WATER SUPPLY PROGRAM
RIVER INTAKE PUMP STATION

VOLUME 4
ADDITIONAL INFORMATION

Atlanta, Georgia

Keisha Lance Bottoms
Mayor
City of Atlanta

Kishia L. Powell
Commissioner
Department of Watershed Management

David L. Wilson II
Chief Procurement Officer
Department of Procurement

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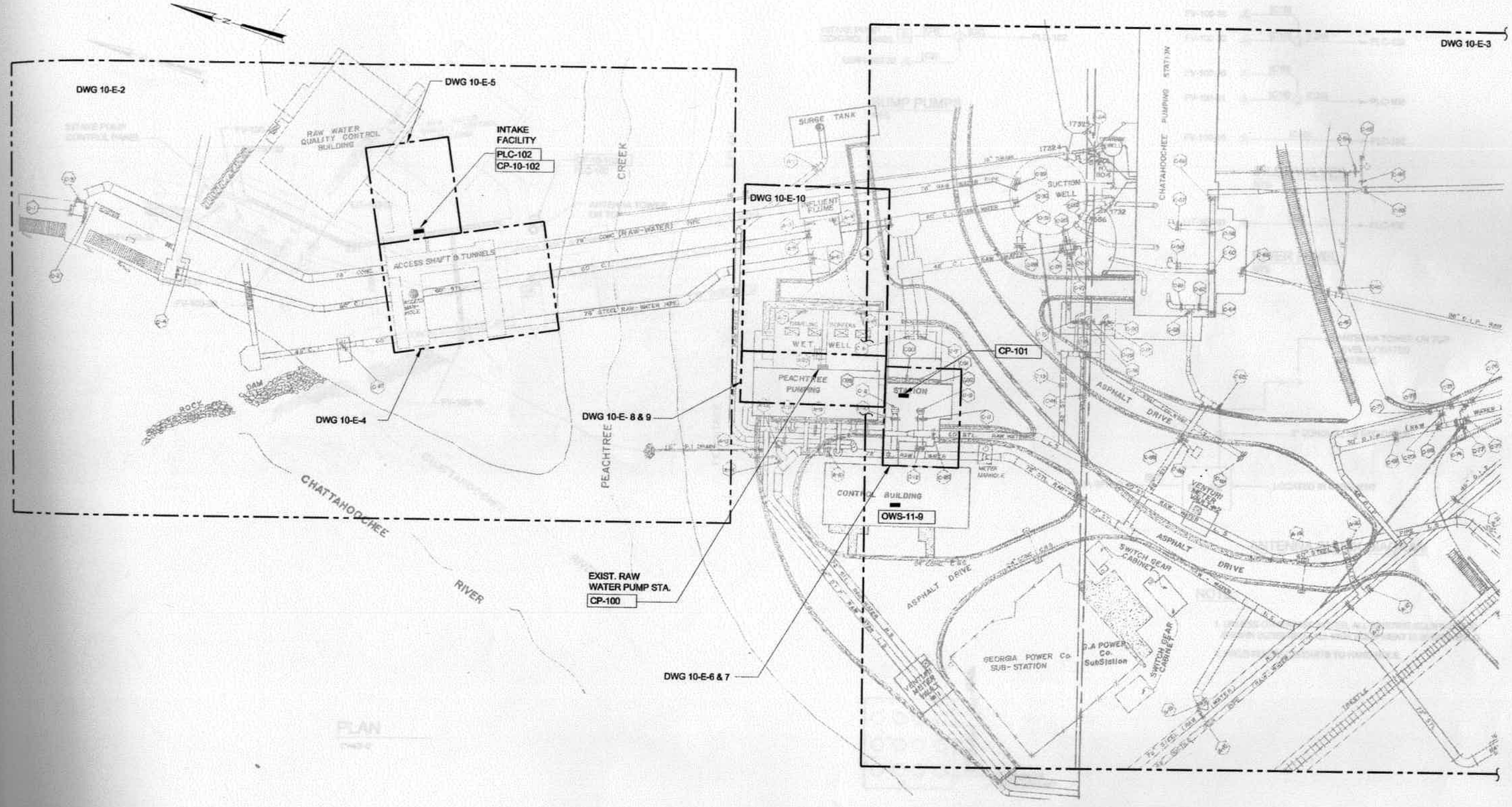
River Intake Pump Station

Part 1 - Record Drawings of Raw Water Intake



PLAN

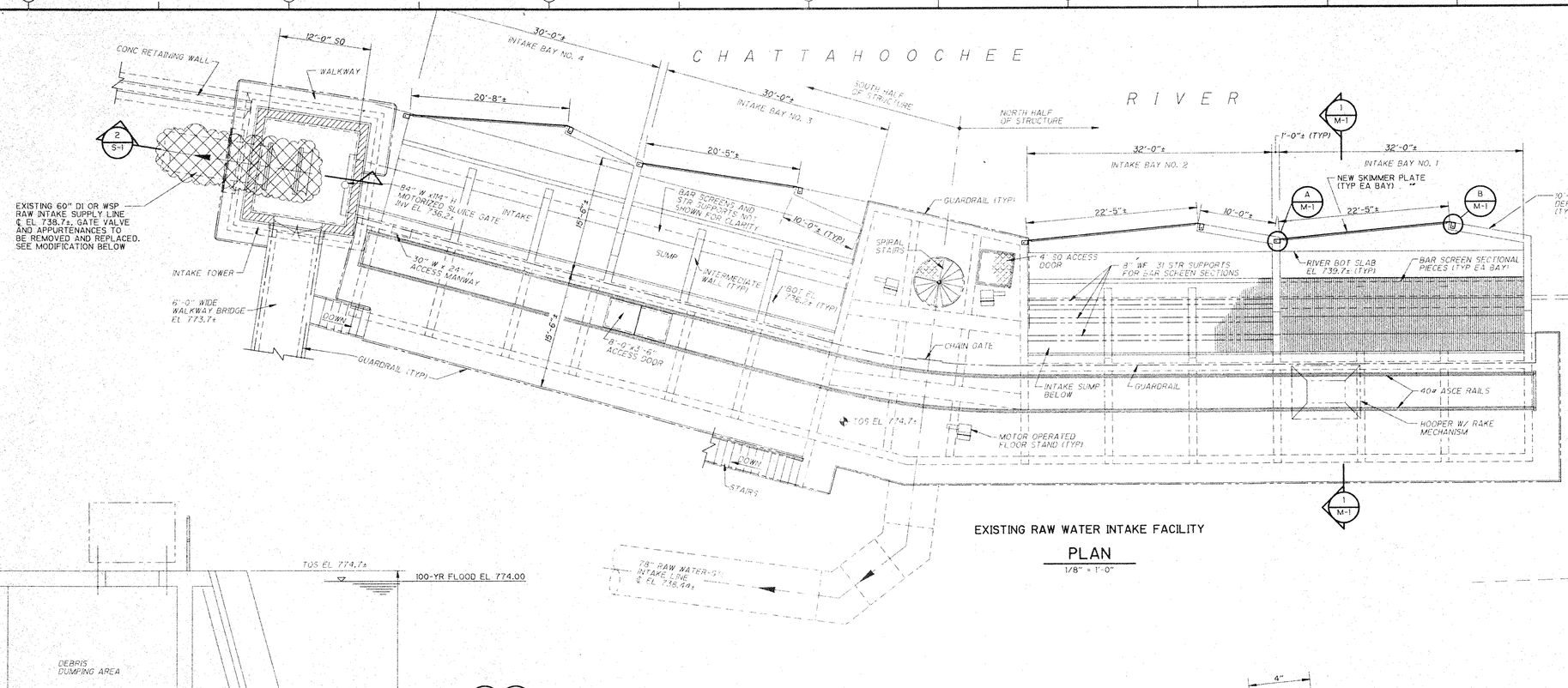
SCALE: 1"=40'-0"

0 40 80 120

1"=40'

DES. A.J. HEIDT III					VERIFY SCALE	AUTOMATION OF HEMPHILL & CHATTAHOOCHEE WTPS	ELECTRICAL
DR. J. DICKERSON					BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	CH2MHILL WILLIAMS - RUSSELL AND JOHNSON ATLANTA, GEORGIA	RAW WATER INTAKE AND PUMP STATION SITE PLAN
CHK. T. HOLLAND							DWG 10-E-1
APVD. T. HOLLAND	NO.	DATE	REVISION	BY	APVD		DATE AUGUST 2009
							PROJ 3904

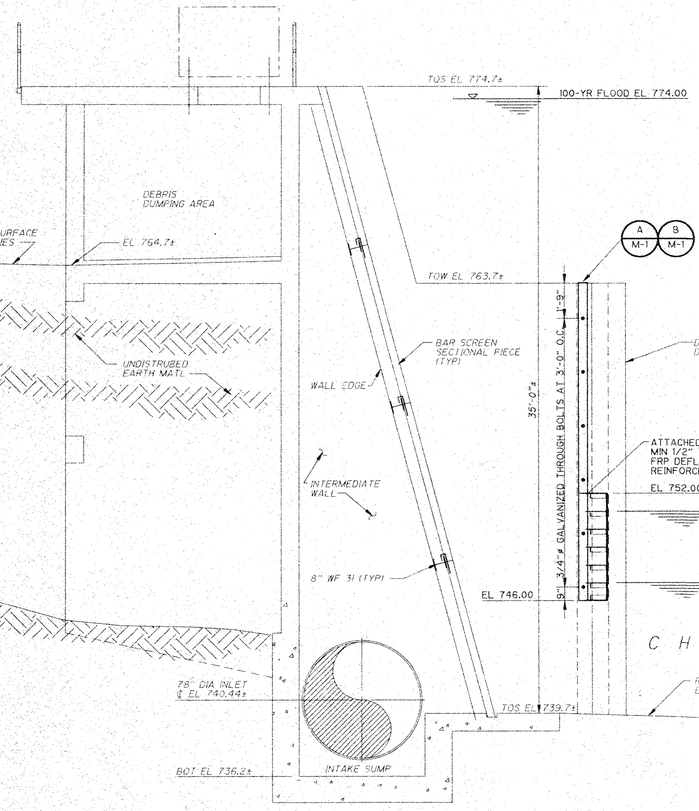
CONFORMED DOCUM



EXISTING RAW WATER INTAKE FACILITY

PLAN

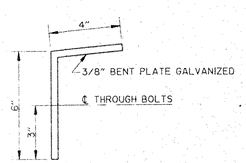
1/8" = 1'-0"



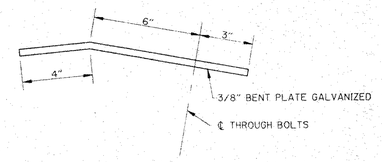
TYPICAL EACH INTAKE BAY

SECTION 1 / M-1

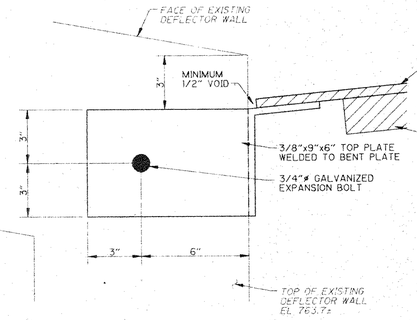
1/4" = 1'-0"



HORIZONTAL SECTION



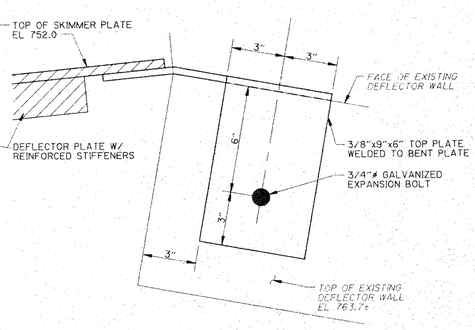
HORIZONTAL SECTION



TOP PLAN

DETAIL A / M-1

3" = 1'-0"



TOP PLAN

DETAIL B / M-1

3" = 1'-0"

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: J. HILL
DRAWN BY: T. MORGAN
SHEET CHK'D BY: M. NOUVEL
CROSS CHK'D BY: D. HARRIS
APPROVED BY:
DATE: JULY 1996

CDM Camp Dresser & McKee Inc.
environmental services
odbce worldwide

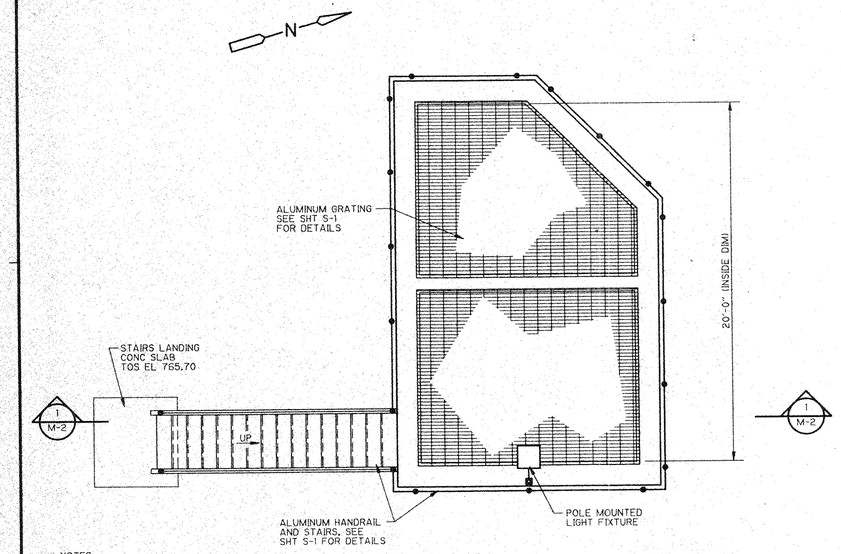
DEPARTMENT OF WATER
CITY OF ATLANTA, GEORGIA
CHATTAHOOCHEE RIVER

RAW WATER INTAKE FACILITY MODIFICATIONS

EXISTING RAW WATER INTAKE FACILITY PLAN, SECTION AND DETAILS

PROJECT NO. 6240-006
FILE NAME: MEISPLM1

SHEET NO.
M-1



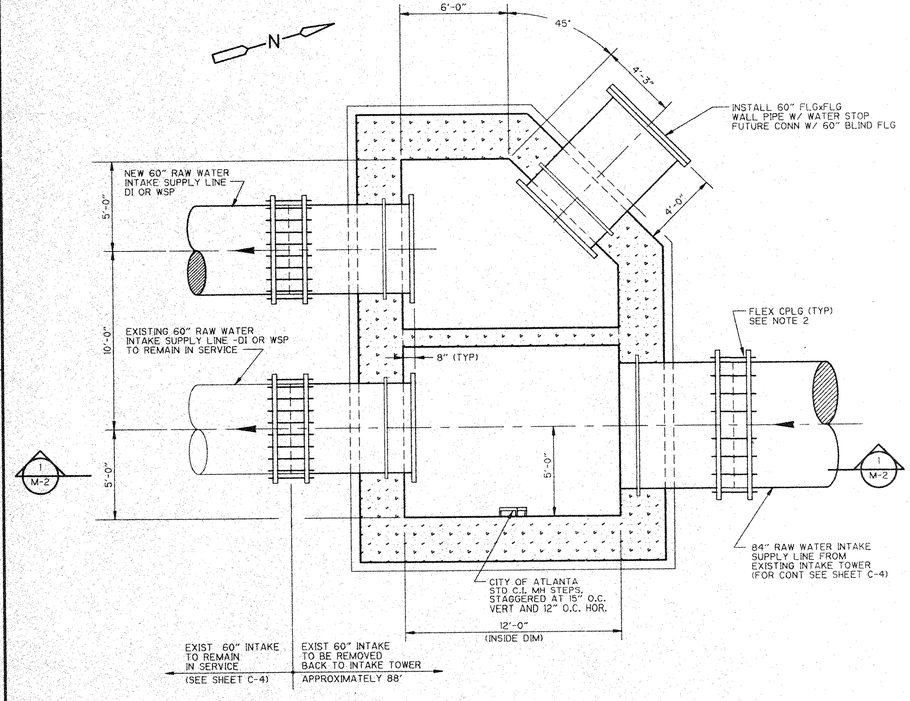
NOTES:

1. SEE SHEET C-4 FOR CONT OF YARD PIPING MODIFICATIONS.
2. WHERE PCCP IS ALLOWED, THE CONTRACTOR SHALL FURNISH AND INSTALL ALL TRANSITION FITTINGS BETWEEN PCCP AND OTHER PIPE MATERIALS.

TOP OF INTAKE JUNCTION STRUCTURE

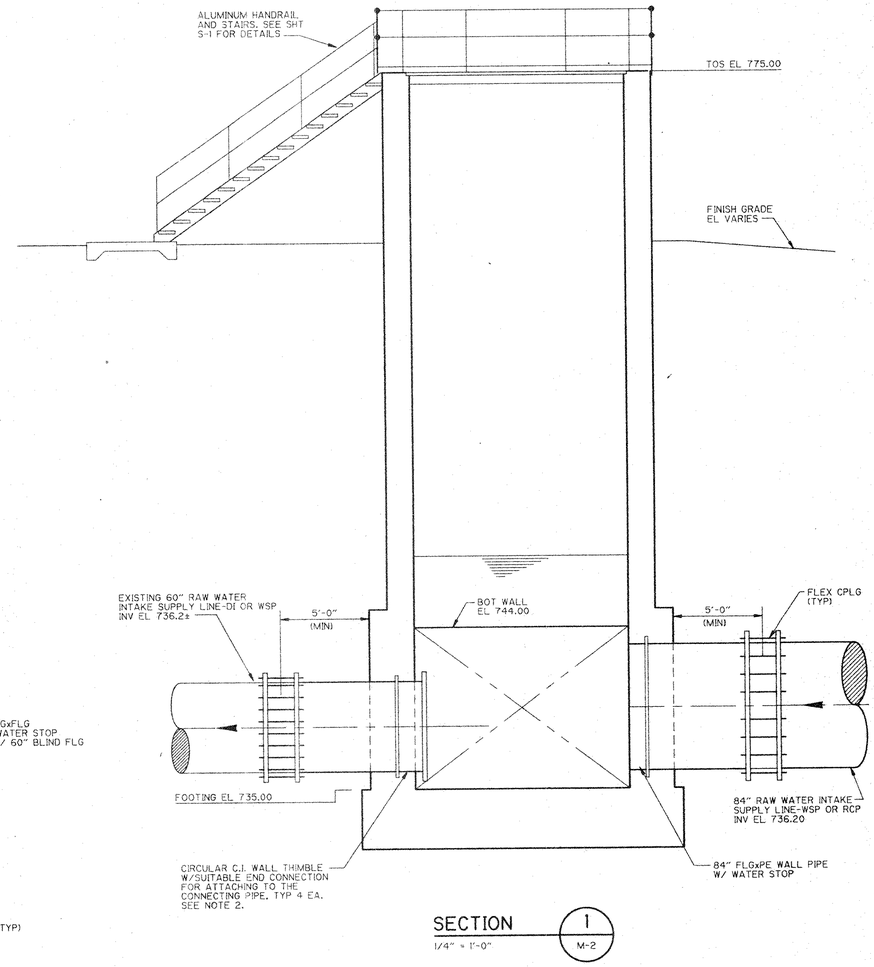
PLAN

1/4" = 1'-0"



SECTIONAL PLAN

1/4" = 1'-0"



SECTION 1 / M-2

1/4" = 1'-0"

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: J. HILL
DRAWN BY: T. MORGAN
SHEET CHK'D BY: M. NOUVEL
CROSS CHK'D BY: R. WOOD
APPROVED BY:
DATE: JULY 1996

CDM Camp Dresser & McKee Inc.
environmental services offices worldwide

DEPARTMENT OF WATER
CITY OF ATLANTA, GEORGIA
CHATTAHOOCHEE RIVER

RAW WATER INTAKE FACILITY MODIFICATIONS

INTAKE JUNCTION STRUCTURE
PLAN, SECTIONAL PLAN AND SECTION

PROJECT NO. 6240-006
FILE NAME: M-2

SHEET NO.
M-2

M:\SDSAFRO\6240.006\DWG\ M2SJBM2 07/09/96 10:46:22 Todd Morgan, CDM

Vol 4 Additional Information

River Intake Pump Station

Part 2 – Duperon Proposal

Duperon® ADAPTIVE TECHNOLOGY™
PRELIMINARY LIQUIDS/SOLIDS SEPARATION SYSTEMS

Date: March 4, 2019 **Proposal # 8991 R5**

Project: FC-1190004, Chattahoochee River Intake Pump Station

Bid Date:

Substantial Completion:

Addendum: **None received or acknowledged**

Owner: City of Atlanta
Suite 1900
City Hall South
55 Trinity Avenue, S.W.
Atlanta, GA 30303

Duperon Contact:
Tammy Blanchard – Sales Project Manager
tblanchard@duperon.com

Mark Hickok – Regional Sales Manager
mhickok@duperon.com
(989) 412-0289

Local Representation:
Clint Curl
The TDH Company, LLC
(770) 509-1808
ccurl@tdhco.com

To: All Bidding Contractors

Duperon is pleased to offer the following scope of supply including mechanical bar screen and accessories, as listed in the scope of supply. Please also refer to Duperon Contractor Installation Guides and Terms and Conditions attached.

We appreciate the opportunity to provide the following pricing for the screening requirements at the Chattanhoochee River Intake Pump Station project. We look forward to the opportunity to work with you and thank you for your consideration.

Note: Duperon equipment is the basis of design and sole sourced for the mechanical bar screen and conveyance system for this project.

Scope of Supply:

Specification Sections: 15101
Drawings: DP0-001, DP1-001, DP2-001, DP2-003, DP2-004, E5-201, E6-202, EI-002, PID-2

(2) Mechanical Bar Screen - Stainless Steel Link Driven, Front Cleaning, Front Return

- **Model FlexRake®**
  - **FPFS, Full penetration Fine Screen– Outdoor Installation, Modular Construction**
- Continuous Cleaning without an operator
- Head Sprocket Only Design – no critical components under water
- Continuous Cleaning, top to bottom, the entire width of scraper
- Scrapers of UV Stabilized UHMW and/or Stainless Steel
- SSTL304 side fabrications, dead plate and cross members
- SSTL304 full enclosure covering from deck to discharge
- SSTL304 enclosure access panels
- SSTL304 cross channel supports
- SSTL304 custom close outs
- SSTL316 FlexLinks and pins
- Modular construction
- Anchor bolts (provided by others)
- 2HP motor
- SSTL304 Drive Head:
  - Drive Sprockets and end castings SSTL304
  - Drive Shaft SSTL304

Dimensions and design criteria

- 8.5 ft channel width
- 7.83 ft screen width
- 60.5 ft channel height
- 60.5 ft channel invert to top of operating deck
- 5.5 ft discharge height onto conveyor
- 72 ft nominal length of FlexLink and scraper system
- 46 ft of barscreen
- 0.25 inch clear opening
- 0.25 inch x 0.75 inch x 0.13 inch SSTL316L tear drop bar screen
- 2:1 UHMW to SSTL304 scraper ratio
- 15 degree from vertical
- 1 ft of head differential structural design
- 43 ft maximum water level during 100 year storm
- 21 ft normal high water level
- 16 ft normal low water level
- 21,800 lbs estimated weight

Hydraulic Profile

- See attached models for hydraulic performance information.

Clarifications/Exceptions/By Others

- The bar screen will be shipped in sections. Modular construction is required because of the length of the screen, please see our Modular Construction notes below.
- Field assembly of SSTL screen enclosure required.
- Some minor field welding will be required at the top of the channel support bar and at the operating deck anchor points.
- Crane may be required for unloading.
- Spreader bar may be required for unloading

- Scope of supply and pricing above does not include additional structure for seismic, additional head differential or wind conditions.

Estimated Anchor Bolts Needed Mechanical Bar Screen:

Estimated Anchor Bolts Needed **(not included in scope of supply):**

- Anchor Bolts
  - Bolts for anchor toes and plates
    - (12) 12 mm (1/2 inch) diameter x 115 mm (4-1/2 inch) long Embed HAS Rods w/ Hilti RE-500V3 Safe Set Adhesive System
  - Bolts for Return Guide / Closeout, per screen
    - (14) 9.5 mm (3/8 inch) diameter x 85 mm (3-3/8) inch long Embed HAS Rods w/ Hilti RE-500V3 Safe Set Adhesive System
    - (3) Epoxy tube
    - (1) Dispenser
- Above quantities not guaranteed as accurate, final quantities will be outlined in submittals.
- Some minor field welding will be required at the top of the channel support bar and at the operating deck anchor points

(1) Screenings Belt Conveyor for (4) four (2 now, 2 future) screening systems

- Flexible Rake Bar Screens Belt Conveyor # 11-BC-001, 24" wide x 54'-0" ± long approximate centers, troughing design, horizontal configuration, and capable of conveying the screenings from the initial two trash rakes and two future trash rakes and transfer to owner provided dumpster and will have the following component and construction features:
- Motor: 5 HP, 1800 RPM, 230/460 volt, 3/60 Hz, TEFC, NEMA Design B, Class F Ins, 1.15 s,f., energy efficient motor
- Reducer: AGMA, Class II, helical gear shaft mount reducer assembly with V-belt and sheave reducer input drive to provide required belt speed. Complete with st steel OSHA style V-belt guard.
- Head Pulley: 16" diameter x 28" face, positive crowned steel drum pulley with compression type hubs and 1/2" thick, vulcanized herringbone rubber lagging.
- Tail Pulley: 16" diameter x 28" face, positive crowned steel drum pulley with compression type hubs.
- Snub Pulley: 6" diameter x 28" face, positive crowned steel drum pulley with compression type hubs, shaft and pillow block bearings
- Shafting: C-1045, turned and polished, 2 7/16" diameter minimum.
- Bearings: Self-aligning, anti-friction, roller bearing pillow blocks.
- Screw Take-Up Assemblies: Protected screw type with min 12" travel and roller bearing assemblies. The take-up assemblies will also include stainless steel adjusting rods, brass bearing capture nuts and st steel frames
- Belting: 24" wide, 2-ply, 220 PIW, conveyor belting with 1/8" x 1/16" MORS covers.
- Belt Splice: Shop installed st steel mechanical belt splice
- Idlers: CEMA "C," 5" diameter 20 degree troughing idlers spaced on 4'-0"max centers. Idlers at load point to be spaced on 2'-0" centers. CEMA "C," 5" diameter flat return idlers spaced on maximum 10'-0" centers. Idler rolls will be polyethylene construction with sealed bearings and st steel brackets.
- Belt Cleaner: Spring tensioned belt wiper for location at discharge pulley with adjustable blade and replaceable urethane wiper blade.
- Skirting: Continuous, fabricated from #10 ga 304 st steel, 16" wide carry width, with adjustable rubber seal strips at belt surface and skirting splash plates at screen load area's
- Safety Stop Switch: NEMA 4X, 120 volt, 20 amp, complete with orange vinyl coated, galvanized aircraft cable and mounting hardware.
- Motion Switch: NEMA 4X, 120 volt, 20 amp,non contacting mag disc mounted on tail pulley
- Belt Alignment Switch: Qty (2) NEMA 4X, 120 volt, 20 amp, with mounting brackets
- Pulley Guards: Head and tail pulley guards fabricated from FRP, OSHA Safety Yellow

- Drip Pans: Fabricated from min #12 ga 304 st steel with 4" dia drain,
- Deck Plate: Continuous, fabricated from #12 ga 304 st steel
- Discharge Chute: Fabricated from min #12 ga 304 st steel, approx. 20' long with st steel supports to wall
- Conveyor Frame and Supports: Fabricated from 304 st steel structural shapes and plates

Warranty

- One Year Standard provided from date of startup or 18 months from date of shipment (whichever occurs first)

(2) Controls Package, Main Panel Screens

- Main control breaker for incoming power 480V/3ph
- Wall mount NEMA 4X SS enclosure
- Enclosure to be:
  - Located indoors in an unclassified area
  - Located in a temperature controlled environment
  - Not located where temperatures drop below 0°C (32°F) frequently
  - Not located where temperatures exceed 40°C (105°F) frequently
- Enclosure to include equipment
  - (1) FlexRake with 2HP motor driven by AC Tech VFD with panel mounted keypad
- PLC Based logic, to include
  - (1) CompactLogix PLC with Ethernet
  - Panelview Plus HMI, (human-to-machine interface)
  - Ethernet card for PLC
  - Pilot lights, push buttons and selector switches on front door
  - Terminal blocks, ETM's, breakers, and relays where required
  - Hand-Off-Auto selector switch uses PB station in Hand mode
  - Hard contact SCADA Interlock(s) Run, No Fault, Auto, High Level, Remote start
  - Differential level controls with back up cycle timer
  - Adjustable on/off cycle timers
  - Machine runs when differential/upstream level is above setpoint, remote start or run timer is active then it will speed up based on size of differential/upstream level
  - Line reactor
  - Load Reactor
  - (2) LUT 400 Ultrasonic transmitter
- Weather protection devices inside enclosure
  - Air conditioner with integral heater
  - Sun shield for HMI

Instrumentation

- Differential Level Control per channel
  - (2) XPS series Ultrasonic Transducers with 150 foot long cabling. (must be mounted at least 1.00 foot above highest water during operation.)

Local to equipment mounted devices

- (2) Three Button NEMA 4X Enclosure for E-Stop, Jog-Reverse and Forward per screen

(1) Controls Package, Main Panel Conveyor

- Main control breaker for incoming power 480V/3ph
- Wall mount NEMA 4X SS enclosure
- Enclosure to be:
  - Located outdoors in an unclassified area
  - Not located where temperatures drop below 0°C (32°F) frequently
  - Not located where temperatures exceed 40°C (105°F) frequently
- Enclosure to include equipment
  - (1) Conveyor with 5HP motor driven by Full Voltage motor starter

- Relay Based logic, to include
  - Pilot lights, push buttons and selector switches on front door
  - Terminal blocks, ETM's, breakers, and relays where required
  - Hand-Off-Auto selector switch uses PB station in Hand mode
  - Hard contact SCADA Interlock(s) Run, No Fault, Auto, High Level, Remote start
  - Differential level controls with back up cycle timer
  - Adjustable on/off cycle timers
  - Machine runs when remote start is active
- Weather protection devices inside enclosure
  - Thermostat for fan and heater with rain hoods

Instrumentation
  - none

Local to equipment mounted devices
- (1) Two Button NEMA 4X Enclosure for Stop and Forward
- (1) Safety stop switches (provided by conveyor manufacturer)
- (1) Zero speed switch (provided by conveyor manufacturer)

Controls Clarifications/Exceptions/By Others
- Any changes to the scope of supply could have direct impact to pricing
- The price below includes our controls as indicated above
- All conduit and field wiring between the equipment
- Mounting hardware

FlexRake Spare Parts
- (1) Drive Clevis Pin
- (10) Snap Rings
- (4) Link Clevis Pins
- (4) Hex Head Cap Screw
- (4) Scraper Nut
- (1) Never Seez
- (1) Snap Ring Tool
- (1) 1 oz. Never Seez

Conveyor Spare Parts
- (1) Drive shaft pillow block bearing
- (1) Tail shaft take up bearing
- (3) Trough carry idlers
- (1) Return idler
- (1) SSTL mechanical belt splice kit with tools and template
- (1) Wiper blade of each size and type
- (1) Set vee belts
- 20 ft of conveyor belting

On Site Technical Assistance for installation supervision
- (1) Trip(s)
- (1) Technician
- (1) 8 hour man-days
- *If additional Technical Service days are required, please add per the rates included in the Clarifications section of this scope of supply.*

On Site Technical Assistance for installation inspection, start-up and O&M training

- (1) Trip(s)
- (1) Technician
- (1) 8 hour man-days
- *If additional Technical Service days are required, please add per the rates included in the Clarifications section of this scope of supply.*

Operation and Maintenance Manuals

- 6 Hard Copies

Warranty for Mechanical Bar Screen

- One Year Standard material and workmanship
- Five year on rotating parts

Freight to Jobsite

Price: To be provided

Price is valid for 180 days from bid date.

Delivery:

- Submittals: 4-6 weeks after approved purchase order, based on workload
- Equipment Delivery: 8-12 weeks after approval based on workload
- FOB Factory, Freight Paid

Modular Construction Notes:

- The bar screen will be shipped from the factory fully assembled with the exception of the operating deck enclosure(s) and intermediate deck side shields, if there are any specified.
- If this installation requires modular construction, please be guided by the following:
- The installation contractor will need to dissemble the bar screen at the site and in locations directed by Duperon and approved for during the submittal process. The contractor will then reassemble the bar screen in the facility. The contactor is required to provide all material, equipment and labor for this process.
- The overall bar screen unit will be fabricated so that it can be split into disassembled segments at the project site. Precise segments depend on site constraints and bar screen dimensions. Each segment will have the exploded sidefab detail as illustrated in our installation guide. The weights of the sections will be proportioned from the overall weight listed in the proposal.
- The drive head assembly may need to be removed if site constraints, for example navigating around a corner, require it.
- The FlexLink and scraper system will need to be removed in segments of approximately six links, or about 6 ft each. The FlexLinks have a snap ring holding the FlexLink pin. These FlexLinks will need to be marked so that the contractor knows what FlexLink connects to what FlexLink during the reassembly process.

- The enclosures and or side shields for the operating deck and intermediated deck, if required will be shipped unassembled. These will comprise anywhere from 10 to 20 pieces per bar screen. These pieces of SSTL sheet metal will need to be bolted together once the bar screen is installed.
- Duperon contact: If any have further questions on our modular construction process, please contact our application engineer, Jan LaFave at 800.383.8479
- Disclaimer: Duperon cautions the contractor, whom we assume is familiar with bar screens that an allowance for the disassembly should be accounted for in their bid. Without knowing the skill set, rigging provisions, and manpower the selected contractor will apply, it is difficult for us to provide specific details on this subject. The above language is only made as an approximation and is not guaranteed.

Exceptions:

- As noted

Clarifications:

- Prices are valid for 180 days unless stated otherwise in the proposal
- See Duperon Contractor Installation Guides for guidance in estimating these costs.
- Duperon requires 3 week's advanced notice in writing to schedule field service technician on site.
- Field Services will be provided as outlined in this proposal. Duperon field service rate is $750 per day plus travel and per diem expenses. If field service personnel arrive on site as scheduled and the project is not ready for intended services to be performed, Duperon will invoice for additional days, if required. If the time required is greater than the time listed in this proposal, Duperon will invoice at the above rates.
- The specifications listed are the only specifications which shall apply to this proposal either directly or by reference. Any additional specifications, with equipment or requirements specified therein, that are not specifically included as part of this offer are excluded from this proposal.

Not Included:

- Anything not specifically stated in this Proposal.
- Bonding, tariffs, permits, taxes, liquidated damages.
- Construction and /or installation work of any kind at the jobsite.
- On-site conditions affecting the work described or which affects the installation.
- Conduit, stands, control mounting wiring, junction boxes, or other accessories.
- Any site work or installation tasks (ie, unloading, placement, dewatering, diving, clearing the forebay, wiring, provision of concrete structure, etc.), equipment (such as cranes, hammer drills, etc.), or anchor bolts.
- Pre-installation tasks such as touch-up painting, checking bolts for tightness, removal of shipping containment devices, etc.
- Engineering: Does not include drawings other than those for the FlexRake.
- Additional structure for seismic or wind conditions.
- Offloading or handling of delivered equipment.
- Union labor for all field support services.
- Controls not specifically listed above.
- Videotaping of the training sessions
- Release of proprietary information.
- Insulation or weather proofing.
- Site/field painting or touch up.

- Vibration and noise testing.
- Anchor Bolts by others.
- Discharge system.
- Stilling wells.

Payment Terms:

- 5% Due with placement of order
- 20% Invoiced upon submittal of engineering drawings
- 65% Invoiced at time of shipment
- 10% Invoiced upon successful start up or 60 days after shipment, whichever is less.
- All payments are due Net 30 days
- Based upon review and approval by Duperon credit department.
- No retentions allowed.

Proposal Terms:

- This offer is subject to the enclosed Duperon Corporation Terms and Conditions page unless alternate terms and conditions are specifically negotiated in writing and are signed/accepted by Duperon Corporation at the time of purchase.
- May be subject to material price escalation.
- This proposal is based upon the information available at this time and may be impacted by future specifications, scope, and other requirements.
- Duperon Corporation retains the right to revise, withdraw, or negotiate this offer at any time prior to signing a material contract.

Order Processing:

To facilitate timely order processing and submittals, refer to this proposal number and please list purchaser contact, telephone, fax, and email with your purchase order. Please provide with your order a copy of trade references and, if tax exempt, please provide a resale or tax exemption certificate. Purchase Order should be sent to and payment remitted to:

Duperon Corporation
1200 Leon Scott Court
Saginaw, MI 48601
Ph. 800-383-8479
Fax 989-754-2175

Duperon Corporation Terms and Conditions

The Terms and Conditions ("Terms") contained herein shall apply to all Duperon Corporation Purchasers. These Terms apply in lieu of any course of dealing between the parties or usage of trade in the industry. Any changes in the Terms contained herein must specifically be agreed to in writing and signed by Duperon Corporation before becoming binding on either party. The sale and purchase of equipment described herein shall be governed exclusively by the foregoing and the following Terms:

1. SPECIFICATIONS: The equipment may not be in strict compliance with the Engineer's/Owner's plans, specifications, or addenda as there may be deviations. The equipment will, however, meet the general intention of the mechanical specifications as described by Duperon Corporation.

2. ITEMS INCLUDED: The proposal includes only the equipment and does not include erection, installation, accessories or associated materials such as controls, piping, etc., unless specifically listed.

3. PARTIES TO CONTRACT: Duperon Corporation is not a party to or bound by the terms of any contract between Purchaser and any other party. Duperon Corporation's undertakings are limited to those defined in the contract between Duperon Corporation and its Purchasers.

4. PRICE AND DELIVERY: All selling prices quoted are subject to change without notice after 30 days from the date of a proposal unless specified otherwise. Unless otherwise stated, all prices are F.O.B. Duperon Corporation or its supplier's shipping points with freight allowed. All claims for damage, delay or shortage shall be made by Purchaser directly against the carrier. When shipments are quoted F.O.B. job site or other designation, Purchaser shall inspect the equipment shipped, notifying Duperon Corporation of any damage or shortage within forty-eight hours of receipt. Failure to so notify Duperon Corporation shall constitute acceptance by Purchaser, relieving Duperon Corporation of any liability for shipping damages or shortages.

5. PAYMENTS: All invoices are net 30 days. Delinquencies are subject to a 1.5% service charge per month or the maximum permitted by law, whichever is less on all past due accounts. Pro rata payments are due as shipments are made. If shipments are delayed by the Purchaser, invoices shall be sent on the date when Duperon Corporation is prepared to make shipment and payment shall become due under standard invoicing terms. If the work to be performed hereunder is delayed by the Purchaser, payments shall be based on percentage of completion. Products held for the Purchaser shall be at the risk and expense of the Purchaser. Unless specifically stated otherwise, prices quoted are for equipment only. These Terms are independent of and not contingent upon the time and manner in which the Purchaser receives payment from the owner.

6. CREDIT APPLICATION: Purchaser must complete a credit application if it wishes credit terms. The credit application must be updated periodically as requested and upon a request by Purchaser for a change in credit terms. The provision of credit is subject to acceptance by Duperon Corporation's Credit Department. If at any time the financial condition of the Purchaser gives Duperon Corporation, in its judgment, doubt concerning the Purchaser's ability to pay, Duperon Corporation may require full or partial payment in advance or may suspend any further deliveries or continuance of the work to be performed by Duperon Corporation until such payment has been received. Failure to pay after demand by Duperon Corporation shall result in a service charge of 1.5% per month, or the maximum permitted by law, whichever is less.

7. RETENTIONS: Retentions are not included, unless specifically noted. Purchaser agrees not retain payment or any part of a payment. Failure to make payment in accordance with the agreed upon terms will result in a 1.5% per month service charge.

8. ESCALATION: If shipment is, for any reason, deferred by the Purchaser beyond the contractually agreed upon normal shipment date, or if material price increases (or decreases) are greater than 5% from proposal date to material procurement date, stated prices set forth herein are subject to a shared risk escalation adjustment. Any escalation less than plus or minus 5% shall be absorbed by Duperon Corporation. All escalation (increase or credit) that exceeds 5% shall be passed onto the Purchaser at cost and shall be based upon increases (or decreases) in material costs to Duperon Corporation that occur in the time period between quotation and material procurement by Duperon Corporation. Purchaser agrees to this potential escalation (or credit) regardless of contradicting terms in the contract, except when an agreed upon escalation adder is included in the price.

(a) The total quoted revised price is based upon changes in the indices as published by third party sources, such as, the United States Department of Labor, Bureau of Labor Statistics. Labor will be related to the Average Hourly Earnings indices found in the Employment and Earnings publication. Material will be related to the Metal and Metal Products Indices published in Wholesale Prices and Price Indices.

(b) Price revision for items furnished to, and not manufactured by Duperon Corporation, which exceed the above escalation calculation, will be passed along by Duperon Corporation to Purchaser based upon the actual increase in price to Duperon Corporation for the period from the date of quotation to the date of material procurement. Any item that is so revised will be excluded from the index escalation calculations set forth in subparagraph (a) above.

9. APPROVAL: If approval of equipment submittals by Purchaser or others is required, a condition precedent to Duperon Corporation supplying any equipment shall be such complete approval.

10. INSTALLATION SUPERVISION: Unless specified, prices quoted for equipment do not include installation supervision. Duperon Corporation recommends and will, upon request, make available, at Duperon Corporation's then current rate, an experienced installation supervisor to act as the Purchaser's agent to supervise installation of the equipment. Purchaser shall at its sole expense furnish all necessary labor equipment, and materials needed for installation. Responsibility for proper operation of equipment, if not installed by Duperon Corporation or installed in accordance with Duperon Corporation's instructions, and inspected and accepted in writing by Duperon Corporation, rests entirely with Purchaser; and any work performed by Duperon Corporation personnel in making

adjustment or changes must be paid by Purchaser at Duperon Corporation's then current per diem rates plus living and traveling expenses.

11. ACCEPTANCE OF PRODUCTS: Products will be deemed accepted without any claim by Purchaser unless written notice of non-acceptance is received by Duperon Corporation within 30 days of delivery if shipped F.O.B. point of shipment, or 48 hours of delivery if shipped F.O.B. point of destination. Such written notice shall not be considered received by Duperon Corporation unless it is accompanied by all freight bills for said shipment, with Purchaser's notations as to damages, shortages and conditions of equipment, containers, and seals. Non-accepted products are subject to the return policy stated below.

12. TAXES: Any federal, state, or local sales, use or other taxes applicable to this transaction, unless specifically included in the price, shall be the responsibility of Purchaser.

13. TITLE: The equipment specified herein, and any replacements or substitutes therefore shall, regardless of the manner in which affixed to or used in connection with realty, remain the sole and personal property of Duperon Corporation until the full purchase price has been paid. Purchaser agrees to do all things necessary to protect and maintain Duperon Corporation's title and interest in and to such equipment; and upon Purchaser's default, Duperon Corporation may retain as liquidated damages any and all partial payments made and shall be free to enter the premises where such equipment is located and remove the same as its property without prejudice to any further claims on account of damages or loss which Duperon Corporation may suffer from any cause.

14. INSURANCE: From date of shipment until the invoice is paid in full, Purchaser agrees to provide and maintain at its expense, but for Duperon Corporation's benefit, adequate insurance including, but not limited to, builders risk insurance on the equipment against any loss of any nature whatsoever. Purchaser shall provide proof of said coverage prior to shipment.

15. SHIPMENTS: Any estimated delivery dates represent Duperon Corporation's best estimate. No liability, direct or indirect, is assumed by Duperon Corporation for failure to ship or deliver on such dates. Duperon Corporation shall have the right to make partial shipments; and invoices covering the same shall be due and payable by Purchaser in accordance with the payment terms thereof. If Purchaser defaults in any payment when due hereunder, Duperon Corporation may, without incurring any liability therefore to Purchaser or Purchaser's customers, declare all payments immediately due and payable with maximum legal interest thereon from due date of said payment, and at its option, stop all further work and shipments until all past due payments have been made, and/or require that any further deliveries be paid for prior to shipment. If Purchaser requests postponements of shipments, the purchase price shall be due and payable upon notice from Duperon Corporation that the equipment is ready for shipment; and thereafter any storage or other charge Duperon Corporation incurs on account of the equipment shall be added to Purchaser's account. If delivery is specified at a point other than Duperon Corporation or its supplier's shipping points, and delivery is postponed or prevented by strike, accident, embargo, or other cause beyond Duperon Corporation's reasonable control and occurring at a location other than Duperon Corporation or its supplier's shipping points, Duperon Corporation assumes no liability for delivery delay. If Purchaser refuses such delivery, Duperon Corporation may store the equipment at Purchaser's expense. For all purposes of this agreement such tender of delivery or storage shall constitute delivery.

16. WARRANTY: DUPERON CORPORATION WARRANTS EQUIPMENT IT SUPPLIES ONLY IN ACCORDANCE WITH THE WARRANTY EXPRESSED IN THE ATTACHED COPY OF "DUPERON WARRANTY" AGAINST DEFECTS IN WORKMANSHIP AND MATERIALS WHICH IS MADE A PART HEREOF. SUCH WARRANTY IN LIEU OF ALL OTHER WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, WHETHER WRITTEN, ORAL, EXPRESSED, IMPLIED OR STATUTORY, DUPERON CORPORATION SHALL NOT BE LIABLE ANY CONTINGENT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES FOR ANY REASON WHATSOEVER. THE PARTIES AGREE AND STIPULATE THAT AN EXPRESS WARRANTY PROVIDED TO PURCHASER IN WRITING IS THE SOLE WARRANTY REGARDING THE PRODUCT AND ANY SERVICE PROVIDED BY DUPERON CORPORATION. THE PARTIES SPECIFICALLY AGREE AND STIPULATE THAT THERE IS NO OTHER WARRANTY OF ANY TYPE WHATSOEVER, INCLUDING BUT NOT LIMITED TO CONSUMER WARRANTIES, WARRANTY OF FITNESS FOR PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, AND DUPERON CORPORATION IS NOT LIABLE FOR ANY SPECIAL, CONSEQUENTIAL, OR ANY OTHER DAMAGES, EXCEPT AS SET FORTH IN THESE TERMS AND THE EXPRESS WARRANTY. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE FACE OF THE EXPRESS WARRANTY.

17. PATENTS: Duperon Corporation agrees that it will, at its own expense, defend all suits or proceedings instituted against Purchaser and pay any award of damages assessed against it in such suits or proceedings, so far as the same are based on any claim that the said equipment or any part thereof constitutes an infringement of any apparatus patent of the United States issued at the date of this Agreement provided Duperon Corporation is given prompt notice in writing of the institution or threatened institution of any suit or proceeding and is given full control of the defense, settlement, or compromise of any such action; and Purchaser agrees to give Duperon Corporation needed information, assistance, and authority to enable Duperon Corporation so to do. In the event said equipment is held or conceded to infringe such a patent, Duperon Corporation shall have the right at its sole option and expense to a) modify the equipment to be non-infringing, b) obtain for Purchaser the license to continue using said equipment, or c) accept return of the equipment and refund to the Purchaser the purchase price thereof less a reasonable charge for the use thereof. Duperon Corporation will reimburse Purchaser for actual out-of-pocket expenses, exclusive of legal fees, incurred in preparing such information and rendering such assistance at Duperon Corporation's request. The foregoing states the entire liability of Duperon Corporation, with respect to patent infringement; and except as otherwise agreed to in writing, Duperon Corporation assumes no responsibility for process patent infringement.

18. CANCELLATION, SUSPENSION, OR DELAY: After acceptance by Duperon Corporation, the proposal, or Purchaser's order based on the proposal, shall be a firm agreement and is not subject to cancellation, suspension, or delay except upon payment by Purchaser of appropriate charges which shall include all costs incurred by Duperon Corporation to date of cancellation, suspension,

or delay plus a reasonable profit. Additionally, all charges related to storage and/or resumption of work, at Duperon Corporation's plant or elsewhere, shall be added to Purchaser's sole account; and all risks incidental to storage shall be assumed by Purchaser.

19. DUPERON CORPORATION CANCELLATION: Duperon Corporation shall have the right to cancel any order or proposal without notice to Purchaser in the event that Purchaser becomes insolvent, adjudicated bankrupt, petitions for or consents to any relief under any bankruptcy reorganization statute, or becomes unable to meet its financial obligations in the normal course of business.

20. RETURN OF PRODUCTS: No products may be returned to Duperon Corporation without Duperon Corporation's prior written permission. Said permission may be withheld by Duperon Corporation at its sole discretion.

21. EXTENDED STORAGE: Extended storage instructions will be part of the information provided at shipment. If equipment installation and start-up is delayed more than 30 days, the provisions of the storage instructions must be followed to keep WARRANTY in force.

22. BACKCHARGES: Duperon Corporation will not approve or accept back charges for labor, materials, or other costs incurred by Purchaser or others in modification, adjustment, service, or repair of Duperon Corporation furnished materials unless such back charge has been authorized in advance in writing by a Duperon Corporation employee, by a Duperon Corporation purchase order, or work requisition signed by Duperon Corporation

23. INDEMNIFICATION AND HOLD HARMLESS: Duperon Corporation and Purchaser agree to hold harmless the other party from any and all liabilities, damages, losses, claims, demands, payments, actions, fees, or judgments arising out of or resulting from injury to or death of any and all persons or from damage to or loss of property (or loss of use thereof) arising out of the sale, use, maintenance, and/or delivery of equipment provided such liabilities, damages, losses, claims, demands, payments, actions, fees, or judgments are caused by actual, or claimed, negligence or breach of warranty and do not arise from any warranty not approved or from any sales for a purpose not authorized. Purchaser agrees to indemnify Duperon Corporation from all costs incurred, including but not limited to court costs and reasonable attorney fees, from enforcing any provisions of this contract, including but not limited to breach of contract or costs incurred in collecting monies owed on this contract.

24. FORCE MAJURE: Neither party shall be considered in default hereunder or be liable for any failure to perform or delay in performing any provisions of this Agreement in the customary manner to the extent that such failure or delay shall be caused by any reason beyond its control, including an act of God; fire, explosions, hostilities or war (declared or undeclared, striking or work stoppage involving either party's employees or governmental restrictions, provided that the party declaring force majeure shall give notice to the other party promptly and in writing of the commencement of the condition, the nature, and the termination of the force majeure condition. The party whose performance has been interrupted by such circumstances shall use every reasonable means to resume full performance of these Terms as promptly as possible.

25. ASSIGNMENT: No assignment of any right or obligation under this Contract shall be made by either party without the prior consent of both parties. Any attempted assignment without such is void.

26. ENTIRE AGREEMENT: This proposal expresses the entire agreement between the parties hereto superseding any prior understandings, either written or oral, and is not subject to modification except by a writing signed by an authorized officer of each party.

27. ARBITRATION: Any controversy or claim arising out of or relating to the performance of any contract resulting from this proposal or contract issued, or the breach thereof, shall be settled by arbitration in accordance with the Arbitration Rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) may be entered to any court having jurisdiction.

28. MISCELLANEOUS: Titles and/or headings in these Terms are inserted for convenience only and are not intended to effect the interpretation or construction of the Terms. Whenever possible, each provision of this Contract shall be interpreted in such a way as to be effective and valid under applicable law. If any provision is prohibited by or invalid under applicable law, it will be ineffective only to the extent of such prohibition or invalidity, without invalidating the remainder of such provision or the remaining provisions of the Terms. The parties agree that time is of the essence. Production and delivery dates may change upon any delay caused by Purchaser or its agents. Duperon Corporation may not be assessed damages for delays in shipment or delivery. Unless otherwise agreed in writing, the Terms contained herein and the subject of this agreement shall be governed by and construed only under the laws of the State of Michigan, USA. The parties agree and stipulate that jurisdiction and venue is proper before the trial courts of Michigan and consent to the jurisdiction thereof, and agree to dismiss any claim brought before the courts of any other state or nation. The parties deem that this Agreement was executed and to be fully performed in Saginaw, Michigan.

Vol 4 Additional Information

River Intake Pump Station

Part 3 – Geotechnical Information

WILLMER engineering
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willmerengineering.com

Technical Memorandum

To: Joe W. Ussery, III, P.E.
R2T, Inc.

From: Joseph M. Sura, PE / Sujit K. Bhowmik, PhD, PE / James L. Willmer, PE

Date: August 5, 2019

Subject: Additional Borings and Rock Coring
New River Pump Station and Associated Facilities
Water Supply Program, City of Atlanta Department of Watershed Management (DWM)
Fulton County, Georgia
Willmer Project No. 71.4384

As requested, we have completed additional borings and rock coring for the new River Intake Pump Station (RIPS) and associated facilities, to be located near the Atlanta Water Works River Intake, north of the R.M. Clayton Water Reclamation Center (R.M. Clayton Plant) in Fulton County, Georgia (see Figure 1). These borings were performed to obtain additional information on rock depth and quality to be provided to bidders for this project. The work was performed in general accordance with Willmer Proposal 19.P139, dated April 10, 2019, and associated discussions with River 2 Tap, Inc. (R2T). This work is a follow-up to previous work performed for the RIPS, which was summarized in two memoranda titled "Geotechnical Exploration and Recommendations – New River Pump Station" dated April 23, 2018 and "Geotechnical Recommendations for Valve Vault" dated February 19, 2018. The results of our additional borings and rock coring are provided in this memorandum. This memorandum is not a stand-alone document; it should be read in conjunction with the two previous memoranda referenced above.

Boring Locations

As shown in Figures 2, 3, and 4 and on the drawings provided by R2T (Appendix V), the additional borings were performed in the following areas:

- New RIPS and associated facilities, constructed near the Atlanta Water Works River Intake
- Golf cart bridge to be constructed for access between the new RIPS and the existing R.M. Clayton Plant
- Underground water tunnel near the existing R.M. Clayton Plant.

Field Exploration Program

Methodology

A field exploration program was conducted by Willmer to assess the depth and quality of rock and depth to groundwater at the site. All field activities were performed during business hours and coordinated with site personnel.

Boring locations were selected by R2T and provided to Willmer. The boring locations were generally within a few feet of a previously drilled boring. The boring depths were selected by Willmer based on structural

drawings provided by R2T and generally extended a minimum of 2 to 5 feet below the lowest elevation required for construction. Borings were located in the field by Willmer personnel by referencing existing site features and using a hand-held GPS device. Subsurface utility clearance at the boring locations was provided by the subscribers of Georgia Utilities Protection Center and a private subsurface utility locating subcontractor. Upon completion of drilling, the boreholes were backfilled using soil cuttings from the drilling operation and where applicable, pavement was patched with cold-mix asphalt. Since the majority of the borings were drilled less than 10 feet of lateral distance from previous Willmer borings at the site, therefore, the ground surface elevations were assumed to be similar to the closest previous boring.

Standard Penetration Test Borings

The subsurface exploration consisted of drilling 12 Standard Penetration Test (SPT) borings to auger refusal, with NQ rock coring below auger refusal to the target elevation. As mentioned before, the borings were located near previously drilled borings; therefore, each boring had the same number as the nearest previously drilled boring, with a suffix "A" or "B". For example, boring SPT-1A is located approximately five feet from the previous boring designated SPT-1. The borings for this work were named SPT-1A to SPT-6A, SPT-10B, GC-1A and GC-2A, RMC-12A, RMC-12B, and RMC-15A. Borings SPT-1A to SPT-6A and SPT-10B are associated with the new RIPS construction. Borings GC-1A and GC-2A are associated with the golf cart bridge between the new RIPS and the existing R.M. Clayton Plant. Borings RMC-12A, RMC-12B, and RMC-15A are associated with a new tunnel construction. The locations of the borings are shown in Figures 2 through 4, boring logs are included in Appendix II, and photographs of rock cores are included in Appendix III.

The SPT borings were drilled using a track-mounted rotary drill rig to advance continuous hollow-stem augers to auger refusal. After reaching auger refusal, NQ-size rock coring was performed. Rock cores were generally advanced in either 5-foot or 10-foot runs. All work was performed under the observation of our geotechnical engineer. The SPT boring and rock coring procedures are described in Appendix I.

Classification of the soil samples collected was performed in general accordance with ASTM D 2487 and D 2488 procedures. Detailed descriptions of the materials encountered in each soil test boring, along with graphic representations of the standard penetration test blow counts (N-values), are presented on the boring logs included in Appendix II.

Rock Coring

The depth of rock coring, percent recovery (REC) of rock core and the Rock Quality Designation (RQD) are presented on the boring logs in Appendix II. Photographs of the recovered rock cores are included in Appendix III. Percent recovery is defined as the length of rock core recovered divided by the total length of the core run. RQD is defined as the sum of the lengths of intact rock core pieces 4 inches or longer (ignoring mechanical breaks) divided by the total length of the core run. Percent REC and RQD provide an indication of the continuity, fracturing, and degree of weathering of the rock.

Soil Sampling

In the SPT borings, soil samples (split-spoon) were obtained at 2.5-foot intervals within the top 10 feet and at 5-foot intervals thereafter to auger refusal depths. Soil samples were classified by our geotechnical engineer. The split-spoon samples obtained from all borings were sealed in glass jars for further classification and laboratory testing, as needed.

Piezometer Installation

At the request of Stantec, 2-inch diameter piezometers RMC-12PZ and RMC-15PZ were installed near boring RMC-12A and RMC-15A, respectively. These piezometers were installed by drilling to approximately 1-2 feet above the auger refusal depth, as estimated from the adjacent boring. Slotted 5-foot well screens were installed from the termination depth. Sand filter pack was used from the base of the well to a depth of approximately 10 feet below ground surface. Bentonite chips were used as a well plug between the top of the sand filter pack and the top of the borehole. A 2 ft by 2 ft rectangular concrete well pad was installed at the surface, and a flush-cut steel well cap was used at the surface.

