MANATEE COUNTY

March 24, 2014

TO: All Interested Bidders:

SUBJECT: Invitation for Bid #14-0684-OV, Southeast Water Reclamation Facility (SEWRF) Dedicated Reject Line (Manatee County, FL (Project No.: 6083680)

ADDENDUM #2
Bidders are hereby notified that this Addendum shall be acknowledged on page 00300-1 of the Bid Form and made a part of the above named bidding and contract documents. Bids submitted without acknowledgement of the Addendum will be considered incomplete.

The following items are issued to add to, modify, and clarify the bid and contract documents. These items shall have the same force and effect as the original bidding document, and cost involved shall be included in the bid prices. Bids to be submitted on the specified bid date, shall conform to the additions and revisions listed herein.

The deadline of March 17, 2014 to submit all inquiries concerning interpretation, clarification or additional information for this bid has lapsed. This deadline has been established to maintain fair treatment for all potential bidders, while maintaining the expedited nature of the Economic Stimulus that the contracting of this work may achieve.

As a result of the questions received from the Bidders at the Information Conference held on March 5, 2014 and questions received via email through March 17, 2014, the following responses have been provided by Cardno TBE, the Engineer of Record.

Note #1:

Delete	Bid Opening, March 26, 2014 at 3:45 PM
and	
Replace	BID OPENING, APRIL 1, 2014 @ 3:00 pm

Note #2:
Delete Bid Form provided with original Invitation for Bid.
and
Replace with Bid Forms (Bid "A" and Bid "B") which are made a part of Addendum #2.
(4 pages)

Financial Management Department, Purchasing Division
1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205
WEB: www.mymanatee.org *PHONE: 941-749-3014 * FAX: 941-749-3034

SUBJECT: Invitation for Bid #14.0684-OV, Southeast Water Reclamation Facility (SEWRF) Dedicated Reject Line (Manatee County, FL (Project No.: 6083680)
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Note #3:
Delete: Plan Sheets C-1, C-3, C-4 and C-6 provided with the original Invitation for Bid.
and
Replace with Plan Sheets C-1, C-3, C-4 and C-6 **(via pdf)** which are made a part of Addendum #2. (4 pages)

Note #4:
ADD: Geotechnical Investigation Report prepared by MC Squared, Inc., dated October 10, 2013. (Attachment "A", 31 pages)

Note#5:
Response to Questions received:

1. Reference specifications Section 02615, DUCTILE IRON PIPE AND FITTINGS, since bid item 2.1 requires factory manufactured restrained joint pipe, what class or pressure class pipe are we to furnish, will it be different than the Class 50 or Pressure Class 350 this specification is requiring? The MEASUREMENT AND PAYMENT SECTION, page 32/197, par. 3.02-A for Bid Item 2.1 tells us to furnish and install Pressure Class 350, please clarify.

   Response: Ductile iron pipe (below ground and above ground) shall be Pressure Class 350.

2. Reference specifications Section 02615, DUCTILE IRON PIPE AND FITTINGS, the specifications do not indicate what type of lining we are to furnish for a "REJECT LINE", please clarify. Also, what color polywrap and what color will the above ground piping have to be painted?

   Response: All ductile iron pipe and fittings shall have a standard thickness cement lining on the inside in accordance with AWWA/ANSI C104/A21.4 and a coal tar enamel coating on the outside. The coal tar enamel shall be in accordance with ANSI A21.4. Black polywrap shall be used and above ground piping shall be painted black. Above ground piping shall be labeled with product type ("REJECT") and flow directional arrows, as approved by the County.

3. Reference bid form, bid item 2.3, 24-Inch Plug Valve Assembly, are these four (4) valves all to have electronic motor-driven valve actuators? Specification Section 01150, MEASUREMENT AND PAYMENT, p. 33/197, par. 3.04, for BID ITEM NO. 2.3 makes no reference to electronic motor-driven valve actuators, please clarify.

   Response: No, these are manual valves.

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4. Reference Specifications Section 01150, MEASUREMENT AND PAYMENT, p. 34/197, par.3.06, ELECTRICAL/SCADA, the description for this item tells us we are to furnish and install all electrical and SCADA work and SCADA programming for this item. This contradicts specification Section 13300, p. 179/197, par. 'C', that speaks to The SYSTEM INTEGRATOR that is to be (under a separate Manatee County contract), please review this bid items description.

Response: REF: Measurement and Payment Section 01150, Paragraph 3.06, Bid Item No. 2.6, ELECTRICAL/SCADA: Remove Paragraph "A": "This bid item describes measurement and payment for furnishing and installing all required electrical and SCADA work related to the electric actuated valves and SCADA programming as shown on the Contract Drawings and Technical Specifications:

REPLACE PARAGRAPH "A" as follows: "This bid item describes measurement and payment for furnishing and installing all required electrical and SCADA equipment related to the electric actuated valves as shown on the Contract Drawings and Technical Specifications. SCADA programming shall be provided by Others (Systems Integrator) under separate Contract with Manatee County."

5. Reference specifications Section, 01150, MEASUREMENT AND PAYMENT, p. 32/197, par. 3.02-C, tells us we are to "Pig" the pipeline, a "Pig" will not pass through a plug valve, please delete this pigging requirement.

Response: Pigging is required as specified.

6. Reference specifications Section 01150, MEASUREMENT AND PAYMENT, p. 33/197, par. 3.03, for BID ITEM 2.2, and bid form bid item 2.2, is the bid quantity of 10.10-Ton for fittings based on C-110 or C-153 fitting weight? It makes a difference when compensating the Contractor. Please clarify.

Response: C-153 fittings are acceptable and will be paid for per the actual tonnage.

7. Reference plan sheet C-4, station 1+17, 90 degree MJ bend, with center line elevation 41.9, shouldn't this be a flanged 90 degree bend? Please clarify.

Response: Yes, please see revised Plan Sheet C-4.

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8. Reference plan sheets C-1 and C-4, at approximately station 3+00, sheet C-1 shows two (2) each 24-inch 22.5 degree bends where sheet C-4 shows these fittings as 24-inch 45 degree bends, what are we bidding on? Please clarify.

Response: Sheet C-1, change the two (2) 24-inch 22.5 degree bends to two (2) 24-inch 45 degree bends.

9. Reference specifications Section 01150, MEASUREMENT AND PAYMENT, p. 34/197, par. 3.05, sub-par. 'C', this paragraph tells us we are to furnish all fittings and valves for these connections, there are two (2) 24-inch flanged valves to be installed at the Westerly connection and these two (2) valves are included in the bid quantity for bid item 2.3, please correct the quantity for bid item 2.3.

Response: See revised Bid Form.

10. Reference Bid Form, bid item 2.2, the bid quantity is high and does not reflect the tonnage of fittings shown on the plans, this needs to be corrected and should reflect the weight if fittings are to be C-110 or C-153. Please review. The flanged fittings at the Westerly Connection are being paid in the bid item for that connection and should not be included in the weight for bid item 2.2.

Response: See revised Bid Form.

11. Reference plan sheet C-3, at the Westerly Connection to Existing, will flanged coupling adaptors be allowed to facilitate assembly of the flange pipe and fittings? Also, some dimensions from top 90 degree bend to center of 30"x24" tee and from 30-inch welded on flange to the 24-inch welded on flange is what we will need for flanged pipe to make the connection and closure, please provide.

Response: Flanged Coupling Adaptors are allowed. See revised sheet with added dimensions.

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12. Please clarify the extent of restrained joints required for the buried piping. We understand all fittings are to be restrained however the plans nor the specification specify if all the underground pipe joints are to be restrained joints. Typically in long runs of pipe it is restrained so many feet from each fittings per DIPRA table or per engineer's restraint chart. Please clarify if all joints are to be restrained or provide restraint table. Will U.S. Pipe "Field-Lok" gaskets or American "Fast-Grip" gaskets be an acceptable means of restraining the ductile iron joints?

Response: All below ground pipe on the project shall be restrained. The Contractor shall utilize either Fastite Joint Pipe with Fast Grip Gasket or Flex-Ring Joint Pipe by American; TRFlex or Field-Lok 350 Gasket by US Pipe; or equivalent.

13. Plug valve specification starting on page 121 states that valves 24" and larger shall have a minimum port area between 80 and 100 percent of nominal pipe area. The two specified brands (Kennedy and DeZurik) can provide either standard port (72%) or full port (100%) of pipe area. Please specify if you want standard port or 100% port.

Response: Plug valves shall be full port 100% pipe area.

14. Ductile pipe specification on page 109 requires that all gaskets 16" and larger are to be EPDM. This is a significant cost adder to the project. For this type of service EPDM provides no benefit over the industry standard SBR gaskets. Will SBR gaskets be acceptable for use on this project?

Response: Gaskets shall be EPDM.

15. At the Easterly Connection when the demo on the 24" dip happens does the contractor haul off materials or does the county want to keep the material?

Response: The Contractor shall retain all excess or demolished material.

16. The plans don't show any air release valves do you want to put them in and how many and where?

Response: No air release valves are to be provided.

17. Does the county have as-built of the existing underground utility on site?

Respnse: No "as-built" data is available. Locations, elevations, and dimensions of existing utilities, structures, and other features are shown according to the best information available at the time of preparation of the plan, but do not purport to be absolutely correct. The Contractor shall verify the location, elevations, and dimensions of all existing utilities, structures, and other features affecting the Work prior to Construction.

18. On the road crossings will the contractor have to mill back 25 feet from each side of ditch?

Response: No. See revised detail for road crossing.

19. Has any consideration been given to the added weight that the tee, reducer and valve will add to the stainless steel pipe? These three (3) items alone will weigh approximately 7,000-pounds.

Response: The proposed structures are adequate to support the added weight.

20. Are the underground electrical duct banks required to be concrete encased? If so, please provide a detail.

Response: The underground electrical duct banks are required to be concrete encased.

- ***Duct banks shall be installed at a minimum of 24" below finished grade.***
- ***Concrete shall be 3,000 PSI minimum compression strength.***
- ***All spare conduits shall include a pull wire and shall be capped.***
- ***Provide #4 rebars (typical).***
- ***Provide #4 hoop at 24" O.C..***
- ***Duct banks may be rearranged for convenience of egress.***

21. Reference plan sheet E-5, DUCTBANK SECTION 'A' and DUCTBANK SECTION 'B', are these conduits to be encased in concrete? Please clarify. At the site visit last Monday, March 10, 2014, I had opportunity to view an open excavation at the area of some buried electrical conduits and none of those were encased in concrete.

