1112 Manatee Ave. West
Bradenton, FL 34205
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Solicitation Addendum

Addendum No.:	2
Solicitation No.:	20-TA003370CD
Project No.:	6093460
Solicitation Title:	Rubonia Water Quality Improvement Project
Addendum Date:	July 21, 2020
Procurement Contact:	Chris Daley, CPPO, CPPB- Procurement Project Manager

IFBC No. 20-TA003370CD 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-TA003370CD.

Change to:
ADVERTISEMENT, DATE, TIME AND PLACE DUE:

The Due Date and Time for submission of Bids in response to this IFBC **is August 5, 2020 at 3:00 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:
INFORMATION FOR BIDDERS, FIRST PARAGRAPH OF SECTION A.01 BID DUE DATE:

The Due Date and Time for submission of Bids in response to this Invitation for Bid (IFBC) **is August 5, 2020 at 3:00 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.

Change to:
SECTION A, PARAGRAPH A.03, PUBLIC OPENING OF BIDS.
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/88984248936

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:
INFORMATION FOR BIDDERS, SECTION A.51 SOLICITATION SCHEDULE

The following schedule has been established for this Solicitation process. Refer to the County's website (www.mymanatee.org > Business > *Bids & Proposals*) for meeting locations and updated information pertaining to any revisions to this schedule.

Scheduled Item	Scheduled Date
Question and Clarification Deadline	June 23, 2020
Final Addendum Posted	July 22, 2020
Bid Response Due Date and Time	August 5, 2020, 3:00 PM, ET
Due Diligence Review Completed	August 7, 2020
Projected Award	August 2020

Replace:
APPENDIX J, BID PRICING FORM, BID PRICING FORM PAGES APPENDIX J-1 THROUGH J-20

Replace Bid Pricing form pages Appendix J-1 through J-12 with the Revised bid Pricing Form pages Appendix J-1 through J-12 that are issued with this Addendum 2.

Add:
ELECTRONIC BID PRICING FORM
An Electronic Bid Pricing Form has been issued with this Addendum 2.

Replace:
BID ATTACHMENT 2, UTILITY SPECIFICATIONS

Replace Bid Attachment 2, Utility Specifications with the Revised Bid Attachment 2 Utility Specifications that are issued with this Addendum 2.

Replace:
BID ATTACHMENT 3, SPECIAL PROVISIONS

Replace Bid Attachment 3, Special Provisions with the Revised Bid Attachment 3 Special Provisions that are issued with this Addendum 2.

Replace:
BID ATTACHMENT 5, CONSTRUCTION PLANS

Replace Bid Attachment 5, Construction Plans with the Revised Bid Attachment 5 Construction Plans that are issued with this Addendum 2.

Add:
BID ATTACHMENT 6, GEOTECHNICAL REPORT

Bid Attachment 6, Geotechnical Report issued with this Addendum 2, is hereby incorporated into this IFBC.

Clarifications of Engineer's Changes:

Bid Form:

Bid Item # 11, Revise description

Bid Item # 12, Revise description & quantity

Bid Item # 14, Revise description & quantity

Bid Item # 18, Revise quantity

Bid Item nos. 20 - 21, Revise quantity

Bid Item nos. 22 - 23, Revise description

Bid Item nos. 28 - 30, Revise quantity

Bid Item no. 33, Revise quantity

Bid Item no. 35, Revise quantity

Bid Item no. 37, Revise quantity

Bid Item nos. 39 - 45, Revise quantity

Bid Item no. 47, Revise quantity

Bid Item nos. 49 - 51, Revise quantity

Bid Item no. 55, Revise quantity

Bid Item nos. 63 - 64, Revise quantity

Bid Item # 70, Revise description & quantity

Bid Item # U2 thru U6, Revise quantity

Bid Item # U7 thru U9, Revise description & quantity

Bid Item # U11 thru U12, Revise quantity

Bid Item # U14, Revise description

Bid Item # U15, Revise quantity

Bid Item # U16, Revise description

Bid Item # U17 thru U18, Revise quantity

Bid Item # U23 thru U24, Revise quantity

Bid Item # U27, Revise quantity

Bid Item # U37 thru U38, Revise quantity

Utility Specifications:

Section 01150, Measurement and Payment:

Bid items 1 thru 49 replaced by U1 thru U51;

Replaced Bid item 7 *Pipe restraints 12- inch or smaller* with Bid item U7 PVC pipe restraints, 12" and smaller, water;

Added Bid item U8 ductile iron pipe restraints, 12" and smaller, water;

Added Bid item U9 existing pipe restraints, 12" and smaller, water.

Special Provisions:

Clarification of specific line items:

Line item #12, revised from 0.75-inch to 1.5" Type S-III Asphaltic Concrete.

Line Item # 70, Brick Paver Drive replace (*incl conc base*) with (incl. Base Course).

Construction Plans:

Plan Sheet No. 2. (Quantity & Description revisions)

Plan Sheet No. 3. (Revision to Milling Depth & Overlay Depth)

Plan Sheet No. 12. (Removed 6-inch Underdrain)

Plan Sheet No. 15. (Increased pipe elevation)

Plan Sheet No. 17. (Revised pipe length crossing 71st St E)

Plan Sheet No. 18. (Revised pipe length crossing 70th St E)

Plan Sheet No. 20. (Revised pipe material from A2000 to RCP)

Plan Sheet No. 20A. (Revised pipe material from A2000 to RCP)

Plan Sheet No. 21 (changed dimension of diversion box)

Plan Sheet No. 21 (removed 15-inch RCP at endwall Sta 299+75 & redirected to Inlet 20A)

Plan Sheet No. 22 (revised index no. & revised pipe material from A2000 to RCP)

Plan Sheet No. 23 (Removed 6-inch Underdrain)

Plan Sheet No. 24 (Revised dimension of struct. & note to read by Tideflex)

Plan Sheet No. 26 (revised index no & pipe length / size)

Plan Sheet No. 27 (Revised pipe material from A2000 to RCP)

Plan Sheet Nos. 37-37B (Rev. detail for Diversion Boxes & sheet piling)

Plan Sheet No. 42A (Revised detail for Miami curb)

Plan Sheet Nos 43 thru 53, (revised call out from *relocate water meter & backflow preventer* to Relocate water meter and install new backflow preventer.

Plan Sheet No. 45 (add new single water service sta. 1004+90 L & add 20 LF of 6-inch PVC @ sta. 1004+90 R & PVC to DI adapters)

Plan Sheet No. 47 (add PVC to DI adapters @ sta. 605+55 & 605+ 82)

Plan Sheet No. 49 (add PVC to DI adapters @ sta. 405+00)

Plan Sheet No. 50 (revise 8-inch DI pipe to 6-inch DI @ sta. 205+30)

Plan Sheet No. 51 (add new single water service sta. 301+60)

Plan Sheet No. 52 (add 150 6-inch PVC from sta. 501+00 to 502+00)

QUESTIONS AND RESPONSES:

Q1. Reference SPECIAL PROVISIONS of the specifications, page 7, par. SHOP DRAWINGS, second paragraph, first sentence, the reference to having a Florida Licensed Professional Engineer certify shop drawings for Traffic Control Plans and Erosion Control Plans needs to be eliminated from this paragraph. Finding an engineer that will commit to these requirements is impossible, besides the F.D.O.T. has Design Standards 600 Series Indexes to cover work zones this job will have and the bid documents include details for and describe areas to receive erosion protection. There is no need to have a Professional Engineer certify to these aspects of the job.
R1. If the contractor utilizes FDOT Index 600 for MOT a Licensed professional will not be required. If a specific MOT is proposed other than stated above, you will need to provide a Specific MOT prepared by a Licensed professional.

Q2. Are soil borings available for this job? If so, please provide.
R2. See Geotechnical report issued with this Addendum 2.

Q3. Reference specifications Section 01150, MEASUREMENT AND PAYMENT, page 30, BID ITEM NO. 13, EXTEND AND ADJUST WATER SERVICE, how are we to determine what materials will be needed for this scope of work? For example, reference plan sheet 49, between stations 406+00 and 407+00, the note to extend and adjust water service long side (see detail UW-19), Detail UW-19 is titled "TEMPORARY RESIDENTIAL DIRECT CONNECTION" how are we to use this detail to determine what material will be involved for each one of these?
R3 See revised specifications issued with this Addendum 2.

Q4. Reference specifications Section 01150, MEASUREMENT AND PAYMENT, page 31, BID ITEM NO. 14, ADJUST WATER METER TO GRADE & LOCK COVER, first sentence, contract drawings do not show a detail for a meter cover with a lock, please provide detail.
R4. See revised specifications issued with this Addendum 2.

Q5. Reference specifications Section 02590, WATER SERVICES ON PRIVATE PROPERTY, par. 1.01, SCOPE OF WORK, fourth sentence, how are we to quantify furnishing and installing backflow preventers, thermal expansion tanks and vacuum breakers for this scope of work when this material is not even described in the Measurement and Payment Section for bid items 15 – 18? Bid items for backflow preventers, thermal expansion tanks and vacuum breakers need to be added to the bid form.
R5. Work on private property will be accomplished by a licensed plumber working for the contractor. Revisions to the plans, measurement and payment section and bid form have been made to clarify this item.

Q6. The bid item descriptions in Section 01150 are not reflective of the pay items. Please clarify and provide a measurement and payment description for each bid item.
R6. See revised specifications issued with this Addendum 2.

Q7. Please clarify how the helical screws on sheet 17 are to be fixed or attached at the specified pipe joints.
R7. Note: There are dual 24" A2000 pipes on the north side of 71st St E; Dual 30" A2000 pipe on the south side of 71st St E. The separation between dual pipes = ½ pipe diameter.

a. One helical screw (84" length) is installed on either side of dual pipe located at each joint. Minimum embedment is 4 feet.

b. A cap w/ threaded port (furnished by Pier Tech) is bolted (or welded) to top of shaft of helical screw.

c. A nylon strap or U-bolt spans dual pipe that connects to cap.

Q8. Sheet 20A notes for removal of a house, storage building, and all utility services. Please confirm the contractor will be responsible for this work. If correct, please also clarify what associated permits will be required by the contractor.
R8. Structures have been removed. Plans have been updated to reflect this.

Q9. Considering the bid date is immediately following Independence Day, when many contractors take the week off, please consider extending the bid date at least one week.
R9. See revised date bids are due on the addendum.

Q10. Could the County furnish the CAD files to the bidders?
R10. CAD files will be provided to the successful low bidder. In order to keep bids equal, the contractor is requested to bid the items and quantities on the bid form.

Q11. Could the County furnish a Google KMZ file of the project to the bidders?
R11. Bid the project based on the information provided by the County.

Q12. I am submitting Epoxytec CPP Sprayliner / series as an "or equal" to material section 02064 Modifications to Existing Structures. The attached technical data sheet has listed physical properties that provide a clear comparison in products. Epoxytec CPP Sprayliner is specifically designed for water/wastewater collections and treatment. Application of Epoxytec CPP Sprayliner is via a plural component spray equipment, from Certified Applicators; a list is available on our website, applied to a recommended 125 mils, either applied directly to properly prepared concrete lift stations or structures, can be returned to service in as little as 18 hours.
R12. Please coordinate with the successful low bidder after this bid has been awarded to have your product submitted for review.

Q13. Aside from the ROW Use Permit and FDEP Generic Permit, please list what other permits will be required to be obtained by the Contractor, including their associated costs.
R13. The Contractor must send to ACOE a completed Commencement Notification Form within 10 days of initiating work. Completed form can be e-mailed to: SAJ-RD- Enforcement@usace.army.mil
A. Also, a construction commencement notification form shall be sent to SWFWMD at least 48 hours prior to initiating work.
B. Also, dewatering plan must be submitted to SWFWMD for their approval

Q14. Please provide a geotechnical report, if available.
R14. See Geotechnical Report issued with this Addendum 2.

Q15. Please eliminate the requirement to provide a schedule with the bid package. This can be provided by the successful low bidder.
R15. This requirement has been deleted

Q16. Reference plan sheets 43-54 (Utility Adjustment Sheets). Please confirm who will be responsible for the utility work removals and relocations designated in red. Please also confirm whether or not this will be completed ahead of construction by the respective utility owners, providing a schedule, if one is available.
R16. Contractor is responsible for coordinating with the impacted private utility companies for relocations and build this time into their schedule. The utility in red referenced with this question is FPL.

Q17. Which, if any, of the utility pay items will require a licensed plumber?
R17. New backflow preventers (installed on private property) will require licensed plumber.

Q18. The water and sewer sections of the bid form include a pay item for road base and asphalt restoration. The roadway section has pay items for ½" milling and ½" asphalt only. There are no pay items for the required road base and asphalt trench patch work for all the road cuts prior to milling and overlay. Please provide a pay item for the road base and asphalt with related quantities as needed.
R18. Please see the revised bid form for roadway asphalt requirements. Cuts in the road due to storm pipe installation will be paid for in the unit price for the storm pipe.

Q19. Reference Bid Form, Pay Item numbers 27 – 33, the Pay Item description for these items shows "Concrete Block", Manatee County Public Works Standards, Part 3. Highway & Traffic Standards Manual allows precast boxes as specified in F.D.O.T. as an acceptable alternative, can we base our bid on using precast boxes for these items?
R19. Precast is acceptable.

Q20. Reference plan sheet 42A, HELICAL ANCHOR DETAIL, what are we using to strap the pipe down to the anchor with? Please provide more information or another detail drawing.
R20. Refer to revised sheet # 42A, that provides additional information on anchoring pipe.

Q21. Reference plan sheet 26, in profile view at approximately station 900+40, 43LF of ?? Concrete Pipe, what size is this run of pipe?
R21. Dual 36" RCP – 43 LF. Plans have been revised.

Q22. Reference plan sheet 20A, Structure (337), a double mitered end section, the run of pipe into this mitered end is 30-inch A-2000 PVC, will the mitered end have to transition to concrete pipe or can it be PVC?
R22. 30" A2000 pipe exiting structure 337 has been changed to 30" RCP. Quantities have been revised, accordingly.

Q23. Reference plan sheet 27, MES at Sta. 1499+54, a mitered end section, the run of pipe into this mitered end is 15-inch A-2000 PVC, will the mitered end have to transition to concrete pipe or can it be PVC?
R23. 15" A2000 pipe at station 1499+54 has been changed to 15" RCP. Quantities have been revised accordingly.

Q24. Reference plan sheet 24, the note that reads "(2) 30" CHECKMATE CHECK VALVES BY RED VALVE", the detail on plan sheet 42A shows TideFlex valves, what are we to bid on for these two check valves on this sheet?
R24. Sheet # 24 has been revised to read "by TideFlex" in lieu of Red Valve.

Q25. Reference plan sheet 20A, Structure (337) is a double mitered end and should not be called out as 2-each, please add a bid item for a 30-inch double mitered end.
R25. FDOT does not have a pay item for dual MES in their master pay item list. Therefore, the Contractor will be compensated for two (2) 30" MES.

Q26. Reference Bid Form, Pay Item 70, Brick Paver Drive (Incl. Conc. Base), now reference plan sheet 42, BRICK PAVER DETAIL, this detail does not show putting a concrete base beneath the brick pavers, but the bid item description indicates a concrete base to be installed, if we are to install a concrete base please provide a detail showing how thick the concrete is to be.
R26. Pay item description and specifications have been revised to read "Incl 6" Base Course" in lieu of conc base.

Q27. Reference Bid Form, Pay Item 66, Type A Miami Curb & Gutter, now reference plan sheet 43, the detail for Type A Miami Curb & Gutter, there is no information showing a sub-grade beneath the new curb to be installed, please provide information regarding what will be required.
R27. Sheet #42A has been revised to indicate 6" sub-base LBR = 40.

Q28. Reference plan sheets 7 through 27, there will be several open cut crossings for storm pipe installation, but there are no pay items to compensate the Contractor for asphalt and base restoration, please provide pay items for this work as well as a pay item for milling and resurfacing at each side of the pipe trench as called for in Detail UG-12 on plan sheet 40.
R28. Specifications state that cost of restoring site, solely for the purpose of constructing pipe culvert, will be included in the contract unit price for the pipe culvert.

Q29. Since roadway storm pipe crossings are open cut constructed, why can't the long side water services be installed by open cut? Every street is being milled and resurfaced anyway.
R29. Minimize the number of open cuts due to the numerous services within project area. Directional drilling should decrease construction time.

Q30. Reference Bid Form, Pay Item 18, bid quantity shows 57-each, plans show 54-each, please review.
R30. The verified quantity is 60.

Q31. Reference Bid Form, Pay Item 20, bid quantity shows 26-each, plans show 27-each, please review.
R31. The verified quantity is 25.

Q32. Reference Bid Form, Pay Item 21, bid quantity shows 9-each, plans show 8-each, please review.
R32. The verified quantity is 8.

Q33. Reference Bid Form, Pay Item 29, bid quantity shows 3-each, plans show 4-each, please review.
R33. The verified quantity is 3.

Q34. Reference Bid Form, Pay Item 30, bid quantity shows 2-each, plans show 3-each, please review.
R34. The verified quantity is 3. Changed one (1) 4' x 7' struct. to 4' x 6' struct.

Q35. Reference Bid Form, Pay item 33, bid quantity shows 41-each, plans show 44-each, please review.
R35. The verified quantity is 44.

Q36. Reference Bid Form, Pay Item 35, bid quantity shows 8-each, plans show 7-each, please review.
R36. The verified quantity is 7.

Q37. Reference Bid Form, Pay Item 37, bid quantity shows 408LF, plans show 441LF, please review.
R37. The verified quantity is 417.

Q38. Reference Bid Form, Pay Item 39, bid quantity shows 750LF, plans show 782LF, please review.
R38. The verified quantity is 782.

Q39. Reference Bid Form, Pay Item 40, bid quantity shows 408LF, plans show 589LF, please review.
R39. The verified quantity is 501.

Q40. Reference Bid Form, Pay Item 41, bid quantity shows 206LF, plans show 282LF, please review.
R40. The verified quantity is 282.

Q41. Reference Bid Form, Pay Item 42, bid quantity shows 711LF, plans show 677LF, please review.
R41. The verified quantity is 706.

Q42. Reference Bid Form, Pay Item 43, bid quantity shows 1,908LF, plans show 1,874LF, please review.
R42. The verified quantity is 1,939.

Q43. Reference Bid Form, Pay Item 44, bid quantity shows 256LF, plans show 296LF, please review.
R43. The verified quantity is 256.

Q44. Reference Bid Form, Pay Item 45, bid quantity shows 2,181LF, plans show 2,072LF, please review.
R44. The verified quantity is 2,054.

Q45. Reference Bid Form, Pay Item 47, bid quantity shows 623LF, plans show 488LF, please review.
R45. The verified quantity is 570.

Q46. Reference Bid Form, Pay Item 49, bid quantity shows 1,244LF, plans show 1,310LF, please review.
R46. The verified quantity is 1,441.

Q47. Reference Bid Form, Pay Item 50, bid quantity shows 1,511LF, plans show 1, 597LF, please review.
R47. The verified quantity is 1,351.

Q48. Reference Bid Form, Pay Item 51, bid quantity shows 1,208LF, plans show 1,277LF, please review.
R48. The verified quantity is 925.

Q49. Reference Bid Form, Pay Item 55, bid quantity shows 40LF, plans show 52LF, please review.
R49. The verified quantity is 50.

Q50. Reference Bid Form, Pay Item 56, bid quantity shows 8-each, plans show 10-each, please review.
R50. The verified quantity is 8.

Q51. Reference Bid Form, Pay item 71, bid quantity shows 20-each, plans show 70-each, please review.
R51. The verified quantity is 38.

Q52. Reference plan sheet 37, M.C. DROP INLET, W/TRENCH STRUCTURE (CIP), in the FRONT ELEVATION view, what is the 6-inch cross hatched area supposed to be?
R52. Cast-in-place conc. support for Steel Lid for trench struct.

Q53. Reference plan sheet 37, M.C. DROP INLET, W/TRENCH STRUCTURE (CIP), what are the install dimensions of the 2"-3" diameter stone with geotextile fabric supposed to be?
R53. Refer to revised sheet 37 that indicates 2' x 5' dimension for fabric.

Q54. Reference plan sheet 37, SWALE CROSSING DETAIL, what is the installed depth of the 2"-3" diameter stone supposed to be?
R54. Refer to revised sheet 37 that indicates 4"-6" depth of stone to be placed at the upstream end of swale crossing.

Q55. Reference plan sheet 37, 5'x7' DIVERSION BOX W/M.C. DROP INLET detail, what are the install dimensions of the 2"-3" diameter stone with geotextile fabric supposed to be?
R55. Refer to revised sheet 37 that indicates 2' x 5' dimension for fabric.

Q56. Reference plan sheet 37, 5'x7' DIVERSION BOX W/M.C. DROP INLET detail, in Section A-A the elevation of the grate is shown at 2.60, in Section B-B the elevation of the grate is shown at 2.70, which elevation is correct?
R56. The correct grate elevation is 2.60. Plans have been revised, accordingly.

Q57. Reference plan sheet 37 and 37A, any maintenance needed to be performed on the TideFlex valves at each of these structures will be impossible to do from inside the structure as there is not enough room for anyone to get over the weir wall and work in such a confined space, the clearance from the top of the weir wall to the underside of the top of the structure is only seven (7) inches, the lid of the structure would have to be removed. Also, the 2'-0" distance from the face of the weir wall to the inside face of structure wall is not large enough to accommodate removal of the TideFlex valve. The design needs to be re-evaluated.
R57. The 2'-0" dimension from face of weir to structure wall has been increased to 2'-6".

Q58. Should consideration be given to installing Manatee grates at the headwalls and any mitered end sections discharging into open waters?
R58. It is not anticipated that anti-clogging devices will be needed since pipe size is generally 30" diameter. In addition, check valves (located at the upstream end of each discharge pipe into open water) perform like swing valves that only allow water to flow in one direction.

Q59. Reference Bid Form, Pay Item 83, bid quantity shows 80LF, plans show 90LF, please review.
R59. The verified quantity is 50.

Q60. Reference Bid Form, Pay Item 84, bid quantity shows 200LF, plans show 250LF, please review.
R60. The verified quantity is 270.

Q61. Reference Bid Form, Pay Item 85, bid quantity shows 310LF, plans show 260LF, please review.
R61. The verified quantity is 260.

Q62. Reference Bid Form, Pay Item 86, bid quantity shows 380LF, plans show 290LF, please review.
R62. The verified quantity is 460.

Q63. Reference Bid Form, Pay Item 87, bid quantity shows 20LF, plans show 60LF, please review.
R63. The verified quantity is 80.

Q64. Reference Bid Form, Pay Item 88, and specifications Section 01150, MEASUREMENT AND PAYMENT, page 30, BID ITEM NO. 7, PIPE RESTRAINTS 12" AND SMALLER, WATER, fourth sentence, this limits the restraints for use on the proposed ductile iron pipe, what about restraints for use on the proposed PVC pipe?
R64. See revised Bid Form and utility Specifications issued with this Addendum 2.

Q65. Reference specifications Section 01150, are these restraints limited for use only to restrain the bell ends of the pipe being installed by means of a bell joint restrainer, in order to maintain restraint along the pipeline, or are these restraints only for the MJ Meg-a-Lug restrainers used at mechanical joint fittings?
R65. Bid item U7 is for restraining pipe upstream and downstream of fittings & isolation valves as required by Manatee County utility standard details UG8 thru UG10.

Q66. Reference Bid Form, Pay Item 88, this bid item is not necessary if it is to compensate the Contractor for MJ Meg-a-Lugs used at mechanical joint fittings, let the cost of the fittings as the bid form has Pay Items for include the costs for the MJ Meg-a-Lug restraints.
R66. Bid item U7 is for restraining pipe upstream and downstream of fittings & isolation valves as required by Manatee County utility standard details UG8 thru UG10.

Q67. Will the Contractor be required to restrain existing joints of pipe due to the installation of horizontal or vertical deflections caused by the installation of the proposed new pipe? If so, please add a Pay Item for this scope of work.
R67. Bid item U7 is for restraining pipe upstream and downstream of fittings & isolation valves as required by Manatee County utility standard details UG8 thru UG10.

Q68. Reference Bid Form, Pay Item 90, bid quantity shows 6-each, plans show 13-each, please review.
R68. This is now Pay Item 92, and the verified quantity is 14.

Q69. Reference Bid Form, Pay Item 91, bid quantity shows 3-each, plans show 2-each, please review.
R69. This is now Pay Item 93, and the verified quantity is 2.

Q70. Reference Bid Form, Pay Item 102, bid quantity shows 38-each, plans show 40-each, please review.
R70. This is now Pay Item 104, and the verified quantity is 40.

Q71. Reference Bid Form, Pay Item 103, bid quantity shows 14-each, plans show 19-each, please review.
R71. This is now Pay Item 105, and the verified quantity is 21.

Q72. Reference Bid Form, Pay Item 106, bid quantity shows 4-each, plans show zero each, please review.
R72. This is now Pay Item 108, and the verified quantity is 2.

Q73. Reference Bid Form, Pay Item 116, bid quantity shows 22-each, plans show 19-each, please review.
R73. This is now Pay Item 118, and the verified quantity is 22.

Q74. Reference Bid Form, Pay Item 117, bid quantity shows 11-each, plans show 9-each, please review.
R74. This is now Pay Item 119, and the verified quantity is 8.

Q75. Reference plan sheet 47, a 6" PVC to DI Adapter is needed at stations 605+55 and 602+82, please review.
R75. Agree. The revised quantity for pay item 118 is 22 EA.

Q76. Plans reference the 2019-2020 FDOT Design Standards as the Governing Design Standards yet include callouts for older FDOT indexes. For example FDOT Index 520 (Gravity Wall) is for the Shallow Wall but is a 2010 index as well as the Handrail Index callout of 862 is not 19-20 standards. Please can you qualify the specific plan callouts Govern.
R76. Applicable Plan sheets have been revised to reference 2019-20 FDOT design Std Index. See revised plans issued with this Addendum 2.

Q77. Sheet Pile Permanent 200 SF. More details are needed. What is the minimum section modulus required?? Is sheet to be coated?? Is there a Cap on top or just bare sheet??
R77. See revised plans issued with this Addendum 2.

Q78. FDOT index 520 (2010) Gravity Wall index specifies Concrete to be Class NS which is a 2500 PSI concrete. Pay Item description is "Concrete Class I Retaining Walls" Class I is a 3000 PSI concrete. Please clarify if we are to follow Index and use a Class NS or modify index to use Class I??
R78. The pay item has been revised to read Concrete Class NS with a required compressive strength of 2,500 psi at 28 days.

Q79. Could you please provide the proposed Scheme of Gravity wall we are to bid? The one cross section included shows 2' embedment which is typical of a Scheme 2 wall with the 9/12 pitch. But QTYs provided do not support. Please advise??
R79. Please use scheme 1 since height of wall is < 5' and no traffic loading.

Q80. Structure #342 References a Double 30" & Single 15" Endwall Per FDOT index 430-030 yet FDOT index 430-030 does not include dissimilar pipe size Endwalls Please advise.
R80. The single 15" pipe has been removed from headwall. This pipe now discharges to proposed structure # 392 (Sta. 300+87). Reference revised sheet no. 21.

Q81. Could lengths be provided for the shallow walls. Some have specific callouts, some have start and stop stations and some have only one station.
R81. Reference sheet nos. 14 & 26 for limit of wall at the southeast corner of 72nd St East & 15th Ave East. Refer to sheet no 26 for station limits of wall at the northeast corner of 71st St East & 15th Ave East.

Q82. Swale Crossing per plan sheet 37 appears to be stone yet paid for under Class I Concrete MIsc. Is this correct? Has this detail been used before? And how has it performed? It seems a Modified Closed Flume Inlet similar to FDOT index 425-061 would be better suited here.
R82. Swale crossing shown on sheet 37 is typically cast-in-place concrete (Class I). These have been constructed within County R/W.

Q83. Could the locations of the Swale Crossings be provided?? I am having a hard time finding them.
R83. Concrete swale crossing are located at stations 1203+65 Lt, 1214+14 Lt, 1215+65 Lt, 1216+10 Lt.

Q84. Reference specifications Section 01150, MEASUREMENT AND PAYMENT, page 33, BID ITEM NO. 41, first paragraph, first sentence, reference to the words "connection at the main line sewer", are we expected to not be able to use the current main line sewer connection and have to cut in a new wye?
R84. We anticipate using existing wye at sewer main line connection. As-builts show location of each existing wye.

Q85. Reference specifications Section 01150, MEASUREMENT AND PAYMENT, page 33, BID ITEM NO. 41, first paragraph, first sentence, reference to the words "concrete encasement", Detail US-13A on plan sheet 41 does not show a concrete encasement, where is the encasement to be installed?
R85. No concrete encasement. Specification has been revised.

Q86. Reference specifications Section 01150, MEASUREMENT AND PAYMENT, page 33, BID ITEM NO. 41, first paragraph, first sentence, reference to the words "concrete pad at the surface", Detail US-13A on plan sheet 41 does not show a concrete pad at the surface, a USF #7621 Ring and Cover is, where does the concrete pad get installed?
R86. No concrete pad at surface. Specification has been revised.

Q87. Reference specifications Section 01150, MEASUREMENT AND PAYMENT, page 33, BID ITEM NO. 41, second paragraph, first sentence, reference to the words "the best locations of all connections at the main line sewer and at the property line", are we going to be expected to reconnect to the existing main line and reroute the service pipe to the property line as the Homeowner so desires? We cannot be expected to know what the Homeowner wants and do not know how to bid this item as a result, please remove this language from the specifications.
R87. Pay item is to re-connect sanitary sewer service at the same location. The reason for sewer service re-connect is to address conflict with the proposed storm pipe.

Q88. Reference Bid Form, Pay Item 63, bid quantity shows 1,420LF, plans show 1,315LF, please review.
R88. The correct quantity for Pay item 63 is 1,110 LF.