Groundwater Level Measurement

Due to the use of water as part of the rock coring process, groundwater at the time of boring completion may not be representative of the groundwater table elevation. Based on the field engineer's assessment, the groundwater elevations recorded at the time of boring in three borings (SPT-1A, RMC-12B, and RMC-15A) were considered to be representative. Groundwater at the time of boring completion was not measured for the remaining borings since the groundwater level was elevated due to the water pumping during rock coring. Groundwater readings were attempted at each borehole approximately 24 hours after boring completion. However, in several borings, based on the field engineer's judgment, the groundwater level at 24 hours after boring completion was still elevated due to water pumped into the hole during rock coring and did not appear representative of the actual groundwater elevation.

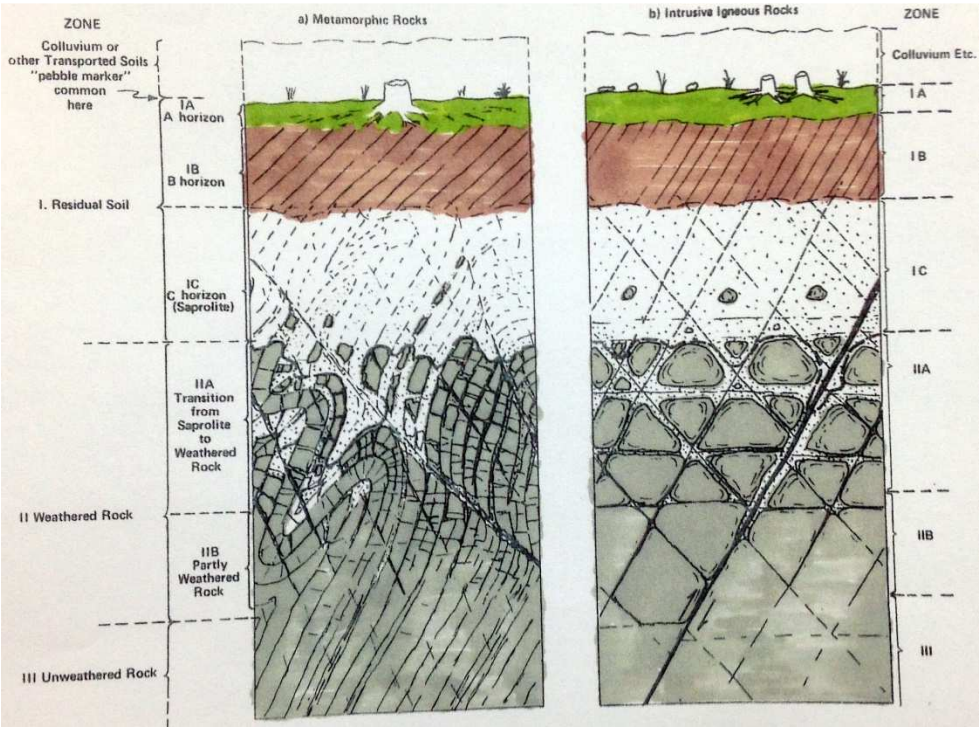
Area Geology and Subsurface Conditions

Area Geology

Based on the USGS Database for the 'Geologic Units of Georgia', the project site is underlain by Porphyritic Granite, located within the Southern Piedmont Physiographic Province of Georgia. The Porphyritic Granite formation is comprised of granite. Based on rock cores recovered during drilling, the rock type underlying the site consists of biotite gneiss, granitic gneiss, and granite.

The Piedmont is composed of metamorphic rocks with localized igneous intrusions. The residual overburden soils encountered in the Piedmont are the product of in-situ chemical and physical weathering of the underlying parent rock. Typically, weathering is most advanced near the surface and decreases with depth. Below the residual soils, partially weathered rock is usually encountered as a transition zone to the underlying bedrock. Partially weathered rock (PWR) is locally defined as a material with a Standard Penetration Resistance in excess of 50 blows per 6 inches of penetration.

An important aspect of the Piedmont subsurface profile is that highly variable conditions may exist over relatively short horizontal distances. This is caused by variation in mineral composition of the parent rock and the intensity of fractures and joints within the rock. Zones of partially weathered rock may be encountered within residual soils, and lenses of soil may occur in the rock mass. The subsurface profile may be altered by excavating or filling, or by effects of water through the process of erosion or alluvial deposition. Typical profiles of metamorphic and intrusive igneous rocks are provided below.



Subsurface Conditions

The subsurface profile encountered at the boring locations generally consisted of a layer of topsoil underlain by fill (at some locations), residual and/or alluvial soils, partially weathered rock (PWR), and parent bedrock. PWR was encountered at all borings with the exception of GC-1A and RMC-12B.

The fill consisted of loose to dense silty sand and very loose to medium dense clayey sand. The fill also randomly contained root materials, boulders, or rock fragments. The residual soils mostly consisted of soft to very stiff sandy silts and sandy clays and loose to dense silty and clayey sands. The PWR consisted mostly of very hard sandy silt and very dense silty/clayey sand with rock fragments at some boring locations.

The parent bedrock consisted of soft to hard biotite gneiss, granitic gneiss, or granite. The core recoveries (REC) generally ranged from 80 to 100 percent. The rock quality designation (RQD) values ranged from 15 to 100 percent, generally increasing with the core depth.

PWR was encountered at depths ranging from less than one foot to 41 ft bgs. Auger refusal was encountered at depths ranging from 9.5 to 41 ft bgs. The boring logs are included in Appendix II, rock core photographs are included in Appendix III.

Laboratory Testing

General

A laboratory testing program was performed by Willmer to determine the engineering properties of rocks for use by Stantec in design of for the proposed tunnel. Based on discussions with R2T and Stantec, the laboratory testing program consisted of (i) rock compressive strength and bulk density tests on three samples from each of the three borings RMC-12A, RMC-12B, and RMC-15A and (ii) three axial point load strength tests on

samples from RMC-12B and RMC-15A. All laboratory tests were performed in general accordance with appropriate ASTM standards.

Rock Compressive Strength and Bulk Density of Rock

Rock core samples obtained from borings RMC-12A, RMC-12B, and RMC-15A were used for compressive strength testing. The compressive strengths varied between 15,413 to 23,981 psi in RMC-12A, 13,536 to 24,980 psi in RMC-12B, and 8,621 to 16,772 psi in RMC-15A. The bulk density values varied between 163 to 174 pcf in the three borings.

Axial Point Load Tests

Axial point load tests were conducted on rock core samples from borings RMC-12B and RMC-15A. In boring RMC-12B, the compressive strength varied between 16,300 and 29,900 psi. In boring RMC-15A, the compressive strength varied between 21,800 and 31,900 psi.

Closing Remarks

Willmer appreciates the opportunity to assist you during this phase of the project. Please contact us if you have any questions concerning this report or require further assistance.

Sincerely,

WILLMER ENGINEERING INC.

Joseph M. Sura, PE
Project Engineer

Sujit K. Bhowmik, PhD, PE
Chief Engineer

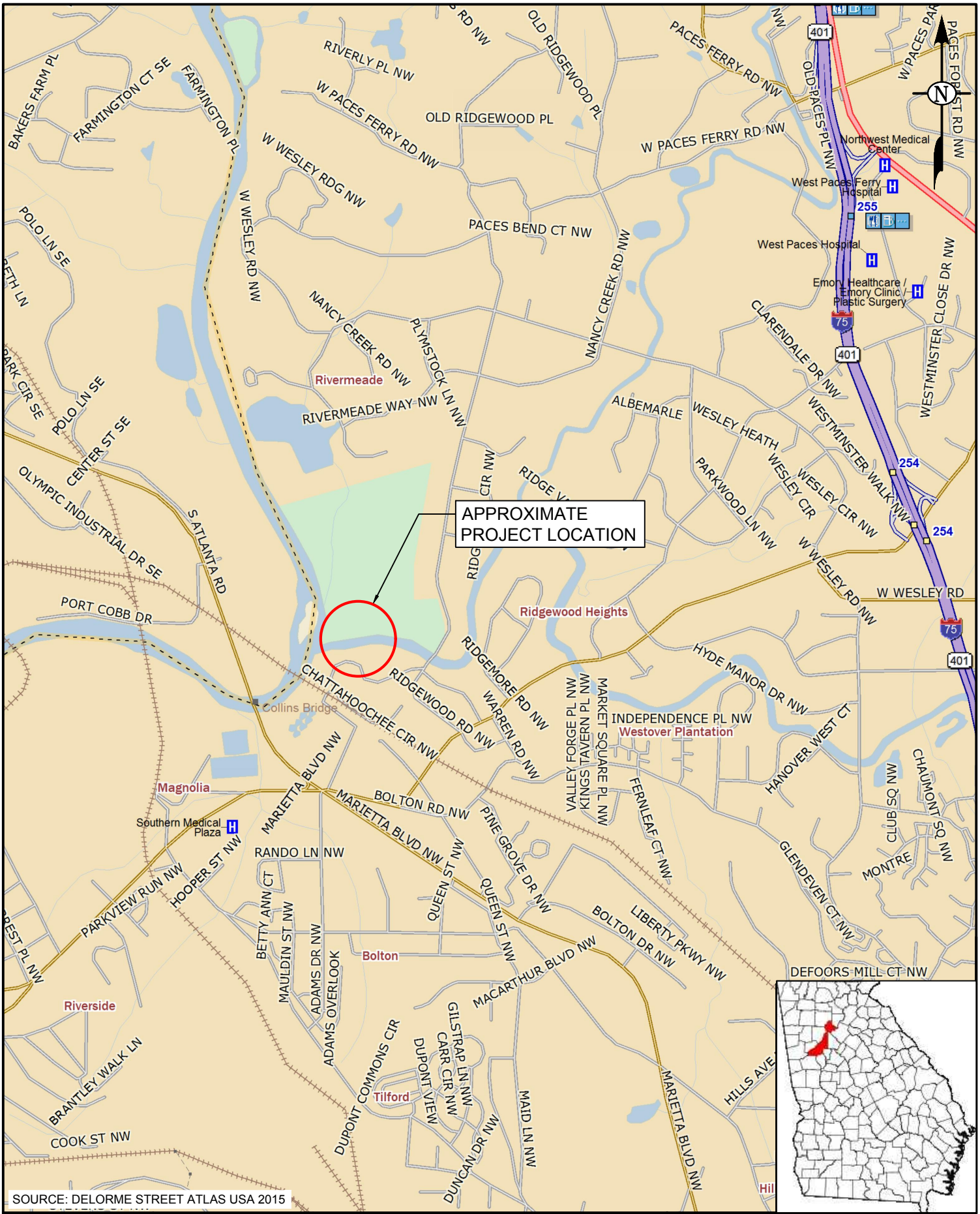
James L. Willmer, P.E.

James L. Willmer, PE
Executive Vice President/Principal Consultant

Attachments:

Figure 1	Project Location Map
Figure 2	Property Location Plan
Figure 3	Boring Location Plan
Figure 4	Boring Location Plan
Appendix I	Drilling and SPT Procedures
Appendix II	USCS Reference, Boring Record Legend, Boring Logs
Appendix III	Rock Core Photographs
Appendix IV	Laboratory Test Results
Appendix V	Drawings from R2T showing Boring Locations
Appendix VI	Important Information about this Geotechnical Report

FIGURES



SOURCE: DELORME STREET ATLAS USA 2015

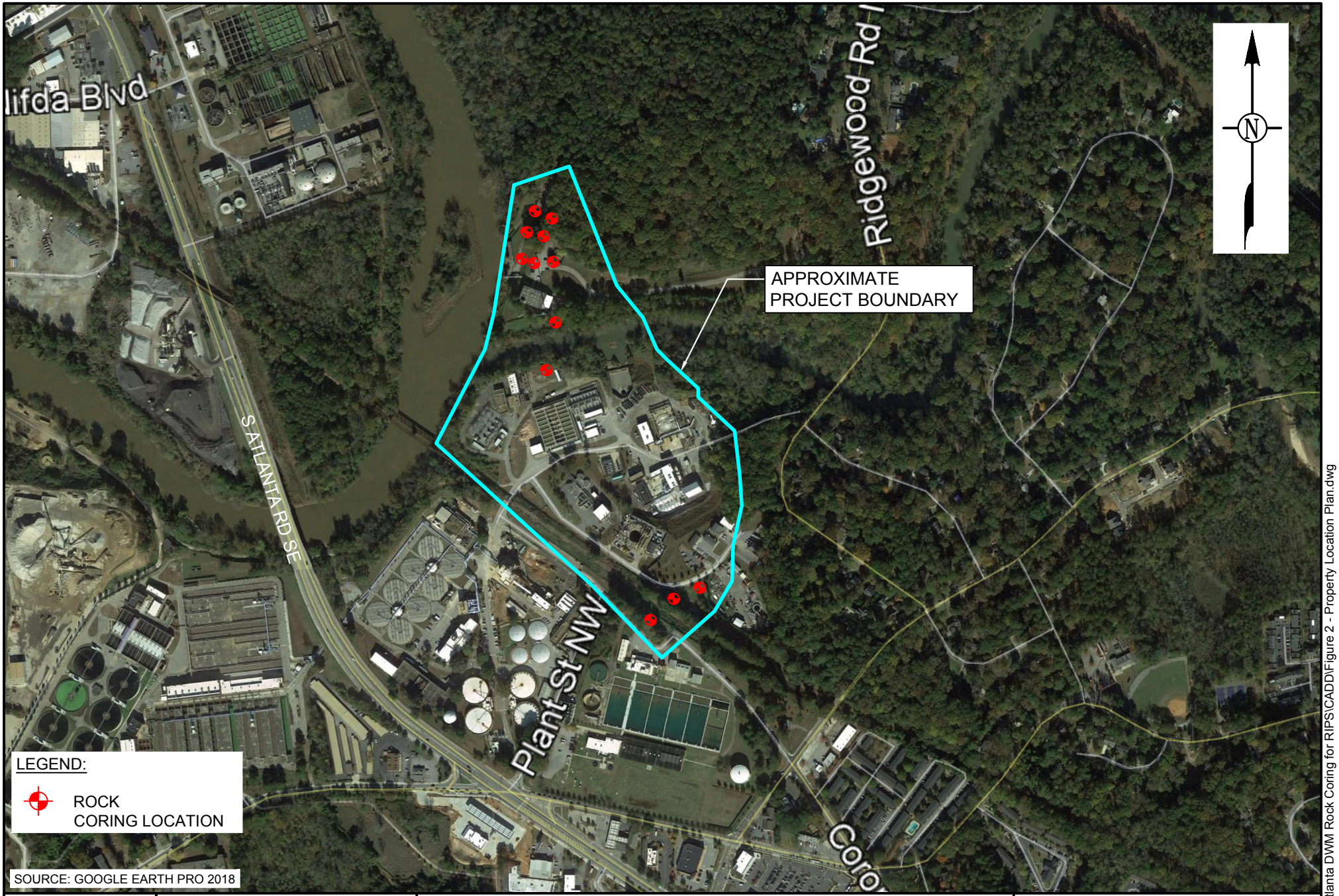
SCALE: 1" = 1800'	
DATE: 5/14/2019	
DRAWN BY: QN	
REVIEWED BY: JS	

WILLMER Engineering

GEOTECHNICAL ENGINEERING
CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

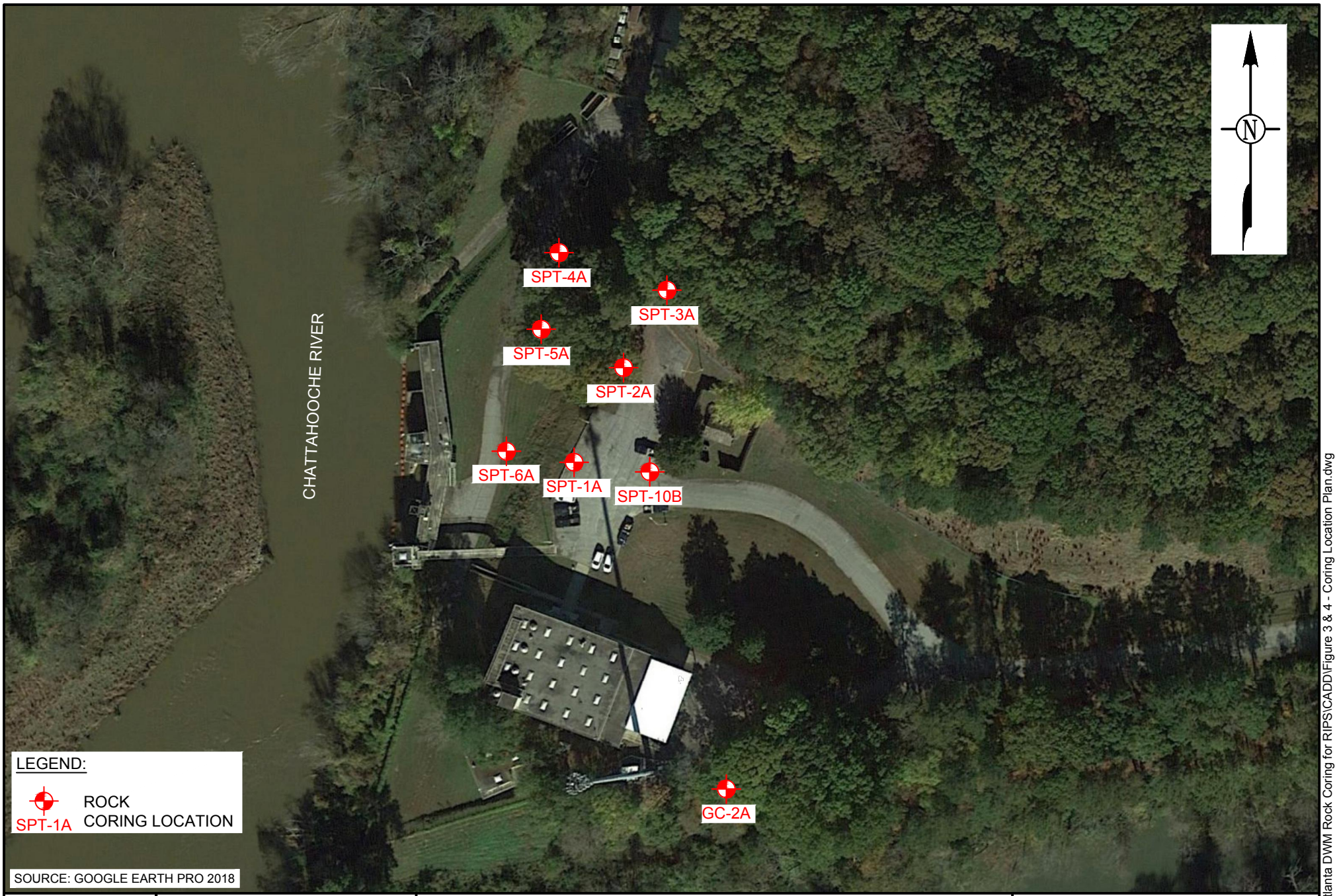
FIGURE 1
PROJECT LOCATION MAP
CITY OF ATLANTA DWM ROCK CORING FOR RIPS
ATLANTA, FULTON COUNTY, GEORGIA
WILLMER PROJECT No. 71.4384

P:\4384 City of Atlanta DWM Rock Coring for RIPS\CADD\Figure 1 - Project Location Map.dwg



SCALE: 1" = 600'	WILLMER Engineering	GEOTECHNICAL ENGINEERING ¤ CONSTRUCTION SERVICES ENVIRONMENTAL SERVICES AND ENGINEERING 3772 PLEASANTDALE ROAD - SUITE 165 ATLANTA, GA 30340-4270	FIGURE 2 PROPERTY LOCATION PLAN CITY OF ATLANTA DWM ROCK CORING FOR RIPS ATLANTA, FULTON COUNTY, GEORGIA WILLMER PROJECT No.: 71.4384
DATE: 5/14/2019			
DRAWN BY: QN			
REVIEWED BY: JS			

P:\4384 City of Atlanta DWM Rock Coring for RIPS\CADD\Figure 2 - Property Location Plan.dwg



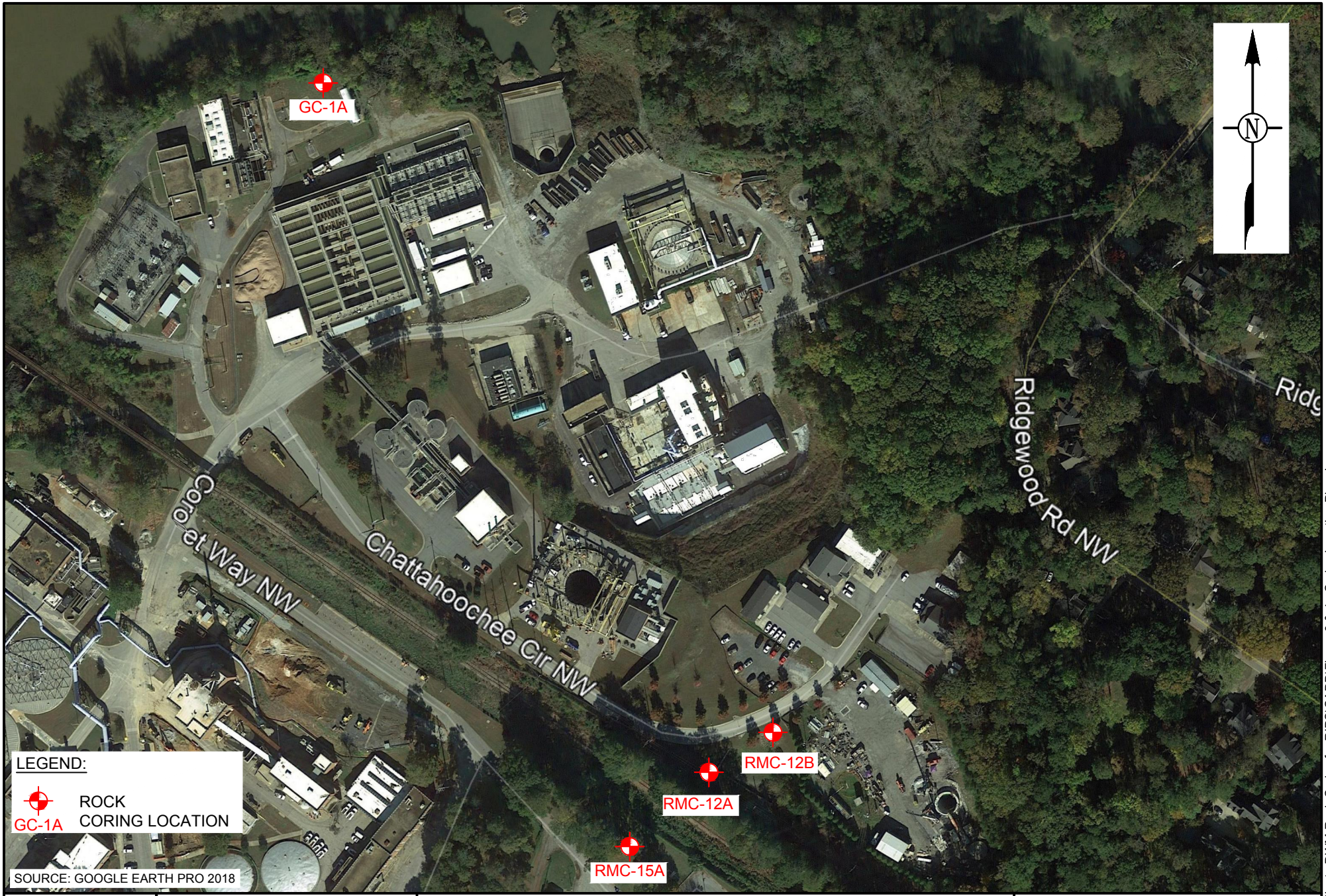
SCALE: 1" = 100'	
DATE: 5/14/2019	
DRAWN BY: QN	
REVIEWED BY: JS	

WILLMER Engineering

GEOTECHNICAL ENGINEERING ¤ CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

FIGURE 3
BORING LOCATION PLAN
CITY OF ATLANTA DWM ROCK CORING FOR RIPS
ATLANTA, FULTON COUNTY, GEORGIA
WILLMER PROJECT No.: 71.4384

P:\4384 City of Atlanta DWM Rock Coring for RIPS\CADD\Figure 3 & 4 - Coring Location Plan.dwg



SCALE: 1" = 200'	WILLMER Engineering	GEOTECHNICAL ENGINEERING ¤ CONSTRUCTION SERVICES ENVIRONMENTAL SERVICES AND ENGINEERING 3772 PLEASANTDALE ROAD - SUITE 165 ATLANTA, GA 30340-4270	FIGURE 4 BORING LOCATION PLAN CITY OF ATLANTA DWM ROCK CORING FOR RIPS ATLANTA, FULTON COUNTY, GEORGIA WILLMER PROJECT No.: 71.4384
DATE: 5/14/2019			
DRAWN BY: QN			
REVIEWED BY: JS			

P:\4384 City of Atlanta DWM Rock Coring for RIPS\CADD\Figure 3 & 4 - Coring Location Plan.dwg

APPENDIX I

DRILLING AND SPT PROCEDURES

The borings were drilled using an all-terrain vehicle (ATV)-mounted rotary drill rig to advance continuous hollow-stem augers. All work was performed under the observation of our geotechnical engineer. The SPT borings were performed in general accordance with ASTM Standard D 1586. The Standard Penetration Test is a widely accepted method for in situ testing of soils. A 2-foot long, 2-inch outside-diameter split-barrel sampler attached to the end of a string of drilling rods is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The blows required for the first 6 inches of penetration are allowed for seating the sampler into any loose cuttings, and the sum of the blows required for penetration of the second and third 6-inch increments constitutes the penetration resistance or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties including consistency, relative density, strength, compressibility, and potential for difficult excavation. Correlations between the N-value and the relative density of cohesionless soils (sands) and consistency of cohesive soils (clays/silts) are included in Appendix II.

APPENDIX II

BORING RECORD LEGEND

SM, CL, etc: - GROUP SYMBOL based on Unified Soil Classification System.
(Refer to ASTM D-2488 and Table 1 of D-2487)

N-VALUE: BLOWS PER FOOT- Standard Penetration Resistance (SPT) blow count, the sum of the second and third 6-inch increments of the SPT test.
(Refer to ASTM D-1586)

CONSISTENCY / RELATIVE DENSITY Correlated with SPT Blow Count, N:

SILTS AND CLAYS

N (blows per foot)	Consistency
0 - 2	Very Soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very Stiff
31 - 50	Hard
> 50	Very Hard

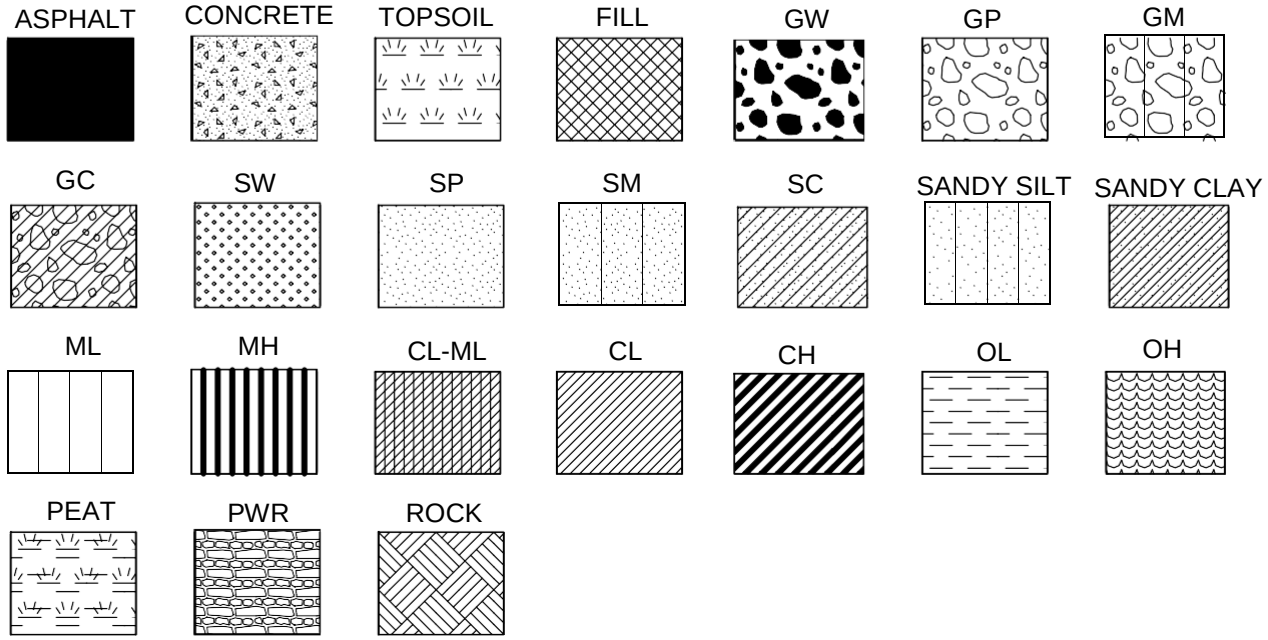
SANDS

N (blows per foot)	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

NOTES:

Groundwater Measurements:

- Water level at time of backfilling
- ▽ Water level at time of boring
- Caved level at 24 hours



Willmer Engineering Inc.
3772 Pleasantdale Road, Suite 165
Atlanta, Georgia 30340

UNIFIED SOIL CLASSIFICATION SYSTEM REFERENCE SHEET

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN #200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED #4 SIEVE	CLEAN GRAVELS LITTLE OR NO FINES	**(GW)**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			(GP)	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES APPRECIABLE AMOUNT OF FINES	**(GM)**	SILTY GRAVELS and GRAVEL-SAND-SILT MIXTURES
			(GC)	CLAYEY GRAVELS and GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING #4 SIEVE	CLEAN SAND LITTLE OR NO FINES	**(SW)**	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			(SP)	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES APPRECIABLE AMOUNT OF FINES	**(SM)**	SILTY SANDS and SAND-SILT MIXTURES
			(SC)	CLAYEY SANDS and SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		**(ML)**	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR VERY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			(CL)	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			(OL)	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		**(MH)**	INORGANIC ELASTIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
			(CH)	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			(OH)	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			**(PT)**	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. GC-1A

Sheet 1 of 2
Location: **See Figure 4**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **778.00** | Station: **-**
Drilling Equipment: **D-50+** | Drilling Method: **HSA, NQ Rock Coring** | Hammer Efficiency (%):
Core Boxes: **3** | Samples: **10** | Overburden (ft): **41** | Rock (ft): **31** | Total Depth (ft): **71.0**
Logged By: **Justin Dunlap** | Date Drilled: **5/8/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
0	SPT			FILL: Loose to medium dense brown clayey medium to fine **SAND** with rock fragments	SC	778.0	16
5	SPT					775	19
	SPT						20
10	SPT					770	12
	SPT					765	9
15	SPT						
20	SPT			RESIDUUM: Loose brown/green/tan clayey medium to fine **SAND** Root materials within sample from 18.5 to 20 feet	SC	760	8
25	SPT					755	6
				Firm tan/gray medium to fine sandy **SILT**	ML	750	6
30	SPT						
35	SPT			Loose to medium dense brown/gray/tan silty medium to fine **SAND**	SC	745	6
40	SPT			Hard drilling from 40 to 41 feet		740	15
45	NQ	94	63	ROCK: White/green/pink/black, soft to moderately hard **GRANITE**, heavily to moderately weathered		735	
50						730	
55						725	

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected)
5 10 20 40 60 80

Continued Next Page

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **GC-1A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. GC-1A

Sheet 2 of 2

Location: **See Figure 4**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION (Continued)	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot, uncorrected) 5 10 20 40 60 80	N-VALUE
60		NQ	93	58	White/green/pink/black, moderately hard to hard **GRANITE**, moderately weathered to fresh	720		
					Soil/PWR seam encountered from 61.5 to 64 feet			
65		NQ	63	49		715		
70						710		
					Auger refusal encountered at 41 ft bgs. Rock coring terminated at 71 ft bgs.	705		
75					Groundwater was not measured at the time of boring completion.	700		
80						695		
85						690		
90						685		
95						680		
100						675		
105						670		
110						665		
115								

SAMPLER TYPE

SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **GC-1A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. GC-2A

Sheet 1 of 2
Location: **See Figure 3**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **768.00** Station: **-**

Drilling Equipment: **D-50+** Drilling Method: **HSA, NQ Rock Coring** Hammer Efficiency (%):

Core Boxes: **5** Samples: **4** Overburden (ft): **9.5** Rock (ft): **50** Total Depth (ft): **59.5**

Logged By: **Justin Dunlap** Date Drilled: **5/7/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
0	SPT			FILL: Medium dense brown/gray/red/black clayey medium to fine **SAND** with rock fragments and root materials	768.0	15
5	SPT			PARTIALLY WEATHERED ROCK: **PWR** Sampled as very dense gray/brown/tan clayey medium to fine **SAND** with rock fragments	765	50/6"
	SPT				760	50/6"
	SPT					50/2"
10				ROCK: Pink/white/green/black, soft to hard **GRANITE**, heavily to slightly weathered	755	
15	NQ	95	74		750	
20					745	
25	NQ	96	83		740	
30					735	
35	NQ	99	73		730	
40				Pink/white/gray/black moderately hard to hard **GRANITIC GNEISS**, heavily to moderately weathered	725	
45	NQ	91	38	Pink/white/gray/black, moderately hard to hard **GRANITE**, moderately weathered	720	
50					715	
55	NQ	100	57			

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected): 5 10 20 40 60 80

Continued Next Page

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **GC-2A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. GC-2A

Sheet 2 of 2

Location: **See Figure 3**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION (Continued)	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot, uncorrected) 5 10 20 40 60 80	N-VALUE
60					Pink/orange/black/white, moderately hard to hard **GRANITE**, moderately weathered	710		
					Auger refusal encountered at 9.5 ft bgs. Rock coring terminated at 59.5 ft bgs.			
					Groundwater was not measured at the time of boring completion.			
65						705		
70						700		
75						695		
80						690		
85						685		
90						680		
95						675		
100						670		
105						665		
110						660		
115						655		

SAMPLER TYPE

SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **GC-2A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-1A

Sheet 1 of 2
Location: **See Figure 3**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **792.40** | Station: **-**
Drilling Equipment: **D-50+** | Drilling Method: **HSA, NQ Rock Coring** | Hammer Efficiency (%):
Core Boxes: **8** | Samples: **5** | Overburden (ft): **18** | Rock (ft): **66** | Total Depth (ft): **84.0**
Logged By: **Gabriel Hoffman** | Date Drilled: **4/23/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
0				ASPHALT = 13"		792.4	
	SPT			FILL: Loose to medium dense tan silty **SAND**	SM	790	11
	SPT						5
5				Firm gray/brown sandy **SILT**	ML		
	SPT					785	8
	SPT			ALLUVIUM: Firm gray/brown sandy **SILT** with wood fragments	ML		7
10						780	
	SPT			RESIDUUM: Dense tan/gray/white silty **SAND**	SM		32
15				PARTIALLY WEATHERED ROCK: No sample collected, interpreted from drilling rate	PWR	775	
	NQ	90	45				
20	NQ	100	32	ROCK: White/gray/pink moderately hard to hard **GRANITE**, moderately weathered		770	
25	NQ	100	48			765	
30	NQ	100	40			760	
35	NQ	100	32	White/black/pink/green hard **GRANITIC GNEISS**, moderately weathered		755	
40	NQ	100	91			750	
45	NQ	100	34	Gray/white/pink/dark green, moderately hard to hard **BIOTITE GNEISS**, moderately to slightly weathered		745	
50	NQ	100	93			740	
55							

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected): 5 10 20 40 60 80

Continued Next Page

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-1A**

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-1A

Sheet 2 of 2
Location: **See Figure 3**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION (Continued)	ELEVATION (feet)
60	NQ	100	88	Gray/white/pink/dark green, moderately hard to hard **BIOTITE GNEISS**, slightly weathered to fresh	735
	NQ	100	65		730
65	NQ	100	100		725
70	NQ	100	100		720
75	NQ	100	92		715
80	NQ	100	100		710
85				Auger refusal encountered at 18 ft bgs. Rock coring terminated at 84 ft bgs.	705
				Groundwater was encountered at 16 ft bgs at the time of boring prior to rock coring. Boring caved to 16.5 ft bgs after completion of rock coring.	
90					700
95					695
100					690
105					685
110					680
115					

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected): 5 10 20 40 60 80

N-VALUE

SAMPLER TYPE

SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-1A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-2A

Sheet 1 of 2
Location: **See Figure 3**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **791.60** | Station: **-**
Drilling Equipment: **D-50+** | Drilling Method: **HSA, NQ Rock Coring** | Hammer Efficiency (%):
Core Boxes: **6** | Samples: **4** | Overburden (ft): **9.8** | Rock (ft): **62** | Total Depth (ft): **71.8**
Logged By: **Gabriel Hoffman** | Date Drilled: **4/26/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
0				ASPHALT = 12"	791.6	
	SPT			FILL: Medium dense tan, grey, and brown silty **SAND** (SM)	790	11
	SPT			RESIDUUM: Tan and brown, coarse to fine silty **SAND** (PWR)		50/5"
5	SPT			PARTIALLY WEATHERED ROCK: Sampled as very dense grey, tan, and brown clayey coarse to fine **SAND** (PWR)	785	50/2"
	SPT			Sampled as very dense white and tan silty coarse to fine **SAND**		50/2"
10					780	
15	NQ	81	41	ROCK: Pink/black/dark green/orange, medium to moderately hard **GRANITE**, moderately weathered	775	
				Possible void encountered from 17 to 18 ft bgs		
20					770	
25	NQ	74	26	White/black/pink/green, medium to moderately hard **GRANITIC GNEISS**, moderately weathered	765	
30					760	
35	NQ	85	15	Gray/white/dark green/black, moderately hard to hard **BIOTITE GNEISS**, moderately weathered to slightly weathered	755	
40					750	
45	NQ	80	52		745	
50					740	
55						

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected): 5 10 20 40 60 80

Continued Next Page

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
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DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-2A**

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-2A

Sheet 2 of 2

Location: **See Figure 3**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION (Continued)	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot, uncorrected) 5 10 20 40 60 80	N-VALUE
60		NQ	100	100	Gray/white/dark green/black, moderately hard to hard **BIOTITE GNEISS**, moderately weathered to slightly weathered	735		
65		NQ	100	76		730		
70					No sample recovery from 70.8 to 71.8 ft bgs.	725		
75					Auger refusal encountered at 9.8 ft bgs. Rock coring terminated at 71.8 ft bgs after repeated attempts to continue were unsuccessful due to core barrel seizing up mechanically.	720		
80					Groundwater was not measured at the time of boring completion. Boring caved to 25 ft bgs at 24 hours after boring completion.	715		
85						710		
90						705		
95						700		
100						695		
105						690		
110						685		
115						680		
						675		

SAMPLER TYPE

SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-2A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-3A

Sheet 1 of 2
Location: **See Figure 3**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **792.00** Station: **-**
Drilling Equipment: **D-50+** Drilling Method: **HSA, NQ Rock Coring** Hammer Efficiency (%):
Core Boxes: **5** Samples: **8** Overburden (ft): **32** Rock (ft): **50** Total Depth (ft): **82.0**
Logged By: **Justin Dunlap** Date Drilled: **5/6/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
0				ASPHALT = 4" **SM**	792.0	
	SPT			RESIDUUM: Medium dense to dense tan/brown/white silty medium to fine **SAND**	790	12
5	SPT					14
	SPT				785	38
10	SPT					26
				Very stiff brown/tan/orange medium to fine sandy **SILT** **ML**	780	
15	SPT					17
	SPT			PARTIALLY WEATHERED ROCK: Sampled as very dense tan/brown/orange/white silty medium to fine **SAND** with rock fragments **PWR**	775	50/6"
20					770	
25	SPT					50/5"
	SPT				765	50/5"
30					760	
35	NQ	95	29	ROCK: White/black/pink/gray/dark green, soft to hard **GRANITIC GNEISS**, moderately to highly weathered	755	
40					750	
45	NQ	90	5		745	
50					740	
55						

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected)
5 10 20 40 60 80

Continued Next Page

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
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NX - Rock Core, 2-1/8"
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DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-3A**

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-3A

Sheet 2 of 2
Location: **See Figure 3**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION (Continued)	ELEVATION (feet)
60	NQ	89	41	White/black/pink/gray/dark green, soft to hard **GRANITIC GNEISS**, moderately to highly weathered	735
65				Black/gray/white/dark green, hard **BIOTITE GNEISS**, moderately to lightly weathered	730
70	NQ	100	38		725
75					720
80	NQ	100	35		715
85				Auger refusal encountered at 32 ft bgs. Rock coring terminated at 82 ft bgs.	710
90				Groundwater was not measured at the time of boring completion.	705
95					700
100					695
105					690
110					685
115					680

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected): 5 10 20 40 60 80

N-VALUE

SAMPLER TYPE

SS - Split Spoon
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CU - Cuttings
CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-3A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-4A

Sheet 1 of 2
Location: **See Figure 3**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **768.10** | Station: **-**
Drilling Equipment: **D-50+** | Drilling Method: **HSA, NQ Rock Coring** | Hammer Efficiency (%):
Core Boxes: **4** | Samples: **6** | Overburden (ft): **25** | Rock (ft): **35** | Total Depth (ft): **60.0**
Logged By: **Justin Dunlap** | Date Drilled: **5/1/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
0						768.1	
5	SPT			FILL: Loose brown silty medium to fine **SAND** with rock fragments	SM	765	6
	SPT			RESIDUUM: Loose to medium dense tan/gray clayey medium to fine **SAND**	SC		9
10	SPT					760	20
15	SPT			Stiff tan/orange/brown/black medium to fine sandy **SILT**	ML	755	15
	SPT			PARTIALLY WEATHERED ROCK: Sampled as very dense white/black/tan silty medium to fine **SAND**	PWR	750	50/2"
20	SPT					745	50/5"
25	NQ	95	59	ROCK: Black/white/gray/dark green, moderately hard to hard **BIOTITE GNEISS**, moderately weathered		740	
30						735	
35						730	
40	NQ	100	83			725	
45				Black/white/dark green, moderately hard to hard **AMPHIBOLITE GNEISS**, slightly weathered		720	
50	NQ	100	78			715	
55							

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected): 5 10 20 40 60 80

Continued Next Page

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
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DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-4A**

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-4A

Sheet 2 of 2

Location: **See Figure 3**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION (Continued)	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot, uncorrected) 5 10 20 40 60 80	N-VALUE
60		NQ	93	58	Black/white/dark green, moderately hard to hard **AMPHIBOLITE GNEISS**, slightly weathered	710		
					Auger refusal encountered at 25 ft bgs. Rock coring terminated at 60 ft bgs. Groundwater was not measured at the time of boring completion.			
65						705		
70						700		
75						695		
80						690		
85						685		
90						680		
95						675		
100						670		
105						665		
110						660		
115						655		

SAMPLER TYPE

SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
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CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-4A**

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-5A

Sheet 1 of 2
Location: **See Figure 3**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **768.50** | Station: **-**
Drilling Equipment: **D-50+** | Drilling Method: **HSA, NQ Rock Coring** | Hammer Efficiency (%):
Core Boxes: **4** | Samples: **6** | Overburden (ft): **25.4** | Rock (ft): **35.6** | Total Depth (ft): **61.0**
Logged By: **Justin Dunlap** | Date Drilled: **4/29/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
0				TOPSOIL = 3"	768.5	
				FILL: Large boulder fill from 3" to 2.5 ft bgs		
	SPT			Brown/black/red very loose clayey medium to fine **SAND** with rock and asphalt fragments **SC**	765	3
5	SPT			RESIDUUM: Firm to very stiff brown/tan/red/black medium to fine sandy **CLAY** **CL**		5
	SPT				760	16
10						
	SPT				755	17
15						
	SPT			PARTIALLY WEATHERED ROCK: Sampled as very dense brown/tan/gray/black medium to fine clayey **SAND** **PWR**	750	50/6"
20						
	SPT				745	50/3"
25				ROCK: Black/white/gray/dark green/pink, soft to hard **BIOTITE GNEISS**, moderately weathered to highly weathered		
	NQ	74	40		740	
30						
					735	
35						
	NQ	86	53		730	
40						
					725	
45				Becomes slightly weathered to fresh		
	NQ	99	94		720	
50						
					715	
55						

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected)
5 10 20 40 60 80

Continued Next Page

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-5A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-5A

Sheet 2 of 2

Location: **See Figure 3**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION (Continued)	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot, uncorrected) 5 10 20 40 60 80	N-VALUE
60		NQ	100	99	Black/white/gray/dark green/pink, hard **BIOTITE GNEISS**, fresh	710		
65					Auger refusal encountered at 25.4 ft bgs. Rock coring terminated at 61 ft bgs. Groundwater was encountered at 7 ft bgs at 24 hours after boring completion.	705		
70						700		
75						695		
80						690		
85						685		
90						680		
95						675		
100						670		
105						665		
110						660		
115						655		

SAMPLER TYPE

SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-5A**

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-6A

Sheet 1 of 2
Location: **See Figure 3**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **766.10** | Station: **-**
Drilling Equipment: **D-50+** | Drilling Method: **HSA, NQ Rock Coring** | Hammer Efficiency (%):
Core Boxes: **5** | Samples: **5** | Overburden (ft): **15** | Rock (ft): **44** | Total Depth (ft): **59.0**
Logged By: **Justin Dunlap** | Date Drilled: **4/30/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
0						766.1	
	SPT			FILL: Loose to medium dense brown/tan silty medium to fine **SAND** with rock fragments	SM	765	13
5	SPT						6
	SPT					760	5
	SPT						9
10				RESIDUUM: Dark green, gray, brown, and orange clayey medium to fine **SAND** with rock fragments	SC	755	
	SPT						50/4"
15				PARTIALLY WEATHERED ROCK: Sampled as very dense dark green, gray, brown, and orange medium to fine **SAND** with rock fragments	PWR	750	
20	NQ	85	30	ROCK: Black/white/gray/dark green, moderately hard to hard **AMPHIBOLITE GNEISS**, moderately weathered		745	
25						740	
30	NQ	80	51			735	
35				SOIL/PWR SEAM: Sampled as gray medium to fine sandy **CLAY**	SC	730	
				ROCK: Black/white/gray/dark green, moderately hard to hard **AMPHIBOLITE GNEISS**, moderately weathered			
40	NQ	77	52			725	
45				Black/white/gray/dark green/pink, moderately hard to hard **BIOTITE GNEISS**, moderately weathered		720	
50	NQ	100	78			715	
55							

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected): 5 10 20 40 60 80

Continued Next Page

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-6A**

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-6A

Sheet 2 of 2

Location: **See Figure 3**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION (Continued)	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot, uncorrected) 5 10 20 40 60 80	N-VALUE
		NQ	82	39	Black/white/gray/dark green/pink, moderately hard to hard **BIOTITE GNEISS**, moderately weathered	710		
60					Auger refusal encountered at 15 ft bgs. Rock coring terminated at 59 ft bgs.	705		
65					Groundwater was not measured at the time of boring completion.	700		
70						695		
75						690		
80						685		
85						680		
90						675		
95						670		
100						665		
105						660		
110						655		
115						650		

SAMPLER TYPE

SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-6A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. SPT-10B

Sheet 1 of 1
Location: **See Figure 3**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **792.95** | Station: **-**
Drilling Equipment: **D-50+** | Drilling Method: **HSA, NQ Rock Coring** | Hammer Efficiency (%):
Core Boxes: **1** | Samples: **5** | Overburden (ft): **15** | Rock (ft): **9.4** | Total Depth (ft): **24.6**
Logged By: **Gabriel Hoffman** | Date Drilled: **4/23/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
0				ASPHALT = 9"	793.0	
	SPT			PARTIALLY WEATHERED ROCK: Sampled as very dense tan/white, coarse to fine silty **SAND**	PWR	50/4"
	SPT				790	50/5"
5				Sampled as very hard tan/grey/brown sandy **SILT**	PWR	
	SPT				785	50/6"
	SPT			Sampled as very dense grey/white/pink coarse to fine silty **SAND**	PWR	50/6"
10						
	SPT				780	50/4"
15				ROCK: Pink/black/dark green/orange, very soft to moderately hard **GRANITE**, moderately weathered		
	NQ	100	65		775	
20						
					770	
25				Auger refusal encountered at 15 ft bgs. Rock coring terminated at 24.6 ft bgs.		
					765	
30				Groundwater was not encountered at the time of boring completion. The boring caved to 12.8 feet prior to rock coring. Groundwater was measured at a depth of 5.6 feet 24 hours after completion of rock coring.		
					760	
35						
					755	
40						
					750	
45						
					745	
50						
					740	
55						

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected): 5 10 20 40 60 80

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **SPT-10B**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. RMC-12A

Sheet 1 of 2
Location: **See Figure 4**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **833.00** | Station: **-**
Drilling Equipment: **D-50+** | Drilling Method: **HSA, NQ Rock Coring** | Hammer Efficiency (%):
Core Boxes: **2** | Samples: **10** | Overburden (ft): **41** | Rock (ft): **20** | Total Depth (ft): **61.0**
Logged By: **Justin Dunlap** | Date Drilled: **5/2/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
0	SPT			FILL: Loose to medium dense tan/black/gray/red silty medium to fine **SAND** with rock fragments	**SM**	833.0	22
5	SPT					830	11
	SPT						9
10	SPT			RESIDUUM: Medium dense red/brown/white/tan silty medium to fine **SAND**	**SM**	825	15
15	SPT			PARTIALLY WEATHERED ROCK: Sampled as very dense brown/tan/gray silty medium to fine **SAND**	**PWR**	820	50/6"
20	SPT					815	50/6"
25	SPT			RESIDUUM: Soft to very stiff brown/red/tan medium to fine sandy **SILT**	**ML**	810	4
30	SPT					805	21
35	SPT			PARTIALLY WEATHERED ROCK: Sampled as very dense tan/white/brown/orange silty medium to fine **SAND**	**PWR**	800	50/6"
40	SPT					795	50/5"
45	NQ	97	96	ROCK: White/gray/black, moderately hard to hard **BIOTITE GNEISS**, slightly weathered to fresh		790	
50						785	
55						780	

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected)
5 10 20 40 60 80

Continued Next Page

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **RMC-12A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. RMC-12A

Sheet 2 of 2

Location: **See Figure 4**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION (Continued)	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot, uncorrected) 5 10 20 40 60 80	N-VALUE
60		NQ	100	96	White/gray/black, moderately hard to hard **BIOTITE GNEISS**, fresh	775		
					Auger refusal encountered at 41 ft bgs. Rock coring terminated at 61 ft bgs.			
65					Groundwater was encountered at 25.5 feet at 48 hours after boring completion.	770		
70						765		
75						760		
80						755		
85						750		
90						745		
95						740		
100						735		
105						730		
110						725		
115						720		

SAMPLER TYPE

SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **RMC-12A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. RMC-12B

Sheet 1 of 2
Location: **See Figure 4**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **833.00** Station: **-**
Drilling Equipment: **D-50+** Drilling Method: **HSA, NQ Rock Coring** Hammer Efficiency (%):
Core Boxes: **3** Samples: **8** Overburden (ft): **37** Rock (ft): **30** Total Depth (ft): **67.0**
Logged By: **Justin Dunlap** Date Drilled: **5/3/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
0						833.0	
5	SPT			FILL: Medium dense to dense brown/gray medium to fine silty **SAND** with rock fragments	SM	830	32
	SPT						17
10	SPT			Soft to stiff red/brown/gray clayey medium to fine **SAND** with rock fragments	SC	825	4
15	SPT					820	15
20	SPT			RESIDUUM: Medium dense red/tan/black/white silty medium to fine **SAND**	SM	815	19
25	SPT			Firm to stiff brown/tan/white/black medium to fine sandy **SILT**	ML	810	11
30	SPT					805	8
35	SPT			Dense brown/white/tan/red silty medium to fine **SAND**	SM	800	42
40	NQ	97	84	ROCK: White/gray/black, moderately hard to hard **BIOTITE GNEISS**, slightly weathered to fresh		795	
45						790	
50	NQ	100	88			785	
55						780	

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected)
5 10 20 40 60 80

Continued Next Page

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **RMC-12B**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. RMC-12B

Sheet 2 of 2

Location: **See Figure 4**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION (Continued)	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot, uncorrected) 5 10 20 40 60 80	N-VALUE
60		NQ	100	100	White/gray/black, moderately hard to hard **BIOTITE GNEISS**, slightly weathered to fresh	775		
65						770		
70					Auger refusal encountered at 37 ft bgs. Rock coring terminated at 67 ft bgs. Groundwater was encountered at 29 feet at the time of boring completion and at 27 feet at 48 hours after boring completion.	765		
75						760		
80						755		
85						750		
90						745		
95						740		
100						735		
105						730		
110						725		
115						720		

SAMPLER TYPE

SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **RMC-12B**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

WILLMER engineering

Project: **COA DWM Rock Coring for RIPS**
Location: **Fulton County, Atlanta, Georgia**
Project Number: **71.4384**

BORING No. RMC-15A

Sheet 1 of 1
Location: **See Figure 4**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **840.00** | Station: **-**
Drilling Equipment: **D-50+** | Drilling Method: **HSA, NQ Rock Coring** | Hammer Efficiency (%):
Core Boxes: **2** | Samples: **7** | Overburden (ft): **25** | Rock (ft): **15.5** | Total Depth (ft): **40.5**
Logged By: **Justin Dunlap** | Date Drilled: **5/9/19**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
0	SPT			FILL: Very loose to loose brown silty medium to fine **SAND** with root materials **SM**	840.0	9
2.5	SPT					4
5	SPT			Loose to medium dense red/brown/black clayey medium to fine **SAND** **SC**	835	13
7.5	SPT					14
10					830	
12.5	SPT					9
15					825	
17.5	SPT			RESIDUUM: Stiff tan/brown/red medium to fine sandy **SILT** **ML**		11
20					820	
22.5	SPT					50/2"
25				PARTIALLY WEATHERED ROCK: Sampled as very dense tan/white/brown silty medium to fine **SAND** **PWR**	815	
27.5	NQ	95	65	ROCK: White/gray/black, moderately hard to hard **BIOTITE GNEISS**, slightly weathered to fresh		
30					810	
32.5				The rock core sample from 37.7 to 40.5 feet fell out of the core barrel and into the hole while withdrawing the auger from the borehole. Attempts to retrieve the sample from the hole were unsuccessful. No sample was recovered.		
35	NQ	100	91		805	
37.5	NQ					
40				Auger refusal encountered at 25 ft bgs. Rock coring terminated at 40.5 ft bgs.	800	
42.5						
45				Groundwater was encountered at 22 feet at the time of boring completion.	795	
47.5						
50					790	
52.5						
55					785	

STANDARD PENETRATION TEST DATA (blows/foot, uncorrected): 5, 10, 20, 40, 60, 80

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

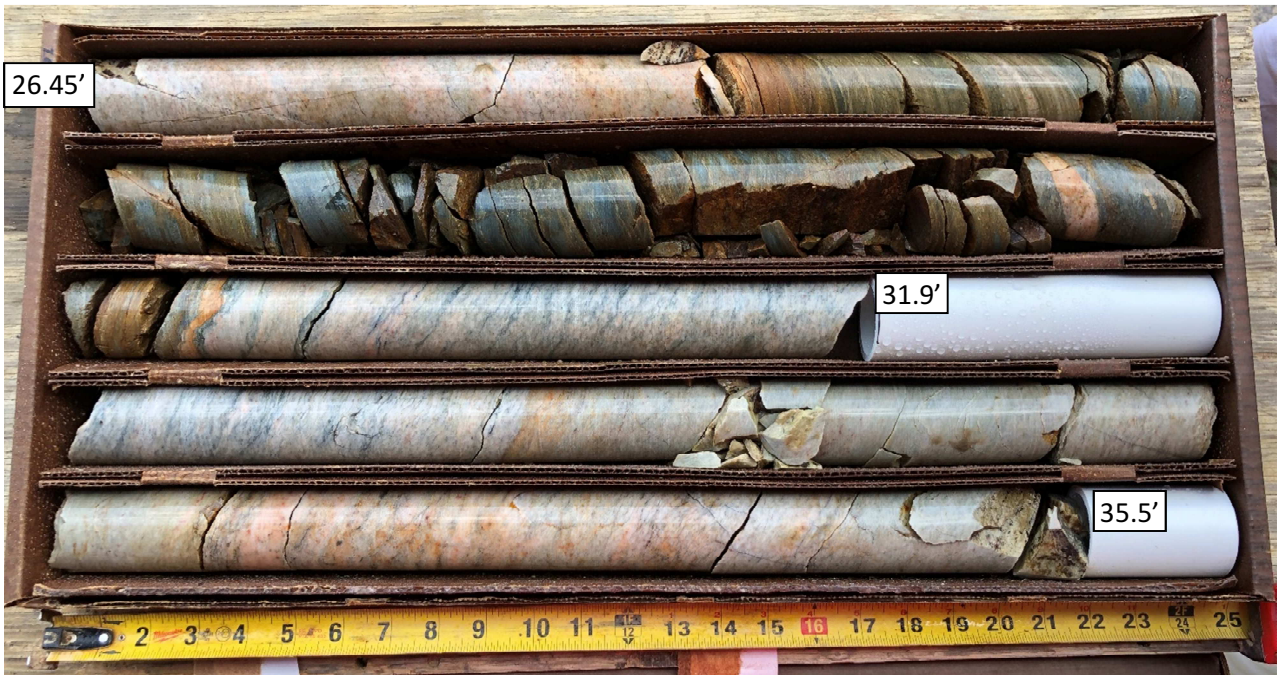
Hole No. **RMC-15A**

SPTN COA DWM ROCK CORING FOR RIPS.GPJ 7/19/19

APPENDIX III

SPT-1A Core Run #1: 18-19 ft bgs
REC = 90%, RQD = 45%

SPT-1A Core Run #2: 19-24 ft bgs
REC = 100%, RQD = 32%



SPT-1A Core Run #3: 24-29 ft bgs
REC = 100%, RQD = 48%

SPT-1A Core Run #4: 29-34 ft bgs
REC = 100%, RQD = 40%

SPT-1A Core Run #5: 34-39 ft bgs
REC = 100%, RQD = 32%

SPT-1A Core Run #6: 39-44 ft bgs
REC = 100%, RQD = 91%

SPT-1A Core Run #7: 44-49 ft bgs
REC = 100%, RQD = 34%

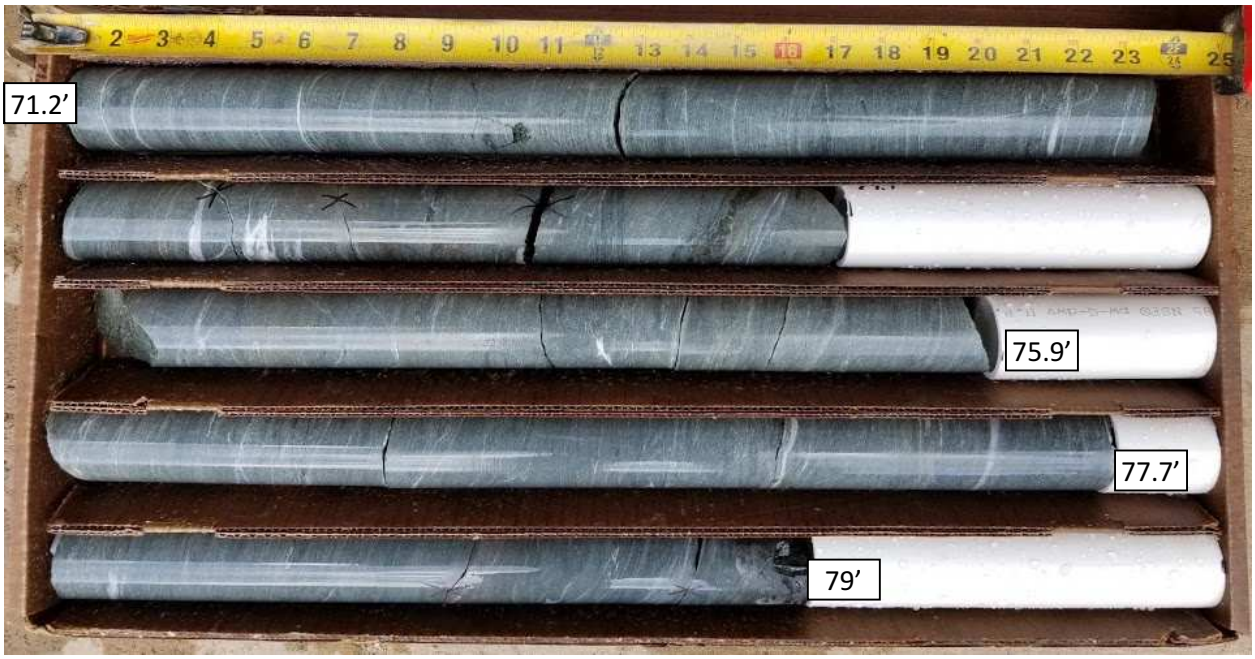
SPT-1A Core Run #8: 49-54 ft bgs
REC = 100%, RQD = 93%