Response: See response to Question #24.

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22. Reference plan sheet E-4, GENERAL NOTES, Note 1, this note tells us the schematic presented is based on the typical configuration of a specific manufacturer, who is this manufacturer?

Response: Limitorque.

23. Reference plan sheet E-2, KEY NOTES, Notes 3, 4, and 5, these notes tell us to install 3/4-inch conduits, this is contradictory to what the specifications tell us to install 1-inch. Please clarify.

Response: Provide 1" conduit.

24. Please verify the thickness class and lining required for the underground ductile iron pipe

Response: Ductile iron pipe (below ground and above ground) shall be Pressure Class 350. Pipe and fittings shall have cement mortar lining.

25. Please confirm that the warranty for all items supplied on this project is intended to be 3 years, as indicated in specification section 01030, and other locations in the documents.

Response: The warranty for all items shall be 3 years.

26. Measurement and Payment specification section 01150.3.04 & 3.06 describe payment for the electric actuators on the valves. Which item do you prefer the cost of the valve actuators be included? Bid Form Item #2.3, the 24" valve price, or with item #2.6 the Electrical/ SCADA price?

Response: Include cost for actuator in valve bid item.

27. Please clarify if the new reject line is considered a "sewer" line or a "re-use" line. The intent being to clarify if the pipe is cement lined, not poly lined, if purple or green polywrap is used, and other identification colors and identifications. (Spec sections 02615 & 02617)

Response: Pipe and fittings shall be cement lined. Polywrap and paint color of above-ground piping shall be black.

28. Please clarify if plant water will be provided for testing and a water supply for Pigging of the line, as described in specification section 02618.

Response: Plant reclaimed water is available for pigging at no cost to the Contractor.

29. Is there a soils report for the project, or some indicator for this project, or even for the facility, of where the ground water elevation may be expected? That would be useful in estimating the extent of dewatering for the pipeline installation.

Response: A soils report will be made available for information only.

30. Reference plan sheet C-3, WESTERLY CONNECTION TO EXISTING, how much time will we have to cut into the stainless steel pipe and install new fittings and valve? How long can the stainless steel pipe line be shut down?

Response: Contractor will have 24 hours to complete the westerly tie-in.

31. How long can you shut down the Westerly Connection so we can weld the Stainless Steel flanges on and hook up?

Response: Contractor will have 24 hours to complete the westerly tie-in.

32. Reference plan sheet C-3, detail for Westerly Connection to Existing, need more information about the stainless steel welded on flanges, what rating, 150 or 250? Also, need a welding specification and if welds need to be x-rayed who is responsible for having this done and who pays? What grade stainless steel is the existing pipe the flanges are being welded on to?

Response: Contractor shall confirm grade of existing stainless steel and rating of the stainless steel flanges prior to Construction. Welding to be x-rayed by Contractor and cost shall be included in bid.

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33. Specification section 01150 Measurement & Payment gives details as to what will be paid for as bid item 2.3 the 24" plug valves. The quantity on the bid form is 4 each, 24" plug valves. On the drawings I follow that there are 2 MJ valves around station 5+00, and 2 Flanged valves at the Westerly connection. I believe the electric actuators are intended to be paid for with bid item 2.6 electrical. Please clarify if the 2 Flanged 24" valves should be included on the bid form, and thus paid with item 2.3 for the valves, or with item 2.5 for the westerly connection.

Response: Please see previous responses and updated bid documents.

34. Bid Item #2.1 is for the 24" pipe. a quantity of 1910 LF is given. What quantity of the pipe will be paid for the westerly and easterly connections (#2.5 & 2.4), and what quantity as restrained joint or flanged pipe with item #2.1. I see on the drawings the 24" from station 1+00 to about 19+60. That is 1860 LF of stations. Would the amount paid for be less, if some of the pipe is assumed to be included as part of the connection pipe

Response: Please see previous responses and updated bid documents.

35. Bid Item 2.2 is for the Ductile Iron Fittings. A quantity of 10.1 tons is given. Should fittings associated with the easterly and westerly connections be included with the connections or with the fitting tonnage? If not all with the fitting tonnage, where is the split? If no fittings change from the bid documents will the payment for those items still is adjusted based on tonnage of fittings installed? It may also vary with MJ fittings with megalugs, or restrained joint fittings. The tonnage on the current bid drawings is less than the bid form. Payment would be for less than the extended total, but could be even less if some tonnage (like the flanged fittings) is considered part of the connection pay items.

Response: Please see previous responses and updated bid documents. Payment will be made on tonnage of actual fittings installed.

36. Can you provide a pipe restraint table?

Response: All pipe shall be restrained.

37. Is there a source of water that is sufficient for pigging the 24" pipe? Is the Contractor responsible to pay for this water? If so, what is the cost of the water?

Response: Plant water (i.e. reclaimed water) is available to the Contractor at no cost.

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38. Is the Contractor responsible for removal of topsoil prior to construction and replacement of the topsoil after construction and prior to sod placement?

Response: Yes.

If you have submitted a bid prior to receiving this addendum, you may request in writing that your original, sealed bid be returned to your firm. All sealed bids received will be opened on the date stated.

END OF ADDENDUM #2

Bids will be received at the **Manatee County Purchasing Division, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205 on April 1, 2014 until 3:00 PM.**

Sincerely,

Melissa M. Wendel, CPPO, Purchasing Official
Manatee County Purchasing Division

/OV
(35 pages attached)
(4 Plan Sheets C-1,C-3,C-4,C-6 via pdf)

BID FORM
(Submit in Triplicate)

SOUTHEAST WATER RECLAMATION FACILITY (SEWRF) DEDICATED REJECT LINE, MANATEE COUNTY, FL (PROJECT NO.:6083680)
IFB #14-0684-OV
ADDENDUM #2 (3.19.2014)

BID "A" Based on Completion time of 120 Calendar Days

ITEM #	DESCRIPTION	U/M	QTY.	BID PRICE PER UNIT	TOTAL BID PRICE
1.0	**Mobilization and Demobilization**	LS	1	$	$
2.0	**WATER MAIN**				
*2.1	**Furnish & Install 24-Inch Ductile Iron Pipe with Manufactured Restrained Joints (Addendum #2)**	LF	1860	$	$
*2.2	**Furnish & Install Ductile Iron Fittings (Addendum #2)**	TONS	5.0	$	$
*2.3	**Furnish & Install 24-Inch Plug Valve Assembly Complete (Addendum #2)**	EA	2	$	$
2.4	Furnish & Install Connection to Existing Reclaim/Reject Line Complete (Easterly)	LS	1	$	$
2.5	Furnish & Install Connection Reclaim/Reject Line Complete (Westerly)	LS	1	$	$
2.6	Electrical / SCADA	LS	1	$	$

BID FORM
(Submit in Triplicate)

SOUTHEAST WATER RECLAMATION FACILITY (SEWRF) DEDICATED REJECT LINE, MANATEE COUNTY, FL (PROJECT NO.:6083680)
IFB #14-0684-OV
ADDENDUM #2 (3.19.2014)

BID "A" Based on Completion time of 120 Calendar Days

ITEM #	DESCRIPTION	U/M	QTY.	BID PRICE PER UNIT	TOTAL BID PRICE
3.0	**MISCELLANEOUS**				
3.1	Miscellaneous Concrete	CY	50	$	**$**
3.2	Unsuitale Material Removal	CY	100	$	$
3.3	Additional Select Fill Material	CY	100	$	$
	TOTAL BASE BID				$
4.0	**CONTRACT CONTINGENCY**	%	10		**$**
	TOTAL CONTRACT AWARD - SOUTHEAST WATER RECLAMATION FACILITY (SEWRF) DEDICATED REJECT LINE (Bid "A") Based On Completion Time of 120 Calendar Days)(Addendum #2)				$

Bidder:_____

Authorized
Signature:_____

Bid "A"

BID FORM
(Submit in Triplicate)

SOUTHEAST WATER RECLAMATION FACILITY (SEWRF) DEDICATED REJECT LINE, MANATEE COUNTY, FL (PROJECT NO.:6083680)
IFB #14-0684-OV
ADDENDUM #2 (3.19.2014)

BID "B" Based on Completion time of 180 Calendar Days

ITEM #	DESCRIPTION	U/M	QTY.	BID PRICE PER UNIT	TOTAL BID PRICE
1.0	**Mobilization and Demobilization**	LS	1	$	$
2.0	**WATER MAIN**				
*2.1	**Furnish & Install 24-Inch Ductile Iron Pipe with Manufactured Restrained Joints (Addendum #2)**	LF	1860	$	$
*2.2	**Furnish & Install Ductile Iron Fittings (Addendum #2)**	TONS	5.0	$	$
*2.3	**Furnish & Install 24-Inch Plug Valve Assembly Complete (Addendum #2)**	EA	2	$	$
2.4	Furnish & Install Connection to Existing Reclaim/Reject Line Complete (Easterly)	LS	1	$	$
2.5	Furnish & Install Connection Reclaim/Reject Line Complete (Westerly)	LS	1	$	$
2.6	Electrical / SCADA	LS	1	$	$

Bidder:_____

Authorized
Signature:_____

Bid "B"

BID FORM
(Submit in Triplicate)

SOUTHEAST WATER RECLAMATION FACILITY (SEWRF) DEDICATED REJECT LINE, MANATEE COUNTY, FL (PROJECT NO.:6083680)
IFB #14-0684-OV
ADDENDUM #2 (3.19.2014)

BID "B" Based on Completion time of 180 Calendar Days

ITEM #	DESCRIPTION	U/M	QTY.	BID PRICE PER UNIT	TOTAL BID PRICE
3.0	**MISCELLANEOUS**				
3.1	Miscellaneous Concrete	CY	50	$	**$**
3.2	Unsuitale Material Removal	CY	100	$	$
3.3	Additional Select Fill Material	CY	100	$	$
	TOTAL BASE BID				$
4.0	**CONTRACT CONTINGENCY**	%	10		**$**
	TOTAL CONTRACT AWARD - SOUTHEAST WATER RECLAMATION FACILITY (SEWRF) DEDICATED REJECT LINE (Bid "B") Based On Completion Time of 180 Calendar Days)(Addendum #2)				

Bidder:_____

Authorized
Signature:_____

Bid "B"

ATTACHMENT 'A'
(31 Pages)

MC Squared, Inc

Geotechnical Investigation Report

Southeast Water Reclamation Facility Reject Line
Manatee County, Florida

Prepared for: **Cardno TBE**
330 Park Place Blvd., Suite 300
Clearwater, Florida 33759

Prepared By:
MC Squared, Inc
5808 – A Breckenridge Parkway
Tampa, Florida 33610

Project No. T121212.253
October 2013

MC²

GEOTECHNICAL • ENVIRONMENTAL
MATERIALS TESTING

GEOTECHNICAL • ENVIRONMENTAL
MATERIALS TESTING

October 10, 2013

Mr. David O'Connor, P.E., BCEE
Assistant Director
Cardno TBE
330 Park Place Blvd., Suite 300
Clearwater, FL 33759

Geotechnical Engineering Services Report
Southeast Water Reclamation Facility Reject Line
Manatee County, Florida
MC² Inc. Project No. T121212.253

MC Squared, Inc. (**MC²**) has completed the geotechnical engineering services for the referenced project. This study was performed in general accordance with **MC²** proposal No. T121212.253 dated February 21, 2013. The services were authorized with a subcontract agreement between **MC²** and **Cardno TBE.** The results of this exploration, together with our recommendations, are included in the accompanying report.

