO. 200 SIEVE (%)

GRANULAR MATERIALS—RELATIVE DENSITY	SPT (BLOWS/FOOT)
VERY LOOSE	LESS THAN 4
LOOSE	4-10
MEDIUM DENSE	10-30
DENSE	30-50
VERY DENSE	GREATER THAN 50

SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FOOT)
VERY SOFT	LESS THAN 2
SOFT	2-4
FIRM	4-8
STIFF	8-15
VERY STIFF	15-30
HARD	GREATER THAN 30

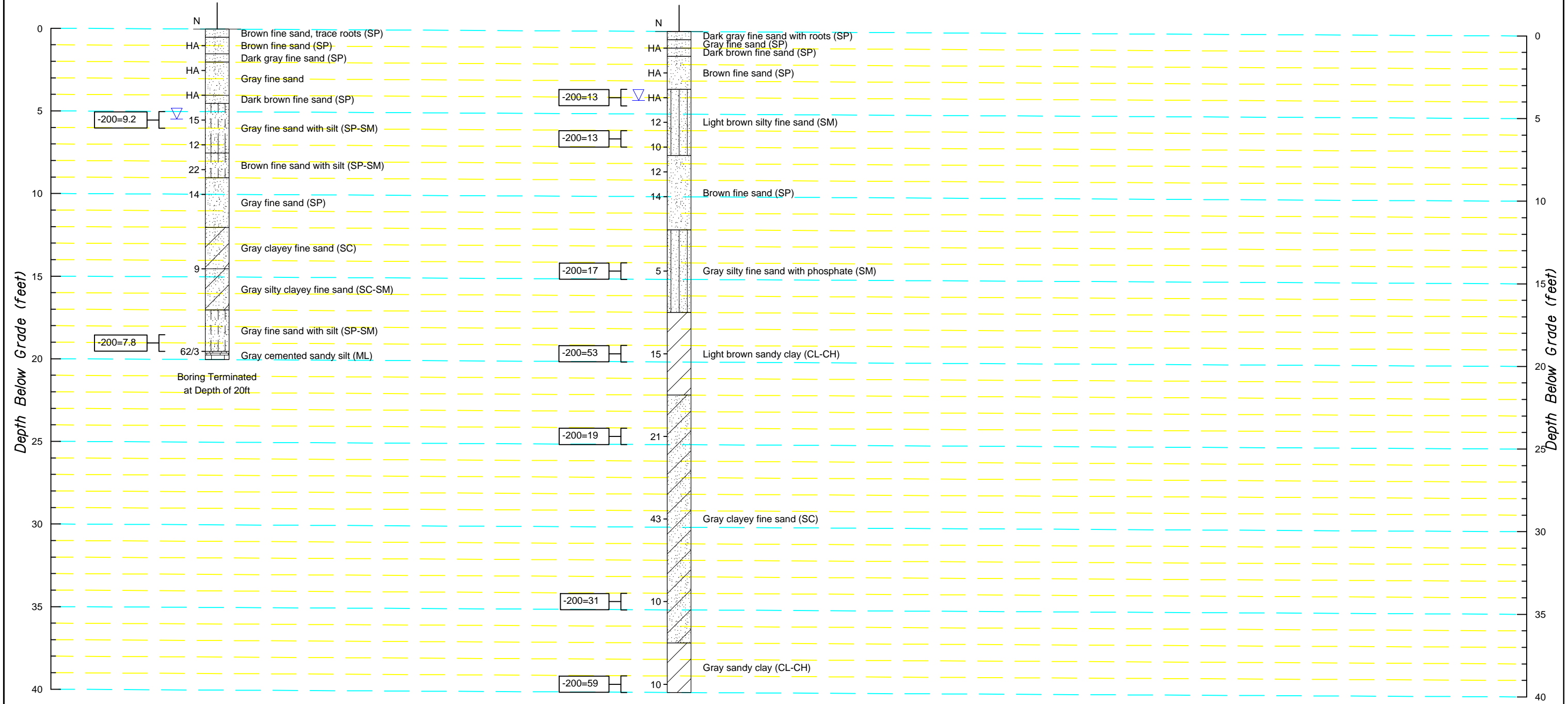
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Soil Boring Logs
 SEWRF Reclaimed Pump Back Station
 Lena Road, Bradenton
 Manatee County, Florida