SPT-1A Core Run #9: 54-59 ft bgs
REC = 100%, RQD = 88%

SPT-1A Core Run #10: 59-64 ft bgs
REC = 100%, RQD = 65%

SPT-1A Core Run #11: 64-69 ft bgs
REC = 100%, RQD = 100%

SPT-1A Core Run #12: 69-74 ft bgs
REC = 100%, RQD = 100%



SPT-1A Core Run #13: 74-79 ft bgs
REC = 100%, RQD = 92%

SPT-1A Core Run #14: 79-84 ft bgs
REC = 100%, RQD = 100%

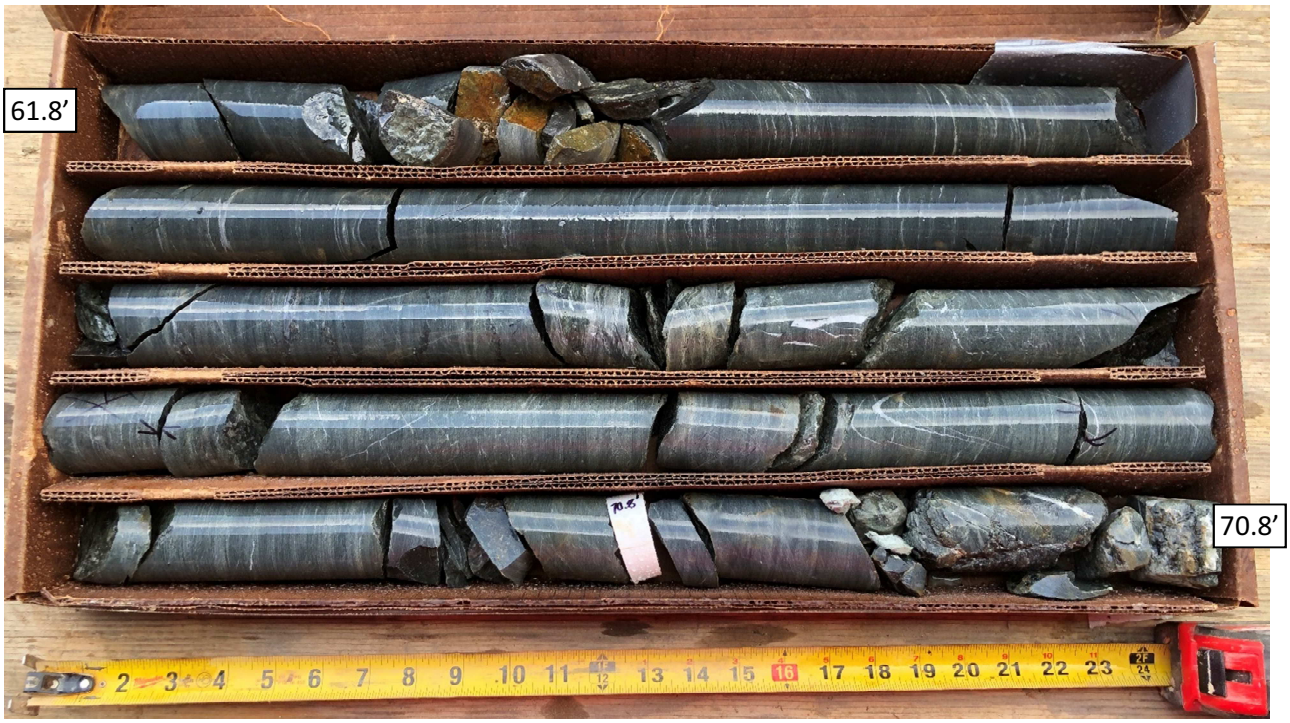
SPT-2A Core Run #1: 9.8-19.8 ft bgs
REC = 81%, RQD = 41%

SPT-2A Core Run #2: 19.8-29.8 ft bgs
REC = 74%, RQD = 26%

SPT-2A Core Run #3: 29.8-39.8 ft bgs
REC = 85%, RQD = 15%

SPT-2A Core Run #4: 39.8-49.8 ft bgs
REC = 80%, RQD = 52%

SPT-2A Core Run #5: 49.8-59.8 ft bgs
REC = 100%, RQD = 100%



SPT-2A Core Run #6: 59.8-71.8 ft bgs
REC = 100%, RQD = 76%

No sample recovery from 70.8 to 71.8 ft bgs

SPT-3A Core Run #1: 32-42 ft bgs
REC = 95%, RQD = 29%

SPT-3A Core Run #2: 42-52 ft bgs
REC = 90%, RQD = 5%

SPT-3A Core Run #3: 52-62 ft bgs
REC = 89%, RQD = 41%

SPT-3A Core Run #4: 62-72 ft bgs
REC = 100%, RQD = 38%

SPT-3A Core Run #5: 72-82 ft bgs
REC = 100%, RQD = 35%

SPT-4A Core Run #1: 25-35 ft bgs
REC = 95%, RQD = 59%

SPT-4A Core Run #2: 35-45 ft bgs
REC = 100%, RQD = 83%

SPT-4A Core Run #3: 45-55 ft bgs
REC = 100%, RQD = 78%

SPT-4A Core Run #4: 55-60 ft bgs
REC = 93%, RQD = 58%

SPT-5A Core Run #1: 25.4-35.4 ft. bgs
REC = 74%, RQD = 40%

SPT-5A Core Run #2: 35.4-44.4 ft bgs
REC = 86%, RQD = 53%

SPT-5A Core Run #3: 44.4-54.4 ft bgs
REC = 99%, RQD = 94%

SPT-5A Core Run #4: 54.4-61 ft bgs
REC = 100%, RQD = 99%

SPT-6A Core Run #1: 15-25 ft bgs
REC = 85%, RQD = 30%

SPT-6A Core Run #2: 25-35 ft bgs
REC = 80%, RQD = 51%

SPT-6A Core Run #3: 35-45 ft bgs
REC = 77%, RQD = 52%

SPT-6A Core Run #4: 45-55 ft bgs
REC = 100%, RQD = 78%

SPT-6A Core Run #5: 55-59 ft bgs
REC = 82%, 39%

SPT-10B Core Run #1: 15-25 ft bgs
REC = 100%, RQD = 65%

GC-1A Core Run #1: 41-51 ft bgs
REC = 94%, RQD = 63%

GC-1A Core Run #2: 51-61 ft bgs
REC = 93%, RQD = 58%

GC-1A Core Run #3: 61-71 ft bgs
REC = 63%, RQD = 49%

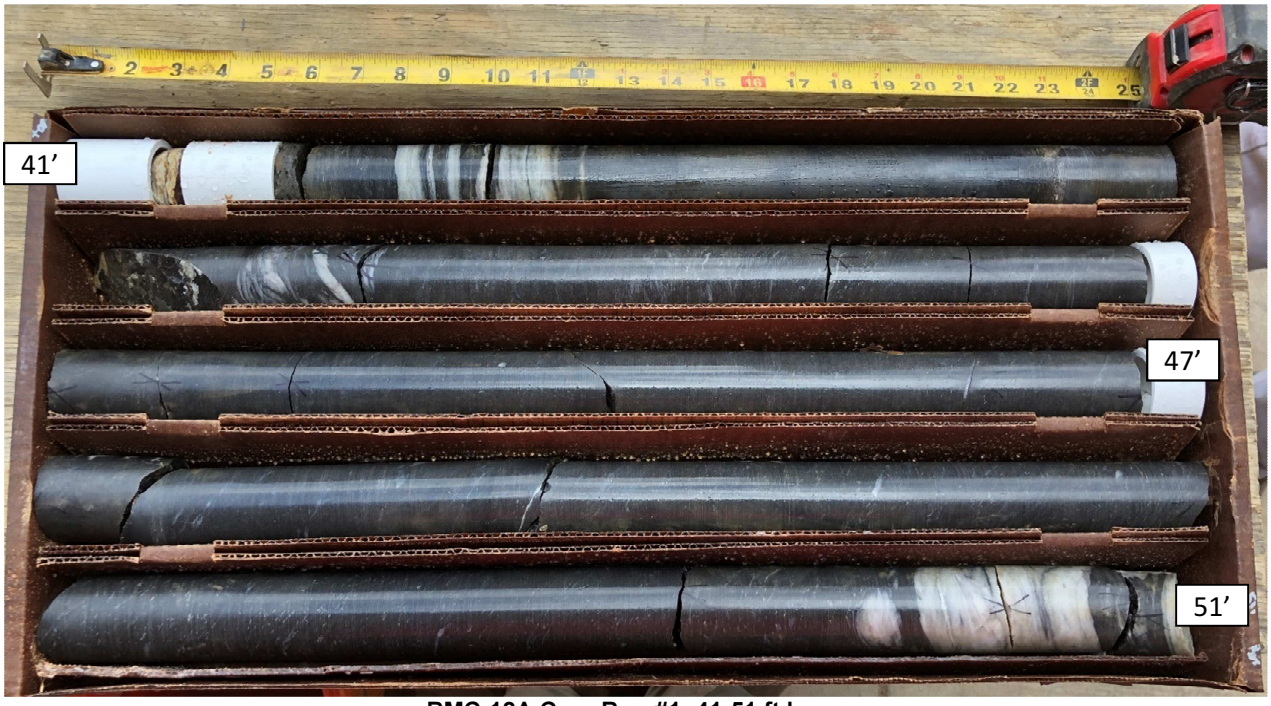
GC-2A Core Run #1: 9.5-19.5 ft bgs
REC = 95%, RQD = 74%

GC-2A, Core Run #2: 19.5-29.5 ft bgs
REC = 96%, RQD = 83%

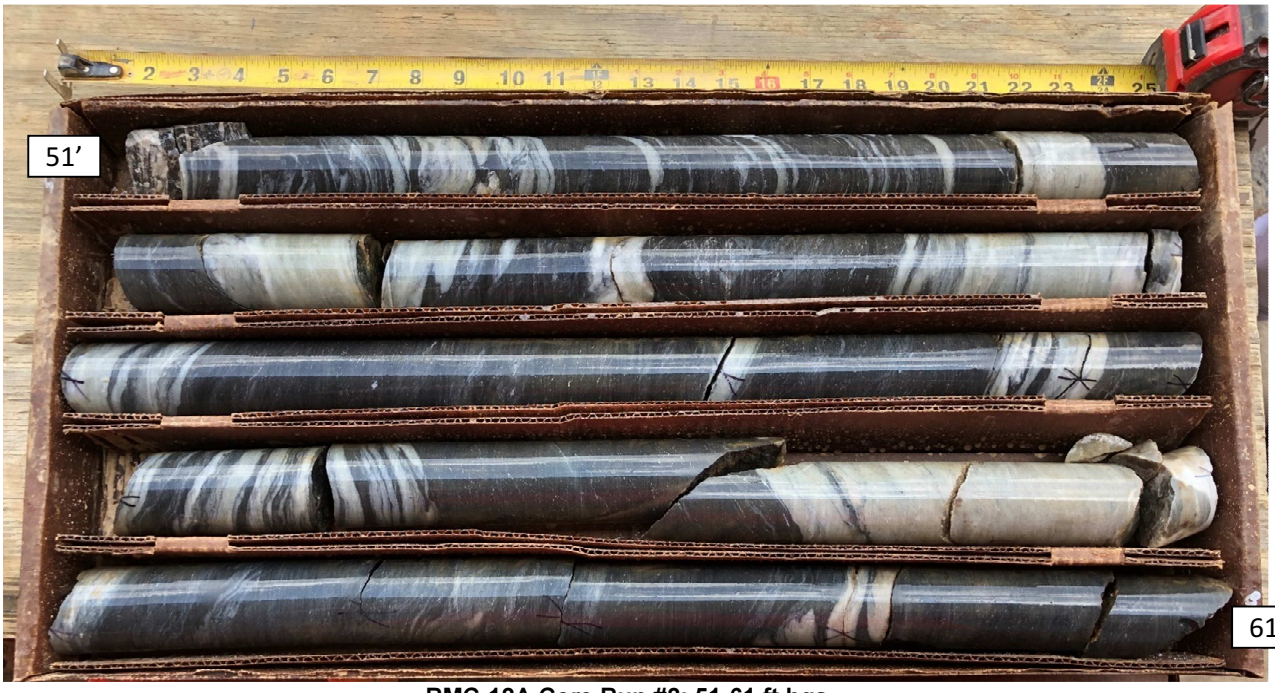
GC-2A Core Run #3: 29.5-39.5 ft bgs
REC = 99%, RQD = 73%

GC-2A Core Run #4: 39.5-49.5 ft bgs
REC = 91%, RQD = 38%

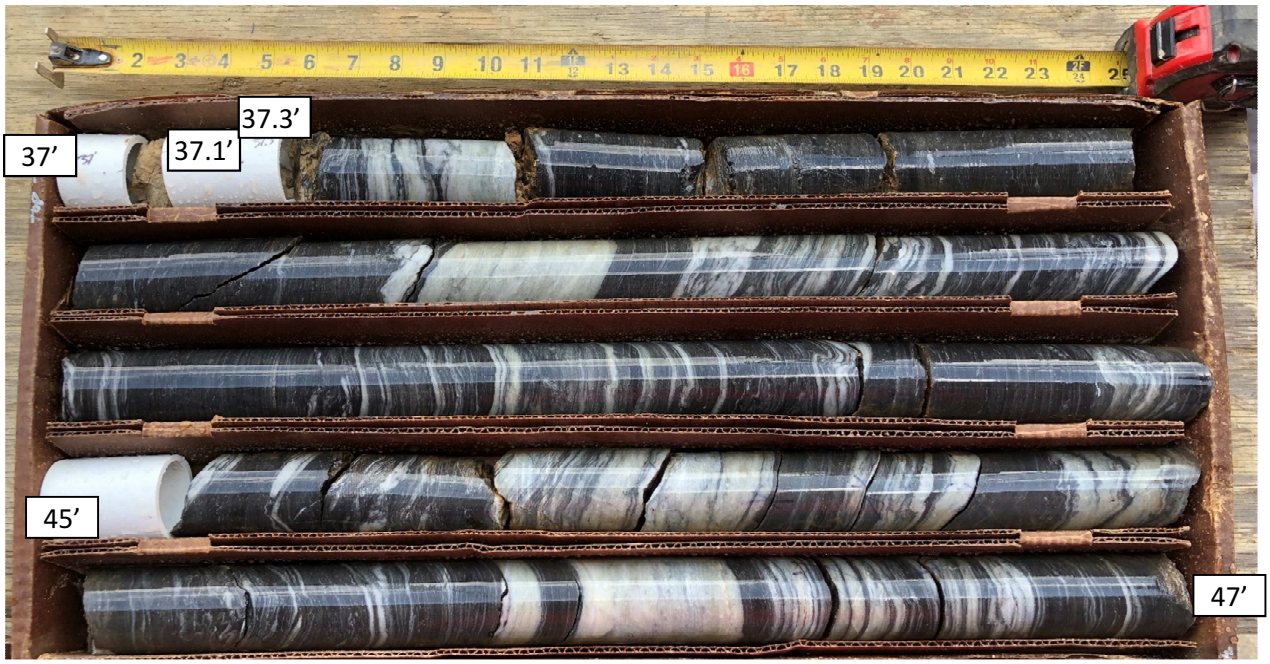
GC-2A Core Run #5: 49.5-59.5 ft. bgs
REC = 100%, RQD = 57%



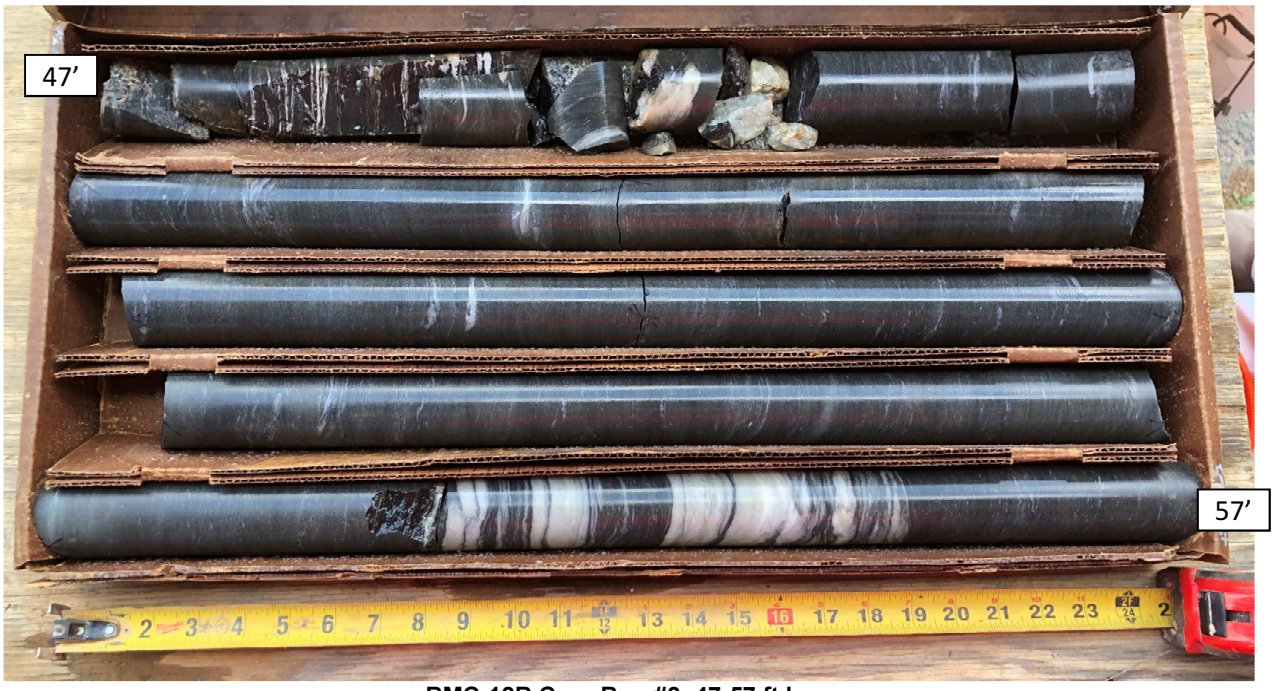
RMC-12A Core Run #1: 41-51 ft bgs
REC = 97%, RQD = 96%



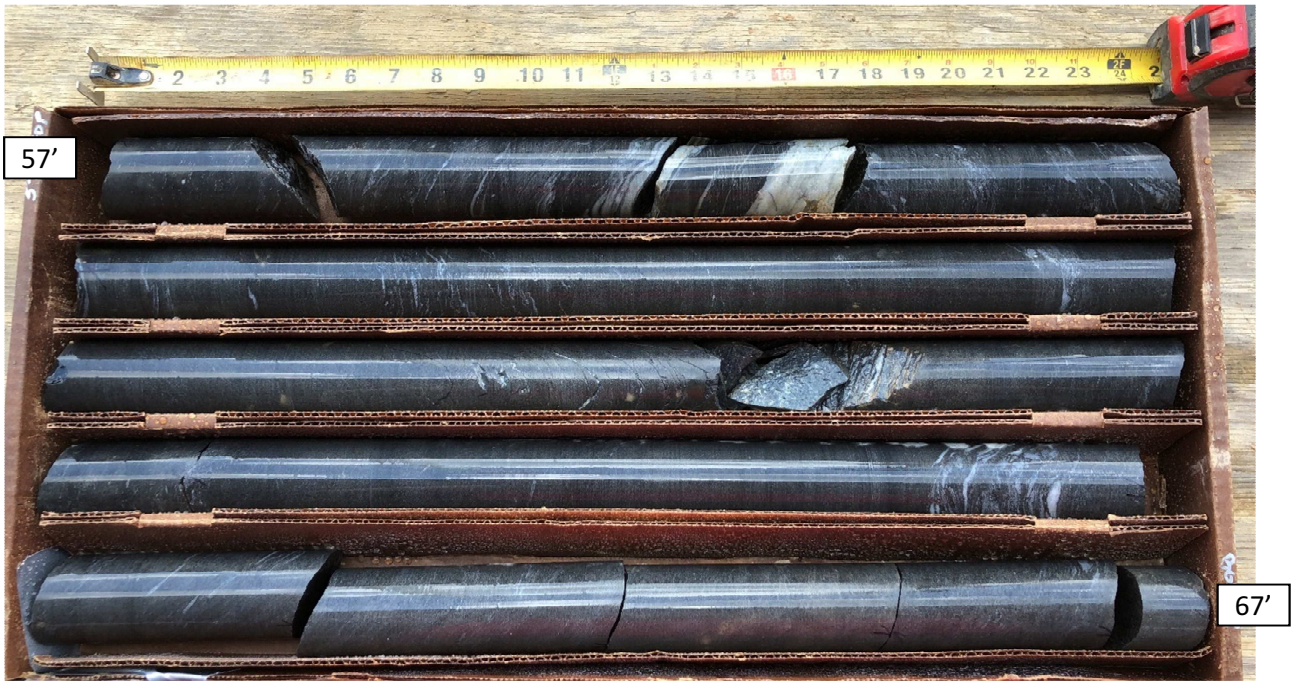
RMC-12A Core Run #2: 51-61 ft bgs
REC = 100%, RQD = 96%



RMC-12B Core Run #1: 37-47 ft bgs
REC = 97%, RQD = 84%

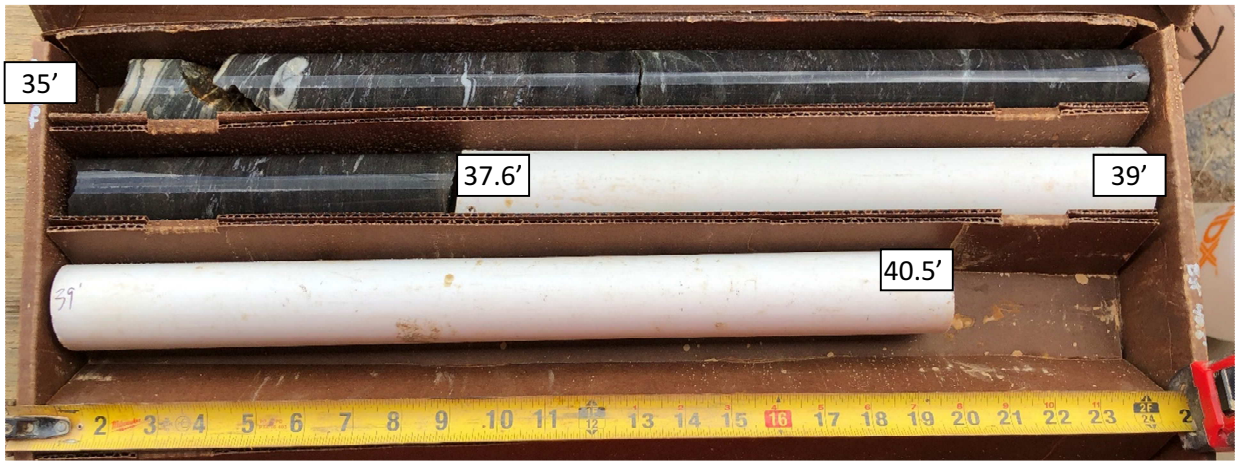


RMC-12B Core Run #2: 47-57 ft bgs
REC = 100%, RQD = 88%



RMC-12B, Core Run #3: 57-67 ft bgs
REC = 100%, 100%

RMC-15A Core Run #1: 25-35 ft bgs
REC = 95%, RQD = 65%



RMC-15A Core Run #2: 35-37.7 ft bgs
REC = 100%, RQD = 91%

RMC-15A Core Run #3: 37.7-40.5 ft bgs
The rock from 37.7 to 40.5 ft bgs fell out of the core barrel and into the hole while withdrawing the auger from the borehole. Attempts to retrieve the sample from the hole were unsuccessful. No sample was recovered.

APPENDIX IV

Client:	Willmer Engineering, Inc.				
Project:	New River Pump Station - Coring A				
Location:	Atlanta, GA			Project No:	GTX-310081
Boring ID:	---	Sample Type:	---	Tested By:	tlm
Sample ID:	---	Test Date:	06/03/19	Checked By:	smd
Depth :	---	Test Id:	506590		

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
RMC-12A	12A-WE02	42.375 - 42.750 ft	174	23981	1	No	2 , 4,*
RMC-12A	12A-WE04	49.570 - 49.916 ft	173	15413	3	No	4,*
RMC-12A	12A-WE06	55.542 - 55.916 ft	171	20715	1	No	4,*

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

1: Best effort end preparation. See Tolerance report for details.
2: The as-received core did not meet the ASTM side straightness tolerance due to irregularities in the sample as cored.
3: Specimen L/D < 2.
4: The as-received core did not meet the ASTM minimum diameter tolerance of 1.875 inches.
5: Specimen diameter is less than 10 times maximum particle size.
6: Specimen diameter is less than 6 times maximum particle size.

*Because the indicated tested specimens did not meet the ASTM D4543 standard tolerances, the results reported here may differ from those for a test specimen within tolerances.

Client:	Willmer Engineering, Inc.	Test Date:	6/3/2019
Project Name:	New River Pump Station - Coring A	Tested By:	cmh
Project Location:	Atlanta, GA	Checked By:	jsc
GTX #:	310081		
Boring ID:	RMC-12A		
Sample ID:	12A-WE02		
Depth:	42.375-42.750 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.34	4.34	4.34
Specimen Diameter, in:	1.85	1.85	1.85
Specimen Mass, g:	533.69		
Bulk Density, lb/ft^3	174	**Minimum Diameter Tolerence Met?**	**NO**
Length to Diameter Ratio:	2.3	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? NO

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **NO**

END FLATNESS AND PARALLELISM (Procedure FP1)

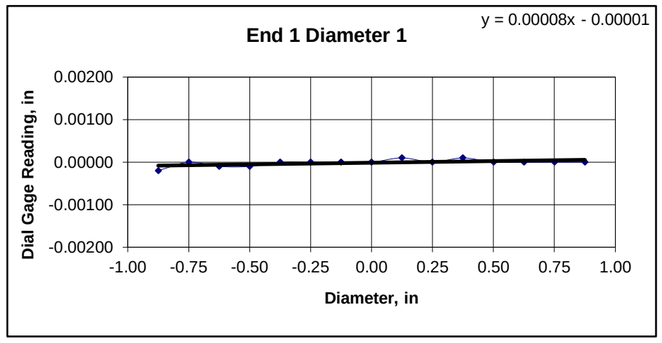
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	0.00000	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000	0.00010	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00030	-0.00030	-0.00050	-0.00060	-0.00070

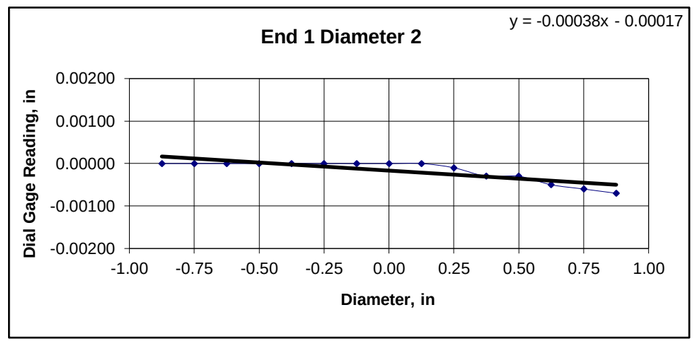
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00070

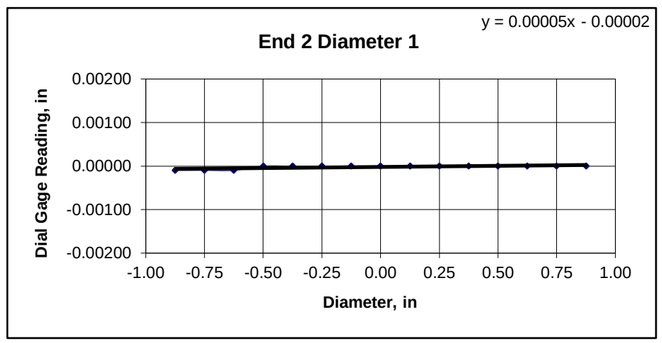
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00030	0.00030	0.00030	0.00020	0.00020	0.00010	0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00030	-0.00040

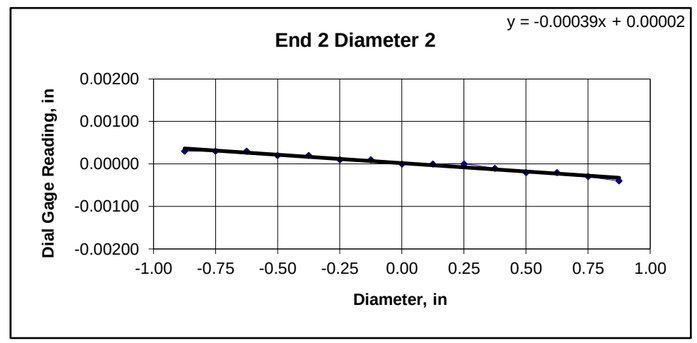
Difference between max and min readings, in:
0° = 0.0001 90° = 0.0007

Maximum difference must be < 0.0020 in. Difference = ± 0.00035
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00008
Angle of Best Fit Line: 0.00442

End 2:
Slope of Best Fit Line 0.00005
Angle of Best Fit Line: 0.00295

Maximum Angular Difference: 0.00147

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00038
Angle of Best Fit Line: 0.02177

End 2:
Slope of Best Fit Line 0.00039
Angle of Best Fit Line: 0.02259

Maximum Angular Difference: 0.00082

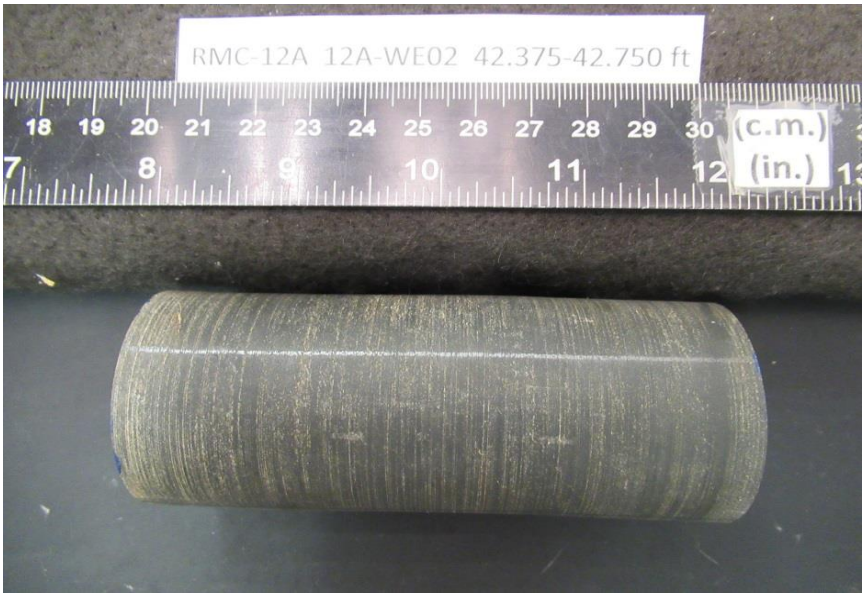
Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.850	0.00016	0.009	YES
Diameter 2, in (rotated 90°)	0.00070	1.850	0.00038	0.022	YES
END 2					
Diameter 1, in	0.00010	1.850	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00070	1.850	0.00038	0.022	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Willmer Engineering, Inc.
Project Name:	New River Pump Station - Coring A
Project Location:	Atlanta, GA
GTX #:	310081
Test Date:	6/3/2019
Tested By:	cmh
Checked By:	jsc
Boring ID:	RMC-12A
Sample ID:	12A-WE02
Depth, ft:	42.375-42.750



After cutting and grinding

After break

Client:	Willmer Engineering, Inc.	Test Date:	6/3/2019
Project Name:	New River Pump Station - Coring A	Tested By:	cmh
Project Location:	Atlanta, GA	Checked By:	jsc
GTX #:	310081		
Boring ID:	RMC-12A		
Sample ID:	12A-WE04		
Depth:	49.570-49.916 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.51	4.51	4.51
Specimen Diameter, in:	1.86	1.86	1.86
Specimen Mass, g:	555.23		
Bulk Density, lb/ft^3	173	**Minimum Diameter Tolerence Met?**	**NO**
Length to Diameter Ratio:	2.4	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

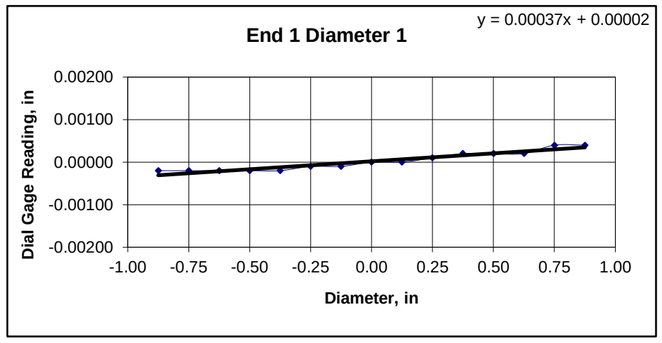
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00010	0.00020	0.00020	0.00020	0.00040	0.00040
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

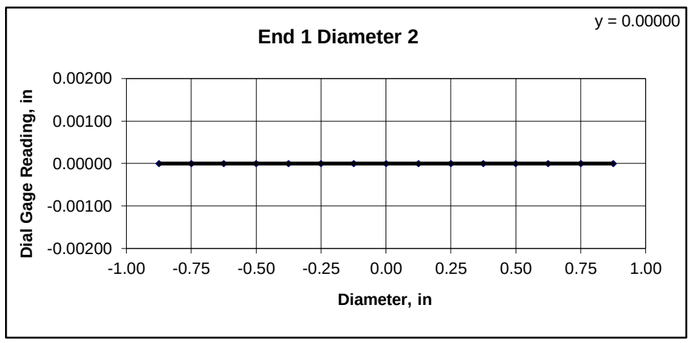
Difference between max and min readings, in:
0° = 0.00060 90° = 0.00000

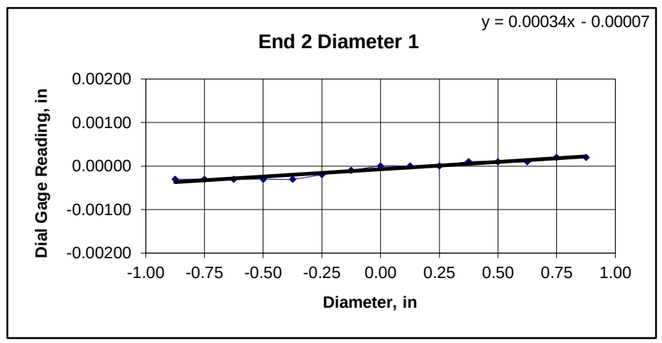
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00030	-0.00030	-0.00030	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00020	0.00020
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

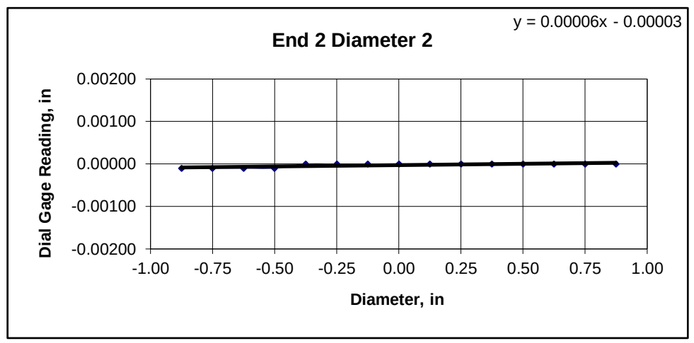
Difference between max and min readings, in:
0° = 0.0005 90° = 0.0001

Maximum difference must be < 0.0020 in. Difference = ± 0.00030
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00037
Angle of Best Fit Line: 0.02144

End 2:
Slope of Best Fit Line 0.00034
Angle of Best Fit Line: 0.01932

Maximum Angular Difference: 0.00213

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00000
Angle of Best Fit Line: 0.00000

End 2:
Slope of Best Fit Line 0.00006
Angle of Best Fit Line: 0.00360

Maximum Angular Difference: 0.00360

Parallelism Tolerance Met? **YES**
Spherically Seated

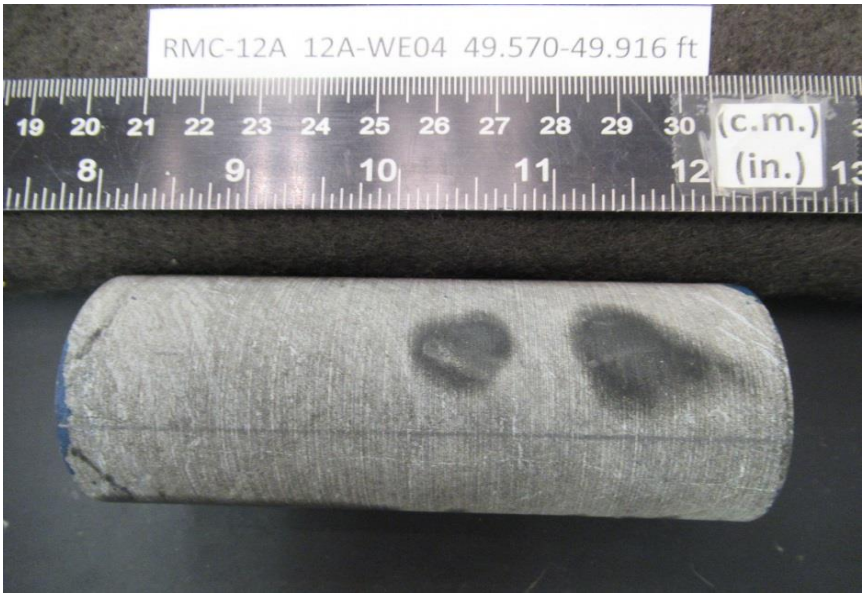
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00060	1.860	0.00032	0.018	YES
Diameter 2, in (rotated 90°)	0.00000	1.860	0.00000	0.000	YES
END 2					
Diameter 1, in	0.00050	1.860	0.00027	0.015	YES
Diameter 2, in (rotated 90°)	0.00010	1.860	0.00005	0.003	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? **YES**

Client:	Willmer Engineering, Inc.
Project Name:	New River Pump Station - Coring A
Project Location:	Atlanta, GA
GTX #:	310081
Test Date:	6/3/2019
Tested By:	cmh
Checked By:	jsc
Boring ID:	RMC-12A
Sample ID:	12A-WE04
Depth, ft:	49.570-49.916



After cutting and grinding

After break

Client:	Willmer Engineering, Inc.	Test Date:	6/3/2019
Project Name:	New River Pump Station - Coring A	Tested By:	cmh
Project Location:	Atlanta, GA	Checked By:	jsc
GTX #:	310081		
Boring ID:	RMC-12A		
Sample ID:	12A-WE06		
Depth:	55.542-55.916 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.10	4.11	4.11
Specimen Diameter, in:	1.85	1.85	1.85
Specimen Mass, g:	496.37		
Bulk Density, lb/ft^3	171	**Minimum Diameter Tolerence Met?**	**NO**
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

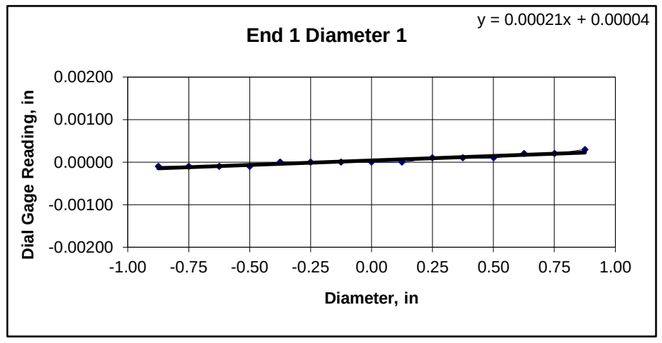
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00020	0.00020	0.00030
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010

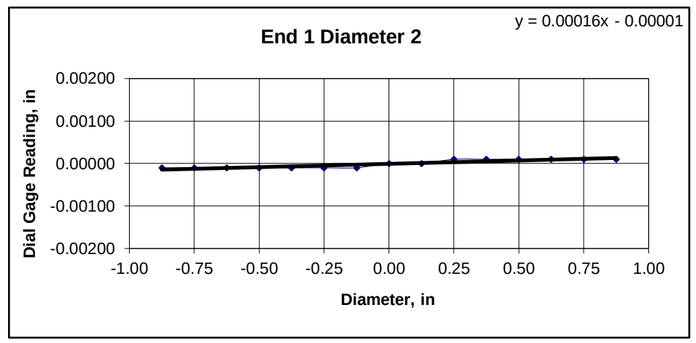
Difference between max and min readings, in:
0° = 0.00040 90° = 0.00020

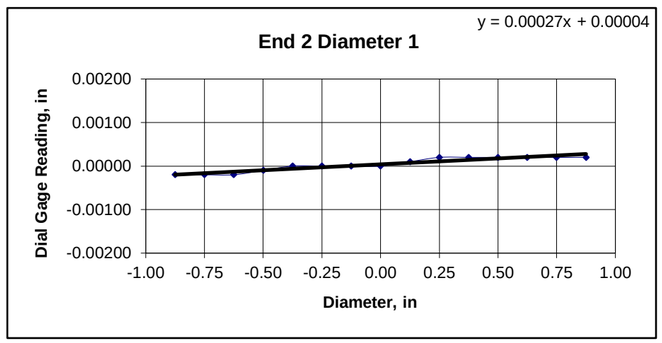
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
Diameter 2, in (rotated 90°)	-0.00020	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020	0.00020

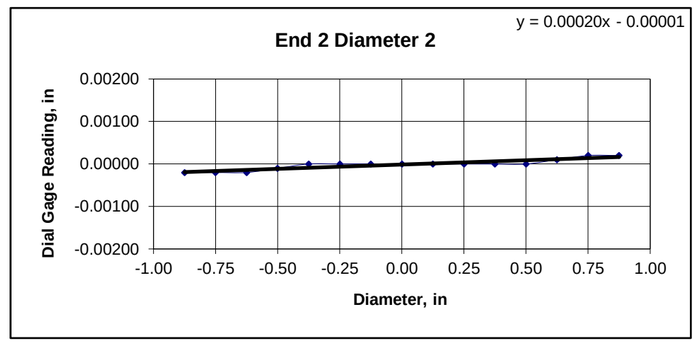
Difference between max and min readings, in:
0° = 0.0004 90° = 0.0004

Maximum difference must be < 0.0020 in. Difference = ± 0.00020
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00021
Angle of Best Fit Line: 0.01211

End 2:
Slope of Best Fit Line 0.00027
Angle of Best Fit Line: 0.01555

Maximum Angular Difference: 0.00344

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00016
Angle of Best Fit Line: 0.00900

End 2:
Slope of Best Fit Line 0.00020
Angle of Best Fit Line: 0.01162

Maximum Angular Difference: 0.00262

Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00040	1.850	0.00022	0.012	YES
Diameter 2, in (rotated 90°)	0.00020	1.850	0.00011	0.006	YES
END 2					
Diameter 1, in	0.00040	1.850	0.00022	0.012	YES
Diameter 2, in (rotated 90°)	0.00040	1.850	0.00022	0.012	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Willmer Engineering, Inc.
Project Name:	New River Pump Station - Coring A
Project Location:	Atlanta, GA
GTX #:	310081
Test Date:	6/3/2019
Tested By:	cmh
Checked By:	jsc
Boring ID:	RMC-12A
Sample ID:	12A-WE06
Depth, ft:	55.542-55.916

After cutting and grinding

After break

Client:	Willmer Engineering, Inc.				
Project:	New River Pump Station - Coring B				
Location:	Atlanta, GA			Project No:	GTX-310082
Boring ID:	RMC-12B	Sample Type:	cylinder	Tested By:	tlm
Sample ID:	12B-WE01	Test Date:	06/04/19	Checked By:	smd
Depth :	41.160-41.542	Test Id:	506591		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm), psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-1	41.18 - 41.26 ft	1.86	1.02	2,082	2.43	1.56	858	0.900	773	19	16,300

Before

After

Intact material and Discontinuity Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

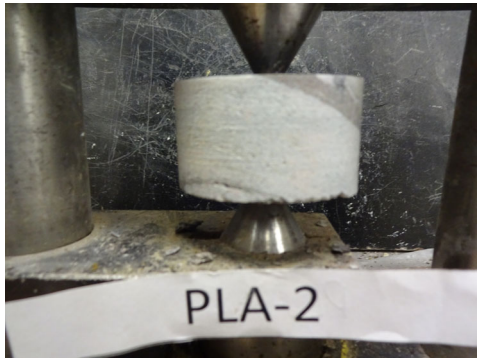
F = the size correction factor

Is(50) = the size corrected point load strength index

Client:	Willmer Engineering, Inc.				
Project:	New River Pump Station - Coring B				
Location:	Atlanta, GA			Project No:	GTX-310082
Boring ID:	RMC-12B	Sample Type:	cylinder	Tested By:	tlm
Sample ID:	12B-WE03	Test Date:	06/04/19	Checked By:	smd
Depth :	57.167-57.542	Test Id:	506592		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm), psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-2	57.167 - 57.27 ft	1.86	1.04	2,734	2.46	1.57	1112	0.903	1004	19	21,100



Before

After

Intact material and Discontinuity Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

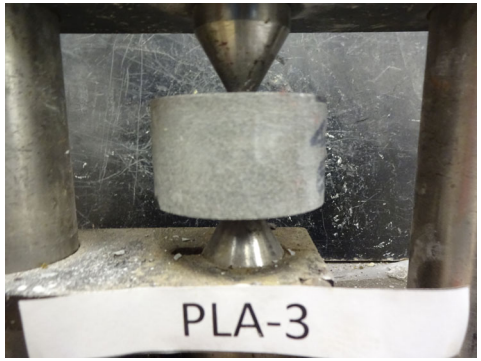
F = the size correction factor

Is(50) = the size corrected point load strength index

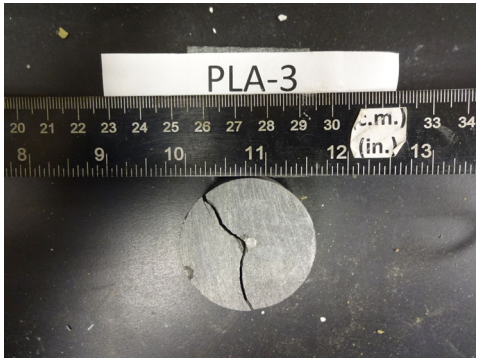
Client:	Willmer Engineering, Inc.				
Project:	New River Pump Station - Coring B				
Location:	Atlanta, GA			Project No:	GTX-310082
Boring ID:	RMC-12B	Sample Type:	cylinder	Tested By:	tlm
Sample ID:	12B-WE05	Test Date:	06/04/19	Checked By:	smd
Depth :	63.333-63.708	Test Id:	506593		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm), psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-3	63.333 - 63.42 ft	1.86	1.09	4,053	2.58	1.61	1573	0.912	1435	19	29,900



Before



After

Intact Material Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

F = the size correction factor

Is(50) = the size corrected point load strength index

Client:	Willmer Engineering, Inc.				
Project:	New River Pump Station - Coring B				
Location:	Atlanta, GA			Project No:	GTX-310082
Boring ID:	---	Sample Type:	---	Tested By:	tlm
Sample ID:	---	Test Date:	06/03/19	Checked By:	smd
Depth :	---	Test Id:	506596		

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
RMC-12B	12B-WE02	41.542 - 41.916 ft	168	13536	1	No	4,*
RMC-12B	12B-WE04	57.542 - 57.916 ft	172	24980	1	No	4,*
RMC-12B	12B-WE06	63.708 - 64.083 ft	172	15972	1	No	4,*

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

1: Best effort end preparation. See Tolerance report for details.
2: The as-received core did not meet the ASTM side straightness tolerance due to irregularities in the sample as cored.
3: Specimen L/D < 2.
4: The as-received core did not meet the ASTM minimum diameter tolerance of 1.875 inches.
5: Specimen diameter is less than 10 times maximum particle size.
6: Specimen diameter is less than 6 times maximum particle size.

*Because the indicated tested specimens did not meet the ASTM D4543 standard tolerances, the results reported here may differ from those for a test specimen within tolerances.