We trust that this report will assist you in the design and construction of the proposed project. We appreciate the opportunity to be of service on this project. Should you have any questions, please do not hesitate to contact us.

Respectfully submitted,
MC²

Kermit Schmidt, PE
Vice President/Chief Engineer
Florida License No. 45603

William Rovira, PE
Project Engineer

Sameer Moussly
CEO

5808 – A Breckenridge Parkway, Tampa, Florida 33610
Phone (813) 623-3399, Fax (813) 623-6636
www.mc2engineers.com

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APPENDIX A

4. Performed three (3) hand auger borings to a depth of 5 feet below the existing ground surface at the locations requested by **Cardno TBE**. These borings were labeled **AB-1R through AB-3R.**

5. Performed three (3) pavement cores at the locations selected by **Cardno TBE.** The pavement cores were labeled **PC-1R through PC-3R.**

6. Visually examined all recovered soil samples in the laboratory and performed laboratory tests on select representative samples to develop the soil legend for the project using the Unified Soil Classification System. A limited laboratory testing program consisting of percent passing the No. 200 sieve and natural moisture contents was performed.

The data was used in performing engineering evaluations, analyses, and for developing geotechnical recommendations in the following areas:

1. General assessment of area geology based on our past experience, study of geological literature and boring information.

2. General location and description of potentially deleterious materials encountered in the borings, which may interfere with the proposed construction or performance, including existing fills or surficial organics.

3. Discuss critical design and/or construction considerations based on the soil and groundwater conditions developed from the borings including excavation difficulties, dewatering and hard/dense soil conditions, etc.

4. Address groundwater levels in the borings and estimate seasonal high groundwater.

5. Suitability and availability of materials on-site that may be moved during site grading for use as structural fill and as pipe backfill.

6. Pipe bedding recommendations.

7. Recommendations for construction including a summary report which includes a summary of findings and analysis.

The approximate locations of the borings and the soils profiles are shown on the **Boring Location Plan and Report of Core Borings, Sheets 1 through 4** in **Appendix A**.

The scope of our services did not include an environmental assessment for determining the

presence or absence of wetlands, hazardous or toxic materials in the soil, bedrock, groundwater, or air on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors, unusual or suspicious items, or conditions are based on observations at the time of drilling.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 Existing Ground Surface at the Boring Locations

Boring ground surface elevations were obtained from a spot elevation drawing provided by **Cardno TBE** and are approximate.

2.2 Manatee County Soil Survey

The U.S. Department of Agriculture - Soil Conservation Service, now known as Natural Resources Conservation Service (NRCS), has mapped the shallow soils in this area of Manatee County. This information was outlined in a report titled *The Soil Survey of Manatee County, Florida* using Version 8, dated July 6, 2012. The aerial images were photographed in February 10, 2010. The proposed reject water pipeline alignment is within areas mapped as EauGallie fine sand (No. 20). Small areas of other similar and dissimilar soils may be present in the mapping unit.

Typically the surface layer of the EauGallie soil is black fine sand. The surface layer is underlain by gray fine sand to a depth of 22 inches. Dark reddish brown sand grading to dark brown fine sand is usually indicated to a depth of 44 inches and is followed by gray fine sand. From depths of 48 to 66 inches, grayish brown sandy loam occurs, which grades to gray sandy loam that continues to a depth of about 80 inches or more. The EauGallie soil in its natural state has a seasonal high water table at a depth of 6 to 18 inches for 1 to 3 months and within a depth of 40 inches for 2 to 6 months. The water table recedes to a depth of more than 40 inches during extended dry periods. This soil and the estimated SHWT are summarized in **Table 1 in Appendix A.**

The USDA Soil Survey is not necessarily an exact representation of the soils on the site. The mapping is based on interpretation of aerial maps with scattered shallow borings for confirmation. Accordingly, borders between mapping units are approximate and the change may be transitional. Differences may also occur from the typical stratigraphy, and small areas of other similar and dissimilar soils may occur within the soil-mapping unit. As such, there may be differences in the mapped description and the boring descriptions obtained for this report. The survey may, however, serve as a good basis for evaluating the shallow soil conditions of the area.

2.3 SUBSURFACE CONDITIONS (SPT AND HAND AUGER BORINGS)

The subsurface conditions were explored by drilling two (2) SPT borings to depths of 15 feet below the existing ground surface (BGS). The borings were located in the field by **MC^2** personnel, based on information provided by **Cardno TBE**.

The SPT borings were conducted in general accordance with ASTM D-1586 (Standard Test Method for Penetration Test and Split Barrel Sampling of Soils) using the rotary wash method, where a clay slurry ("drill mud" or "drill fluid") was used to flush and stabilize the borehole. The initial 4 or 6 feet of the borings was advanced with a hand auger to further explore for underground utilities. Afterwards, Standard Penetration sampling was performed at closely spaced intervals in the upper 10 feet and at 5-foot intervals thereafter. After seating the sampler 6 inches into the bottom of the borehole, the number of blows required to drive the sampler one foot further with a standard 140 pound hammer is known as the "N" value or blowcount. The blowcount has been empirically correlated to soil properties. The recovered samples were placed into containers and returned to our office for visual review.

A total of three (3) hand auger borings were performed to a depth of 5 feet below the existing grades. The hand auger borings were performed by manually twisting and advancing a bucket auger into the ground in 4 to 6-inch increments. As each soil type was revealed, representative samples were placed in air-tight jars and returned to the **MC^2** Tampa office for review by a geotechnical engineer and confirmation of the field classification. The approximate boring locations are presented on the **Boring Location Plans, Sheets 1 through 3** in **Appendix A.**

Select soil samples were tested in the laboratory to determine material properties for our evaluation. The subsurface descriptions discussed below are of a generalized nature to highlight the major subsurface stratification features and material characteristics noted. The soil profiles included in the **Report of Core Boring, Sheet 4** in **Appendix A** should be reviewed for specific information at individual boring locations. These profiles include soil descriptions, stratification, and penetration resistances. The stratifications shown on the boring profiles represent the conditions only at the actual boring location. Variations may occur and should be expected between boring locations.

SPT Borings B-1R and B-2R

In general, the soil profiles in the borings are consistent and indicated brown, (No N-value in the top 4 and 6 feet, assumed very loose) very loose to medium dense fine sands to slightly silty fine sands to slightly clayey fine sand (SP/SP-SM/SP-SC) extending from the existing ground surface to a depth of 12.0 feet. These sands were followed by pale brown to gray

very loose to loose, clayey fine sands (SC), with traces of some phosphate, extending to the boring termination depth of 15 feet.

Hand Auger Borings AB-1R through AB-3R

In general, the borings indicated brown, light brown or dark brown, fine sands to slightly silty fine sands to slightly clayey fine sand (SP/SP-SM/SP-SC) extending from the existing ground surface to the boring termination depth of 5.0 feet.

2.4 GROUNDWATER INFORMATION

The groundwater table was not encountered within depths of 5 feet in hand auger borings AB-1R through AB-3R. In addition, the SPT borings are performed using mud-rotary drilling methods which may yield an inaccurate measurement of the stabilized water level at the time of drilling. In addition, the SPT borings are filled with cement grout-bentonite chips upon completion; as a result, a stabilized water table reading is not generally obtained in these borings. However, for information only, the groundwater levels encountered at the time of our drilling is summarized in **Table1 in Appendix A**. The water table can be different at other times and will fluctuate seasonally based on rainfall quantities, the water level in the nearby canals, surface drainage conditions and other factors. Based on our review of the Soil Survey of Manatee County, Florida and soil samples collected in the field, we estimate the Seasonal High Water to be at the depths below the existing ground surface listed in **Table 1.**

It should be noted that groundwater levels tend to fluctuate during periods of prolonged drought and extended rainfall and may be affected by man-made influences. In addition, a seasonal effect will also occur in which higher groundwater levels are normally recorded in rainy seasons.

The groundwater levels presented in this report are the levels that were measured at the time of our field activities. Fluctuation should be anticipated. We recommend that the Contractor determine the actual groundwater levels at the time of construction to better determine groundwater impact on the construction procedure.

The approximate locations of the borings and soils profiles (showing the groundwater table at the time of our drilling) are shown on the **Boring Location/Report of Core Borings, Sheets 1 through 4 in Appendix A**.

2.5 Pavement Coring Information

Three (3) pavement cores were performed and labeled PC-1R through PC-3R. Information is included in the table below. The information, measurements and photos

for all the cores taken are presented in **Appendix A.**

Summary of Pavement Core Results			
Core No.	Approx. Station Along the Pipe and Offset from Proposed Pipe C/L (ft)	Type of Material and Averaged Thickness	
		Asphalt Thickness[1] (in.)	Field Measurement of Base and Type (in.)
PC-1R	4+45, on C/L	2.39	9.00 – Shell
PC-2R	14+10, on C/L	2.72	8.50 - Shell
PC-3R	17+75, on C/L	3.24	10.00 – Shell/ Concrete, Rock and Asphalt
Avg. Layer Thickness (in.)		**2.78**	**9.17**
Layer Thickness Range (in.)		**2.39 to 3.24**	**8.50 to 10.00**
Notes:			
1.	**The thicknesses were measured at four locations around the core using a calibrated caliper and averaged.**		

3.0 LABORATORY TESTING

3.1 General

Laboratory tests were assigned to aid in the classification of the explored soils. These tests included moisture content determination and percent passing the -200 Sieve. The laboratory test results are presented in **Table 2 in the Appendix.**

3.2 Soil Classification

The SPT soil samples were classified using the USCS in general accordance with ASTM test designation D-2488. This test method classifies soils into specific categories based upon the results of the laboratory testing program. The assignment of a group name and symbol is then used to aid in the evaluation of the significant engineering properties of a soil.