Q89. Reference plan sheets 43 – 54, what kind of materials are the existing sanitary sewer pipe and service laterals made of, vitrified clay or PVC?
R89. Existing sanitary sewer and laterals are PVC. Per County GIS.

Q90. Reference plan sheet 50, the note that reads "WATER MAINS TO BE REMOVED AND CAPPED AT EOP WITHIN R/W", how many mains, what are the lengths what sizes are they and since there are no Pay Items for this work, where do we get paid for this?
R90. Water services to Webb Property and adjacent Cobb Property (to the east PID # 2101800007) will be removed due to construction of wet detention pond.

Q91. Reference plan sheet 45, at approximately station 1004+90, what is the length and type of 6-inch pipe being installed? The plans do not call it out.
R91. Plan sheet # 45 has been revised to indicate 20 LF of 6" PVC.

Q92. Reference plan sheet 45, at approximately station 1004+90, the long side water service, this service is currently called out as EXTEND & ADJUST, shouldn't this be a new Long Side Single Service?
R92. Plan sheet # 45 has been revised to indicate new water service at station 1004+90 in lieu of extend & adjust.

Q93. Reference Bid Form, Pay Item 97, bid quantity shows 3-each, plans show 6-each, please review.
R93. This is now Pay item 99, and the correct quantity is 5 EA.

Q94. Reference plan sheet 50, REMOVE (2) CLEANOUTS and REMOVE SEWER SERVICE, there are no Pay Items for this work, where do we get paid for this?
R94. Removal of clean outs & sewer service will be paid for under clearing & grubbing.

Q95. Reference plan sheet 50, REMOVE EXISTING GATE VALVES, REMOVE EXISTING WATER SERVICE, and REMOVE EXISTING GATE VALVE, there are no Pay Items for this work, where do we get paid for this?
R95. Removal of gate valves & water service will be paid for under clearing & grubbing.

Q96. Please provide a detail showing how the top of pile connects to the pipe.
R96. See Revised plans issued with this Addendum 2.

Q97. Please provide the ultimate compression and tension values for the piles.
R97. See Revised plans issued with this Addendum 2.

Q98. Will Soil Borings be provided?
R98. See Geotechnical Report issued with this Addendum 2.

Q99. Will the Pond Material excavated be suitable to utilize for fill needed on the site?
R99. See Geotechnical Report issued with this Addendum 2.

Q100. Will the power/electric relocates called out on the Utility Adjustments be by others?
R100. Yes, by FPL.

Q101. Is there a utility relocation schedule that FPLE provides the durations for the work to be performed?
R101. Contractor to coordinate with private utility companies.

NOTE: Items that are ~~struck through~~ are deleted. Items that are <u>underlined</u> 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 Chris Daley, CPPO, CPPB Digitally signed by Chris Daley, CPPO, CPPB Date: 2020.07.21 13:13:41 -04'00'

BID FORM

(Submit in Triplicate)

Rubonia Water Quality Improvement Project

BID "A" Based on Completion Time of 480 Calendar Days

PAY ITEM NO.	FDOT ITEM NUMBER	DESCRIPTION	ESTIMATED QUANTITY	UNITS	BID PRICE PER UNIT ($)	TOTAL BID PRICE ($)
		ROADWAY & DRAINAGE				
1.	101-1	Mobilization	1.00	LS		
2.	102-1	Maintenance of Traffic	1.00	LS		
3.	104-10-3	Staked Silt Fence (Type III)	16,600.00	LF		
4.	104-11	Floating Turbidity Barrier (Type II)	825.00	LF		
5.	104-15	Soil Tracking Prevention Device	2.00	EA		
6.	104-18	Inlet Protection System	170.00	EA		
7.	110-1-MC	Clearing & Grubbing, incl. trees, pipes, wood / conc. structures, Brazillian Peppers	1.75	AC		
8.	120-1	Regular Excavation	14,200.00	CY		
9.	120-4	Excavation, Subsoil	100.00	CY		
10.	120-6	Embankment (Regular)	500.00	CY		
11.	327-70-16	Milling Exist. Asph. Pavement (1/2" Avg. Depth)	20,660.00	SY		
12.	334-1-MC1	1/2" Type S-III Asphalt Concrete	1,860.00	TN		
13.	400-1-2	Concrete Class I, Endwalls	30.00	CY		
14.	400-1-11	Concrete Class I, Retaining Walls	20.00	CY		
15.	400-1-15	Concrete Class I, Miscellaneous	4.00	CY		
16.	416-1-MC1	Helical screw anchors (A2000 Pipe)	50.00	EA		
17.	425-1-711	Inlets, Gutter, Type V, < 10'	4.00	EA		
18.	425-1-521	Inlets, Ditch Bot, Type C, < 10'	60.00	EA		
19.	425-1-523	Inlets, Ditch Bot, Type C, J-Bot (9'ø), < 10'	3.00	EA		
20.	425-1-541	Inlets, Ditch Bot, Type D, < 10'	25.00	EA		
21.	425-1-551	Inlets, Ditch Bot, Type E, < 10'	8.00	EA		
22.	425-1-MC1	Diversion Box (9'X8')	1.00	EA		
23.	425-1-MC2	Diversion Box (5'X7')	1.00	EA		
24.	425-1-MC3	Diversion Box (7'X8')	1.00	EA		
25.	425-1-MC4	Control Structures (5'x5')	2.00	EA		
26.	425-1-MC5	M.C. Junction Box	2.00	EA		

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27.	425-1-MC6	Concrete Block Box 4' x 5' w/ C.I. Grate	2.00	EA		
28.	425-1-MC7	Concrete Block Box 4' x 6' w/ C.I. Grate	2.00	EA		
29.	425-1-MC8	Concrete Block Box 4' x 7' w/ C.I. Grate	3.00	EA		
30.	425-1-MC9	Concrete Block Box 5' x 7' w/ C.I. Grate	3.00	EA		
31.	425-1-MC10	Concrete Block Box 6' x 7' w/ C.I. Grate	2.00	EA		
32.	425-1-MC11	Concrete Block Box 4' x 8' w/ C.I. Grate	1.00	EA		
33.	425-1-MC12	Concrete Block Box 2' x 2' w/ C.I. Grate	44.00	EA		
34.	425-1-MC13	M.C. Drop Inlet w/ Trench Drain	9.00	EA		
35.	425-1-MC14	M.C. Drop Inlet	7.00	EA		
36.	425-1-MC15	Baffle Box #1 w/ Upflow Filter & Bold & Gold media	2.00	EA		
37.	430-174-215	Pipe Culvert, 12" x 18" ERCP	417.00	LF		
38.	430-174-218	Pipe Culvert, 14" x 23" ERCP	502.00	LF		
39.	430-174-224	Pipe Culvert, 19" x 30" ERCP	782.00	LF		
40.	430-174-230	Pipe Culvert, 24" x 38" ERCP	501.00	LF		
41.	430-174-236	Pipe Culvert, 29" x 45" ERCP	282.00	LF		
42.	430-175-115	Pipe Culvert, 15" RCP	706.00	LF		
43.	430-175-115	Pipe Culvert, 15" A2000	1,939.00	LF		
44.	430-175-118	Pipe Culvert, 18" RCP	256.00	LF		
45.	430-175-118	Pipe Culvert, 18" A2000	2,054.00	LF		
46.	430-175-121	Pipe Culvert, 21" A2000	274.00	LF		
47.	430-175-124	Pipe Culvert, 24" RCP	570.00	LF		
48.	430-175-124	Pipe Culvert, 24" A2000	1,320.00	LF		
49.	430-175-130	Pipe Culvert, 30" RCP	1,441.00	LF		
50.	430-175-130	Pipe Culvert, 30" A2000	1,351.00	LF		
51.	430-175-136	Pipe Culvert, 36" RCP	925.00	LF		
52.	430-175-136	Pipe Culvert, 36" A2000	543.00	LF		
53.	430-175-142	Pipe Culvert, 42" RCP	69.00	LF		

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54.	430-175-148	Pipe Culvert, 48" RCP	219.00	LF		
55.	430-175-MC1	Pipe Culvert, 10" PVC, Incl. MES	50.00	LF		
56.	430-880-MC1	30" Check Valve (storm outlet pipe)	8.00	EA		
57.	430-880-MC2	42" Check Valve (storm outlet pipe)	2.00	EA		
58.	430-982-123	MES (Cross Drain) 15"	2.00	EA		
59.	430-982-133	MES (Cross Drain) 30"	3.00	EA		
60.	430-982-141	MES (Cross Drain) 48"	1.00	EA		
61.	430-984-123	MES (Side Drain) 15"	1.00	EA		
62.	430-984-623	MES (Side Drain) (12"x18")	4.00	EA		
63.	440-1-10	Underdrain, Type 1, 6" Dia.	1,110.00	LF		
64.	455-133-3	Steel Sheet Piling, F & I Permanent	360.00	SF		
65.	515-2-311	Pedestrian / Bicycle Railing, Aluminum, 42" Type 1	310.00	LF		
66.	520-2-MC1	Type A Miami Curb & Gutter	185.00	LF		
67.	520-2-4	Concrete Curb, Type D	1,018.00	LF		
68.	522-1	4" Concrete Sidewalk	4,000.00	SY		
69.	522-2	6" Concrete Sidewalk	4,440.00	SY		
70.	522-MC1	Brick Paver Drive (Incl. Conc. Base)	600.00	SF		
71.	527-2	Detectable Warnings	38.00	EA		
72.	530-3-4	Riprap, Rubble, F & I, Ditch Lining	150.00	TN		
73.	550-10-220	Fencing, Type B, 5.1-6.0', Standard Features	1,013.00	LF		
74.	550-60-212	Fence Gate, Type B, Single, 6.1- 12.0' Opening	2.00	EA		
75.	570-1-2	Sodding (Performance Turf, Bahia)	24,000.00	SY		
76.	570-1-MC1	Tree Protection	40.00	EA		
77.	570-1-MC2	Replant Trees (Up to 6" Caliper)	20.00	EA		
78.	700-1-11	Single Post Sign, F & I GM < 12 SF	2.00	AS		
79.	700-1-50	Single Post Sign (Relocate)	5.00	AS		
80.	711-11-123	Thermoplastic (Standard) (White) (Solid) (12")	820.00	LF		

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PAY ITEM NO.	FDOT ITEM NUMBER	DESCRIPTION	ESTIMATED QUANTITY	UNITS	BID PRICE PER UNIT ($)	TOTAL BID PRICE ($)
81.	711-11-125	Thermoplastic (Standard) (White) (Solid) (24")	160.00	LF		
		SUBTOTAL (ROADWAY & DRAINAGE ONLY)				
		CONTRACT CONTINGENCY WORK FOR ROADWAY & DRAINAGE (USED ONLY WITH COUNTY APPROVAL			**10%**	
		WATER				
82.	U1	12" DIP (CL 350) Water Main	20	LF		
83.	U2	8" DIP (CL350) Water Main	50	LF		
84.	U3	6" DIP (CL350) Water Main	270	LF		
85.	U4	4" DIP (CL350) Water Main	260	LF		
86.	U5	6" PVC DR-18 C900	460	LF		
87.	U6	4" PVC DR-18 C900	80	LF		
88.	U7	12" & Smaller PVC Pipe Restraints	1	LS		
89.	U8	12" & Smaller D.I. Pipe Restraints	1	LS		
90.	U9	12" & Smaller Existing Pipe Restraints	1	LS		
91.	U10	8" Gate Valve for Water Main, MJ	3	EA		
92.	U11	6" Gate Valve for Water Main, MJ	14	EA		
93.	U12	4" Gate Valve for Water Main, MJ	2	EA		
94.	U13	Adjust Gate Valve to grade	2	EA		
95.	U14	Relocate Water Meter	38	EA		
96.	U15	Extend & Adjust Water Service	48	EA		
97.	U16	Install New Backflow Preventer	38	EA		
98.	U17	Install Single Water Service, Long Side	4	EA		
99.	U18	Install Single Water Service, Short Side	5	EA		
100.	U19	Install Double Water Service, Long Side	2	EA		
101.	U20	Install Double Water Service, Short Side	1	EA		
102.	U21	12" - 45 degree MJ bend	4	EA		
103.	U22	8" - 45 degree MJ bend	2	EA		
104.	U23	6" - 45 degree MJ bend	40	EA		

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BID "A" Based on Completion Time of 480 Calendar Days

PAY ITEM NO.	FDOT ITEM NUMBER	DESCRIPTION	ESTIMATED QUANTITY	UNITS	BID PRICE PER UNIT ($)	TOTAL BID PRICE ($)
105.	U24	4" - 45 degree MJ bend	21	EA		
106.	U25	6" - 22.5 degree MJ bend	4	EA		
107.	U26	4" - 22.5 degree MJ bend	4	EA		
108.	U27	6" - 11.25 degree MJ bend	2	EA		
109.	U28	8" x 8" Tee MJ	1	EA		
110.	U29	6" x 6" Tee MJ	3	EA		
111.	U30	6" x 4" Tee MJ	1	EA		
112.	U31	8" x 6" Reducer	1	EA		
113.	U32	8" x 4" Reducer	1	EA		
114.	U33	6" x 4" Reducer	1	EA		
115.	U34	6" Cross, MJ	1	EA		
116.	U35	12" PVC to DI Adapter	2	EA		
117.	U36	8" PVC to DI Adapter	3	EA		
118.	U37	6" PVC to DI Adapter	22	EA		
119.	U38	4" PVC to DI Adapter	8	EA		
120.	U39	Miscellaneous Concrete	4	CY		
121.	U40	Asphalt Road Restoration (Base & Resurface)	400	SY		
122.	U41	Mobilization	1	LS		
		SUBTOTAL (WATER ONLY)				
	U42	**CONTRACT CONTINGENCY WORK FOR WATER (USED ONLY WITH COUNTY APPROVAL**			**10%**	
		WASTEWATER				
123.	U43	Re-Connect Sewer Service	60	EA		
124.	U44	Adjust Cleanout to Grade	1	EA		
125.	U45	Install New Clean Out	14	EA		
126.	U46	Proposed Sanitary Sewer Manhole	1	EA		
127.	U47	8 Inch SDR 26 Gravity Sewer	133	LF		

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PAY ITEM NO.	FDOT ITEM NUMBER	DESCRIPTION	ESTIMATED QUANTITY	UNITS	BID PRICE PER UNIT ($)	TOTAL BID PRICE ($)
128.	U48	Modify Existing Sanitary Sewer Manhole	1	EA		
129.	U49	Asphalt Road Restoration (Base & Resurface)	375	SY		
130.	U50	Mobilization	1	LS		
		SUBTOTAL (WASTEWATER ONLY)				
	U51	**CONTRACT CONTINGENCY WORK FOR WASTEWATER (USED ONLY WITH COUNTY APPROVAL**			**10%**	
	TOTAL BASE BID "A" - Based on Completion Time of 480 Calendar Days					
	CONTRACT CONTINGENCY WORK (USED ONLY WITH COUNTY APPROVAL)					
	TOTAL OFFER FOR BID "A" with Contract Contingency - Based on Completion Time of 480 Calendar Days					

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BID FORM

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Rubonia Water Quality Improvement Project

BID "B" Based on Completion Time of 540 Calendar Days

PAY ITEM NO.	FDOT ITEM NUMBER	DESCRIPTION	ESTIMATED QUANTITY	UNITS	BID PRICE PER UNIT ($)	TOTAL BID PRICE ($)
		ROADWAY & DRAINAGE				
1.	101-1	Mobilization	1.00	LS		
2.	102-1	Maintenance of Traffic	1.00	LS		
3.	104-10-3	Staked Silt Fence (Type III)	16,600.00	LF		
4.	104-11	Floating Turbidity Barrier (Type II)	825.00	LF		
5.	104-15	Soil Tracking Prevention Device	2.00	EA		
6.	104-18	Inlet Protection System	170.00	EA		
7.	110-1-MC	Clearing & Grubbing, incl. trees, pipes, wood / conc. structures, Brazillian Peppers	1.75	AC		
8.	120-1	Regular Excavation	14,200.00	CY		
9.	120-4	Excavation, Subsoil	100.00	CY		
10.	120-6	Embankment (Regular)	500.00	CY		
11.	327-70-16	Milling Exist. Asph. Pavement (1/2" Avg. Depth)	20,660.00	SY		
12.	334-1-MC1	1/2" Type S-III Asphalt Concrete	1,860.00	TN		
13.	400-1-2	Concrete Class I, Endwalls	30.00	CY		
14.	400-1-11	Concrete Class I, Retaining Walls	20.00	CY		
15.	400-1-15	Concrete Class I, Miscellaneous	4.00	CY		
16.	416-1-MC1	Helical screw anchors (A2000 Pipe)	50.00	EA		
17.	425-1-711	Inlets, Gutter, Type V, < 10'	4.00	EA		
18.	425-1-521	Inlets, Ditch Bot, Type C, < 10'	60.00	EA		
19.	425-1-523	Inlets, Ditch Bot, Type C, J-Bot (9'ø), < 10'	3.00	EA		
20.	425-1-541	Inlets, Ditch Bot, Type D, < 10'	25.00	EA		
21.	425-1-551	Inlets, Ditch Bot, Type E, < 10'	8.00	EA		
22.	425-1-MC1	Diversion Box (9'X8')	1.00	EA		
23.	425-1-MC2	Diversion Box (5'X7')	1.00	EA		
24.	425-1-MC3	Diversion Box (7'X8')	1.00	EA		
25.	425-1-MC4	Control Structures (5'x5')	2.00	EA		
26.	425-1-MC5	M.C. Junction Box	2.00	EA		

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27.	425-1-MC6	Concrete Block Box 4' x 5' w/ C.I. Grate	2.00	EA		
28.	425-1-MC7	Concrete Block Box 4' x 6' w/ C.I. Grate	2.00	EA		
29.	425-1-MC8	Concrete Block Box 4' x 7' w/ C.I. Grate	3.00	EA		
30.	425-1-MC9	Concrete Block Box 5' x 7' w/ C.I. Grate	3.00	EA		
31.	425-1-MC10	Concrete Block Box 6' x 7' w/ C.I. Grate	2.00	EA		
32.	425-1-MC11	Concrete Block Box 4' x 8' w/ C.I. Grate	1.00	EA		
33.	425-1-MC12	Concrete Block Box 2' x 2' w/ C.I. Grate	44.00	EA		
34.	425-1-MC13	M.C. Drop Inlet w/ Trench Drain	9.00	EA		
35.	425-1-MC14	M.C. Drop Inlet	7.00	EA		
36.	425-1-MC15	Baffle Box #1 w/ Upflow Filter & Bold & Gold media	2.00	EA		
37.	430-174-215	Pipe Culvert, 12" x 18" ERCP	417.00	LF		
38.	430-174-218	Pipe Culvert, 14" x 23" ERCP	502.00	LF		
39.	430-174-224	Pipe Culvert, 19" x 30" ERCP	782.00	LF		
40.	430-174-230	Pipe Culvert, 24" x 38" ERCP	501.00	LF		
41.	430-174-236	Pipe Culvert, 29" x 45" ERCP	282.00	LF		
42.	430-175-115	Pipe Culvert, 15" RCP	706.00	LF		
43.	430-175-115	Pipe Culvert, 15" A2000	1,939.00	LF		
44.	430-175-118	Pipe Culvert, 18" RCP	256.00	LF		
45.	430-175-118	Pipe Culvert, 18" A2000	2,054.00	LF		
46.	430-175-121	Pipe Culvert, 21" A2000	274.00	LF		
47.	430-175-124	Pipe Culvert, 24" RCP	570.00	LF		
48.	430-175-124	Pipe Culvert, 24" A2000	1,320.00	LF		
49.	430-175-130	Pipe Culvert, 30" RCP	1,441.00	LF		
50.	430-175-130	Pipe Culvert, 30" A2000	1,351.00	LF		
51.	430-175-136	Pipe Culvert, 36" RCP	925.00	LF		
52.	430-175-136	Pipe Culvert, 36" A2000	543.00	LF		
53.	430-175-142	Pipe Culvert, 42" RCP	69.00	LF		

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PAY ITEM NO.	FDOT ITEM NUMBER	DESCRIPTION	ESTIMATED QUANTITY	UNITS	BID PRICE PER UNIT ($)	TOTAL BID PRICE ($)
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55.	430-175-MC1	Pipe Culvert, 10" PVC, Incl. MES	50.00	LF		
56.	430-880-MC1	30" Check Valve (storm outlet pipe)	8.00	EA		
57.	430-880-MC2	42" Check Valve (storm outlet pipe)	2.00	EA		
58.	430-982-123	MES (Cross Drain) 15"	2.00	EA		
59.	430-982-133	MES (Cross Drain) 30"	3.00	EA		
60.	430-982-141	MES (Cross Drain) 48"	1.00	EA		
61.	430-984-123	MES (Side Drain) 15"	1.00	EA		
62.	430-984-623	MES (Side Drain) (12"x18")	4.00	EA		
63.	440-1-10	Underdrain, Type 1, 6" Dia.	1,110.00	LF		
64.	455-133-3	Steel Sheet Piling, F & I Permanent	360.00	SF		
65.	515-2-311	Pedestrian / Bicycle Railing, Aluminum, 42" Type 1	310.00	LF		
66.	520-2-MC1	Type A Miami Curb & Gutter	185.00	LF		
67.	520-2-4	Concrete Curb, Type D	1,018.00	LF		
68.	522-1	4" Concrete Sidewalk	4,000.00	SY		
69.	522-2	6" Concrete Sidewalk	4,440.00	SY		
70.	522-MC1	Brick Paver Drive (Incl. Conc. Base)	600.00	SF		
71.	527-2	Detectable Warnings	38.00	EA		
72.	530-3-4	Riprap, Rubble, F & I, Ditch Lining	150.00	TN		
73.	550-10-220	Fencing, Type B, 5.1-6.0', Standard Features	1,013.00	LF		
74.	550-60-212	Fence Gate, Type B, Single, 6.1- 12.0' Opening	2.00	EA		
75.	570-1-2	Sodding (Performance Turf, Bahia)	24,000.00	SY		
76.	570-1-MC1	Tree Protection	40.00	EA		
77.	570-1-MC2	Replant Trees (Up to 6" Caliper)	20.00	EA		
78.	700-1-11	Single Post Sign, F & I GM < 12 SF	2.00	AS		
79.	700-1-50	Single Post Sign (Relocate)	5.00	AS		
80.	711-11-123	Thermoplastic (Standard) (White) (Solid) (12")	820.00	LF		

Bidder Name: _____

Authorized Signature: _____

BID FORM

(Submit in Triplicate)

Rubonia Water Quality Improvement Project

BID "B" Based on Completion Time of 540 Calendar Days

PAY ITEM NO.	FDOT ITEM NUMBER	DESCRIPTION	ESTIMATED QUANTITY	UNITS	BID PRICE PER UNIT ($)	TOTAL BID PRICE ($)
81.	711-11-125	Thermoplastic (Standard) (White) (Solid) (24")	160.00	LF		
		SUBTOTAL (ROADWAY & DRAINAGE ONLY)				
		CONTRACT CONTINGENCY WORK FOR ROADWAY & DRAINAGE (USED ONLY WITH COUNTY APPROVA			**10%**	
		WATER				
82.	U1	12" DIP (CL 350) Water Main	20	LF		
83.	U2	8" DIP (CL350) Water Main	50	LF		
84.	U3	6" DIP (CL350) Water Main	270	LF		
85.	U4	4" DIP (CL350) Water Main	260	LF		
86.	U5	6" PVC DR-18 C900	460	LF		
87.	U6	4" PVC DR-18 C900	80	LF		
88.	U7	12" & Smaller PVC Pipe Restraints	1	LS		
89.	U8	12" & Smaller D.I. Pipe Restraints	1	LS		
90.	U9	12" & Smaller Existing Pipe Restraints	1	LS		
91.	U10	8" Gate Valve for Water Main, MJ	3	EA		
92.	U11	6" Gate Valve for Water Main, MJ	14	EA		
93.	U12	4" Gate Valve for Water Main, MJ	2	EA		
94.	U13	Adjust Gate Valve to grade	2	EA		
95.	U14	Relocate Water Meter	38	EA		
96.	U15	Extend & Adjust Water Service	48	EA		
97.	U16	Install New Backflow Preventer	38	EA		
98.	U17	Install Single Water Service, Long Side	4	EA		
99.	U18	Install Single Water Service, Short Side	5	EA		
100.	U19	Install Double Water Service, Long Side	2	EA		
101.	U20	Install Double Water Service, Short Side	1	EA		
102.	U21	12" - 45 degree MJ bend	4	EA		
103.	U22	8" - 45 degree MJ bend	2	EA		
104.	U23	6" - 45 degree MJ bend	40	EA		

Bidder Name: _____

Authorized Signature: _____

BID FORM

(Submit in Triplicate)

Rubonia Water Quality Improvement Project

BID "B" Based on Completion Time of 540 Calendar Days

PAY ITEM NO.	FDOT ITEM NUMBER	DESCRIPTION	ESTIMATED QUANTITY	UNITS	BID PRICE PER UNIT ($)	TOTAL BID PRICE ($)
105.	U24	4" - 45 degree MJ bend	21	EA		
106.	U25	6" - 22.5 degree MJ bend	4	EA		
107.	U26	4" - 22.5 degree MJ bend	4	EA		
108.	U27	6" - 11.25 degree MJ bend	2	EA		
109.	U28	8" x 8" Tee MJ	1	EA		
110.	U29	6" x 6" Tee MJ	3	EA		
111.	U30	6" x 4" Tee MJ	1	EA		
112.	U31	8" x 6" Reducer	1	EA		
113.	U32	8" x 4" Reducer	1	EA		
114.	U33	6" x 4" Reducer	1	EA		
115.	U34	6" Cross, MJ	1	EA		
116.	U35	12" PVC to DI Adapter	2	EA		
117.	U36	8" PVC to DI Adapter	3	EA		
118.	U37	6" PVC to DI Adapter	22	EA		
119.	U38	4" PVC to DI Adapter	8	EA		
120.	U39	Miscellaneous Concrete	4	CY		
121.	U40	Asphalt Road Restoration (Base & Resurface)	400	SY		
122.	U41	Mobilization	1	LS		
		SUBTOTAL (WATER ONLY)				
	U42	**CONTRACT CONTINGENCY WORK FOR WATER (USED ONLY WITH COUNTY APPROVAL**			10%	
		WASTEWATER				
123.	U43	Re-Connect Sewer Service	60	EA		
124.	U44	Adjust Cleanout to Grade	1	EA		
125.	U45	Install New Clean Out	14	EA		
126.	U46	Proposed Sanitary Sewer Manhole	1	EA		
127.	U47	8 Inch SDR 26 Gravity Sewer	133	LF		

Bidder Name: _____

Authorized Signature: _____

BID FORM

(Submit in Triplicate)

Rubonia Water Quality Improvement Project

BID "B" Based on Completion Time of 540 Calendar Days

PAY ITEM NO.	FDOT ITEM NUMBER	DESCRIPTION	ESTIMATED QUANTITY	UNITS	BID PRICE PER UNIT ($)	TOTAL BID PRICE ($)
128.	U48	Modify Existing Sanitary Sewer Manhole	1	EA		
129.	U49	Asphalt Road Restoration (Base & Resurface)	375	SY		
130.	U50	Mobilization	1	LS		
		SUBTOTAL (WASTEWATER ONLY)				
	U51	**CONTRACT CONTINGENCY WORK FOR WASTEWATER (USED ONLY WITH COUNTY APPROVAL**			10%	
	TOTAL BASE BID "B" - Based on Completion Time of 540 Calendar Days					
	CONTRACT CONTINGENCY WORK (USED ONLY WITH COUNTY APPROVAL)					
	TOTAL OFFER FOR BID "B" with Contract Contingency - Based on Completion Time of 540 Calendar Days					

Bidder Name: _____

Authorized Signature: _____

CONTRACT DOCUMENTS

FOR

Rubonia Subdivision
Stormwater Improvements

PROJECT # 304-6093460

June 2020

PROJECT OWNER:

County of Manatee, Florida
c/o Manatee County Procurement Division
1112 Manatee Avenue West
Bradenton, Florida 34205
(941) 748-3014

PREPARED BY:

Engineering Division
Manatee County Public Works Department
1022 26th Avenue East
Bradenton, Florida 34208
(941) 708-7450

INFRASTRUCTURE ENGINEERING STANDARD SPECIFICATIONS

This specification includes by reference the Manatee County Public Works Standards, Part I Utilities Standards Manual approved June 2015.

All items and/or materials furnished and installed shall conform to the Manatee County Approved Products List. 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 of 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 construction of:
Furnish and installation of 20 LF of 12" ductile iron water main, 80 LF of 8" ductile iron water main, 200 LF 6" ductile iron water main, 310 LF 4" ductile iron water main, 380 LF of 6" poly vinyl chloride water main, 20 LF of 4" poly vinyl chloride water main, 8", 6" & 4" ductile iron gate valves, 12", 8", 6", & 4" 45° bends, 6" & 4" 22.5° bends, 6" 11.25° bends, 8" x 8" ductile iron tee, 6" x 6" ductile iron tee, 6" x 4" ductile iron tee, 8" x 6" ductile iron reducer, 8" x 4" ductile iron reducer, 6" x 4" ductile iron reducer, 6" x 6" ductile iron cross, 12", 8", 6" & 4" PVC to ductile iron pipe adapters,133 LF of 8" poly vinyl chloride gravity sewer, re-connect existing sewer services, install new sanitary sewer manhole, relocate back flow preventers & water meter assembly, install new water services, furnish and install 12", 8", 6", & 4" pipe restraints, furnish and installation of pavement repair, as needed.