Client:	Willmer Engineering, Inc.	Test Date:	6/3/2019
Project Name:	New River Pump Station - Coring B	Tested By:	cmh
Project Location:	Atlanta, GA	Checked By:	jsc
GTX #:	310082		
Boring ID:	RMC-12B		
Sample ID:	12B-WE02		
Depth:	41.542-41.916 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.48	4.48	4.48
Specimen Diameter, in:	1.86	1.86	1.86
Specimen Mass, g:	536.15		
Bulk Density, lb/ft^3	168	**Minimum Diameter Tolerence Met?**	**NO**
Length to Diameter Ratio:	2.4	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

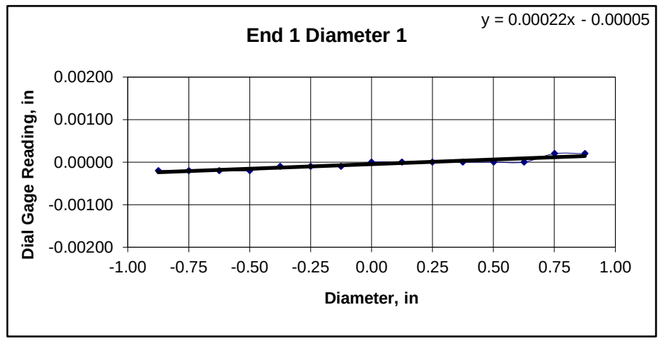
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00020	0.00020
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

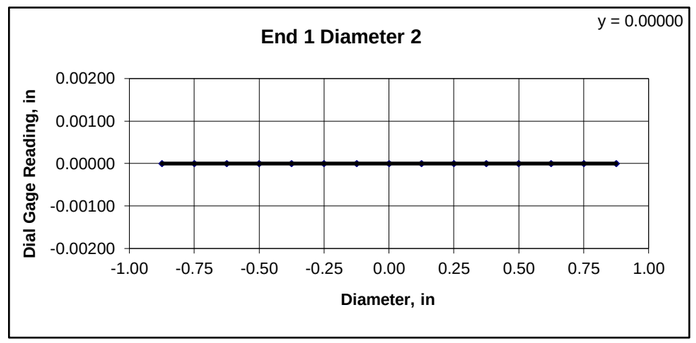
Difference between max and min readings, in:
0° = 0.00040 90° = 0.00000

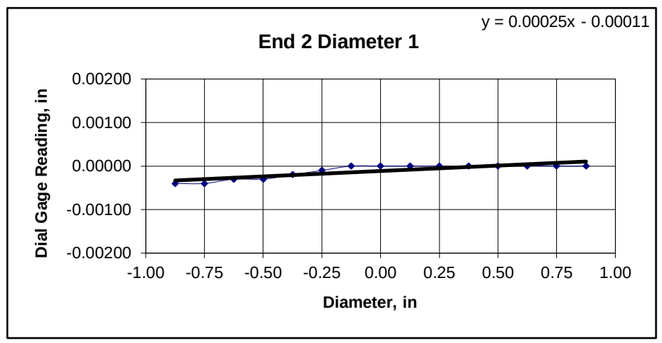
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00040	-0.00040	-0.00030	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

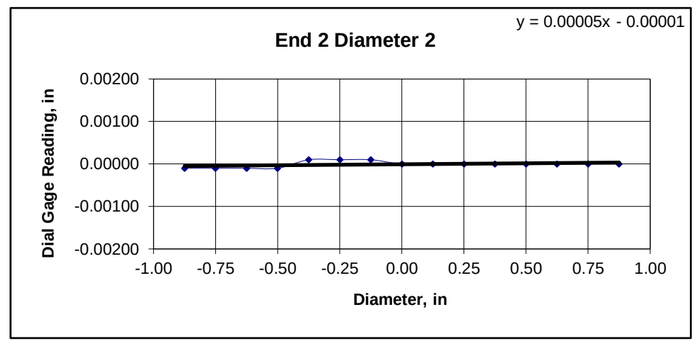
Difference between max and min readings, in:
0° = 0.0004 90° = 0.0002

Maximum difference must be < 0.0020 in. Difference = ± 0.00020
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00022
Angle of Best Fit Line: 0.01244

End 2:
Slope of Best Fit Line 0.00025
Angle of Best Fit Line: 0.01424

Maximum Angular Difference: 0.00180

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00000
Angle of Best Fit Line: 0.00000

End 2:
Slope of Best Fit Line 0.00005
Angle of Best Fit Line: 0.00262

Maximum Angular Difference: 0.00262

Parallelism Tolerance Met? **YES**
Spherically Seated

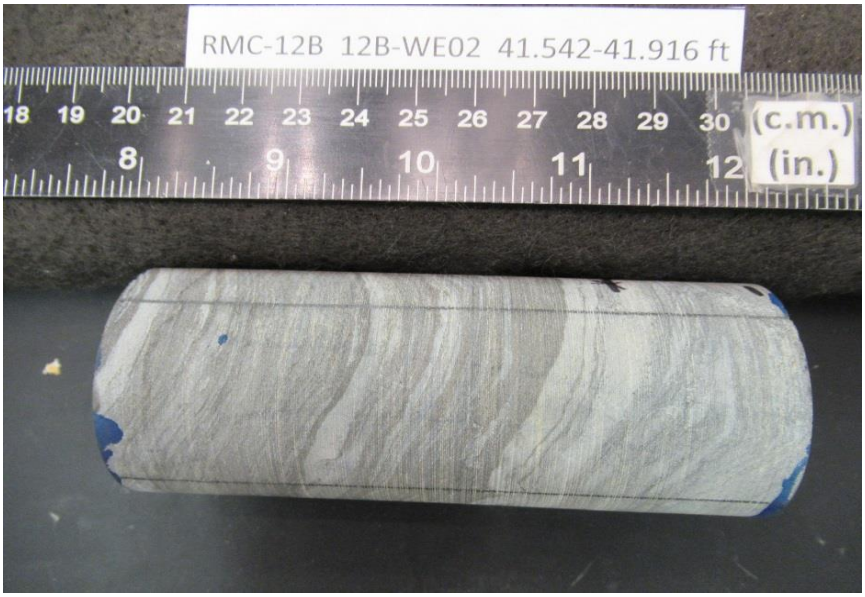
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00040	1.860	0.00022	0.012	YES
Diameter 2, in (rotated 90°)	0.00000	1.860	0.00000	0.000	YES
END 2					
Diameter 1, in	0.00040	1.860	0.00022	0.012	YES
Diameter 2, in (rotated 90°)	0.00020	1.860	0.00011	0.006	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? **YES**

Client:	Willmer Engineering, Inc.
Project Name:	New River Pump Station - Coring B
Project Location:	Atlanta, GA
GTX #:	310082
Test Date:	6/3/2019
Tested By:	cmh
Checked By:	jsc
Boring ID:	RMC-12B
Sample ID:	12B-WE02
Depth, ft:	41.542-41.916



After cutting and grinding

After break

Client:	Willmer Engineering, Inc.	Test Date:	6/3/2019
Project Name:	New River Pump Station - Coring B	Tested By:	cmh
Project Location:	Atlanta, GA	Checked By:	jsc
GTX #:	310082		
Boring ID:	RMC-12B		
Sample ID:	12B-WE04		
Depth:	57.542-57.916 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.37	4.37	4.37
Specimen Diameter, in:	1.86	1.86	1.86
Specimen Mass, g:	535.72		
Bulk Density, lb/ft^3	172	**Minimum Diameter Tolerence Met?**	**NO**
Length to Diameter Ratio:	2.3	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

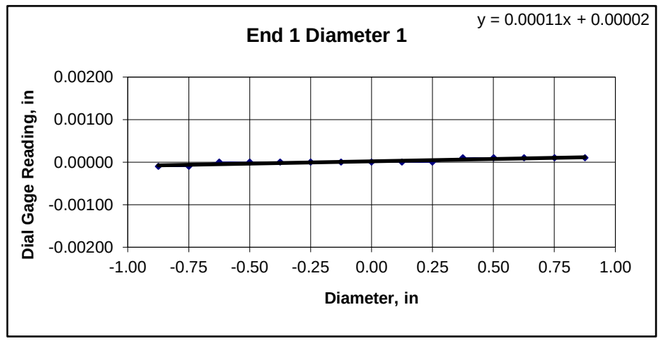
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010	0.00010
Diameter 2, in (rotated 90°)	-0.00060	-0.00050	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00010	0.00020	0.00020	0.00030	0.00040	0.00040	0.00040

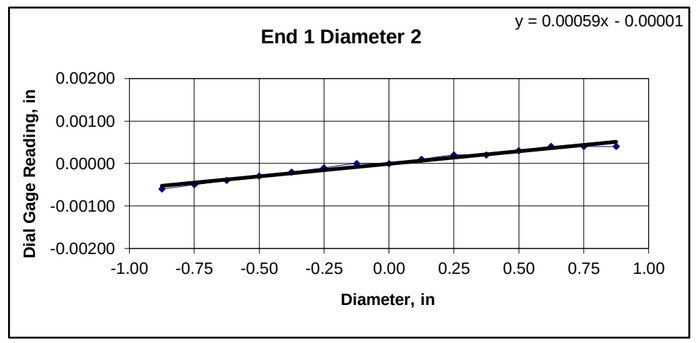
Difference between max and min readings, in:
0° = 0.00020 90° = 0.00100

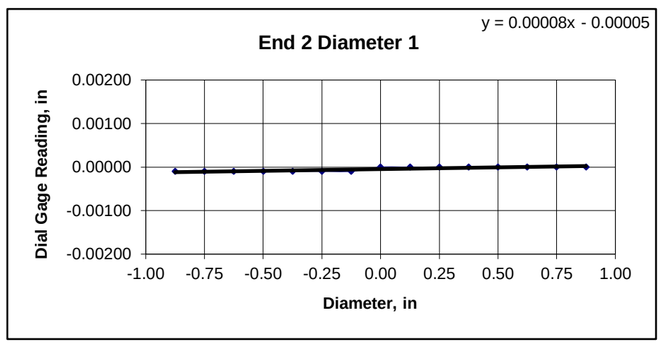
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00060	-0.00050	-0.00040	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00020	0.00020	0.00030	0.00040	0.00040	0.00050	0.00060

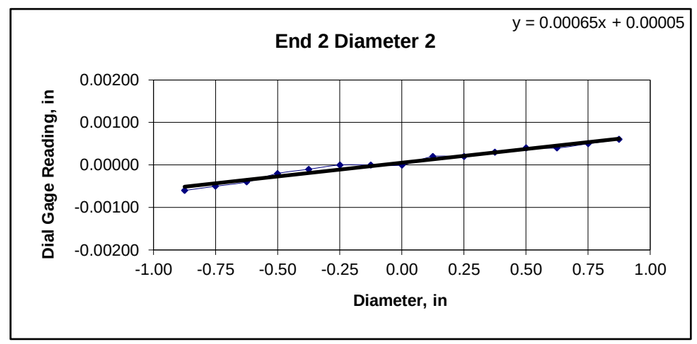
Difference between max and min readings, in:
0° = 0.0001 90° = 0.0012

Maximum difference must be < 0.0020 in. Difference = ± 0.00060
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00011
Angle of Best Fit Line: 0.00622

End 2:
Slope of Best Fit Line 0.00008
Angle of Best Fit Line: 0.00458

Maximum Angular Difference: 0.00164

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00059
Angle of Best Fit Line: 0.03389

End 2:
Slope of Best Fit Line 0.00065
Angle of Best Fit Line: 0.03700

Maximum Angular Difference: 0.00311

Parallelism Tolerance Met? **YES**
Spherically Seated

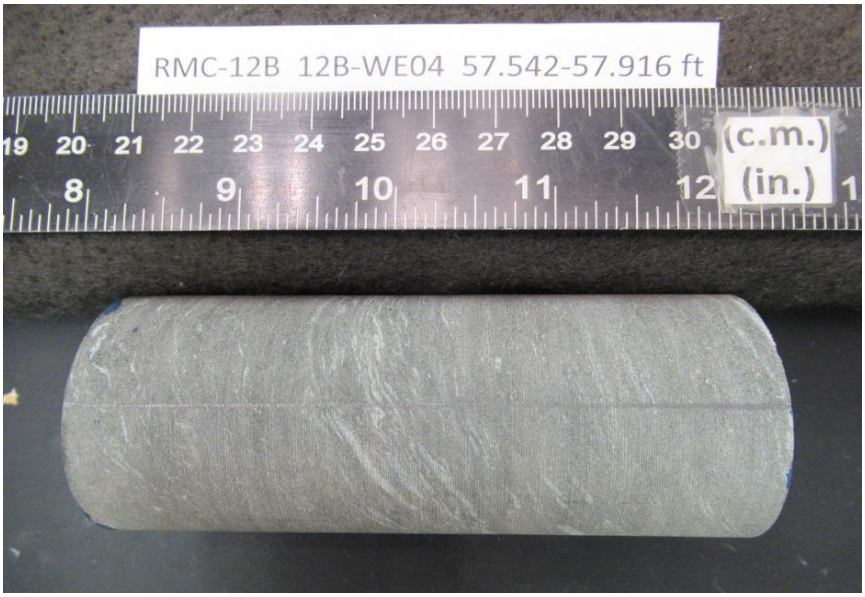
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.860	0.00011	0.006	YES
Diameter 2, in (rotated 90°)	0.00100	1.860	0.00054	0.031	YES
END 2					
Diameter 1, in	0.00010	1.860	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00120	1.860	0.00065	0.037	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? **YES**

Client:	Willmer Engineering, Inc.
Project Name:	New River Pump Station - Coring B
Project Location:	Atlanta, GA
GTX #:	310082
Test Date:	6/3/2019
Tested By:	cmh
Checked By:	jsc
Boring ID:	RMC-12B
Sample ID:	12B-WE04
Depth, ft:	57.542-57.916



After cutting and grinding

After break

Client:	Willmer Engineering, Inc.	Test Date:	6/3/2019
Project Name:	New River Pump Station - Coring B	Tested By:	cmh
Project Location:	Atlanta, GA	Checked By:	jsc
GTX #:	310082		
Boring ID:	RMC-12B		
Sample ID:	12B-WE06		
Depth:	63.708-64.083 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.36	4.36	4.36
Specimen Diameter, in:	1.85	1.85	1.85
Specimen Mass, g:	529.88		
Bulk Density, lb/ft^3	172	**Minimum Diameter Tolerence Met?**	**NO**
Length to Diameter Ratio:	2.4	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

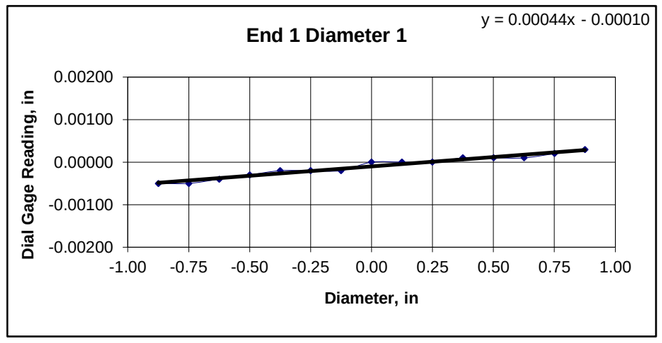
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00050	-0.00050	-0.00040	-0.00030	-0.00020	-0.00020	-0.00020	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00020	0.00030
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010

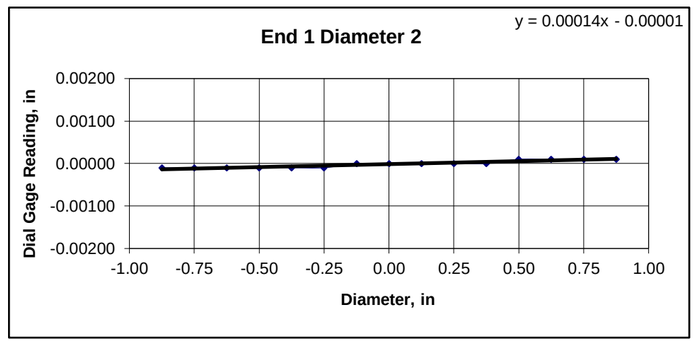
Difference between max and min readings, in:
0° = 0.00080 90° = 0.00020

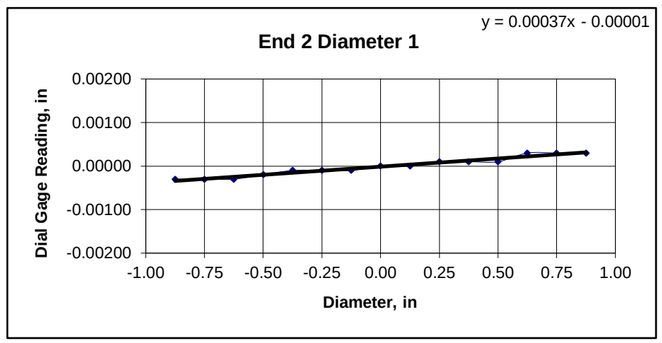
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00030	-0.00030	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00010	0.00010	0.00010	0.00030	0.00030	0.00030
Diameter 2, in (rotated 90°)	-0.00040	-0.00040	-0.00030	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010

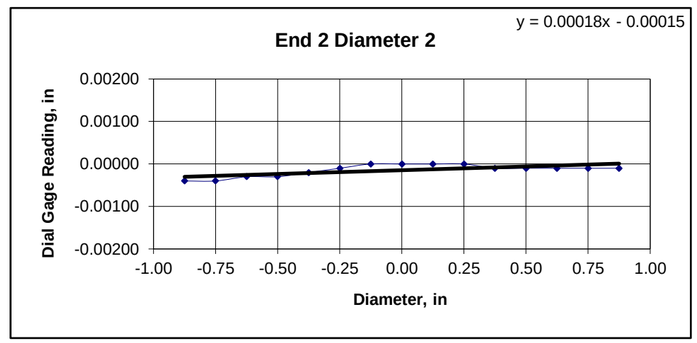
Difference between max and min readings, in:
0° = 0.0006 90° = 0.0004

Maximum difference must be < 0.0020 in. Difference = ± 0.00040
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00044
Angle of Best Fit Line: 0.02521

End 2:
Slope of Best Fit Line 0.00037
Angle of Best Fit Line: 0.02144

Maximum Angular Difference: 0.00377

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00014
Angle of Best Fit Line: 0.00802

End 2:
Slope of Best Fit Line 0.00018
Angle of Best Fit Line: 0.01015

Maximum Angular Difference: 0.00213

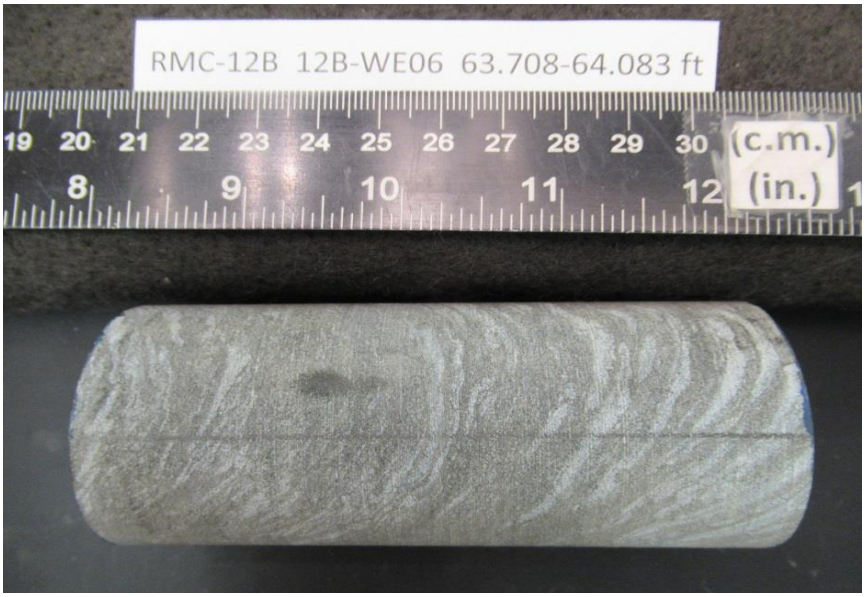
Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00080	1.850	0.00043	0.025	YES
Diameter 2, in (rotated 90°)	0.00020	1.850	0.00011	0.006	YES
END 2					
Diameter 1, in	0.00060	1.850	0.00032	0.019	YES
Diameter 2, in (rotated 90°)	0.00040	1.850	0.00022	0.012	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Willmer Engineering, Inc.
Project Name:	New River Pump Station - Coring B
Project Location:	Atlanta, GA
GTX #:	310082
Test Date:	6/3/2019
Tested By:	cmh
Checked By:	jsc
Boring ID:	RMC-12B
Sample ID:	12B-WE06
Depth, ft:	63.708-64.083



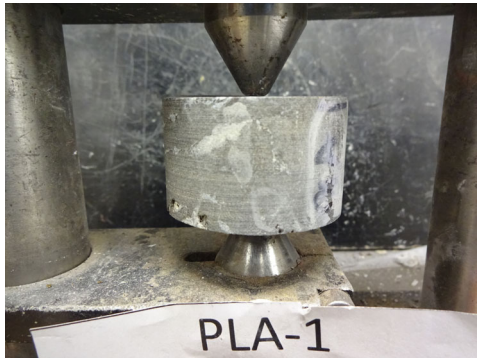
After cutting and grinding

After break

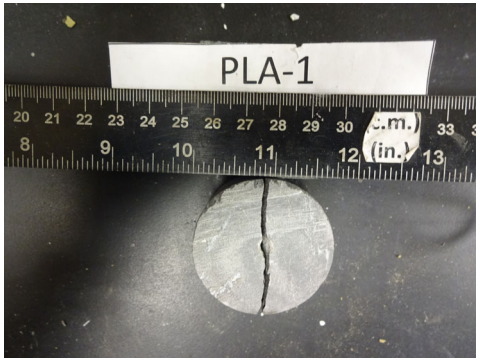
Client:	Willmer Engineering, Inc.				
Project:	New River Pump Station - Coring C				
Location:	Atlanta, GA			Project No:	GTX-310083
Boring ID:	RMC-15A	Sample Type:	cylinder	Tested By:	tlm
Sample ID:	15A-WE01	Test Date:	06/04/19	Checked By:	smd
Depth :	26.208-26.458	Test Id:	506598		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm), psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-1	26.208 - 26.30 ft	1.85	1.15	3,174	2.71	1.64	1173	0.922	1082	19	22,300



Before



After

Intact Material Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

F = the size correction factor

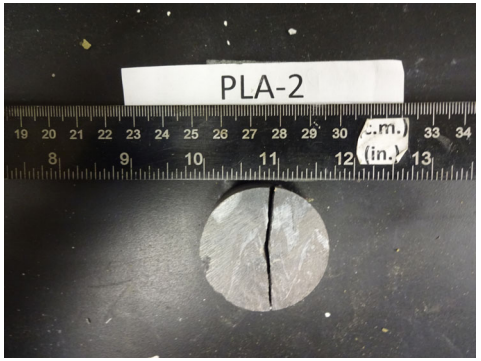
Is(50) = the size corrected point load strength index

Client:	Willmer Engineering, Inc.				
Project:	New River Pump Station - Coring C				
Location:	Atlanta, GA			Project No:	GTX-310083
Boring ID:	RMC-15A	Sample Type:	cylinder	Tested By:	tlm
Sample ID:	15A-WE03	Test Date:	06/04/19	Checked By:	smd
Depth :	31.875	Test Id:	506599		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm), psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-2	32.27 - 32.37 ft	1.85	1.15	3,100	2.71	1.65	1145	0.923	1056	19	21,800

Before



After

Intact Material Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

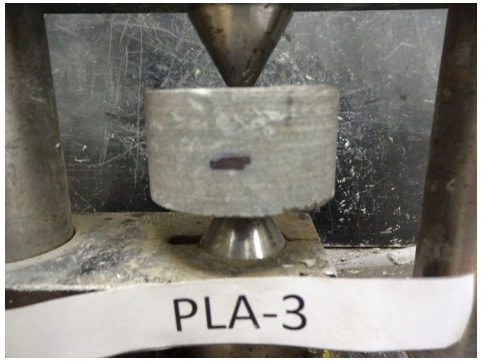
F = the size correction factor

Is(50) = the size corrected point load strength index

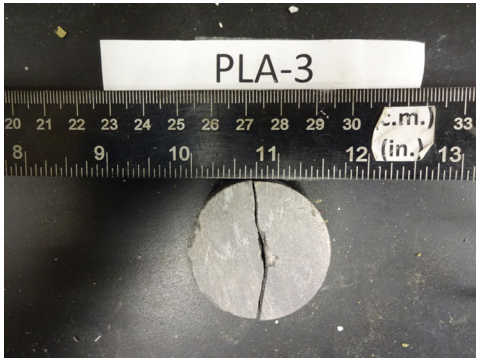
Client:	Willmer Engineering, Inc.				
Project:	New River Pump Station - Coring C				
Location:	Atlanta, GA			Project No:	GTX-310083
Boring ID:	RMC-15A	Sample Type:	cylinder	Tested By:	tlm
Sample ID:	15A-WE04	Test Date:	06/04/19	Checked By:	smd
Depth :	36.167	Test Id:	506600		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm), psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-3	36.56 - 36.65 ft	1.85	0.99	4,145	2.34	1.53	1770	0.893	1581	18	31,900



Before



After

Intact Material Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

F = the size correction factor

Is(50) = the size corrected point load strength index

Client:	Willmer Engineering, Inc.				
Project:	New River Pump Station - Coring C				
Location:	Atlanta, GA			Project No:	GTX-310083
Boring ID:	---	Sample Type:	---	Tested By:	tlm
Sample ID:	---	Test Date:	06/05/19	Checked By:	smd
Depth :	---	Test Id:	506603		

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
RMC-15A	15A-WE02	34.083-34.458 ft	163	8621	1	No	---
RMC-15A	15A-WE03	31.875-32.26 ft	169	14937	1	No	---
RMC-15A	15A-WE04	36.167-36.55 ft	169	16772	1	No	---

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

Client:	Willmer Engineering, Inc.	Test Date:	6/4/2019
Project Name:	New River Pump Station - Coring C	Tested By:	jck
Project Location:	Atlanta, GA	Checked By:	jsc
GTX #:	310083		
Boring ID:	RMC-15A		
Sample ID:	15A-WE02		
Depth:	34.083-34.458 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.20	4.20	4.20
Specimen Diameter, in:	1.85	1.85	1.85
Specimen Mass, g:	484.08		
Bulk Density, lb/ft^3	163	**Minimum Diameter Tolerence Met?**	**NO**
Length to Diameter Ratio:	2.3	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

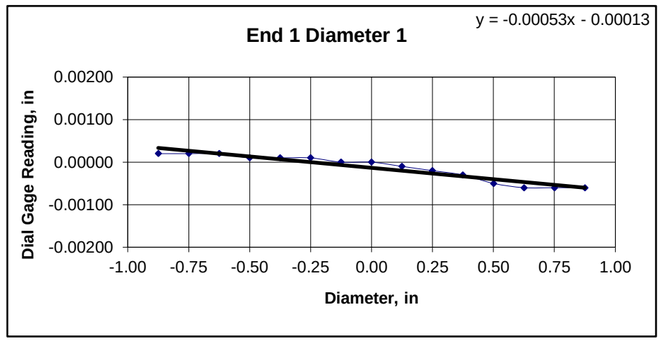
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00020	0.00020	0.00020	0.00010	0.00010	0.00010	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00050	-0.00060	-0.00060	-0.00060
Diameter 2, in (rotated 90°)	-0.00050	-0.00040	-0.00030	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

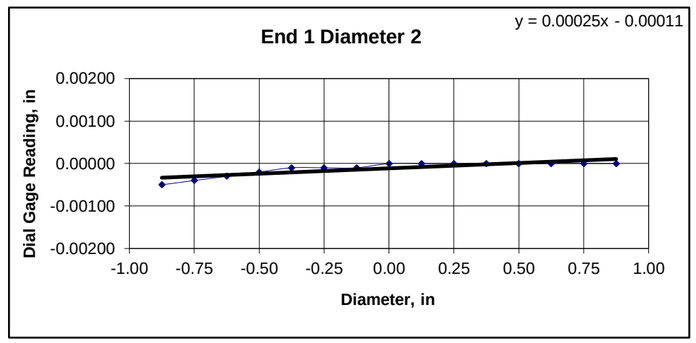
Difference between max and min readings, in:
0° = 0.00080 90° = 0.00050

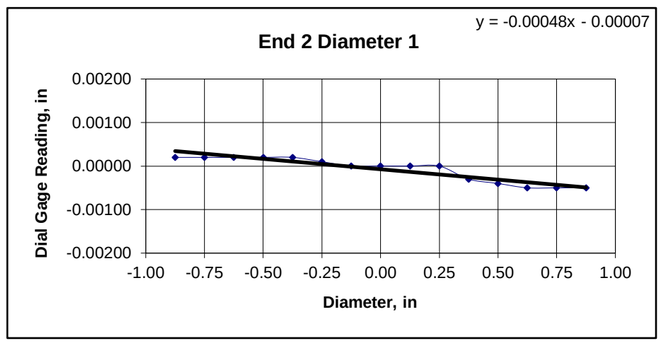
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00020	0.00020	0.00020	0.00020	0.00020	0.00010	0.00000	0.00000	0.00000	0.00000	-0.00030	-0.00040	-0.00050	-0.00050	-0.00050
Diameter 2, in (rotated 90°)	-0.00050	-0.00040	-0.00030	-0.00020	-0.00010	-0.00010	0.00000	0.00000	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

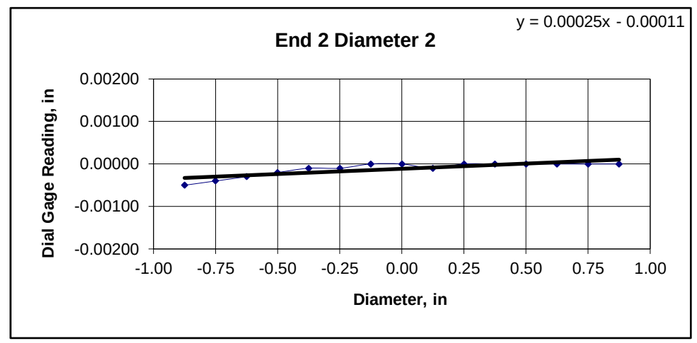
Difference between max and min readings, in:
0° = 0.0007 90° = 0.0005

Maximum difference must be < 0.0020 in. Difference = ± 0.00040
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00053
Angle of Best Fit Line: 0.03061

End 2:
Slope of Best Fit Line 0.00048
Angle of Best Fit Line: 0.02734

Maximum Angular Difference: 0.00327

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00025
Angle of Best Fit Line: 0.01441

End 2:
Slope of Best Fit Line 0.00025
Angle of Best Fit Line: 0.01408

Maximum Angular Difference: 0.00033

Parallelism Tolerance Met? **YES**
Spherically Seated

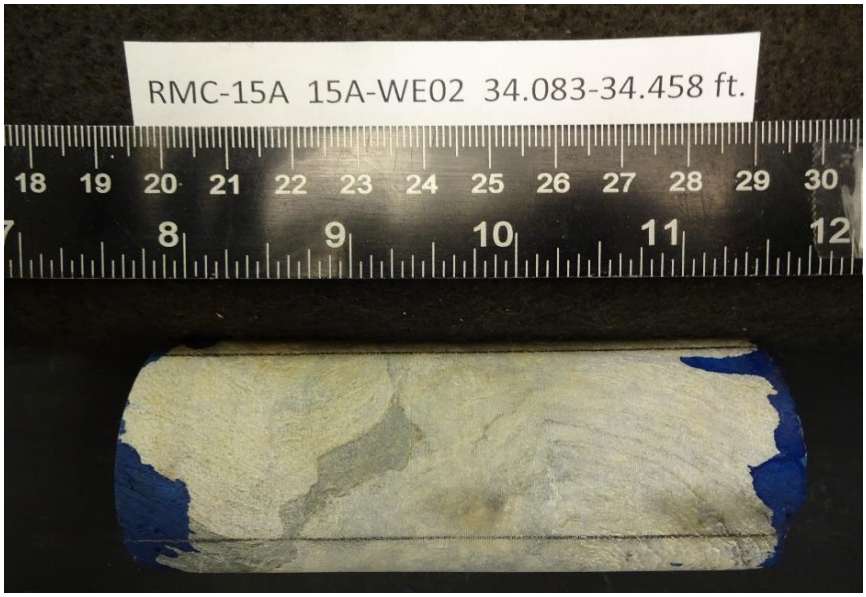
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00080	1.850	0.00043	0.025	YES
Diameter 2, in (rotated 90°)	0.00050	1.850	0.00027	0.015	YES
END 2					
Diameter 1, in	0.00070	1.850	0.00038	0.022	YES
Diameter 2, in (rotated 90°)	0.00050	1.850	0.00027	0.015	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? **YES**

Client:	Willmer Engineering, Inc.
Project Name:	New River Pump Station - Coring C
Project Location:	Atlanta, GA
GTX #:	310083
Test Date:	6/5/2019
Tested By:	cmh
Checked By:	jsc
Boring ID:	RMC-15A
Sample ID:	15A-WE02
Depth, ft:	34.083-34.458



After cutting and grinding

After break

Client:	Willmer Engineering, Inc.	Test Date:	6/4/2019
Project Name:	New River Pump Station - Coring C	Tested By:	jck
Project Location:	Atlanta, GA	Checked By:	jsc
GTX #:	310083		
Boring ID:	RMC-15A		
Sample ID:	15A-WE03		
Depth:	31.875-32.26 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.49	4.49	4.49
Specimen Diameter, in:	1.85	1.85	1.85
Specimen Mass, g:	536.19		
Bulk Density, lb/ft^3	169	**Minimum Diameter Tolerence Met?**	**NO**
Length to Diameter Ratio:	2.4	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

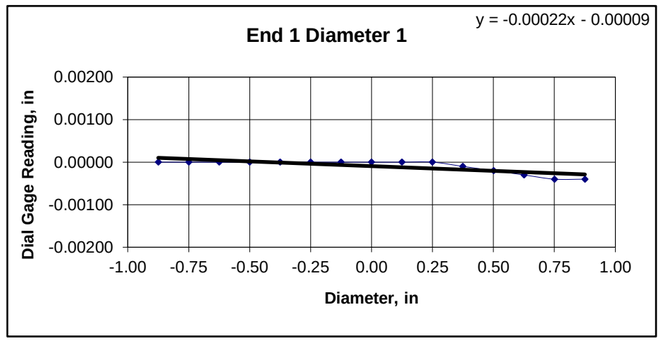
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00040
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

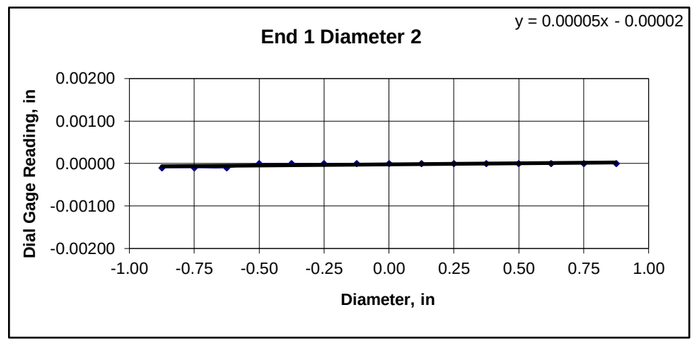
Difference between max and min readings, in:
0° = 0.00040 90° = 0.00010

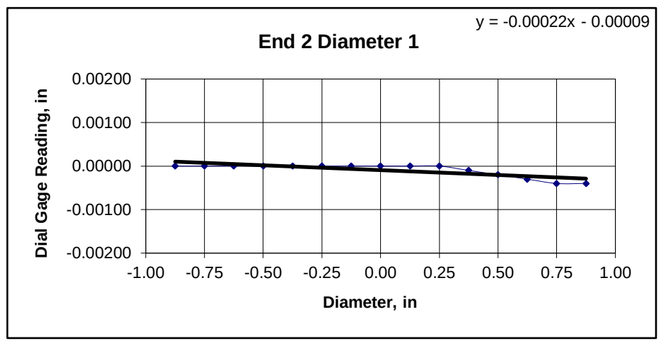
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00040
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

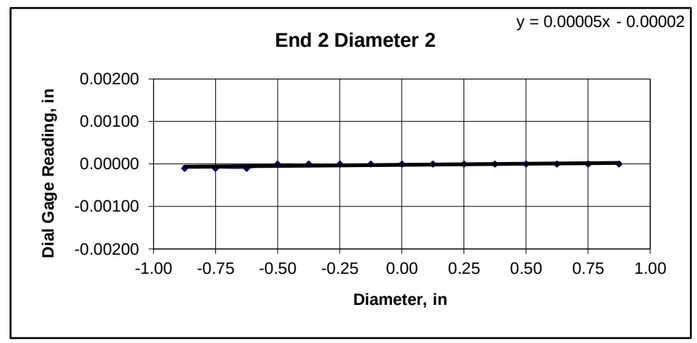
Difference between max and min readings, in:
0° = 0.0004 90° = 0.0001

Maximum difference must be < 0.0020 in. Difference = ± 0.00020
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00022
Angle of Best Fit Line: 0.01277

End 2:
Slope of Best Fit Line 0.00022
Angle of Best Fit Line: 0.01277

Maximum Angular Difference: 0.00000

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00005
Angle of Best Fit Line: 0.00295

End 2:
Slope of Best Fit Line 0.00005
Angle of Best Fit Line: 0.00295

Maximum Angular Difference: 0.00000

Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00040	1.850	0.00022	0.012	YES
Diameter 2, in (rotated 90°)	0.00010	1.850	0.00005	0.003	YES
END 2					
Diameter 1, in	0.00040	1.850	0.00022	0.012	YES
Diameter 2, in (rotated 90°)	0.00010	1.850	0.00005	0.003	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Willmer Engineering, Inc.
Project Name:	New River Pump Station - Coring C
Project Location:	Atlanta, GA
GTX #:	310083
Test Date:	6/5/2019
Tested By:	cmh
Checked By:	jsc
Boring ID:	RMC-15A
Sample ID:	15A-WE03
Depth, ft:	31.875-32.26

After cutting and grinding

After break

Client:	Willmer Engineering, Inc.	Test Date:	6/4/2019
Project Name:	New River Pump Station - Coring C	Tested By:	jck
Project Location:	Atlanta, GA	Checked By:	jsc
GTX #:	310083		
Boring ID:	RMC-15A		
Sample ID:	15A-WE04		
Depth:	36.167-36.55 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.37	4.37	4.37
Specimen Diameter, in:	1.86	1.86	1.86
Specimen Mass, g:	527.72		
Bulk Density, lb/ft^3	169	**Minimum Diameter Tolerence Met?**	**NO**
Length to Diameter Ratio:	2.3	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

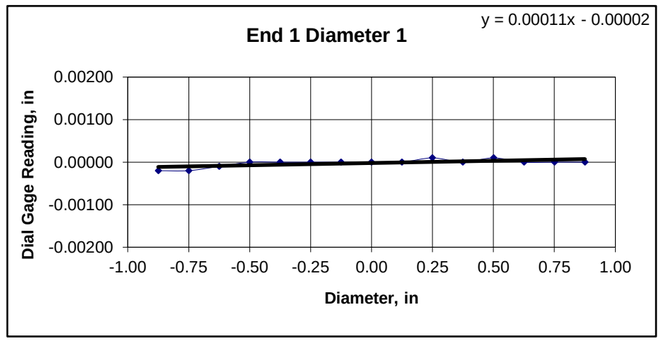
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000	0.00010	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00050	-0.00040	-0.00040	-0.00030	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00010	0.00020	0.00030	0.00030	0.00040	0.00040

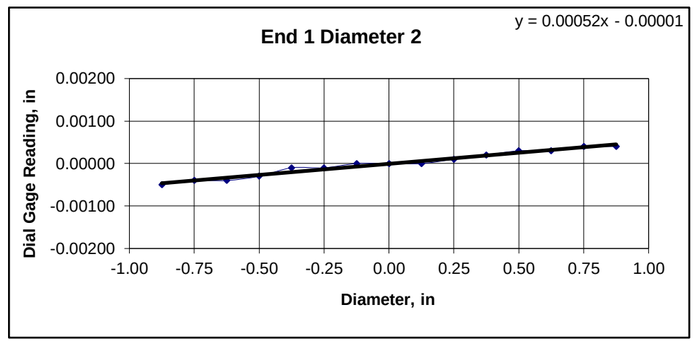
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00090

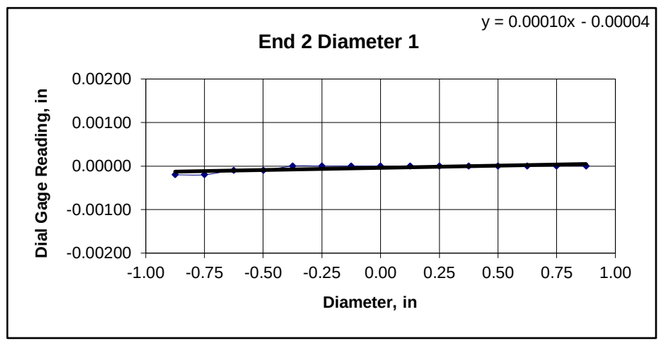
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00050	-0.00040	-0.00030	-0.00030	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00020	0.00030	0.00030	0.00030	0.00040

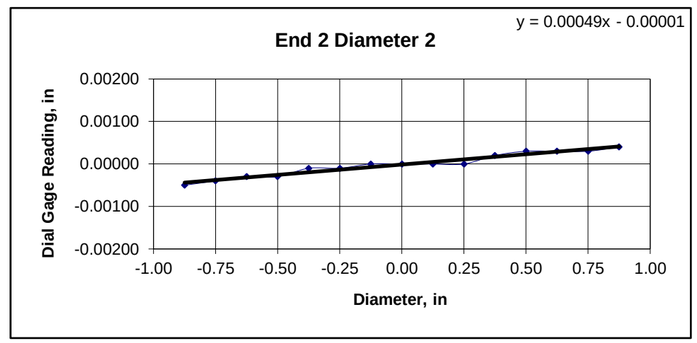
Difference between max and min readings, in:
0° = 0.0002 90° = 0.0009

Maximum difference must be < 0.0020 in. Difference = ± 0.00045
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00011
Angle of Best Fit Line: 0.00606

End 2:
Slope of Best Fit Line 0.00010
Angle of Best Fit Line: 0.00573

Maximum Angular Difference: 0.00033

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00052
Angle of Best Fit Line: 0.02996

End 2:
Slope of Best Fit Line 0.00049
Angle of Best Fit Line: 0.02783

Maximum Angular Difference: 0.00213

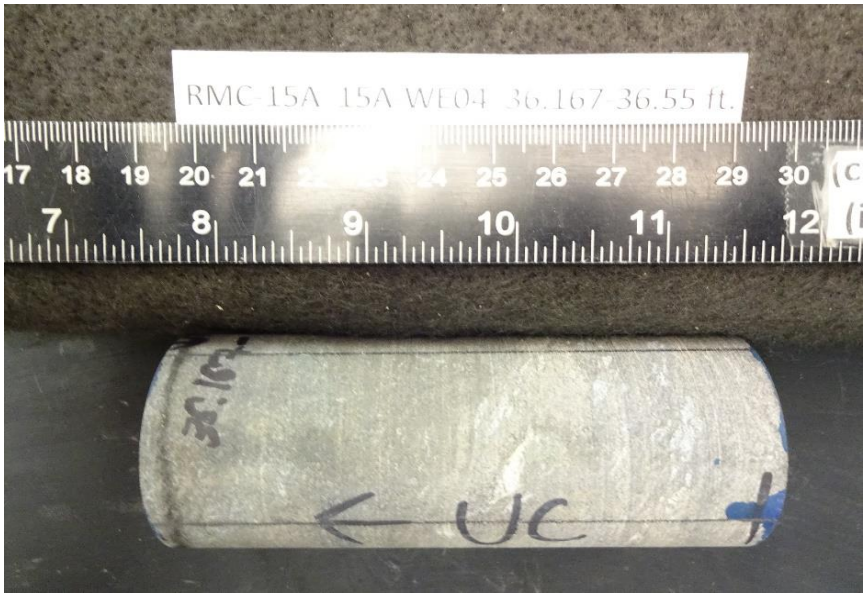
Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

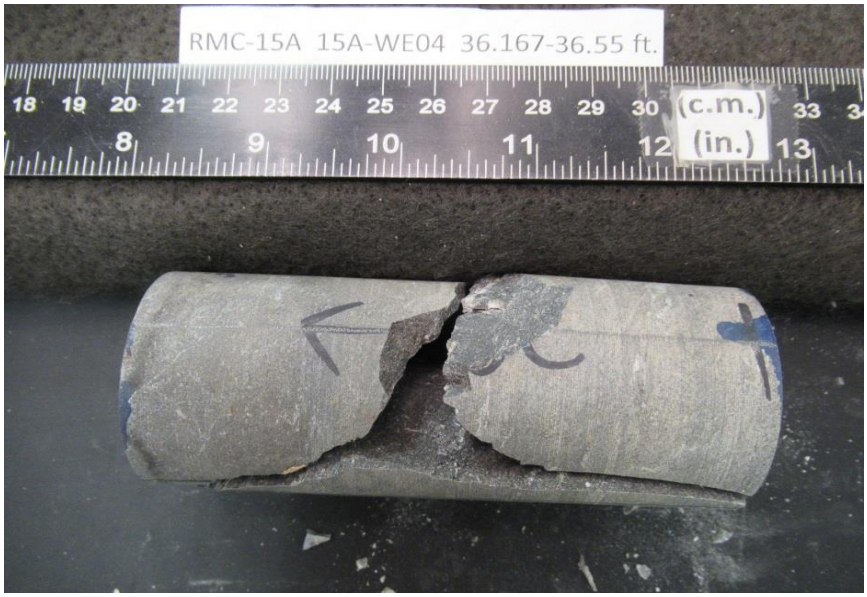
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.860	0.00016	0.009	YES
Diameter 2, in (rotated 90°)	0.00090	1.860	0.00048	0.028	YES
END 2					
Diameter 1, in	0.00020	1.860	0.00011	0.006	YES
Diameter 2, in (rotated 90°)	0.00090	1.860	0.00048	0.028	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Willmer Engineering, Inc.
Project Name:	New River Pump Station - Coring C
Project Location:	Atlanta, GA
GTX #:	310083
Test Date:	6/5/2019
Tested By:	cmh
Checked By:	jsc
Boring ID:	RMC-15A
Sample ID:	15A-WE04
Depth, ft:	36.167-36.55



After cutting and grinding



After break

APPENDIX V

80 0 40 80 160

(IN FEET)
1 inch = 80 ft.

RESURFACE EXISTING ACCESS ROAD

9FU415 BOUNDARY, SEE ARCHEOLOGY REPORT

9FU414 BOUNDARY, SEE ARCHEOLOGY REPORT

9FU413 BOUNDARY, SEE ARCHEOLOGY REPORT

VORTEX PRE-SETTLING UNITS (FUTURE)

AREAS CONSTRUCTED WITH $3.13 STRUCTURAL ADDER

PUMP 4 SCREEN 3 ADDER

RIVER INTAKE PUMP STATION

Perform rock borings in this area as marked up on following pages.

SCREENING DEBRIS ROLL-OFF CONTAINER

8' WIDE CHANNEL

SLIDE GATE (TYP.)

EXIST. INTAKE STRUCTURE

CONNECT TO EX. 78" STL.

FLOODWAY

CHATTAHOOCHEE RIVER

TUNNEL SHAFT TRANSITION BOX

RIPS DROP/CONSTRUCTION SHAFT

WATER QUALITY INSTRUMENTATION

9FU414 BOUNDARY, SEE ARCHEOLOGY REPORT

9FU10 BOUNDARY, SEE ARCHEOLOGY REPORT

NEW REPLICA CABIN

RIDGEWOOD ROAD (HWY 155)

REPAIR DISTURBED PAVEMENT MARKINGS AND LIKE IN KIND TO NEW MATERIAL

AREA TO BE RESERVED FOR LAB BUILDING CITY VEHICLES DURING CONSTRUCTION

RESERVED FOR CITY USE EXCLUSIVELY DURING CONSTRUCTION. CONTRACTOR WILL NOT BE ALLOWED TO IMPACT OR INTRUDE AREA.

MILL AND OVERLAY EXISTING DRIVEWAY. CARRY MILL AND OVERLAY TO RADIUS RETURNS AND UP TO INTERSECTION OF RIDGEWOOD ROAD

PEACHTREE CREEK

FLOODWAY

PEACHTREE CREEK

MATCHLINE SEE SHEET RI-PS C1-002

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jp2 value ▪ innovation ▪ results

2SURGENS BEST ATLANTA GA. 2018

CITY OF ATLANTA DEPARTMENT OF watershed management

No.	Description	Date

No.	Description	Date

PROJECT NO:	TASK_13
DESIGNED BY:	A.T.
DRAWN BY:	J.J.
CHECKED BY:	G.A.
DATE:	06/12/18
SCALE:	AS NOTED

CITY OF ATLANTA DEPT. OF WATERSHED MANAGEMENT
WATER SUPPLY PROGRAM

RIVER INTAKE PUMP STATION

OVERALL SITE PLAN
RIVER INTAKE

DRAWING NO.
RI-PS
C1-001
SHEET OF

ISSUED FOR BIDDING

MATCHLINE SEE SHEET RI-PS C1-001

CHATTAHOOCHEE RIVER

ZONE AE

ZONE AE

Perform rock borings in this area as marked up on following pages.

PEACHTREE PUMP STATION

TRANSMISSION SUBSTATION

CONTAINMENT FACILITY

PL

ZONE AE

PEACHTREE SUBSTATION CONNECTION

CSX RAILROAD

CSX RAILROAD

CSO TUNNEL VENT SHAFT

PEACHTREE DROP/ CONSTRUCTION SHAFT

60" CONNECTION TO PEACHTREE DROP/CONSTRUCTION SHAFT

VALVE VAULT W/ BYPASS

42" VERT. CONFLICT AVOIDANCE

CHATTAHOOCHEE WTP FLOW CONNECTION

CHATTAHOOCHEE WATER TREATMENT PLANT

8' Ø LINER PLATE TUNNEL

Perform rock borings in this area as marked up on following pages.

PLANT ROAD

CORONET WAY

CHEROKEE CIRCLE

80 0 40 80 160

(IN FEET)
1 inch = 80 ft.

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jp² value ▪ innovation ▪ results

PRESURGENS ATLANTA, GA. 2011

CITY OF ATLANTA DEPARTMENT OF watershed management

No.	Description	Date

No.	Description	Date

PROJECT NO:	TASK_13
DESIGNED BY:	A.T.
DRAWN BY:	J.J.
CHECKED BY:	G.A.
DATE:	06/12/18
SCALE:	AS NOTED

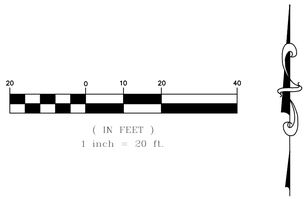
CITY OF ATLANTA DEPT. OF WATERSHED MANAGEMENT
WATER SUPPLY PROGRAM

RIVER INTAKE PUMP STATION

OVERALL SITE PLAN
CHATTAHOOCHEE COMPLEX

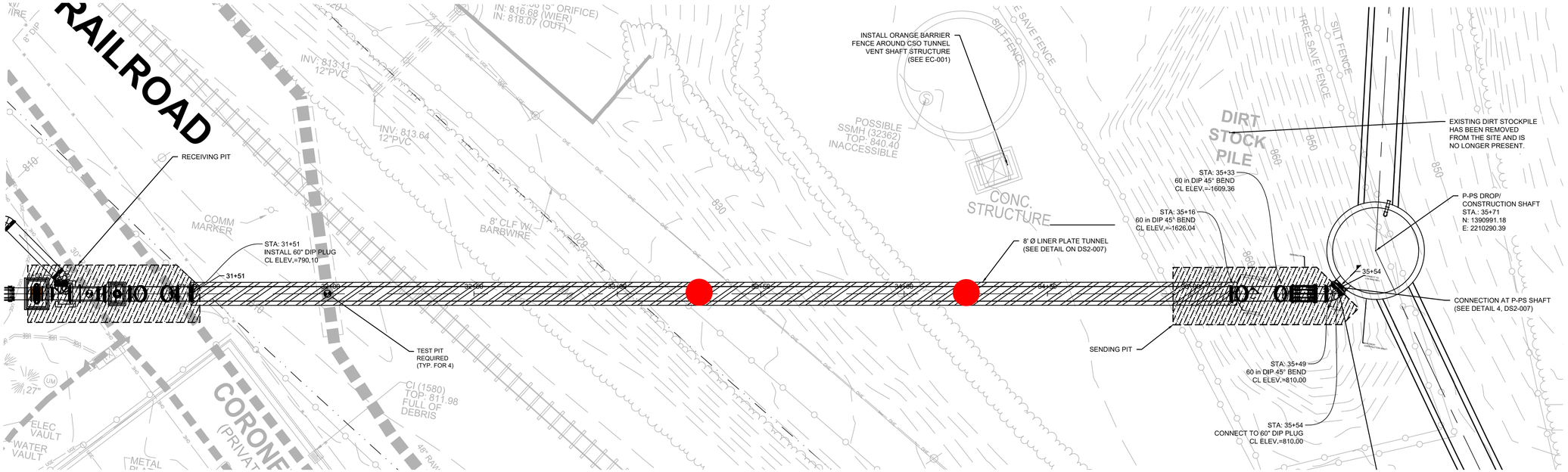
DRAWING NO.
RI-PS
C1-002
SHEET OF

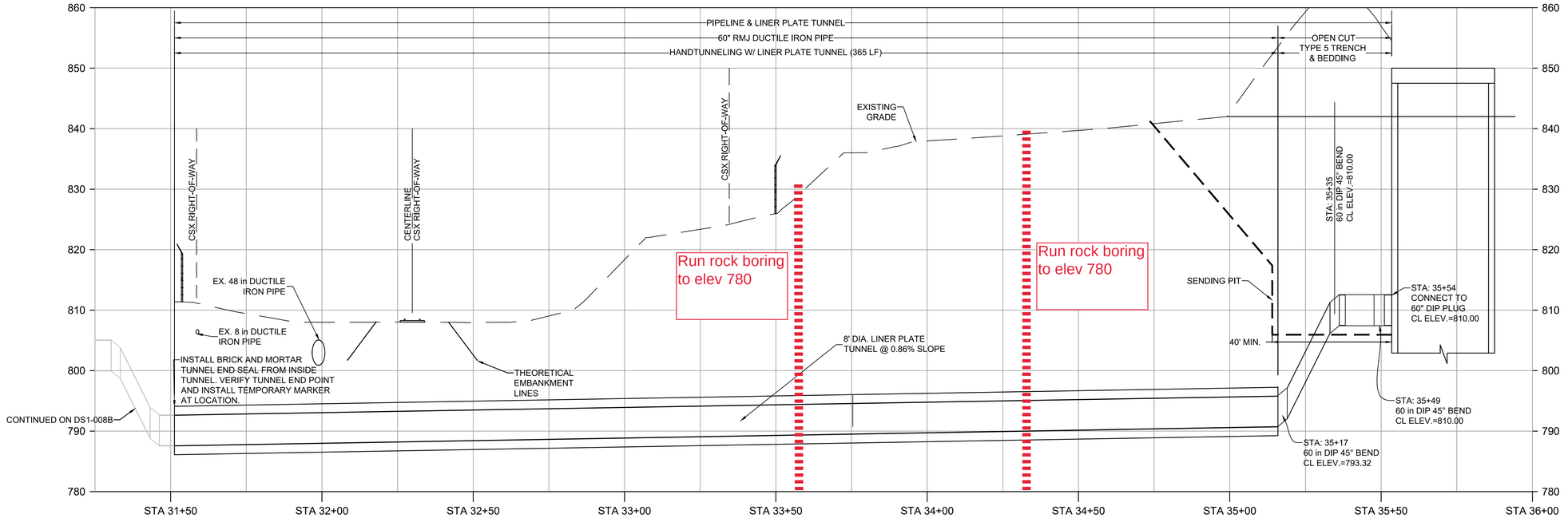
ISSUED FOR BIDDING



NOTES:

1. FINAL ALIGNMENT OF THE PROPOSED 60-INCH RAW WATER MAIN MAY ALTER PENDING VERTICAL UTILITY DATA.
2. SURVEY IS SUPPLEMENTED BY ADDITIONAL INFORMATION AS RECEIVED FROM CITY OF ATLANTA GIS AND AS-BUILTS. CONTRACTOR TO VERIFY THE LOCATION OF ALL EXISTING UTILITIES.
3. CONNECTIONS TO EXISTING TEES AND SERVICE CONNECTIONS MAY REQUIRE ADDITIONAL FITTINGS NOT SPECIFIED HEREON. ADDITIONAL INTERCONNECTIONS MAY BE PRESENT, THOUGH NOT DEPICTED HERE, AND SHALL BE RE-ESTABLISHED.
4. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REGULATIONS WHEN WORKING WITHIN THE IMMEDIATE VICINITY OF POWER POLES, POWER LINES, ETC.
5. YARD PIPING SHALL MAINTAIN EIGHTEEN (18) INCHES VERTICAL CLEARANCE FROM NON-POTABLE PIPELINES, TWENTY-FOUR (24) INCHES FROM ANY EXISTING GAS MAIN GREATER THAN TWO (2) INCHES, AND THIRTY-SIX (36) INCHES FROM ANY EXISTING PERPENDICULAR CROSSING OF GRAVITY AND FORCE MAINS. (MEASURED FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.)
6. SEE SEQUENCING NOTES, G-004, NOTE 3.G.GA FOR SEQUENCING RESTRICTIONS AT THE P-PS DROP/CONSTRUCTION SHAFT SITE.





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jp² value ▪ innovation ▪ results

RESURGENS ATLANTA GA

CITY OF ATLANTA DEPARTMENT OF watershed management

No.	Description	Date

No.	Description	Date

PROJECT NO:	TASK_13
DESIGNED BY:	J.J.
DRAWN BY:	J.J.
CHECKED BY:	G.A.
DATE:	06/12/18
SCALE:	AS NOTED

CITY OF ATLANTA DEPT. OF WATERSHED MANAGEMENT
WATER SUPPLY PROGRAM

RIVER INTAKE PUMP STATION

YARD PIPING
PLAN & PROFILE

DRAWING NO.
RI-PS
DS1-008A
SHEET OF

ISSUED FOR BIDDING

NOTES:

1. FINAL ALIGNMENT OF THE PROPOSED 60-INCH RAW WATER MAIN MAY ALTER PENDING VERTICAL UTILITY DATA.
2. SURVEY IS SUPPLEMENTED BY ADDITIONAL INFORMATION AS RECEIVED FROM CITY OF ATLANTA GIS AND AS-BUILTS. CONTRACTOR TO VERIFY THE LOCATION OF ALL EXISTING UTILITIES.
3. CONNECTIONS TO EXISTING TEES AND SERVICE CONNECTIONS MAY REQUIRE ADDITIONAL FITTINGS NOT SPECIFIED HEREON. ADDITIONAL INTERCONNECTIONS MAY BE PRESENT, THOUGH NOT DEPICTED HERE, AND SHALL BE RE-ESTABLISHED.
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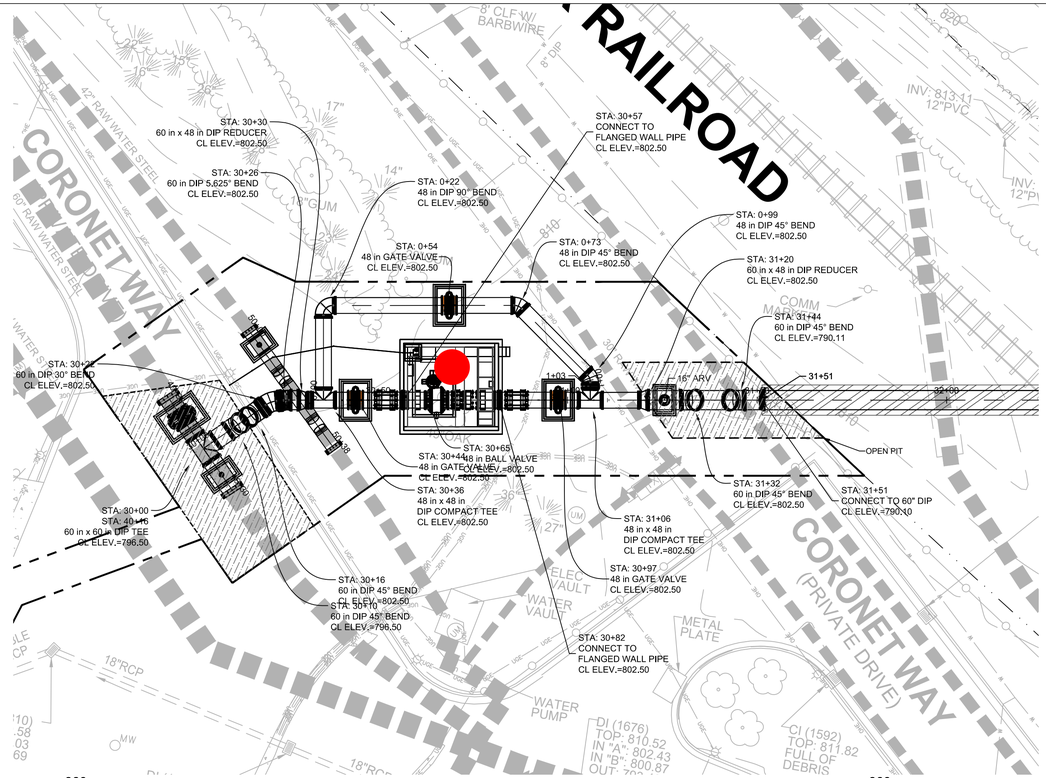
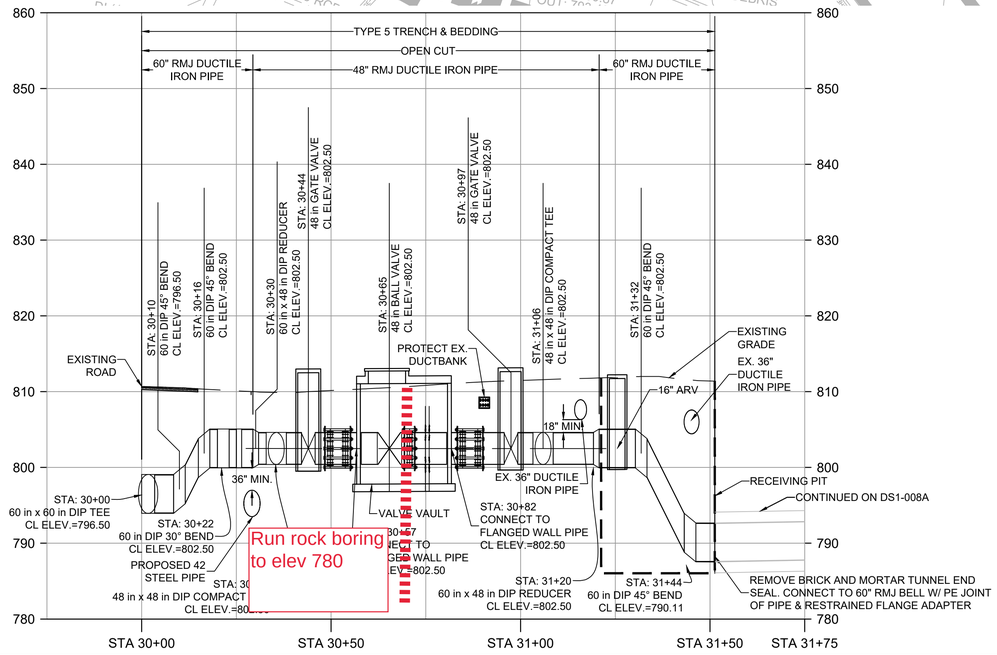
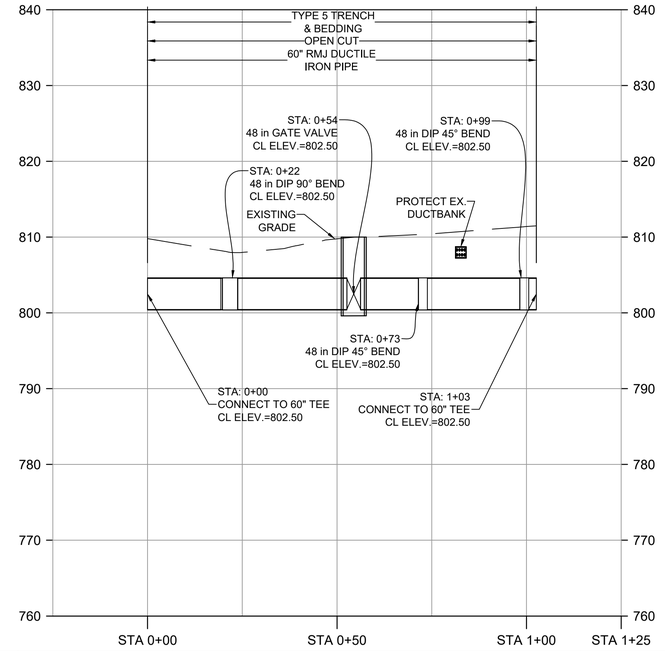
5. YARD PIPING SHALL MAINTAIN EIGHTEEN (18) INCHES VERTICAL CLEARANCE FROM NON-POTABLE PIPELINES, TWENTY-FOUR (24) INCHES FROM ANY EXISTING GAS MAIN GREATER THAN TWO (2) INCHES, AND THIRTY-SIX (36) INCHES FROM ANY EXISTING PERPENDICULAR CROSSING OF GRAVITY AND FORCE MAINS. (MEASURED FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.)