3.3 Moisture Content

The laboratory moisture content test consists of the determination of the percentage of moisture contents in selected samples in general accordance with FDOT test designation 1-T265 (ASTM test designation D-2216).

3.4 Percent Passing the No. 200 sieve

The wash gradation test was performed in general accordance with ASTM D 1140 (Standard Test Methods for Amount of Material Finer Than the No. 200 (75 μm) Sieve).

4.0 EVALUATION AND RECOMMENDATIONS

4.1 GENERAL

The following design recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered. If there are any changes in these project criteria, including project location on the site, it is suggested that a review be made determine if any modifications in the recommendations will be required. The findings of such a review will be presented in a supplemental report.

4.2 PIPELINE CONSIDERATIONS

The soil profiles in the borings are consistent and indicated brown, (No N-value in the top 4 and 6 feet, assume very loose) very loose to medium dense fine sands to slightly silty fine sands to slightly clayey fine sand (SP/SP-SM/SP-SC) extending from the existing ground surface to a depth of 12.0 feet. These sands were followed by pale brown to gray very loose to loose, clayey fine sands (SC), with traces of some phosphate, extending to the boring termination depth of 15 feet.

Based on the proposed pipe invert depths, ranging from 5.0 to 6.0 feet below the existing ground surface, the 24-inch diameter pipe will bear on very loose to medium dense sands (SP/SP-SM/SP-SC).

Based on laboratory classification tests and our experience in the local area, the clayey fine sands (SC) encountered at depths of 12 feet in both SPT borings, are moderately plastic, retain moisture and are susceptible to shrinking or swelling with changes in moisture content. The amount of swelling or shrinkage is dependent upon the thickness of the clay zone, the proximity of the clayey soils to the surface, and the nature of the clay itself.

Moisture increases or decreases can occur within the clays due to varying causes. Specifically, water allowed to pond or infiltrate directly into the clays such as with the discharging from rain events can cause clay swelling. Alterations in subsurface drainage patterns due to construction can also result in moisture changes in the clays.

Moisture uptake by large vegetation has also had a significant effect, based on our experience. Most significantly, Florida has seasonal patterns of relatively dry and rainy periods. Generally, the clay soils in Florida tend to remain moist (swelled), and distress in structures supported above can occur during dry periods as the clay shrinks.

Regarding the potential use of the clayey fine sands (SC) for backfill and pipe bedding, the project has limited areas available for stockpiling wet clays and clayey sands to allow them to dry to meet compaction requirements. We recommend overexcavating a minimum of 2 feet of clayey sand (SC) material below the invert or pipe bedding elevation and backfilling it with properly compacted structural fill (SP/SP-SM/SP-SC). In addition, we recommend overexcavating a minimum of 2 feet of the clayey sands (SC) along the sides of the pipe and a minimum of 1-foot on top and backfill it with properly compacted structural fill (SP/SP-SM/SP-SC). The width of the overexcavation, along the sides of the pipe, should be wide enough to allow adequate compaction of the soils and meet the compaction requirements, as indicated below.

Settlement, due to the presence of the pipeline, should be minimal unless the subsoil is excessively disturbed during the installation, the phreatic surface is lowered for a substantial period of time, or if new loads are placed above or near the pipeline. Uplift pressure from the groundwater should be considered when the bottom of the pipeline is significantly below the existing groundwater level.

Surface water and groundwater control will be necessary during construction of the pipeline to establish a stable sand bottom in which to bed the pipeline. Dewatering, consisting of sump pumps and/or well pointing, has been successful in the past. Dewatering must be conducted with care to avoid settlement of nearby structures, roads or utilities, and in such a manner that the areas possibly affected are as small as possible.

Depending upon shallow groundwater levels and the effectiveness of dewatering at the time of construction, seepage may enter the excavated trenches from the bottom and sides. Such seepage will act to loosen soils and create difficult working conditions. Groundwater levels should be determined immediately prior to construction. Shallow groundwater should be kept at least 12 inches below the working area to facilitate proper material placing and compaction. Organic soils, clayey soils and soils with debris should be removed (if encountered) within 24 inches from the bottom of the pipeline and replaced with properly compacted clean fine sands (SP/SP-SM/SP-SC).

A density of at least 98% of the modified Proctor maximum dry density (ASTM D-1557) is recommended for all fill materials and natural subgrade under the pipeline. The subgrade soils should be firm and stable prior to placement of the pipe. Once the pipeline is placed, it is recommended that backfill around the sides of the pipe be placed and compacted in equal lifts with a vibratory tamper in lifts not to exceed 6-inches (loose) to avoid laterally displacing the pipeline. Failure to compact the backfill will result in future settlement of the ground surface.

Pipeline backfill should be clean fine sand (free of clay, rubble, organics and debris) with less than 12% passing the No. 200 sieve and placed in compacted lifts. Some contractors like to place a gravel working bed in wet areas. An approximate one foot thick layer of fine gravel, such as No. 57, and No. 67 stone may be used in limited areas for this purpose. The gravel or stone should be wrapped in a geotextile fabric, installed in accordance with FDOT 514. A continuous gravel bed should not be placed for the full pipe length to prevent a flow conduit under the pipeline. The gravel, where used, should be compacted and the compaction confirmed by visual observation.

The non-organic clean fine sands and slightly silty fine sands (SP/SP-SM/SP-SC), encountered in the project, with less than 12 percent passing the No. 200 sieve are suitable for backfill.

4.3 Structure and Pipe Excavations

All structure and pipe excavations should be observed by the Manatee County designated representative to explore the extent of any fill and excessively loose, soft, or otherwise undesirable materials. If the excavation appears suitable as load bearing materials, the soils should be prepared for construction by compaction to a dry density of at least 98% of the modified Proctor maximum dry density (ASTM D-1557) for a depth of at least 1 foot below the foundation base.

If soft pockets are encountered in the bottom of the structure/pipe excavations, the unsuitable materials should be removed and the proposed foundation elevation re-established by backfilling after the undesirable material has been removed. This backfilling may be done with a very lean concrete or with a well-compacted, suitable fill such as clean sand, gravel, or #57 or #67 stone. Sand backfill should be compacted to a dry density of at least 98% of the modified Proctor maximum dry density (ASTM D-1557), as previously described. Gravel, or #57 or #67 stone, if used, should be compacted and the compaction confirmed by visual observation.

4.4 Lateral Earth Pressures

The pipeline will be subject to lateral earth pressures. For structures which are restrained

and adjacent to moderately compacted backfill, design is usually based on "at-rest" earth pressures. Active pressures are usually employed for unrestrained structure design. Several earth pressure theories could be utilized. One of the most straightforward is the equivalent fluid pressure or Rankine Theory.

Pipe constructed below existing grades or which have adjacent compacted fill will be subjected to lateral at-rest or active earth pressures. Pipe which is restrained will be subjected to at-rest soil pressures equivalent to a fluid density of 55 pounds per cubic foot (pcf). Pipe which is not restrained and where sufficient movement may mobilize active earth pressures, an equivalent fluid density of 36 pcf can be used. At locations where the invert of the pipe extends below the groundwater table, soil pressures can be calculated using half (½) the equivalent fluid densities given above (see table below for actual values). However, hydrostatic and seepage forces must then also be included. The above pressures do not include any surcharge effects for sloped backfill, point or area loads behind the pipe and assume that adequate drainage provisions have been incorporated.

Earth Pressure Condition	Coefficient of Earth Pressure (K)	Un-submerged Fluid Density (1) (pcf)	Submerged Fluid Density (2) (pcf)
At-Rest (K_o)	0.50	55	24
Active (K_a)	0.33	36	16
Passive (K_p)	3.00	330	143

(1) These fluid densities are based on a clean sand backfill with an average internal friction angle of 30 degrees and a moist unit weight of 110 pcf.
(2) Hydrostatic and seepage forces should be added to the submerged fluid densities when calculating total forces acting on retaining walls.

4.5 STRUCTURAL FILL

All materials to be used for backfill or compacted fill construction should be evaluated and, if necessary, tested prior to placement to determine if they are suitable for the intended use. In general, based on the boring results, the majority of the on-site sandy materials (SP/SP-SM/SP-SC) encountered in our borings are suitable for use as structural fill and as general subgrade fill and backfill. Suitable structural fill materials should consist of fine to medium sand with less than 12% passing through the No. 200 sieve and be free of rubble, organics, clay, debris and other unsuitable material.

All structural fill should be compacted to a dry density of at least 98 percent of the modified Proctor maximum dry density (ASTM D-1557). In general, the compaction should be

accomplished by placing the fill in maximum 6-inch loose lifts and mechanically compacting each lift to at least the specified minimum dry density. Field density tests should be performed on each lift as necessary to assure that adequate compaction is achieved.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 GENERAL

It is recommended that observation and testing of construction activities involved in the foundation, earthwork, and related activities of this project should be performed by qualified personnel to ensure that the recommendations contained herein are properly interpreted and implemented.

5.2 FILL PLACEMENT AND SUBGRADE PREPARATION

The following are our general recommendations for overall site preparation and mechanical densification work for the proposed project based on the anticipated construction and our boring results. These recommendations should be used as a guideline for the project general specifications by the Design Engineer.

1. The excavated subgrade (dewatered trench bottom) for the pipe should be leveled, cut to grade if necessary, and then compacted with a vibratory compactor. Careful observations should be made during compaction to help identify any areas of soft yielding soils that may require overexcavation and replacement. If unsuitable material, such as organic or clayey soils, is encountered at the bottom of the pipe or structure embedment depth, overexcavation of an additional 2 feet of the material is recommended for the pipe. The excavation should then be backfilled to foundation grade with clean sands in controlled lifts not exceeding 6-inches and compacted to a density of at least 98 percent of the maximum density as determined by ASTM D-1557. Care should be used when operating the compactor to avoid transmission of vibrations to existing structures or other construction operations that could cause settlement damage or disturb occupants. Dewatering may also have an effect on adjacent structures. A preconstruction survey with video and/or photographs of adjacent residences/structures is recommended to check for existing cracking prior to construction and during construction. Vibration and groundwater level monitoring are also recommended.