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 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
179l 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 4410-B 66th St. W. Bradenton, FL 34210
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 24th 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. Project signs and photographs.
2. Removal, repair, replacement or relocation of all signs, walls, private irrigation systems and related items.
3. Rubbish and spoil removal.
4. Shop Drawings, Working Drawings.
5. Clearing, grubbing and grading except as hereinafter specified.
6. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
7. Dewatering and disposal of surplus water.
8. Structural fill, backfill, and grading.
9. Replacement of unpaved roadways, and shrubbery plots.
10. Cleanup & miscellaneous work.
11. Foundation and borrow materials, except as hereinafter specified.
12. Testing and placing system in operation.
13. Any material and equipment required to be installed and utilized for the tests.
14. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
15. Maintaining the existing quality of service during construction.
16. Appurtenant work as required for a complete and operable system.
17. Seeding and hydro mulching.

(THE BID ITEM SECTION IS TO BE COMPLETED FOR EACH ITEM TO BE BID. EXAMPLES AS FOLLOWS)

BID ITEM NOS. U1 THRU U4 DIP (C-150 & C-151) WATER MAINS

Payment for all work included in these Bid Items shall be made at the applicable Contract unit price bid per the schedule of prices for furnishing and installing the listed diameter DIP water main (AWWA C150 and AWWA C151) pipe and fittings as shown on the Contract Drawings and listed in the Bid Form. Measurement and Payment shall be made for the actual length of the listed diameter pipe installed and will represent full compensation for all labor, materials, excavation, including rock, dewatering, bedding, backfill, compaction, testing and disinfection and equipment required to complete these Bid Items. No additional compensation will be made for excavation below the bottom of the pipe, for rock removal or bedding and backfill materials, or for repair of any trench settlement.

BID ITEM NOS. U5 THRU U6 PVC (C-900 & C-905) WATER MAINS

Payment for all work included in these Bid Items shall be made at the applicable Contract unit price bid per the schedule of prices for furnishing and installing the listed diameter PVC water main (AWWA C-900, CL-150 or C-905, CL-235) pipe and fittings as shown on the Contract Drawings and listed in the Bid Form. Measurement and Payment shall be made for the actual length of the listed diameter pipe installed and will represent full compensation for all labor,

materials, excavation, including rock, dewatering, bedding, backfill, compaction, testing and disinfection and equipment required to complete these Bid Items. No additional compensation will be made for excavation below the bottom of the pipe, for rock removal or bedding and backfill materials, or for repair of any trench settlement.

BID ITEM NO. U7: PVC PIPE RESTRAINTS, 12" AND SMALLER, WATER

Payment for all work included in this Bid Item will be made at the applicable Contract unit price bid for furnishing and installing all restraints required to restrain the piping shown on the Contract Drawings. Measurement will be based on lump sum. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing required to complete this Bid Item. This bid item includes the installation of restraints (EBBA Iron or equal) used in restraining the proposed PVC pipe, acceptably. The work shall include, but is not limited to, all bolts, nuts, washers, gaskets, and all other related and necessary materials, work and equipment required or associated with this item.

BID ITEM NO. U8: DUCTILE IRON PIPE RESTRAINTS, 12" AND SMALLER, WATER

Payment for all work included in this Bid Item will be made at the applicable Contract unit price bid for furnishing and installing all restraints required to restrain the piping shown on the Contract Drawings. Measurement will be based on lump sum. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing required to complete this Bid Item. This bid item includes the installation of restraints (EBBA Iron or equal) used in restraining the proposed ductile iron pipe, acceptably. The work shall include, but is not limited to, all bolts, nuts, washers, gaskets, and all other related and necessary materials, work and equipment required or associated with this item.

BID ITEM NO. U9: EXISTING PIPE RESTRAINTS, 12" AND SMALLER, WATER

Payment for all work included in this Bid Item will be made at the applicable Contract unit price bid for furnishing and installing all restraints required to restrain existing piping shown on the Contract Drawings specifically for defection of existing water main due to installation of new storm pipe. Measurement will be based on lump sum. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing required to complete this Bid Item. This bid item includes the installation of restraints (EBBA Iron or equal) used in restraining the proposed PVC pipe, acceptably. The work shall include, but is not limited to, all bolts, nuts, washers, gaskets, and all other related and necessary materials, work and equipment required or associated with this item.

BID ITEM NOS. U10 thru U12: GATE VALVES

Payment for all work included in these Bid Items shall be made at the applicable Contract unit price bid per each valve for furnishing and installing the listed diameter 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 these Bid Items.

BID ITEM NO. U13: ADJUST GATE VALVE TO GRADE

Payment for all work included under this Bid Item shall be made at the applicable Contract unit price bid per each to adjust gate valve to grade as shown on the Contract Drawings and as

directed by the Engineer.

BID ITEM NO. U14: RELOCATE WATER METER

This Bid Item includes the relocation of existing meter including service line, and appurtenances of the specified type acceptably relocated and installed as shown on the Drawings or where directed by the Project Representative. The work includes connection of the relocated meter to the existing water service line, and installation of new service line as required on private property from the relocated meter box installed by the Contractor. Measurement and Payment for all work under this Bid Item shall be made at the applicable Contract unit price bid. The work shall include, but is not limited to; service piping, excavation, restoration, compaction, curb stops, curb or pavement location disks, 10 gauge copper clad steel tracer wire, complete meter assembly & yoke, all necessary fittings, all service connections, disinfection, coordination with service customers, removal and reinstallation of meters, and all other related and necessary materials, work and equipment associated with this item.

BID ITEM NO. U15: EXTEND & ADJUST WATER SERVICE

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per each water service adjustment in conflict with proposed storm pipe or other structure as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, excavation, including rock, bedding, backfill, compaction, testing and disinfection and equipment required to complete this Bid Item.

BID ITEM NO. U16: INSTALL NEW BACKFLOW PREVENTER

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per each to install new backflow preventer as shown on the Contract Drawings and listed on the Bid Form. All work conducted on private property shall be performed by a plumber licensed in Manatee County and experienced in furnishing and installing potable water plumbing systems. Payment shall represent full compensation for all labor, material, excavation, including rock, bedding, backfill, compaction, and equipment required to complete this Bid Item.

BID ITEM NOS U17 thru U20: INSTALL NEW WATER SERVICES

Payment for all work included in these Bid Items shall be made at the applicable Contract unit price bid for each service type for furnishing and installing the listed 1" single and 1-1/2" double water service lines, both short and long side, as shown on the Contract Drawings and listed on the Bid Form. The work includes removal and disposal of the existing water service and appurtenances, connection of the new water service to the relocated water main, and installation of new service line as required on private property to the existing meter box installed by the Contractor. Measurement will be according to the type of services, long or short, single or double. Payment for all work under this Bid Item shall be made at the applicable Contract unit price bid according to the type of services. The work shall include, but is not limited to; service piping, excavation, directional drilling, restoration, compaction, casing pipe, meter box, tapping saddles, corporation stops, curb stops, curb or pavement location disks, 10 gauge copper clad steel tracer wire, complete meter assembly & yoke, all necessary fittings, all service connections, disinfection, coordination with service customers, removal and reinstallation of meters, and all other related and necessary materials, work and equipment associated with these bid items.

BID ITEM NOS. U21 thru U34: DUCTILE IRON FITTINGS, WATER

Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid for furnishing and installing each ductile iron fitting (cement-lined) as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing and disinfection required to complete these Bid Items.

BID ITEM NOS. U35 thru U38: ADAPTERS, WATER

Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid for furnishing and installing each PVC to ductile iron adapter as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing and disinfection required to complete these Bid Items.

BID ITEM NO. U39: MISCELLANEOUS CONCRETE

Payment for all work under this Bid Item shall be made at the applicable Contract unit price bid per cubic yard of concrete as shown on the Bid Form for furnishing, placing and installing all necessary thrust blocks pertaining to new water mains, measured in place, within the lines and grades as shown on the Contract Drawings and as described in the Specifications. All concrete placed outside these lines and grades to fill unauthorized excavation and all concrete for replacing defective work shall be at the expense of the Contractor. Concrete specifically included under any other Bid Item will not be measured or paid for under this Bid Item.

Measurement for thrust blocks shall be per actual cubic yard of concrete furnished, placed and installed as shown on the Contract Drawings or as ordered by the County in writing. This Bid Item includes encasements, nonreinforced pipe cradles, and like work. Payment shall represent full compensation for all labor, materials, and equipment for mixing, placing, forming and curing of the concrete and all incidentals necessary to complete the concrete work, ready for approval and acceptance by the County.

BID ITEM NO. U40: ASPHALT ROAD RESTORATION

Payment for all work included under this Bid Item will be made at the Contract unit price bid per square yard of base, subbase and tonnage of asphalt for furnishing, installing and testing the road restoration pavement section within these Specifications and as listed on the Bid Form. Measurement will be based on the actual number of square yards of road restoration installed, tested, complete and approved. The measurement will be from face of curb to face of curb or as specified, but not greater than the width of the existing roadway prior to construction. Payment will include complete restoration of the roadway section in accordance with the applicable details on the Contract Drawings, but not less than 1-1/2 inches of Type III asphaltic concrete, the necessary base, subbase or compacted suitable excavation material all in accordance with these Specifications. No payment for restoration of a private driveway within or outside the right-of-way shall be made under this Bid Item. Payment shall include all items and incidentals necessary to complete the road restoration in accordance with the requirements of Manatee County ready for approval and acceptance by the County.

BID ITEM NO. U41: MOBILIZATION (% Water)

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. U42: CONTRACT CONTINGENCY (% Water)

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 Bidders Total Base Bid for all items pertaining to water main. The Bidder shall calculate and enter a dollar amount for this Bid Item.

BID ITEM NO. U43: RE-CONNECT SEWER SERVICE LATERALS

Payment for work included under this Bid Item shall be made at the Contract unit price bid for each single or double sewer service lateral and connection at the main line sewer, 6-inch diameter service line to the location designated on the Contract Drawings or as alternately requested by the property owner, and including all bends, fittings, the vertical extension, and cap, all as shown on the service connection detail on the Contract Drawings and all other appurtenances including all labor, equipment, and materials necessary to complete each service connection. The elevation depth below grade as shown in the service connection detail on the Contract Drawings for the lateral invert shall be maintained by the Contractor installing the sanitary sewer service line.

All service locations shown on the Contract Drawings are approximate and it shall be the responsibility of the Contractor to contact all homeowners and determine, subject to approval by the County, the best locations of all connections at the main line sewer and at the property line by station and offset method shall be recorded on the as-built drawings to be furnished to County by the Contractor.

Also included in payment shall be all excavation, including rock as necessary, bedding, backfill,

compaction, testing, extensions and caps all as shown on the Contract Drawings, furnished and installed watertight, ready for approval by the County acceptance.

BID ITEM NO. U44: ADJUST CLEAN OUT TO GRADE

Payment for all work included under this Bid Item shall be made at the applicable Contract unit price bid per each to adjust clean out to grade as shown on the Contract Drawings and as directed by the Engineer.

BID ITEM NO. U45: INSTALL NEW CLEAN OUT

Payment for all work included under this Bid Item shall be made at the applicable Contract unit price bid per each to furnish and install new clean out as shown on the Contract Drawings. Work shall include all labor, equipment, and materials necessary to complete each clean out for sanitary sewer service.

BID ITEM NO. U46: PROPOSED SANITARY SEWER MANHOLE

Payment for all work included under this Bid Item shall be made at the applicable Contract unit price bid per each furnishing and installing the listed diameter sanitary sewer manhole at the depths shown on the Contract Drawings and designated on the Bid Form for the actual number installed.

BID ITEM NO. U47: GRAVITY SEWER MAIN

Payment for all work included under this Bid Item shall be made at the applicable Contract unit price bid per linear foot for furnishing and installing the listed diameter sanitary sewer main at the depths shown on the Contract Drawings and designated on the Bid Form for the actual length installed.

Measurement for the installed length shall be measured horizontally from center to center of manholes.

Payment shall represent full compensation for all labor, excavation, including rock as necessary, dewatering, pipe, bedding, materials, backfill, compaction, sheeting, testing and equipment. Also included shall be the installation of all wyes and/or tees as required for service connections and the recording of their location by station and offset method and all other appurtenances and incidentals required or specified to complete the gravity sewer main. No additional compensation will be made by the County for excavation performed below the bottom of the pipe, for rock removal or materials or for repair of any trench settlement. Class of pipe to be as specified or as listed on the Bid Form.

BID ITEM NO. U48: MODIFY EXISTING SANITARY SEWER MANHOLE.

Payment will be per each modification to existing manhole completed and accepted.
The unit bid price shall include, but is not limited to, coring into existing manhole, plugging existing sanitary invert, and all labor, materials, necessary equipment, and incidental necessary to complete this bid item, ready for approval and acceptance by the County.

BID ITEM NO. U49: ASPHALT ROAD RESTORATION

Payment for all work included under this Bid Item will be made at the Contract unit price bid per square yard of base, subbase and tonnage of asphalt for furnishing, installing and testing

the road restoration pavement section within these Specifications and as listed on the Bid Form. Measurement will be based on the actual number of square yards of road restoration installed, tested, complete and approved. The measurement will be from face of curb to face of curb or as specified, but not greater than the width of the existing roadway prior to construction. Payment will include complete restoration of the roadway section in accordance with the applicable details on the Contract Drawings, but not less than 1-1/2 inches of Type III asphaltic concrete, the necessary base, subbase or compacted suitable excavation material all in accordance with these Specifications. No payment for restoration of a private driveway within or outside the right-of-way shall be made under this Bid Item. Payment shall include all items and incidentals necessary to complete the road restoration in accordance with the requirements of Manatee County ready for approval and acceptance by the County.

BID ITEM NO. U50: MOBILIZATION (% Sanitary Sewer)

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. U51: CONTRACT CONTINGENCY (% Sanitary Sewer)

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 Bidders Total Base Bid for all items pertaining to sanitary sewer. 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 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 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 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 televiewing 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 ± 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

DIVISION 2 SITE WORK

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 cementatious 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. 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-filled shall be capped or plugged with suitable pipe fittings. The grout material shall be of suitable properties and the pumping pressure shall be such that the pipe sections are filled completely with grout. 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 grouting operations. Provide standpipes and/or additional means of visual inspection as required to determine if adequate grout material has filled the entire pipe sections.

D. All tees, crosses, and valves left in service shall be plugged and restrained.

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 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 02590 WATER SERVICES ON PRIVATE PROPERTY

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals necessary for complete installation of potable water services for and on the lots identified on the Drawings when authorized by the County and Property Owner. The Contractor shall construct water service lines on private property from the proposed County meter to a connection point within the customer's water system. In addition, the Contractor shall remove the existing water meter and box assembly and cap and abandon the existing water service at the service line, or as directed by the County. Backflow Preventers and associated Thermal Expansion Tanks and vacuum breakers on all outside hose bibbs shall be installed by the Contractor where cross connection risks are present, as required by the applicable County Ordinances and Plumbing Codes. Installation of Expansion Tanks will often require the Contractor to access inside existing buildings and coordinate work and timing with individual property owners.

1.02 GENERAL

A. The work shall include furnishing and installing a pipe, fittings, valves, and appurtenances necessary to convey water from the customer's water meter at the property line to the house service connection, including restoration of all lawns, drives, walkways, plants, customer private property, and other activities necessary to restore the site to a condition equal to or better than that which existed prior to construction. The Contractor shall carefully examine the Drawings and shall be responsible for the proper fittings of materials and equipment in each building and on each lot or site. All work shall comply with local code requirements.

B. Plumbing fixtures, devices and pipe shall be installed in such a manner to prohibit a cross connection or interconnection between a potable water supply and a polluted supply. The plumbing installation shall further prohibit the backflow of sewage, polluted water, or waste into the water supply system. The Contractor shall install vacuum breakers on all outside hose bibs where backflow preventers are required.

C. Required materials not covered by the Specifications shall meet the requirements of the local Plumbing Code, other applicable State and Local Ordinances and Codes, the AWWA, NSF, and shall conform to accepted plumbing practice.

D. The Contractor shall coordinate all work called for in the Contract Documents with the County Meter Superintendent and other involved parties, and shall establish a work plan to install the new water service lines which results in minimal impact to customer private property.

E. All work on customer service lines conducted on private property shall be performed by a plumber licensed in Manatee County and experienced in furnishing and installing potable water plumbing systems.

F. Upon completion of water service construction on private property, the Contractor shall obtain a Building Department inspection and approval to place the system into operation.

G. Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. Upon completion of all work, the fixtures, materials and equipment shall be thoroughly cleaned, adjusted and operated.

1.03 SUBMITTALS

A. The Contractor shall submit to the Engineer for review and approval in accordance with the Contract Documents: complete shop drawings, working drawings, and product data for all materials and equipment furnished under this Section. The Contractor shall meet with each property owner to coordinate the routing of the water service line on private property prior to the commencement of any work and shall document the agreed upon route on a sketch signed and dated by all parties and submit them to the Engineer.

1.04 CODES, ORDINANCES AND PERMITS

A. The Contractor shall comply with all of the laws, ordinances, and codes, rules and regulations of the local and state authorities having jurisdiction over any of the work specified herein. He shall apply and pay for all necessary permits, including Manatee County Building Permits for all lots. Up to 11 permits at $75 each may be required, with up to 10 adjacent lots on each permit.

B. If any part of the Plans and Specifications conflict with existing laws and codes, the Contractor shall call it to the Engineer's attention prior to the commencement of work.

1.05 GUARANTEE

A. The Contractor shall warrant all labor and materials free from defects for a period of one (1) year from the date of acceptance and shall, upon notification during this period, promptly repair or replace any defective items of material or equipment at no additional cost.

1.06 ACCESSIBILITY

A. The Contractor shall inform himself fully regarding the peculiarities and limitations of the space available for the installation of all material in this Contract.

B. The Contractor is responsible for obtaining access to the private properties identified on the Drawings. The County will issue notices to the Owners of the Properties requesting their cooperation with the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

A. Refer to Manatee County Utility Standards (Manual) for details. All pipe, fittings, materials, and appurtenances shall be furnished and installed to meet the requirements of this project and the requirements of the Florida Building Code - Plumbing, and Residential Chapter 29 (Water Supply & Distribution).

B. If required by site specific conditions, the Backflow Preventer, Thermal Expansion

Tank, and vacuum breakers shall be in accordance with Manatee County Utility Standards, latest edition and are subject to the approval of the Engineer.

C. Water service pipe shall be per Section 02620 of these Specifications.

D. A dielectric coupling shall be provided between ferrous and nonferrous materials.

E. The Contractor shall furnish certified statements from the manufacturer that the material conforms to the requirements specified above.

PART 3 EXECUTION

3.01 PLANNING AND COORDINATION

A. The Contractor shall coordinate with each water customer, property owner and the County Meter Superintendent to establish a reasonable plan and location for installation of each new customer water service line. The Contractor shall perform exploratory work and have all materials in hand at the commencement of construction to reduce the risk of delays in completion of the work associated with lack of materials.

B. The Contractor shall schedule the installation of the new water service lines to coordinate with the installation of the new County water line, water services and water meters as a part of this project. The Contractor shall carefully schedule the work of subcontractor licensed plumbers to ensure that customer water service disruption is minimized and is not interrupted for longer than the period specified in the Specifications. The Contractor shall schedule the inspection of the work by Manatee County Building officials as necessary to allow for timely use of the new customer service.

C. The County will provide new and/or existing water meters to the Contractor to install in proposed meter boxes. The Contractor shall remove existing meters from meter boxes as part of this Contract, return the meters to the County Meter Division, and shall verify with the County Meter Division which meters shall be reinstalled new and which will be reused. Just prior to removing an existing meter from service, the Contractor shall notify the customer, record the existing meter reading, and record the serial number prior to returning meters to the County meter division.

3.02 PRIVATE WATER SERVICE CONSTRUCTION

A. The Contractor shall install new 1 inch diameter water service lines at a location on the customer's property that is agreed to by the property owner, minimizes impact to existing site features and private property improvements and which most directly connects the new water meter location with the connection point for the customers water service.

B. The new water service connection on private property shall include new customer service line from the new meter location to the agreed upon point of connection with the customer house water service line; piping, fittings, valves, and appurtenances, excavation and backfill as required; restoration of grass, shrubs, drives, walkways, and other customer property damaged by construction and related work required to result in a new customer service line system that meets code requirements.

3.03 STERILIZATION

The entire potable water collection and distribution system shall be thoroughly sterilized with a solution of not less than 50 parts per million of available chlorine. The sterilizing solution shall be allowed to remain in the system for a period of three hours after which time all valves and faucets shall be opened and the system shall be flushed with clean water until the residual chlorine content is not greater than 0.92 parts per million, unless otherwise directed.

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 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. 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 rubber-ring compression-type push-on joint or standard mechanical joint pipe as manufactured by the American Cast Iron Pipe Company, U.S. Pipe and Foundry Company, or an approved equal.

C. All mechanical joint fittings shall be pressure rated for 350 psi for sizes 4-24 inches and 250 psi for sizes 30 inches 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.

D. Rubber gaskets shall conform to AWWA C111 for mechanical and push-on type joints and shall be Ethylene Propylene Diene Monomer (EPDM) rubber for potable water and reclaimed water pipelines. Standard gaskets shall be such as Fastite as manufactured by American Cast Iron Pipe Company, or an approved equal. 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 contaminates are found.

E. Water Main and Reclaimed Water Main Coatings: All 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 ductile iron or gray iron fittings used in water and reclaimed water systems shall have standard thickness cement linings on the inside per AWWA C104 and an asphaltic exterior coating or they shall have factory-applied fusion bonded epoxy coatings both inside and outside in accordance with AWWA C550.

F. Wastewater Main Coatings: All ductile iron pipe and fittings used in wastewater sewer systems shall have a factory applied dry film thickness 40-mil Protecto 401 or 40-mil Novocoat SP2000W amine cured novalac ceramic epoxy lining on the inside. The interior lining application is to be based on the manufacturer's recommendation for long-term exposure to raw sewage. To ensure a holiday-free lining, documentation must be provided, prior to shipment, showing each section of lined pipe has passed holiday testing at the time of production per ASTM G62. The lining shall have a minimum one year warranty covering failure of the lining and bond failure between liner and pipe.

Exterior coatings for ductile iron pipe and fittings used in wastewater systems shall be either an asphaltic coating per AWWA C151 or a factory-applied epoxy coating per AWWA C550.

G. Thrust restraint devices shall be provided at all horizontal and vertical 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 or restraining glands as manufactured by Star Pipe Products, Stargrip 3000 and 3100, Allgrip 3600, or as manufactured by EBAA Iron Sales, Megaflange, 2000 PV, 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 the bends or fittings at distances as required by these Standards. 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" diameter and above

2.02 DETECTION

A. Pipe shall have a 3-inch wide warning tape of the proper color placed directly above the pipe 12 inches below finished grade or a 6-inch warning tape between 12 inches and 24 inches below finished grade.

B. 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.

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 12 inches and smaller shall be entirely polyethylene-wrapped blue for water mains, purple (Pantone 522 C) for reclaimed water mains and green for sewer mains, per AWWA C105.

C. All ductile iron pipe greater than 12 inches shall be spiral wrapped with color coded polyethylene at a six-inch minimum spacing, If soil testing, in accordance with AWWA C105, indicates that the soil at the site is corrosive, the ductile iron pipe shall be entirely polyethylene-wrapped with color coded polyethylene.

D. Poly-wrap shall be by V-BioTM Enhanced Polyethylene Encasement (or equivalent).

E. All above ground potable water mains and appurtenances shall be painted safety blue.

END OF SECTION

SECTION 02616 DISINFECTING POTABLE WATER PIPE LINES

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and incidentals required to clean and disinfect potable water pipe lines. This work is required to place all types of pipe into service as potable water lines.

1.02 CLEANING WATER MAINS

At the conclusion of the work, the Contractor shall thoroughly clean all of the new pipes to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period per Section 02618.

1.03 DISINFECTING & BACTERIOLOGICAL TESTING OF POTABLE WATER PIPE LINES

A. All record drawing requirements must be submitted to the County prior to starting the bacteriological testing of the water lines.

B. After the new potable water pipelines have been hydrostatically tested, or after existing potable water pipelines have been modified or repaired, they shall be cleaned, disinfected and sampled and tested for the presence of coliform organisms in accordance with AWWA C651.

C. The County Inspector shall have been notified and shall be present at the time of the introduction of the chlorine disinfectant and water from the supply system into the main.

D. At the end of the chlorine contact period, the chlorine residual shall be determined by sampling and testing, and the results shall be reported to the regulatory agencies with the County and State. The pipelines shall then be flushed thoroughly with clean potable water until chlorine measurements show that the concentration is no higher than the chlorine concentration that is acceptable for domestic use.

E. Discharge flows from cleaning or flushing operations, and heavily chlorinated water from disinfecting operations, shall be disposed of in a manner consistent with US EPA, FDEP and SWFWMD regulations. Chapter 62-302 F.A.C. water quality standard for residual chlorine in Class III waters is <0.01 mg/L (ppm).

F. After final flushing and before the new main is connected to the distribution system, sampling and analysis of the replacement water shall be performed by an approved laboratory or by the Department of Health. Sampling locations shall be as required by AWWA C651 or as determined by the FDEP representative. Pipelines that are tested and return an unsatisfactory test result shall be reflushed and resampled, or redisinfected, or otherwise reconditioned, until a satisfactory result is attained.

G. No potable water main shall be placed into service until the results of the bacteriological tests are satisfactory and the FDEP has provided the County with a written letter of acceptance. Potable water services, fire service, and fire hydrant leads that are exempt from a permit from the FDEP but still require bacteriological sampling in accordance with Chapter 62-555, Florida Administrative Code, shall not be placed into service until the results of the

bacteriological tests are satisfactory and the Manatee County Public Works Engineering Department has provided written acceptance.

H. Special disinfecting procedures when approved by the County, may be used where the method outlined above is not practical.

END OF SECTION

SECTION 02617 INSTALLATION AND TESTING OF PRESSURE PIPE

PART 1 GENERAL

Reference Section 1.9, 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.

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-metalic 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

A. 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 02619 HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.01 SCOPE

The Contractor shall furnish all labor, materials, equipment and incidentals required to install all pipe, fittings and appurtenances as shown on the Drawings and specified in the Contract Documents by Horizontal Directional Drilling (HDD).

1.02 GENERAL

A. All existing structures, water and sewer lines, storm drains, utilities, driveways, sidewalks, signs, mail boxes, fences, trees, landscaping, and any other improvement or facility in the construction area that the Contractor disturbs for his own construction purposes shall be replaced to original condition at no additional cost to the County.

B. For “Navigable Waters of the U.S.” reference 33 of the Code of Federal Regulations, Part 329.

C. For “Waters of the U.S.” reference 33 of the Code of Federal Regulations, Part 323.

D. For “Waters of the State” reference Section 62-301 of the Florida Administrative Code.

1.03 TESTING

A. In place soil compaction tests shall be performed by a qualified testing laboratory.

B. Compaction tests shall be taken at every excavation, except in the road crossings or road shoulders; tests are to be taken according to current FDOT Standards.

C. All pipe shall be tested in accordance with the appropriate material specifications.

D. Reference Standards: American Society for Testing and Materials (ASTM), D1557, Moisture-Density Relations of Soils Using 10-lb. Rammer and 18-in. Drop.

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

1.04 QUALIFICATIONS

A. Pipe Manufacture: All pipe and fittings shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the items to be furnished.

B. Drilling Supervisor: The Contractor shall provide a competent boring specialist who shall remain on the project site during the entirety of the directional boring operation. This includes, but is not limited to, drilling fluid preparation, seaming, boring and pulling. The boring specialist shall have a minimum of five years of experience in supervising directional bores of similar nature, diameter, materials and lengths.

C. Pipe Fusion: All boring and fusing equipment shall be certified for operation. The Contractor responsible for thermal butt fusing pipe and fittings shall have manufacturer certification for

performing such work or a minimum of five years of experience performing this type of work. If no certification is available, written documentation of the required work experience shall be submitted for approval.

D. Drilling Fluid Specialist: The personnel responsible for supervising the supply, mixing, monitoring fluid quality, pumping and re-circulation system proposed for the drilling fluid shall have a written certification issued by the Drilling Fluid manufacturer for performing such work or a minimum of five years of experience performing this type of work. If no certification is available, written documentation of the required work experience for the proposed personnel shall be submitted for review and approval.

1.05 SUBMITTALS

A. Detailed description including specifications and catalog cuts for:

1. Shop drawings and catalog data for all HDD equipment.
2. The pipe manufacturer's maximum degree of radial bending allowed for the pipe when full and when empty and pullback force recommended setting.
3. Steering and tracking devices including specific tracer wire.
4. Drilling fluids; the drilling fluid submittal shall include the ratio of mixture to water, including any additives, based on the Contractor's field observations prior to construction, knowledge and experience with drilling in similar conditions, and any soil data provided in the Contract Documents, which shall be verified by the fluid specialist.
5. Shop drawings for the breakaway swivel, including the method of setting the swivels' break point and set point to be used.
6. Shop drawings for sizing of the mandrel for pull through testing
7. Pipe assembly procedure, details of support devices, and staging area layout including methods to avoid interference with local streets, driveways, and sidewalks.
8. Details of pipe fusion procedures and copies of the fusion technician qualification certification or documentation.
9. Drilling fluid technician qualification certification or documentation

B. If the Contractor proposes any changes to the pull-back distance or profile shown on the drawings, he may be required to submit a complete design for the proposed pipe including an analysis for pull-back forces, external loads including full hydrostatic pressure if empty, external forces due to borehole collapse, ovalization during pull-back, thermal stress while exposed to Sun-light, shortening after release of pull-back force, and tensile stress during pull-back.