DRAWN BY: KGS CHECKED BY: DATE: 5/3/18
 FILE NO. 17-7261 APPROVED BY: FIGURE: 4

BOR # 10
 DATE 4/11/2018
 DRILLER DP/AG
 HAMMER Auto
 RIG CME-45

BOR # 11
 DATE 4/11/2018
 DRILLER DP/AG
 HAMMER Auto
 RIG CME-45



Cemented or calcareous soils were encountered within the borings. This material may behave as rock and may contain rock inclusions. Excavations into or through cemented or calcareous soils may be difficult and may require non-conventional construction techniques and specialized equipment.

LEGEND

▽ GROUNDWATER LEVEL MEASURED ON DATE DRILLED

N SPT N-VALUE IN BLOWS PER FOOT (UNLESS OTHERWISE NOTED)

SPT N VALUES CONVERTED TO EQUIVALENT SAFETY HAMMER

HA HAND AUGER

-200 FINES PASSING THE NO. 200 SIEVE (%)

GRANULAR MATERIALS—RELATIVE DENSITY	SPT (BLOWS/FOOT)
VERY LOOSE	LESS THAN 4
LOOSE	4-10
MEDIUM DENSE	10-30
DENSE	30-50
VERY DENSE	GREATER THAN 50

SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FOOT)
VERY SOFT	LESS THAN 2
SOFT	2-4
FIRM	4-8
STIFF	8-15
VERY STIFF	15-30
HARD	GREATER THAN 30

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Soil Boring Logs
 SEWRF Reclaimed Pump Back Station
 Lena Road, Bradenton
 Manatee County, Florida

DRAWN BY: KGS CHECKED BY: DATE: 5/3/18
 FILE NO. 17-7261 APPROVED BY: FIGURE: 5

APPENDIX I
Exploration Methods

SOIL BORING, SAMPLING AND TESTING METHODS

Standard Penetration Test

The Standard Penetration Test (SPT) is a widely accepted method of in situ testing of foundation soils (ASTM D-1586). A 2-foot long, 2-inch O.D. split-barrel sampler attached to the end of a string of drilling rods is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load. The following tables relate N-values to a qualitative description of soil density and, for cohesive soils, an approximate unconfined compressive strength (Qu):

Cohesionless Soils:	<u>N-Value</u>	<u>Description</u>
	0 to 4	Very loose
	4 to 10	Loose
	10 to 30	Medium dense
	30 to 50	Dense
	Above 50	Very dense

Cohesive Soils:	<u>N-Value</u>	<u>Description</u>	<u>Qu (ton/ft²)</u>
	0 to 2	Very soft	Below 0.25
	2 to 4	Soft	0.25 to 0.50
	4 to 8	Medium stiff	0.50 to 1.0
	8 to 15	Stiff	1.0 to 2.0
	15 to 30	Very stiff	2.0 to 4.0
	Above 30	Hard	Above 4.0

The tests are usually performed at 5-foot intervals. However, more frequent or continuous testing is done by our firm through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is a bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, NX-size flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or prevent the loss of circulating fluid.

Representative split-spoon samples from each sampling interval and from every different stratum are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary. After thorough examination and testing of the samples, the samples are discarded unless prior arrangements have been made. After completion of a test boring, the hole is kept open until a steady state groundwater level is recorded. The hole is then sealed, if necessary, and backfilled.