2. Prior to beginning compaction, soil moisture contents may need to be

controlled in order to facilitate proper compaction. A moisture content within 2 percentage points of the optimum indicated by the modified Proctor test (ASTM D-1557) is recommended.

3. Following satisfactory completion of the initial compaction on the excavation bottom, the construction areas may be brought up to finished subgrade levels. Fill should consist of fine sand with less than 12% passing the No. 200 sieve, free of rubble, organics, clay, debris and other unsuitable material. Fill should be tested and approved prior to acquisition and/or placement. Approved sand fill should be placed in loose lifts not exceeding 6-inches in thickness and should be compacted to a minimum of 98% of the maximum modified Proctor dry density (ASTM D-1557). Density tests to confirm compaction should be performed in each fill lift before the next lift is placed.

4. It is recommended that a qualified representative be retained to provide on-site observation of earthwork activities. The field technician would observe the placement of approved fills and compaction and provide compaction testing. Density tests should be performed in subgrade sands after each fill lift.

5.3 GROUNDWATER CONTROL

Dewatering may be necessary to achieve the required depth of excavation and compaction of backfill. Groundwater can normally be controlled in excavations with a sump pump and/or well pointing as previously discussed. For deep excavations, dewatering using temporary well points or temporary sheet pile walls may be necessary.

Surface water and groundwater control will be necessary during construction to permit establishment of a stable sand bottom. If a pump is used, a standby pump is recommended.

Soils exposed in the bases of all satisfactory excavations should be protected against any detrimental change in conditions such as from physical disturbance or rain. Surface run-off water should be drained away from the excavations and not be allowed to pond. If possible, all drainage structures should be placed the same day the excavation is made. If this is not possible, the excavations should be adequately protected.

Groundwater levels should be determined by the contractor immediately prior to construction. Shallow groundwater should be kept at least 12 inches below the lowest working area to facilitate proper material placement and compaction.

5. 4 TEMPORARY SLOPES

In medium dense clayey sands (SC), the sides for temporary excavations may stand almost vertical, depending upon the amount of sand interbedded with the clay.

In clean sandy soils (SP/SP-SM/SP-SC), the sides slopes for temporary excavations may stand near one and a half horizontal to one (1) vertical (1.5H:1V) for short dry periods of time and a maximum excavation depth of four (4) feet. Where restrictions do not permit slopes to be constructed as recommended above, the excavation should be shored in accordance with current OSHA requirements. In addition, any open cut excavations adjacent to existing structures should be evaluated by a Manatee County designated representative on a case by case basis. During construction, excavated materials should not be stockpiled at the top of the slope within a horizontal distance equal to the excavation depth.

Excavation slopes should conform to OSHA, State of Florida and any other local regulations. The dewatering system chosen for use on this project should consider the nature of the permeable upper sands encountered at the project site. The contractor should also assess equipment loads and vibrations when considering slopes or excavation bracing.

5.5 EXCAVATIONS

The contractor is solely 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. The contractors "responsible person", as defined in 29 CFR, Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in all local, state, and federal safety regulations.

5.6 ON-SITE SOIL SUITABILITY

All materials to be used for backfilling or compacted fill construction should be evaluated by a Manatee County designated representative and, if necessary, tested prior to placement to determine if they are suitable for the intended use. In general, based on the boring results, the majority of the shallow/near surface on-site clean, non-organic sandy material (SP/SP-SM/SP-SC with less than 12% -passing the - 200 sieve) can be used as structural fill and as general subgrade fill and backfill in other areas, provided the fill material is free of rubble, clay, rock, roots, debris and organics. Any off-site materials used as fill should be approved prior to acquisition. Based on the material encountered in the boring, the majority of the

material to be excavated is fine sands (SP/SP-SM/SP-SC) and moderately plastic clayey fine sands (SC).

6. 0 REPORT LIMITATIONS

The recommendations submitted are based on the available soil information obtained by **MC^2** and design details furnished by **Cardno TBE** for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, **MC^2** should be notified immediately to determine if changes in the foundation, or other, recommendations are required. If **MC^2** is not retained to perform these functions, **MC^2** cannot be held responsible for the impact of those conditions on the performance of the project.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be provided the opportunity to review them to assess that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of **Cardno TBE** for the specific application to the proposed improvements at the **Southeast Water Reclamation Facility Reject Line in Manatee County, Florida.**

APPENDIX A

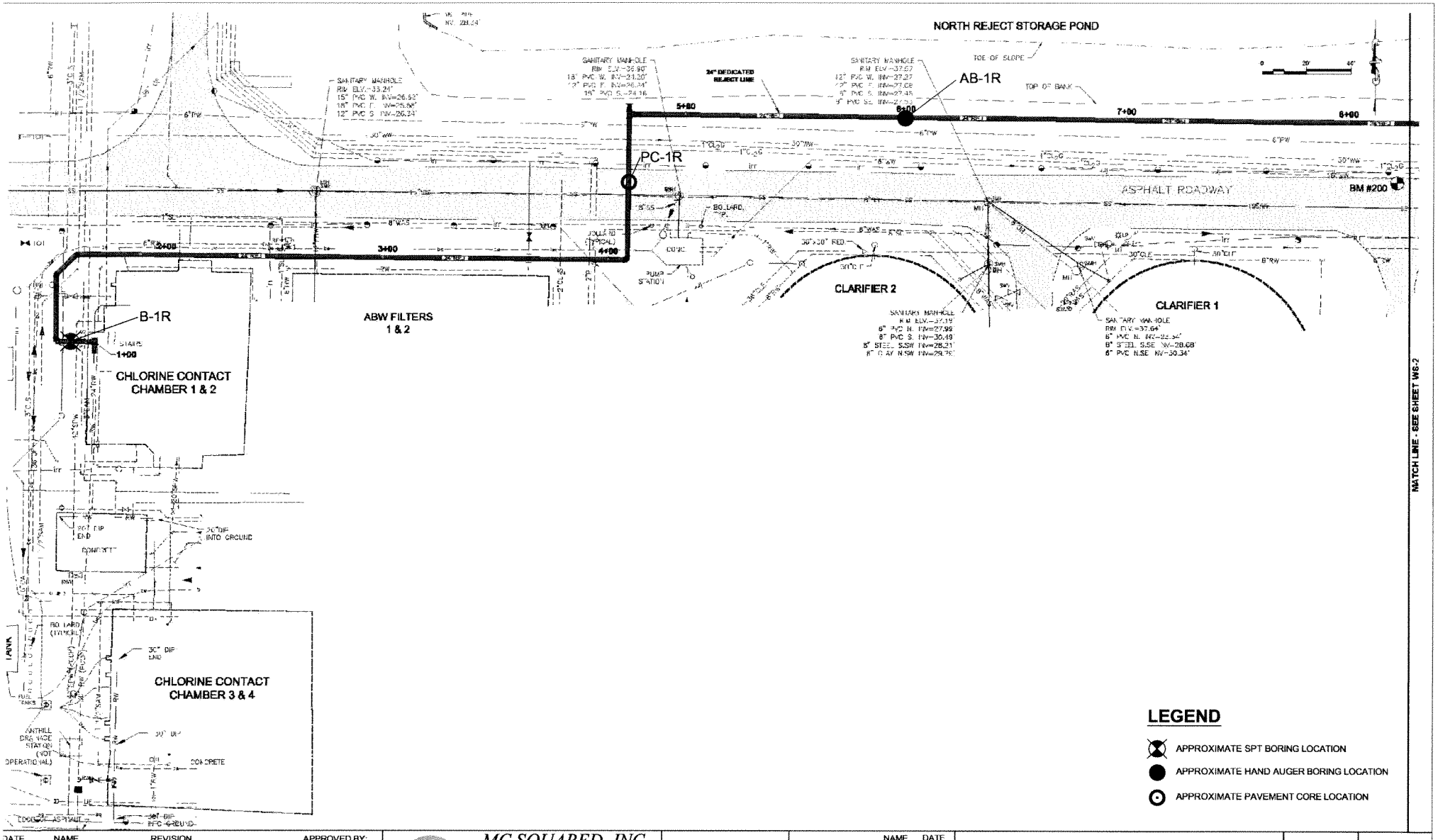
- Table 1 – Summary of Borings, Groundwater Table and Estimated SHWT
- Table 2 – Summary of Laboratory Test Results
- Boring Location Plan – Sheets 1 through 3
- Report of Core Borings – Sheet 4
- Pavement Cores Photos
- Test Procedures

Table 1
Summary of Borings, Groundwater Levels and
Estimated Normal and Estimated Seasonal High Groundwater Level
SEWRF Reject Line
Manatee County, Florida
MC Squared Project No. T121212.253.

Boring No.	Approx. Station Along the Pipe and Offset from Proposed Pipe C/L (ft)	USDA Soil Type	USDA SHWT Depth (feet)	Existing Ground Surface Elevation (feet) (See Note 1).	Measured Groundwater Depth on August and September 2013 (feet)	Measured Groundwater Table Elev. (ft)	Estimated SHGWT Levels	
							Depth (feet)	Elevation (ft)
Reject Line								
B-1R	1+10, on C/L	(No. 20) EauGallie fine sand	0.5 -1.5	36.0	4.5	-	2.5	33.5
AB-1R	6+00, on C/L			37.0	GNE	-	-	-
AB-2R	12+00, on C/L			37.5	GNE	-	-	-
B-2R	13+50, on C/L			36.0	4.0	-	2.5	33.5
AB-3R	18+00, on C/L			37.0	GNE	-	-	--
Notes:								
1.	Boring ground surface elevations obtained from a spot elevation drawing provided by **Cardno TBE** and is approximate.							
2.	GNE= Groundwater not encountered within the depth explored.							