C. Bore Plan: For all contiguous piping installations over 300 feet in length or any installations for piping larger than 4" in diameter, the Contractor shall submit a Bore Plan that includes the following:

1. Contact information and experience for the drilling fluid specialist.
2. The number of passes the bore will include to get the product pipe installed.
3. The pilot bore and all reaming bore sizes including the final pullback with the product pipe.
4. Drilling rod length in feet.
5. The pilot bore, pre-ream bores (if any) and pullback production rate in minutes per (drilling) rod to maintain adequate mud flow.
6. Details of the entry and exit pit locations along with entry and exit angles for the bore,

drawn to scale, depicting the position of all required equipment, access points, existing facilities to remain in place, existing traffic lanes to be maintained in operation, office trailers and storage sites.

7. The method of fusing or joining pipe of adjacent bores to ensure that the joint is on grade with the installed pipe.

D. Furnish a Bore Path Report to the County within seven days of the completion of each bore path. Data collected by the County Representative does not relieve the Contractor from the responsibility of recording his own data. Include the following in the report:

1. Location of project, project name and number
2. Name of person collecting data, including title, position and company name
3. Investigation site location (Contract plans station number or reference to a permanent structure within the project right-of-way)
4. Driller's Log & identification of the detection method used
5. Elevations and offset dimensions of installed pipe as referenced to the drawings
6. Data log of pullback force during product pipe installation
7. All failed bores. Include length of pipe left in place and explanation of failed installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Incidental materials that may or may not be used to install the product depending on field requirements are not paid for separately and will be included in the cost of the installed product.

B. Drilling Fluids shall use a mixture of bentonite clay or other approved stabilizing agent mixed with potable water with a pH of 8.5 to 10.0 to create the drilling fluid for lubrication and soil stabilization. Vary the fluid viscosity to best fit the soil conditions encountered. Contractor shall have appropriate additives for drilling fluid available for different soil conditions that may be encountered. Do not use any other chemicals or polymer surfactants in the drilling fluid without written consent from the County. Certify to the County in writing that any chemicals to be added are environmentally safe and not harmful or corrosive to the product pipe.

C. For drilling operations that will be below waters of the State of Florida, only bentonite free drilling fluids shall be used. Acceptable products are BioMax, manufactured by M-I Swaco, Inc., P.O. Box 2216, Laurel, Mississippi 39440, Phone: (800) 731-7331 or Bio-Bore, manufactured by Baroid Drilling Fluids, Inc., P.O. Box 1675, Houston, Texas 77251, Phone: (731) 987-5900 or approved equal.

D. Identify the source of water for mixing the drilling fluid. Approvals and permits are required for obtaining water from such sources as streams, rivers, ponds or fire hydrants. Any water source used other than potable water may require a pH test.

E. The tracer wire to be used for all directional drills 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.

F. Breakaway connectors shall be supplied by DCD Design & Manufacturing, Condux

International, Inc. or approved equal.

PART 3 EXECUTION

3.01 SITE CONDITIONS

A. Carry out excavation for entry, exit, recovery pits, slurry sump pits, or any other excavation as specified in the Contract documents. Sump pits are required to contain drilling fluids if vacuum devices are not operated throughout the drilling operation, unless approved by the County.

B. Within 48 hours of completing installation of the boring product, clean the work site of all excess slurry or spoils. Take responsibility for the removal and final disposition of excess slurry or spoils. Ensure that the work site is restored to pre-construction conditions or as identified on the plans.

C. Exposure of product pipe to sunlight shall be limited to 14 consecutive days unless approved by the County.

D. The pipe shall be supported at intervals along its length with rollers or Teflon pads to minimize frictional forces when being pulled, and to hold the pipe above the ground. Surface cuts or scratches greater than or equal to the maximum defect depth in 3.08 E are not acceptable.

3.02 DAMAGE RESTORATION & REMEDIATION

A. The Contractor shall take responsibility for restoration for any damage caused by heaving, settlement, separation of pavement, escaping drilling fluid (frac-out), or the directional drilling operation, at no cost to the County.

B. When required by the County, provide detailed plans which show how damage to any roadway facility will be remedied. These details will become part of the Record Drawings Package. Remediation Plans must follow the same guidelines for development and presentation of the Record Drawings. When remediation plans are required, they must be approved by the County before any work proceeds.

C. For HDD operations that will be below waters of the State of Florida, the contractor shall be responsible for any damage caused by the drilling operation, including, but not limited to, fracturing of the channel bottom. Any State or Federal required environmental cleanup due to the release of drilling fluids into State waters shall be at the Contractor's expense. The Contractor may at his own expense increase the depth of his drilling operations upon the approval from the County.

3.03 QUALIFICATIONS FOR REJECTION OF DIRECTIONAL BORE

A. The County may reject any portion of the work that is deemed to be non-responsive to the Contract requirements or not in conformance with approved plans and submittals, and for other factors including the following:

1. Failed Bore: When there is any indication that the installed product has sustained damage, stop all work, notify the County and investigate damage. The County may require a pressure and / or mandrel test at no additional cost to the County and shall

have a County representative present during the test. Perform all testing within 24 hours unless otherwise approved by the County. Furnish a copy of the test results and all bore logs to the County for review and approval. The County is allowed up to 5 working days to approve or determine if the product installation is not in compliance with the specifications.

2. Obstructions: If an obstruction is encountered during boring which prevents completion of the installation in accordance with the design location and specification, the pipe may be taken out of service and left in place at the discretion of the County.
3. Pull-back Failure: If the installed breakaway device should fail during pull back.
4. Loss of Drilling Fluids: If the drilling fluid is "lost" during the pull back of the product and cannot be regained within the required timeframe of the manufacturer or if more than a reasonable amount of fluid is used to fill an unknown void and flow cannot be regained. No pipe shall be pulled without visible flow of drilling fluid.
5. Test Failure: If the pipe shall fail a hydraulic pressure test or mandrel test as specified by the County.
6. Damaged Pipe: If at any time when the product is pulled back and any exposed areas have a greater than allowable "gouging" or visible marring of the pipe per the table in 3.08 E.
7. Alignment Tolerance Exceeded: If the vertical and horizontal limits are not within tolerances.
8. Defective Material: Any other defect in material or workmanship which would affect the quality, performance, or installation life of the installed pipeline.

B. Remediation: All rejected bores shall be at the Contractors expense to correct and provide a satisfactory installed product. The Contractor shall submit to the County a revised installation plan and procedure for approval before resuming work. The County may require non-compliant installations to be filled with excavatable flowable fill or to be completely removed at no additional cost to the County.

3.04 PRODUCT LOCATING AND TRACKING

A. The County recognizes walkover, wire line, and wire line with surface grid verification, or any other system as approved by the County, as the accepted methods of tracking directional bores. Use a locating and tracking system capable of ensuring that the proposed installation is installed as intended. The locating and tracking system must provide information on:

1. Clock and pitch information
2. Depth
3. Transmitter temperature
4. Battery status
5. Position (x,y)
6. Azimuth, where direct overhead readings (walkover) are not possible (i.e. sub aqueous)

B. Ensure proper calibration of all equipment before commencing directional drilling operation.

C. Prepare the Driller's Log. Take and record alignment readings or plot points such that elevations on top of and offset dimensions from the center of the product to a permanent fixed feature are provided. Such permanent fixed feature must have prior approval of the County. Provide elevations and dimensions at all bore alignment corrections (vertical and

horizontal) with a minimum distance between points of 10 feet. Provide a sufficient number of elevations and offset distances to accurately plot the vertical and horizontal alignment of the installed product.

D. Installation Location Tolerances:

a. It shall be the Contractors responsibility to notify the County when the pilot bore activities are taking place. The Contractor shall provide the County a printout of the completed pilot bore path for review prior to pull back of the product.

b. The location of the initial bored hole shall be deemed acceptable by the County if the deviations of the bore from the design alignment or approved adjustments do not exceed the following tolerances:

1. Profile (vertical):
   a. max. slope does not exceed 2% (2.0 feet within a length of 100 feet).
   b. No reverse curvature within 200 feet
   c. No vertical deviations greater than ten (10) percent of depth of cover over the length of the bore.

2. Alignment (horizontal:
   a. 3.0 feet within a length of 200 feet
   b. No reverse curvature
   c. Total deviation not to exceed 2.0 feet

c. If the pilot bore does deviate from the above criteria, the Contractor shall notify the County prior to pull back. The County, at its discretion, may require the Contractor to pull back and re-drill the pilot bore to correct any deviations.

3.05 PRODUCT BORE HOLE DIAMETER

Minimize potential damage from soil displacement/settlement by limiting the ratio of the bore hole to the product size. The size of the back reamer bit or pilot bit, if no back reaming is required, will be limited relative to the product diameter to be installed as follows:

Table 2-1. Recommended Relationship between Product Diameter and Reamed Diameter

Product Diameter	Reamed Diameter
< 8”	Diameter of product + 4”
8” – 24”	Diameter of product x 1.5
> 24”	Diameter of product + 12”
*Horizontal Directional Drilling Good Practices Guidelines – HDD Consortium	

3.06 EQUIPMENT REQUIREMENTS

A. The HDD equipment selected by the Contractor shall be capable of drilling, steering, tracking, reaming and installing the pipeline through all the subsurface conditions that may be present at the site.

B. Match equipment to the size of pipe being installed. Obtain the County’s approval for installations differing from the above chart. Ensure that the drill rod can meet the bend radius required for the proposed installation.

C. All HDD equipment shall have an electronic data logger to record pull back force during all pipe installations.

D. All HDD equipment that has the capability to exceed the maximum recommended pulling force shall have a breakaway swivel properly attached to the product pipe that will release if the pullback force exceeds the pipe manufacturers recommended pulling force.

3.07 THRUST / PULLBACK REQUIREMENTS

The Contractor shall provide as part of the required working drawings submittal complete data regarding the operational and maximum thrust or pulling forces to be used for the initial drill head and back-reamer installations, and the final pull-back of the pipe. Gages or other measurement tools shall be used to monitor the forces being used.

3.08 INSTALLATION PROCESS

A. Ensure adequate removal of soil cuttings and stability of the bore hole by monitoring the drilling fluids such as the pumping rate, pressures, viscosity and density during the pilot bore, back reaming and pipe installation. Relief holes can be used as necessary to relieve excess pressure down hole. Obtain the County's approval of the location and all conditions necessary to construct relief holes to ensure the proper disposition of drilling fluids is maintained and unnecessary inconvenience is minimized to other facility users.

B. The Contractor shall determine the pull-back rate in order to allow the removal of soil cuttings without building excess down-hole pressure and to avoid local heaving, or spills. Contain excess drilling fluids at entry and exit points until they are recycled and separated from excavated materials, or removed from the site or vacuumed during drilling operations. Ensure that entry and exit pits and storage tanks are of sufficient size to contain the expected return of drilling fluids and soil cuttings. The bored hole shall always be maintained full of drilling fluids for support of surfaces, and the fluid re-circulation equipment shall operate continuously until the pipe installation is completed and accepted by the County.

C. Ensure that all drilling fluids are disposed of or recycled in a manner acceptable to the appropriate local, state, or federal regulatory agencies. When drilling in suspected contaminated ground, test the drilling fluid for contamination and appropriately dispose of it. Remove any excess material upon completion of the bore. If in the drilling process it becomes evident that the soil is contaminated, contact the County immediately. Do not continue drilling without the County's approval.

D. The timing of all boring processes is critical. Install a product into a bore hole within the same day that the pre-bore is completed to ensure necessary support exists. Once pullback operations have commenced, the operation shall continue without interruption until the pipe is completely pulled into the borehole.

E. All prepared pipe that is being used for installation shall be adequately supported off the ground along the entire length to avoid damaging of the material during pullback due to ground surface conditions. Surface cuts or scratches greater than or equal to the maximum defect depth are not acceptable.

Pipe Size	Max. Defect Depth

In.	In.
4	1/16
6	1/11
8	5/32
10	3/16
12	1/4
> 12	Per Pipe Manufacturer's Recommendations

F. The drilling fluid specialist shall remain on the project site during the entirety of the directional boring operation to ensure proper mixture and production of drilling fluids needed for the bore.

G. Upon successful completion of the pilot hole, the borehole shall be reamed to a minimum of 25 percent greater than the outside diameter of the pipe being installed.

H. For bores with more than two radii of curvature (entrance and exit), the borehole should be reamed up to 50 percent larger than the outside diameter of the carrier pipe. Prereaming may be necessary dependent on size of material to be pulled.

I. Additional passes for prereaming may be required for larger pipe. Incremental increases shall be used as needed until appropriate bore hole size has been achieved.

J. Prereaming must be accomplished with no product attached to the reamer head on all bore pipe 6" and larger. The bore product maybe pulled back on final pass of prereaming upon prior approval from the County.

K. After reaming the borehole to the required diameter, the pipe shall be pulled through the hole. In front of the pipe shall be a breakaway swivel and barrel reamer to compact the borehole walls.

L. The Contractor shall not attempt to ream at a rate greater than the drilling equipment and drilling fluid system are designed to safely handle.

M. Install all piping such that their location can be readily determined by electronic designation (tracer wire) after installation.

1. For all pipe installations, externally attach two (2) tracer wires; see Section 2.01 – Materials, Part I. above, to the top of product pipe and secure in place with duct tape or 10-mil thickness polyethylene pressure sensitive tape at every joint and at 5 foot intervals.

N. Connect any break in the conductor line before construction with an electrical clamp, or solder, and coat the connection with a rubber or plastic insulator to maintain the integrity of the connection from corrosion. Clamp connections must be made of brass or copper and of the butt end type with wires secured by compression. Soldered connections must be made by tight spiral winding of each wire around the other with a finished length minimum of 3 inches overlap. Tracking conductors must extend 2 feet beyond bore termini. Test conductors for continuity. Each conductor that passes must be identified as such by removing the last 6 inches of the sheath. No deductions are allowed for failed tracking conductors. Upon completion of the directional bore, the Contractor shall demonstrate to the County that the wire is continuous and unbroken through the entire run of the pipe by

providing full signal conductivity (including splices) when energizing for the entire run in the presence of the County Representative. If the wire is broken, the Contractor shall repair or replace it at no additional cost to the County.

3.09 PIPELINE TESTING

A. HYDROSTATIC TESTING

1. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.7.

B. MANDREL DEFLECTION TESTING PROCESS

1. The deflection test for flexible pipe systems shall be performed by pulling a mandrel through the pipe line. The mandrel shall have a diameter equal to 80 percent of the inside diameter of the pipe system being tested. When the mandrel cannot be pulled through the pipe line the Contractor shall locate and correct the defect to the satisfaction of the County. After the defect is corrected and trench backfilled, the section of line shall then be retested to compliance.

2. Deflection tests shall be performed not sooner than 24 hours after completion of the pipe pull-back. The Contractor shall take measures to ensure the pipe is clean as not to interfere with the mandrel test.

3. The mandrel types that can be used are:
   a. a rigid, nonadjustable, odd number of legs (9 legs minimum), mandrel having an effective length not less than its nominal diameter; and (2) be fabricated of steel, fitted with pulling rings at each end, stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size and be furnished in a suitable carrying case labeled with the same data as stamped or engraved on the mandrel.

   b. If approved by the County, a smaller diameter piece of similar pipe material that is approximately double the nominal diameter in length and meets the 80% reduction of the inside diameter of the pipe being tested. The pipe length may need to be adjusted to ensure the pipe section cannot become skewed and become lodged; this may cause the test to fail.

4. The mandrel shall be pulled through the pipe by hand to ensure that maximum allowable deflections have not been exceeded or that “necking” has not occurred. Prior to use, the mandrel shall be inspected by County personnel. Use of an unapproved mandrel or a mandrel altered or modified after inspection will invalidate the test. If the mandrel fails to pass, the pipe will be deemed overdeflected or necked.

5. Overdeflected or necked pipe shall be abandoned and reinstalled. The replaced pipe shall be tested for deflection not sooner than 24 hours after installation.

D. The following deficiencies in the flexible pipe system installation shall be corrected by the Contractor at no cost to the County:

   1. Overdeflections
   2. Stretched or “Necked” Pipe

3. Damaged Pipe
4. Improper Pipe Welds
5. Infiltration Points
6. Debris in the line

E. The County will not accept a credit, maintenance bond, or any other form of compensation in lieu of corrective measures that may be required to correct any sections of flexible pipe system that are improperly installed or do not meet the requirements of these specifications. In addition, all corrective measures proposed by the Contractor shall be approved by the County. In addition, should repairs of the flexible pipe system be accomplished by the use of any unauthorized materials or procedure, the County will require replacement of those substandard portions or repairs made to conform to the requirements of these specifications.

END OF SECTION

SECTION 02620 POLYETHYLENE (HDPE) PIPE AND FITTING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install polyethylene pressure pipe, fittings and appurtenances as shown on the Drawings and specified in the Contract Documents and these Standards.

B. Newly installed pipe shall be kept clean and free of all foreign matter & gouges.

C. All pipe shall be correctly color coded / identified.

1.02 QUALIFICATIONS

All polyethylene pipe, fittings and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the items to be furnished.

1.03 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 polyethylene pipe and fittings.

B. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

C. The Contractor shall submit shop drawings showing installation method and the proposed method and specialized equipment to be used.

PART 2 PRODUCTS

2.01 POLYETHYLENE PRESSURE PIPE

A. Polyethylene pipe 4" diameter and larger shall be high-density bimodal PE3408/PE 100/PE4710 polyethylene resin with a minimum cell classification of 445574 per ASTM D3350, Class 160, DR 11, Performance Pipe DriscoPlex 4000, or an approved equal, meeting the requirements of AWWA C906. All pipe materials used in potable water systems shall comply with NSF Standard 61. Outside diameters of water, reclaimed water and pressure sewer HDPE pipes shall be ductile-iron sizing system (DIPS).

B. Polyethylene pipe 3 inches in diameter (for potable water and reclaimed water), and 3 inches in diameter and smaller (for wastewater grinder pump force mains) shall be high-density PE 3408 polyethylene, per ASTM D2737, Pressure Class 160, iron pipe size (IPS) outside diameter, DR 11, Performance Pipe DriscoPlex 4100 or an approved equal, meeting the requirements of ASTM D 3035 and AWWA C901.

C. Polyethylene tubing 2 inches in diameter and smaller for potable water and reclaimed water shall be high density PE 3408 polyethylene resin per ASTM D2737, Pressure Class 200,

Copper Tube Size (CTS), SDR 9, Performance Pipe DriscoPlex 5100, Endot EndoPure, Charter Plastics or an approved equal, meeting the requirements of AWWA C901. Butt fusion or CTS brass connections shall be used. All pipe materials used in potable water systems shall comply with NSF Standard 61.

2.02 JOINTS

A. Where PE pipe is joined to PE pipe, it shall be by thermal butt fusion. Thermal fusion shall be accomplished in accordance with the written instructions of the pipe manufacturer and fusion equipment supplier. The installer of the thermal butt fused PE pipe shall have received training in heat fusion pipe joining methods and shall have had experience in performing this type of work.

B. Flanged joints, mechanical joints and molded fittings for 4" and larger pipe shall be in accordance with AWWA C906. Mechanical joints and fittings for 3" and smaller pipe & tubing shall meet the requirements of: AWWA C901, ASTM D 3350 and ASTM D 3140.

2.03 DETECTION

A. Direct buried HDPE 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 HDPE 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.

2.04 IDENTIFICATION

A. Pipe shall bear identification markings in accordance with AWWA C906.

B. Pipe shall be color coded blue for water, purple (Pantone 522 C) for reclaimed water or green for pressure sewer using a solid pipe color or embedded colored stripes. Where stripes are used, there shall be a minimum of three stripes equally spaced.

PART 3 EXECUTION

3.01 INSTALLING POLYETHYLENE PRESSURE PIPE AND FITTINGS

All polyethylene pressure pipe shall be installed by direct bury, directional bore, or a method approved by the County prior to construction. If directional bore is used, or if directed by the County, the entire area of construction shall be surrounded by silt barriers during construction.

3.02 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.

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 ASTMD2241, 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 IDENTI FICATION

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 02623 POLYVINYL CHLORIDE (PVC) PIPE (GRAVITY SEWER)

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, equipment, materials, pipe and incidentals and shall construct gravity sewers, complete, as shown on the drawings and as herein specified.

B. The work shall include furnishing, laying and testing gravity sewer pipe.

1.02 SUBMITTALS DURING CONSTRUCTION

A. The Contractor shall submit prior to construction, Shop Drawings, Working Drawings and Samples for approval to the County.

B. The Contractor shall submit to the County not less than fourteen (14) calendar days after the date of the Notice to Proceed, a list of materials to be furnished, the names of suppliers and an expected schedule of delivery of materials to the site.

C. The Contractor shall furnish in duplicate to the County sworn certificates that all tests and inspections required by the Specifications under which the pipe is manufactured have been satisfied.

D. The pipe manufacturer shall inspect all pipe joints for out-of-roundness and pipe ends for squareness. The Contractor shall furnish to the County, a manufacturer's Notarized Affidavit stating all pipe meets the requirements of ASTM, ASCE, ANSI, the Contract Documents, as well as all applicable standards regarding the joint design with respect to square ends and out-of-round joint surfaces.

1.03 INSPECTION AND TESTS

A. All pipe and accessories installed under this Contract shall be inspected and tested as required by the Standard Specifications to which the material is manufactured. The pipe shall be tested at the place of manufacture or taken to an independent laboratory by the manufacturer.

B. Each length of pipe shall be subject to inspection and approval at the factory, point of delivery and site of work. Sample of pipe to be tested shall be selected at random by the County or the testing laboratory and shall be delivered by the Contractor to the testing laboratory approved by the County.

C. When the specimens tested conform to applicable standards, all pipe represented by such specimens shall be considered acceptable based on the test parameters measured. Copies of test reports shall be submitted to the County prior to the pipe installation. Acceptable pipe shall be stamped with an appropriate monogram under the supervision of the testing laboratory.

D. All pipe test specimens failing to meet the applicable standards shall be rejected. The Contractor may provide two additional test specimens from the same shipment or delivery for each failed specimen. The pipe shall be acceptable if both of these additional specimens meet the requirements of the applicable standards.

E. Pipe which has been deemed unacceptable by the County shall be removed from the work site by the Contractor and shall be replaced with acceptable pipe.

PART 2 MATERIALS

2.01 GENERAL

A. The sizes of gravity sewer pipe shall be shown on the Drawings.

B. Each length of pipe shall bear the name or trademark of the manufacturer, the location of the manufacturing plant and the class or strength classification of the pipe. The markings shall be plainly visible on the pipe barrel.

2.02 POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE

A. Polyvinyl chloride (PVC) gravity sewer pipe and fittings, 4-15 inches in diameter, shall be SDR 26, meeting the requirements of ASTM D 3034. Joining of pipe sections and fittings shall be by water-tight push-on joints using elastomeric gaskets in accordance with ASTM D 3212.

B. Polyvinyl chloride (PVC) pipe, 16-48 inches in diameter, for gravity sewers, shall be DR 25, with cast-iron (CI) outside diameter, meeting the requirements of AWWA C905.

C. All PVC sewer pipe bell ends shall be field inspected for out-of-roundness and spigot ends shall be field inspected for out-of-roundness and for squareness of the pipe end. Any materials not in conformance with the tolerances of ASTM D 3212 or AWWA C905 shall be removed from the work site.

D. All PVC sewer pipe sections shall also be field inspected for excessive cross-section deflection. Any pipe section visually found to have a pipe deflection, before installation, of 2 percent of the Base Inside Diameter or greater shall be removed from the work site. After installation and backfill, pipe deflection shall not be allowed to be 5 percent or greater of the Base Inside Diameter. Any length of pipe found installed having excessive deflection shall be dug up and either reinstalled or removed from the work site.

E. Six inch PVC fittings for sewer laterals shall also be SDR 26, molded in one piece, with elastomeric joints in accordance with ASTM D-3034. Fittings not currently available in molded form may be fabricated in accordance with ASTM D-3034 with manufacturer's standard pipe bells and gaskets.

2.03 JOINING PVC GRAVITY SEWER AND FITTING

A. The PVC joints shall be of the push-on type with a single rubber gasket conforming to ASTM F 477.

B. Wyes and riser fittings shall be gasketed connections. Rubber doughnuts are not to be used.

C. Joints between pipes of different materials shall be made using stainless steel shielded couplings (as provided by Fernco) or Protecto 401 mechanical joint connections. Metal piping shall not be threaded into plastic fittings, valves, or couplings, nor shall plastic piping be threaded into metal valves, fittings, or couplings.

2.04 INDENTIFICATION AND DETECTION

A. PVC gravity sewer pipe shall bear identification markings in accordance with ASTM D 3034 or AWWA C905.

B. PVC gravity sewer pipe shall be color-coded green using a solid pipe color pigment.

PART 3 EXECUTION

3.01 PIPE DISTRIBUTION

The Contractor shall not distribute material on the job faster than it can be used to good advantage. He shall unload pipe, which cannot be physically lifted by workers from the trucks, by a forklift or other approved means. He shall not drop pipe of any size from the bed of the truck to the ground. He shall not distribute more than one weeks supply of material in advance of laying, unless otherwise approved by the County.

3.02 PIPE PREPARATION AND HANDLING

A. The Contractor shall inspect all pipe and fittings prior to lowering them into trench. Cracked, broken, or otherwise defective materials are not acceptable and shall not be used. The Contractor shall clean the ends of the pipe thoroughly. He shall remove foreign matter and dirt from inside of pipe and keep the pipe clean during and after laying.

B. The Contractor shall use proper implements, tools and facilities for the safe and proper protection of the work. He shall lower the pipe into the trench in a manner to avoid any physical damage to the pipe, remove all damaged pipe from the job site and under no circumstances shall the pipe be dropped or dumped into trenches.

3.03 LINE AND GRADE

A. The Contractor shall not deviate more than 1/2-inch for line and 1/4-inch for grade from the line design and design grade established by the County provided that such variation does not result in a level or a reverse sloping invert. He shall measure the grade at the pipe invert and not at the top of the pipe. The Contractor shall furnish, set and control the line and grade by laser beam method. Other methods of controlling line and grade may be submitted to the County for approval if using the laser beam method proves to be impractical because of other conditions.

B. The Contractor shall use the laser beam method of maintaining line and grade. The Contractor shall submit evidence to the County that a qualified operator shall handle the equipment during the course of construction. A "Caution-Laser Light" placard shall be displayed in a conspicuous place. When "in the pipe" method is used, grade boards shall be installed for the first 50 feet of pipe. The Contractor shall check the line and grade at any additional points at which offset stakes have been placed and when requested by the County. A fan shall be provided to circulate the air if bending of the beam due to air temperature variations becomes apparent with "in the pipe" units. However excessive air velocity shall not be permitted to cause pulsating or vibrating of the beam. If, in the opinion of the County, the beam cannot be accurately controlled, this method of setting line and grade shall be discontinued. When the above ground method is used, the set-up shall be checked with the three grade boards including one set at the upstream manhole. If the laser

has a gradient indicator, two boards may be used to check the set-up. The grade board at the up-stream manhole shall be retained to check into as pipe laying progresses.

3.04 PREPARATION OF TRENCH

A. The Contractor shall provide pipe bedding material under all the pipe for the full trench width. The minimum depth of bedding material below the pipe barrel shall be as follows

Minimum Depth of

Pipe Size	Bedding Under Pipe Barrel
15" & Smaller	4 inches
18" to 36"	6 inches
42" & Large	9 inches

B. The depth of pipe bedding material under the pipe bell shall not be less than three inches under normal trench conditions.

C. The Contractor shall hand-grade bedding to proper grade ahead of the pipe laying operation. The bedding shall provide a firm, unyielding support along the entire pipe length.

D. Should the Contractor excavate the trench below the required depth for pipe bedding material placement without direction from the County, the Contractor shall fill the excess depth with pipe bedding material as specified herein to the proper subgrade.

E. The Contractor shall excavate bell holes at each joint to permit proper assembly and inspection of the entire joint.

3.05 DEWATERING

The Contractor shall prevent water from entering the trench during excavation and pipe laying operations to properly grade the bottom of the trench and allow for proper compaction of the backfill. Pipe shall not be laid in water.

3.06 LAYING AND JOINTING PIPE AND FITTINGS

A. The Contractor shall lay pipe upgrade with spigot ends pointing in direction of flow. After a section of pipe has been lowered into the prepared trench, he shall clean the end of the pipe to be joined, the inside of the joint and, if applicable, the rubber ring immediately prior to joining the pipe. The Contractor shall assemble the joint in accordance with the recommendations of the manufacturer of the type of joint used. He shall provide all special tools and appliances required for the jointing assembly.

B. The Contractor shall lay all pipe uniformly to line and grade so that the finished sewer shall present a uniform bore. Variations from line and grade in excess of the tolerances specified under LINE AND GRADE are not acceptable and the work shall be rejected.

C. The Contractor shall check the pipe for alignment and grade after the joint has been made. The pipe bedding shall form a continuous and uniform bearing and support for the pipe barrel between joints. Sufficient pressure shall be applied to the joint to assure that the joint is "home" as defined in the standard installation instructions provided by the pipe manufacturer. The Contractor shall place sufficient pipe cover material to secure the pipe

from movement prior to installing the next joint to assure proper pipe alignment and joint makeup.

D. Pipe 21" and smaller intended to be in straight alignment shall be laid so that the inside joint space does not exceed 3/8" in width. If interior joints on 24" and larger pipe laid either in straight alignment or on a curve are greater than 3/8", the Contractor shall thoroughly clean the joint surfaces and fill and seal the entire joint with premixed mortar conforming to ASTM C-387 only after the trench has been backfilled, unless otherwise approved by the County. Trowel smooth on the inside surface. Water shall not be allowed to rise in or around, or pass over any joint before it has substantially set.

E. When the Contractor lays pipe within a movable trench shield, he shall take all necessary precautions to prevent pipe joints from pulling apart when moving the shield ahead.

F. The Contractor shall prevent excavated or other foreign material from getting into the pipe during the laying operation. He shall close and lock the open end of the last laid section of pipe to prevent entry of foreign material or creep of the gasketed joints when laying operations cease, at the close of the day's work, or whenever the workers are absent from the job.