A hammer with an automatic drop release (auto-hammer) is sometimes used. In this case, a correction factor is applied to the raw blow counts, since the energy efficiency of the auto-hammer is greater than that of the safety hammer. The auto-hammer blow counts are corrected to equivalent safety hammer "N" values, based upon calibration of the auto-hammer (per ASTM D4633) and standard practice.

Auger Borings

Auger borings are used when a relatively large, continuous sampling of soil strata close to ground surface is desired. A 4-inch diameter, continuous flight, helical auger with a cutting head at its end is screwed into the ground in 5-foot sections. It is powered by the rotating action of the Kelly bar of a rotary drill rig. The sample is recovered by withdrawing the auger out of the ground without rotating it. The soil sample so obtained is classified and representative samples put in bags or jars and brought back to the laboratory for further classification and testing.

Hand Auger Borings

Hand auger borings are used, if soil conditions are favorable, when the soil strata are to be determined within a shallow (approximately 5 to 9 feet) depth or when access is not available to power drilling equipment. A 3-inch diameter, hand bucket auger with a cutting head is simultaneously turned and pressed into the ground. The bucket auger is retrieved to the surface at approximately 6-inch intervals and its contents emptied for inspection. The soil sample so obtained is classified and representative samples put in bags or jars and transported to the laboratory for further classification and testing.

Laboratory Test Methods

Soil samples returned to our laboratory are examined by a geotechnical engineer or geotechnician to obtain more accurate descriptions of the soil strata. Laboratory testing is performed on selected samples as deemed necessary to aid in soil classification and to further define engineering properties of the soils. The test results are presented on the soil boring logs at the depths at which the respective sample was recovered, except that grain size distributions or selected other test results may be presented on separate tables, figures or plates as described in this report. The soil descriptions shown on the logs are based upon a visual-manual classification procedure in general accordance with the Unified Soil Classification System (ASTM D-2488-84) and standard practice. Following is a list of abbreviations which may be used on the boring logs or elsewhere in this report.

- 200 - Fines Content (percent passing the No. 200 sieve); ASTM D1140
- DD - Dry Density of Undisturbed Sample; ASTM D2937
- Gs - Specific Gravity of Soil; ASTM D854
- k - Hydraulic Conductivity (Coefficient of Permeability)
- LL - Liquid Limit; ASTM D423
- OC - Organic Content; ASTM D2974
- pH - pH of Soil; ASTM D2976
- PI - Plasticity Index (LL-PL); ASTM D424
- PL - Plastic Limit; ASTM D424
- Qp - Unconfined Compressive Strength by Pocket Penetrometer;
- Qu - Unconfined Compressive Strength; ASTM D2166 (soil), D7012 (rock)
- SL - Shrinkage Limit; ASTM D427
- ST - Splitting Tensile Strength; ASTM D3967 (rock)
- USCS - Unified Soil Classification System; ASTM D2487, D2488
- w - Water (Moisture) Content; ASTM D2216

Soil Classifications

The soil descriptions presented on the soil boring logs are based upon the Unified Soil Classification System (USCS), which is the generally accepted method (ASTM D-2487 and D-2488) for classifying soils for engineering purposes. The following modifiers are the most commonly used in the descriptions.

For Sands:	<u>Modifier</u>	<u>Fines, Sand or Gravel Content*</u>
	with silt or with clay	5% to 12% fines
	silty or clayey	12% to 50% fines
	with gravel or with shell	15% to 50% gravel or shell
For Silts or Clays:	<u>Modifier</u>	<u>Fines, Sand or Gravel Content*</u>
	with sand	15% to 30% sand and gravel; and % sand > % gravel
	sandy	30% to 50% sand and gravel; and % sand > % gravel
	with gravel	15% to 30% sand and gravel; and % sand < % gravel
	gravelly	30% to 50% sand and gravel; and % sand < % gravel

* may be determined by laboratory testing or estimated by visual/manual procedures. Fines content is the combined silt and clay content, or the percent passing the No. 200 sieve.

The USCS also uses a set of Group Symbols, which may also be listed on the soil boring logs. The following is a summary of these.