Table 2
Summary of Laboratory Test Results
Southeast Water Reclamation Facility Reject Line
Manatee County, Florida
MC^2 Project No. T121212. 253

Boring No.	Depth (ft)	USCS Classi.	Sieve Analysis (% Passing)							Liquid Limit (%)	Plastic Index (%)	Organic Content (%)	Natural Moisture Content (%)
			#10	#20	#40	#60	#100	#140	#200				
B-1R	14.0 – 15.0	SC							15				26



LEGEND

- APPROXIMATE SPT BORING LOCATION
- APPROXIMATE HAND AUGER BORING LOCATION
- APPROXIMATE PAVEMENT CORE LOCATION

DATE	NAME	REVISION	APPROVED BY:

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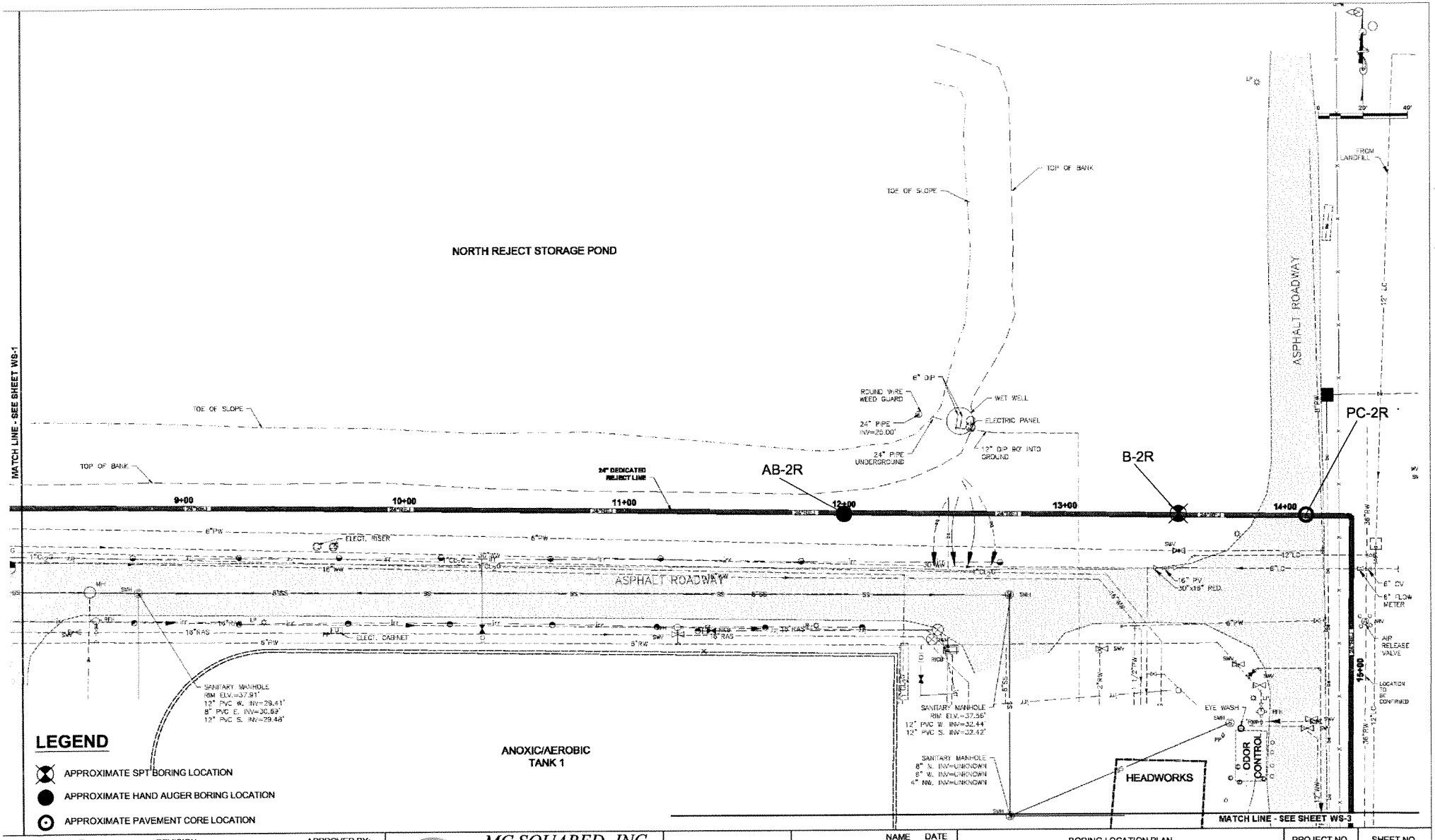
FLORIDA LICENSE No. 45603

	NAME	DATE
DESIGNED BY:	IR	09/13
DRAWN BY:	IR	09/13
CHECKED BY:	KS	09/13
SUPERVISED BY:		

BORING LOCATION PLAN	PROJECT NO.	SHEET NO.
Southeast Water Reclamation Facility Reject Line Manatee County, FL	T121212.253	1



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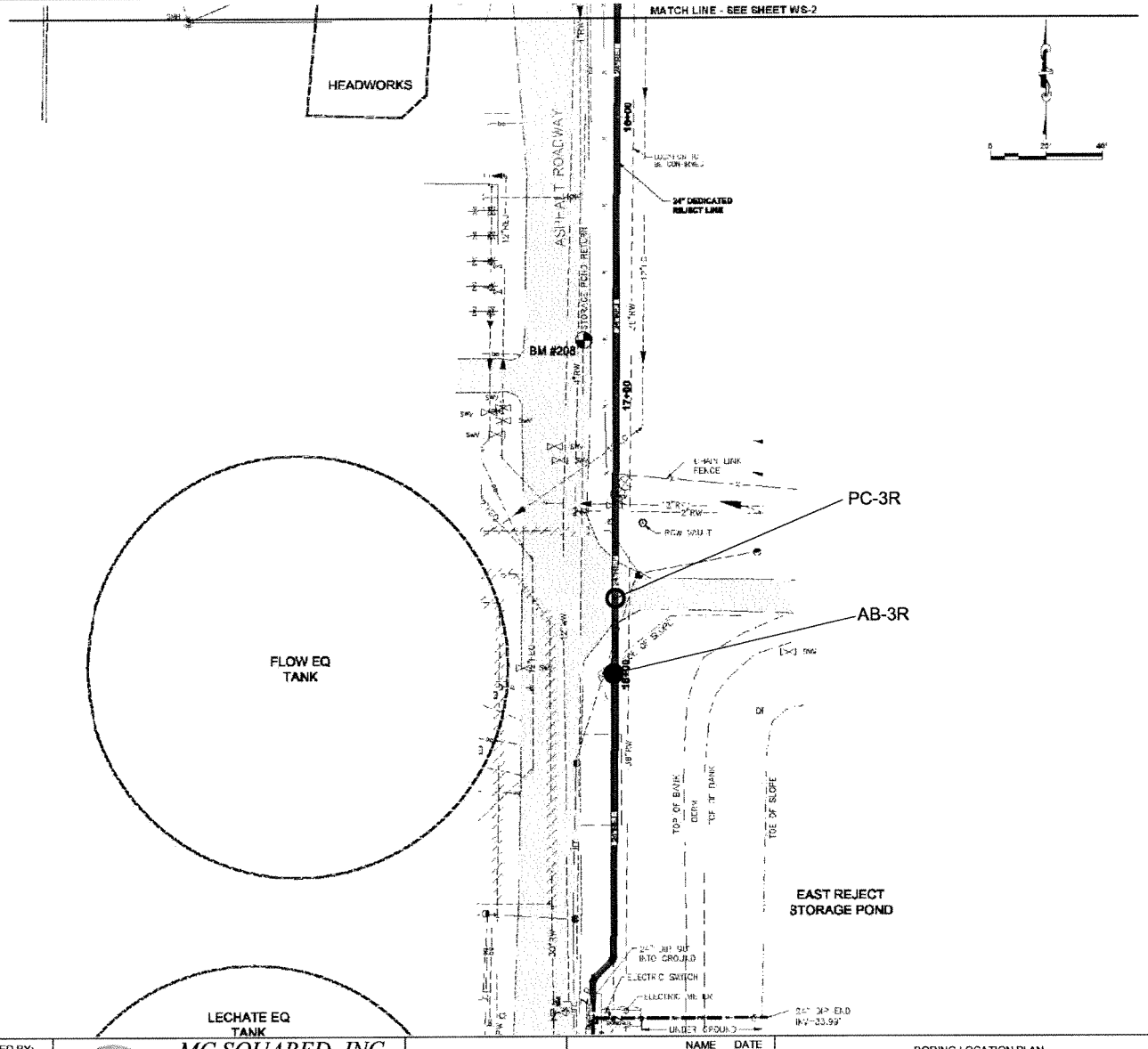
SUPERVISED BY:		

BORING LOCATION PLAN

Southeast Water Reclamation Facility Reject Line
Manatee County, FL

PROJECT NO. T121212.253

SHEET NO. 2



LEGEND

- APPROXIMATE SPT BORING LOCATION
- APPROXIMATE HAND AUGER BORING LOCATION
- APPROXIMATE PAVEMENT CORE LOCATION

DATE	NAME	REVISION	APPROVED BY:

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	NAME	DATE
DESIGNED BY:	IR	09/13
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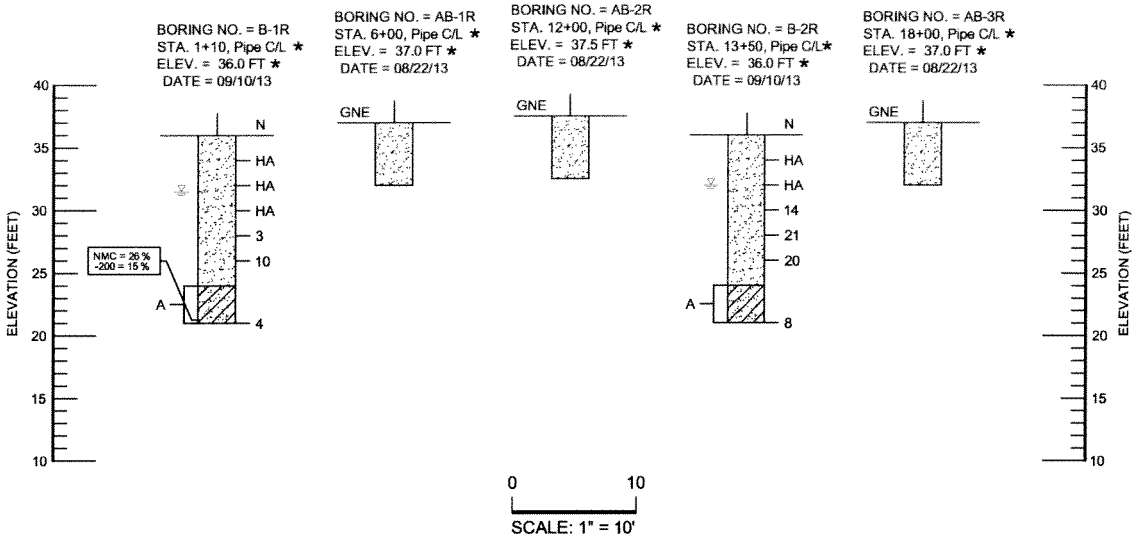
CHECKED BY:	KS	09/13
SUPERVISED BY:		

BORING LOCATION PLAN

Southeast Water Reclamation Facility Reject Line
Manatee County, FL

PROJECT NO. T121212.253

SHEET NO. 3



LEGEND

(SP/SP-SM/SP-SC) BROWN, LIGHT BROWN, OR DARK BROWN FINE SAND, SLIGHTLY SILTY FINE SAND, TO SLIGHTLY CLAYEY FINE SAND.