G. The Contractor shall plug or close off the pipes which are stubbed off with temporary plugs.

H. The Contractor shall take all necessary precautions to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.

I. The Contractor shall make connections of non-reinforced pipe to manholes or concrete structures, so that a standard pipe joint is located at a minimum of 18" outside the edge of structure.

J. When field cutting and/or machining the pipe is necessary, the Contractor shall use only tools and methods recommended by the pipe manufacturer and approved by the County.

K. Service lateral shall be constructed by the Contractor as shown on the standard sewer details and located approximately as shown on the Contract Drawings.

3.07 LAYING PLASTIC PIPE

A. Polyvinyl chloride (PVC) pipe shall be installed by the Contractor in accordance with the instructions of the manufacturer, as shown on the Drawings and as called out in the Contract Documents.

B. The Contractor shall lay the pipe, bedding and backfill to lines and grade shown on the Drawings and called out in the Contract Documents. Blocking under the pipe will not be permitted.

C. The Contractor shall install a green metallic tape as shown in these Standards below finish grade along the entire pipeline PVC sewer main pipe route.

D. The Contractor shall use care in the handling, storage and installation of pipe. Storage of pipe on the job site shall be done in accordance with the pipe manufacturer's recommendation.

3.08 BACKFILL IN THE PIPE ZONE

A. The pipe zone shall be considered to include the full width of the excavated trench from the bottom of the trench to a point above the top outside surface of the barrel of the pipe.

B. The Contractor shall pay particular attention to the area of the pipe zone from the flow line to the springline of the pipe to insure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of the pipe zone.

C. The Contractor shall take care to insure that the pipe does not rest directly on the bell or pipe joint, but is uniformly supported on the barrel throughout its entire length.

D. After the pipe is laid by the Contractor to line and grade, he shall place and carefully compact pipe bedding material for the full width of the trench to the springline of the pipe. He shall place the material around the pipe in 6-inch layers and thoroughly hand tamp with approved tamping sticks supplemented by "walking in" and slicing with a shovel to assure that all voids are filled.

E. The Contractor shall backfill and carefully compact the area above the pipe springline with pipe cover material to a point 12" above the top outside surface of the pipe barrel. Pipe bedding material may, at the Contractor's option, be substituted for pipe cover material.

3.09 EXCESS TRENCH WIDTH

A. Normal trench widths shall be as shown on the Drawings. If the normal trench width below the top of the pipe is exceeded for any reason, the Contractor shall furnish an adequate support for the pipe. The County may determine that the pipe being used is strong enough for the actual trench width or the Contractor may furnish a stronger pipe or a concrete cradle for approval.

B. Concrete thickness under the pipe shall be one-third of the nominal diameter of the pipe, but not less than four inches. Concrete block or brick may be used for adjusting and maintaining proper grade and elevation of pipe. After the pipe is laid to line and grade, the Contractor shall place 3,000 psi concrete under the pipe for the full width of the trench to form a cradle of the required length and thickness with the concrete brought up to a level equal to 1/4 of the inside pipe diameter below the springline of the pipe. Start and terminate the concrete cradle at the face of a pipe bell or collar. Do not encase pipe joints at the ends of the concrete cradle.

C. After the concrete has taken initial set, the Contractor shall place cover material over the concrete cradle and up to a level 12" above the pipe barrel and for the full width of the trench. Cover material shall be placed by hand or by equally careful means.

3.10 CONNECTING DISSIMILAR PIPE MATERIALS

The Contractor shall use the following method to connect dissimilar pipe materials. Use concrete closure collars only when approved by the County and then only to make connections between dissimilar pipe when standard rubber gasketed joints or shielded couplings are impracticable. Before the closure collars are poured, wash the pipe to remove all loose material and soil from the surface on which the concrete will be placed. Wet nonmetallic pipe thoroughly prior to pouring the collars. Wrap and securely fasten a light gauge of sheet metal or building-felt around the pipe to insure that no concrete shall enter

the line. Place reinforcement as shown on the plans. Make entire collar in one pour using 3,000 psi concrete and extend a minimum 12" on each side of the joint. The minimum thickness around the outside diameter of the pipe shall be 6". No collar shall be poured in water. After the collars are poured and have taken their initial set, cure by covering with well-moistened earth.

3.11 PIPE BULKHEADS

A. Connections for future sewers shall be bulkheaded by the Contractor in the following manner:

1. All wyes and bell-and-spigot pipe sewers 18" in diameter or smaller shall be bulkheaded with caps or disc stoppers with factory-fabricated resilient joints. The disk or cap shall be banded or otherwise secured to withstand all test pressures without leakage.
2. Connections 21" and 24" in diameter shall be bulkheaded with a four-inch brick wall, using clay brick or concrete brick. The wall shall be capable of withstanding all test pressures without leakage.
3. Connections 27" in diameter and larger shall be bulkheaded with an eight-inch wall, using clay brick or concrete brick. The wall shall be capable of withstanding all test pressures without leakage.

3.12 AIR TEST FOR GRAVITY SEWERS - GENERAL

A. Gravity sewers shall be required to pass the low pressure air test. All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.10.

B. Air loss rates may be measured by the County. These tests shall be performed by the Contractor under the observation of the County Inspector.

C. The groundwater height above the installed pipe shall be determined by attaching a transparent plastic tube to a pipe nipple in the manhole and using the plastic tube as a manometer. A test hole may be dug directly above the sewer main for visual inspection.

D. The ends of branches, laterals, tees, wyes and stubs included in a test section shall be plugged to prevent air leakage. All plugs shall be secured to prevent blowout due to internal pressure. A test section is defined as the length of sewer between manholes.

E. The Contractor shall repair all visible leaks in manholes and pipe, even if the leakage test requirements are met.

3.13 TELEVISION INSEPCTION OF GRAVITY SEWERS

A. TV inspection of the entire length of the inside of new gravity sewer mains shall be conducted by the Contractor. The County Inspector shall have been notified and shall be present during the TV inspection.

B. The sewer pipelines shall be thoroughly cleaned of all dirt, debris or obstructions before the TV inspection. Water shall be added to the upstream manhole until it is seen flowing from the most downstream point of the system to be inspected.

C. The TV camera shall be a self-propelled, 360 degree pan-head, high resolution, color type and shall have dual DVD recording capability. The camera shall be equipped with a depth gauge calibrated to ¼-inch increments to accurately record the depth of the water in the pipeline. A calibration report shall be submitted with each digital video disk (DVD), which shall include a drawing of the depth gauge, indicating the marks on the gauge, and what depth each mark represents.

D. The County Inspector shall be present and will observe the TV monitor along with the camera operator as the camera progresses through the pipe. All pipelines will be inspected with the camera progressing in an upstream direction when possible. The camera operator shall record the manhole numbers and the distance the camera has progressed from the downstream manhole as the inspection proceeds. The operator shall stop the progress of the camera and record the distance at all locations along the pipeline where unusual or defective features are encountered. The operator shall record the distance and depth of the water in the pipe at all locations where the depth is greater than or equal to 75% of the maximum depth as listed in the table below. The camera operator shall make records where cracked, dented or deformed pipe is found, or at joints that are not properly installed, or where infiltration is observed, or at any other abnormality or where any other defective feature is encountered.

E. Pipe grade between manholes shall not deviate by more than the maximum depth as list below from the design grade line, as measured with the television (TV) camera's depth gauge during the TV inspection, provided that such deviation does not result in a level or a reverse slope. Joint deflection and longitudinal pipe deflection between manholes that exceeds the maximum depth or more than two deflections that exceed 75% of the maximum depth, as measured with the television camera's depth gauge during the TV inspection, shall not be accepted.

	Water Holding Depth (inches)	
Pipe Sizes		Maximum
8 inch to 15 inch		1.00
18 inch to 21 inch		2.00
24 inch and greater		2.50

F. At the end of the inspections, or at the end of the day, one original digital video disk (DVD) of the TV record shall be submitted to the County Inspector along with the written inspection report and depth gauge calibration for evaluation. The County's representative shall be the sole judge of whether any information imparted by the TV test DVD will cause the County to accept or reject the pipe test section.

3.14 PIPE RING DEFLECTION TESTING OF GRAVITY SEWERS (MANDREL)

A. The Contractor shall perform a pipe ring deflection test on all new gravity sanitary sewer mains. The rigid ball or mandrel used for the ring deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe depending on which is specified in the ASTM C 3034, to which the pipe is manufactured. The test shall be performed without mechanical pulling devices.

B. The allowable ring deflection is 5 percent of the inside pipe diameter. Pipes that have a ring deflection that exceeds this amount shall not be accepted.

3.15 FINAL SEWER CLEANING

A. Prior to final acceptance and final manhole-to-manhole inspection of the sewer system by the County, the Contractor shall flush and clean all parts of the system, remove all accumulated construction debris, rocks, gravel, sand, silt and other foreign material from the sewer system at or near the closest downstream manhole.

B. During the final manhole-to-manhole inspection of the sewer system, the County may require the Contractor to reflush and clean any section or portion of the line if any foreign matter is still present in the system.

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 stainless steel. Thrust collar tie-rod bolts shall be stainless steel. All MJ-type underground bolts, nuts, and washers shall be COR-TEN or 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 and Plain End 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 14 inches in diameter shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 or 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 stainless steel stem to eliminate lead content. All bolts, nuts and washers shall be 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 Bermad 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 XPII, 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. Plug valves shall be Kennedy or Dezurik.

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 Protecto 401 or amine-cured novolac ceramic epoxy or another 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 Limitorque 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 for sewer applications, Fig-920 for water and reclaimed water application, 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 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-25025 (Saddle)
Copper	Flare x AWWA Taper Thread	B-25000 (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 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.

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-2600-6-01 (sewer), No. A-2602-6-01 (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, extended bronze or stainless steel hinge pins and 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 blocks or by other mechanical methods, including tie rods, Stargrip and Allgrip, as manufactured by Star Pipe Products or Megaflange and 2000 PV, as manufactured by EBAA Iron Sales. Flanged joints may be used above ground.

B. All T-bolts, bolts, nuts, washers, and all thread rods shall meet ASTM A-588 requirements (Cor-ten or equivalent) “weathering steel” or be 316 stainless steel. The use of rebar with welded thread is prohibited.

A certification from the supplier shall be provided to the County during the shop drawing review process ensuring all T-bolts, bolts, nuts, washers, and all thread rods meet the A-588 requirements and shall state the project name and contractor in the certification letter. If stainless steel is to be used, no certification letter is required.

C. Restrained joints may also be Lok-Ring, as manufactured by American Cast Iron Pipe Company, or an approved equal.

D. 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 be stainless steel, seal to the pipe by the use of a gasket compounded for water or sewer, 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; Romac SST III or Romac SST-H.

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 high strength, low alloy Corten or 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 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 safety blue.

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 02720 SANITARY SEWER BYPASS PUMPING

PART 1 GENERAL

1.01 SCOPE

The Contractor shall furnish all labor, materials, equipment and incidentals required to maintain existing and anticipated flows within the affected portion of the collection system throughout the construction period.

1.02 PUBLIC IMPACTS

The contractor shall not create a public nuisance due to excessive noise or dust, nor impact the public with flooding of adjacent lands, discharge of raw sewage, or release of other potential hazards, nor shall he encroach on or limit access to adjacent lands. No extra charge may be made for increased costs to the contractor due to any of the above.

1.03 SUBMITTALS

A. The Contractor shall, within 30 days of the date of the Notice to Proceed, submit to the Project Manager a detailed Pumping Plan for each site by-pass pumping will be needed. The Pumping Plan shall address all measures and systems to prevent a sanitary sewer overflow (SSO) as defined by the EPA. The Plan shall include as a minimum:

1. Working drawings and sketches showing work location, pump location, piping layout & routing. Show all proposed encroachment and access impacts on adjacent properties or facilities.
2. Pump, control, alarm and pipe specifications or catalog cuts. Detailed sketch of controls and alarm system.
3. Power requirements and details on methods to provide by-pass power or fueling.
4. Calculation and determination of response times to prevent an SSO after a high water alarm. If anticipated peak flows are 750 G.P.M. or greater, an operator is required on site at all times pump is in service. If the anticipated peak flows are less than 750 G.P.M. an operator may not be required to be on site at all times; show operator on-site schedule.
5. Procedures to be taken in case of power, pump, or piping failures; including contact names and numbers for emergency notifications.
6. Frequency and specific responsibility for monitoring pump operation, fuel levels, pump maintenance and entire length of piping.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Pumps:

1. By-pass pumping system shall consist of at least a primary pump and a backup pump. Each pump shall have a minimum pumping capacity of 100% of the anticipated peak flows. When bypassing a pump station, 100% of the lift station capacity (G.P.M. & T.D.H) shall be provided.
2. Pumps shall be low noise or sound attenuated. The noise level at any operating

condition, in any direction, shall not exceed 70dBA at a distance of twenty three (23) feet (7 meters) from the pump and/or power source.

B. Controls:

The by-pass pump system shall be equipped with automatic controls and an alarm system. The automatic controls will automatically start the backup pump in the event of a high water condition or failure of the primary pump. The alarm system will immediately notify the Contractor of a pump failure or high water condition.

C. Pipe:

Pipe shall be of adequate size and capacity to match the pumps. Pipe type and materials will depend on the particulars of the site conditions, and shall be detailed in the Pumping Plan. Contractor will provide all connections.

PART 3 EXECUTION

3.01 SITE CONDITIONS

Site conditions will vary by site. Contractor is responsible to determine and address requirements such as traffic control, excavation, connections & fittings, impacts on access to adjacent properties, routing and support of by-pass piping, etc., in the Pumping Plan.

3.02 ON-SITE MONITORING

A. All by-pass operations where the anticipated flow rates are 750 G.P.M or greater shall require an employee on-site at all times (full-time on-site monitoring attended by personnel experienced with the pumps and controls, with demonstrated ability to monitor, turn on & off, and switch between pumps while the by-pass pump system is in service.

B. By-pass operations where the anticipated flow rates are less than 750 G.P.M may not require an employee on-site at all times while the by-pass pump system is in operation. The Contractor shall have personnel experienced with the pumps and controls on site within the calculated response time to prevent an SSO after a high water alarm.

C. During by-pass operations, the Contractor shall have posted on site with the permit, a copy of the approved Plan and the name and 24 hour contact number of the primary response person, the job site superintendent, and the construction company owner.

3.03 OPERATIONS

A. The Contractor is responsible for securing and providing power, fuel, site security, traffic control and all other supplies, materials and permits required for the by-pass pumping.

B. Contractor shall demonstrate automatic pump switching and alarm system to the satisfaction of: the County inspector, Project Manager, or Lift Stations Superintendent prior to beginning by-pass pumping. Satisfactory demonstration shall be documented by the inspector's, PM's or Lift Station Superintendent's dated signature on the posted copy of the approved Pumping Plan.

3.04 DAMAGE RESTORATION & REMEDIATION

A. The Contractor shall be responsible for any pre-pump notifications, all restoration of pre-pump conditions and any damage caused by by-pass operations.

B. Should there be an SSO caused by or as a direct result of the by-pass pumping, the contractor is responsible for all immediate & long term response, notifications, clean up, mitigation, etc. Copies of all written response plans, notifications, documentation, mitigation plans, etc., shall be submitted to the County Project Manager.

END OF SECTION

DIVISION 3 CONCRETE

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: +l in.
   b. Depth of truss bars: +0, -1/2 in.
   c. Stirrups, ties and spirals: $\pm$1/4 in.
   d. All other bends: $\pm$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". Through bolts 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 03410 PRECAST 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	± 3/8"
Inside Diameter	± 3/8"
Outside Diameter	± 1/2"
Height or Length	± 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 RESIL IENT 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 WETWEL L JOINTS

A. Joints between manhole sections and wetwell 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 wetwells 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 WE TWEL L S WITH PROTECTIVE LINERS

A. Drop manholes, manholes with opposing flows, manholes immediately upstream of a lift station wetwell, 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 wetwells 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 wetwells 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 CONCRE TE MANHOLE INSTALLATION

A. Manholes shall be installed at the end of each line; at al 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 nt 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:

Time of Test in Seconds			
Depth Feet	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

SPECIAL PROVISIONS

Section **Page**

SPECIAL PROVISIONS

GENERAL

This Section amends, enhances or otherwise revises the Technical Specifications.

STANDARD SPECIFICATIONS

The standard Specifications to be used for this work shall be Division II and III of the Florida Department of Transportation (FDOT) *Standard Specifications for Road and Bridge Construction*, 2020, (Jan.) Edition and all Supplemental Specifications thereto, hereinafter referred to as the *Standard Specifications*, for roadway construction, except as amended under this Contract, or as noted on the construction plans meeting the Manatee County Highway, Traffic & Stormwater Standards (dated June 2015).

The Contractor's work shall follow the Manatee County Public Works Utility Standards (dated June 2015) and Specifications (dated May 2019) for all utility work, Bid Form pay items U1 thru U49.

These specifications cover the usual construction requirements for work specified by the County Public Works Department; however, in the event it is determined that the specific work to be done is of such a nature that the method of construction, type and/or kind of material is not defined by the *Standard Specifications*, such work shall be performed in accordance with the Special Provisions.

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. Interpretation of these specifications shall be made upon that basis.

PRIORITY

In any instance where there is an apparent conflict between these technical specifications, special provisions and the corresponding terms of the "Standard Specifications", these special provisions followed by these technical specifications shall be controlling.

NO SEPARATE PAYMENT FOR SPECIAL PROVISIONS

No separate payment will be made for the Contractor to execute Special Provisions. All expenses borne by the Contractor shall be included in the individual unit prices for the particular pay item.

MATERIALS

a. **Delivery Tickets**: It will be necessary to submit a copy of all delivery tickets for materials used on the project, regardless of the basis of payment.

b. **Job Mix Formula for Asphaltic Concrete**: Attention is directed to the requirement that job mix formulas for asphaltic concrete, of the type specified, be submitted at least 14 days before plant operations begin. The submitted formula should be derived, or approved, by the laboratory approved by the Owner and/or its agents. Costs for such job mix formulation will be paid by the Contractor directly to the assigned laboratory.

c. **Job Mix Formula for Portland Cement Concrete**: Attention is directed to the requirement that job mix design formulas for all Portland Cement Concrete, of the type specified, be submitted at least 14 days prior to use on the project. The submitted formulas shall be derived or approved by the Owner and/or its agents. All concrete mix designs shall meet FDOT Concrete Class mix guidelines, except as follows: when approved, in writing by the Engineer, an Alternate Class I Concrete mix design formula, for concrete curb and gutter to be placed by automated curb machines, may show, as a substitution for #57 aggregate, an amount of #89 aggregate not to exceed 33 percent, by weight, of the #57 aggregate.

LABORATORY TESTING

Testing for the Work shall be performed at no expense to the Contractor. However, any test that fails or is not performed, as a result of the Contractor's action will, in turn, be back charged to the Contractor, including the cost of all re-testing due to defective materials or construction. The testing laboratory shall be approved by the County.

The samples and tests used for determining the quality and acceptability of the materials and workmanship, which have been or are to be incorporated in the Work, shall conform to the requirements of the State of Florida Department of Transportation Materials Sampling, Testing and Reporting Guide, latest edition.

Testing shall also be in accordance with the applicable portions of the *FDOT Standard Specifications* and these specifications.

MEASUREMENT AND PAYMENT

a. All work completed under the terms of this contract shall be measured according to United States Standard Measures.

b. All measurements shall be taken horizontally or vertically unless specifically provided otherwise.

c. No payment will be made for construction over a greater area than authorized, nor for material moved from outside of stakes and data shown on the plans, except when such work is performed upon instructions of the Engineer.

d. The Contractor shall accept compensation provided under the terms of this contract as full payment for furnishing all materials and for performing all work contemplated and embraced under this contract. Such compensation shall also be for any and all loss or damage arising out of the nature of the work or from the action of the elements, or from any unforeseen difficulties or obstructions encountered during the contract period until final acceptance by the Owner.

- Whenever any change, or combination of changes, on the plans results in an increase or decrease in the original contract quantities, and the work added or decreased/eliminated is of the same general character as that called for on the plans, the Contractor shall accept payment in full at the original contract unit prices for the actual quantity of work performed, with no allowance for any loss of anticipated profits.

f. It is the Contractor's responsibility to perform a detailed quantity take-off from the plans to determine actual quantities for ordering and delivery purposes. The Owner will not be responsible for quantities ordered in excess of those installed and constructed. The Contractor should be aware that some of the pay items may have contingency quantities. Payment shall be made only for final in-place quantities.

   No payment shall be made for contingency quantities or additional work unless otherwise directed and approved in writing by the Engineer.

g. Bid Schedule Completion - the blank spaces in the bid schedule shall be filled in correctly where indicated for each and every item for which a description is given, as the bidder must state the unit prices for which he proposes to do each part of the work contemplated, and the total price for all the parts included in any or all of the combinations of the work. In case of a discrepancy, the written words for "unit price", where stated, shall be considered as being the unit price. If the bid schedule does not use the written words for the unit price, then the numerically correct "total price", shall be considered as being the total price.

RESTORATION

Payment for restoration shall be covered under the applicable restoration Pay Items as specified in the proposal. If a specific restoration Pay Item is not listed in the proposal, the cost of such work shall be included in the applicable Pay Item unless otherwise provided under separate restoration section or pay quantity of these Specifications.

COOPERATION WITH OTHERS

The Contractor shall cooperate with the owners of any underground or overhead utility lines in their removal and rearrangement operations, in order that these operations may progress in a reasonable manner and that service rendered by these parties will not be interrupted. The Owner shall not be responsible for costs associated with delays, disruptions and remobilizations attributed to utility agency scheduling.

SITE INVESTIGATION

The Contractor acknowledges that he has satisfied himself as to the nature and location of the work; the general and local conditions, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials; availability of labor, water, electric power, roads; and uncertainties of weather, water stages, tides or similar physical conditions at the site; the conformation and conditions of the ground; the character of equipment and facilities needed preliminary to and during prosecution of the work.

The Contractor further acknowledges that he has satisfied himself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered, insofar as this information presented by the drawings and Specifications made a part of this contract.

The Contractor shall carefully review and adhere to conditions and recommendations made in the project geotechnical report.

Any failure by the Contractor to acquaint himself with the available information will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the work.

The Owner assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis of the information made available by the Owner. The Owner also assumes no responsibility for any understanding or representations made by its officers or agents during or prior to the execution of this Contract, unless (1) such understanding or interpretations are made in writing by the Engineer or are expressly stated in the Contract and (2) the Contract expressly provides that the responsibility therefore is assumed by the Owner.

PROJECT SCHEDULE

The Contractor shall submit a detailed Critical Path Method (CPM) construction schedule within 15 days of the notification of award or its intent for the County to review. The submittal shall meet the following requirements:

- Schedule will be submitted on 11-inch by 17-inch paper.
- The time scale (horizontal) shall be in weeks. The activities shall be listed on the left hand side (vertical).
- Activities shall show most Work activities. The listing from top to bottom shall be in a logical sequence of how the Work will be accomplished. Space shall be provided between activities or within bars to allow for marking of actual progress.

A copy of the CPM schedule, clearly showing progress made, shall be submitted on a monthly basis during the progress of the work at the monthly meeting. Review or acceptance will neither impose on the County responsibility for the progress or scheduling of the Work, nor relieve the Contractor from full responsibility, therefore.

The Contractor shall provide a revised CPM schedule if, at any time, the County considers the completion date to be in jeopardy because of "activities behind schedule". An activity that cannot be completed by its original or latest completion date shall be deemed to be behind schedule. The revised CPM schedule is designed to show how the Contractor intends to accomplish the Work to meet the contractual completion date. The form and method employed by the Contractor shall be the same as for the original CPM schedule. The cost to prepare and revise the schedule is considered incidental to the Work.

PROJECT IDENTIFICATION SIGNS

The Contractor shall be responsible for furnishing, installing and maintaining two (2) County project identification signs and removal of same upon completion of the construction. Project identification sign shall be constructed and maintained at the project site as directed by the Owner. The Contractor shall erect, maintain and relocate the sign as directed for the duration of the Project.

The Contractor shall mount the sign using 4-inch pressure treated lumber or as approved by the Engineer, and other supports as required, at a location mutually agreed by the Engineer and the Contractor.

The identification signs shall not be less than 32 square feet in area. The Contractor shall coordinate with the Owner for the sign verbiage before fabrication. The signs shall be painted with graphic content to include:

- Title of Project
- Name of Owner
- Names and Titles of authorities, as directed by Owner
- Prime Contractor
- Construction Cost

The signs shall be erected prior to commencement of work at a lighted location of high public visibility, adjacent to the main entrance at each end of the project, as approved by the Engineer and Owner.

The signs shall be a minimum of 8 feet wide and 4 feet high. The signs shall be constructed of high density ¾-inch exterior plywood without waves or buckles, mounted and braced with pressure treated lumber as necessary and maintained in a presentable condition for the duration of the project. Hardware shall be galvanized. The surface of the sign shall be of exterior softwood plywood with medium density overlay.

Painting shall be constructed with materials to resist weathering and fading during the construction period. Experienced professionals shall perform painting. Graphic design and style shall be in accordance with the following:

- The signs will be placed in accordance with Manatee County Development Code, Ordinance 90-01, Section 724, Signs and Section 713, Visibility Triangles.

Payment for installing and maintaining the project identification signs shall be included as part of the lump sum quantity under Pay Item Number 1 (101-1) for Mobilization. The sign will remain the property of the Owner upon completion of the Project unless otherwise directed.

PROJECT NAME

Board of County Commissioners

BETSY BENAC
CHAIRMAN

STEPHEN JONSSON	REGGIE BELLAMY
CAROL WHITMORE	VANESSA BAUGH
MISTY SERVIA	PRISCILLA TRACE
CONSTRUCTION COST $ (Enter Amount)	PRIME CONTRACTOR (Enter Contractor Name)

SOIL EROSION AND SILTATION

The Contractor shall plan and control the Work to minimize all soil erosion and the siltation of drains and canals resulting from such erosion.

At the pre-construction meeting, the Contractor shall present his proposed plan and schedule, which shall specifically indicate the proposed usage of temporary erosion control features. The plan shall include:

- **Synthetic Bales, Baled hay and straw barriers** designed, furnished and installed by the Contractor in accordance with the plans, and FDOT Specifications Section 104.

- **Floating turbidity barriers and staked turbidity barriers** furnished and installed by the Contractor as shown on the plans and/or required by conditions of the permits and as outlined in FDOT Specifications Section 104.

SHOP DRAWINGS

The Contractor shall submit to the Engineer for approval, all working drawings and shop drawings with descriptive specifications and engineering calculations necessary for the successful completion of the Work. The shop drawing shall be submitted in pdf format, along with a submittal log, and the number of the submittals should follow the number on the submittal log. Each shop drawing shall have a cover sheet and reference the submittal log number, following the sample format provided in the contact documents.

The working and shop drawings shall be certified by a Florida licensed Professional Engineer and state that the design is sufficient for the successful completion of the Work. The working drawings and shop drawings shall include, but not be limited to:

- Traffic Control Plan
- Erosion Control Plan
- Shop Drawings as required by FDOT Standard Specifications

The Contractor is responsible for maintaining a Submittal Activity Record (Logbook) on this project. The Contractor shall submit all shop drawings to the Roadway Engineer of Record for processing to the appropriate Area of Practice EOR for review. The Area of Practice EOR will complete the review and return the shop drawing to the Roadway Engineer of Record for logging and processing back to the Contractor and to the County Representative.

The logbook shall be updated each time when any Shop Drawing submittal activity occurs.

The following minimum data shall be entered in the logbook for each submittal:

County Project Number
Submittal Number
Description of Submittal
Number of Sheets in the Submittal
Number of Pages of Calculations, in Reports, in Manuals, etc.
Date Transmitted by Contractor to the Roadway Engineer of Record
Date Transmitted by Roadway EOR to the Area of Practice EOR
Date Roadway EOR Receives Shop Drawing Back From Area of Practice EOR
Date Roadway EOR Sends Shop Drawing Back to Contractor

Disposition as either "A" (Approved), "AN" (Approved as Noted), "R" (Resubmit) or "NA" (Not Approved).

The Logbook is a historical record of the activity devoted to an individual submittal as well as that for the project as a whole. It can serve as a verification of review time, to respond to inquiries of a particular submittal's status and as a record of manpower effort to aid in estimating and allocating future workload.

SUBSOIL EXCAVATION

The contractor shall detect and remove all unsuitable material, such as plastic/organic soil, rock, hard plane, debris and trash, within project limit, following FDOT Design Standard Index 500, latest version. Payment for subsoil excavation shall be included in the subsoil excavation pay items.

DEWATERING, SHEETING AND BRACING

The contractor shall determine the need of dewatering, sheeting and bracing to facilitate the construction, conforming to current SWFWMD/FDEP rule and OSHA safety criteria. Payment for dewatering, sheeting and bracing shall be included in the applicable item for earthwork, unless separate pay items are specified.

Approval of Dewatering Plan:
At least 10 days prior to the commencement of any dewatering activity, the Contractor shall obtain the approval from SWFMWD, or FDEP (if water needs to be discharged offsite into the state surface water), and submit the permit with a detailed description of the proposed dewatering system to the Project Manager. The dewatering plan shall include design computations, layout, type, and spacing of dewatering devices, number and size of pumps and other equipment, with a description of the installation and operating procedures.

EARTHWORK

Quantities included on cross-section sheets, if any, represent estimated in-place quantities and do not include shrinkage and expansion factors. The quantities were calculated by the method with average end areas between the station-to-station limits. Payment for Earthwork shall be made based on average end area method calculations. Contractor shall provide supporting survey data (before and after cross-sections) and calculations for payment purposes

TEMPORARY PAVEMENT

Temporary pavement shall consist of a minimum of Optional Base Group 4 and one (1) inch of Type SP structural course (Traffic C) over a firm, unyielding, well-compacted subgrade. The Contractor shall immediately repair all potholes that develop within the project limits and shall maintain a supply of cold mix on the project site to expedite these repairs.