<u>Group Symbol</u>	<u>General Group Name*</u>	<u>Group Symbol</u>	<u>General Group Name*</u>
GW	Well-graded gravel	SW	Well-graded sand
GP	Poorly graded gravel	SP	Poorly graded sand
GW-GM	Well-graded gravel with silt	SW-SM	Well-graded sand with silt
GW-GC	Well-graded gravel with clay	SW-SC	Well-graded sand with clay
GP-GM	Poorly graded gravel with silt	SP-SM	Poorly graded sand with silt
GP-GC	Poorly graded gravel with clay	SP-SC	Poorly graded sand with clay
GM	Silty gravel	SM	Silty sand
GC	Clayey gravel	SC	Clayey sand
GC-GM	Silty, clayey gravel	SC-SM	Silty, clayey sand
CL	Lean clay	ML	Silt
CL-ML	Silty clay	MH	Elastic silt
CH	Fat clay	OL or OH	Organic silt or organic clay

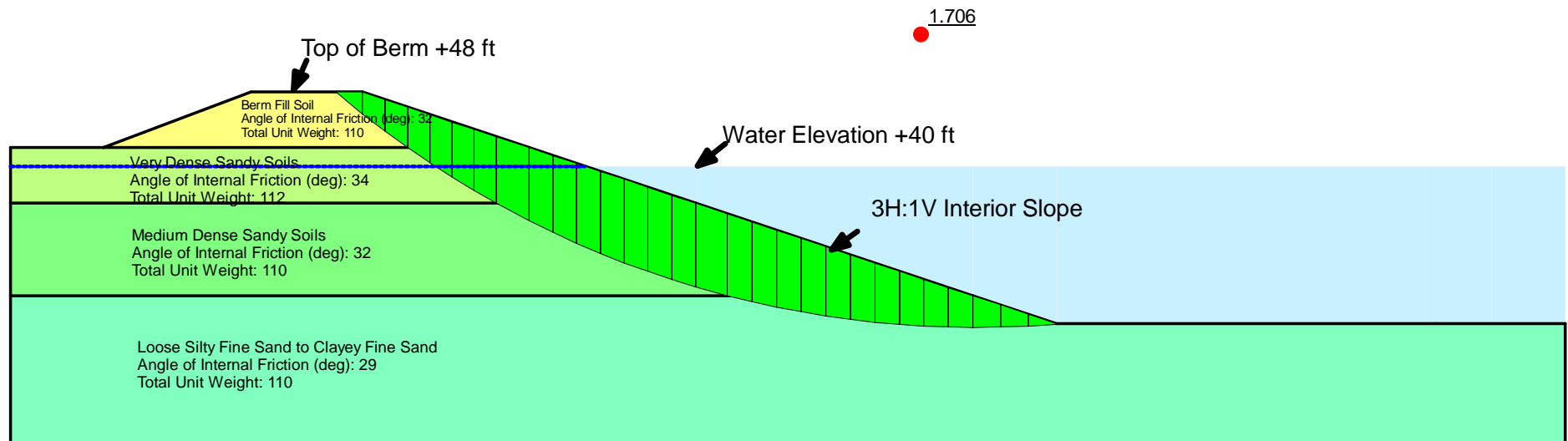
* Group names may also include other modifiers, per standard or local practice.

Other soil classification standards may be used, depending on the project requirements. The AASHTO classification system is commonly used for highway design purposes and the USDA soil textural classifications are commonly used for septic (on-site sewage disposal) system design purposes.