(SC) PALE BROWN TO GRAY CLAYEY FINE SAND.

A WITH TRACES TO SOME PHOSPHATE

★ ELEVATIONS, STATIONS, AND OFFSETS WERE OBTAINED FROM PLANS PROVIDED BY CARDNO TBE AND ARE APPROXIMATE.

NOTES:

- WATER TABLE
- HA HAND AUGER
- GNE GROUNDWATER NOT ENCOUNTERED
- WH WEIGHT OF HAMMER
- N SPT N-VALUE
- 100 LOSS OF CIRCULATION (%)
- NMC NATURAL MOISTURE CONTENT (%)
- -200 FINES PASSING A NO. 200 SIEVE (%)

GRANULAR MATERIALS- RELATIVE DENSITY	SPT (BLOWS/FT)
VERY LOOSE	LESS THAN 4
LOOSE	5-10
MEDIUM	11-30
DENSE	31-50
VERY DENSE	GREATER THAN 50
SILTS AND CLAYS CONSISTENCY	**SPT (BLOWS/FT)**
VERY SOFT	LESS THAN 2
SOFT	3-4
FIRM	5-8
STIFF	9-15
VERY STIFF	16-30
HARD	30-50
VERY HARD	GREATER THAN 50

DATE	NAME	REVISION	APPROVED BY:

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GEOTECHNICAL - ENVIRONMENTAL MATERIALS TESTING

FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION No. 9191
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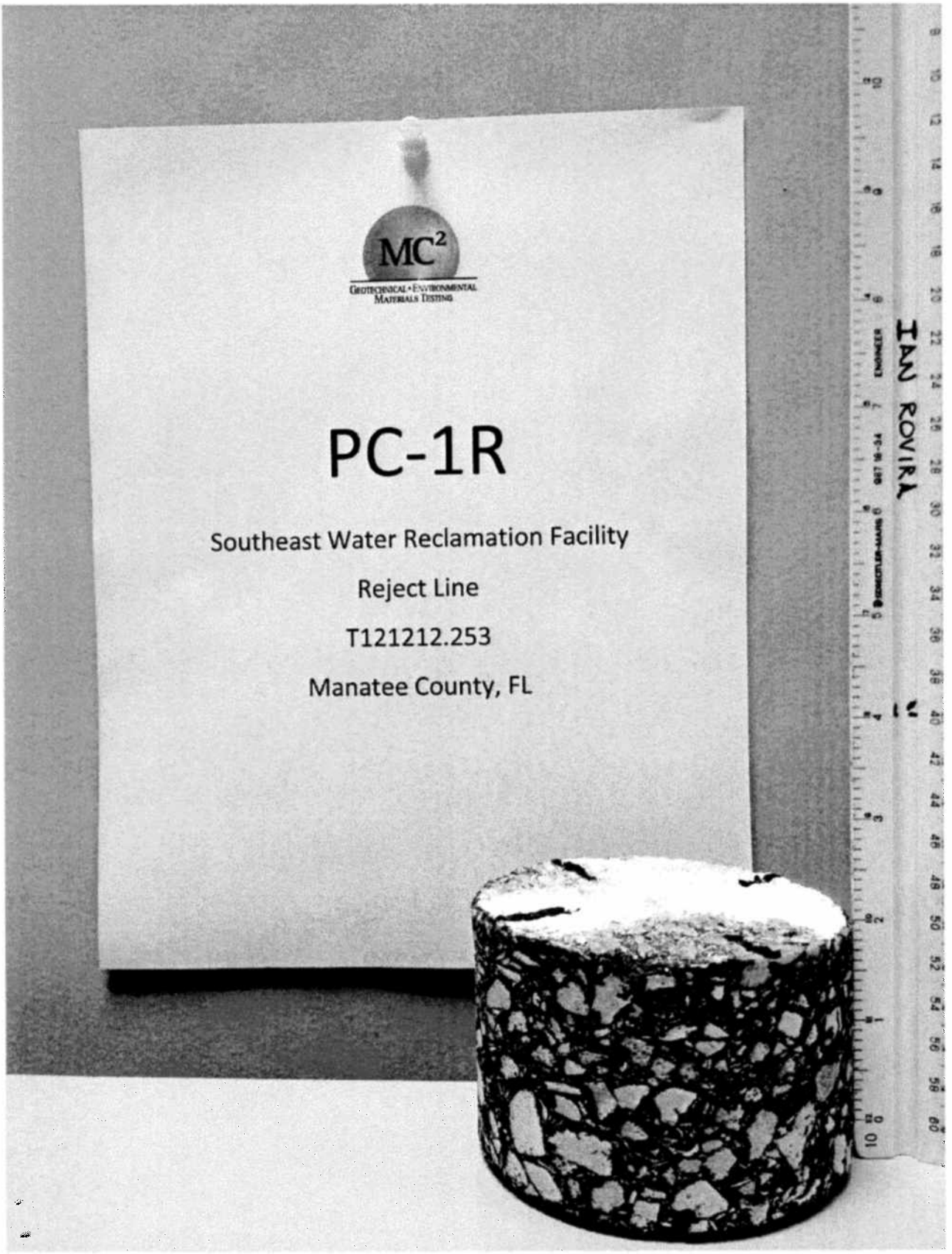
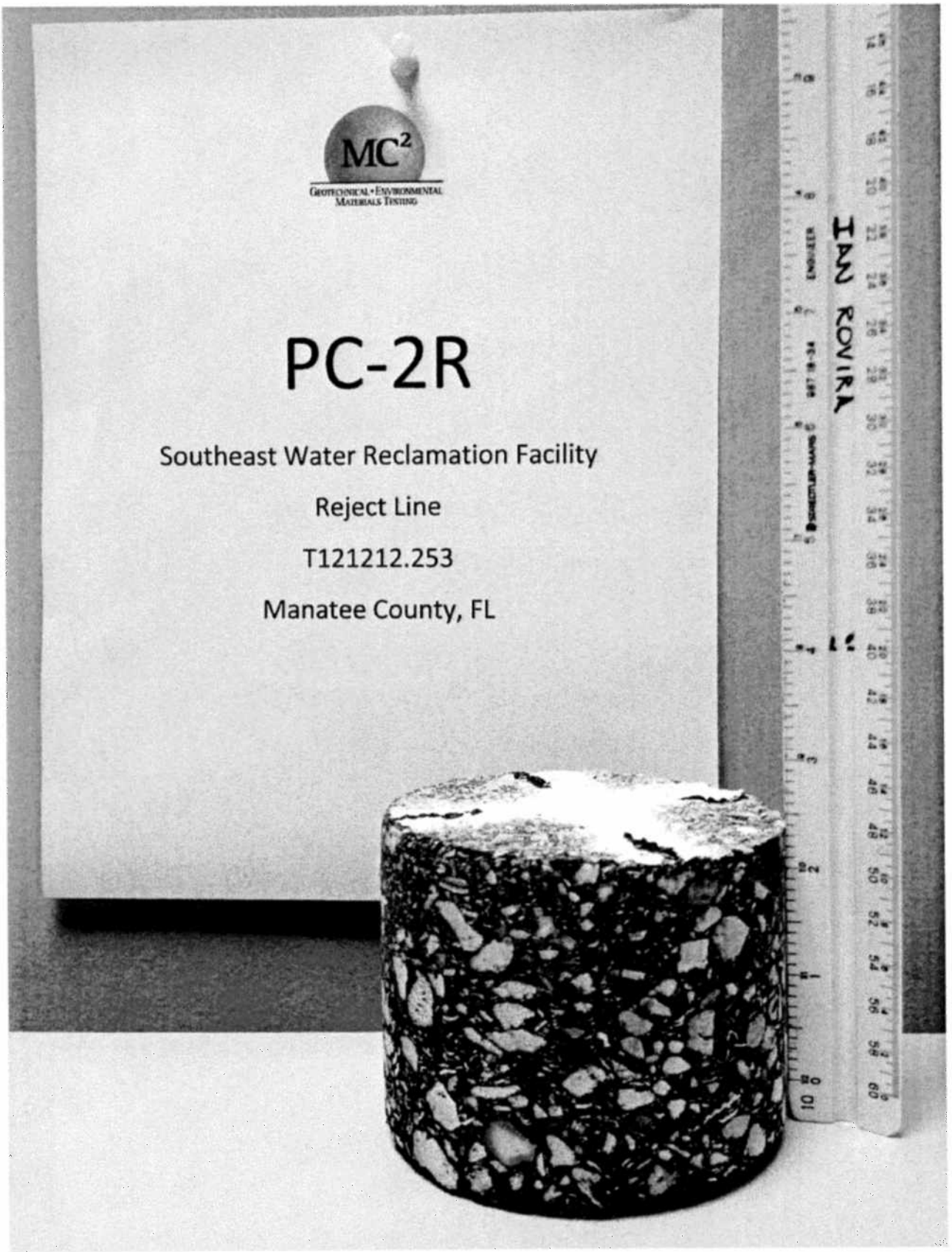
	NAME	DATE
DESIGNED BY:	IR	09/13
DRAWN BY:	IR	09/13
CHECKED BY:	KS	09/13
SUPERVISED BY:		

REPORT OF CORE BORINGS	PROJECT NO.	SHEET NO.
Southeast Water Reclamation Facility Reject Line Manatee County, FL	T121212.253	4