The Temporary by-pass road shall provide adequate cover and protection of existing utilities. It is the Contractor’s responsibility to coordinate with utility companies to repair any damages to the exiting utilities during the construction at no additional cost to the County.

Payment for the temporary pavement and maintenance of this pavement shall be included under Maintenance of Traffic.

MAINTENANCE OF TRAFFIC

The Contractor shall provide access to local businesses and residents at all times. No road closures will be allowed between the hours of 6AM to 7PM. Temporary by-pass lanes may be constructed at all tie-in locations during the MOT phasing. The payment for temporary by-pass lanes shall be included in Maintenance of Traffic. Business Entrance signs per FDOT Index 17355 (FTP-59) shall be placed at all business entrance points and maintained during all phases of construction. Payment for these items shall be included under the pay item for Maintenance of Traffic.

Temporary pavement marking shall be paid under Maintenance of Traffic. Temporary Striping and Marking during 30-day cure time of the asphalt shall be part of the pay item for Maintenance of Traffic, in accordance with Section 102-1, FDOT Specifications 2020 (Jan.).

The Contractor shall prepare a Maintenance of Traffic plan and submit it to the Project Manager for review prior to implementation. It must comply with all FDOT safety criteria, FDOT Design Standards 600 Series Indexes, FHWA and MUTCD standards, and allow for traffic to operate in daytime or nighttime. The Maintenance of Traffic Plan will require the seal of a Florida licensed Professional Engineer with a current FDOT Advance Work Zone certification if any change is made to the FDOT Index 600 Series. No road closures will be allowed without approval from the Project Manager.

STORMWATER DRAINAGE PIPES AND STRUCTURES

All proposed storm structure shall have a wall thickness no less than 6 inch.
Metal storm pipe or metal mitered end section shall not be used in the road right of way or carry right of way runoff.

MAINTENANCE OF STORM DRAINAGE SYSTEM

The Contractor shall be responsible at all times to maintain the operation of existing stormwater facilities, or, when existing stormwater facilities are removed, to provide equivalent capacity alternate forms of stormwater removal adequate to prevent upstream flooding in excess of existing conditions. This responsibility shall include the installation of temporary connections, bypass pumping, or other temporary means necessary until the new drainage system is fully operational. Payment for these items shall be included under the applicable pay item for new storm systems.

POST-CONSTRUCTION STORM PIPE TESTING

The Contractor shall inspect and televise all newly constructed storm pipes on the project. Video DVD and report shall be provided for those pipes whose diameters are equal or smaller than 48 in, with Laser profile data included for non-RCP pipes, following FDOT Specifications latest version. The purpose is to assure the pipes are properly constructed and do not leak at the joints. Payment for this item shall be included under the pay item for Mobilization.

DUST CONTROL

The Contractor shall control dust resulting from construction operations at all times. The locations and frequencies of applications shall be as directed by the Engineer. Contractor shall provide dust control measures using water sources as needed and maintaining dust control throughout duration of the project. Payment for Dust Control shall be made under Maintenance of Traffic unless separate pay item for Dust Control is specified.

UNDERGROUND UTILITY LOCATIONS

The Contractor shall field verify existing underground utility locations by means of subsurface locating or other approved method. All existing utilities shall remain unless otherwise noted on the plans. The Contractor shall locate all existing utilities to remain at potential conflict locations prior to construction activities and before ordering any proposed structures. The Contractor shall contact and coordinate with "Sunshine State One Call 811" as well as the individual utilities prior to and during construction for utility locations, relocation and assistance while installing in potential conflict areas. All utility coordination and relocations shall be factored into the Contractor's construction schedule at no additional cost to the Owner.

The cost of all labor, materials and incidentals required for the performance of any survey and utility location work shall be included under the pay item for Mobilization. A Florida registered land surveyor shall perform all survey work.

UTILITY COORDINATION

The Contractor shall be responsible for coordination of the work with all affected utility owners. The Contractor must take into consideration the required utility adjustments and relocations in development of his schedule for completing the work including construction of temporary work to allow phased construction of the permanent facilities.

The Contractor shall coordinate and schedule utility relocations and/or adjustments with the utility owners along the project in order to avoid delays. The work includes remobilization if required after utility relocation is complete. The intent is to coordinate utility construction activities, so the project construction continues and is not stopped or delayed at any time due to utility work being done. Once Notice to Proceed is issued, the Contractor shall contact the affected utilities to discuss the Contractor's anticipated means and methods so temporary and permanent relocation plans can be implemented as needed to meet OSHA safety requirements.

The Contractor shall hold a utility owners meeting every two weeks / or alternate time schedule agreed to by the Owner at 1022 26th Avenue East. The meeting shall review current and upcoming activities for the project. Written meeting minutes will be prepared by the Contractor and distributed to the meeting participants within 3 calendar days of the meeting.

UTILITY CONFLICTS

It shall be the Contractor's responsibility to avoid conflicts with other utilities. The Owner will not be responsible for additional costs incurred by the Contractor for incorrect installations, relocations and breaks due to service conflicts.

The contractor's equipment shall maintain a minimum clearance distance to the power line (10 feet for voltage up to 50kv, 15 feet for voltage over 50kv to 200kv, 20 feet for voltage over 200kv to 350kv, 25 feet for voltage over 350kv to 500kv, 35 feet for voltage over 500kv to 750kv, 45 feet for voltage over 750kv to 1,000kv.), following new OSHA Rule (29 CFR Part 1926) and FDOT Roadway Design Bulletin 11-03 DCE Memorandum 02-11.

DAILY CLEAN-UP REQUIREMENTS

The Contractor shall clean up the job site at the end of each workday. Clean up will include the elimination of rubble and waste material on public and private property. Driveways shall remain accessible by residents. Each Friday, the Contractor shall prepare the road surface and barricades in an acceptable manner for weekend traffic use.

MAINTENANCE AND RESTORATION OF JOB SITE

The Contractor shall conduct his operations in such a manner as will result in a minimum of inconvenience to occupants of adjacent homes and business establishments and shall provide temporary access as directed or as may be required by the Project Manager. All final restoration must be performed to an equal or better condition than that which existed prior to construction.

Good housekeeping on this project is extremely important and the Contractor will be responsible for keeping the construction site neat and clean, with debris being removed daily as the work progresses or as otherwise directed by the Project Manager. Good housekeeping at the job site shall include: Removing all tools and temporary structures, dirt, rubbish, etc.; hauling all excess dirt, rock, etc., from excavations to a dump provided by the Contractor; and all clean up shall be accomplished to the satisfaction of the Project Manager. Dust will be controlled daily as may be required. Immediately after construction completion in an area or part thereof (including restoration), barricades, construction equipment and surplus and discarded materials shall be removed by the Contractor.

In the event that the timely clean up and restoration of the job site is not accomplished to the satisfaction of the Project Manager, the Project Manager shall make arrangements to affect the necessary clean up by others. The Contractor shall be charged for these costs through deductions in payment due the contractor. If such action becomes necessary on the part of and in the opinion of the Project Manager, the Owner shall not be responsible for the inadvertent removal from the work site of materials which the Contractor would not normally have disposed of had he affected the required clean up.

NOTICE AND SERVICE THEREOF

All notices, which shall include demands, instructions, requests, approvals, and claims shall be in writing. Any notice to or demand upon the Contractor shall be sufficiently given if delivered to the office of the Contractor specified in the bid (or to such other office as the Contractor may, from time to time, designate to the Owner in writing), or if deposited in the United States mail in a sealed, postage prepaid envelope, or delivered, with charges prepaid, sent via fax transmission, or to any telegraph company for transmission, in each case addressed to such office.

All notices required to be hand delivered to the Owner, unless otherwise specified in writing to the Contractor, shall be delivered to the Project Manager, and any notice to or demand upon the Owner shall be sufficiently given as delivered to the office of the Project Manager, or if deposited in the United States mail in a sealed, postage prepaid envelope, sent via fax transmission, or delivered with charges prepaid to any telegraph company for transmission, in each case addressed to said Project Manager or to such other representative of the Owner or to such other address as the Owner may subsequently specify in writing to the Contractor for such purposes.

Any such notice or demand shall be deemed to have been given or made as of the time of actual delivery or (in the case of mailing) when the same should have been received in due course of post or in the case of a fax transmission or telegram at the time of actual receipt, as the case may be.

REQUIREMENTS FOR CONTROL OF THE WORK

Prior to the start of the Work described in this contract, a pre-construction conference may be held by the Project Manager to be attended by the Contractor and representatives of the various utilities and others as required, for the purpose of establishing a schedule of operations which will coordinate the work to be done under this contract with all related work to be done by others within the limits of the project.

All items of work in this contract shall be coordinated so that progress of each related item will be continuous from week to week. The progress of the work will be reviewed by the Project Manager at the end of each week, and if the progress of any item of work during that week is found to be unsatisfactory, the Contractor shall be required to adjust the rate of progress on that item or other items as directed by the Project Manager without additional compensation. The Contractor will continuously control the work until completed.

USE OF PRIVATE PROPERTY

All construction activities required to complete this project in accordance with the Contract Documents shall be confined to public right-of-way, easements of record or temporary construction easements, unless the Contractor makes specific arrangements with private property owners for his use of their property. Written authorization from the granting property owner shall be placed on file with the Project Manager prior to utilization of said private properties. The Owner assumes no responsibility for damage to private property in such instances. The Contractor is responsible for protection of private property abutting all work areas on this project. Adequate equipment storage and material storage shall also be accomplished outside the Owner's right-of-way. Pipe and other materials shall not be strung out along the right-of-way but will be delivered in quantities adequate for one day's installation. The Owner will coordinate with the Contractor to identify possible storage sites.

CONSTRUCTION PHOTOGRAPHY

General

The Contractor shall employ a competent photographer to take construction record photographs and perform videotaping, including providing all labor, materials, equipment and incidentals necessary to obtain photographs and/or videotapes of all areas specified in the Contract specifications.

The word "Photograph" includes standard photographic methods involving negatives, prints and slides and it also includes digital photographic methods involving computer technology items such as diskettes and CD-ROMs.

Qualifications
A competent camera operator who is fully experienced and qualified with the specified equipment shall do all photography.

For the videotape 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 to be easily understood.

General
The Contractor shall employ a competent photographer to take construction record digital photos and perform video recording, including providing all labor, materials, equipment and incidentals necessary to obtain photos and/or video recordings of all areas within the project limits or as otherwise specified in the Contract specifications.

The word "Photo" includes standard photographic methods involving digital photography and production of hard copies for photos and saving photos as jpg files on diskettes and CD-ROMs.

Qualifications
A competent camera operator who is fully experienced and qualified with the specified equipment shall do all photography.

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.

Project Photos for Construction Progress
Provide photos of the entire work area during construction for the purpose of records of completed work. Photos should be spaced at approximately 100-foot intervals. Three prints of each standard photograph shall be provided to the County. In addition to the CD_ROM media, one print of each digital photograph shall be provided to the County.

The Contractor shall pay all costs associated with the required photographs and prints. Any parties requiring additional photography or prints will pay the photographer directly.

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 photographer and the photographers numbered identification of exposure.

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 by 10 inches.

All project photos 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 Representative at each period of photography for instructions concerning views required.

The Contractor shall deliver photos in conformance with the above requirements to the County Representative. No construction shall begin until pre-construction photos are completed and submitted to the County Representative.

Record Photos
The Contractor shall require that photographer maintain digital copies of photos for a period of two years from date of Substantial Completion of the Project.

Photographer shall agree to furnish additional prints to the County Representative at commercial rates applicable at the time of purchase. Photographer shall also agree to participate as required in any litigation requiring the photographer as expert witness.

Video Recording for Pre-Construction
Video recording shall be used in lieu of photos for pre-construction. It shall be of sufficient quality to fully illustrate details of conditions and construction, including special features

Video recording shall be accomplished along all routes that are scheduled for construction.

The video recording shall, when viewed, depict an image with ¼ of the image being the roadway fronting of property and ¾ of the image being of the property. The video recording shall be done so as to show the roadway and property in an oblique view (30 degrees).

A complete view, in sufficient detail, of all driveways, with audio description of the exact location shall be provided.

The Engineering plans shall be used as a reference for stationing in the audio portion of the video recording for easy location identifications. If visible, house numbers shall be mentioned on the audio.

Two complete sets of video recording shall be delivered to the Owner for the permanent and exclusive use of the Owner prior to the start of any construction on the project.

All video recording 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.

Payment for this item shall be included under the pay item for Mobilization.

CONTRACTOR TO EXECUTE NPDES "NOTICE OF INTENT"

Prior to proceeding with construction, the Contractor shall prepare and submit a "Notice of Intent to Use Generic Permit for Stormwater Discharge from Construction Activities that Disturb One or More Acres of Land" to the Florida Department of Environmental Protection (FDEP). The Contractor shall monitor the site at all times and take appropriate action to prevent erosion including the use of BMPs. No pumping of ground or surface water shall be performed without approval from the Water Management District. Following completion of construction, Contractor shall prepare and submit a "Notice of Termination of Generic Permit Coverage" to FDEP. Payment for this item shall be included under the pay item for Mobilization.

WORKSITE TRAFFIC SUPERVISOR

- The Contractor shall have a Worksite Traffic Supervisor who will be responsible for initiating, installing and maintaining all traffic control devices as described in Section 102 of the FDOT *Standard Specifications for Road and Bridge Construction* and in the Plans. The Worksite Traffic Supervisor shall have at least one year of experience directly related to work site traffic control in a supervisory or responsible capacity and shall be certified by the American Traffic Safety Services Association Worksite Traffic Supervisor Certification Program or an equal approved by FDOT. Approved alternate Worksite Traffic Supervisors may be used when necessary.
- The Worksite Traffic Supervisor shall be available on a 24-hour per day basis and shall review the project on a day-to-day basis as well as being involved in all changes to traffic control. The Worksite Traffic Supervisor shall have access to all equipment and materials needed to maintain traffic control and handle traffic related situations. The Worksite Traffic Supervisor shall ensure that routine deficiencies are corrected within a 24-hour period.
- The Worksite Traffic Supervisor shall be available on the site within 45 minutes after notification of an emergency situation, prepared to positively respond to repair the work zone traffic control or to provide alternate traffic arrangements.
- Failure of the Worksite Traffic Supervisor to comply with the provisions of the Sub-article may be grounds for decertification or removal from the project or both. Failure to maintain a designated Worksite Traffic Supervisor or failure to comply with these provisions will result in temporary suspension of all activities except traffic and erosion control and such other activities deemed to be necessary for project maintenance.
- Payment for Worksite Traffic Supervisor shall be included under the pay item for Maintenance of Traffic.

CONTRACTOR'S SUPERVISION

- Prosecution of Work: The Contractor shall give the work the constant attention necessary to assure the scheduled progress. He shall cooperate fully with the Project Manager and with other Contractors at work in the vicinity.
- Contractor's Superintendent: The Contractor shall at all times have on the work site as his agent, a competent superintendent capable of thoroughly interpreting the plans and specifications and thoroughly experienced in the type of work being performed, who shall receive the instructions

from the Project Manager or his authorized representatives. The superintendent shall have full authority to execute the orders or directions of the Project Manager and to supply promptly any materials, tools, equipment, labor and incidentals that may be required. Such superintendence shall be furnished regardless of the amount of work sublet.

- The Contractor's superintendent shall speak and understand English, and at least one responsible person who speaks and understands English shall be on the project during all working hours, and wherever work is being done by the contractor.
- Supervision for Emergencies: The Contractor shall have a responsible person available at or reasonably near the work site on a 24-hour basis, 7 days a week, in order that he may be contacted for emergencies and in cases where immediate action must be taken to maintain traffic or to handle any other problem that may arise. The Contractor's responsible person for supervision for emergencies shall speak and understand English. The Contractor shall submit, by certified mail, phone numbers and names of personnel designated to be contacted in cases of emergencies along with a description of the project location to the Florida Highway Patrol and all other local law enforcement agencies.

LIST OF EMERGENCY CONTACT NUMBERS & UTILITY SERVICE MAINTENANCE

The Contractor shall obtain and maintain a list of emergency contact phone numbers for all utilities during the course of the project. The Contractor shall maintain utility service during the project except for interruptions authorized by the utility owner. If interruptions are required, the Contractor shall notify the Owner 48 hours in advance.

PEDESTRIAN ACCESS

The Contractor shall provide access and make provisions to maintain school zones during construction. The Contractor is to facilitate pedestrian traffic whether for school or public transportation.

THERMOPLASTIC TRAFFIC STRIPES AND MARKINGS

Do not place thermoplastic traffic stripes and markings on newly constructed final surface courses prior to 30 calendar days after placement of the final surface course. The Engineer may require longer cure periods. Provide temporary pavement markings during the interim period if the road is open to traffic. The price of temporary pavement marking shall be included in the Maintenance of Traffic.

RECORD DRAWINGS AND PROJECT CERTIFICATION

The County will furnish the Contractor copies of the bid plans to be used for the record drawings. A Florida Registered Surveyor shall perform a field survey and any differences between the plan elevations or dimensions shall be marked through and the as-built elevation or dimension legibly entered. All elevations and dimensions that are correct shall have a check mark placed beside it.

The Contractor shall keep a complete set of surveyed "As-built" records. These records shall show all items of Work and existing features of utilities revealed by excavation work. The records shall be kept in a professional manner, in a form that shall be approved by the County prior to the Work. These results shall be available at all times during construction for reference by the Engineer and shall be delivered to the Engineer upon completion of the Work. All completed "As-builts" must be certified by a Florida Licensed Surveyor or Engineer per Chapter 61 G 17-6, Florida Administrative Code, pursuant to Sec. 47207, Florida Statutes. All Record Drawings shall be in accordance with current Manatee County Standards.

The "Record Drawings" shall, at a minimum, include the following:

- Roadway centerline profile [100-foot maximum interval].
- Roadway cross sections [100-foot maximum interval].
- All underground piping with elevations and dimensions, changes to piping locations, horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements. Actual installed pipe material, class, etc. Dimensions at these locations shall indicate distance from the centerline of construction.
- Elevations on all drainage control structures, verifying all plan dimensions.
- Stormwater ponds with cross sections [25-foot maximum interval] (sufficient to calculate volumes).
- Flow line elevations on all ditch breaks (vertical and horizontal).
- Field changes of dimensions and details.
- Details not on original contract drawings.
- Equipment and piping relocations.
- The locations of all headwalls, pipes and any other structures shall be located by station and offset.
- Benchmarks and elevation datum shall be indicated.
- Additional elevations or dimensions as required by the Engineer
- Additional elevations or dimensions as required by the County Representative

Following completion of construction and prior to final payment, the Contractor shall submit a Certification by the Contractor and Manufacturer including test data that the materials (filter fabric, filter media, etc.) installed meet plan specifications and regulatory requirements.

Upon completion of the work, four (4) sets of draft "Record Drawings" shall be submitted to the Owner for review. Such drawings shall accurately show all approved field changes to the original Construction Drawings, including actual locations, dimensions and elevations and shall be subject to a field review in the presence of the Engineer or his designated representative. The drawings are to be prepared by competent personnel, neatly drafted and certified, signed and sealed by a Florida Registered Surveyor.

The Contractor shall incorporate any comments from the Owner and/or Engineer and shall submit two write-only CD-ROMs, one set of 11-inch by 17-inch mylar record drawings and four sets of 11-inch by 17-inch certified prints with the Surveyor's certification.

All Digital Drawings shall be identical to those submitted as hard copy. The Digital Drawing files shall be AutoCAD format (Release 2010 or later) and shall include all external reference drawings, text fonts, shape files and all other files necessary to make use of the drawings.

In addition, $150,000 or five percent (whichever is smaller) of the Contract price shall be retained until the County Representative has approved the "Record Drawings". The County Representative will review and approve the "Record Drawings within 30 days unless additional information is required. No final payment shall be made until such time as the "Record Drawings" have been approved and accepted by SWFWMD for Maintenance and Operation Phase Transfer. Unless there is a separate pay item for Record Drawings, payment shall be included as part of the lump sum quantity for Mobilization.

COMPLIANCE WITH THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (SWFWMD) STORMWATER MANAGEMENT AND DISCHARGE PERMIT REQUIREMENTS AND/OR THE DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) DREDGE AND FILL PERMIT REQUIREMENTS

Southwest Florida Water Management District Stormwater Management and Discharge permits or exemptions, if any, and/or a Department of Environmental Protection Dredge and Fill permit, if any, required for this project have been obtained by the County. The Contractor shall comply with the stipulations of the Permits or Exemptions as stated herein.

The Contractor shall allow periodic inspection of the work by authorized representatives of the Department of Environmental Protection, the Southwest Florida Water Management District, as well as other duly authorized law enforcement officers of the State.

CRUSHED CONCRETE BASE

Crushed Concrete Base shall follow FDOT Standard Specifications 2020 (Jan.), Section 911. The layer coefficient of 0.18 with Limerock Bearing Ratio (LBR) minimum 150 is allowed to calculate the base thickness.

Only FDOT certified piles are acceptable to this project. The producing process certified by FDOT without the actual pile certified is not considered solid enough for the acceptance of the material. The contract shall send the engineer the deliver tickets with FDOT certified pile number, pile location, project name and manufactory contact information shown.

Additional tests and pile inspections will be required for the quality control and the contractor will be responsible for the cost of the initial ten tests and any re-tests when needed. The material will be rejected by the County if the initial test fails. The rejected material shall be completely removed from the project site.

1) Regarding structural number on Crushed Concrete Base, Manatee County to approve SN 0.18 if following criteria is met and maintained:

A) Limerock Bearing Ratio value of 150 or greater.

B) Gradation conforms to FDOT Specifications 2020, Section 911.

C) Deleterious materials conform to FDOT Specifications 2020, Section 911.

D) Delivery ticket indicates FDOT approved source, actual lot allocated to a particular project.

E) Piles or lots to be inspected by Manatee County representative prior to acceptance.

2) Regarding Limerock Bearing Ratio value:

A) No Limerock Bearing Ratio value less than 150, with no under tolerance.

3) Regarding source approval:

A) FDOT approved source, allocated lot sufficient to serve project's needs, delivery tickets stating FDOT approved source, project name, FDOT preapproved lot or pile number.

4) Regarding deleterious materials:

A) Deleterious material content in addition to the FDOT Specifications 2020, Section 911, should state that no construction debris such as Styrofoam insulation, telephone wire, lumber, shingles, aluminum window or door frames etc., or household trash ie: bottles, cans, paper goods etc. is acceptable.

5) Material source inspection:

A) Prior to acceptance of base product, a representative of Manatee County will visit the Producer's location and obtain a sample of the proposed base for the specified project. In addition to sampling, the pile will be visually inspected for deleterious materials, substantial segregation, or any other undesirable characteristics. The pile shall have a traceable identification by pile number or lot number and an accurate quality assessment.

6) Import and placement of base product:

A) During import of base product, a county inspector or duly designated representative of the county will be onsite monitoring incoming loads, making visual assessments of the product and checking load tickets for verification of materials.

7) Import and placement of base product:

A) After spreading out, prior to compacting, samples of the base product will be obtained by Manatee County approved testing lab, every 500 LF staggering right, left, center of the roadway for Limerock Bearing Ratio, gradation and deleterious material testing.

8) Rejection of materials:

A) Material not meeting above requirements will subject to rejection and be removed from the project site. Any three (3) concurrent rejections will require immediate shut down of imported material and require review and remedies prior to restart.

9) Compaction of material:

A) In place material shall achieve 98% of AASHTO T-180 compaction.

CLARIFICATION OF SPECIFIC LINE ITEMS

Clarification of the County's expectations of work to be performed as it relates to specific line items and/or item No. listed on the Bid Form is included in the FDOT Basis of Estimate Manual version 2015. Where such item number is not available, the description shows herein will prevail.

Line item #7, Clearing & Grubbing, incl. trees, storm pipes, wood/conc structures, Brazilian peppers shall follow FDOT Specifications 2020 (Jan.), and shall also include the removal of bushes, existing water & sanitary sewer services, sanitary sewer clean outs, and concrete walk. Work under this pay item shall also include removal of existing chain link fence. Work shall also include removal of exotic species including Brazilian Peppers located between the east end of 70th Street Ct. East and McMullen Creek. This area shall be designated in field by County biologist and limited to 0.10 acres.

Line item # 9, Subsoil Excavation shall include the removal of any unsuitable material such as muck and organic materials, plastic soils, trash, rock fragments and dense soil, etc. The quantity to be paid shall be "in place" value.

Line item #12, 1.5" Type S-III Asphaltic Concrete, shall follow *FDOT Standard Specifications Road and Bridge Construction* 2020 (Jan.), section 334.

Line Item # 16, Helical screw anchors (A2000 Pipe), shall conform to the details and locations shown on the construction plans. The Contractor shall submit shop drawings that show anchor details.

Line Item Nos. 22 thru 24, Diversion Boxes, shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202. Construction of diversion boxes shall also conform to the details shown on the construction plans.

Line Item # 25, Control Structures (5'x5'), shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202. Construction of control structures shall also conform to the details shown on the construction plans.

Line Item # 26, M.C. Junction box, shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 and conform to the details shown on the construction plans.

Line Item # 27, Concrete block box 4' x 5', shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 and conform to the details and locations shown on the construction plans.

Line Item # 28, Concrete block box 4' x 6', shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 and conform to the details and locations shown on the construction plans.

Line Item # 29, Concrete block box 4' x 7', shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 and conform to the details and locations shown on the construction plans.

Line Item # 30, Concrete block box 5' x 7', shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 and conform to the details and locations shown on the construction plans.

Line Item # 31, Concrete block box 6' x 7', shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 and conform to the details and locations shown on the construction plans.

Line Item # 32, Concrete block box 4' x 8', shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 also conform to the details and locations shown on the construction plans.

Line Item # 33, Concrete block box 2' x 2', shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 also conform to the details and locations shown on the construction plans.

Line Item # 34, M.C. Drop Inlet w/Trench Drain, shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 also conform to the details and locations shown on the construction plans. Cast in place concrete trench drain shall have a minimum strength (28-day) of 4,000 psi. Reinforcing shall be grade 60 steel.

Line Item # 35, M.C. Drop Inlet shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 also conform to the details and locations shown on the construction plans.

Line Item # 36, Baffle Box w/ upflow filter and bold & gold media, shall be installed per manufacturer's recommendations (Suntree Technologies). Installation of baffle boxes shall also conform to the details shown on the construction plans and shall follow *FDOT Standard Specifications Road and Bridge Construction* 2020 (Jan.), section 425.

Line Item # 55, Pipe Culvert, 10" ADS, Incl. MES shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 202 also conform to the details and locations shown on the construction plans.

Line Item #56, 30" Check valve (storm outlet pipe), shall be installed per manufacturer's recommendations and conform to the details and locations shown on the construction plans. Check valves shall be made of neoprene material and made in the USA.

Line Item #57, 42" Check valve (storm outlet pipe), shall be installed per manufacturer's recommendations and conform to the details and locations shown on the construction plans. Check valves shall be made of neoprene material and made in the USA. Reference sheet #16, station 609+28, 13' Lt that calls out two (2) 30" gate (check) valves; Reference sheet #17, station 799+86, 98' Rt that calls out two (2) 30" gate (check) valves; Reference sheet #20A, station 202+37, 328' Rt that calls out one (1) 42" gate (check) valve; Reference sheet #21, station 299+55, 15' Lt that calls out two (2) 30" gate (check) valves; Reference sheet #27, station 1499+10, Lt that calls out one (1) 42" gate (check) valve.

Line Item # 64, Steel Sheet Piling, Furnish & Install, Permanent, shall be installed using a vibratory hammer. Impact hammers shall not be allowed due to potential disturbance to marine life. Installation shall conform to the details and locations shown on the construction plans & structural report.

Line Item # 66, Type A Miami Curb & Gutter, shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 201 and conform to the details and locations shown on the construction plans.

Line Item # 70, Brick Paver Drive (Incl. Base Course), Installation shall conform to the details and locations shown on the construction plans. Work shall also include removal of existing brick and base course. Also, work shall include installation of new concrete base, resetting of brick paver, and finish work incidental to satisfy property owner and County inspector.

Line Item # 72, Riprap, Rubble, F & I Ditch Lining, installation shall conform to the details and locations shown on the construction plans. Work shall also include required excavation at outlet pipes to McMullen Creek to gain positive drainage. Reference sheet #16, station 609+37, 13' Rt; Reference sheet #17, station 799+86, 121' Rt; Reference sheet #20A, station 202+40, 365' Rt; station 299+40, 14.9' Lt and Station 299+75, 21' Rt; Reference sheet #27, station 1498+89, 9.9' Lt.

Line Item # 76, Tree Protection, shall conform to the details and locations shown on the construction plans.

Line Item # 77, Replant trees (up to 6" caliper), shall follow Manatee County Highway, Traffic & Stormwater Standards 2015, section 600 and conform to the details and locations shown on the construction plans.

CONTRACT CONTINGENCY

The discretionary work (Contingency) pay item shall cover the cost for various contingencies and contract amendments authorized by the Owner. Any amount of extra work and/or alterations to the proposed work charged to the allowance shall be fully documented and authorized by the Project Manager before the start of the work. No payment shall be made for work completed without written authorization from the Owner or Engineer.