20 0 10 20 40

(IN FEET)
1 inch = 20 ft.







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RESURGENS ATLANTA, GA.

CITY OF ATLANTA DEPARTMENT OF watershed management

No.	Description	Date

No.	Description	Date

PROJECT NO:	TASK_13
DESIGNED BY:	A.T.
DRAWN BY:	J.J.
CHECKED BY:	G.A.
DATE:	06/12/18
SCALE:	AS NOTED

CITY OF ATLANTA DEPT. OF WATERSHED MANAGEMENT
WATER SUPPLY PROGRAM

RIVER INTAKE PUMP STATION

YARD PIPING
PLAN & PROFILE

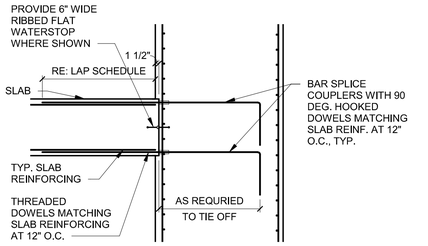
DRAWING NO.

RI-PS

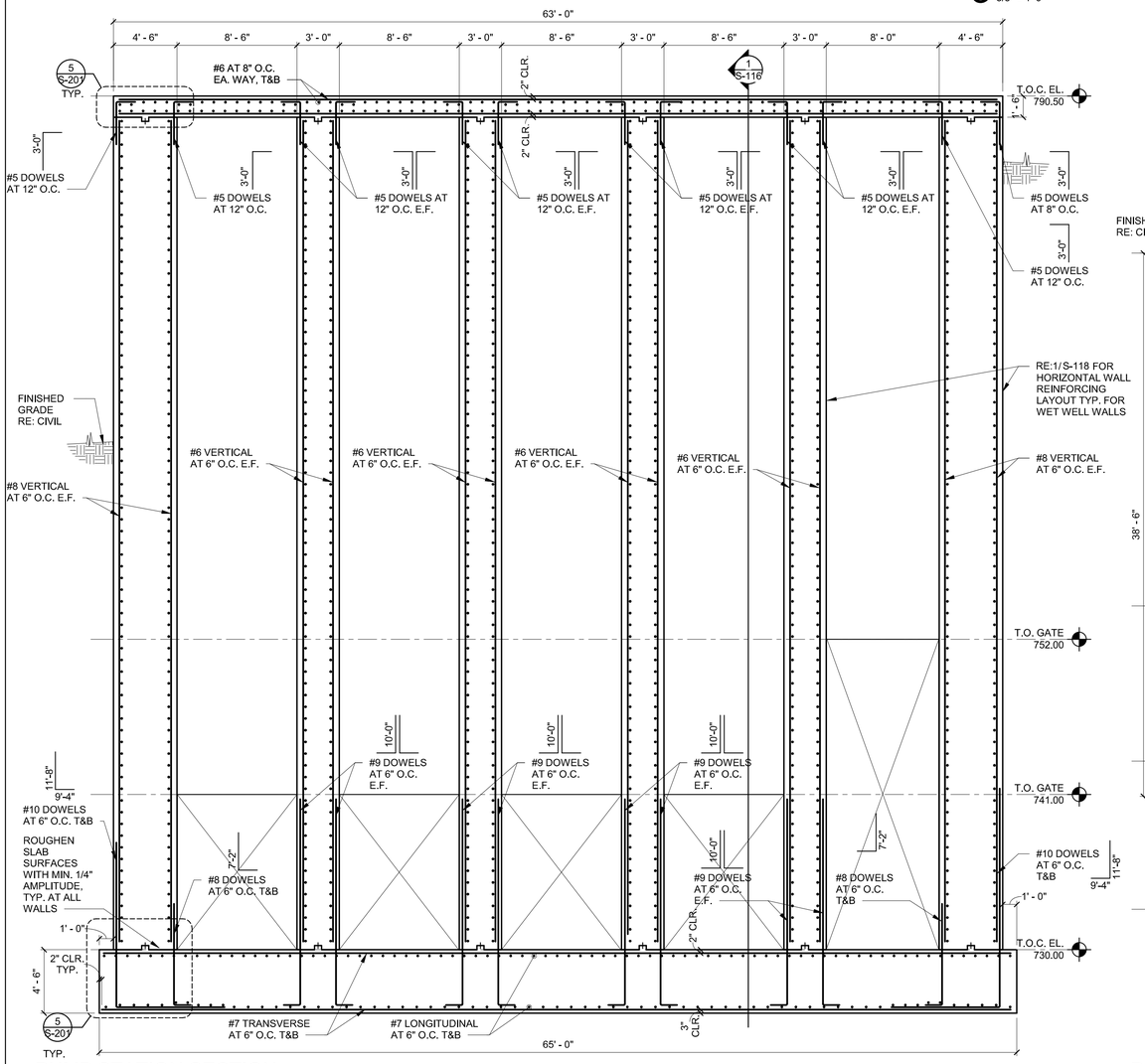
DS1-008B

SHEET OF

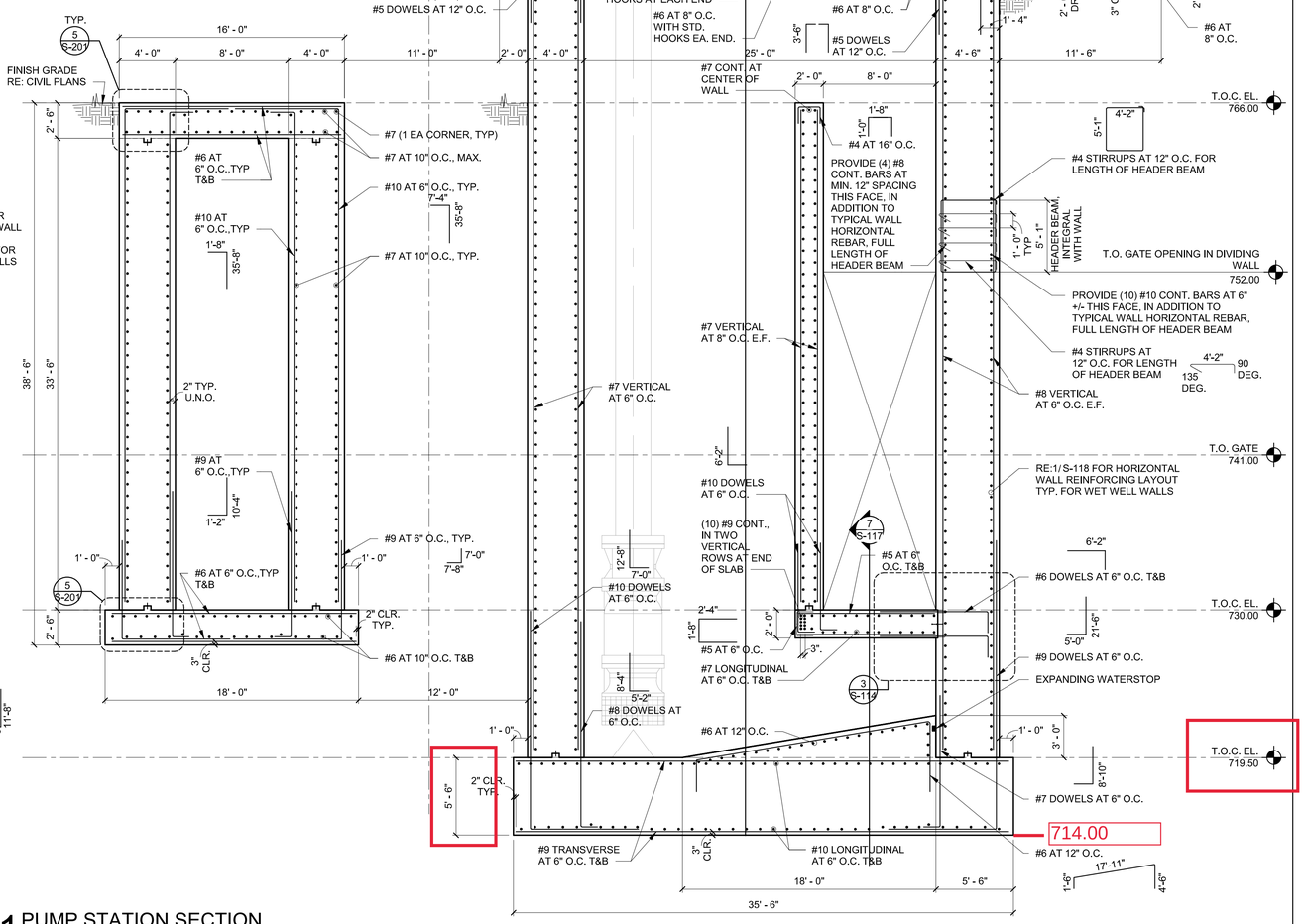
ISSUED FOR BIDDING



3 SLAB/ WALL INTERSECTION
3/8" = 1'-0"



2 PUMP STATION SECTION
3/16" = 1'-0"



1 PUMP STATION SECTION
3/16" = 1'-0"

Wallace Engineering
Structural Consultants, Inc.

Structural and Civil Consultants
887 West Marietta Street NW, Suite G
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value ▪ innovation ▪ results

CITY OF ATLANTA DEPARTMENT OF watershed management

No.	Description	Date

GEORGIA REGISTERED No. 037288 PROFESSIONAL ENGINEER SARAH A. APPLETON
2018.06.12 13:18:55-04'00'

PROJECT NO:	1790066
DESIGNED BY:	WJM
DRAWN BY:	JJM
CHECKED BY:	ALM
DATE:	6-12-2018
SCALE:	As indicated

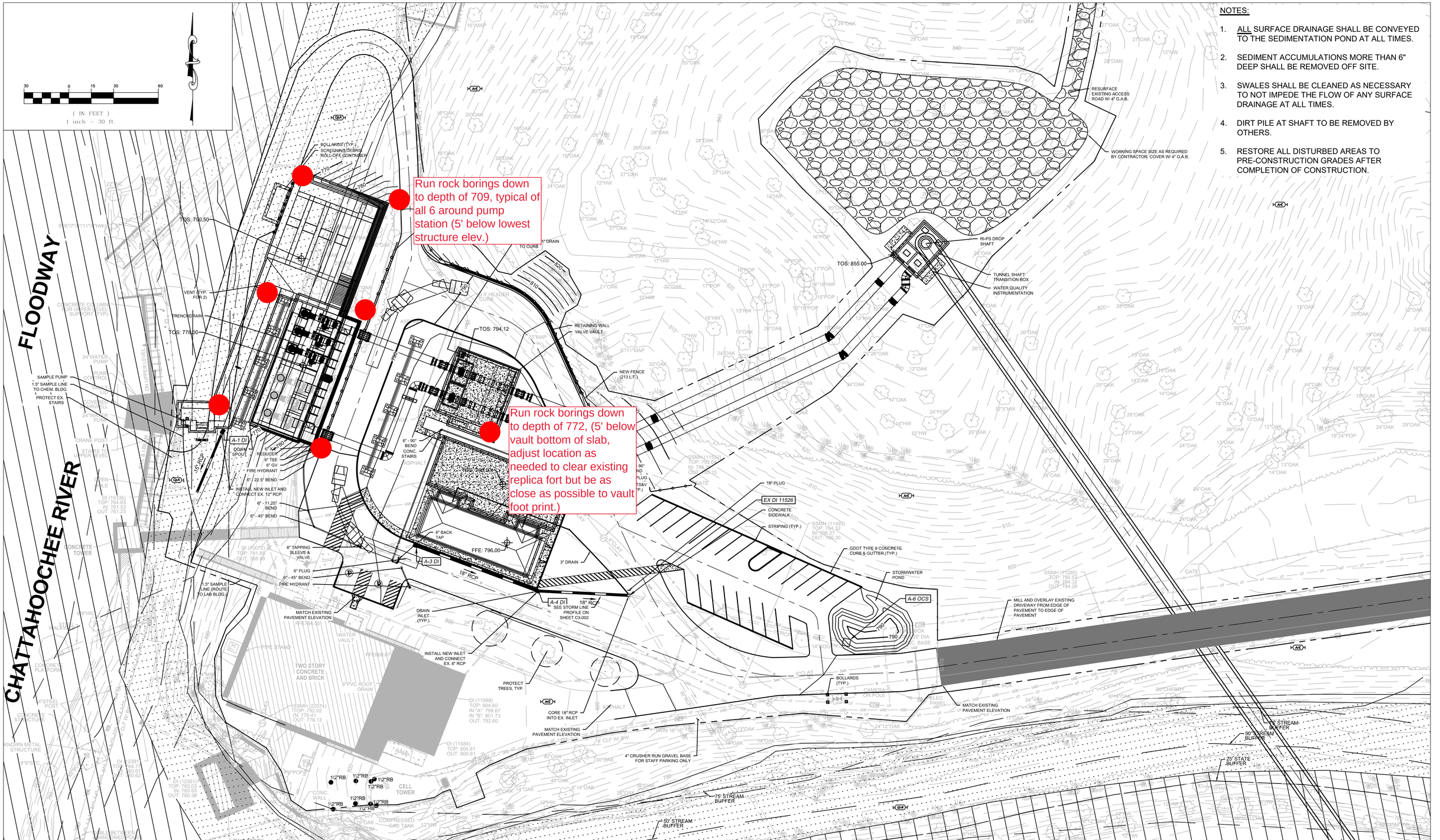
CITY OF ATLANTA DEPT. OF WATERSHED MANAGEMENT
WATER SUPPLY PROGRAM - Phase 1

RIVER INTAKE PUMP STATION
PUMP STATION BUILDING SECTIONS

DRAWING NO.
RI-PS
S-114
SHEET OF

6/12/2018 12:04:45 PM

ISSUED FOR BIDDING



NOTES:

1. ALL SURFACE DRAINAGE SHALL BE CONVEYED TO THE SEDIMENTATION POND AT ALL TIMES.
2. SEDIMENT ACCUMULATIONS MORE THAN 6" DEEP SHALL BE REMOVED OFF SITE.
3. SWALES SHALL BE CLEANED AS NECESSARY TO NOT IMPEDE THE FLOW OF ANY SURFACE DRAINAGE AT ALL TIMES.
4. DIRT PILE AT SHAFT TO BE REMOVED BY OTHERS.
5. RESTORE ALL DISTURBED AREAS TO PRE-CONSTRUCTION GRADES AFTER COMPLETION OF CONSTRUCTION.

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jp2 value ▪ innovation ▪ results

RESURGENS ATLANTA GA. 2001

CITY OF ATLANTA DEPARTMENT OF watershed management

No.	Description	Date

No.	Description	Date

PROJECT NO:	TASK_13
DESIGNED BY:	A.T.
DRAWN BY:	J.J.
CHECKED BY:	G.A.
DATE:	06/12/18
SCALE:	AS NOTED

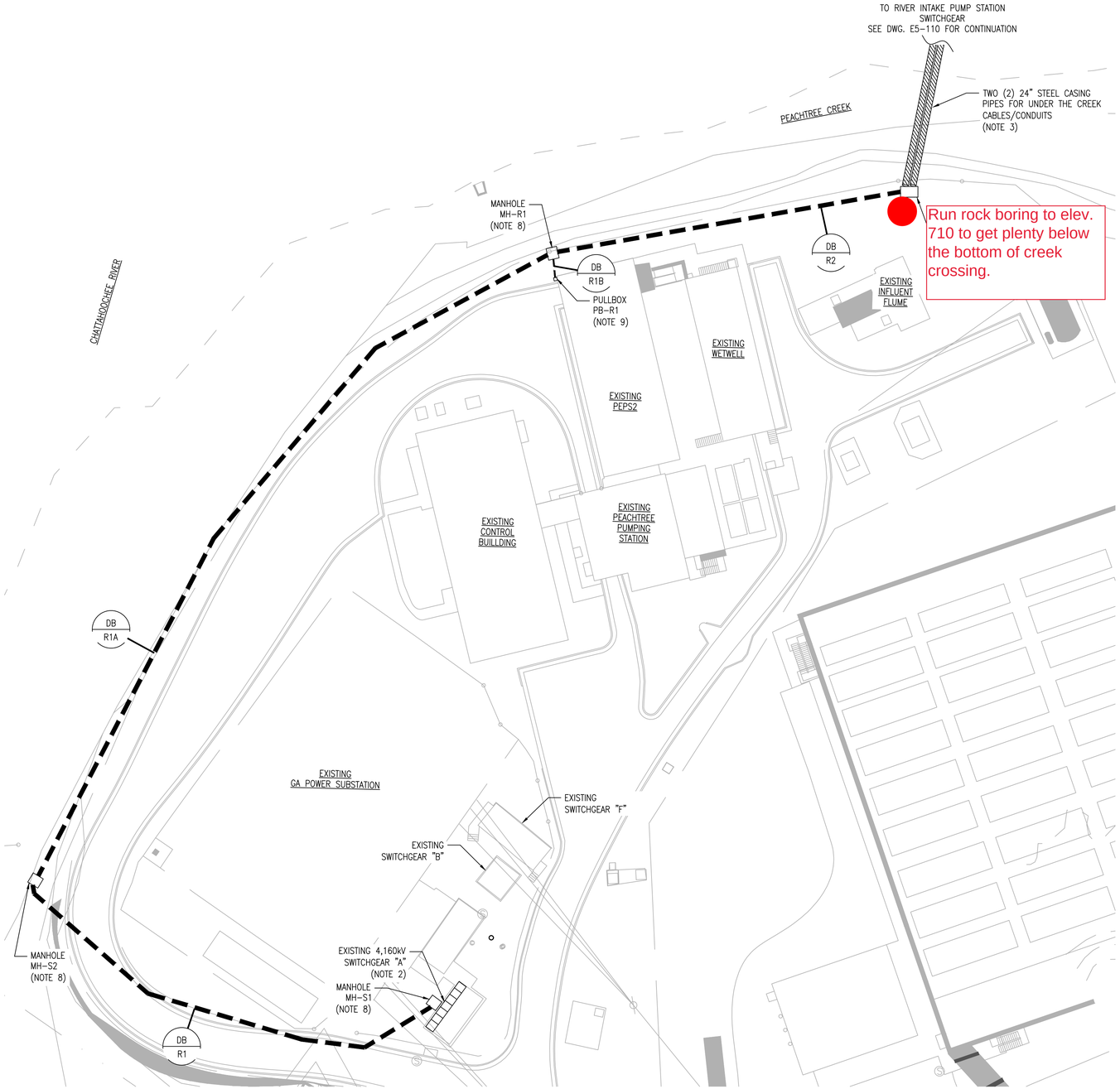
CITY OF ATLANTA DEPT. OF WATERSHED MANAGEMENT
WATER SUPPLY PROGRAM

RIVER INTAKE PUMP STATION

RIVER INTAKE
PROPOSED SITE PLAN

DRAWING NO.
RI-PS
C1-008
SHEET OF

ISSUED FOR BIDDING



1 EXISTING PECHTREE PS ELECTRICAL PLAN
SCALE: 1" = 30'

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

NOTES:

1. CONTRACTOR SHALL RUN AN UNDERGROUND CONCRETE ENCASED DUCT BANKS AS SHOWN. THE ROUTING SHALL BE COORDINATED WITH UNDERGROUND UTILITIES TO AVOID ANY INTERFERENCES. THE DUCTBANK DEPTH SHALL BE ADJUSTED AS NEEDED TO AVOID ANY CONFLICTS WITH EXISTING UTILITIES. THE EXACT LOCATION AND NUMBER OF MANHOLES SHALL BE ADJUSTED IN THE FIELD AS NEEDED.
2. CONTRACTOR SHALL PROVIDE AND INSTALL ALL NECESSARY CONDUITS, PULLBOXES, SUPPORTS AND ANY OTHER HARDWARE REQUIRED FOR 5kV POWER CABLES CONNECTION TO TWO (2) 1,200 AMP CURCUIT BREAKERS IN EXISTING SWITCHGEAR "A".
3. CONTRACTOR SHALL PROVIDE AND INSTALL TWO (2) 24" STEEL CASING PIPES BETWEEN MANHOLES MH-R2 AND MH-R3 WITH FIVE (5) 5" CONDUITS EACH SEPARATED BY SPACERS. THE SPACERS SHALL PROVIDE SMOOTH INSTALLATION AND REMOVAL OF EACH CONDUIT. USE DIRECT BORING TO GO UNDER PEACHTREE CREEK. THE STEEL CASING DEPTH SHALL BE ADJUSTED AS NEEDED TO AVOID ANY CONFLICTS WITH EXISTING UTILITIES. THE EXACT LOCATION AND NUMBER OF MANHOLES SHALL BE ADJUSTED IN THE FIELD AS NEEDED.
4. ALL UNDERGROUND DUCTBANKS UNDER THE ROADS AND PARKING AREAS SHALL BE CONCRETE ENCASED AND STEEL REINFORCED. EACH DUCTBANK SHALL HAVE #4/0 BARE COPPER GROUND WIRE (NOT SHOWN FOR CLARITY).
5. THE CONTRACTOR SHALL DISCONNECT AND DEMOLISH EXISTING HIGH SERVICE PUMPS HSP-1 AND HSP-2 AND ALL ASSOCIATED INSTALLATION HARDWARE, CABLES AND CONDUITS. COORDINATE WITH OWNER FOR DISPOSAL OF THE REMOVED EQUIPMENT.
6. CONTRACTOR SHALL PROVIDE AND INSTALL UNDERGROUND PULLBOX SIZED IN ACCORDANCE WITH NEC ARTICLE 314.28. SEE DWG. EG-002 DETAIL "A" FOR UNDERGROUND PULLBOX DETAILS.
7. SEE DWG. E5-001 FOR DUCTBANK SECTIONS.
8. SEE DWG. EG-004, DETAIL "B" FOR MANHOLE DETAILS.
9. CONTRACTOR SHALL PROVIDE AND INSTALL A NEMA 4X RATED PULLBOX MOUNTED ON THE WALL RUN CONDUITS FROM PB-R1 TO THE EXISTING CONTROL PANEL CP-10-101 EXPOSED ALONG THE WALL AFTER ENTERING THE BUILDING. CONTRACTOR SHALL PROPERLY SEAL ALL WALL PENETRATIONS TO BE WATERTIGHT.
10. SEE NOTES 9, 10 AND 12 ON DWG. E6-102.

LEGEND:

- – CONCRETE ENCASED UNDERGROUND DUCTBANK (DETAIL D, DWG. EG-002)
- – 18" STEEL CASING PIPE FOR MEDIUM VOLTAGE CONDUITS

A-101 MAIN BREAKER #1	A-101 AUXILIARY LINE VT'S & CPT	A-202 PEPS1 SWGR PUMP #1	SPACE HEATER	SPACE HEATER	A-702 PEPS1 SWGR PUMP #2	A-701 4MCC-1H PUMP #4	CPT-S	A-901 MAIN BREAKER #2
METERING	A-302 FINISHED WATER SWGR PUMP #1	A-201 WATER QUALITY LAB (NOTE 2)	A-401 TIE BREAK	A-502 TIE BREAKER	A-801 STEAM PLANT	1200A SPARE (NOTE 2)	A-602 FINISHED WATER SWGR PUMPS #2/3	METERING

2 EXISTING SWITCHGEAR "A" (10-SWGR-101) LAYOUT

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jp2 value ▪ innovation ▪ results

PRESURGENS ATLANTA, GA

CITY OF ATLANTA DEPARTMENT OF watershed management

No.	Description	Date

No.	Description	Date

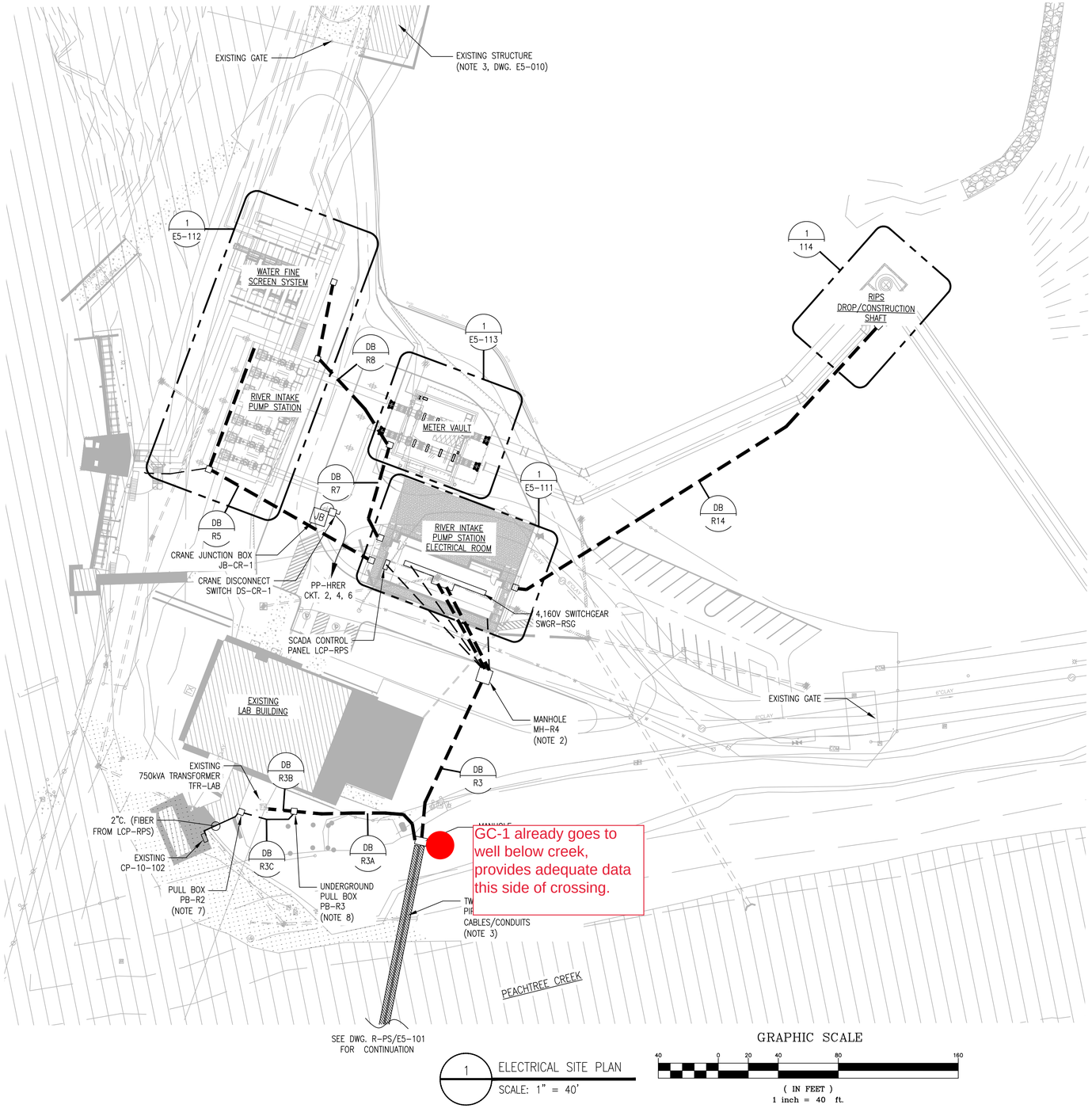
PROJECT NO:	TASK 1
DESIGNED BY:	RV
DRAWN BY:	RV
CHECKED BY:	AZ
DATE:	6-12-2018
SCALE:	N.T.S.

CITY OF ATLANTA DEPT. OF WATERSHED MANAGEMENT
WATER SUPPLY PROGRAM - Phase 1

RIVER INTAKE PUMP STATION
EXISTING PEACHTREE PS
ELECTRICAL SITE PLAN

DRAWING NO.
RI-PS
E5-101
SHEET OF

ISSUED FOR BIDDING



1 ELECTRICAL SITE PLAN
SCALE: 1" = 40'

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

NOTES:

1. CONTRACTOR SHALL RUN AN UNDERGROUND CONCRETE ENCASED DUCT BANKS AS SHOWN. THE ROUTING SHALL BE COORDINATED WITH UNDERGROUND UTILITIES TO AVOID ANY INTERFERENCES. THE DUCT BANK DEPTH SHALL BE ADJUSTED AS NEEDED TO AVOID ANY CONFLICTS WITH EXISTING UTILITIES. THE EXACT LOCATION AND NUMBER OF MANHOLES SHALL BE ADJUSTED IN THE FIELD AS NEEDED.
2. SEE DRAWING EG-004, DETAIL "B" FOR MANHOLE DETAILS.
3. SEE DRAWING E5-101 NOTE 3 FOR MORE DETAILS.
4. ALL UNDERGROUND DUCTBANKS UNDER THE ROADS AND PARKING AREAS SHALL BE CONCRETE ENCASED AND STEEL REINFORCED. EACH DUCT BANK SHALL HAVE #4/0 BARE COPPER GROUND WIRE (NOT SHOWN FOR CLARITY).
5. 4,160V INCOMING POWER CONDUITS SHALL BE CONCRETE ENCASED UNDER THE BUILDING SLAB. COORDINATE THE EXACT CONDUITS ELEVATION WITH THE STRUCTURAL DRAWINGS.
6. SEE DWG. E5-001 FOR DUCT BANK SECTIONS.
7. CONTRACTOR SHALL PROVIDE AND INSTALL A NEMA 4X RATED PULLBOX MOUNTED ON THE BUILDING WALL. RUN CONDUITS FROM PB-R2 TO THE EXISTING CONTROL PANEL CP-10-102 EXPOSED ALONG THE OUTSIDE WALL. CONTRACTOR SHALL PROPERLY SEAL ALL WALL PENETRATIONS TO BE WATERTIGHT.
8. CONTRACTOR SHALL PROVIDE AND INSTALL UNDERGROUND PULL BOX SIZED IN ACCORDANCE WITH NEC ARTICLE 314.28. SEE DWG. EG-002 DETAIL "A" FOR UNDERGROUND PULLBOX DETAILS.
9. CONTRACTOR SHALL COORDINATE THE EXACT CRANE JUNCTION BOX LOCATION WITH APPROVED SHOP DRAWINGS.

LEGEND:

- – CONCRETE ENCASED UNDERGROUND DUCT BANK (DETAIL D, DWG. EG-002)
- – 18" STEEL CASING PIPE FOR MEDIUM VOLTAGE CONDUITS

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jp² value ▪ innovation ▪ results

22 SURGEONS ATLANTA GA 2018

CITY OF ATLANTA DEPARTMENT OF watershed management

No.	Description	Date

No.	Description	Date

PROJECT NO:	TASK 1
DESIGNED BY:	RV
DRAWN BY:	RV
CHECKED BY:	AZ
DATE:	6-12-2018
SCALE:	N.T.S.

CITY OF ATLANTA DEPT. OF WATERSHED MANAGEMENT
WATER SUPPLY PROGRAM - Phase 1

RIVER INTAKE PUMP STATION
ELECTRICAL SITE PLAN

DRAWING NO.
RI-PS
E5-110
SHEET OF

ISSUED FOR BIDDING

APPENDIX VI

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

Vol 4 Additional Information

River Intake Pump Station

Part 3 Continued

EXCERPT

WILLMER Engineering

SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION

City of Atlanta
Chattahoochee Water Treatment Plant Improvements
Atlanta, Fulton County, Georgia

September 18, 2018

Submitted to:
R2T, Inc.
580 W. Crossville Road
Suite 101
Roswell, GA 30075

Submitted by:
Willmer Engineering Inc.
Project No. 71.4311

WILLMER
Engineering

September 18, 2018

VIA EMAIL

Mr. David Pressler, PE
R2T, Inc.
580 W. Crossville Road
Suite 101
Roswell, Georgia 30075

SUBJECT: **Subsurface Exploration and Geotechnical Engineering Evaluation**
City of Atlanta Chattahoochee Water Treatment Plant Improvements
Atlanta, Fulton County, Georgia
Willmer Project No. 71.4311

Dear Mr. Preissler:

Willmer Engineering Inc. (Willmer) is pleased to provide this report of subsurface exploration and geotechnical engineering evaluation for the proposed City of Atlanta Chattahoochee Water Treatment Plant Improvements project, located in Atlanta, Fulton County, Georgia. This work was performed in general accordance with our Subconsultant Agreement dated July 23, 2018.

This report presents our understanding of the proposed development, the results of our geotechnical exploration, analyses, and evaluation, and our recommendations for the design and construction of the proposed improvements.

This engineering report is divided into five sections. Section 1 contains the project background information and provides a summary of the objectives and scope of our work. Summaries of the field exploration and laboratory testing programs are provided in Sections 2 and 3, respectively. Section 4 presents a description of the site and regional geologic conditions, and a description of the subsurface conditions based on the results of the field exploration and laboratory testing programs. The results of our geotechnical engineering evaluations and our recommendations are provided in Section 5.

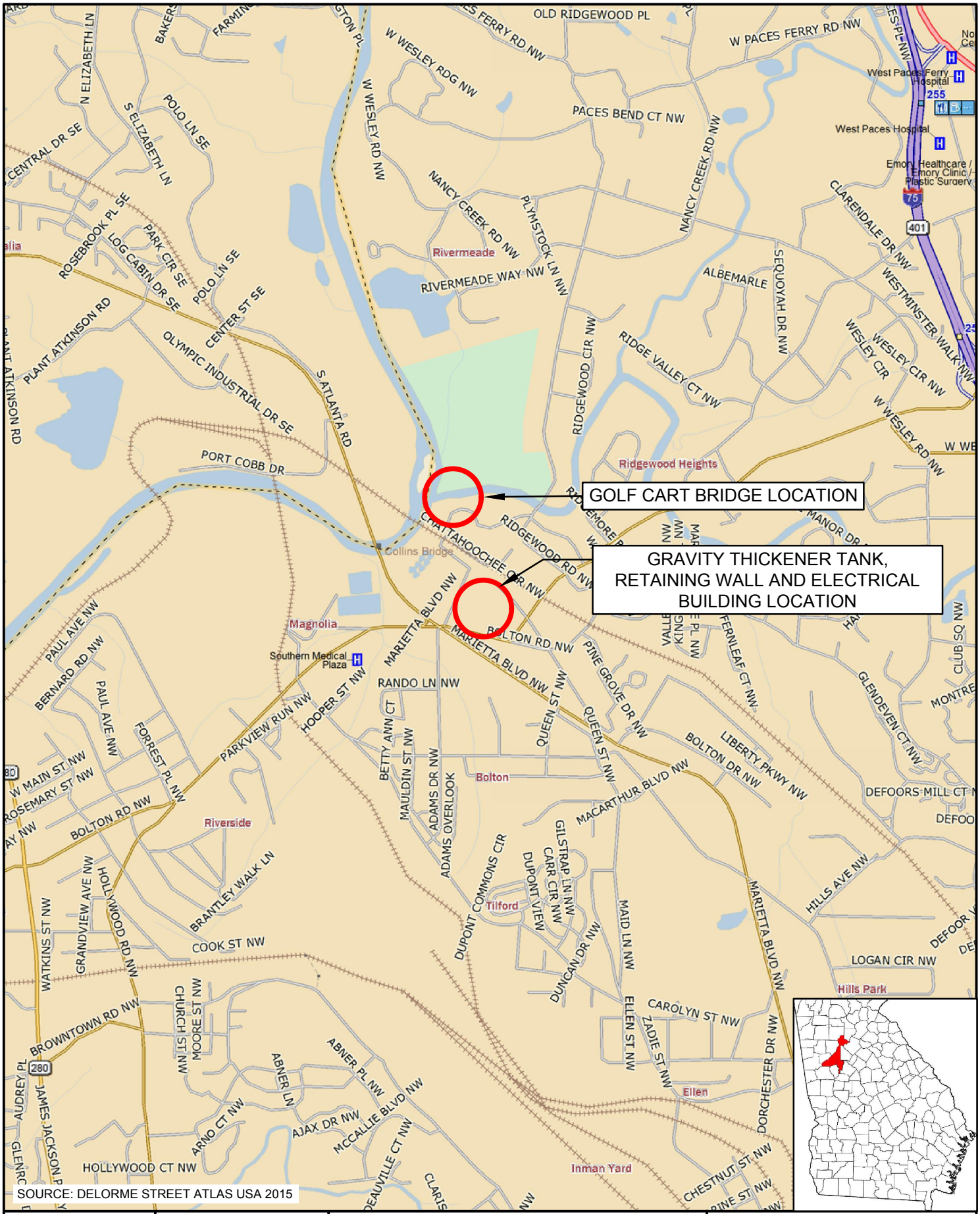
We greatly appreciate the opportunity to be of service to you on this project. Please contact us if you have any questions concerning this report or require further assistance.

Sincerely,
WILLMER ENGINEERING INC.

G. Bradford Drew, PE
Project Engineer

Sujit K. Bhowmik, PhD, PE
Chief Engineer

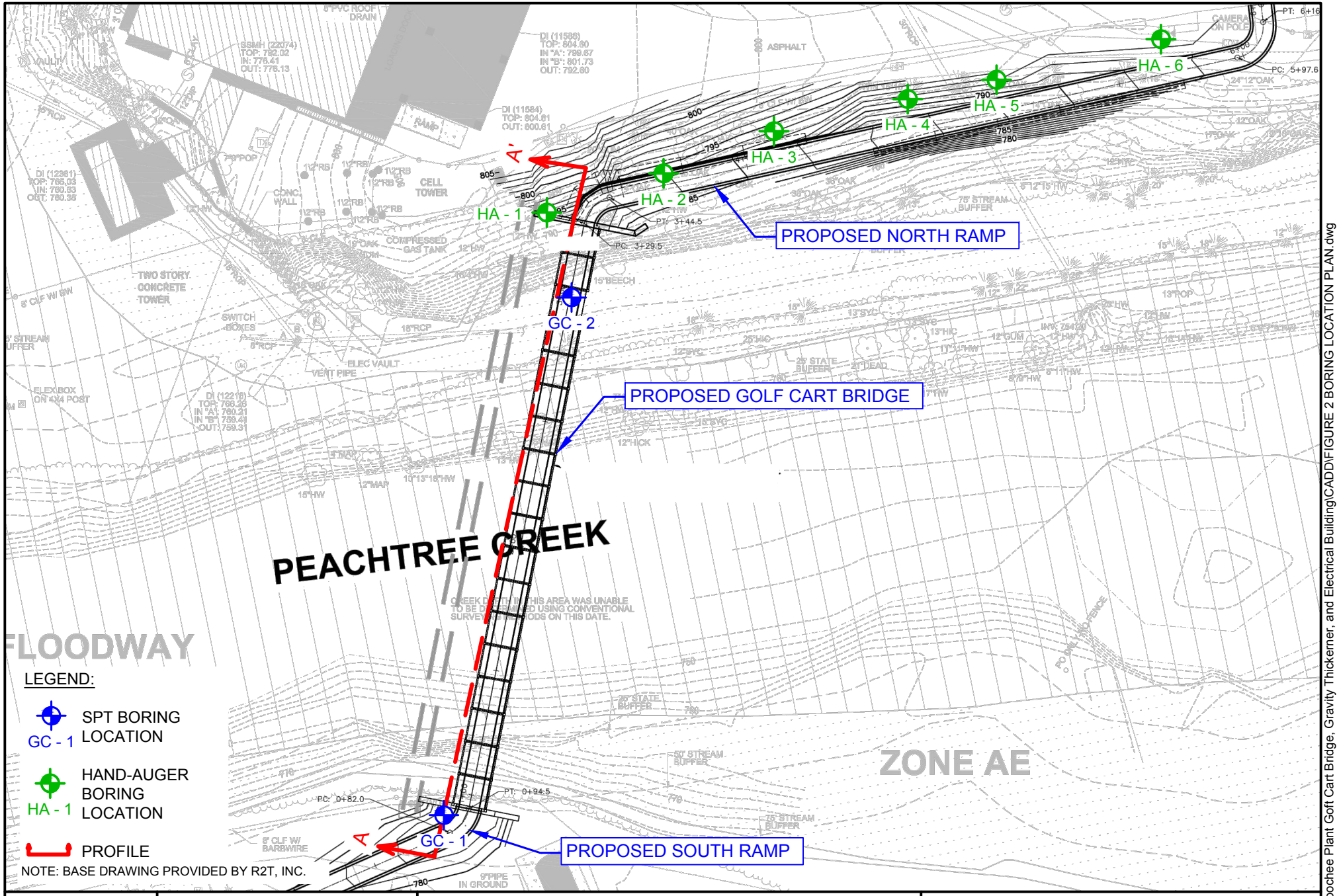
James L. Willmer, P.E.
James L. Willmer, PE
Executive Vice President/Principal Consultant



SOURCE: DELORME STREET ATLAS USA 2015

SCALE: 1" = 2000'	WILLMER Engineering	GEOTECHNICAL ENGINEERING CONSTRUCTION SERVICES ENVIRONMENTAL SERVICES AND ENGINEERING 3772 PLEASANTDALE ROAD - SUITE 165 ATLANTA, GA 30340-4270	FIGURE 1 PROJECT LOCATION MAP CHATTAHOOCHEE WATER TREATMENT PLANT IMPROVEMENTS ATLANTA, FULTON COUNTY, GEORGIA WILLMER PROJECT No.71.4311
DATE: 9/4/2018			
DRAWN BY: DS			
REVIEWED BY: BD			

P:\4311 Chattahoochee Plant Goft Cart Bridge, Gravity Thickerner, and Electrical Building\CADD\FIGURE 1 PROJECT LOCATION MAP.dwg



SCALE: 1" = 50'	
DATE: 9/18/2018	
DRAWN BY: DS	
REVIEWED BY: BD	

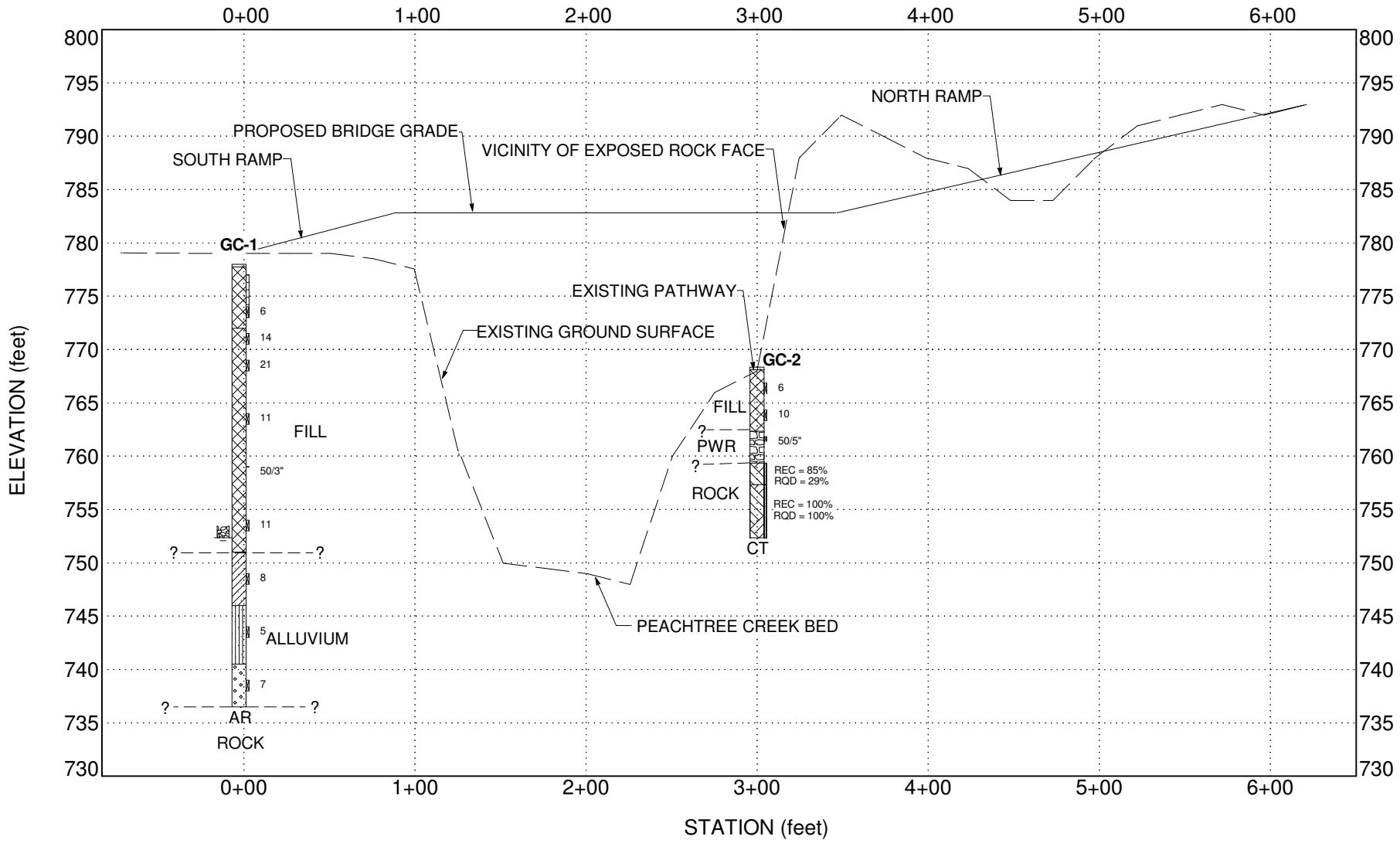
WILLMER Engineering

GEOTECHNICAL ENGINEERING ¤ CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

FIGURE 2A

BORING LOCATION PLAN (GOLF CART BRIDGE)
CHATTAHOOCHEE WATER TREATMENT PLANT IMPROVEMENTS
ATLANTA, FULTON COUNTY, GEORGIA
WILLMER PROJECT No. 71.4311

P:\4311 Chattahoochee Plant Goft Cart Bridge, Gravity Thickener, and Electrical Building\CADD\FIGURE 2 BORING LOCATION PLAN.dwg



LEGEND:

- Caved Depth @ Time of Boring
PWR - Partially Weathered Rock
AR - Auger Refusal
CT - Coring Terminated

SCALE: H: 1" = 80' V: 1" = 15' DATE: 9/12/2018 DRAWN BY: BD REVIEWED BY: SKB	WILLMER Engineering	GEOTECHNICAL ENGINEERING | CONSTRUCTION SERVICES ENVIRONMENTAL SERVICES AND ENGINEERING 3772 PLEASANTDALE ROAD - SUITE 165 ATLANTA, GA 30340-4270	FIGURE 3A SOIL PROFILE A-A' SUBSURFACE EXPLORATION AND GEOTECHNICAL EVALUATION CHATTAHOOCHEE PLANT - GOLF CART BRIDGE ATLANTA, FULTON COUNTY, GEORGIA WILLMER PROJECT No. ATL-71.4311

WILLMER Engineering

Project: **Chattahoochee Water Treatment Plant Improvements**
Location: **City of Atlanta, Fulton County, Georgia**
Project Number: **ATL-71.4311**

HOLE No. GC-1

Sheet 1 of 1
Location: **SEE FIGURE 2**

Azimuth: **--** Angle from Horizontal: **90** Surface Elevation (ft): **778.00** Station: **0+85.00**
Drilling Equipment: **DIEDRICH D-50** Drilling Method: **HSA with SPT (Automatic Hammer)**
Core Boxes: **NA** Samples: **10** Overburden (ft): **41.5** Rock (ft): **NA** Total Depth (ft): **41.5**
Logged By: **JRD** Date Drilled: **7/27/18**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
0				TOPSOIL = 3"	CL	
	BULK			FILL: Firm brown medium to fine sandy **CLAY**	778.0	
5	SS				775	6
	SS			Medium dense brown clayey medium to fine **SAND** with rock fragments	SC	14
	SS				770	21
10						
	SS				765	11
15						
	SS			- N-value amplified from rock fragments	760	50/3"
20						
	SS				755	11
25						
				ALLUVIUM: Stiff brown medium to fine sandy **CLAY**	CL	
30	SS				750	8
				Firm brown medium to fine sandy **SILT**	ML	
35	SS				745	5
				Loose tan and brown coarse to fine **SAND**	SW	
40	SS				740	7
				Auger refusal was encountered at 41.5 feet below the existing ground surface.		
45					735	
				Bulk sample was taken from a depth of 1 to 5 feet below the existing ground surface.		
50					730	
				The boring caved at 26 feet below the existing ground surface at the time of boring completion.		
55					725	

STANDARD PENETRATION TEST DATA (blows/foot)
5 10 20 40 60 80

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **GC-1**

SPTN CHATTAHOOCHEE TREATMENT PLANT- GOLF CART BRIDGE , GRAVITY THICKENER, RETAINING WALL, AND ELECTRICAL BUILDING.GPJ 9/18/18

WILLMER Engineering

Project: **Chattahoochee Water Treatment Plant Improvements**
Location: **City of Atlanta, Fulton County, Georgia**
Project Number: **ATL-71.4311**

HOLE No. GC-2

Sheet 1 of 1
Location: **SEE FIGURE 2**

Azimuth: **--** Angle from Horizontal: **90** Surface Elevation (ft): **768.00** Station: **3+25.00**
Drilling Equipment: **DIEDRICH D-50** Drilling Method: **HSA with SPT (Automatic Hammer)**
Core Boxes: **1** Samples: **3** Overburden (ft): **9** Rock (ft): **7** Total Depth (ft): **16.0**
Logged By: **JRD** Date Drilled: **7/27/18**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
0				TOPSOIL = 3" **SC**	768.0	
	SS			FILL: Loose brown and grey clayey medium to fine **SAND** with rock fragments and root material		6
5	SS				765	10
	SS			PARTIALLY WEATHERED ROCK: Sampled as very dense grey and tan clayey medium to fine **SAND** with rock fragments **PWR**	760	50/5"
10	NQ	85	29	ROCK: Medium to soft light grey and pink medium to coarse grained **GRANITE**	755	
	NQ	100	100			
15				Medium to soft light grey and pink medium to coarse grained **GRANITE**	750	
20				Auger refusal was encountered at 9 feet below the existing ground surface. Coring was terminated at 16 feet below the existing ground surface.	745	
25				No groundwater was encountered at the time of boring completion.	740	
30					735	
35					730	
40					725	
45					720	
50					715	
55						

STANDARD PENETRATION TEST DATA (blows/foot)
5 10 20 40 60 80

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

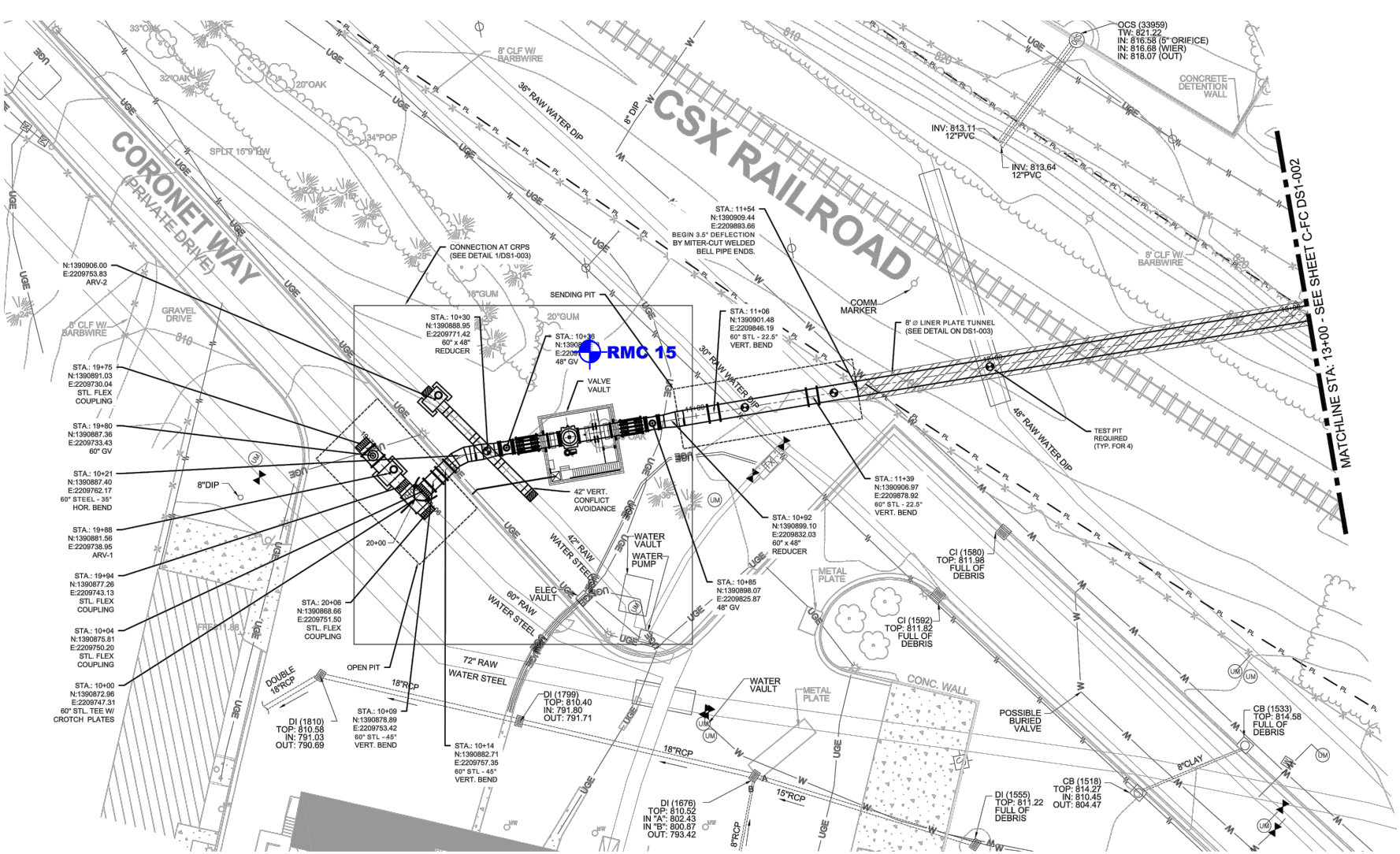
Hole No. **GC-2**

SPTN CHATTAHOOCHEE TREATMENT PLANT- GOLF CART BRIDGE , GRAVITY THICKENER, RETAINING WALL, AND ELECTRICAL BUILDING.GPJ 9/18/18

Run #1
Depth: 9’-11’
Recovery = 85%
RQD = 29%

Run #2
Depth: 11’-16’
Recovery = 100%
RQD = 100%

Rock Core Obtained from GC-2 (9’ – 16’)



LEGEND:

RMC 15 — BORING LOCATION

BACKGROUND IMAGE SOURCE: DRAWING C-FC DS1-001 PROVIDED BY R2T

SCALE: 1" = 50'	WILLMER Engineering	GEOTECHNICAL ENGINEERING ▫ CONSTRUCTION SERVICES ENVIRONMENTAL SERVICES AND ENGINEERING 3772 PLEASANTDALE ROAD - SUITE 165 ATLANTA, GA 30340-4270
DATE: 2/1/2018		
DRAWN BY: JC		
REVIEWED BY: JS		

FIGURE 2
BORING LOCATION PLAN
VALVE VAULT
WATER SUPPLY PROGRAM
ATLANTA, FULTON COUNTY, GEORGIA
WILLMER PROJECT No. 71.4005

P:\4005 Raw Water Conveyance and Storage Improvements\CADD\Valve Vault\FIG 2 BORING LOCATION.dwg

WILLMER Engineering

Project: **City of Atlanta Water Supply Program - Phase II**
Location: **R.M. Clayton Plant, Atlanta, GA**
Project Number: **71.4005**

HOLE No. RMC-15

Sheet 1 of 1
Location: **See Figure 1**

Azimuth: **--** Angle from Horizontal: **90** Surface Elevation (ft): **810.00** Station: **N/A**
Drilling Equipment: **CME 550X** Drilling Method: **HSA Automatic Hammer**
Core Boxes: **N/A** Samples: **7** Overburden (ft): **25.0** Rock (ft): **N/A** Total Depth (ft): **25.0**
Logged By: **GH** Date Drilled: **8/18/16**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
0	SS			FILL: Very stiff red and brown medium to fine sandy **CLAY** with rock fragments	CL	810.0	27
5	SS			RESIDUUM: Very stiff red medium to fine sandy **CLAY**	CL	805	19
	SS						22
10	SS			- becomes mottled black		800	20
				Very stiff tan and red medium to fine sandy **CLAY** with rock fragments (slightly micaceous)	CL		
15	SS					795	17
				Firm brown and white (mottled black) medium to fine sandy **SILT**	ML		
20	SS					790	8
25	SS			PARTIALLY WEATHERED ROCK: Sampled as brown, white, and red silty medium to fine **SAND** with rock fragments	PWR	785	50/1"
30				Auger refusal was encountered at 25 feet below the existing ground surface.		780	
35				Groundwater was not encountered at the time of boring completion or 24 hours after boring completion.		775	
40						770	
45						765	
50						760	
55						755	