MC²
GEOTECHNICAL • ENVIRONMENTAL
MATERIALS TESTING
PC-1R
Southeast Water Reclamation Facility
Reject Line
T121212.253
Manatee County, FL
IAN ROVIRA


MC²
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PC-3R

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Reject Line

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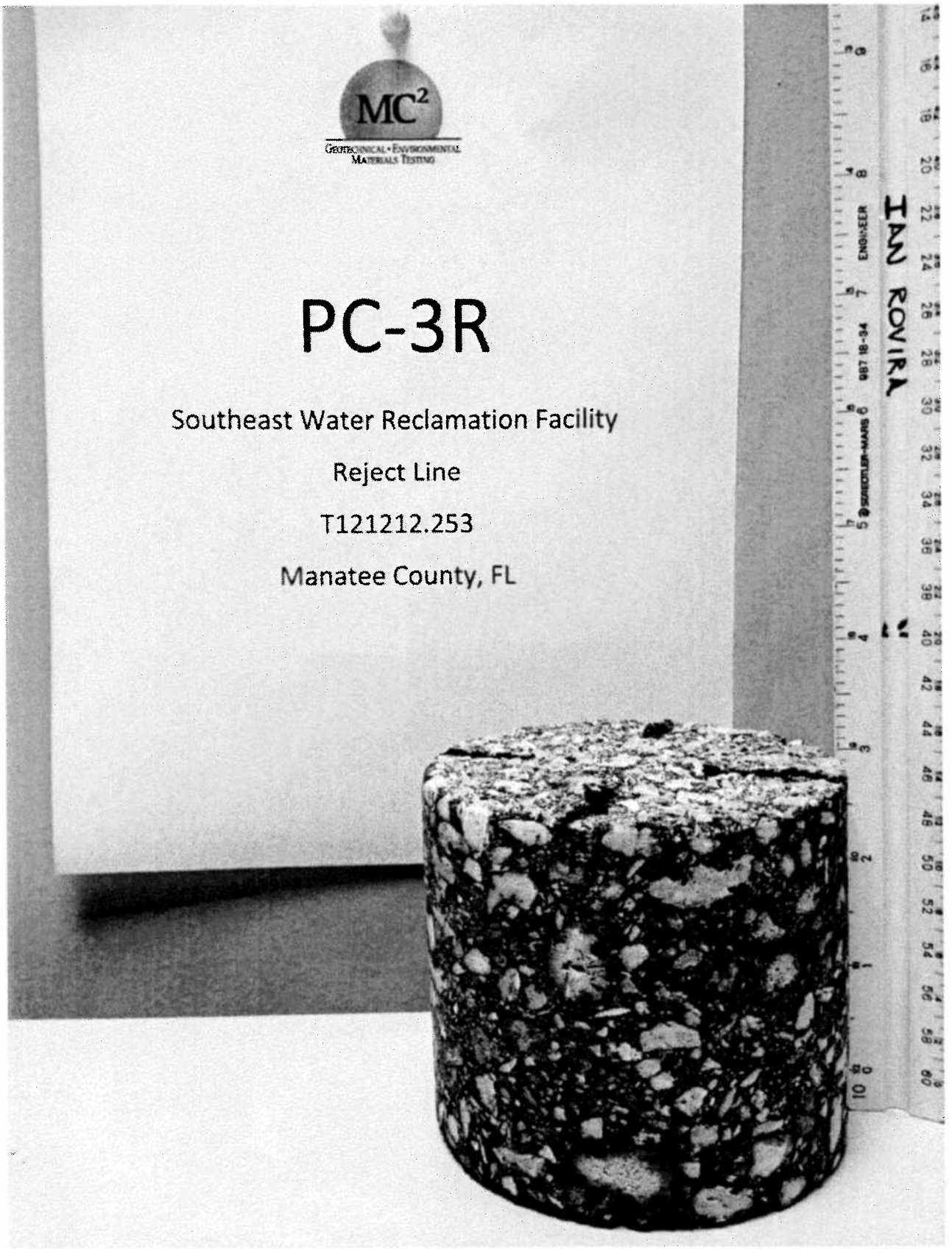

TEST PROCEDURES

The general field procedures employed by MC Squared, Inc. (**MC^2**) are summarized in the American Society for Testing and Materials (ASTM) Standard D420 which is entitled "Investigating and Sampling Soil and Rock". This recommended practice lists recognized methods for determining soil and rock distribution and groundwater conditions. These methods include geophysical and in-situ methods as well as borings.

Standard Drilling Techniques
To obtain subsurface samples, borings are drilled using one of several alternate techniques depending upon the subsurface conditions. Some of these techniques are:

In Soils:

a) Continuous hollow stem augers.
b) Rotary borings using roller cone bits or drag bits, and water or drilling mud to flush the hole.
c) "Hand" augers.

In Rock:

a) Core drilling with diamond-faced, double or triple tube core barrels.
b) Core boring with roller cone bits.

The drilling method used during this exploration is presented in the following paragraph.

Hollow Stem Augering: A hollow stem augers consists of a hollow steel tube with a continuous exterior spiral flange termed a flight. The auger is turned into the ground, returning the cuttings along the flights. The hollow center permits a variety of sampling and testing tools to be used without removing the auger.

Core Drilling: Soil drilling methods are not normally capable of penetrating through hard cemented soil, weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound, continuous rock. Material which cannot be penetrated by auger or rotary soil-drilling methods at a reasonable rate is designated as "refusal material". Core drilling procedures are required to penetrate and sample refusal materials.

Prior to coring, casing may be set in the drilled hole through the overburden soils, to keep the hole from caving and to prevent excessive water loss. The refusal materials are then cored according to ASTM D-2113 using a diamond-studded bit fastened to the end of a hollow, double or triple tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovery is measured, and the core is placed, in sequence, in boxes for storage and transported to our laboratory.

Sampling and Testing in Boreholes
Several techniques are used to obtain samples and data in soils in the field; however the most common methods in this area are:

a) Standard Penetration Testing
b) Undisturbed Sampling
c) Dynamic Cone Penetrometer Testing
d) Water Level Readings

The procedures utilized for this project are presented below.

Standard Penetration Testing: At regular intervals, the drilling tools are removed and soil samples obtained with a standard 2 inch diameter split tube sampler connected to an A or N-size rod. The sampler is first seated 6 inches to penetrate any loose cuttings, and then driven an additional 12 inches with blows of a 140 pound safety hammer falling 30 inches. Generally, the number of hammer blows required to drive the sampler the final 12 inches is designated the "penetration resistance" or "N" value, in blows per foot (bpf). The split barrel sampler is designed to retain the soil penetrated, so that it may be returned to the surface for observation. Representative portions of the soil samples obtained from each split barrel sample are placed in jars, sealed and transported to our laboratory.

The standard penetration test, when properly evaluated, provides an indication of the soil strength and compressibility. The tests are conducted according to ASTM Standard D1586. The depths and N-values of standard penetration tests are shown on the Boring Logs. Split barrel samples are suitable for visual observation and classification tests but are not sufficiently intact for quantitative laboratory testing.

Water Level Readings: Water level readings are normally taken in the borings and are recorded on the Boring Records. In sandy soils, these readings indicate the approximate location of the hydrostatic water level at the time of our field exploration. In clayey soils, the rate of water seepage into the borings is low and it is generally not possible to establish the location of the hydrostatic water level through short-term water level readings. Also, fluctuation in the water level should be expected with variations in precipitation, surface run-off, evaporation, and other factors. For long-term monitoring of water levels, it is necessary to install piezometers.

The water levels reported on the Boring Logs are determined by field crews immediately after the drilling tools are removed, and several hours after the borings are completed, if possible. The time lag is intended to permit stabilization of the groundwater level that may have been disrupted by the drilling operation.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the cave-in zone.

BORING LOGS

The subsurface conditions encountered during drilling are reported on a field boring log prepared by the Driller. The log contains information concerning the boring method, samples attempted and recovered, indications of the presence of coarse gravel, cobbles, etc., and observations of groundwater. It also contains the driller's interpretation of the soil conditions between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are kept on file in our office.

After the drilling is completed a geotechnical professional classifies the soil samples and prepares the final Boring Logs, which are the basis for our evaluations and recommendations.

SOIL CLASSIFICATION

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our Boring Logs.

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary; grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D-2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties are presented in this report.

The following table presents criteria that are typically utilized in the classification and description of soil and rock samples for preparation of the Boring Logs.

Relative Density of Cohesionless Soils From Standard Penetration Test	
Very Loose	≤ 4 bpf
Loose	5 - 10 bpf
Medium Dense	11 - 30 bpf
Dense	31 - 50 bpf
Very Dense	> 50 bpf
(bpf = blows per foot, ASTM D 1586)	

Consistency of Cohesive Soils	
Very Soft	≤ 2 bpf
Soft	3 - 4 bpf
Firm	5 - 8 bpf
Stiff	9 - 15 bpf
Very Stiff	16 - 30 bpf
Hard	30 – 50 bpf
Very Hard	> 50 bpf

Relative Hardness of Rock	
Very Soft	Hard Rock disintegrates or easily compresses to touch; can be hard to very hard soil.
Soft	May be broken with fingers.
Moderately Soft	May be scratched with a nail, corners and edges may be broken with fingers.
Moderately Hard	Light blow of hammer required to break samples.
Hard	Hard blow of hammer required to break sample.

Particle Size Identification	
Boulders	Larger than 12"
Cobbles	3" - 12"
Gravel	
Coarse	3/4" - 3"
Fine	4.76mm - 3/4"
Sand	
Coarse	2.0 - 4.76 mm
Medium	0.42 - 2.00 mm
Fine	0.42 - 0.074 mm
Fines (Silt or Clay)	Smaller than 0.074 mm

Rock Continuity

RECOVERY = $\frac{\text{Total Length of Core}}{\text{Length of Core Run}}$ x 100 %

Description	Core Recovery %
Incompetent	Less than 40
Competent	40 - 70
Fairly Continuous	71 - 90
Continuous	91 - 100

Relative Quality of Rocks

RQD = $\frac{\text{Total core, counting only pieces > 4" long}}{\text{Length of Core Run}}$ x 100 %

Description	RQD %
Very Poor	0 - 25 %
Poor	25 - 50 %
Fair	50 - 75 %
Good	75 - 90 %
Excellent	90 - 100 %