Date:___/___/_____ Submittal No. _____

SHOP DRAWING SUBMITTAL COVER SHEET

(IFB) # [Insert IFB Number]
Project Name: [Insert Full Project Name]
Project File No.: [Insert Project Number]
Specification Title Number: [Insert Section No.] Specification No.: Part *[Insert Part No.]*, *[Insert Item No.]* Page(s): *[Insert Page No.]*
Submittal Description: [Insert Title, Description of Submittal and Use]

Your Company Logo and/or information
[Contractor's Name]
[Contractor's Title]
[Company Name]
[Company Address]
[Office Number]
[Fax Number]
[email address]
[Approval Signature:_____
[Approval Date:___/___/_____

Geotechnical Engineering Report

Rubonia Drainage Improvements
Rubonia, Florida
March 8, 2019
Terracon Project No. HC195005

Prepared for:
Manatee County Public Works
Bradenton, FL

Prepared by:
Terracon Consultants, Inc.
Sarasota, Florida

March 8, 2019

Manatee County Public Works
1022 26th Avenue East
Bradenton, FL 34206

Attn: Mr. Michael Sturm, P.E.
P: (941) 708-7450
E: Michael.Sturm@mymanatee.com

Re: Geotechnical Engineering Report
Rubonia Drainage Improvements
Rubonia, Florida
Terracon Project No. HC195005

Dear Mr. Sturm:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PHC195005 dated January 17, 2019 and authorized by Purchase Order on January 25, 2019. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and pavement rehabilitation for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

James M. Jackson, P.E.
Department Manager
FL License No. 77733

Douglas S. Dunkelberger, P.E.
Principal
FL License No. 33317

REPORT TOPICS

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

REPORT SUMMARY

Topic [1]	Overview Statement [2]
Project Description	The existing drainage ditches (i.e. grassed swales) are to be replaced with reinforced concrete drainage pipe and structures. Additionally, the existing pavements are to be rehabilitated and two ponds (wet retention features) are to be excavated as part of the drainage improvement construction.
Geotechnical Characterization	In general, the borings found loose to medium dense sand with silt from the surface to a depth of about 18 feet followed by either medium hard weathered limestone or medium dense clayey sand to the maximum borehole termination depth of 20 feet below the ground surface (bgs). As an exception, Boring B-3 found medium dense to dense silty and clayey sands from the surface to a depth of 20 feet bgs. Additionally, three of the borings (AB-5, AB-7, and AB-12) found sand with organic material from about 2 to 4 feet bgs. The organic soils are unsuitable for support or reuse for the drainage pipe and structure construction and should be removed and replaced with soil meeting the General Fill requirement when encountered. The depth to groundwater ranged from about ½ to 4 ½ feet bgs.
Earthwork	Remove organic soils and replace with soil meeting the general fill requirements when encountered. Densify backfill soils to at least 95 percent of the maximum modified Proctor dry density. In general, the soils in Pond #1 to a depth of about 18 feet meet the General Fill requirements. However, the soils in Pond #2 do not meet the General Fill requirements.
Pavements	The results of the pavement cores found about 1 to 3 inches of asphalt followed by 6 to 12 inches of sand-shell base and underlain by poorly graded sand with silt. The asphalt was found to have full-depth cracking while the base was found to be in generally good condition with estimated LBR values in the range of 75 to 125. Additionally, field observations did not disclose pavement areas of significant structural distress (i.e. alligator cracking, rutting, pot holing, or other surface distortions). The existing conditions are reasonably good for a pavement rehabilitation strategy consisting of full depth milling/resurfacing of the asphalt pavement. Alternatively, Full Depth Reclamation (FDR) could be used to increase pavement strength and durability considering both the full-depth asphalt cracking as well as the relatively high groundwater level.
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Geotechnical Engineering Report

Rubonia Drainage Improvements

Rubonia, Florida

Terracon Project No. HC195005

March 8, 2019

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed drainage improvements to be located in Rubonia, Florida. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil (and rock) conditions
- Groundwater conditions
- Site preparation and earthwork
- Pavement rehabilitation
- Excavation considerations
- Dewatering considerations

The geotechnical engineering Scope of Services for this project included the advancement of 25 test borings to depths ranging from approximately 8 to 20 feet below existing site grades.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located on the following roadways in Rubonia, Florida: ■ 72nd Street Court East (2,250 linear feet) ■ 72nd Street East (2,300 lf) ■ 71st Street East (1,700 lf) ■ 70th Street Court East (950 lf) ■ 69th Street Court East (600 lf) ■ 11th Avenue East (1,350 lf) ■ 12th Avenue Drive East (550 lf) ■ 14th Avenue East (260 lf) ■ 15th Avenue East (670 lf) ■ 15th Avenue Drive East (170 lf) Total = 10,800 +/- lf of roadway See **Site Location**
Existing Improvements	Two-lane asphalt paved residential roadways with grassed drainage ditches. Large block cracking was observed along some of the roadway areas. Additionally, field observations did not disclose pavement areas of significant structural distress (i.e. alligator cracking, rutting, pot holing, or other surface distortions).
Current Ground Cover	Asphalt pavement and short grasses.
Existing Topography	The 60% Design Plans by Manatee County Public Works dated March 2018 indicate existing ground surface elevation of about +2 ½ to +3 ½ feet-NAVD.
Prior Land Use	Review of historical aerial photographs (ref. Google Earth) indicate the site has been developed with a neighborhood from at least 1995 to the present day.

Item	Description
Surficial Soil Conditions	Review of the Soil Survey for Manatee County, Florida issued April 1983 indicates the site is mapped with Soil Unit 17, Delray-EauGallie complex; Unit 20, EauGallie fine sand; Unit 39, Parkwood Variant complex; and Unit 53, Wulfert-Kesson association. **Unit 17, Delray-EauGallie complex:** The typical soil profile consists of fine sand to a depth ranging from 18 to 55 inches followed by sandy loam and sandy clay loam to a depth of 80 inches or more. Under natural (pre-development) conditions, the seasonal high groundwater level (SHGWL) is reported to be at or near the ground surface. **Unit 20, EauGallie fine sand:** The typical soil profile consists of fine sand to a depth of 42 inches followed by sandy clay loam and sandy loam to a depth of 65 inches or more. It should be noted that a layer of sand coated with organic matter (i.e. hardpan) may be found between 28 and 42 inches. The SHGWL is reported to be within 10 inches of the ground surface. **Unit 39, Parkwood Variant complex:** The typical soil profile consists of loamy sand to a depth of 37 inches followed by soft **limestone** to a depth of 80 inches or more. The SHGWL is reported to be within 10 inches of the ground surface. **Unit 53, Wulfert-Kesson association:** The typical soil profile consists of **muck** to a depth of 36 inches followed by fine sand to a depth of 80 inches or more. The SHGWL is reported to be above the ground surface. Additionally, our experience near the vicinity of the proposed site indicates that subsurface conditions will likely consist of sands with varying amounts of silt and clay from the surface to a depth of about 5 feet followed by silty to a depth of about 15 feet.

We also collected photographs at the time of our field exploration program. Representative photos are provided in our **Photography Log**.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	The following information was provided by you in an e-mail on January 11, 2019.
Project Description	Based on the 60% Design Plans by Manatee County Public Works dated March 2018, we understand the existing drainage ditches are to be replaced with reinforced concrete drainage pipe and structures.

Item	Description
Grading/Slopes	Fill thicknesses in the existing ditches to be moderate (3 feet +/-).
Pavements	We understand the existing pavements are to be milled and resurfaced as part of the construction.
Storm Water	Two storm water retention ponds, Wet Pond #1 and Wet Pond #2, are planned for the site.

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** section and the GeoModel can be found in the **Figures** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Sand with silt**	Poorly graded sand with silt, sometimes with shell fragments (SP-SM)
2	**Silty sand**	Silty sand, sometimes with shell fragments (SM)
3	**Clayey sand**	Clayey sand (SC)
4	**Weathered Limestone**	Weathered limestone
5	**Sand with organics**	Poorly graded sand with silt and organic material (SP-SM)

The GeoModel Layer 5 soils are unsuitable for support or backfill for the drainage pipe and structures. When encountered, the organic soils should be removed and replaced with soil meeting the General Fill requirements.

Pavement Cores

The results of the pavement cores are summarized in the following table:

Location	Asphalt Thickness (in)	Crack Depth (in)	Base Thickness (in)[1]	Estimated Base LBR Value[2]	Average Estimated Subbase LBR Value[2, 3]
PC-1	1 ¼	Full	6	50	44

Location	Asphalt Thickness (in)	Crack Depth (in)	Base Thickness (in)[1]	Estimated Base LBR Value[2]	Average Estimated Subbase LBR Value[2, 3]
PC-2	1	Full	12	100 to 125	15
PC-3	2	Full	12	75 to 125	41
PC-4	2 ¾	Full	12	75 to 125	27
PC-5	3	Full	6	125	16
PC-6	1 ¾	Full	12	125	38
PC-7	2 ¼	Full	6	125	33
PC-8	2 ¼	Full	12	75 to 125	35
PC-9	2	Full	12	100 to 125	35
PC-10	2	Full	10	125	23
PC-11	1 ¾	Full	6	125	29
Avg.	**2**	**Full**	**9 ½**	**110**	**30**

1. Estimated LBR value is based on correlations between DCP Index, California Bearing Ratio (CBR), and Limerock Bearing Ratio (LBR) values
2. The base consisted of poorly graded sand with silt and trace to some shell fragments.
3. The subbase consisted of poorly graded sand with silt

The results of the pavement cores indicate a typical asphalt and base thickness for the low-volume residential roadways. Some of the cores show indication of a previous asphalt overlay. Photographs of the pavement cores are provided in our **Photography Log**.

Groundwater

The groundwater levels measured during drilling are summarized in the following table. The groundwater levels shown for the three borings located in the planned ponds were recorded 24 hours after the completion of drilling.

Location	Estimated Ground Surface Elevation (feet-NAVD)[1]	Depth to Groundwater (ft-bgs)	Elevation of Groundwater (feet-NAVD)
B-1	+4	0.8	+3.2
B-2	+4	3.6	+0.4
B-3	+2	0.7	+1.3
AB-1	+4	1.5	+2.5
AB-2	+5	2	+3
AB-3	+5	2	+3
AB-4	+6	2	+4
AB-5	+4	2.5	+1.5
AB-6	+5	3.5	+1.5
AB-7	+4	2.5	+1.5
AB-8	+4	2.5	+1.5

Location	Estimated Ground Surface Elevation (feet-NAVD)[1]	Depth to Groundwater (ft-bgs)	Elevation of Groundwater (feet-NAVD)
AB-9	+4	1	+3
AB-10	+5	2.5	+2.5
AB-11	+6	1	+5
AB-12	+4	2	+2
AB-13	+4	2.5	+1.5
AB-14	+3	1.5	+1.5
AB-15	+3	3.5	-0.5
AB-16	+4	4	0
AB-17	+4	NM[2]	--
AB-18	+4	3.5	+0.5
AB-19	+3	4	-1
AB-20	+3	2	+1
AB-21	+3	3.5	-0.5
AB-22	+3	0.5	+2.5

1. Ground surface elevations were estimated from the 60% Design Plans by Manatee County Public Works dated March 2018.
2. Groundwater was not measured in boring AB-17 due to a conflict with an underground utility.

The groundwater levels were recorded during the typical dry season (January and February 2019) which has been relatively wet this year. Nonetheless, we would expect groundwater levels to rise one to two feet from our recorded levels during the wet season.

The following table provides estimated groundwater levels at each pavement core locations. The groundwater levels are based on the nearest boring.

Location	Estimated Depth to Groundwater below bottom of Base (inches)
PC-1	18
PC-2	12
PC-3	18
PC-4	18
PC-5	24
PC-6	18
PC-7	12
PC-8	18
PC-9	30
PC-10	38
PC-11	36

The table above for the pavement core holes reflects existing groundwater levels within 12 to 38 inches of the existing base layer. Therefore, we anticipate the groundwater levels to be close to the bottom of the pavement base during the typical wet season, even after completion of the planned drainage improvements.

If more accurate groundwater data is desired, we recommend the installation of piezometers that could be monitored over a period of time.

GEOTECHNICAL OVERVIEW

In general, the borings found loose to medium dense sand with silt from the surface to a depth of about 18 feet followed by either medium hard weathered limestone or medium dense clayey sand to the maximum borehole termination depth of 20 feet below the ground surface (bgs). As an exception, Boring B-3 found medium dense to dense silty and clayey sands from the surface to a depth of 20 feet bgs. Additionally, three of the borings (AB-5, AB-7, and AB-12) found sand with organic material from about 2 to 4 feet bgs. The organic soils are unsuitable for support or reuse for the drainage pipe and structure construction and should be removed and replaced with soil meeting the General Fill requirement when encountered. Other than the organic soils, these materials are generally suitable for construction of the proposed drainage improvements following completion of the recommendations in the **Earthwork** section of this report.

The **Pavements** section addresses our recommendations for rehabilitation.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork is anticipated to include excavations and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Fill Material Types

Engineered fill should meet the following material property requirements:

Fill Type [1]	USCS Classification	Acceptable Location for Placement
General [1]	SP, SP-SM, SM (fines content < 15 percent, maximum particle size < 2 inches, organic content < 3 percent)	All locations and elevations

1. GeoModel Layer 1 soils at this site appear to meet this criterion. Soils with fines content > 12 percent may retain moisture and be difficult to compact and achieve specified density and stability. These soils may need to be maintained dry of optimum to properly compact.

Borrow

Based on Borings B-1 and B-2 ,which were drilled in the planned Pond #1, the soils to a depth of about 18 feet should produce materials meeting the General Fill criteria established above. However, the soils found in Boring B-3 which was drilled in Pond #2 will likely not meet the General Fill requirements.

Pipe Installation Recommendations

- Any open trench (excavation) areas for placing and backfilling the pipe should be accomplished in the dry (i.e. not in saturated or submerged conditions). Dewatering to a depth of 2 feet below the bottom of all pipes should be performed prior to placement of bedding and backfill materials.
- Muck, or other organics, encountered in excavations should be removed in their entirety from beneath the pipe and for a minimum lateral distance of 5 feet from pipe/structure edges. **Removal of organic soils should be anticipated in the vicinity of Borings AB-5, AB-7, and AB-12.**
- Should the pipe trench bottom become unstable due to persistent moisture or hydrostatic pressure, the bottom should be over-excavated a minimum of 12 inches (deep) and replaced with clean gravel (FDOT No. 57 Stone) wrapped with a filter fabric.
- Pipe backfill below the existing water level at the time of construction should consist of General Fill as previously defined. The fill should be placed in the dry in lifts that do not exceed 12 inches in vertical measure. Each lift should be compacted to at least 95% of the Modified Proctor maximum dry density (ASTM D-1557). Backfill in pavement areas should be compacted to at least 98% density (ASTM D-1557).
- If pipe is to be installed beneath pavements, the pipe manufacturer's specifications for minimum depth of cover for the pipe should be consulted as applicable for pipe installed in SP, SP-SM, or SM (USCS soil classification) or A-3 and A-2-4 (AASHTO classification) soils compacted to 98% maximum dry density as determined by a Modified Proctor test.
- As a minimum, all temporary excavations should be sloped or braced as required by Occupational Health and Safety Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations will probably be required during pipe installation operations. The utility contractor, by contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations, as required, to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, state, and federal safety regulations including the current OSHA Excavation and Trench safety Standards.

Temporary Dewatering

Dewatering will be needed to facilitate earthwork and underground construction operations for this project. The necessity for dewatering will be dependent on the depth of excavation below existing grade and the groundwater levels at the time of construction. Actual dewatering means and methods should be left up to a contractor experienced in installation and operation of dewatering systems. The contractor should provide a dewatering plan for review and approval by the engineer prior to the installation of the dewatering systems.

Also, the dewatering plan should consider the potential impact of lowered groundwater (i.e. increased vertical stress on subsoils) on nearby, existing construction.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Each lift of compacted fill should be tested, evaluated, and reworked as necessary until approved by the Geotechnical Engineer prior to placement of additional lifts.

If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

PAVEMENTS

Recommendations for Pavement Rehabilitation

Based on the results of the pavement cores and DCP testing, we believe, with some reservation as explained below, milling and resurfacing is a reasonable rehabilitation strategy for the existing roadways. Due to the full-depth cracks in the existing asphalt, we recommend the milling depth extend to the top of the base. Following milling, the exposed surface should be proof-rolled using a fully loaded dump truck to identify any localized weak areas. Excessively rutted areas should be repaired with either 12-inches of aggregate base or 5-inches of asphalt base. Following proof-rolling and as needed base repairs, a prime coat should be applied with a minimum application rate of 0.15 gallons per square yard in accordance with Table 300-1 of the Florida Department of Transportation (FDOT) Standard Specification for Road and Bridge Constructed dated January 2018. Once the milled surface has been primed, Type SP asphalt should be placed as outlined below.

For a flexible pavement section, it is important to have a minimum of 24 inches of separation between the bottom of the base and the wet season water table. Given the groundwater levels measured in January-February, it's unlikely that the desired base separation will occur even with the planned drainage improvements. Furthermore, the full-depth cracking of the asphalt suggests that there is some underlying weakness in the base and/or subgrade layers. With these conditions, you may wish to consider modifying and strengthening the base through a full-depth reclamation (FDR) process. FDR would involve in-place mixing of the existing asphalt, base and possibly upper subgrade layers together with a cement admixture to create a thicker base of sufficient strength to support a new, surface layer of asphalt. Please let us know if you'd like to further consider the FDR approach.

Asphalt Concrete Design Recommendations

The following items are applicable to asphalt concrete construction.

- For replacement areas, if any, limerock base material from an approved FDOT source should have a minimum LBR value of 100 and be compacted to a minimum of 98 percent of the maximum dry density as determined by the Modified Proctor test. Limerock should be placed in uniform lifts not to exceed 6 inches of loose thickness. Recycled limerock is not a suitable substitute for virgin limerock for base courses but may be used as a granular stabilizing admixture.
- Crushed (recycled) concrete base should meet the current FDOT Specification 911 for recycled materials.
- Asphalt should be compacted to a minimum of 92 percent of the theoretical maximum density. Asphalt surface courses should be Type SP mix design according to FDOT requirements.
- To verify thicknesses, after placement and compaction of the pavement courses, core the wearing surface to evaluate material thickness and composition at a minimum frequency of 2,000 linear feet or two locations per day's production.

Pavement Maintenance

Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., re-surfacing). Preventive maintenance is usually the priority when implementing a pavement maintenance program. Additional engineering observation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

FIGURES

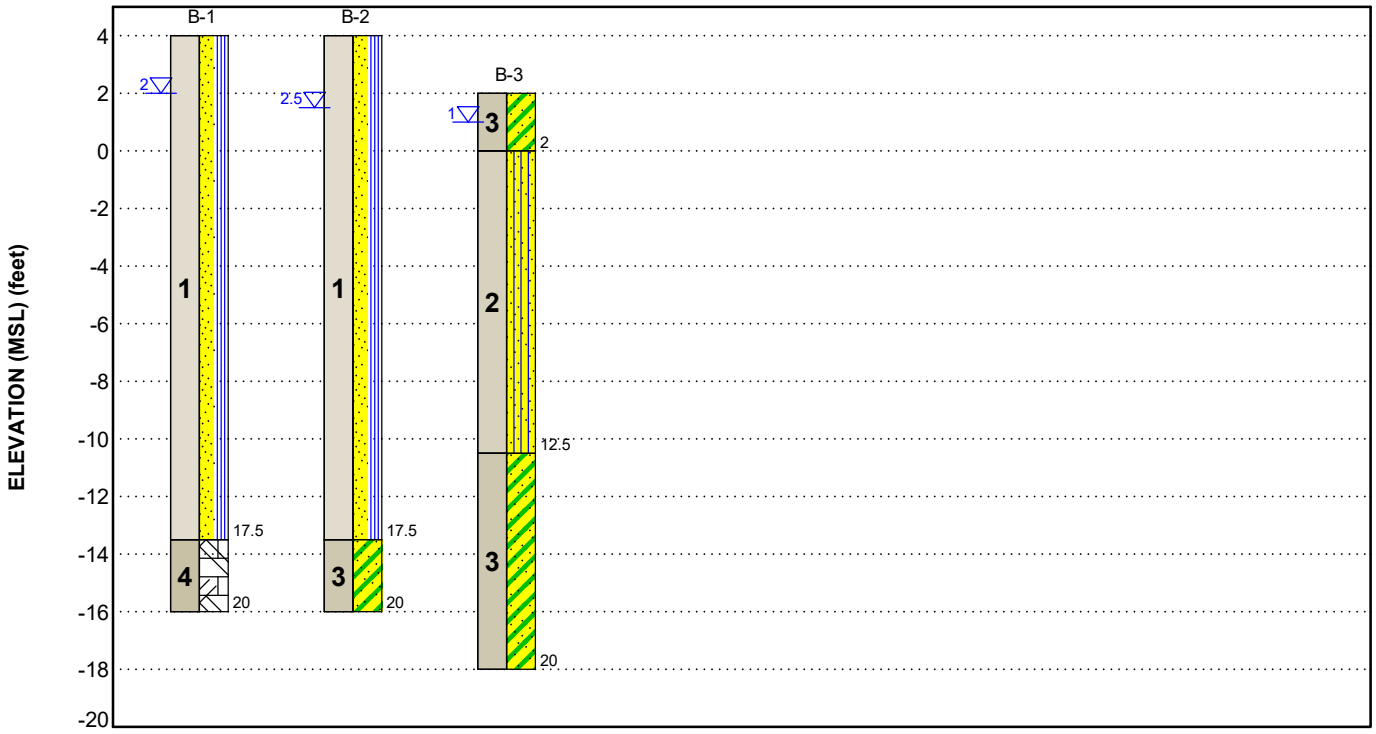
Contents:

IFBC NO. 20-TA003370CD: BID ATTACHMENT 6

GEOMODEL

Rubonia Drainage Improvements ■ Palmetto, FL
3/4/2019 ■ Terracon Project No. HC195005

Terracon GeoReport



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Sand with silt	Poorly graded sand with silt, sometimes with shell fragments (SP-SM)
2	Silty sand	Silty sand, sometimes with shell fragments (SM)
3	Clayey sand	Clayey sand (SC)
4	Weathered Limestone	Weathered Limestone
5	Sand with organics	Poorly graded sand with silt and organic material (SP-SM)

LEGEND

Poorly-graded Sand with Silt
Silty Sand
Weathered Limestone
Clayey Sand

First Water Observation
Second Water Observation
Third Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

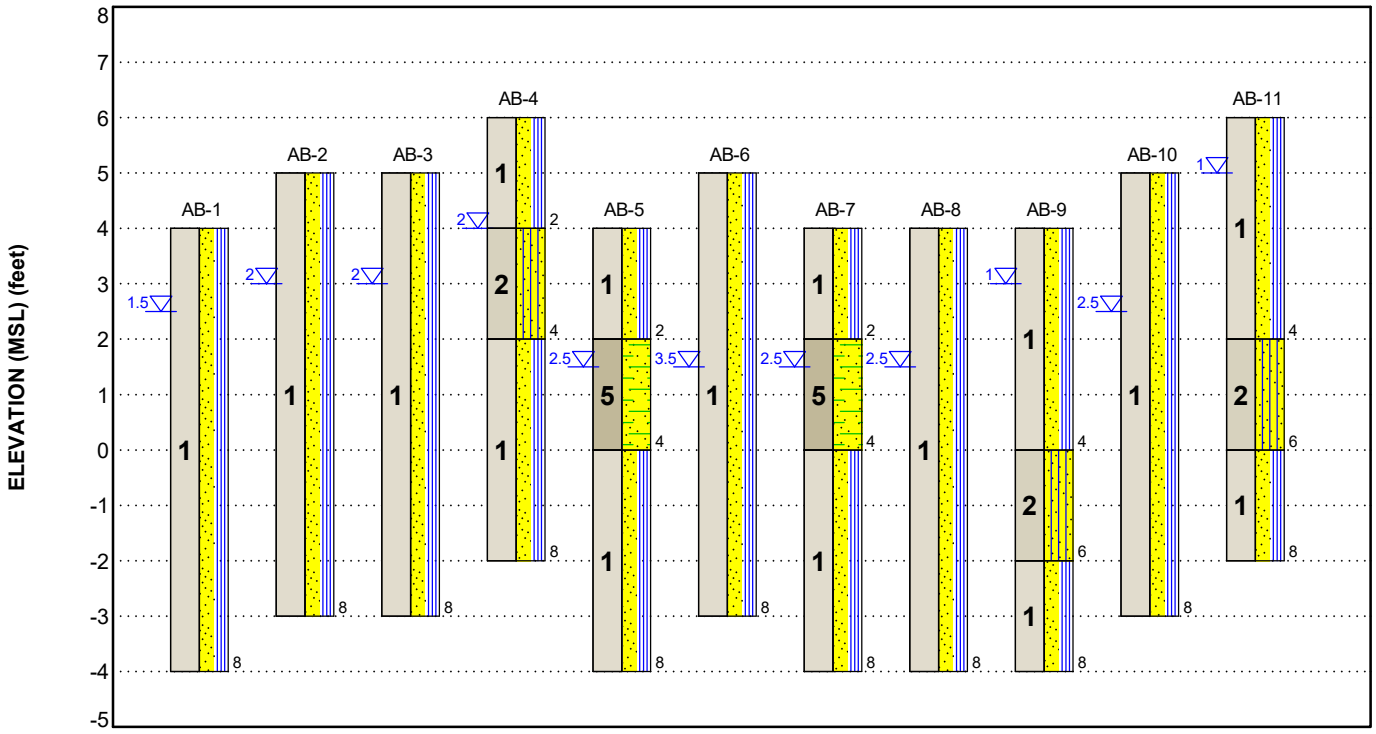
NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

IFBC NO. 20-TA003370CD: BID ATTACHMENT 6

GEOMODEL

Rubonia Drainage Improvements ■ Palmetto, FL
3/4/2019 ■ Terracon Project No. HC195005

Terracon GeoReport



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Sand with silt	Poorly graded sand with silt, sometimes with shell fragments (SP-SM)
2	Silty sand	Silty sand, sometimes with shell fragments (SM)
3	Clayey sand	Clayey sand (SC)
4	Weathered Limestone	Weathered Limestone
5	Sand with organics	Poorly graded sand with silt and organic material (SP-SM)

LEGEND

- Poorly-graded Sand with Silt
- Silty Sand
- Sandy Organic Silt

- First Water Observation
- Second Water Observation
- Third Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

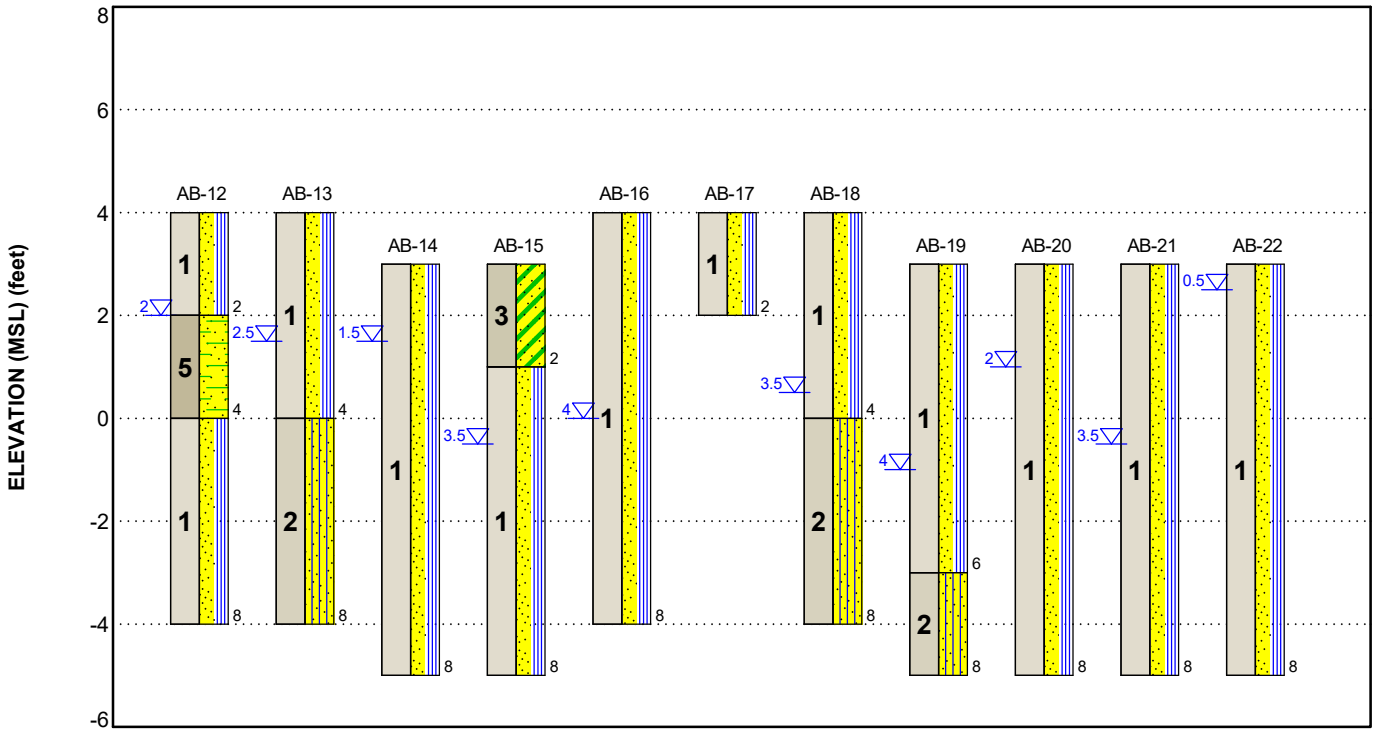
NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

IFBC NO. 20-TA003370CD: BID ATTACHMENT 6

GEOMODEL

Rubonia Drainage Improvements ■ Palmetto, FL
3/4/2019 ■ Terracon Project No. HC195005

Terracon GeoReport



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Sand with silt	Poorly graded sand with silt, sometimes with shell fragments (SP-SM)
2	Silty sand	Silty sand, sometimes with shell fragments (SM)
3	Clayey sand	Clayey sand (SC)
4	Weathered Limestone	Weathered Limestone
5	Sand with organics	Poorly graded sand with silt and organic material (SP-SM)

LEGEND

Poorly-graded Sand with Silt
Clayey Sand
Sandy Organic Silt
Silty Sand

First Water Observation
Second Water Observation
Third Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Location
22	8	Approximately 500-foot centers along existing ditches
3	20	Two in Wet Pond #1 and One in Wet Pond #2
11	2	Approximately 1,000-foot center on existing roadway

Boring Layout and Elevations: Unless otherwise noted, Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet). If elevations and a more precise boring layout are desired, we recommend borings be surveyed following completion of fieldwork.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted rotary drill rig using mud rotary procedures. Five samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound rope and cathead operated safety hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration or the middle 12 inches of a 24-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling. All borings were backfilled with bentonite chips at their completion.