Appendix II
Seep/W Slope/W Outputs

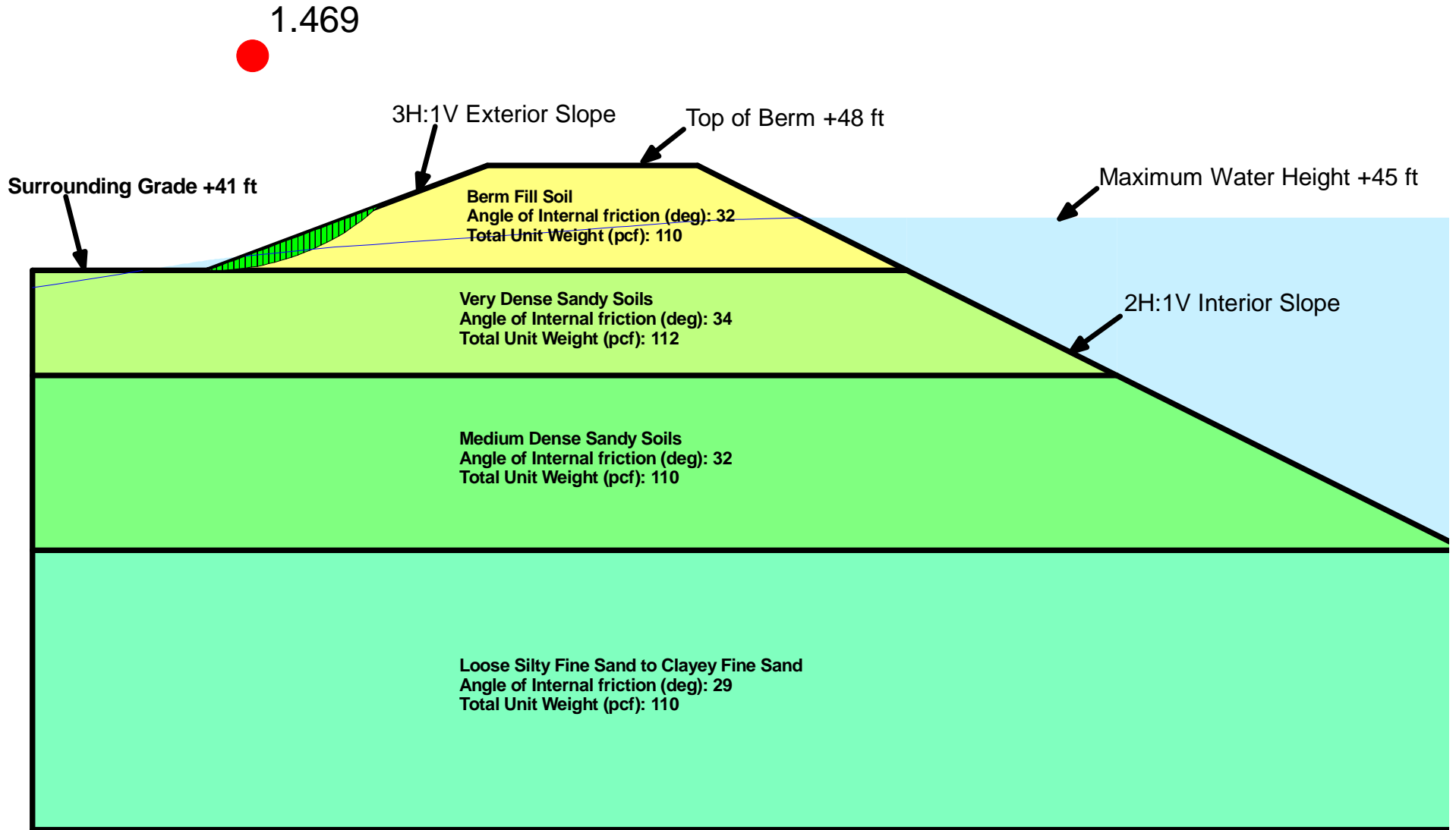
3H:1V Interior Slope Evaluation

Modifications to Reclaimed Pump Back Station
SEWRF - Lena Road
A&A File No. 17-7261



Exterior Slope Evaluation

Modifications to Reclaimed Pump Back Station
SEWRF - Lena Road
A&A File No. 17-7261



Interior Slope Evaluation

Modifications to Reclaimed Pump Back Station
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