STANDARD PENETRATION TEST DATA (blows/foot)
5 10 20 40 60 80

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **RMC-15**

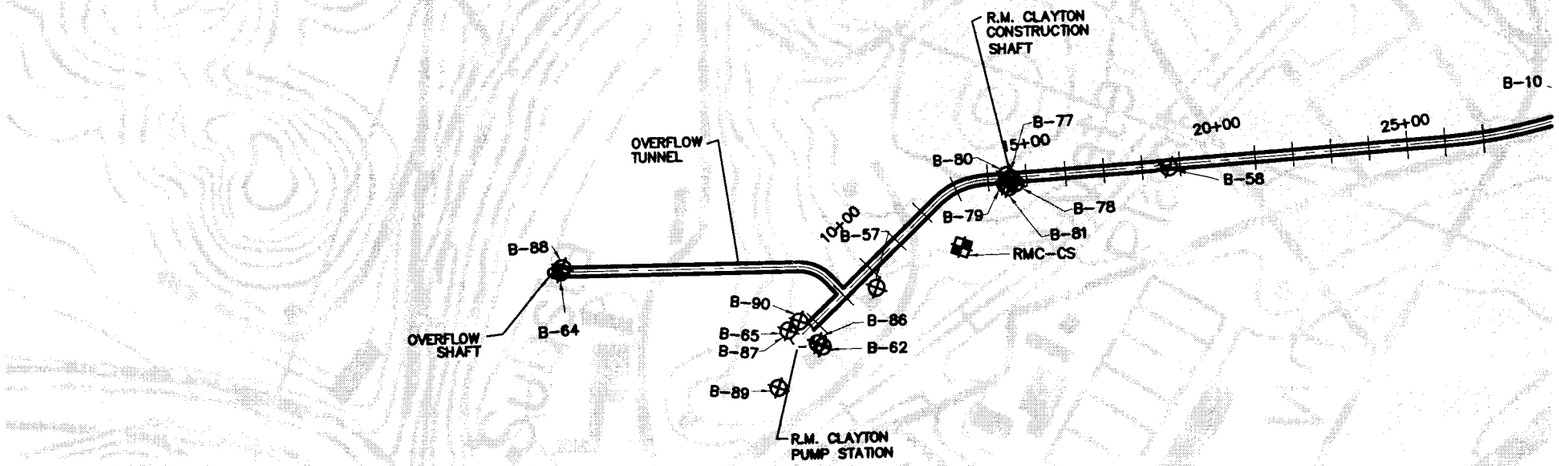
SPTN 4005 PHASE 2 LOGS.GPJ 9/2/16

Vol 4 Additional Information

River Intake Pump Station

Part 3 Continued

AT1142fig7C.dwg
12.11.03



DETAIL
FIG. 7-A
1"=400'

SYMBOL NO.	SYMBOL	
1	⊕	BORING ADVANCED TO TUNNEL DEPTH
2	⊕	BORING ADVANCED TO ROCK TERMINATES ABOVE TUNNEL
3	■	SOIL BORING

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 INCH = 400 FEET
(SCALE IS APPROXIMATE)

GHADEN

JDH
A Joint Venture
6801 Governors Lake Parkway
Norcross, Georgia 30071

WEST AREA COMBINED SEWER OVERFLOW (CSO) STORAGE TUNNEL FACILITIES

GEOTECHNICAL DATA REPORT
BORING SITE PLAN
NORTH AVENUE TUNNEL

DATE : DEC 2003
SCALE : 1"=400'
JOB NO.: 2061.042

FIGURE 7-C

Home

CORE BORING B-8
WEST AREA CSO STORAGE TUNNEL FACILITIES PROJECT
RECOVERY AND RQD MEASUREMENTS

Run Number	Depth (feet) Top of Run	Depth (feet) Bottom of Run	Feet Recovered Total	Feet Recovered Sum of Pieces >4"	Calculated Results Run Length	Calculated Results Recovery	Calculated Results RQD
1	60.0	66.0	5.8	0.0	6.0	97%	0%
2	66.0	76.0	9.9	8.1	10.0	99%	81%
3	76.0	86.0	10.0	9.1	10.0	100%	91%
4	86.0	96.0	10.0	8.5	10.0	100%	85%
5	96.0	106.0	10.0	7.4	10.0	100%	74%
6	106.0	116.0	10.0	7.6	10.0	100%	76%
7	116.0	126.0	9.8	7.1	10.0	98%	71%
8	126.0	136.0	10.0	8.4	10.0	100%	84%
9	136.0	146.0	9.9	8.7	10.0	99%	87%
10	146.0	156.0	9.9	7.9	10.0	99%	79%
11	156.0	166.0	10.0	8.4	10.0	100%	84%
12	166.0	176.0	9.9	7.9	10.0	99%	79%
13	176.0	186.0	10.0	8.9	10.0	100%	89%
14	186.0	196.0	9.8	9.7	10.0	98%	97%
15	196.0	200.0	3.7	3.7	4.0	93%	93%

Home

CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

(in feet)	Depth	Elev.				
Ground Level:	0.0	777.6	Station & Offset	NA 16+12		1809R
Bottom of Casing:	60.0	717.6	Dates Drilled:	8-Nov-01	to	8-Nov-01
Invert Level:	132.5	645.2	Angle&Bearing:	vertical		N/A
Bottom of Hole:	200.0	577.6	Method: HQ coring (triple tube)			
Water Level:	20.0	757.6	Version:	16-Oct-03		B-8

B-8

page 1

(all depths, heights, and elevations in feet)

Top (ft) | General Rock Description | Weathering Index (0 1 2 3 4) | Joint Count (per 3 ft) (0 4 8 12 16) | RQD / Recovery (100% 50% 0%) | Permeability (cm/sec) (10^{-6} 10^{-5} 10^{-4} 10^{-3} 10^{-2}) | Elevation | Hgt above Invert

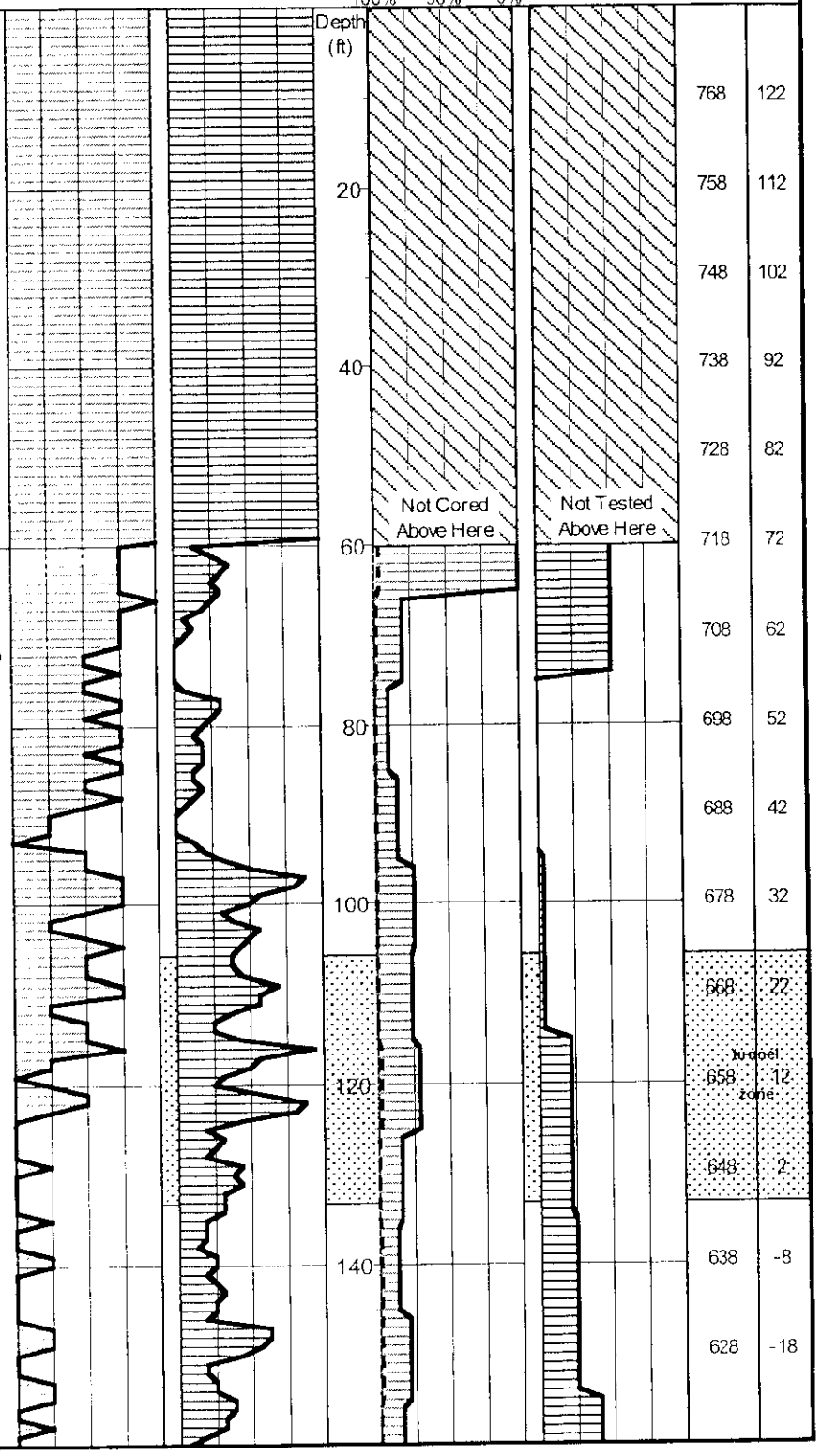
0 SOIL.

(auger refusal @ 60 ft)

60 WHITE MYLONITE, white to light gray; aphanitic to very fine grained, strong internal shearing fabric, dark gray to black compositional layers of BLACK MYLONITE up to 10 ft thick present at random spacing [comprise 15-20% of interval]; generally contains at least 2 high-angle joint sets plus partings along internal shearing fabric.

@ 60-120 ft: Transition Zone.

@ 109-110 ft: high-angle fracture set, slight weathering on surfaces.
@ 115-116 ft: foliation joint set.



Home

CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

(in feet)	Depth	Elev.				
Ground Level:	0.0	777.6	Station & Offset	NA 16+12		1809R
Bottom of Casing:	60.0	717.6	Dates Drilled:	8-Nov-01	to	8-Nov-01
Invert Level:	132.5	645.2	Angle&Bearing:	vertical		N/A
Bottom of Hole:	200.0	577.6	Method: HQ coring (triple tube)			
Water Level:	20.0	757.6	Version:	16-Oct-03		B-8

B-8
page 2

(all depths, heights, and elevations in feet)

Top (ft) | General Rock Description

cont

WHITE MYLONITE, (as described on previous page @ 60 ft).

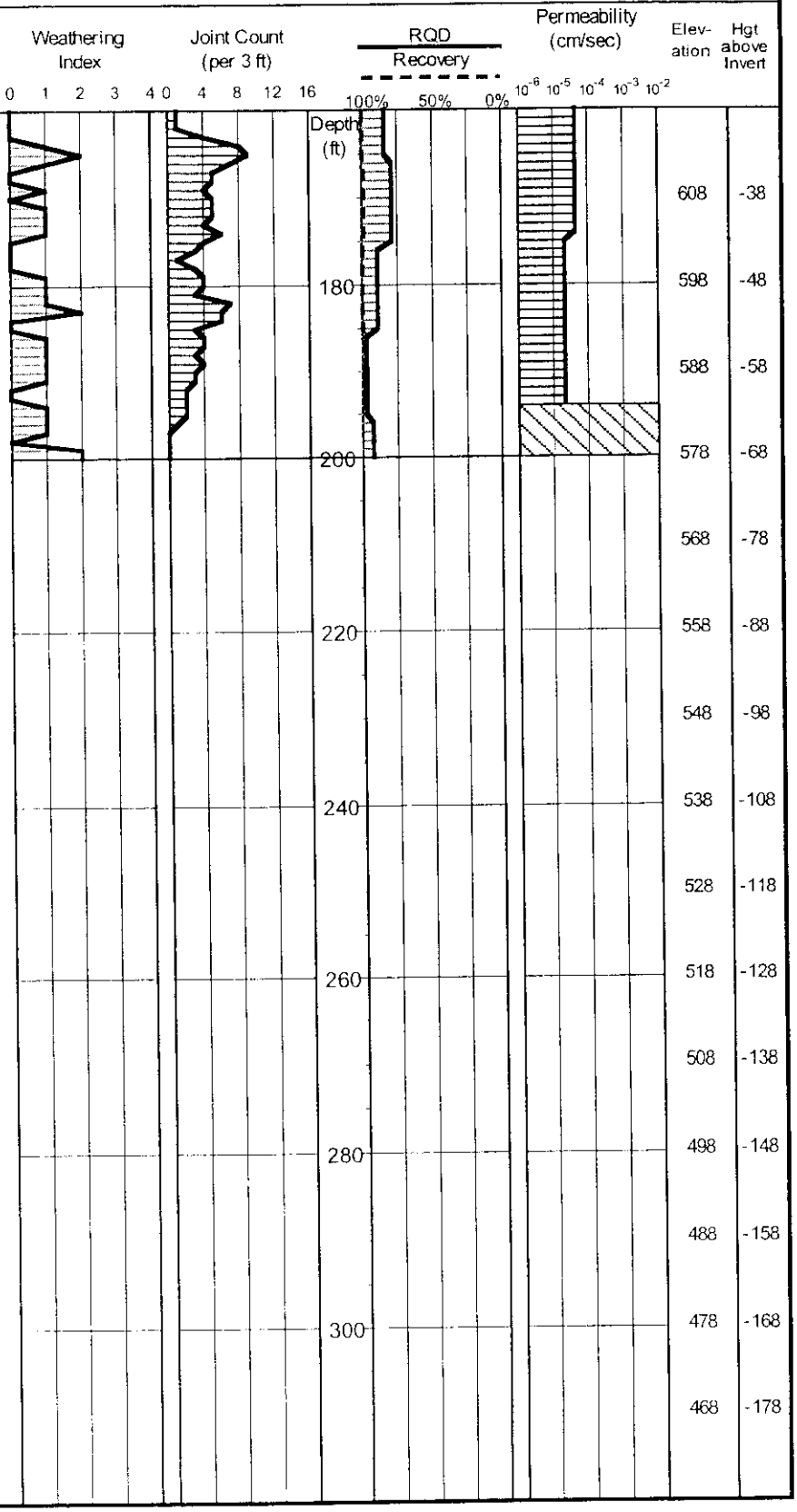
@ 165 ft: foliation joints.

@ 182-187 ft: foliation fracture, slight weathering on surfaces.

TOTAL DEPTH: 200 FT.

Notes:

(1) Borehole B-8 was formally designated as W-8 on the *City of Atlanta CSO Remedial measures Plan. CSO Pre-Design Report for the Consolidated Storage Tunnel Component* (May 2002).



Elevation	Hgt above Invert
608	-38
598	-48
588	-58
578	-68
568	-78
558	-88
548	-98
538	-108
528	-118
518	-128
508	-138
498	-148
488	-158
478	-168
468	-178

Home

CORE BORING B-57
WEST AREA CSO STORAGE TUNNEL FACILITIES PROJECT
RECOVERY AND RQD MEASUREMENTS

Run Number	Depth (feet) Top of Run	Bottom of Run	Feet Recovered Total	Sum of Pieces >4"	Calculated Results Run Length	Recovery	RQD
1	41.7	45.9	3.8	2.4	4.2	90%	57%
2	45.9	55.9	9.6	7.6	10.0	96%	76%
3	55.9	65.9	10.0	9.5	10.0	100%	95%
4	65.9	75.9	10.0	10.0	10.0	100%	100%
5	75.9	85.9	10.0	10.0	10.0	100%	100%
6	85.9	95.9	10.0	9.8	10.0	100%	98%
7	95.9	105.9	10.0	9.4	10.0	100%	94%
8	105.9	115.9	10.0	10.0	10.0	100%	100%
9	115.9	125.9	10.0	10.0	10.0	100%	100%
10	125.9	135.9	10.0	8.5	10.0	100%	85%
11	135.9	145.9	10.0	10.0	10.0	100%	100%
12	145.9	155.9	10.0	9.1	10.0	100%	91%
13	155.9	165.9	10.0	9.0	10.0	100%	90%
14	165.9	175.9	10.0	9.9	10.0	100%	99%
15	175.9	185.9	10.0	10.0	10.0	100%	100%
16	185.9	195.9	10.0	10.0	10.0	100%	100%
17	195.9	205.9	10.0	9.8	10.0	100%	98%
18	205.9	215.9	10.0	9.6	10.0	100%	96%
19	215.9	225.9	9.3	8.0	10.0	93%	80%
20	225.9	235.9	10.0	9.6	10.0	100%	96%
21	235.9	245.9	10.0	10.0	10.0	100%	100%
22	245.9	255.9	10.0	9.7	10.0	100%	97%
23	255.9	259.9	4.0	4.0	4.0	100%	100%

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CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

(in feet)	Depth	Elev.				
Ground Level:	0.0	828.8	Station & Offset	NA 9+78		49R
Bottom of Casing:	41.7	787.1	Dates Drilled:	7-Jul-03	to	9-Jul-03
Invert Level:	184.3	644.5	Angle&Bearing:	vertical		N/A
Bottom of Hole:	259.9	568.9	Method: HQ coring (triple tube)			
Water Level:	47.7	781.1	Version:	30-Oct-03		B-57

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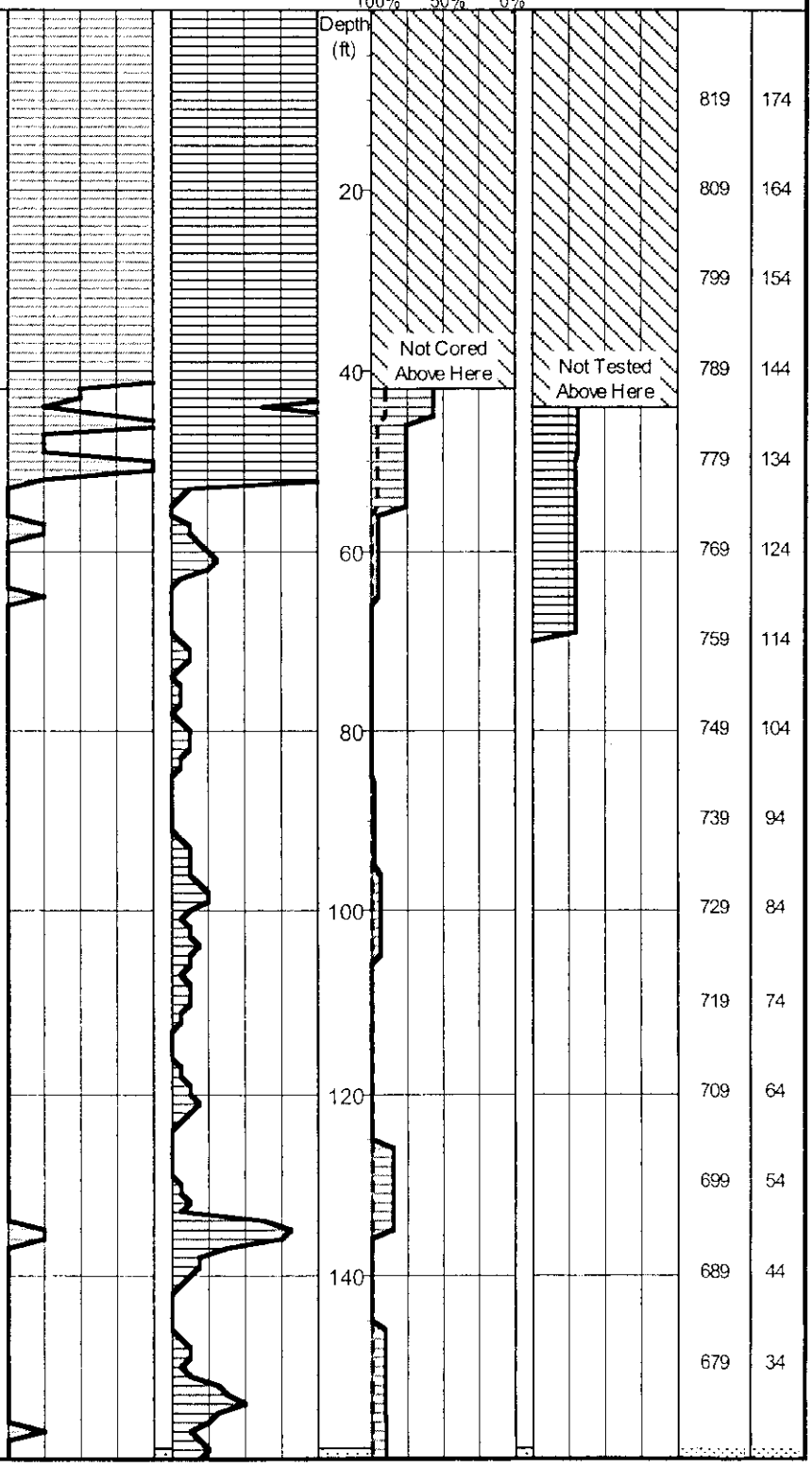
(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
0	SOIL (not sampled).
	(auger refusal @ 42 ft)
42	BLACK MYLONITE, gray to black; aphanitic to very fine grained, with strong internal shearing fabric and localized highly contorted white lenses, parts along fabric or perpendicular to core axis; compositional layers of WHITE MYLONITE up to 10 ft thick present at random spacing [comprise < 15% of interval].
	@42-52 ft: Transition Zone.
	@51 ft: crushed zone; highly weathered.
	@57-61 ft: series of parallel high-angle joints.
	@71 ft: high-angle joint.
	@95 ft: high-angle joint.
	@110 ft: high-angle joint.
	@134-137 ft: series of high-angle joints.
	@139-149 ft: quartz veins [comprise 15-20% of interval]; highly sheared.
	@152-155 ft: series of subparallel high-angle joints.



Elevation	Hgt above Invert
819	174
809	164
799	154
789	144
779	134
769	124
759	114
749	104
739	94
729	84
719	74
709	64
699	54
689	44
679	34

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CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

(in feet)	Depth	Elev.				
Ground Level:	0.0	828.8	Station & Offset	NA 9+78		49R
Bottom of Casing:	41.7	787.1	Dates Drilled:	7-Jul-03	to	9-Jul-03
Invert Level:	184.3	644.5	Angle&Bearing:	vertical		N/A
Bottom of Hole:	259.9	568.9	Method: HQ coring (triple tube)			
Water Level:	47.7	781.1	Version:	30-Oct-03		B-57

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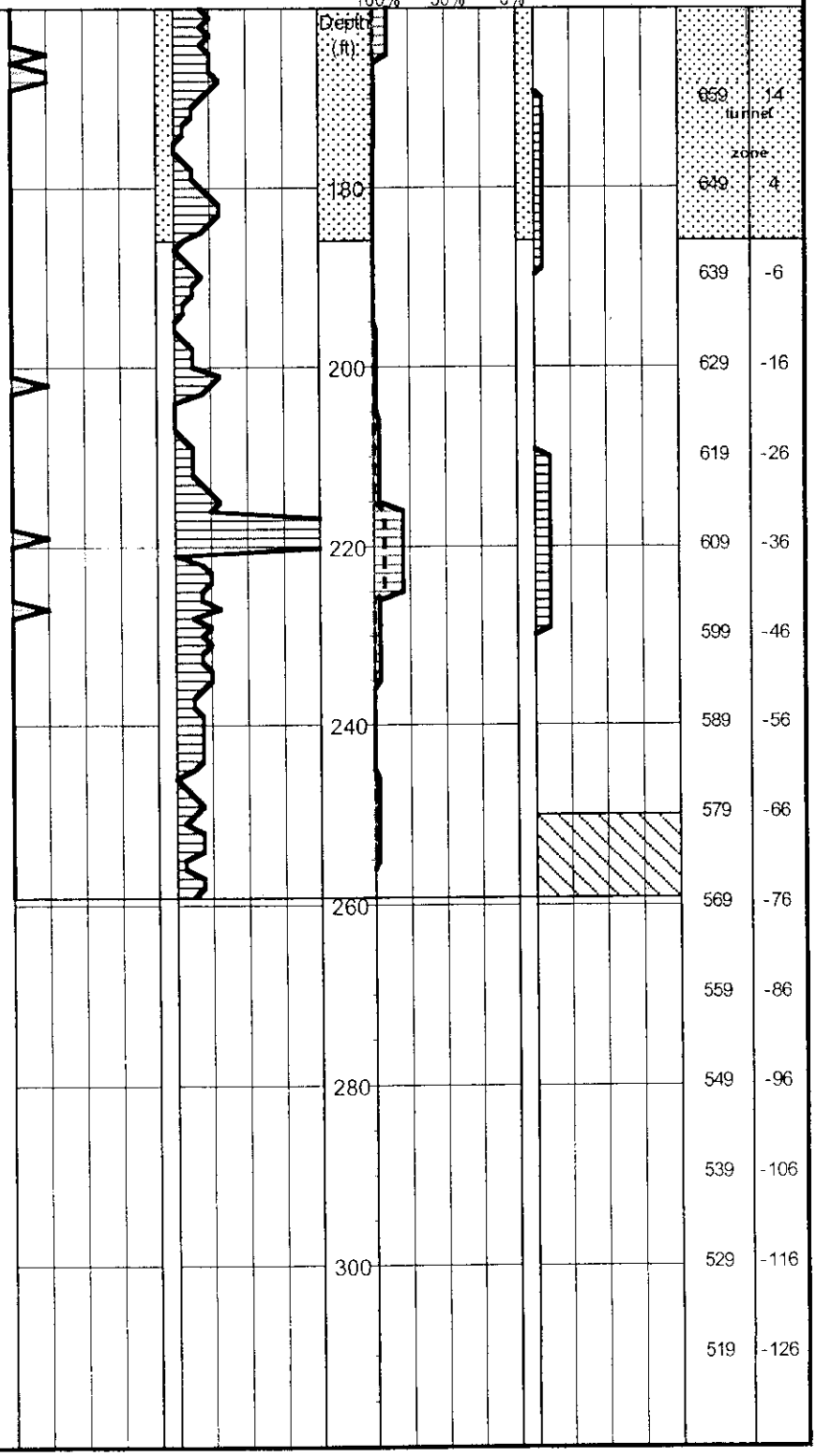
(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
cont	BLACK MYLONITE, (as described on previous page @ 42 ft).
	@160 ft: high-angle joint.
	@162 ft: high-angle joint.
	@166 ft: high-angle joint.
	@219-223 ft: near vertical, calcite infilled joint < 0.1 inch wide.
	@256 ft: high-angle joint.
	TOTAL DEPTH: 259 FT.



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CORE BORING B-62
WEST AREA CSO STORAGE TUNNEL FACILITIES PROJECT
RECOVERY AND RQD MEASUREMENTS

Run Number	Depth (feet) Top of Run	Depth (feet) Bottom of Run	Feet Recovered Total	Feet Recovered Sum of Pieces >4"	Calculated Results Run Length	Calculated Results Recovery	Calculated Results RQD
1	45.5	46.5	0.4	0.0	1.0	40%	0%
2	46.5	56.5	6.2	0.2	10.0	62%	2%
3	56.5	66.5	10.0	4.5	10.0	100%	45%
4	66.5	76.5	10.0	8.0	10.0	100%	80%
5	76.5	86.5	10.0	9.5	10.0	100%	95%
6	86.5	96.5	10.0	9.2	10.0	100%	92%
7	96.5	106.5	10.0	9.8	10.0	100%	98%
8	106.5	116.5	10.0	9.5	10.0	100%	95%
9	116.5	126.5	10.0	9.4	10.0	100%	94%
10	126.5	136.5	10.0	9.6	10.0	100%	96%
11	136.5	146.5	10.0	9.0	10.0	100%	90%
12	146.5	156.5	10.0	9.8	10.0	100%	98%
13	156.5	166.5	10.0	9.0	10.0	100%	90%
14	166.5	176.5	10.0	9.6	10.0	100%	96%
15	176.5	186.5	10.0	6.3	10.0	100%	63%
16	186.5	196.5	10.0	3.8	10.0	100%	38%
17	196.5	206.5	10.0	4.0	10.0	100%	40%
18	206.5	216.5	10.0	7.9	10.0	100%	79%
19	216.5	226.5	10.0	7.3	10.0	100%	73%
20	226.5	236.5	10.0	6.1	10.0	100%	61%
21	236.5	246.5	10.0	4.0	10.0	100%	40%
22	246.5	256.5	10.0	9.8	10.0	100%	98%
23	256.5	266.5	10.0	8.4	10.0	100%	84%
24	266.5	276.5	10.0	7.5	10.0	100%	75%
25	276.5	286.5	10.0	9.9	10.0	100%	99%
26	286.5	290.5	4.0	4.0	4.0	100%	100%

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CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

(in feet)	Depth	Elev.				
Ground Level:	0.0	811.3	Station & Offset	NA 7+69		60R
Bottom of Casing:	45.4	765.9	Dates Drilled:	7-Jul-03	to	9-Jul-03
Invert Level:	167.0	644.3	Angle&Bearing:	vertical		N/A
Bottom of Hole:	290.5	520.8	Method: HQ coring (triple tube)			
Water Level:	45.2	766.2	Version:	30-Oct-03		B-62

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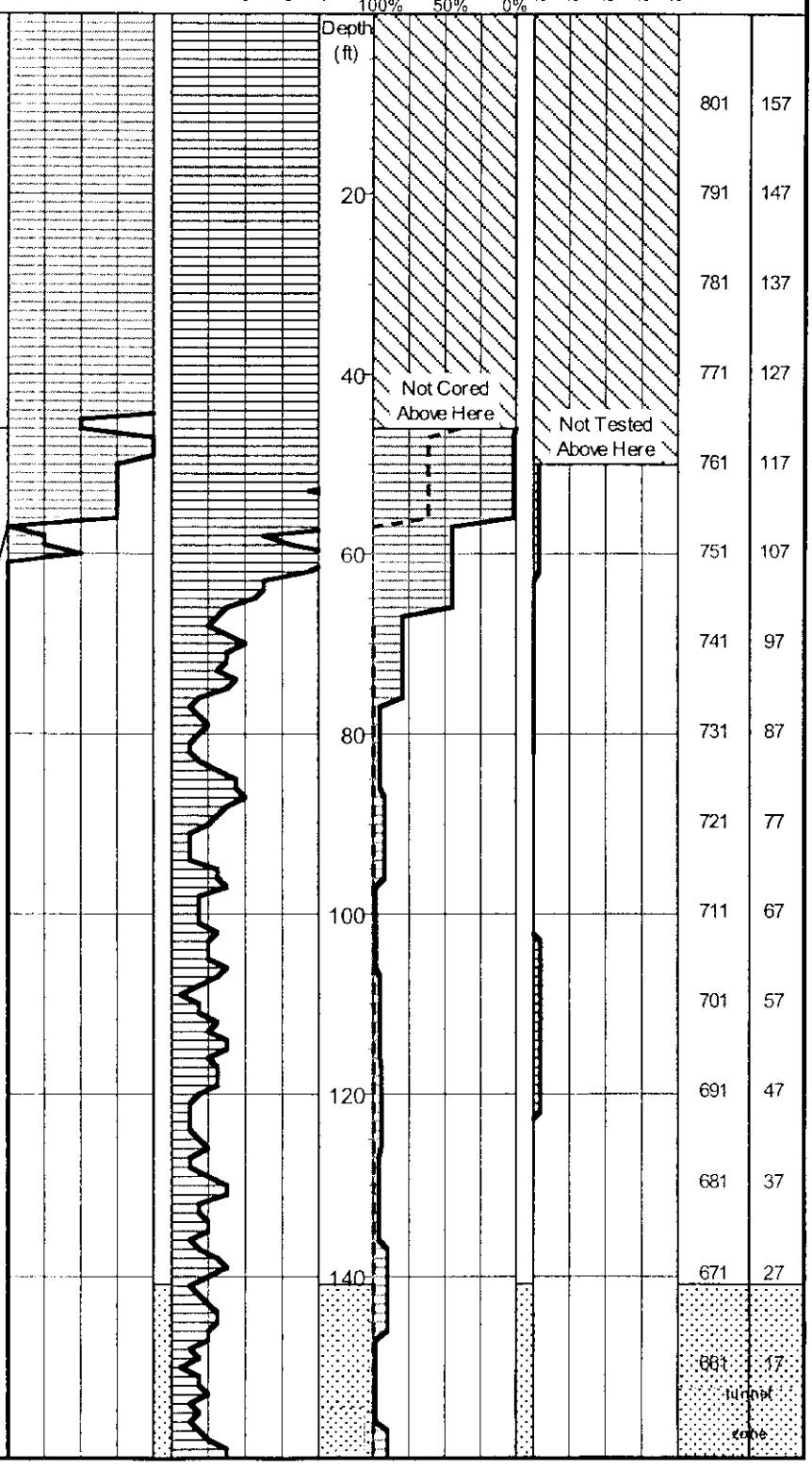
(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
0	SOIL (not sampled).
	(auger refusal @ 46 ft)
46	WHITE MYLONITE, white to light gray; aphanitic to very fine grained, with strong internal shearing fabric, rock typically parts along this fabric.
	@46-60 ft: Transition Zone.
57	BLACK MYLONITE, medium gray to black; aphanitic to very fine grained, with strong internal shearing fabric, rock typically parts along this fabric; compositional layers of WHITE MYLONITE (as described @ 46 ft) [comprise 15% of interval] up to 25 ft thick present at random spacing.
	@74 ft: high-angle joint.
	@93-97 ft: series of subparallel high-angle joints.
	@114 ft: high-angle joint.
	@144 ft: high-angle joint.
	@144-146 ft: fractured, but not weathered.
	@152 ft: high-angle joint.



CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

(in feet)	Depth	Elev.				
Ground Level:	0.0	811.3	Station & Offset	NA 7+69		60R
Bottom of Casing:	45.4	765.9	Dates Drilled:	7-Jul-03	to	9-Jul-03
Invert Level:	167.0	644.3	Angle&Bearing:	vertical		N/A
Bottom of Hole:	290.5	520.8	Method: HQ coring (triple tube)			
Water Level:	45.2	766.2	Version:	30-Oct-03		B-62

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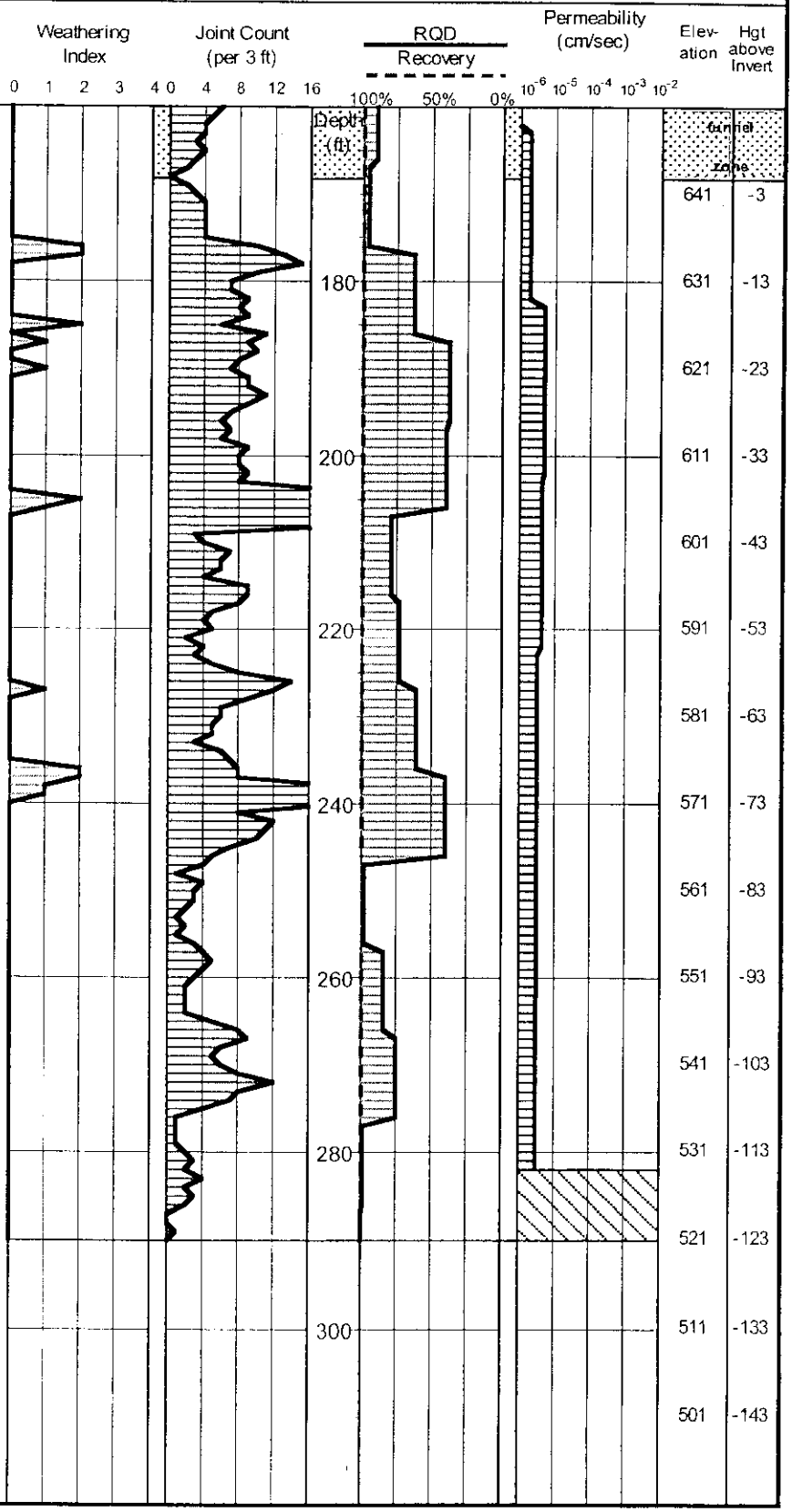
(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
cont	BLACK MYLONITE, (as described on previous page @ 57 ft).
	@178-180 ft: series of closely spaced, parallel, high-angle joints with partings along fabric in WHITE MYLONITE (as described on previous page @ 46 ft).
	@186-207 ft: series of parallel and subparallel high-angle joints with closely spaced partings in BLACK MYLONITE; rock highly fractured at 205-207 ft into pieces < 1 inch; no strain evidence or rock alteration.
	@190 ft: slight degradation.
	@215-217 ft: high-angle joint.
	@238-239 ft: highly fractured rock due to high-angle joints and partings along closely spaced shear fabric.
	@263-282 ft: series of subparallel high-angle joints.
	TOTAL DEPTH: 290 FT.



CORE BORING B-77
WEST AREA CSO STORAGE TUNNEL FACILITIES PROJECT
RECOVERY AND RQD MEASUREMENTS

Run Number	Depth (feet) Top of Run	Depth (feet) Bottom of Run	Feet Recovered Total	Feet Recovered Sum of Pieces >4"	Calculated Results Run Length	Calculated Results Recovery	Calculated Results RQD
1	20.0	26.0	0.4	0.0	6.0	7%	0%
2	26.0	36.0	8.8	0.4	10.0	88%	4%
3	36.0	46.0	9.8	8.6	10.0	98%	86%
4	46.0	56.0	10.0	8.5	10.0	100%	85%
5	56.0	66.0	10.0	7.8	10.0	100%	78%
6	66.0	76.0	9.9	9.2	10.0	99%	92%
7	76.0	86.0	10.0	8.3	10.0	100%	83%
8	86.0	96.0	9.8	7.8	10.0	98%	78%
9	96.0	106.0	10.0	9.7	10.0	100%	97%
10	106.0	116.0	10.0	9.4	10.0	100%	94%
11	116.0	126.0	10.0	9.7	10.0	100%	97%
12	126.0	136.0	10.0	9.7	10.0	100%	97%
13	136.0	146.0	10.0	9.0	10.0	100%	90%
14	146.0	156.0	10.0	9.6	10.0	100%	96%
15	156.0	166.0	10.0	9.5	10.0	100%	95%
16	166.0	176.0	10.0	10.0	10.0	100%	100%
17	176.0	186.0	10.0	8.9	10.0	100%	89%
18	186.0	196.0	10.0	10.0	10.0	100%	100%
19	196.0	206.0	10.0	9.7	10.0	100%	97%
20	206.0	216.0	10.0	9.7	10.0	100%	97%
21	216.0	226.0	10.0	10.0	10.0	100%	100%
22	226.0	236.0	10.0	9.2	10.0	100%	92%
23	236.0	246.0	10.0	9.3	10.0	100%	93%
24	246.0	256.0	10.0	9.3	10.0	100%	93%
25	256.0	266.0	9.8	9.8	10.0	98%	98%
26	266.0	276.0	10.0	8.9	10.0	100%	89%
27	276.0	286.0	9.7	8.3	10.0	97%	83%
28	286.0	296.0	10.0	8.8	10.0	100%	88%
29	296.0	306.0	10.0	7.1	10.0	100%	71%
30	306.0	316.0	10.0	5.7	10.0	100%	57%
31	316.0	320.0	4.0	4.0	4.0	100%	100%

CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

(in feet)	Depth	Elev.			
Ground Level:	0.0	846.4	Station & Offset	NA 14+60	8R
Bottom of Casing:	20.0	826.4	Dates Drilled:	20-Aug-03 to	26-Aug-03
Invert Level:	201.4	645.0	Angle&Bearing:	vertical	N/A
Bottom of Hole:	320.0	526.4	Method: HQ coring (triple tube)		
Water Level:	41.2	805.2	Version:	30-Oct-03	B-77

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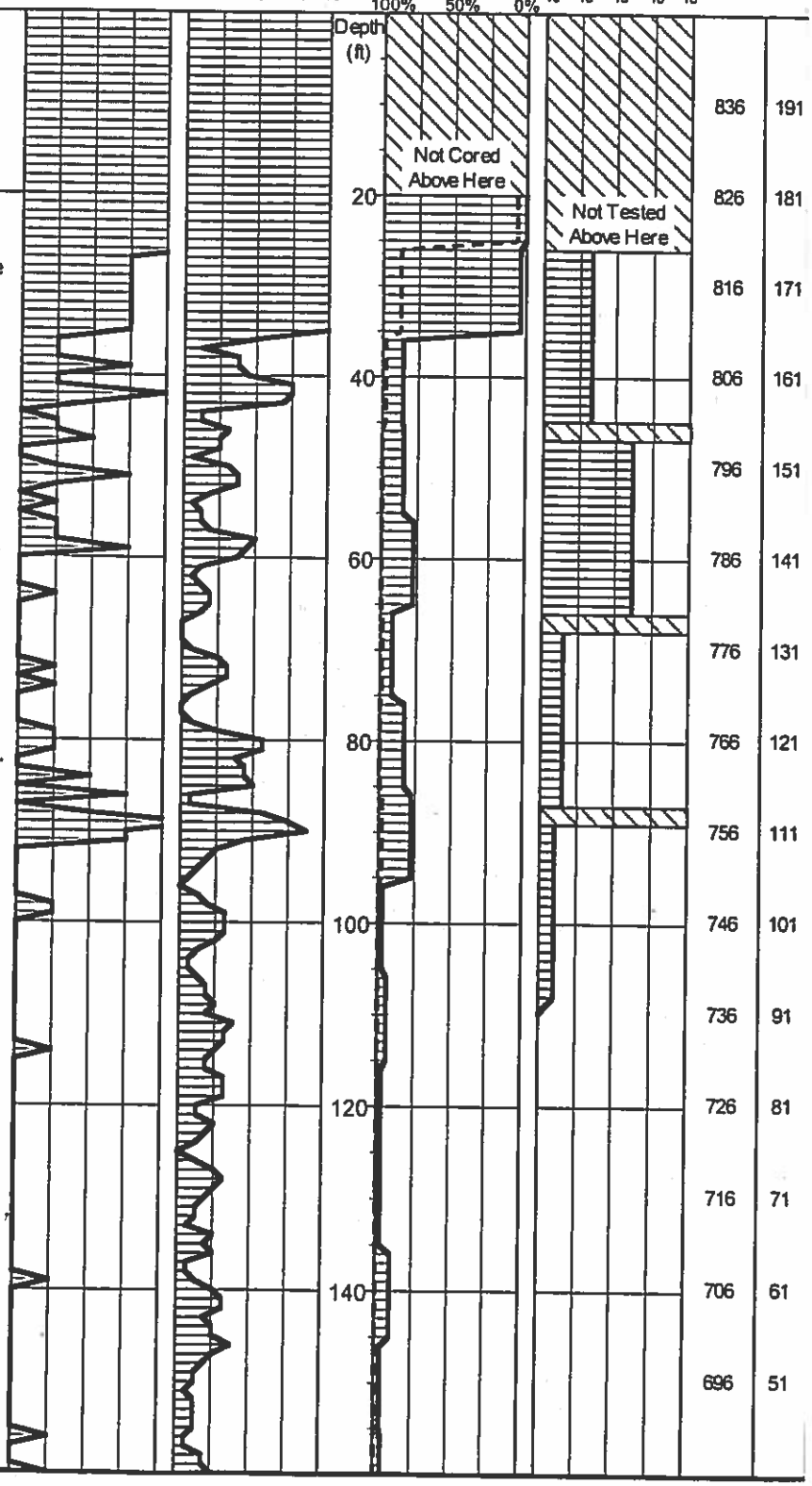
(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
0	SOIL (not sampled).
	(auger refusal @ 20 ft)
20	BLACK MYLONITE, medium gray to black; aphanitic to very fine grained, strong internal shearing fabric, core typically parts along the low to mid angle fabric.
	WHITE MYLONITE, present as thin to medium thick compositional layers [comrise 10-20% of entire borehole].
	@20-36 ft: parts along internal shearing fabric and along mid angle cross-cutting joints.
	@20-61 ft: Transition Zone.
	@42-43 ft: very closely spaced parting along internal shear fabric.
	@46-47 ft: high-angle joint; surrounding rock pitted.
	@56-58 ft: near vertical joint.
	@64-65 ft: series of high-angle joints.
	@80-81 ft: series of parallel, high-angle joints.
	@89-90 ft: blocky zone.
	@134-149 ft: WHITE MYLONITE comprises > 50% of interval.
	@159-160 ft: parallel, high-angle joints.



Elevation	Hgt above Invert
836	191
826	181
816	171
806	161
796	151
786	141
776	131
766	121
756	111
746	101
736	91
726	81
716	71
706	61
696	51

CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

(in feet)	Depth	Elev.				
Ground Level:	0.0	846.4	Station & Offset	N	14+60	8R
Bottom of Casing:	20.0	826.4	Dates Drilled:	20-Aug-03	to	26-Aug-03
Invert Level:	201.4	645.0	Angle&Bearing:	vertical		N/A
Bottom of Hole:	320.0	526.4	Method: HQ coring (triple tube)			
Water Level:	41.2	805.2	Version:	30-Oct-03		B-77

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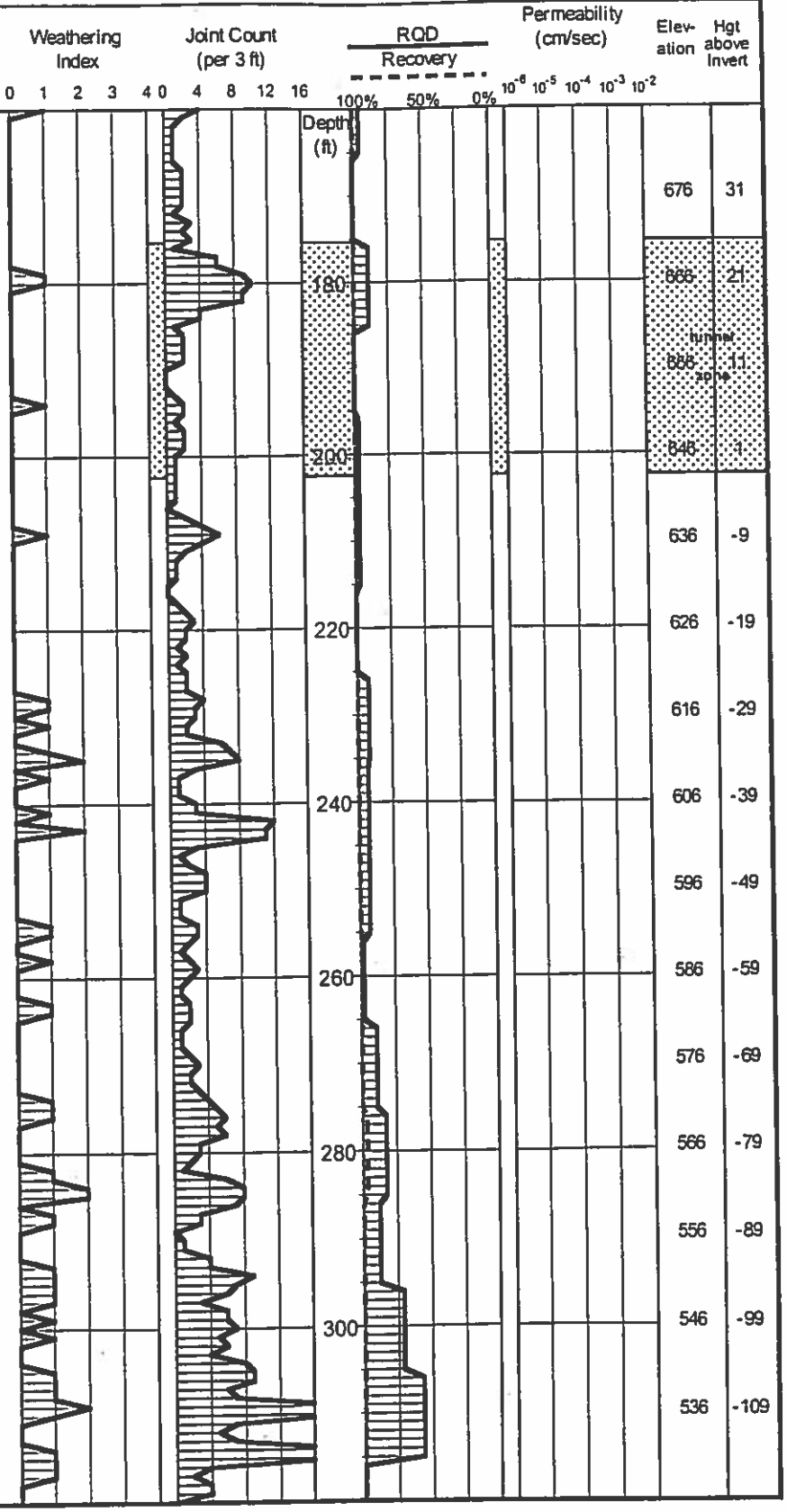
(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
cont	BLACK MYLONITE, (as described on previous page @ 20 ft).
	@171-186 ft: WHITE MYLONITE comprises > 50% of interval.
	@178-181 ft: closely spaced partings along internal shearing fabric.
	@207-211 ft: WHITE MYLONITE comprises > 50% of interval.
	@227-231 ft: WHITE MYLONITE comprises > 50% of interval.
	@234-235 ft: closely spaced parting along low-angle internal shearing fabric.
	@243 ft: foliation joints cross cutting joint.
	@253-265 ft: series of sub-parallel, high-angle joints cross-cutting shearing fabric.
	@254-317 ft: weathering predominantly along high-angle, widely spaced fracture set.
	@284-285 and 309 ft fractures are more closely spaced and crushed during drilling.
	@282-306 ft: series of high-angle joints.
	@283-285 ft: zone of closely spaced, high-angle and mid-angle joints with partings along internal shearing fabric.
	@311-320 ft: WHITE MYLONITE comprises ~50% of the interval.
	TOTAL DEPTH: 320 FT.



Elevation	Hgt above Invert
676	31
666	21
tunnel zone	
656	11
646	1
636	-9
626	-19
616	-29
606	-39
596	-49
586	-59
576	-69
566	-79
556	-89
546	-99
536	-109

CORE BORING B-78
WEST AREA CSO STORAGE TUNNEL FACILITIES PROJECT
RECOVERY AND RQD MEASUREMENTS

Run Number	Depth (feet) Top of Run	Depth (feet) Bottom of Run	Feet Recovered Total	Feet Recovered Sum of Pieces >4"	Calculated Results Run Length	Calculated Results Recovery	Calculated Results RQD
1	15.0	16.0	0.9	0.0	1.0	90%	0%
2	16.0	25.5	3.2	0.5	9.5	34%	5%
3	25.5	35.5	6.8	3.1	10.0	68%	31%
4	35.5	45.5	10.0	9.5	10.0	100%	95%
5	45.5	55.5	10.0	8.2	10.0	100%	82%
6	55.5	65.1	9.6	9.0	9.6	100%	94%
7	65.1	75.1	10.0	8.9	10.0	100%	89%

CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

(in feet)	Depth	Elev.				
Ground Level:	0.0	845.7	Station & Offset	NA 14+70		15R
Bottom of Casing:	15.0	830.7	Dates Drilled:	27-Aug-03	to	27-Aug-03
Invert Level:	200.7	645.0	Angle&Bearing:	vertical		N/A
Bottom of Hole:	75.1	770.6	Method: NQ coring			
Water Level:	N/A	N/A	Version:	30-Oct-03		B-78

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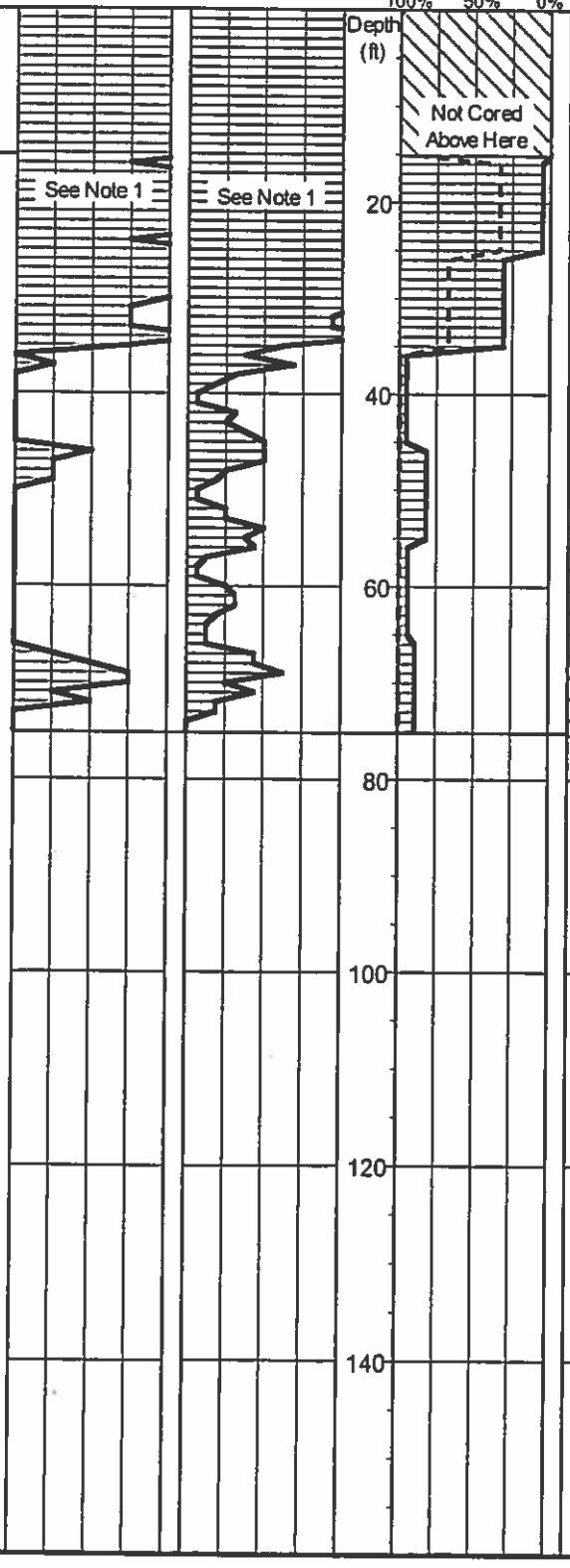
(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
0	SOIL.
	(auger refusal @ 15 ft)
15	BLACK MYLONITE, medium gray to black; aphanitic to very fine grained, moderate to strong internal shearing fabric, core typically parts along this fabric at low orientations or along mid to high angle joints; WHITE MYLONITE present as short discontinuous stringers [comprise < 1% of interval].
	@15-35 ft: Transition Zone, comprised of weathered rock and closely spaced parts, some with silt and clay infilling along shearing fabric.
	@46-48 ft: near vertical joint.
	@68-71 ft: rock more weathered with numerous internal short fracture, mostly healed, some broken.
	TOTAL DEPTH: 75 FT.
	Notes:
	(1) 5 ft of soil and core loss between interval of 16-25 ft, but do not know exact depth because soil seams varied throughout the interval. Soil gaps and core loss at intervals 25-29 and 34 ft.