The pavement borings consisted of pavement cores with Dynamic Cone Penetration (DCP) testing on the base and subgrade soils. The borings were drilled with hand-turned bucket-type augering equipment to a maximum depth of 2 feet below the pavement surface.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D1140-17 Standard Test Method for Amount of Material in Soils Finder than No. 200 (75-µm) Sieve)
- ASTM D2974-14 Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Our laboratory testing program also included examination of soil samples by an engineer. Based on observation and test data, the engineer classified the soil samples in accordance with the Unified Soil Classification System (ASTM D2487)

PHOTOGRAPHY LOG

72nd Street Court East at 15th Avenue East, looking West

72nd Street East at 12th Ave. Drive East, looking East

11th Avenue East at 71st Street East, looking North

70th Street Court East at 11th Ave. East, looking West

	
Core PC-1, 1 ¼” Asphalt (Full-Depth Crack)	Core PC-2, 1” Asphalt (Full-Depth Crack)
	
Core PC-3, 2” Asphalt (Full-Depth Crack)	Core PC-4, 2 ¾” Asphalt (Full-Depth Crack)

	
Core PC-5, 3” Asphalt (Full-Depth Crack)	Core PC-6, 1 ¾” Asphalt (Full-Depth Crack)
	
Core PC-7, 2 ¼” Asphalt (Full-Depth Crack)	Core PC-8, 2 ¼” Asphalt (Full-Depth Crack)

Core PC-9, 2” Asphalt (Full-Depth Crack)

Core PC-10, 2” Asphalt (Full-Depth Crack)

Core PC-11, 1 ¾” Asphalt (Full-Depth Crack)


PC-1
PC-2
PC-3
PC-4
PC-5
PC-6
PC-7
PC-8
PC-9
PC-10
PC-11
Terracon
Rubonia Drainage Improvements
Manatee County, Florida
HC195005

All Cores

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

SITE LOCATION

Rubonia Drainage Improvements ■ Rubonia, Florida
March 8, 2019 ■ Terracon Project No. HC195005

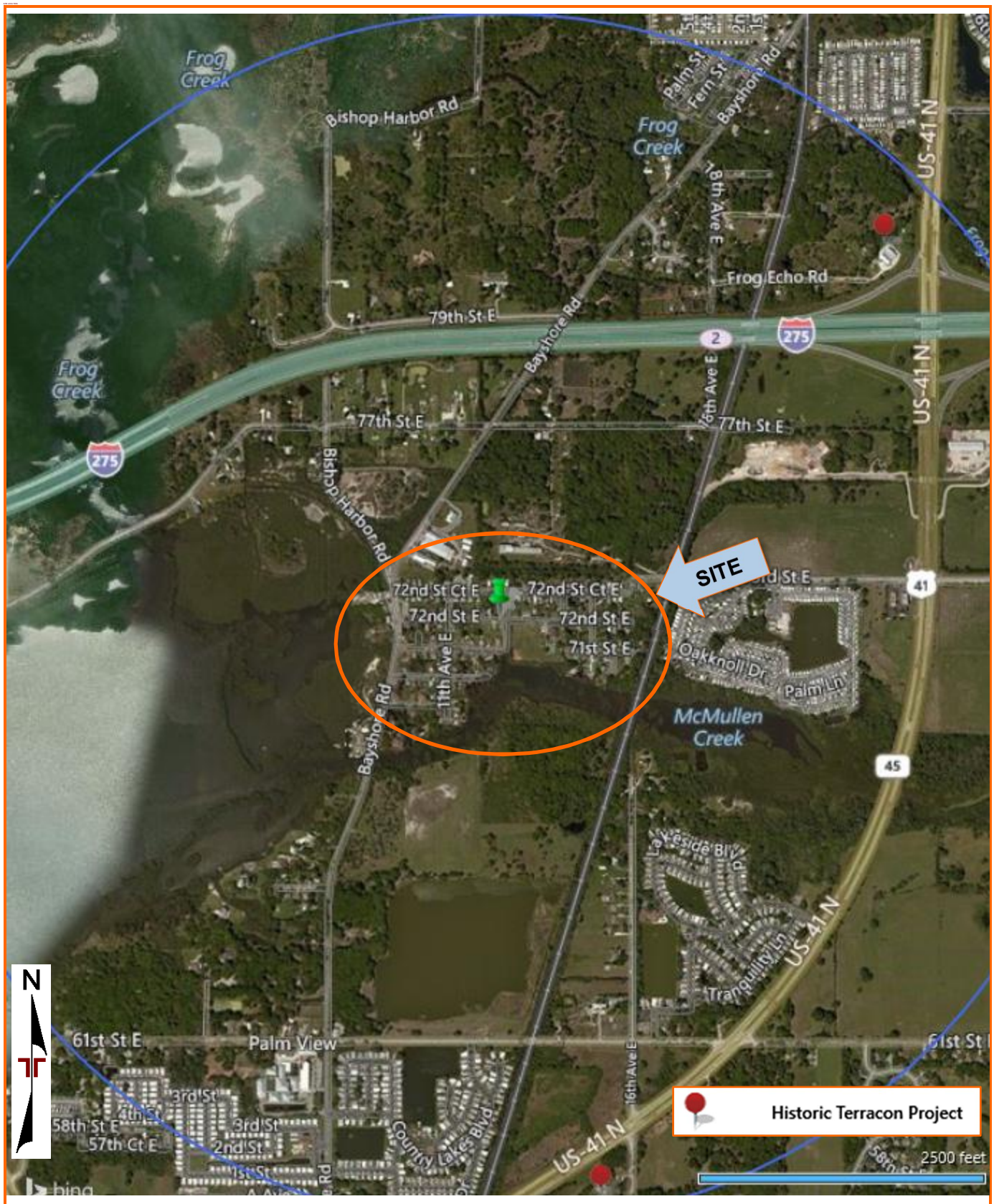


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Rubonia Drainage Improvements ■ Rubonia, Florida
March 8, 2019 ■ Terracon Project No. HC195005

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Coring Logs (PC-1 through PC-11)
Boring Logs (B-1 through B-3, AB-1 through AB-22)

Note: All attachments are one page unless noted above.

IFBC NO. 20-TA003370CD: BID ATTACHMENT 6

BORING LOG NO. PC-1

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.579° Longitude: -82.5528°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	DCP Index	Estimated LBR
	0.1	**ASPHALT**, 1.25" Asphalt, full-depth cracking						
	0.6	**POORLY GRADED SAND WITH SILT (SP-SM)**, with trace shell fragments, brown				27/6"	6	50
	2.1	**POORLY GRADED SAND WITH SILT (SP-SM)**, light brown to gray				22/6"	7	44
						25/6"	6	50
				▽		18/6"	8	38
		Boring Terminated at 2.1 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

27/6" - Indicates that 27 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

▽ *At 1.7' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. PC-2

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.579° Longitude: -82.5496°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	DCP Index	Estimated LBR
	0.1	**ASPHALT**, 1" Asphalt, full-depth cracking						
		POORLY GRADED SAND WITH SILT (SP-SM), with trace shell fragments, brown				50/3"	2	125
						44/6"	3	100
	1.1	**POORLY GRADED SAND WITH SILT (SP-SM)**, gray				20/6"	18	14
				▽		9/6"	17	15
	2.1	***Boring Terminated at 2.08 Feet***						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

44/6" - Indicates that 44 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

▽ *At 1.6' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. PC-3

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5784° Longitude: -82.5541°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	DCP Index	Estimated LBR
	ASPHALT, 2" Asphalt, full-depth cracking						
	0.2 **POORLY GRADED SAND WITH SILT (SP-SM)**, with trace shell fragments, brown				50/4"	2	125
					38/6"	4	75
	1.2 **POORLY GRADED SAND WITH SILT (SP-SM)**, dark gray to light brown				30/6"	5	63
			▽		11/6"	14	19
	2.2 ***Boring Terminated at 2.17 Feet***						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

38/6" - Indicates that 38 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

▽ *At 2' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. PC-4

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5785° Longitude: -82.5516°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	DCP Index	Estimated LBR
	0.2	**ASPHALT**, 2.75" Asphalt, full-depth cracking						
	1.2	**POORLY GRADED SAND WITH SILT (SP-SM)**, with trace shell fragments, brown				50/3.25"	2	125
						40/6"	4	75
	2.2	**POORLY GRADED SAND WITH SILT (SP-SM)**, grayish brown to dark brown				19/6"	8	38
						9/6"	17	15
		Boring Terminated at 2.23 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

40/6" - Indicates that 40 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. PC-5

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5783° Longitude: -82.5485°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	DCP Index	Estimated LBR
	ASPHALT, 3" Asphalt, full-depth cracking						
	0.3 **POORLY GRADED SAND WITH SILT (SP-SM)**, with trace shell fragments, brown				50/2.5"	1	125
	0.8 **POORLY GRADED SAND WITH SILT (SP-SM)**, dark gray to dark brown				12/6"	13	20
			▽		11/6"	14	19
					5/6"	30	8
	2.3 ***Boring Terminated at 2.25 Feet***						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

12/6" - Indicates that 12 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

▽ *At 1.7' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. PC-6

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.578° Longitude: -82.5532°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	DCP Index	Estimated LBR
	0.1	**ASPHALT**, 1.75" Asphalt, full-depth cracking						
		POORLY GRADED SAND WITH SILT (SP-SM), with trace shell fragments, brown to dark brown				50/3"	2	125
						50/3"	2	125
						21/6"	7	44
						17/6"	9	31
	2.1	***Boring Terminated at 2.15 Feet***						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

21/6" - Indicates that 21 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. PC-7

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5776° Longitude: -82.5525°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	DCP Index	Estimated LBR
	ASPHALT, 2.25" Asphalt, full-depth cracking						
	0.2						
	POORLY GRADED SAND WITH SILT (SP-SM), with trace shell fragments, brown, moderate cementation				50/3"	2	125
					18/6"	8	38
	1.2						
	POORLY GRADED SAND WITH SILT (SP-SM), dark brown				19/6"	8	38
					13/6"	12	23
	2.2						
	Boring Terminated at 2.19 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

18/6" - Indicates that 18 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. PC-8

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.578° Longitude: -82.5493°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	DCP Index	Estimated LBR
	ASPHALT, 2.25" Asphalt, full-depth cracking						
	0.2						
	POORLY GRADED SAND WITH SILT (SP-SM), with trace shell fragments, brown				50/4"	2	125
					34/6"	4	75
	1.2						
	POORLY GRADED SAND WITH SILT (SP-SM), tan and brown				17/6"	9	31
					18/6"	8	38
	2.2						
	Boring Terminated at 2.19 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

34/6" - Indicates that 34 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. PC-9

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5776° Longitude: -82.549°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	DCP Index	Estimated LBR
	ASPHALT, 2" Asphalt, full-depth cracking						
	0.2 **POORLY GRADED SAND WITH SILT (SP-SM)**, with trace shell fragments, brown				50/4.5"	2	125
					49/6"	3	100
	1.2 **POORLY GRADED SAND WITH SILT (SP-SM)**, gray and brown				18/6"	8	38
					17/6"	9	31
	2.2 ***Boring Terminated at 2.17 Feet***						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

49/6" - Indicates that 49 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. PC-10

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.577° Longitude: -82.5538°

DEPTH	Description	FIELD TEST RESULTS	DCP Index	Estimated LBR
0.2	**ASPHALT**, 2" Asphalt, full-depth cracking			
1.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, with trace shell fragments, brown, moderate cementation	50/1.5"	1	125
		50/3"	2	125
2.2	**POORLY GRADED SAND WITH SILT (SP-SM)**, gray and brown	9/6"	17	15
		17/6"	9	31
	Boring Terminated at 2.17 Feet			

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:
9/6" - Indicates that 9 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

At 2.2' While sampling

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. PC-11

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5763° Longitude: -82.5542°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	DCP Index	Estimated LBR
0.1		**ASPHALT**, 1.75" Asphalt, full-depth cracking						
0.6		**POORLY GRADED SAND WITH SILT (SP-SM)**, with trace shell fragments, brown, moderate cementation				50/4"	2	125
		POORLY GRADED SAND WITH SILT (SP-SM), gray and brown				21/6"	7	44
						11/6"	14	19
2.1				▽		15/6"	10	25
		Boring Terminated at 2.15 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Core through asphalt then hand auger

Abandonment Method:
Boring backfilled with auger cuttings and surface capped with cold mix asphalt patch

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

21/6" - Indicates that 21 blows of the DCP hammer were required to drive the tip 6 inches

WATER LEVEL OBSERVATIONS

▽ *At 2' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 01-28-2019 | Boring Completed: 01-28-2019

Drill Rig: | Driller: AH

Project No.: HC195005

BORING LOG NO. B-1

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5757° Longitude: -82.5542°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, dark gray to brown, loose to medium dense	5	▽		3-3-5-6 N=8				
							5-7-10-10 N=17		19		11
				10			5-5-5-8 N=10				
			- with shell fragments in the 13.5 foot sample				2-2-6 N=8		27		10
		17.5		15							
4			**WEATHERED LIMESTONE**, tan, medium hard				14-14-15 N=29				
		20.0	-16+/-	20							
			Boring Terminated at 20 Feet								

-13.5+/-

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, continous spoon from 4 to 10 feet, then mud rotary

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-04-2019	Boring Completed: 02-04-2019
Drill Rig: BR-2500	Driller: CH
Project No.: HC195005	

BORING LOG NO. B-2

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5759° Longitude: -82.5539°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0.0			▽			4			
				5			4-3-4-5 N=7				
							5-7-12-14 N=19				
				10			4-4-6-4 N=10				
				15			2-2-4 N=6				
3		17.5	-13.5+/-				5-7-8 N=15		30	NP	33
		20.0	-16+/-	20							

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, dark gray, dark brown, brown, and gray, loose to medium dense

- with shell fragments in the 13.5 foot sample

CLAYEY SAND (SC), light gray, medium dense

Boring Terminated at 20 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, continous spoon from 4 to 10 feet, then mud rotary

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-04-2019 | Boring Completed: 02-04-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. B-3

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.577° Longitude: -82.5486°

Approximate Surface Elev.: 2 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		2.0	0+/-		▽			3			
2		12.5	-10.5+/-	5			5-4-6-7 N=10				
							11-17-17-17 N=34				
				10			7-5-5-4 N=10				
3		20.0	-18+/-	15			6-7-7 N=14		25	34-18-16	47
				20			4-6-6 N=12				

CLAYEY SAND (SC), trace organics, fine grained, black

SILTY SAND (SM), fine grained, brown to gray, medium dense to dense

CLAYEY SAND (SC), fine grained, grayish brown, medium dense

Boring Terminated at 20 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, continous spoon from 4 to 10 feet, then mud rotary

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 1' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-04-2019 | Boring Completed: 02-04-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-1

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.579° Longitude: -82.5541°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0			▽				22		4
				5			3-3-5-6 N=8				
							6-6-8-12 N=14				
		8.0	-4+/-								

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, gray, dark brown, and brown, loose to medium dense

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 1.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-2

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5791° Longitude: -82.5524°

Approximate Surface Elev.: 5 (Ft.) +/-

DEPTH ELEVATION (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0	▽						
		5			3-5-5-7 N=10				
					6-7-9-10 N=16		21		10

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, gray, dark brown, and brown, medium dense

8.0 -3+/-

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-3

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.579° Longitude: -82.551°

Approximate Surface Elev.: 5 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0	5	5	▽			2			
							2-3-5-7 N=8				
							6-9-11-9 N=20				
		8.0	-3+/-								

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, dark brown, brown, and gray, loose to medium dense

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-4

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.579° Longitude: -82.5495°

Approximate Surface Elev.: 6 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, gray and brown		▽						
		2.0	4+/-								
2			**SILTY SAND (SM)**, fine grained, gray						21		28
		4.0	2+/-								
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, brown, loose to medium dense	5			3-4-4-7 N=8				
							5-8-8-10 N=16				
		8.0	-2+/-								
			Boring Terminated at 8 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-5

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5784° Longitude: -82.5542°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, brown								
		2.0	2+/-								
5			**POORLY GRADED SAND WITH SILT AND ORGANICS (SP-SM)**, fine grained, dark brown		▽			6			
		4.0	0+/-								
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, gray, loose	5			3-3-5-8 N=8				
							4-4-5-6 N=9				
		8.0	-4+/-								
			Boring Terminated at 8 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-6

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5787° Longitude: -82.5531°

Approximate Surface Elev.: 5 (Ft.) +/-

DEPTH ELEVATION (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		5	▽		4-5-8-8 N=13		22		6
					8-8-6-6 N=14				

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, gray and brown, medium dense

8.0 -3+/-

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 3.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-7

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5783° Longitude: -82.5526°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, gray								
		2.0	2+/-								
5			**POORLY GRADED SAND WITH SILT AND ORGANICS (SP-SM)**, fine grained, dark brown		▽			5			
		4.0	0+/-								
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, brown, medium dense	5			2-4-6-8 N=10				
							4-7-8-13 N=15				
		8.0	-4+/-								
			Boring Terminated at 8 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-8

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5784° Longitude: -82.5511°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0			▽						
				5			3-6-7-10 N=13		22		11
							4-9-9-9 N=18				
		8.0	-4+/-								

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, dark brown to gray, medium dense

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-9

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5786° Longitude: -82.5501°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, gray		▽						
		4.0	0+/-								
2			**SILTY SAND (SM)**, fine grained, gray, medium dense	5			3-4-6-10 N=10		21		14
		6.0	-2+/-								
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, gray, medium dense				6-8-10-10 N=18				
		8.0	-4+/-								
			Boring Terminated at 8 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 1' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-10

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5782° Longitude: -82.5496°

Approximate Surface Elev.: 5 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0.0	5	5	▽		4-6-6-8 N=12				
							5-7-12-12 N=19		21		12
		8.0	-3+/-								

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, brown to gray, medium dense

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-11

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5786° Longitude: -82.5493°

Approximate Surface Elev.: 6 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, dark brown to brown		▽			2			
		4.0	2+/-								
2			**SILTY SAND (SM)**, fine grained, gray, loose	5			3-4-5-7 N=9				
		6.0	0+/-								
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, gray, medium dense				5-5-9-11 N=14				
		8.0	-2+/-								
			Boring Terminated at 8 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 1' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-12

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5776° Longitude: -82.5541°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, brown		▽						
		2.0	2+/-								
5			**POORLY GRADED SAND WITH SILT AND ORGANICS (SP-SM)**, fine grained, dark brown					5			
		4.0	0+/-								
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, brown, medium dense	5			4-7-6-6 N=13				
							3-4-6-10 N=10				
		8.0	-4+/-								
			Boring Terminated at 8 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-13

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5775° Longitude: -82.5532°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, dark brown		▽			2			
		4.0	0+/-								
2			**SILTY SAND (SM)**, fine grained, gray, loose to medium dense	5			4-3-4-5 N=7		20		17
							6-7-8-10 N=15				
		8.0	-4+/-								
			Boring Terminated at 8 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-14

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5777° Longitude: -82.5526°

Approximate Surface Elev.: 3 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0			▽			2			
				5			5-6-8-12 N=14				
							10-11-10-9 N=21				
		8.0	-5+/-								

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, dark brown to gray, medium dense

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 1.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-15

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5778° Longitude: -82.5517°

Approximate Surface Elev.: 3 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		2.0	1+/-								
1		8.0	-5+/-	5	▽		1-2-2-2 N=4 4-6-6-7 N=12				

CLAYEY SAND (SC), fine grained, grayish brown

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, brown to gray, loose to medium dense

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 3.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: CH

Project No.: HC195005

BORING LOG NO. AB-16

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5775° Longitude: -82.5499°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0			▽						
				5			6-5-4-6 N=9		23		10
							9-7-8-11 N=15				
		8.0	-4+/-								

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, gray to brown, loose to medium dense

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 4' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: SK

Project No.: HC195005

BORING LOG NO. AB-17

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5774° Longitude: -82.5494°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0	4+/-								
			POORLY GRADED SAND WITH SILT (SP-SM), fine grained, brown								
		2.0	2+/-								
			Boring Terminated at 2 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Hand auger

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:
Boring terminated at 2 feet due to a utility conflict

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: SK

Project No.: HC195005

BORING LOG NO. AB-18

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5776° Longitude: -82.5485°

Approximate Surface Elev.: 4 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1			**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, light gray		▽						
		4.0	0+/-								
2			**SILTY SAND (SM)**, fine grained, gray, loose to medium dense	5			6-4-4-4 N=8				
							4-8-9-9 N=17		21		13
		8.0	-4+/-								
			Boring Terminated at 8 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 3.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: SK

Project No.: HC195005

BORING LOG NO. AB-19

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.577° Longitude: -82.5543°

Approximate Surface Elev.: 3 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0.0			▽			2			
			POORLY GRADED SAND WITH SILT (SP-SM), fine grained, dark brown to brown	5			3-5-3-3 N=8				
		6.0	-3+/-								
2			**SILTY SAND (SM)**, fine grained, gray, loose to medium dense				2-3-7-7 N=10				
		8.0	-5+/-								
			Boring Terminated at 8 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 4' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: SK

Project No.: HC195005

BORING LOG NO. AB-20

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5769° Longitude: -82.5527°

Approximate Surface Elev.: 3 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0			▽						
				5			3-5-5-7 N=10		21		11
							7-10-12-12 N=22				
		8.0	-5+/-								

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, dark brown to gray, medium dense

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 2' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: SK

Project No.: HC195005

BORING LOG NO. AB-21

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5762° Longitude: -82.5539°

Approximate Surface Elev.: 3 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0		5	▽		5-4-7-9 N=11				
							7-10-13-16 N=23				
		8.0	-5+/-								

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, gray to brown, medium dense

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 3.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: SK

Project No.: HC195005

BORING LOG NO. AB-22

PROJECT: Rubonia Drainage Improvements

CLIENT: Manatee County Government
Bradenton, FL

SITE: 72nd Street East
Palmetto, FL

LOCATION See Exploration Plan

Latitude: 27.5762° Longitude: -82.5532°

Approximate Surface Elev.: 3 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	ORGANIC CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0.0			▽						
				5			7-7-7-9 N=14		22		11
							8-9-12-10 N=21				
		8.0	-5+/-								

POORLY GRADED SAND WITH SILT (SP-SM), fine grained, brown to gray, medium dense

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Hand auger to 4 feet, then continuous spoon

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At 0.5' While sampling*

Terracon
8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 02-01-2019 | Boring Completed: 02-01-2019

Drill Rig: BR-2500 | Driller: SK

Project No.: HC195005

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

IFBC NO. 20-TA003370CD: BID ATTACHMENT

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING

- Auger Cuttings
- Rock Core
- Grab Sample
- No Recovery
- Shelby Tube
- Standard Penetration Test

WATER LEVEL

- **Water Initially Encountered**
- **Water Level After a Specified Period of Time**
- **Water Level After a Specified Period of Time**

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	**Hand Penetrometer**
(T)	**Torvane**
(DCP)	**Dynamic Cone Penetrometer**
(PID)	**Photo-Ionization Detector**
(OVA)	**Organic Vapor Analyzer**

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		**CONSISTENCY OF FINE-GRAINED SOILS** (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (psf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 500	0 - 1
Loose	4 - 9	Soft	500 to 1,000	2 - 4
Medium Dense	10 - 29	Medium Stiff	1,000 to 2,000	4 - 8
Dense	30 - 50	Stiff	2,000 to 4,000	8 - 15
Very Dense	> 50	Very Stiff	4,000 to 8,000	15 - 30
		Hard	> 8,000	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Terracon

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu ³ 4 and 1 £ Cc £ 3 [E]		GW	Well-graded gravel [F]
			Cu < 4 and/or [Cc<1 or Cc>3.0] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu ³ 6 and 1 £ Cc £ 3 [E]		SW	Well-graded sand [I]
			Cu < 6 and/or [Cc<1 or Cc>3.0] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above “A”		CL	Lean clay [K, L, M]
			PI < 4 or plots below “A” line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above “A” line		CH	Fat clay [K, L, M]
			PI plots below “A” line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add “with cobbles or boulders, or both” to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ³ 15% sand, add “with sand” to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add “with organic fines” to group name.

[I] If soil contains ³ 15% gravel, add “with gravel” to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add “with sand” or “with gravel,” whichever is predominant.

[L] If soil contains ³ 30% plus No. 200 predominantly sand, add “sandy” to group name.

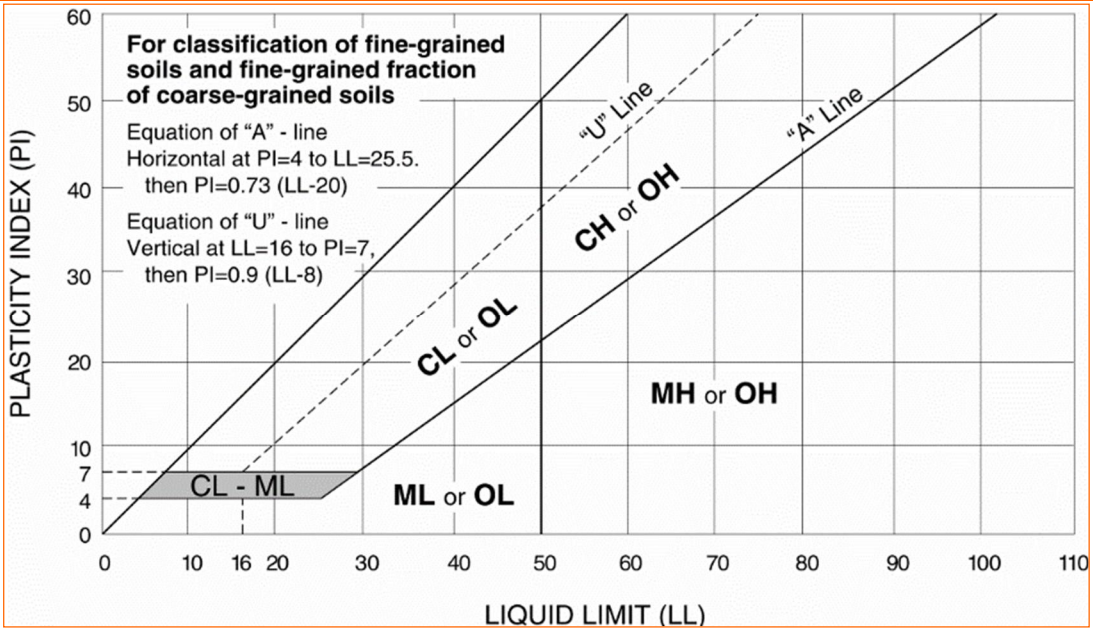
[M] If soil contains ³ 30% plus No. 200, predominantly gravel, add “gravelly” to group name.

[N] PI ³ 4 and plots on or above “A” line.

[O] PI < 4 or plots below “A” line.

[P] PI plots on or above “A” line.

[Q] PI plots below “A” line.



DESCRIPTION OF ROCK PROPERTIES

WEATHERING	
Fresh	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer if crystalline.
Very slight	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
Slight	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 in. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.
Moderate	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.
Moderately severe	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick.
Severe	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
Very severe	All rock except quartz discolored or stained. Rock "fabric" discernible, but mass effectively reduced to "soil" with only fragments of strong rock remaining.
Complete	Rock reduced to "soil". Rock "fabric" no discernible or discernible only in small, scattered locations. Quartz may be present as dikes or stringers.

HARDNESS (for engineering description of rock – not to be confused with Moh's scale for minerals)	
Very hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
Moderately hard	Can be scratched with knife or pick. Gouges or grooves to ¼ in. deep can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 in. deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1-in. maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1-in. or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

Joint, Bedding, and Foliation Spacing in Rock [1]

Spacing	Joints	Bedding/Foliation
Less than 2 in.	Very close	Very thin
2 in. – 1 ft.	Close	Thin
1 ft. – 3 ft.	Moderately close	Medium
3 ft. – 10 ft.	Wide	Thick
More than 10 ft.	Very wide	Very thick

1. Spacing refers to the distance normal to the planes, of the described feature, which are parallel to each other or nearly so.

Rock Quality Designator (RQD) [1]

RQD, as a percentage	Diagnostic description
Exceeding 90	Excellent
90 – 75	Good
75 – 50	Fair
50 – 25	Poor
Less than 25	Very poor

1. RQD (given as a percentage) = length of core in pieces 4 inches and longer / length of run

Joint Openness Descriptors

Openness	Descriptor
No Visible Separation	Tight
Less than 1/32 in.	Slightly Open
1/32 to 1/8 in.	Moderately Open
1/8 to 3/8 in.	Open
3/8 in. to 0.1 ft.	Moderately Wide
Greater than 0.1 ft.	Wide

References: American Society of Civil Engineers. Manuals and Reports on Engineering Practice - No. 56. Subsurface Investigation for Design and Construction of Foundations of Buildings. New York: American Society of Civil Engineers, 1976. U.S. Department of the Interior, Bureau of Reclamation, Engineering Geology Field Manual.