Elevation	Hgt above Invert
836	191
826	181
816	171
806	161
796	151
786	141
776	131
766	121
756	111
746	101
736	91
726	81
716	71
706	61
696	51

CORE BORING B-79
WEST AREA CSO STORAGE TUNNEL FACILITIES PROJECT
RECOVERY AND RQD MEASUREMENTS

Run Number	Depth (feet) Top of Run	Depth (feet) Bottom of Run	Feet Recovered Total	Feet Recovered Sum of Pieces >4"	Calculated Results Run Length	Calculated Results Recovery	Calculated Results RQD
1	14.6	20.1	2.3	0.3	5.5	43%	6%
2	20.1	30.1	3.5	0.0	10.0	35%	0%
3	30.1	39.8	8.6	1.7	9.7	89%	17%
4	39.8	50.1	9.8	1.3	10.3	95%	12%
5	50.1	60.1	8.9	0.7	10.0	89%	7%
6	60.1	70.1	10.0	5.4	10.0	100%	54%
7	70.1	80.1	10.0	5.3	10.0	100%	53%
8	80.1	90.1	9.9	5.5	10.0	99%	55%
9	90.1	100.1	10.0	7.3	10.0	100%	73%
10	100.1	110.1	10.0	9.2	10.0	100%	92%

CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

(in feet)	Depth	Elev.				
Ground Level:	0.0	846.4	Station & Offset	NA 14+43		17R
Bottom of Casing:	14.6	831.8	Dates Drilled:	28-Aug-03	to	28-Aug-03
Invert Level:	201.4	645.0	Angle&Bearing:	vertical		N/A
Bottom of Hole:	110.1	736.3	Method: NQ coring			
Water Level:	N/A	N/A	Version:	30-Oct-03		B-79

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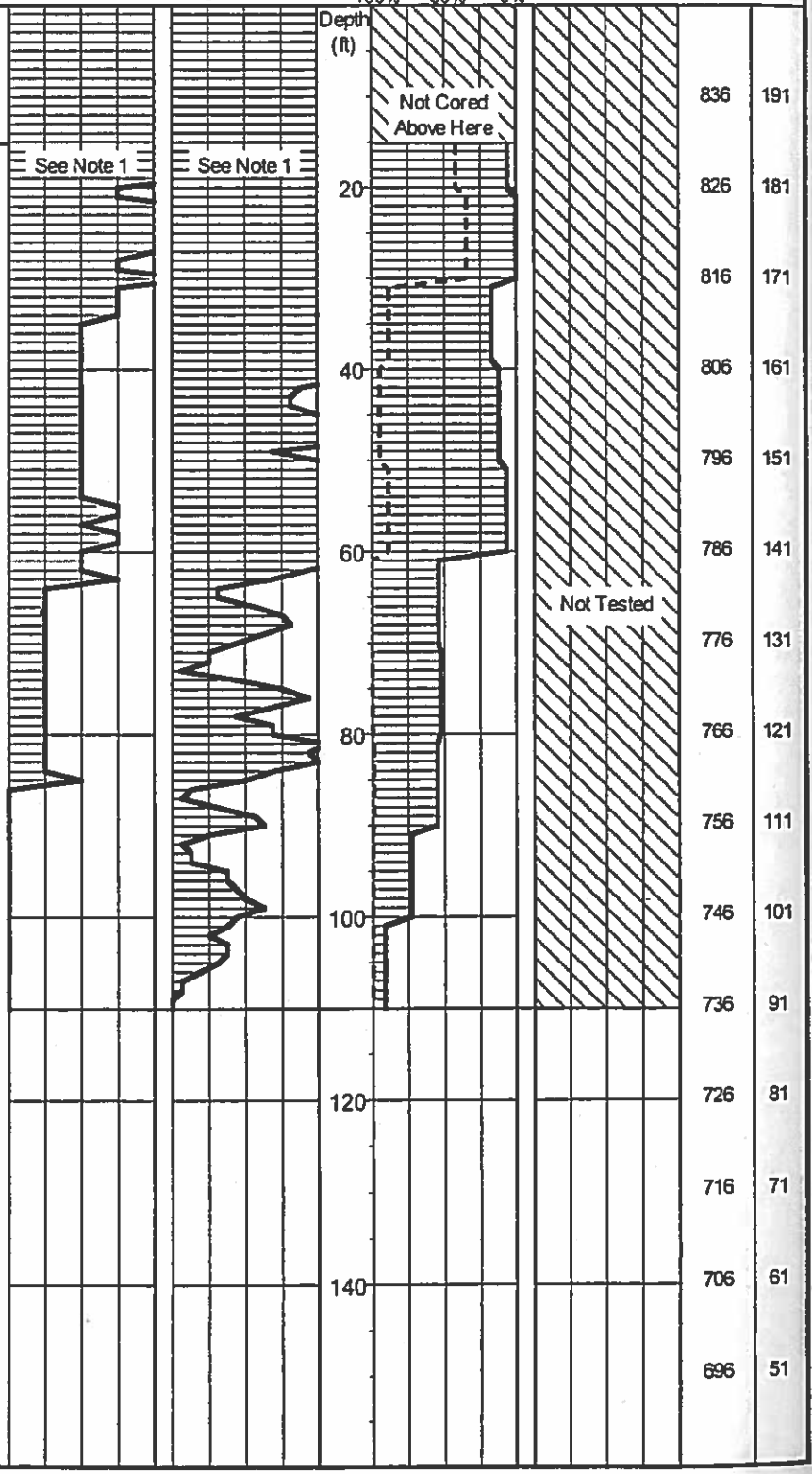
page 1

(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
0	SOIL.
	(auger refusal @ 15 ft)
15	BLACK MYLONITE, medium gray to black; aphanitic to very fine grained, with moderate to strong internal shear fabric, core typically parts along this low-angle shear fabric.
	@18-63 ft: Transition Zone characterized by stained and weathered, closely spaced partings and mid to high angle joints; rock surfaces locally pitted.
	@38-40 ft: near vertical joint, with closely spaced partings along shear fabric.
	@45-53 ft: highly fractured rock with several high-angle joints and closely spaced partings along internal shear fabric.
	@55-60 ft: highly fractured rock with several high-angle joints and closely spaced shear fabric partings.
	@60-63 ft: near vertical joint.
	@75-84 ft: highly fractured rock with a series of high-angle joints, spaced 12 to 18 inches apart; closely spaced partings along internal shearing fabric.
	@81-110 ft: thin to medium compositional layers of WHITE MYLONITE comprise < 10% of interval.
	@89 ft: highly fractured zone.
	@95-99 ft: near vertical joints, tight and healed @ 95-97.5 ft; core parts on joint @ 97.5-99 ft.
	@101-102 ft: en echelon vertical joints.
	TOTAL DEPTH: 110 FT.
	Notes:
	(1) No recovery between the intervals of 15-18, 20-27, and 30-31 ft.



CORE BORING B-80
WEST AREA CSO STORAGE TUNNEL FACILITIES PROJECT
RECOVERY AND RQD MEASUREMENTS

Run Number	Depth (feet) Top of Run	Depth (feet) Bottom of Run	Feet Recovered Total	Feet Recovered Sum of Pieces >4"	Calculated Results Run Length	Calculated Results Recovery	Calculated Results RQD
1	33.1	40.3	7.2	0.5	7.2	100%	7%
2	40.3	50.3	10.0	7.1	10.0	100%	71%
3	50.3	60.3	10.0	7.4	10.0	100%	74%
4	60.3	70.3	10.0	9.1	10.0	100%	91%
5	70.3	80.3	10.0	9.3	10.0	100%	93%

CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

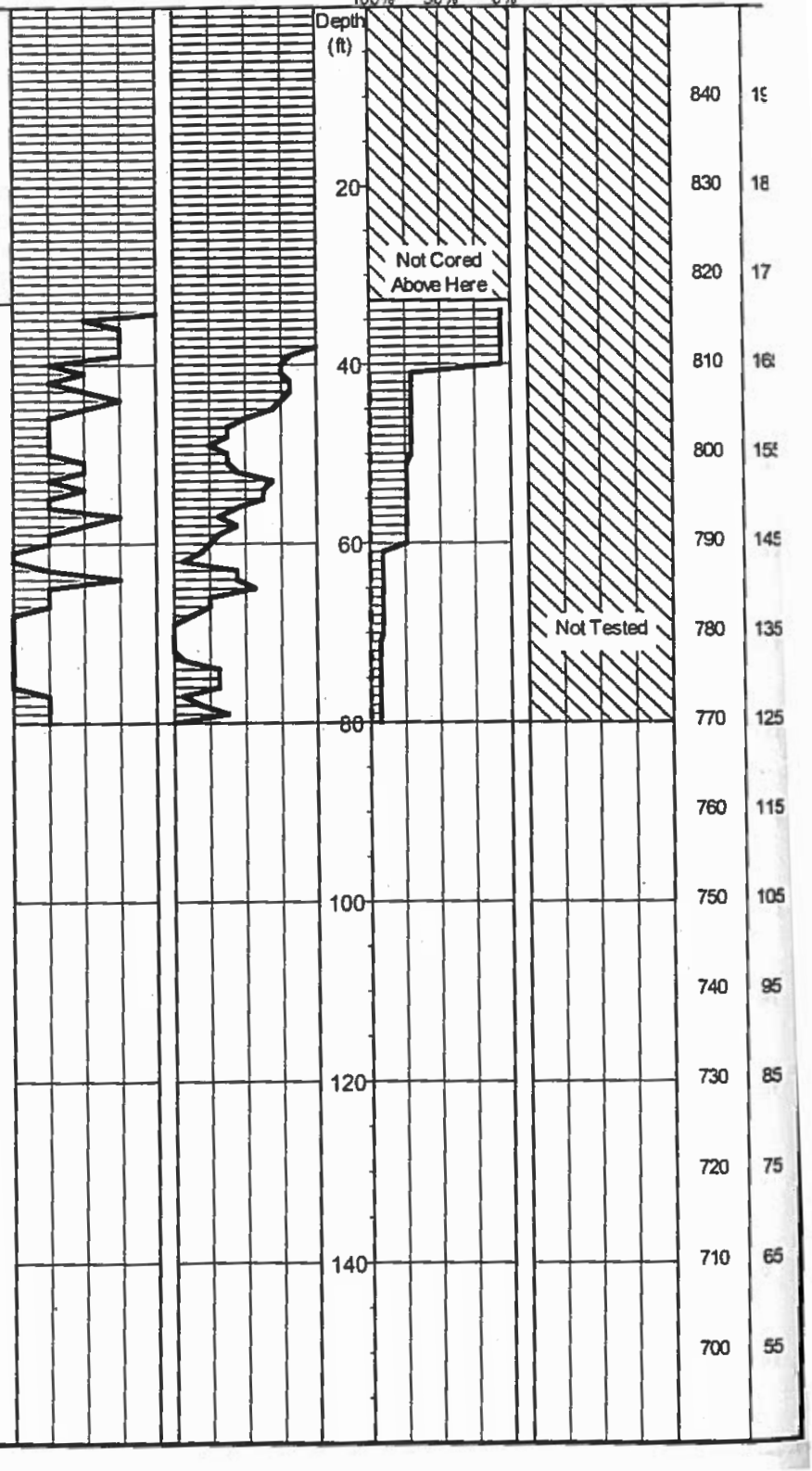
(in feet)	Depth	Elev.			
Ground Level:	0.0	850.0	Station & Offset	NA 14+49	8L
Bottom of Casing:	33.1	816.9	Dates Drilled:	1-Sep-03 to	1-Sep-03
Invert Level:	205.1	645.0	Angle&Bearing:	vertical	N/A
Bottom of Hole:	80.3	769.7	Method: NQ coring		
Water Level:	N/A	N/A	Version:	30-Oct-03	B-80

B-8C

page 1

(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
0	SOIL.
	(auger refusal @ 33 ft)
33	BLACK MYLONITE, medium gray to black; aphanitic to very fine grained, weak to strong internal shearing fabric, core typically parts along this fabric at low to medium angle orientation.
	@33-68 ft: Transition Zone, characterized by pitted core, stained joints and closely spaced partings along shearing fabric.
	@37-38 ft: high-angle joint.
	@46-47 ft: high-angle joint.
	@80 ft: 3-inch compositional layer of WHITE MYLONITE.
	TOTAL DEPTH: 80 FT.



CORE BORING B-81
WEST AREA CSO STORAGE TUNNEL FACILITIES PROJECT
RECOVERY AND RQD MEASUREMENTS

Run Number	Depth (feet) Top of Run	Depth (feet) Bottom of Run	Feet Recovered Total	Feet Recovered Sum of Pieces >4"	Calculated Results Run Length	Calculated Results Recovery	Calculated Results RQD
1	28.9	37.0	8.1	2.7	8.1	100%	33%
2	37.0	47.0	7.6	5.7	10.0	76%	57%
3	47.0	57.0	10.0	7.2	10.0	100%	72%
4	57.0	67.0	9.9	9.4	10.0	99%	94%
5	67.0	77.0	8.7	8.3	10.0	87%	83%

CITY OF ATLANTA -- WEST AREA CSO STORAGE TUNNEL FACILITIES

JDH

Jordan Jones & Goulding
Hatch Mott MacDonald
Delon Hampton Associates

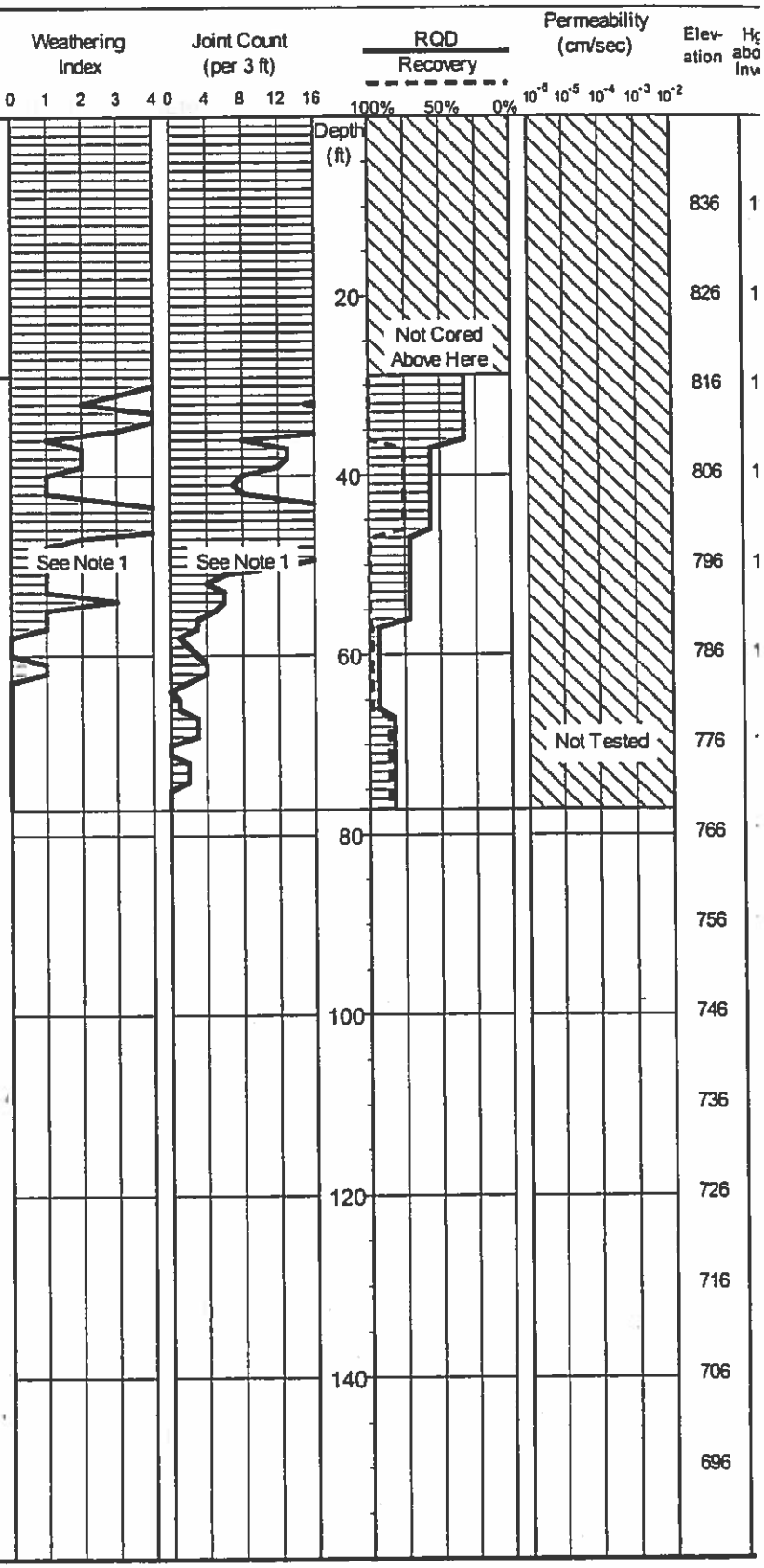
(in feet)	Depth	Elev.			
Ground Level:	0.0	846.3	Station & Offset	NA 14+24	24R
Bottom of Casing:	28.9	817.4	Dates Drilled:	2-Sep-03 to	2-Sep-03
Invert Level:	201.3	645.0	Angle&Bearing:	vertical	N/A
Bottom of Hole:	77.0	769.3	Method: NQ coring		
Water Level:	N/A	N/A	Version:	27-Oct-03	B-81

B-81

page 1

(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
0	SOIL.
	(auger refusal @ 29 ft)
29	BLACK MYLONITE, medium gray to black; aphanitic to very fine grained, weak to strong internal shearing fabric, core typically parts along low to mid angle shear fabric.
	@29-62 ft: Transition Zone, core typically parts along closely spaced, internal shear fabric.
	@32-33 ft: high-angle and near vertical joints, Fe stained.
	@33 ft: 3-inch zone with weathering index of 4-5, locally weathered to silt.
	@39-40 ft: near vertical joint, Fe-Mn stained.
	@43-45 ft: closely spaced shear fabric partings with high-angle joints.
	@43-46 ft: highly fractured zone, partings along near vertical joints and low-angle internal shear fabric.
	@46-47 ft: pitted with numerous healed, high-angle joints.
	@48-51 ft: highly fractured zone with partings along mid to high angle joints and low to mid angle internal shearing fabric.
	@62 ft: high-angle joint.
	@72 ft: high-angle joint.
	TOTAL DEPTH: 77 FT.
	Notes:
	(1) Core loss at 44.5-46.5 ft.



Home

WILLMER ENGINEERING
INCORPORATED
ENVIRONMENTAL & GEOTECHNICAL SERVICES

Project: **R. M. Clayton Shafts**
Location: **Atlanta, Fulton County, Georgia**
Project Number: **ATL-171-2525**

HOLE No. B-86

Sheet 1 of 1
Location: **RMC Pumping Sta. Shaft**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **811.48** Station: **NA 7+66, 45' L of CL**

Drilling Equipment: **CME 550X** Drilling Method: **HSA**

Core Boxes: Samples: **7** Overburden (ft): **37** Rock (ft): **N/A** Total Depth (ft): **37.0**

Logged By: **SS** Date Drilled: **9/12/03**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	RCD%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)
0					CONCRETE		811.5
					FILL: Stiff, Red Brown and Orange, Fine Sandy **SILT**		810
5		SS					
							805
10		SS			Becomes Soft and More Clayey		
							800
15		SS			RESIDUUM: Very Stiff, Gray Brown and Orange, Fine Sandy **SILT**	ML	
							795
20		SS			Very Stiff, White, Brown and Gray, Fine Sandy **SILT**	ML	
							790
25		SS			PARTIALLY WEATHERED ROCK: Sampled as Very Hard, White, Fine Sandy **SILT**	PWR	
							785
30		SS			RESIDUUM: Very Stiff, Gray, Brown, White and Tan, Fine Sandy **SILT**	ML	
							780
35		SS			Becomes Hard		
							775
					Auger Refusal Encountered @ 37 Feet Below the Existing Ground Surface		
					No Ground Water Encountered @ the Time of Drilling		

STANDARD PENETRATION TEST DATA (blows/foot)

5 10 20 40 60 80

N-VALUE: 15, 3, 17, 22, 50/4, 26, 35

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NX - Rock Core, 2-1/8"
CU - Cuttings

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
RW - Rotary Wash
RC - Rock Core

Hole No. B-86

TN 2525-RMC.GPJ 11/3/03

RWB 1

RWB 2

RWB 3

RWB 31

SB 1

239+22

238+00

236+00

234+00

232+00

230+00

228+00

MAIN TUNNEL - PHASE 1 EXTENSION

EXISTING
WEST AREA CSO
NORTH AVENUE TUNNEL

EXISTING
WEST AREA CSO
OVERFLOW TUNNEL

PEACHTREE
PUMP STATION
SHAFT
AT STA. 239+21.72

EXISTING
NANCY CREEK
TUNNEL

0 200' 300' 400'

1"=200'

N

CLEAN WATER ATLANTA
drinking water, stormwater, wastewater

5887 Glenridge DR.
Suite 300
Atlanta, GA. 30328
P: 404.979.3300
F: 404.979.3310

jp²
value ▪ innovation ▪ results

REVISIONS		
△	DATE	DESCRIPTION

REVISIONS		
△	DATE	DESCRIPTION

DESIGNED BY:	TJ
DRAWN BY:	DL
CHECKED BY:	
APPROVED BY:	
DATE:	6/30/2016
SCALE:	NOTED

DEPT OF WATERSHED MANAGEMENT
WATER SUPPLY PROGRAM
PHASE 1 EXTENSION

GEOTECHNICAL DATA REPORT

PEACHTREE PUMP STATION SITE PLAN

DRAWING NO.

FIG 3

SHEET OF

U:\175656158 FC-7383E Ph 1 Extension, T0-1\TNT\tunneling\drawings\sheet files\boring location exhibit\EXHIBITS\Peachtree boring location-fig3.dwg

SUMMARY OF RECOVERY AND RQD MEASUREMENTS
CORE BORING RWB-3

Run Number	Depth (feet)		Feet Recovered		Calculated Results		
	Top of Run	Bottom of Run	Total	Sum of Pieces > 4"	Run Length (feet)	Recovery (%)	RQD (%)
1	99.0	103.0	4.0	0.9	4.0	100	23
2	103.0	112.3	9.3	6.8	9.3	100	73
3	112.3	120.8	8.5	4.7	8.5	100	55
4	120.8	130.8	10.0	7.4	10.0	100	74
5	130.8	140.8	10.0	8.3	10.0	100	83
6	140.8	151.0	10.2	9.2	10.2	100	90
7	151.0	161.3	10.3	10.3	10.3	100	100
8	161.3	163.3	2.0	1.4	2.0	100	70
9	163.3	173.3	10.0	6.1	10.0	100	61
10	173.3	183.3	10.0	10.0	10.0	100	100
11	183.3	193.3	10.0	9.0	10.0	100	90
12	193.3	203.3	10.0	9.4	10.0	100	94
13	203.3	213.4	10.1	10.1	10.1	100	100
14	213.4	223.4	10.0	10.0	10.0	100	100
15	223.4	233.2	9.8	9.8	9.8	100	100
16	233.2	243.2	10.0	10.0	10.0	100	100
17	243.2	253.4	10.2	10.2	10.2	100	100
18	253.4	263.3	9.9	9.9	9.9	100	100
19	263.3	273.6	10.2	9.6	10.3	99	93
20	273.6	283.6	10.0	10.0	10.0	100	100
21	283.6	293.4	9.9	9.8	9.8	100	100
22	293.4	303.4	10.0	9.8	10.0	100	98

CITY OF ATLANTA -- WATER SUPPLY PROGRAM

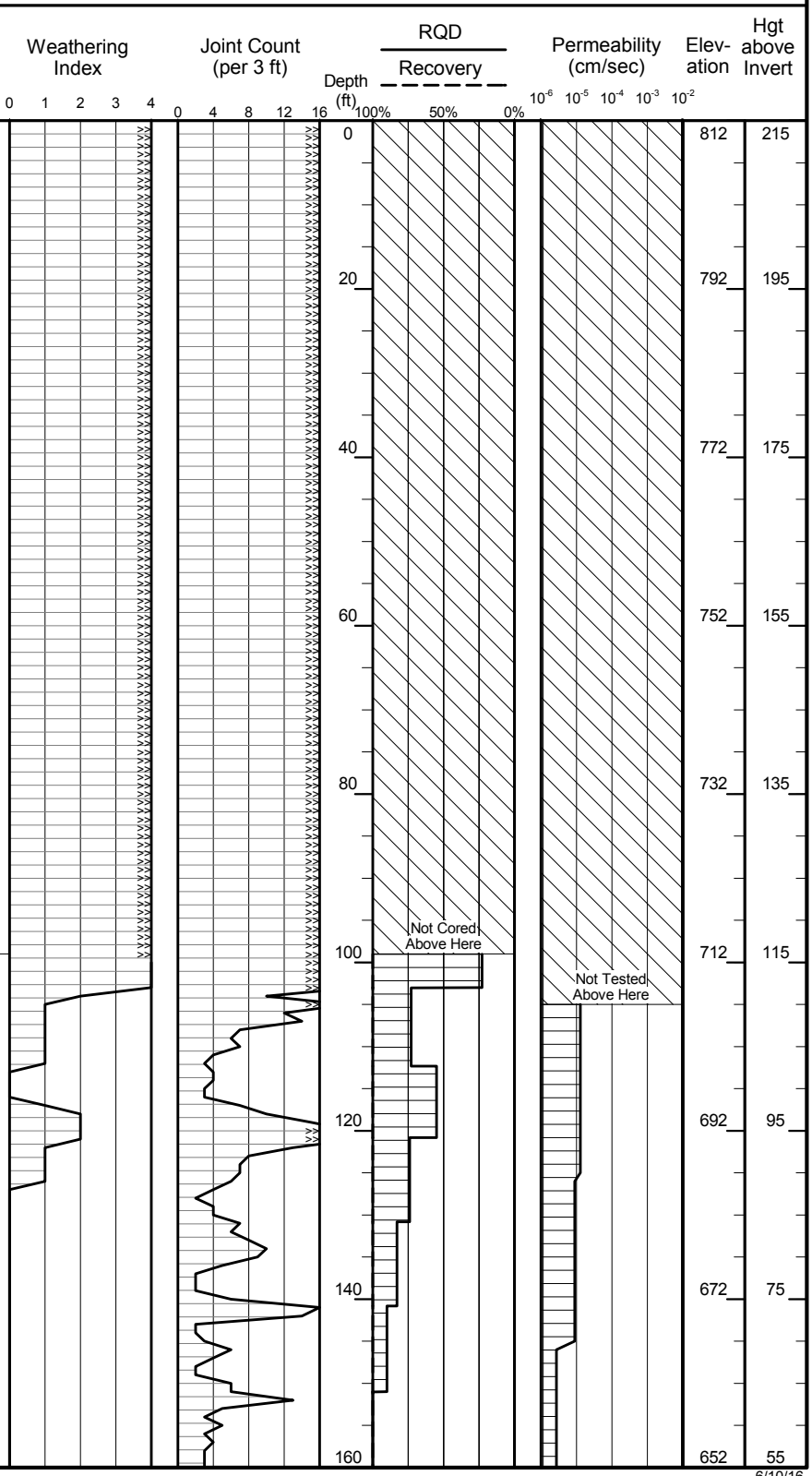
Stantec Consulting Services Inc.

(in feet)	Depth	Elev.				
Ground Level:	0.0	812.0	Station & Offset:	235+23		442 L
Bottom of Casing:	99.0	713.0	Dates Drilled:	8/14/14	to	8/19/14
Invert Level:	215.0	597.0	Angle & Bearing:	Vertical		N/A
Bottom of Hole:	303.4	508.6	Method:	HQ coring (triple tube)		
Water Level:	39.0	773.0	Version:	6/10/16		**RWB-3**

RWB-3

(all depths, heights, and elevations in feet)

Top (ft)	General Rock Description
0.0	SOIL
99.0'	*(Auger Refual @ 99 ft)*
	BLACK MYLONITE - Very fine grained, very well foliated, and medium to dark gray. Very well developed shear texture. Qtz>fspar>bio>musc. Trace Garnet present. Quartz occurs as ribbons. Porphryoclasts often display tails. @120': Numerous high and medium angle fractures with typically smooth-planar surfaces. @123': High angle joint with smooth-planar surface. @134': High angle fracture with rough-stepped joint surface. Core in numerous pieces. @140': High angle fracture with rough-stepped joint surface. Core in numerous pieces. Between 149' and 151': Medium angle joints with smooth-planar surface. Js=1".



CITY_OF_ATLANTA ATLANTA_PROJECT_PHASE-1-EXT - REV01.GPJ ATLANTA_DATA_TEMPLATE.GDT 6/10/16

CITY OF ATLANTA -- WATER SUPPLY PROGRAM

Stantec

Stantec Consulting Services Inc.

(in feet)	Depth	Elev.				
Ground Level:	0.0	812.0	Station & Offset:	235+23		442 L
Bottom of Casing:	99.0	713.0	Dates Drilled:	8/14/14	to	8/19/14
Invert Level:	215.0	597.0	Angle & Bearing:	Vertical		N/A
Bottom of Hole:	303.4	508.6	Method:	HQ coring (triple tube)		
Water Level:	39.0	773.0	Version:	6/10/16		**RWB-3**

RWB-3
Page 2

(all depths, heights, and elevations in feet)

Between 163' and 165': Foliation joint set. Surfaces range from smooth-planar to smooth-irregular.

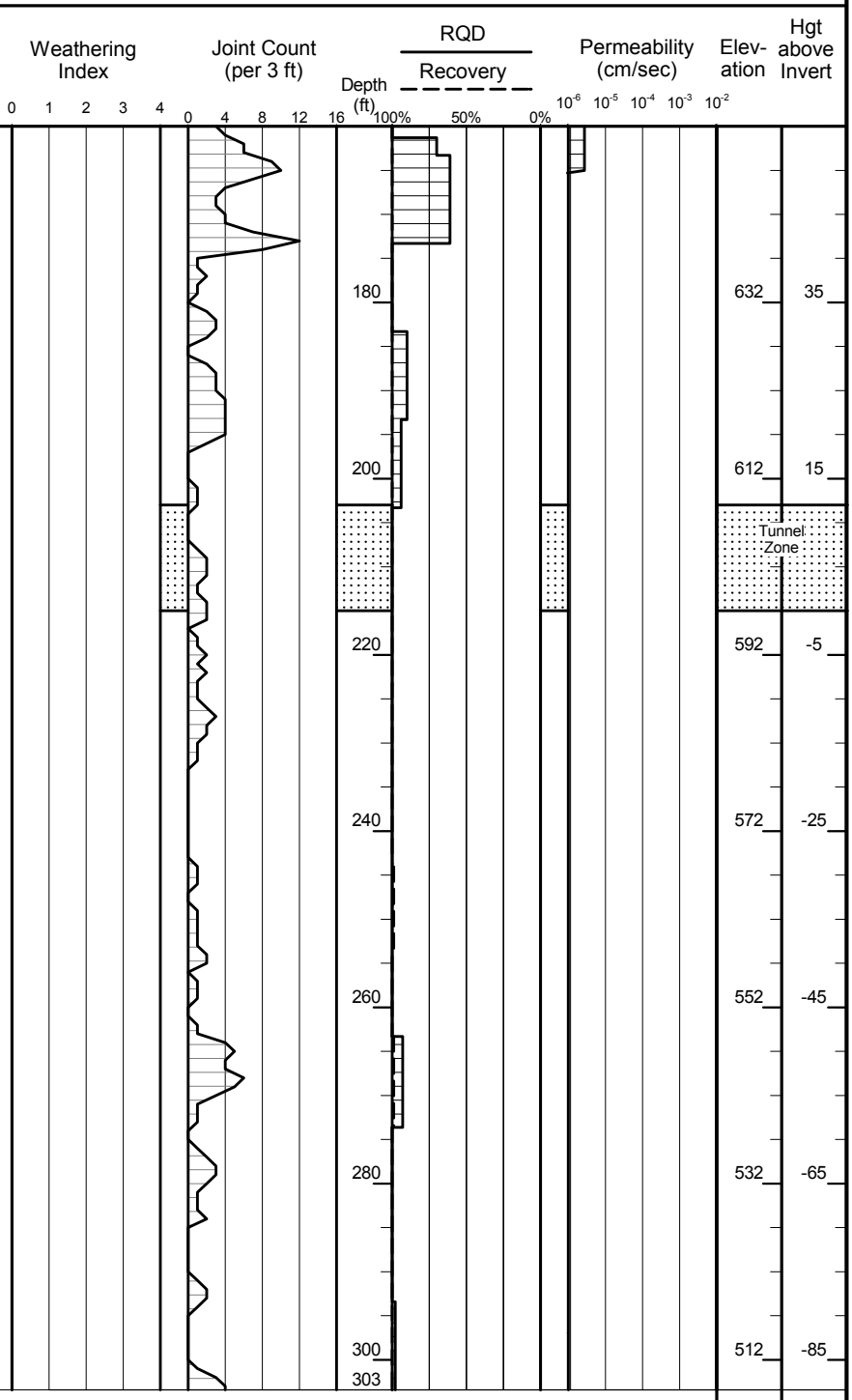
@188': High angle joint with smooth-undulating fracture surface.

Between 267' and 269': Foliation joint set. Js=2".

303.4' Bottom of Hole

* No packer test performed between 297' and BOH.

* Groundwater level measured on 12/04/2014.



Vol 4 Additional Information

River Intake Pump Station

Part 4 – CSX Agreement

FACILITY ENCROACHMENT AGREEMENT

THIS AGREEMENT, made and effective as of June 20, 2018, by and between CSX TRANSPORTATION, INC., a Virginia corporation, whose mailing address is 500 Water Street, Jacksonville, Florida 32202, hereinafter called "Licensor," and CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT, a municipal corporation, political subdivision or state agency, under the laws of the State of Georgia, whose mailing address is 72 Marietta Street NW, Atlanta, Georgia 30303, hereinafter called "Licensee," WITNESSETH:

WHEREAS, Licensee desires to construct (unless previously constructed and designated as existing herein), use and maintain the below described facility(ies), hereinafter called "Facilities," over, under or across property owned or controlled by Licensor, at the below described location(s):

1. One (1) sixty inch (60") diameter pipeline crossing, solely for the conveyance of potable water, located at or near Atlanta, Fulton County, Georgia, Atlanta Division, Atlanta Terminal Subdivision, Milepost SG-577.9;

hereinafter, called the "Encroachment," as shown on print(s) labeled Exhibit "A," attached hereto and made a part hereof;

NOW, THEREFORE, in consideration of the mutual covenants, conditions, terms and agreements herein contained, the parties hereto agree and covenant as follows:

1. LICENSE:

1.1 Subject to Article 17, Licensor, insofar as it has the legal right, power and authority to do so, and its present title permits, and subject to:

(A) Licensor's present and future right to occupy, possess and use its property within the area of the Encroachment for any and all purposes;

(B) All encumbrances, conditions, covenants, easements, and limitations applicable to Licensor's title to or rights in the subject property; and

(C) Compliance by Licensee with the terms and conditions herein contained;

does hereby license and permit Licensee to construct, maintain, repair, renew, operate, use, alter or change the Facilities at the Encroachment above for the term herein stated, and to remove same upon termination.

1.2 The term Facilities, as used herein, shall include only those structures and ancillary facilities devoted exclusively to the transmission usage above within the Encroachment, and as shown on attached Exhibit A.

1.3 No additional structures or other facilities shall be placed, allowed, or maintained by Licensee in, upon or on the Encroachment except upon prior separate written consent of Licensor.

2. ENCROACHMENT FEE; TERM:

2.1 Licensee shall pay Licensor a one-time nonrefundable Encroachment Fee of TWENTY-FOUR THOUSAND FOUR HUNDRED EIGHTY AND 00/100 U.S. DOLLARS ($24,480.00) upon execution of this Agreement. Licensee agrees that the Encroachment Fee applies only to the original Licensee under this Agreement. In the event of a successor (by merger, consolidation, reorganization and/or assignment) or if the original Licensee changes its name, then Licensee shall be subject to payment of Licensor's current administrative and document preparation fees for the cost incurred by Licensor in preparing and maintaining this Agreement on a current basis.

2.2 However, Licensee assumes sole responsibility for, and shall pay directly (or reimburse Licensor), any additional annual taxes and/or periodic assessments levied against Licensor or Licensor's property solely on account of said Facilities or Encroachment.

2.3 This Agreement shall terminate as herein provided, but shall also terminate upon: (a) Licensee's cessation of use of the Facilities or Encroachment for the purpose(s) above; (b) removal of the Facilities; (c) subsequent mutual consent; and/or (d) failure of Licensee to complete installation within five (5) years from the effective date of this Agreement.

2.4 In further consideration for the license or right hereby granted, Licensee hereby agrees that Licensor shall not be charged or assessed, directly or indirectly, with any part of the cost of the installation of said Facilities and appurtenances, and/or maintenance thereof, or for any public works project of which said Facilities is a part.

3. CONSTRUCTION, MAINTENANCE AND REPAIRS:

3.1 Licensee shall construct, maintain, relocate, repair, renew, alter, and/or remove the Facilities, in a prudent, workmanlike manner, using quality materials and complying with any applicable standard(s) or regulation(s) of Licensor (CSXT Specifications), or Licensee's particular industry, National Electrical Safety Code, or any governmental or regulatory body having jurisdiction over the Encroachment.

3.2 Location and construction of Facilities shall be made strictly in accordance with design(s) and specifications furnished to and approved by Licensor and of material(s) and size(s) appropriate for the purpose(s) above recited.

3.3 All of Licensee's work, and exercise of rights hereunder, shall be undertaken at time(s) satisfactory to Licensor, and so as to eliminate or minimize any impact on or interference with the safe use and operation of Licensor's property and appurtenances thereto.

3.4 In the installation, maintenance, repair and/or removal of said Facilities, Licensee shall not use explosives of any type or perform or cause any blasting without the separate express written consent of Licensor. As a condition to such consent, a representative will be assigned by Licensor to monitor blasting, and Licensee shall reimburse Licensor for the entire cost and/or expense of furnishing said monitor.

3.5 Any repairs or maintenance to the Facilities, whether resulting from acts of Licensee, or natural or weather events, which are necessary to protect or facilitate Licensor's use of its property, shall be made by Licensee promptly, but in no event later than thirty (30) days after Licensee has notice as to the need for such repairs or maintenance.

3.6 Licensor, in order to protect or safeguard its property, rail operations, equipment and/or employees from damage or injury, may request immediate repair or renewal of the Facilities, and if the same is not performed, may make or contract to make such repairs or renewals, at the sole risk, cost and expense of Licensee.

3.7 Neither the failure of Licensor to object to any work done, material used, or method of construction or maintenance of said Encroachment, nor any approval given or supervision exercised by Licensor, shall be construed as an admission of liability or responsibility by Licensor, or as a waiver by Licensor of any of the obligations, liability and/or responsibility of Licensee under this Agreement.

3.8 All work on the Encroachment shall be conducted in accordance with Licensor's safety rules and regulations.

3.9 Licensee hereby agrees to reimburse Licensor any loss, cost or expense (including losses resulting from train delays and/or inability to meet train schedules) arising from any failure of Licensee to make repairs or conduct maintenance as required by Section 3.5 above or from improper or incomplete repairs or maintenance to the Facilities or Encroachment.

3.10 In the event it becomes necessary for the Licensee to deviate from the approved Exhibit, Licensee shall seek prior approval from CSXT, or when applicable, an official field representative of CSXT permitted to approve changes, authorizing the necessary field changes and Licensee shall provide CSXT with complete As-Built Drawings of the completed work. As-Built Drawings shall be submitted to Licensor in either electronic or hard copy form upon the substantial completion of the project and upon Licensor's request.

3.11 In the event of large scale maintenance/construction work to railroad bridges Licensee is required to protect power lines with insulated covers or comparable safety devices at their costs during construction/maintenance for safety of railroad employees.

4. PERMITS, LICENSES:

4.1 Before any work hereunder is performed, or before use of the Encroachment for the contracted purpose, Licensee, at its sole cost and expense, shall obtain all necessary permit(s) (including but not limited to zoning, building, construction, health, safety or

environmental matters), letter(s) or certificate(s) of approval. Licensee expressly agrees and warrants that it shall conform and limit its activities to the terms of such permit(s), approval(s) and authorization(s), and shall comply with all applicable ordinances, rules, regulations, requirements and laws of any governmental authority (State, Federal or Local) having jurisdiction over Licensee's activities, including the location, contact, excavation and protection regulations of the Occupational Safety and Health Act (OSHA) (29 CFR 1926.651(b)), et al., and State "One Call" - "Call Before You Dig" requirements.

4.2 Licensee assumes sole responsibility for failure to obtain such permit(s) or approval(s), for any violations thereof, or for costs or expenses of compliance or remedy.

5. MARKING AND SUPPORT:

5.1 With respect to any subsurface installation or maintenance upon Licensor's property, Licensee, at its sole cost and expense, shall:

(A) support track(s) and roadbed in a manner satisfactory to Licensor;

(B) backfill with satisfactory material and thoroughly tamp all trenches to prevent settling of surface of land and roadbed of Licensor; and

(C) either remove any surplus earth or material from Licensor's property or cause said surplus earth or material to be placed and distributed at location(s) and in such manner Licensor may approve.

5.2 After construction or maintenance of the Facilities, Licensee shall:

(A) Restore any track(s), roadbed and other disturbed property; and

(B) Erect, maintain and periodically verify the accuracy of aboveground markers, in a form approved by Licensor, indicating the location, depth and ownership of any underground Facilities or related facilities.

5.3 Licensee shall be solely responsible for any subsidence or failure of lateral or subjacent support in the Encroachment area for a period of three (3) years after completion of installation.

6. TRACK CHANGES:

6.1 In the event that rail operations and/or track maintenance result in changes in grade or alignment of, additions to, or relocation of track(s) or other facilities, or in the event future use of Licensor's rail corridor or property necessitate any change of location, height or depth in the Facilities or Encroachment, Licensee, at its sole cost and expense and within thirty (30) days after notice in writing from Licensor, shall make changes in the Facilities or Encroachment to accommodate such track(s) or operations.

6.2 If Licensee fails to do so, Licensor may make or contract to make such changes at Licensee's cost.

7. FACILITY CHANGES:

7.1 Licensee shall periodically monitor and verify the depth or height of the Facilities or Encroachment in relation to the existing tracks and facilities, and shall relocate the Facilities or change the Encroachment, at Licensee's expense, should such relocation or change be necessary to comply with the minimum clearance requirements of Licensor.

7.2 If Licensee undertakes to revise, renew, relocate or change in any manner whatsoever all or any part of the Facilities (including any change in voltage or gauge of wire or any change in circumference, diameter or radius of pipe or change in materials transmitted in and through said pipe), or is required by any public agency or court order to do so, plans therefor shall be submitted to Licensor for approval before such change. After approval, the terms and conditions of this Agreement shall apply thereto.

8. INTERFERENCE WITH RAIL FACILITIES:

8.1 Although the Facilities/Encroachment herein permitted may not presently interfere with Licensor's railroad or facilities, in the event that the operation, existence or maintenance of said Facilities, in the sole judgment of Licensor, causes: (a) interference (including, but not limited to, physical or interference from an electromagnetic induction, or interference from stray or other currents) with Licensor's power lines, communication, signal or other wires, train control system, or electrical or electronic apparatus; or (b) interference in any manner, with the operation, maintenance or use of the rail corridor, track(s), structures, pole line(s), devices, other property, or any appurtenances thereto; then and in either event, Licensee, upon receipt of written notice from Licensor of any such interference, and at Licensee's sole risk, cost and expense, shall promptly make such changes in its Facilities or installation, as may be required in the reasonable judgment of the Licensor to eliminate all such interference. Upon Licensee's failure to remedy or change, Licensor may do so or contract to do so at Licensee's sole cost.

8.2 Without assuming any duty hereunder to inspect the Facilities, Licensor hereby reserves the right to inspect same and to require Licensee to undertake repairs, maintenance or adjustments to the Facilities, which Licensee hereby agrees to make promptly, at Licensee's sole cost and expense.

9. RISK, LIABILITY, INDEMNITY:

With respect to the relative risk and liabilities of the parties, it is hereby agreed that:

9.1 To the fullest extent permitted by State law (constitutional or statutory, as amended), Licensee hereby agrees to, defend, indemnify, and hold Licensor harmless from and against any and all liability, loss, claim, suit, damage, charge or expense which Licensor may suffer, sustain, incur or in any way be subjected to, on account of death of or injury to any person

whomsoever (including officers, agents, employees or invitees of Licensor), and for damage to or loss of or destruction of any property whatsoever, arising out of, resulting from, or in any way connected with the construction, repair, maintenance, replacement, presence, existence, operations, use or removal of the Facilities or any structure in connection therewith, or restoration of premises of Licensor to good order or condition after removal, EXCEPT when proven to have been caused solely by the willful misconduct or gross negligence of Licensor. HOWEVER, to the fullest extent permitted by State law, during any period of actual construction, repair, maintenance, replacement or removal of the Facilities, wherein agents, equipment or personnel of Licensee are on the railroad rail corridor, Licensee's liability hereunder shall be absolute, irrespective of any joint, sole or contributory fault or negligence of Licensor.

9.2 Use of Licensor's rail corridor involves certain risks of loss or damage as a result of the rail operations. Notwithstanding Section 9.1, Licensee expressly assumes all risk of loss and damage to Licensee's Property or the Facilities in, on, over or under the Encroachment, including loss of or any interference with use or service thereof, regardless of cause, including electrical field creation, fire or derailment resulting from rail operations. For this Section, the term "Licensee's Property" shall include property of third parties situated or placed upon Licensor's rail corridor by Licensee or by such third parties at request of or for benefit of Licensee.

9.3 To the fullest extent permitted by State law, as above, Licensee assumes all responsibility for, and agrees to defend, indemnify and hold Licensor harmless from: (a) all claims, costs and expenses, including reasonable attorneys' fees, as a consequence of any sudden or nonsudden pollution of air, water, land and/or ground water on or off the Encroachment area, arising from or in connection with the use of this Encroachment or resulting from leaking, bursting, spilling, or any escape of the material transmitted in or through the Facilities; (b) any claim or liability arising under federal or state law dealing with either such sudden or nonsudden pollution of air, water, land and/or ground water arising therefrom or the remedy thereof; and (c) any subsidence or failure of lateral or subjacent support of the tracks arising from such Facilities leakage.

9.4 Notwithstanding Section 9.1, Licensee also expressly assumes all risk of loss which in any way may result from Licensee's failure to maintain either required clearances for any overhead Facilities or the required depth and encasement for any underground Facilities, whether or not such loss(es) result(s) in whole or part from Licensor's contributory negligence or joint fault.

9.5 Obligations of Licensee hereunder to release, indemnify and hold Licensor harmless shall also extend to companies and other legal entities that control, are controlled by, subsidiaries of, or are affiliated with Licensor, as well as any railroad that operates over the rail corridor on which the Encroachment is located, and the officers, employees and agents of each.

9.6 If a claim is made or action is brought against Licensor, and/or its operating lessee, for which Licensee may be responsible hereunder, in whole or in part, Licensee shall be

notified to assume the handling or defense of such claim or action; but Licensor may participate in such handling or defense.

9.7 Notwithstanding anything contained in this Agreement, the limitation of liability contained in the state statutes, as amended from time to time, shall not limit Licensor's ability to collect under the insurance policies required to be maintained under this Agreement.

10. INSURANCE:

10.1 Prior to commencement of surveys, installation or occupation of premises pursuant to this Agreement, Licensee shall procure and shall maintain during the continuance of this Agreement, at its sole cost and expense, a policy of

(i) Statutory Worker's Compensation and Employers Liability Insurance with available limits of not less than ONE MILLION AND 00/100 U.S. DOLLARS ($1,000,000.00), which must contain a waiver of subrogation against CSXT and its Affiliates;

(ii) Commercial General Liability coverage (inclusive of contractual liability) with available limits of not less than FIVE MILLION AND 00/100 U.S. DOLLARS ($5,000,000.00), naming Licensor, and/or its designee, as additional insured and in combined single limits for bodily injury and property damage and covering the contractual liabilities assumed under this Agreement. The evidence of insurance coverage shall be endorsed to provide for thirty (30) days' notice to Licensor, or its designee, prior to cancellation or modification of any policy. Mail CGL certificate, along with agreement, to CSX Transportation, Inc., Speed Code J180, 500 Water Street, Jacksonville, FL 32202. On each successive year, send certificate to RenewalCOI@csx.com.

(iii) Business automobile liability insurance with available limits of not less than ONE MILLION AND 00/100 U.S. DOLLARS ($1,000,000.00) combined single limit for bodily injury and/or property damage per occurrence;

(iv) Such other insurance as Licensor may reasonably require.

10.2 If Licensee's existing CGL policy(ies) do(es) not automatically cover Licensee's contractual liability during periods of survey, installation, maintenance and continued occupation, a specific endorsement adding such coverage shall be purchased by Licensee. If said CGL policy is written on a "claims made" basis instead of a "per occurrence" basis, Licensee shall arrange for adequate time for reporting losses. Failure to do so shall be at Licensee's sole risk.

10.3 Licensor, or its designee, may at any time request evidence of insurance purchased by Licensee to comply with this Agreement. Failure of Licensee to comply with Licensor's request shall be considered a default by Licensee.

10.4 Securing such insurance shall not limit Licensee's liability under this Agreement, but shall be security therefor.

10.5 (A) In the event Licensee finds it necessary to perform construction or demolition operations within fifty feet (50') of any operated railroad track(s) or affecting any railroad bridge, trestle, tunnel, track(s), roadbed, overpass or underpass, Licensee shall: (a) notify Licensor; and (b) require its contractor(s) performing such operations to procure and maintain during the period of construction or demolition operations, at no cost to Licensor, Railroad Protective Liability (RPL) Insurance, naming Licensor, and/or its designee, as Named Insured, written on the current ISO/RIMA Form (ISO Form No. CG 00 35 01 96) with limits of FIVE MILLION AND 00/100 U.S. DOLLARS ($5,000,000.00) per occurrence for bodily injury and property damage, with at least TEN MILLION AND 00/100 U.S. DOLLARS ($10,000,000.00) aggregate limit per annual policy period, with Pollution Exclusion Amendment (ISO CG 28 31 11 85) if an older ISO Form CG 00 35 is used. The original of such RPL policy shall be sent to and approved by Licensor prior to commencement of such construction or demolition. Licensor reserves the right to demand higher limits.

(B) At Licensor's option, in lieu of purchasing RPL insurance from an insurance company (but not CGL insurance), Licensee may pay Licensor, at Licensor's current rate at time of request, the cost of adding this Encroachment, or additional construction and/or demolition activities, to Licensor's Railroad Protective Liability (RPL) Policy for the period of actual construction. This coverage is offered at Licensor's discretion and may not be available under all circumstances.

10.6 Notwithstanding the provisions of Sections 10.1 and 10.2, Licensee, pursuant to State Statute(s), may self-insure or self-assume, in any amount(s), any contracted liability arising under this Agreement, under a funded program of self-insurance, which fund will respond to liability of Licensee imposed by and in accordance with the procedures established by law.

11. GRADE CROSSINGS; FLAGGING:

11.1 Nothing herein contained shall be construed to permit Licensee or Licensee's contractor to move any vehicles or equipment over the track(s), except at public road crossing(s), without separate prior written approval of Licensor.

11.2 If Licensor deems it advisable, during any construction, maintenance, repair, renewal, alteration, change or removal of said Facilities, to place watchmen, flagmen, inspectors or supervisors for protection of operations of Licensor or others on Licensor's rail corridor at the Encroachment, and to keep persons, equipment or materials away from the track(s), Licensor shall have the right to do so at the expense of Licensee, but Licensor shall not be liable for failure to do so.

12. LICENSOR'S COSTS:

12.1 Any additional or alternative costs or expenses incurred by Licensor to accommodate Licensee's continued use of Licensor's property as a result of track changes or wire changes shall also be paid by Licensee.

12.2 Licensor's expense for wages ("force account" charges) and materials for any work performed at the expense of Licensee pursuant hereto shall be paid by Licensee within thirty (30) days after receipt of Licensor's bill therefor. Licensor may, at its discretion, request an advance deposit for estimated Licensor costs and expenses.

12.3 Such expense shall include, but not be limited to, cost of railroad labor and supervision under "force account" rules, plus current applicable overhead percentages, the actual cost of materials, and insurance, freight and handling charges on all material used. Equipment rentals shall be in accordance with Licensor's applicable fixed rate. Licensor may, at its discretion, require advance deposits for estimated costs of such expenses and costs.

13. DEFAULT, BREACH, WAIVER:

13.1 The proper and complete performance of each covenant of this Agreement shall be deemed of the essence thereof, and in the event Licensee fails or refuses to fully and completely perform any of said covenants or remedy any breach within thirty (30) days after receiving written notice from Licensor to do so (or within forty-eight (48) hours in the event of notice of a railroad emergency), Licensor shall have the option of immediately revoking this Agreement and the privileges and powers hereby conferred, regardless of encroachment fee(s) having been paid in advance for any annual or other period. Upon such revocation, Licensee shall make removal in accordance with Article 14.

13.2 No waiver by Licensor of its rights as to any breach of covenant or condition herein contained shall be construed as a permanent waiver of such covenant or condition, or any subsequent breach thereof, unless such covenant or condition is permanently waived in writing by Licensor.

13.3 Neither the failure of Licensor to object to any work done, material used, or method of construction or maintenance of said Encroachment, nor any approval given or supervision exercised by Licensor, shall be construed as an admission of liability or responsibility by Licensor, or as a waiver by Licensor of any of the obligations, liability and/or responsibility of Licensee under this Agreement.

14. TERMINATION, REMOVAL:

14.1 All rights which Licensee may have hereunder shall cease upon the date of (a) termination, (b) revocation, or (c) subsequent agreement, or (d) Licensee's removal of the Facility from the Encroachment. However, neither termination nor revocation of this Agreement shall affect any claims and liabilities which have arisen or accrued hereunder, and which at the time of termination or revocation have not been satisfied; neither party, however, waiving any third party defenses or actions.

14.2 Within thirty (30) days after revocation or termination, Licensee, at its sole risk and expense, shall (a) remove the Facilities from the rail corridor of Licensor, unless the parties hereto agree otherwise, (b) restore the rail corridor of Licensor in a manner satisfactory to

Licensor, and (c) reimburse Licensor any loss, cost or expense of Licensor resulting from such removal.

15. NOTICE:

15.1 Licensee shall give Licensor at least thirty (30) days written notice before doing any work on Licensor's rail corridor, except that in cases of emergency shorter notice may be given. Licensee shall provide proper notification as follows:

a. For non-emergencies, Licensee shall submit online via the CSX Property Portal from Licensor's web site, via web link: https://propertyportal.csx.com/pub_ps_res/ps_res/jsf/public/index.faces

b. For emergencies, Licensee shall complete all of the steps outlined in Section 15.1 a. above, and shall also include detailed information of the emergency. Licensee shall also call and report details of the emergency to Licensor's Rail Operations Emergency Telephone Number: 1-800-232-0144. In the event Licensor needs to contact Licensee concerning an emergency involving Licensee's Facility(ies), the emergency phone number for Licensee is: 678-560-2557.

15.2 All other notices and communications concerning this Agreement shall be addressed to Licensee at the address above, and to Licensor at the address shown on Page 1, c/o CSXT Contract Management, J180; or at such other address as either party may designate in writing to the other.

15.3 Unless otherwise expressly stated herein, all such notices shall be in writing and sent via Certified or Registered Mail, Return Receipt Requested, or by courier, and shall be considered delivered upon: (a) actual receipt, or (b) date of refusal of such delivery.

16. ASSIGNMENT:

16.1 The rights herein conferred are the privileges of Licensee only, and Licensee shall obtain Licensor's prior written consent to any assignment of Licensee's interest herein; said consent shall not be unreasonably withheld.

16.2 Subject to Sections 2 and 16.1, this Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors or assigns.

16.3 Licensee shall give Licensor written notice of any legal succession (by merger, consolidation, reorganization, etc.) or other change of legal existence or status of Licensee, with a copy of all documents attesting to such change or legal succession, within thirty (30) days thereof.

16.4 Licensor expressly reserves the right to assign this Agreement, in whole or in part, to any grantee, lessee, or vendee of Licensor's underlying property interests in the Encroachment, upon written notice thereof to Licensee.

16.5 In the event of any unauthorized sale, transfer, assignment, sublicense or encumbrance of this Agreement, or any of the rights and privileges hereunder, Licensor, at its option, may revoke this Agreement by giving Licensee or any such assignee written notice of such revocation; and Licensee shall reimburse Licensor for any loss, cost or expense Licensor may incur as a result of Licensee's failure to obtain said consent.

17. TITLE:

17.1 Licensee understands that Licensor occupies, uses and possesses lands, rights-of-way and rail corridors under all forms and qualities of ownership rights or facts, from full fee simple absolute to bare occupation. Accordingly, nothing in this Agreement shall act as or be deemed to act as any warranty, guaranty or representation of the quality of Licensor's title for any particular Encroachment or segment of Rail Corridor occupied, used or enjoyed in any manner by Licensee under any rights created in this Agreement. It is expressly understood that Licensor does not warrant title to any Rail Corridor and Licensee will accept the grants and privileges contained herein, subject to all lawful outstanding existing liens, mortgages and superior rights in and to the Rail Corridor, and all leases, licenses and easements or other interests previously granted to others therein.

17.2 The term "license," as used herein, shall mean with regard to any portion of the Rail Corridor which is owned by Licensor in fee simple absolute, or where the applicable law of the State where the Encroachment is located otherwise permits Licensor to make such grants to Licensee, a "permission to use" the Rail Corridor, with dominion and control over such portion of the Rail Corridor remaining with Licensor, and no interest in or exclusive right to possess being otherwise granted to Licensee. With regard to any other portion of Rail Corridor occupied, used or controlled by Licensor under any other facts or rights, Licensor merely waives its exclusive right to occupy the Rail Corridor and grants no other rights whatsoever under this Agreement, such waiver continuing only so long as Licensor continues its own occupation, use or control. Licensor does not warrant or guarantee that the license granted hereunder provides Licensee with all of the rights necessary to occupy any portion of the Rail Corridor. Licensee further acknowledges that it does not have the right to occupy any portion of the Rail Corridor held by Licensor in less than fee simple absolute without also receiving the consent of the owner(s) of the fee simple absolute estate. Further, Licensee shall not obtain, exercise or claim any interest in the Rail Corridor that would impair Licensor's existing rights therein.

17.3 Licensee agrees it shall not have nor shall it make, and hereby completely and absolutely waives its right to, any claim against Licensor for damages on account of any deficiencies in title to the Rail Corridor in the event of failure or insufficiency of Licensor's title to any portion thereof arising from Licensee's use or occupancy thereof.

17.4 Licensee agrees to fully and completely indemnify and defend all claims or litigation for slander of title, overburden of easement, or similar claims arising out of or based upon the Facilities placement, or the presence of the Facilities in, on or along any Encroachment(s), including claims for punitive or special damages.

17.5 Licensee shall not at any time own or claim any right, title or interest in or to Licensor's property occupied by the Encroachments, nor shall the exercise of this Agreement for any length of time give rise to any right, title or interest in Licensee to said property other than the license herein created.

17.6 Nothing in this Agreement shall be deemed to give, and Licensor hereby expressly waives, any claim of ownership in and to any part of the Facilities.

17.7 Licensee shall not create or permit any mortgage, pledge, security, interest, lien or encumbrances, including without limitation, tax liens and liens or encumbrances with respect to work performed or equipment furnished in connection with the construction, installation, repair, maintenance or operation of the Facilities in or on any portion of the Encroachment (collectively, "Liens or Encumbrances"), to be established or remain against the Encroachment or any portion thereof or any other Licensor property.

17.8 In the event that any property of Licensor becomes subject to such Liens or Encumbrances, Licensee agrees to pay, discharge or remove the same promptly upon Licensee's receipt of notice that such Liens or Encumbrances have been filed or docketed against the Encroachment or any other property of Licensor; however, Licensee reserves the right to challenge, at its sole expense, the validity and/or enforceability of any such Liens or Encumbrances.

18. GENERAL PROVISIONS:

18.1 This Agreement, and the attached specifications, contains the entire understanding between the parties hereto.

18.2 Neither this Agreement, any provision hereof, nor any agreement or provision included herein by reference, shall operate or be construed as being for the benefit of any third person.

18.3 Except as otherwise provided herein, or in any Rider attached hereto, neither the form of this Agreement, nor any language herein, shall be interpreted or construed in favor of or against either party hereto as the sole drafter thereof.

18.4 This Agreement is executed under current interpretation of applicable Federal, State, County, Municipal or other local statute, ordinance or law(s). However, each separate division (paragraph, clause, item, term, condition, covenant or agreement) herein shall have independent and severable status for the determination of legality, so that if any separate division is determined to be void or unenforceable for any reason, such determination shall have no effect upon the validity or enforceability of each other separate division, or any combination thereof.

18.5 This Agreement shall be construed and governed by the laws of the state in which the Facilities and Encroachment are located.

18.6 If any amount due pursuant to the terms of this Agreement is not paid by the due date, it will be subject to Licensor's standard late charge and will also accrue interest at eighteen percent (18%) per annum, unless limited by local law, and then at the highest rate so permitted.

18.7 Licensee agrees to reimburse Licensor for all reasonable costs (including attorney's fees) incurred by Licensor for collecting any amount due under the Agreement.

18.8 The provisions of this License are considered confidential and may not be disclosed to a third party without the consent of the other party(s), except: (a) as required by statute, regulation or court order, (b) to a parent, affiliate or subsidiary company, (c) to an auditing firm or legal counsel that are agreeable to the confidentiality provisions, or (d) to Lessees of Licensor's land and/or track who are affected by the terms and conditions of this Agreement and will maintain the confidentiality of this Agreement.

18.9 Within thirty (30) days of an overpayment in a cumulative total amount of One Hundred Dollars ($100.00) or more by Licensee to Licensor, Licensee shall notify Licensor in writing with documentation evidencing such overpayment. Licensor shall refund the actual amount of Licensee's overpayment within 120 days of Licensor's verification of such overpayment.

[Signatures on the following page]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement in duplicate (each of which shall constitute an original) as of the effective date of this Agreement.

Witness for Licensor:

_____

CSX TRANSPORTATION, INC.

By: _____

Print/Type Name: Ray E. Birkholz

Director, Real Estate Services

Print/Type Title: _____

Witness for Licensee:

_____

CITY OF ATLANTA

By: _____

Who, by the execution hereof, affirms that he/she has the authority to do so and to bind the Licensee to the terms and conditions of this Agreement.

Print/Type Name: DAVID L. WILSON II

Print/Type Title: CHIEF PROCUREMENT OFFICER

Tax ID No.: 58 6000511

Recommended By: _____

KISHIA L. POWELL
COMMISSIONER, DWM

Name Title

APPROVED AS TO FORM:

_____

City Attorney, Sr. Asst.

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By: Ray E. Birkholz

Print/Type Name: Ray E. Birkholz
Director, Real Estate Sales

Print/Type Title:

Witness for Licensee:

CITY OF ATLANTA

By:

Who, by the execution hereof, affirms that he/she has the authority to do so and to bind the Licensee to the terms and conditions of this Agreement.

Print/Type Name: DAVID L. WILSON II

Print/Type Title: CHIEF PROCUREMENT OFFICER

Tax ID No.: 580600511

Recommended By:

KISHIA L. POWELL
COMMISSIONER, DWM

Name Title

APPROVED AS TO FORM:

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By: Ray E. Birkholz

Print/Type Name: Ray E. Birkholz
Director, Real Estate Services

Print/Type Title:

Witness for Licensee:

CITY OF ATLANTA

By:

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Print/Type Title: CHIEF PROCUREMENT OFFICER

Tax ID No.: 586000511

Recommended By:

KISHIA L. POWELL
COMMISSIONER, DWM
Name Title

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Director, Real Estate Services

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Tax ID No.: 586000511

Recommended By: _____
KISHIA L. POWELL
COMMISSIONER, DWM

Name Title

APPROVED AS TO FORM:

_____
City Attorney Sr. Asst.

Vol 4 Additional Information

River Intake Pump Station

Part 5 – River Intake Shaft Workplan

-Not for Construction-

Current Ground Elevation

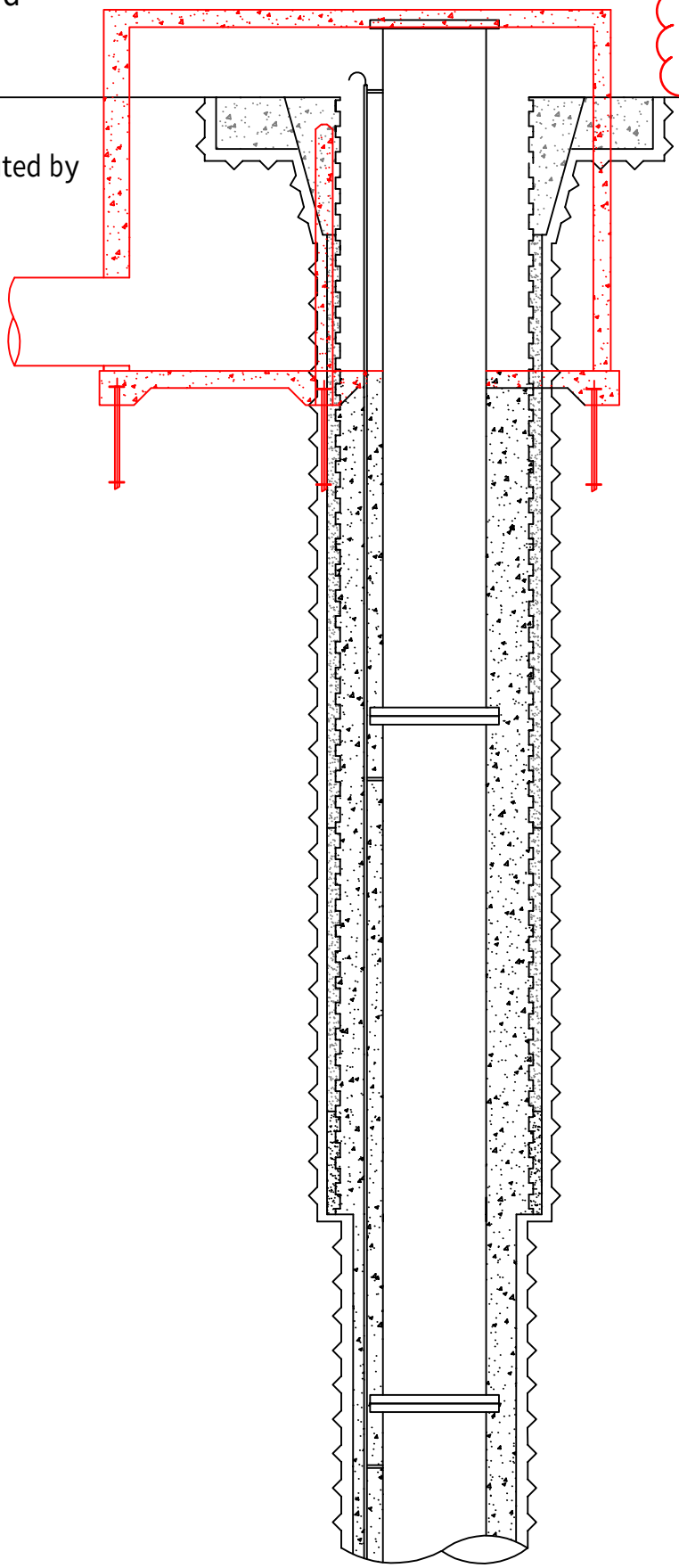
EL. 850

Excavation executed by future contractor.

EL. 834

EL. 807

EL. 785



Not Issued for Construction:
For information only

ATKINSON CONSTRUCTION | TECHNIQUE concrete construction
Excellence is the standard, not the goal

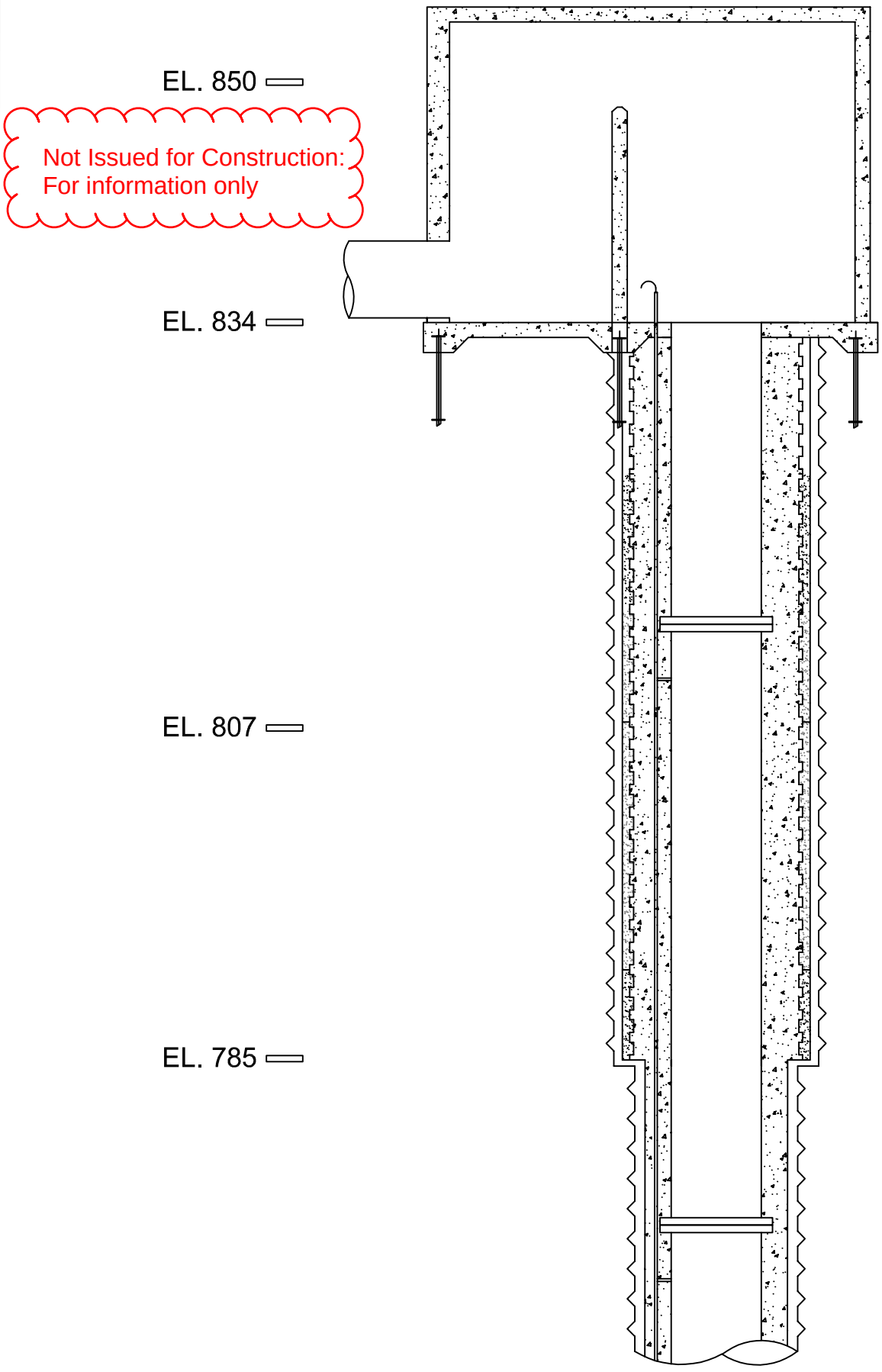
RIPS Steel Casing Pipe Install

River Inflow Shaft

QUARRY, TUNNELING & SHAFT WORK
Water Supply Program – Phase I

Rev. –
Scale NTS
Dwn by TG
3 March 2018

Sheet 2 of 2



ATKINSON CONSTRUCTION | TECHNIQUE concrete construction — Excellence is the standard, not the goal

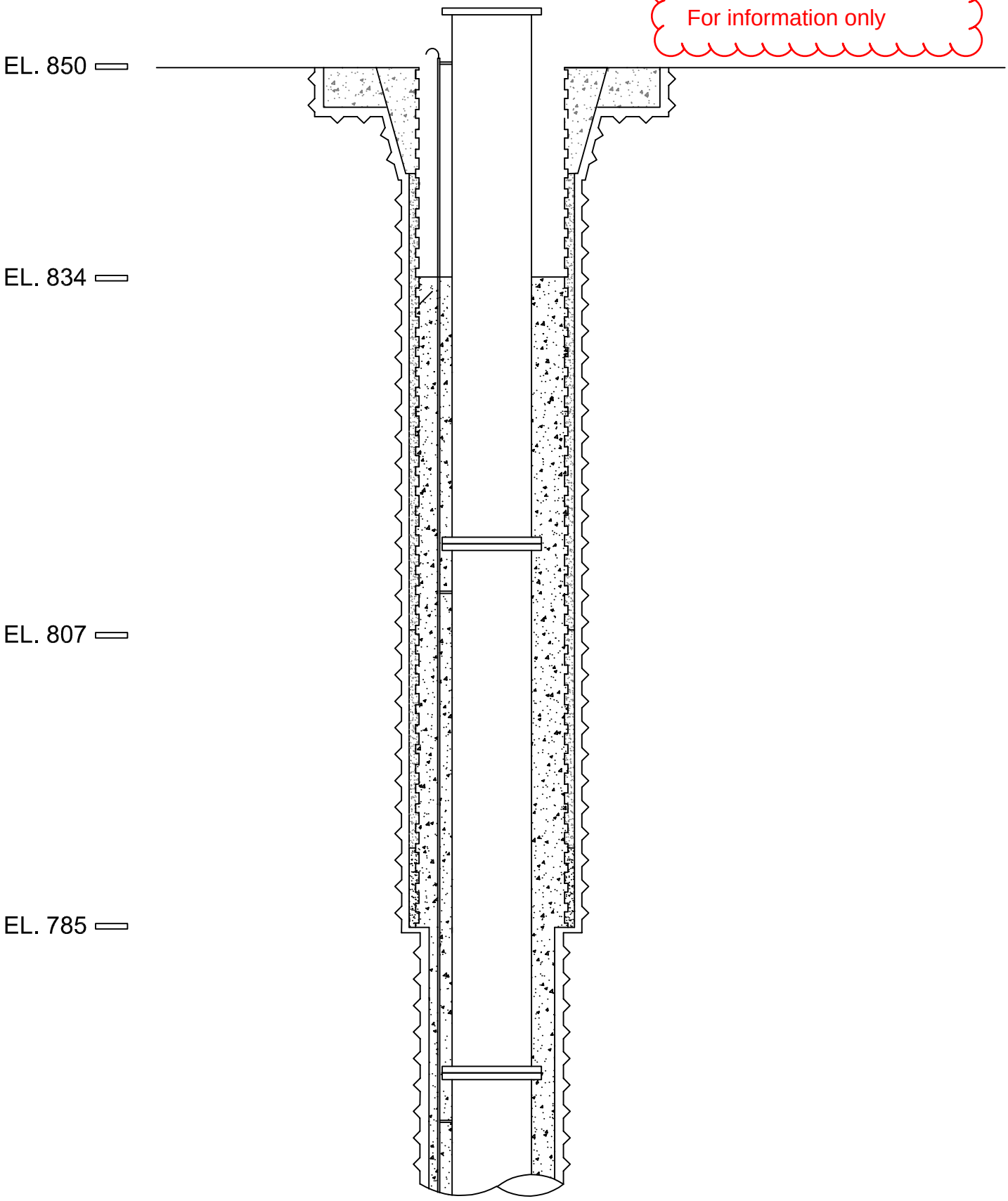
RIPS Steel Casing Pipe Install

QUARRY, TUNNELING & SHAFT WORK
Water Supply Program – Phase I

River Inflow Shaft

Rev.	Scale	Dwn by		Sheet
–	NTS	TG	3 March 2018	2 of 2

Not Issued for Construction:
For information only



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River Inflow Shaft

Rev.	Scale	Drn by		Sheet
–	NTS	TG	3 March 2018	2 of 2

Vol 4 Additional Information

River Intake Pump Station

Part 6 – Product Data

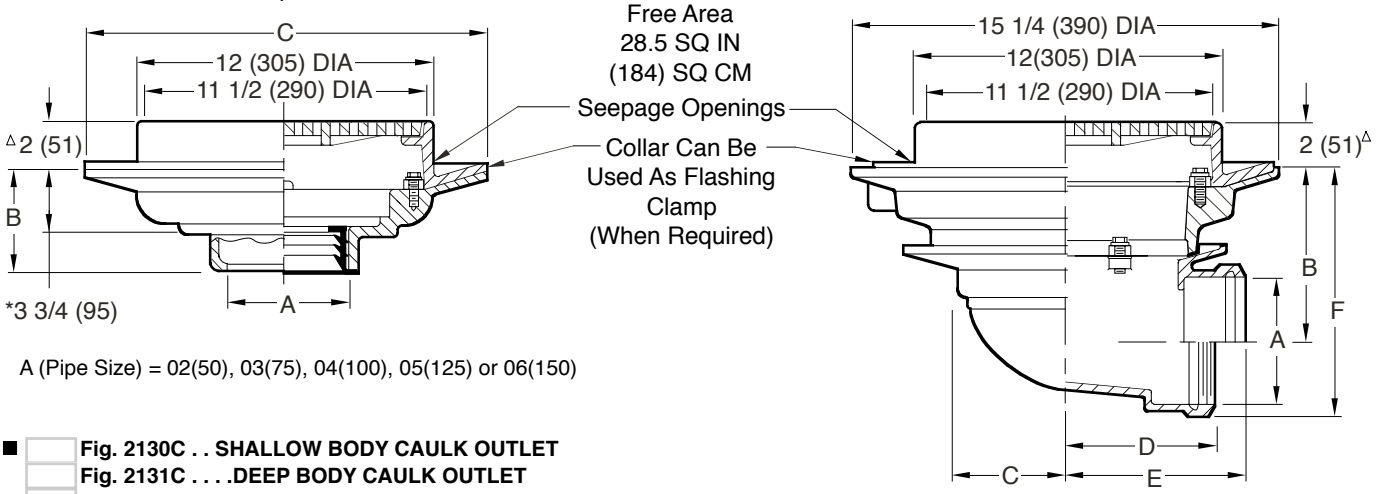
SMITH® JAY R. SMITH MFG. CO.®
MEMBER OF MORRIS GROUP INTERNATIONAL
POST OFFICE BOX 3237
MONTGOMERY, ALABAMA 36109-0237 (USA)
TEL: 334-277-8520 FAX: 334-272-7396 www.jrsmith.com
CUSTOMER DRIVEN SINCE 1926
MEMBER OF:

LOCATION

FLOOR DRAINS
WITH 12" (305) ROUND TOPS

MEDIUM DUTY DRAINS

FUNCTION: Used in moderate traffic areas where waste water contains no sediment or debris and floor construction requires a shallow drain. Body flange and flashing collar serve as anchor in on grade locations and as flashing clamp when installed in waterproof floors.



A (Pipe Size) = 02(50), 03(75), 04(100), 05(125) or 06(150)

■ **Fig. 2130C . . SHALLOW BODY CAULK OUTLET**
Fig. 2131C . . . .DEEP BODY CAULK OUTLET
Fig. 2131Y . . . .DEEP BODY NO-HUB OUTLET

Fig. 2135C . . . .CAULK OUTLET
Fig. 2135T . . . .THREADED OUTLET

Figure	B			C
	Caulk	Thread	NO-HUB	DIA
2130	3 3/4 (95)	3 3/4 (95)	5 (125)	**15 1/4 (390)
2131	5 (125)	3 3/4 (95)	5 (125)	15 1/4 (390)

** Dimension is 16 (405) for Caulk outlet.

A SIZE	02 (50)	03 (75)	04 (100)	05 (125)	06 (150)
B	6 7/8 (175)	6 3/8 (162)	5 7/8 (149)	5 (125)	4 1/2 (115)
C	4 3/4 (120)	4 3/4 (120)	4 3/4 (120)	6 1/4 (160)	6 1/4 (160)
D	6 (150)	6 (150)	6 (150)	6 5/8 (168)	6 7/8 (175)
E	7 1/4 (185)	7 1/2 (190)	7 3/4 (195)	7 3/4 (195)	7 3/4 (195)
F	8 5/8 (219)	8 3/4 (220)	8 3/4 (220)	8 1/2 (215)	8 1/2 (215)

REGULARLY FURNISHED:
Duco Cast Iron Body and Flashing Collar with Cast Iron Bar Grate.

*This Dimension to Internal Stop of Speedi-Set Gasket.

Δadd 3/8" (10) when hinged top is specified.

Δadd 1/8" (3) when bronze top is specified.

■ Meets U. S. Gov't Spec. WW-P-541-b. Type 220 04" (100) size only.

VARIATIONS:
- Deflector Grate -DG
- Dome Grate -D
- Flat Bottom Strainer -FBS
- Hinged Grate -H
- L Speedi-Set Service Weight 2(50), 3(75) & 4" (100) sizes only (Fig. 2131 only)
- LXH Speedi-Set Extra Heavy 2(50), 3(75) & 4"(100) sizes only (Fig. 2131only)
- NO-HUB Adaptor (Specify Fig. 2646Y) (Fig. 2130 & 2135 only)
- Sediment Bucket -B
- Solid Scoriated Cover -SC
- Square Top -S
- Trap Primer Connection -P050 1/2" (13) & -P075 3/4" (19) (Fig. 2131,2131Y & 2135 only)
- Vandal Proof Grate -U
- Wide Flange Deck Drain (Specify Fig. DX2566)
- T Threaded Outlet
- Quad Close Trap Seal (Specify Fig. 2692) (Fig. 2130 & 2131 Only)

OPTIONAL MATERIALS:
- Ductile Iron Grate -M
- Galvanized Cast Iron -G
- Nickel Bronze Top -NB
- Polished Bronze Top -PB

NOTE: 02(50), 03(75), & 04"(100) sizes require a transition collar (as shown in above illustration) which fits between the body & collar. 05(125) & 06"(150) sizes do not require transition collar.

NOTE: Dimensions shown in parentheses are in millimeters.

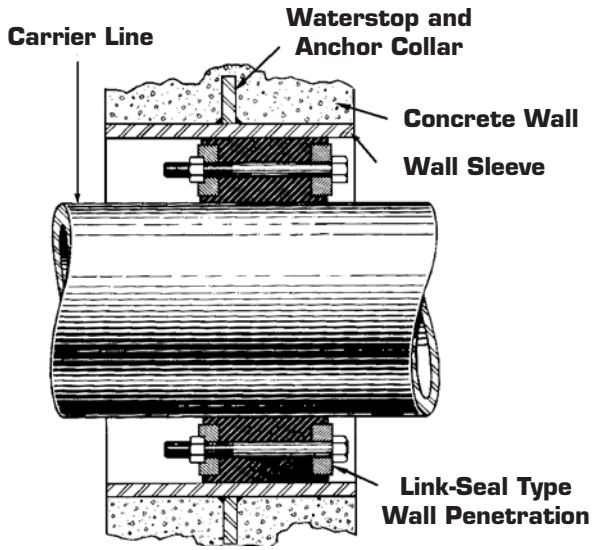
REV.	DATE	DESCRIPTION	BY	CKD. BY
J	6-11-15	Revised Variations	TBW	CL
H	1-10-07	Revised Millimeters	RN	CL
G	1-18-96	Revised	TBW	BS
F	6-15-95	Added Millimeters	EMB	BS

WEIGHT POUNDS | VOLUME CUBIC FEET | FIGURE NUMBER **2130, 2131, 2135**

FIGURE NUMBER **2130, 213, 2135** | DRAWN BY: **BS** | CHECKED BY: **TD** | APPROVED BY: **TD** | DATE: **5-17-85** | SCALE: **NONE** | SIZE **A** | DRAWING NUMBER **S2130** | **J**

Wall Sleeves

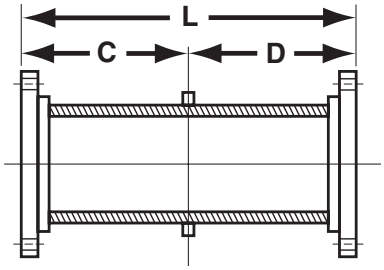
Wall Sleeves



Cut-away of completed Link-Seal and sleeve installation.

For concrete wall or floor penetration we offer fabricated steel wall sleeves. Sleeves are specifically fabricated for use with Link-Seal,which provides hydrostatic sealing of annular space between pipes and sleeves. Link-Seal is available in eight (8) different thicknesses to fit various size spaces.

Wall Pipe



ORDERING NOTES:

- Wall Pipe may have screwed on or cast MJ Bell at discretion of manufacturer. Screw on bells may be tapped for stud bolts for flush mount.
- Fabricated Wall Pipe and Wall Sleeves are made to order, and are NOT RETURNABLE.
- Dimensions "C", "D" and "L" are required to enter order. O.D. of seep ring is O.D. of the pipe plus 3-inches.
- Minimum length is 6-inches face to face.

Link–Seal®

Link-Seals are synthetic rubber interlocking links for sealing pipes through walls, floors and casings.

Design Considerations:

Link–Seal Saves Time And Money

Link-Seal installs in up to 75% less time compared to lead-oakum joints, hand-fitted flashings, mastics, or casing boots. This means important cost savings.

Positive Hydrostatic Sealing

Properly installed, Link-Seal is rated at 20 psig (40 feet of head), which exceeds the performance requirements of most applications.

Long Seal Life

Link-Seal is designed for use as a permanent seal. Many installations have been in service for 25 years. Seal elements are specially compounded to resist aging, ozone, sunlight, water and a wide range of chemicals.

Seals and Pipe

If it's round, Link-Seal can seal it! Applications include concrete, cast iron, steel, copper, plastic, electrical and telecommunications cable.

Corrosion Protection

Where insulation against galvanic corrosion (or electrolysis) is required, Link-Seal provides complete separation of pipe and casing. Metal-to-metal contact is eliminated.

Compensates for Misalignment

Link-Seal allows for some angular and off-center pipe conditions and still seals effectively.

Absorbs Shocks, Sound and Vibration

This inherent benefit of Link-Seal helps reduce pipe failures due to fatigue at welds, flanges and threaded connections.

LINK SEAL®	SIZE	PRODUCT NUMBER
	LS-200-C	28275
	LS-275-C	28276
	LS-300-C	28277
	LS-315-C	28278
	LS-325-C	28279
	LS-400-C	28281
	LS-425-C	28283
	LS-475-C	28285
	LS-500-C	28287
	LS-525-C	28289
	LS-575-C	28290
	LS-600-C	28291

Phone: 800-EJP-24HR (357-2447) • Fax: 207-582-5637

Pipe A-45

Wall Sleeves

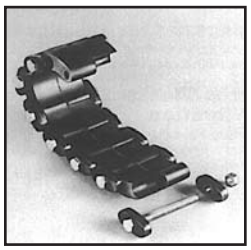
Link–Seal® For Ductile Iron Pipe (AWWA-Type)

NOM. PIPE SIZE	ACTUAL OUTSIDE DIAMETER (O.D) (inches)	CS MODEL PLASTIC SLEEVE			STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		PLASTIC SLEEVE MODEL	LINK-SEAL SIZE NO.**	LINKS PER SEAL	STEEL SLEEVE SIZE (inches)	LINK-SEAL SIZE NO.**	LINKS PER SEAL	HOLE I.D.	LINK-SEAL SIZE NO.**	LINKS PER SEAL
2"	2.50	CS-4-*	LS-300-***	6	WS-3½-22-S-*	LS-200-***	8	4.00	LS-300-***	6
2¼"	2.75	CS-4-*	LS-275-***	10	WS-4-23-S-*	LS-200-***	9	4.00	LS-200-***	9
3"	3.96	CS-6-*	LS-340-***	10	WS-6-18-S-*	LS-340-***	10	6.00	LS-315-***	10
4"	4.80	CS-8-*	LS-475-***	8	WS-8-18-S-*	LS-475-***	8	8.00	LS-410-***	7
6"	6.90	CS-10-*	LS-475-***	10	WS-10-36-S-*	LS-410-***	10	10.00	LS-410-***	10
8"	9.05	CS-12-*	LS-400-***	9	WS-12-37-S-*	LS-400-***	9	12.00	LS-400-***	9
10"	11.10	CS-14-*	LS-410-***	15	WS-14-37-S-*	LS-340-***	24	14.00	LS-410-***	15
12"	13.20	CS-18-*	LS-575-***	15	WS-16-37-S-*	LS-340-***	28	16.00	LS-400-***	12
14	15.30	CS-20-*	LS-575-***	17	WS-20-37-S-*	LS-575-***	17	18.00	LS-360-***	24
16	17.40	CS-22-*	LS-360-***	28	WS-22-37-S-*	LS-575-***	19	20.00	LS-360-***	27
18	19.50	CS-24-*	LS-410-***	25	WS-24-37-S*	LS-575-***	21	22.00	LS-360-***	30
20	21.60	CS-25-*	LS-400-***	20	WS-26-37-S-*	LS-575-***	23	26.00	LS-525-***	19
24	25.80	CC-30-**	LS-400-***	23	WS-30-37-S-*	LS-400-***	23	28.00	LS-425-***	23
30	32.00	CC-38-**	LS-500-***	28	WS-36-37-S-*	LS-400-***	29	36.00	LS-575-***	34
36	38.30	CC-44-**	LS-500-***	33	WS-44½-37-S-*	LS-500-***	33	43.00	LS-500-***	33
42	44.50	CC-50-**	LS-500-***	38	WS-50-37-S-*	LS-500-***	38	49.00	LS-525-***	38
48	50.80	CC-56-**	LS-500-***	43	WS-57-37-S-*	LS-500-***	43	56.00	LS-500-***	43

*=Specify sleeve length in inches, **=See Cell-Cast® catalog, ***=Specify LS Model C, S-316, L…etc when ordering (Example LS-475-C-17)
NOTE: WS rolled sleeves (6" & 8") =.1875" wall thickness; (10") = .25" wall thickness.

NOTE: See next page for Steel, Plastic and Copper Link-Seal sizes. Link-Seal will work with most other types of pipe and will accommodate odd opening sizes. Please call your local Team EJP sales office for assistance.

Complete Installation in less than 5 minutes



1 **Link-Seal is shipped as a belt of interconnected rubber links.**

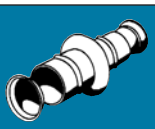
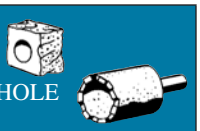
2 **Wrap the belt around the pipe. Then connect the first and last links.**

3 **Slide the assembly into the space between the pipe and wall.**

4 **When the bolts are tightened, Link Seal expands to create a gas and watertight seal.**

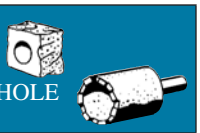
Wall Sleeves

Link-Seal® For Steel and Plastic Pipe With Same Outside Diameter

NOM. PIPE SIZE	ACTUAL OUTSIDE DIAMETER (O.D)	CS MODEL NON-METALIC SLEEVE 			STEEL SLEEVE 			CAST OR CORE BIT DRILLED HOLE 		
		SLEEVE MODEL	LINK-SEAL SIZE	LINKS PER SEAL	STEEL SLEEVE	LINK-SEAL SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL SIZE	LINKS PER SEAL
½"	0.840"	CS-3-*	LS-315-***	4	WS-2-15-S*	LS-275-***	5	2.000	LS-200-***	4
¾"	1.050"	CS-3-*	LS-315-***	4	WS-2½-20-S-*	LS-275-***	6	3.000	LS-315-***	4
1"	1.315"	CS-3-*	LS-300-***	4	WS-2½-20-S-*	LS-200-***	5	3.000	LS-300-***	4
1¼"	1.660"	CS-3-*	LS-275-***	7	WS-3-21-S-*	LS-275-***	8	3.000	LS-275-***	8
1½"	1.900"	CS-3½-*	LS-300-***	5	WS-3-21-S-*	LS-200-***	7	4.000	LS-315-***	6
2"	2.375"	CS-4-*	LS-300-***	6	WS-3½-22-S-*	LS-200-***	8	4.000	LS-300-***	6
2½"	2.875"	CS-4-*	LS-200-***	9	WS-4-23-S-*	LS-200-***	9	4.000	LS-200-***	9
3"	3.500"	CS-5-*	LS-315-***	9	WS-6-28-S-*	LS-360-***	7	5.000	LS-300-***	8
3½"	4.000"	CS-6-*	LS-340-***	10	WS-6-18-S-*	LS-340-***	10	6.000	LS-315-***	10
4"	4.500"	CS-6-*	LS-300-***	10	WS-6-18-S-*	LS-315-***	11	6.000	LS-300-***	10
5"	5.563"	CS-8-*	LS-360-***	10	WS-8-18-S*	LS-360-***	10	8.000	LS-340-***	13
6"	6.625"	CS-10-*	LS-475-***	10	WS-8-18-S-*	LS-315-***	15	10.000	LS-475-***	10
8"	8.625"	CS-12-*	LS-475-***	12	WS-10-25-S-*	LS-315-***	20	12.000	LS-475-***	12
10"	10.750"	CS-14-*	LS-410-***	15	WS-14-37-S-*	LS-360-***	17	14.000	LS-475-***	14
12"	12.750"	CS-18-*	LS-475-***	17	WS-16-37-S-*	LS-360-***	20	16.000	LS-475-***	17
14"	14.000"	CS-20-*	LS-340-***	30	WS-18-37-S-*	LS-475-***	18	18.000	LS-575-***	16
16"	16.000"	CS-22-*	LS-410-***	21	WS-20-37-S-*	LS-475-***	21	20.000	LS-575-***	18
18"	18.000"	CS-24-*	LS-340-***	38	WS-22-37-S*	LS-475-***	23	22.000	LS-575-***	20
20"	20.000"	CS-25-*	LS-500-***	18	WS-24-37-S-*	LS-475-***	25	24.000	LS-575-***	22
22"	22.000"	CS-25-*	LS-360-***	34	WS-26-37-S-*	LS-475-***	28	26.000	LS-575-***	24
24"	24.000"	CC-30-**	LS-500-***	21	WS-28-37-S-*	LS-475-***	30	28.000	LS-575-***	26

*=Specify sleeve length in inches **=See Cell-Cast® catalog ***=Specify LS Model C, S-316, L…etc when ordering (Example LS-475-C-17)
NOTE: WS rolled sleeves (6" & 8") =.1875" wall thickness; (10") = .25" wall thickness.

Link-Seal® For Copper Tubing

NOM. PIPE SIZE	ACTUAL OUTSIDE DIAMETER (O.D)	CS MODEL NON-METALIC SLEEVE 			STEEL SLEEVE 			CAST OR CORE BIT DRILLED HOLE 		
		SLEEVE MODEL	LINK-SEAL SIZE	LINKS PER SEAL	STEEL SLEEVE	LINK-SEAL SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL SIZE	LINKS PER SEAL
½"	.625"	CS-2-*	LS-275-***	4	WS-2-15-S*	LS-275-***	5	2.000	LS-275-***	4
¾"	.875"	CS-3-*	LS-315-***	4	WS-2½-20-S-*	LS-275-***	6	2.000	LS-200-***	4
1"	1.13"	CS-3-*	LS-315-***	4	WS-2½-20-S-*	LS-275-***	6	3.000	LS-315-***	4
1¼"	1.38"	CS-3-*	LS-275-***	8	WS-2½-20-S-*	LS-200-***	5	3.000	LS-300-***	4
1½"	1.63"	CS-3-*	LS-275-***	8	WS-3-21-S-*	LS-275-***	8	3.000	LS-275-***	8
2"	2.13 "	CS-4-*	LS-315-***	6	WS-3½-22-S-*	LS-275-***	10	4.000	LS-315-***	6

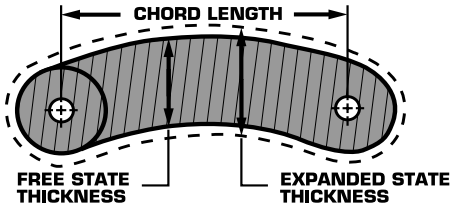
*=Specify sleeve length in inches **=See Cell-Cast® catalog ***=Specify LS Model C, S-316, L…etc when ordering (Example LS-475-C-17)
NOTE: WS rolled sleeves (6" & 8") =.1875" wall thickness; (10") = .25" wall thickness.

Phone: 800-EJP-24HR (357-2447) • Fax: 207-582-5637

Pipe A-47

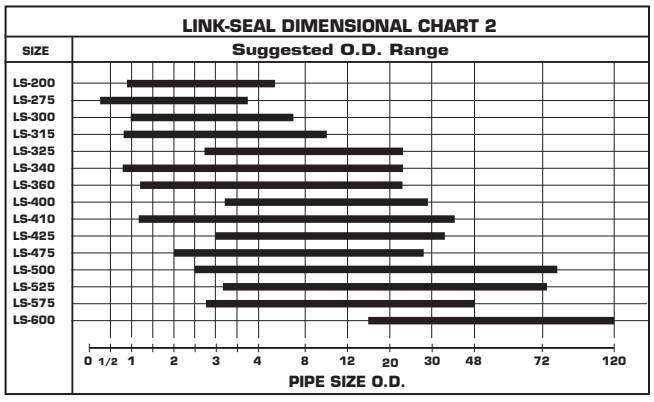
Wall Sleeves

Link-Seal Dimensional Chart 1



LINK-SEAL SIZE	FREE STATE THICKNESS*	EXPANDED STATE THICKNESS	CHORD LENGTH
LS-200	0.50"	0.64"	1.120"
LS-275	0.62"	0.80"	0.906"
LS-300	0.71"	0.92"	1.510"
LS-315	0.82"	1.10"	1.469"
LS-325	0.94"	1.14"	3.110"
LS-340	1.05"	1.33"	1.575"
LS-360	1.29"	1.65"	2.106"
LS-400	1.43"	1.87"	3.622"
LS-410	1.48"	1.91"	2.598"
LS-425	1.13"	1.43"	3.622"
LS-475	1.62"	2.08"	2.630"
LS-500	2.37"	2.81"	3.860"
LS-525	2.18"	2.58"	3.860"
LS-575	1.88"	2.35"	3.100"
LS-600	3.20"	4.00"	6.000"

*= **Free State Thickness** includes an insertion tolerance and therefore, differes from the **actual thickness** as listed in Link-Seal modular seal dimensional data.



Calculation Method For Non-Standard Diameters

If your pipe size does not appear on the two preceding pages call your local Team EJP Sales Office or use this method to select the proper Link-Seal.

First, calculate the Annular Space in order to select your Link-Seal size from the chart on this page. Then determine the number of links required to go around the pipe. Here's how:

Step A: The Annular Space is half the difference between your pipe size and the wall opening diameter. Use this formula:

$$\text{Annular Space} = \frac{\text{Wall Opening} - \text{Pipe Diameter}}{2}$$

Step B: Now go to Link-Seal Dimensional Chart #1. Select the size closest to the Annular Space just calculated. You have selected the correct size Link-Seal if … the Free State Thickness is less than the Annular Space…and the Expanded State Thickness is greater than the Annular Space.

Step C: Next calculate how many links are required to fit around the pipe and seal the Annual Space. This is a 3-part calculation. First determine the Bolt Circle for your Link-Seal assembly. This is simply the mid-point of the Annular Space:

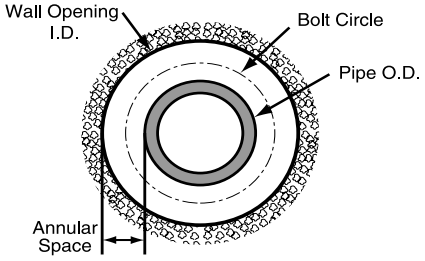
$$\text{Bolt Circle} = \frac{\text{Wall Opening} + \text{Pipe Diameter}}{2}$$

Step D: Second, determine the number of links needed for your assembly. To do this, find the Chord Length of your Link-Seal size from the Link-Seal Dimensional Chart 1. Then multiply the Bolt Circle by 3.14 and divide by the Chord Length.

$$\text{Links Per Seal} = \frac{\text{Bolt Circle} \times 3.14}{\text{Chord Length}}$$

Finally the results must be rounded down to the next whole number. This completes your calculation.

IMPORTANT: If the Step D calculation results in 10 or more links, it is accurate. If it indicates fewer than 10 links, please call your local Team EJP Sales Office for further assistance.



Series 007 ½" - 2", 007DCDA 2"

Double check valve assemblies

- Backflow preventers designed to protect potable water supplies in accordance with national plumbing codes for non-health hazard cross connections and continuous pressure applications.
- Provides protection against back siphonage and backpressure backflow.

Specifications

- All sizes supplied with resilient seated shutoffs
- Sizes: ½" - 1" (15-25 mm) have tee handle shutoffs. 1¼" - 2" (32-50 mm) have lever handle shutoffs.
- For supply pressures up to 175 psi (12.1 bars).
- Water temperature: sizes ½" - 2" (13-50 mm) from 33°F to 180°F (.55°C to 82°C).

Flow Charts see page 44, 45.

Features

007M3QT ¾"

- Line sized construction for reduced fouling
- Replaceable seats and seat discs
- No screws in the waterway for reliable operation
- Captured springs for safety
- Top entry, single cover for access ease
- Top mounted test cocks to simplify testing

For additional information, request ES-007.
For WattsBox Enclosures, request ES-WB and ES-WB-T.

Options *add Suffix:*

PC - with internal polymer coating

S - with bronze strainer

LF - without shutoff valves

LH - with locking handle ball valves (open position)

SH - with stainless steel ball valve handles

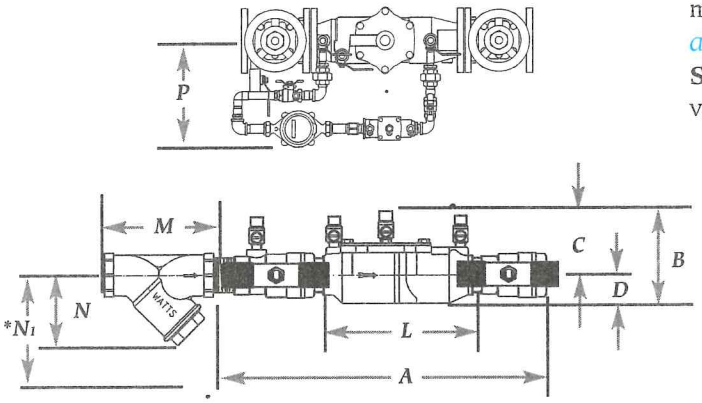
U - union connections

HC - with fire hydrant connections (female hose swivel x male NST)

add Prefix:

SS - with 316 stainless steel backflow preventer and ball valve shutoffs.

Dimensions/Wgts.



STRAINER DIMENSIONS

Size (DN) in.	Size (DN) mm	M in.	M mm	N in.	N mm	*N1 in.	*N1 mm
½	15	2¾	70	2¼	57	10	254
¾	20	3 3/16	81	2¾	70	10	254
1	25	3¾	95	3	76	12	305
1¼	32	4 7/16	113	3½	89	20	508
1½	40	4⅞	124	4	102	22¾	578
2	50	5 5/16	151	5	127	28	711

**Dimensions required for screen removal.*

Model	Order No§	Size (DN) in.	Size (DN) mm	A in.	A mm	B in.	B mm	C in.	C mm	D in.	D mm	L in.	L mm	P		Weight lbs.	Weight kg.
007QT	0062131	½	15	10	250	3⅛	79	2⅜	60	¾	19	5	127	–	–	4½	2.0
007M3QT	0062020	¾	20	11⅛	282	4	100	3⅛	79	⅞	22	5	127	–	–	5	2.3
007M1QT	0062306	1	25	13¼	337	5⅛	130	3⅞	98	1¼	32	6 3/16	157	–	–	12	5.4
007M2QT	0062681	1¼	32	16⅜	416	5	127	3½	89	1½	38	6 3/16	157	–	–	23	10.4
007M2QT	0062436	1½	40	16¾	425	5	127	3½	89	1½	38	7½	191	–	–	27	12.2
007M1QT	0062427	2	50	19½	495	6¼	159	3¾	95	2½	64	7½	191	–	–	25¾	11.7
007QT-S	0062132	½	15	10	250	6	150	2⅜	60	¾	19	9½	241	–	–	5½	2.5
007M3QT-S	0062021	¾	20	11⅛	282	6⅛	156	3⅛	79	⅞	22	9½	241	–	–	6¾	3.1
007M1QT-S	0062308	1	25	13¼	337	7¾	197	3⅞	98	1¼	32	9¾	248	–	–	14	6.5
007M2QT-S	0062450	1¼	32	16⅜	416	7	178	3½	89	1½	38	9¾	248	–	–	26	11.7
007M2QT-S	0062616	1½	40	16¾	425	7	178	3½	89	1½	38	13⅜	340	–	–	35½	16.0
007M1QT-S	0062428	2	50	19½	495	8¾	222	3¾	95	2½	64	13⅜	340	–	–	33½	15.2
*007DCDAOSY‡	0062665	2	50	35⅛	892	11	279	12¼	311	2¼	57			12¼	311	97	44

§- Contact your local Watts Agent or call Customer Service (978) 689-6066 for other models and order numbers or refer to PL-WR. For Union Models refer to ES-007. ‡ - models come with CFM/GPM meters. For GPM codes see price list.
**B dimension is from the lowest part of the valve (the unmachined relief port) to the highest part of the gate/ball valve shutoff.*

ITEM # 142

TREMCO®

TREMDrain Series Drainage Mats

Multi-Composite Drainage and Protection Boards

Product Description

The TREMDrain® Series of drainage mats consists of a family of drainage mats with a variety of combinations of filter fabrics, drainage cores and protective polymeric film. The fabric allows water to pass into the drainage core while keeping soil particles out. The drainage core acts as a protection course and creates a high capacity drainage plane. The addition of polymeric film prevents the drainage core from pressing into the waterproofing membrane. TREMDrain drainage mats are used in conjunction with TREMproof® and Paraseal® waterproofing membranes in both vertical and horizontal applications.

TREMDrain is a two-layer drainage mat consisting of a polystyrene core and nonwoven, needle-punched, polypropylene fabric.

TREMDrain 1000 consists of a polystyrene core and nonwoven, needle-punched, polypropylene fabric (PF). Available with or without the polymeric film attached to the back of the drainage core, it offers greater compressive strength than TREMDrain.

TREMDrain 2000 is a three-layer drainage mat including a woven polypropylene fabric, polystyrene core and polymeric film.

TREMDrain S has the highest compressive strength available within the TREMDrain series and consists of a nonwoven, needle-punched, polypropylene fabric, polystyrene core and polymeric film backing.

TREMDrain GS drainage mats consist of a perforated polystyrene core with fabrics attached to both sides. Installed with the dimples down, the core also functions as a water retention layer. Water retention of TREMDrain GS 1/2 in. core is 0.06 gal/sq ft and of TREMDrain GS 1 in. core is 0.11 gal/sq ft. When the dimples fill with water, excess water escapes through the perforations in the core and drains out through the dimple layer below. The spun-bound fabric on the dimple side of the core acts as a cushion to protect the membrane below. The fabric on the flat side of the mat is typically a spun-bound polypropylene fabric, but is also available as a copper hydroxide-treated non-woven, needlepunched fabric for systems with aggressive root structures.

TREMDrain 3000 is a two-part prefabricated drainage material and protection board consisting of a formed polystyrene core covered on one side with a woven polypropylene filter fabric. This fabric allows water to pass into the drainage core while restricting the movement of soil particles. The plastic core provides compressive strength and moderate flow capacity.

TREMDrain Total Drain is a two-layer drainage mat with a unique polystyrene core that consists of a high-profile drainage section for water collection and flow around the structure and a transition section to connect to other TREMDrain series drainage mats. TREMDrain Total Drain also includes a non-woven polypropylene filter fabric.

Basic Uses

The TREMDrain Series of mats are used with TREMproof and Paraseal waterproofing membranes serving both as a protection course and replacement for traditional pipe and stone drainage systems.

Features and Benefits

TREMDrain Series drainage mats are available in various combinations of fabrics and compressive strengths to provide the optimal level of performance for a range of applications. TREMDrain, TREMDrain 1000 and TREMDrain S feature a non-woven, needle-punched fabric that will allow water to pass through while filtering out soil particles. TREMDrain 2000 features a woven fabric, which has greater puncture resistance compared to the spun-bound fabric, making it ideal for horizontal applications where concrete will be poured on top of the drainage mat. TREMDrain 3000 is designed for horizontal applications requiring moderate flow capacity, high compressive strength and the strength and filtration properties of a woven geotextile.

Limitations

- Not for use beneath sand-set vehicular pavers.
- When installing TREMDrain GS, the type of plants and/or vegetation, soil type, and other related issues should be reviewed and specified by a regional horticulturist for accurate selection of vegetation for your specific region.

Installation

Refer to TREMDrain Series Application Instructions for specific application details. The techniques involved may require modification to adjust to job-site conditions. Consult your local Tremco Sales Representative for specific design requirements.

Availability

Immediately available from your local Tremco Sales Representative, Tremco Distributor or Tremco Warehouse.

Warranty

Tremco warrants its Products to be free of defects in materials, but makes no warranty as to appearance or color. Since methods of application and on-site conditions are beyond our control and can affect performance, Tremco makes no other warranty, expressed or implied including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE, with respect to Tremco Products. Tremco's sole obligation shall be, at its option, to replace or refund the purchase of the quantity of Tremco Products proven to be defective and Tremco shall not be liable for any loss or damage.

Please refer to our website at www.tremcosealants.com for the most up-to-date Product Data Sheets.

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TREMCO®

TYPICAL PHYSICAL PROPERTIES

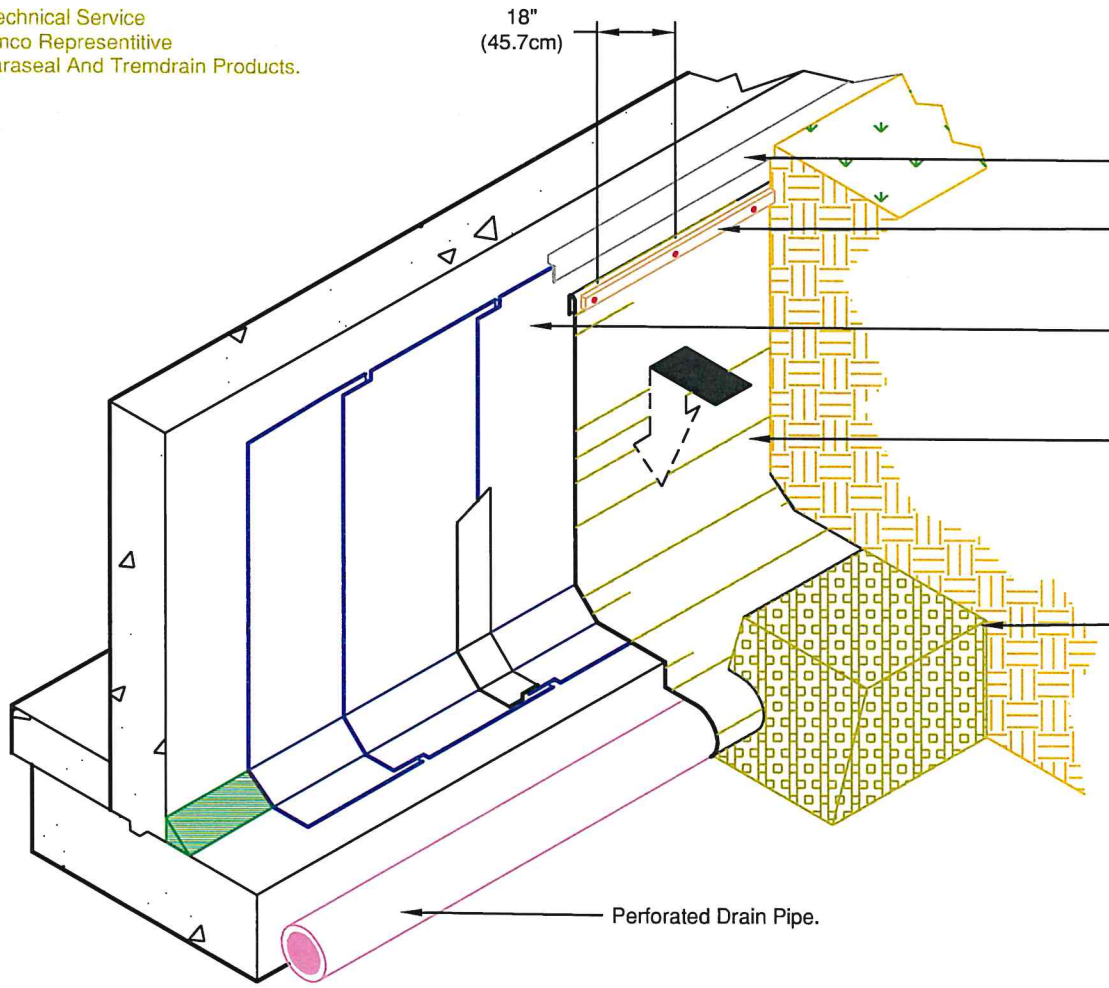
Physical Property	ASTM Test Method	TREMDrain	TREMDrain 1000/1000 PF	TREMDrain 2000	TREMDrain S	TREMDrain GS (1/2 in., 1 in)	TREMDrain 3000	TREMDrain TotalDrain
Typical Applications		Backfilled Wall, Blindside Wall	Backfilled Wall, Under Slab	Split Slab, Planters	Under Slab, Split Slab	Planters	Split Slab, Planters	Backfilled Walls, Blindside Walls
Flow Capacity per unit width	D4716	9 gpm/ft 112 lpm/m	18 gpm/ft 224 lpm/m	18 gpm/ft 224 lpm/m	9 gpm/ft 112 lpm/m	18\80 gpm/ft 224\994 lpm/m	13 gpm/ft 161 lpm/m	Transition: 18 gpm/ft 224 lpm/m High Profile: 80 gpm/ft 994 lpm/m
Roll Length		50 ft 15.8 m	50 ft 15.8 m	50 ft 15.8 m	50 ft 15.8 m	50 ft 15.8 m	50 ft 15.8 m	50 ft 15.8 m
Roll Width		4 ft 1.22 m	4 ft 1.22 m	4 ft 1.22 m	4 ft 1.22 m	4\3 ft 1.22\0.91 m	4 ft 1.22 m	2 ft 0.61 m
Roll Weight		28 lb 12.5 kg	38 lb 17 kg	46 lb 20 kg	30 lb 13.5 kg	40\44 lb 18\20 kg	42 lb 19 kg	30 lb 13.5 kg
Fabric								
Material		Nonwoven Needle-punched Polypropylene	Nonwoven Needle-punched Polypropylene	Woven Polypropylene	Nonwoven Needle-punched Polypropylene	Spun-bound Polypropylene	Woven Polypropylene	Nonwoven Needle-punched Polypropylene
Weight	D3776	3.5 oz/yd² 119 gm/m²	3.5 oz/yd² 119 gm/m²	6 oz/yd² 200 gm/m²	3.5 oz/yd² 119 gm/m²	4 oz/yd² 136 gm/m²	6 oz/yd² 200 gm/m²	4 oz/yd² 136 gm/m²
Grab Tensile Strength	D4632	100 lb 445 N	100 lb 445 N	365 x 200 lb 1620 x 890 N	100 lb 445 N	145 lb 645 N	410 x 220 lb 1824 x 979 N	115 lb 512 N
Puncture Strength	D4833	65 lb 289 N	65 lb 289 N	105 lb 470 N	65 lb 289 N	50 lb 222 N	105 lb 467 N	70 lb 310 N
Trapezoidal Tear	D4533	50 lb 220 N	50 lb 220 N	115 x 75 lb 510 x 330 N	50 lb 220 N	70 lb 310 N	115 x 75 lb 510 x 330 N	60 lb 260 N
Mullen Burst Strength	D3786	225 psi 1,554 kPa	225 psi 1,554 kPa	480 psi 3309 kPa	225 psi 1,554 kPa	150 psi 1,034 kPa	480 psi 3,309 kPa	250 psi 1,724 kPa
Grab Elongation	D4632	65%	65%	15%	65%	60%	15%	70%
AOS	D4751	70 sieve 210 micron	70 sieve 210 micron	40 sieve 380 micron	70 sieve 210 micron	80 sieve 180 micron	45 sieve 355 micron	70 sieve 210 micron
Permittivity	D4491	2.6 sec^{-1}	2.6 sec^{-1}	1.36 sec^{-1}	2.6 sec^{-1}	1.0 sec^{-1}	1.36 sec^{-1}	2.2 sec^{-1}
Permeability	D4491	0.3 cm/sec	0.3 cm/sec	0.92 cm/sec	0.3 cm/sec	0.03 cm/sec	0.92 cm/sec	
Flow Rate	D4491	165 gpm/ft² 6,724 lpm/m²	165 gpm/ft² 6,724 lpm/m²	100 gpm/ft² 4074 lpm/m²	165 gpm/ft² 6,724 lpm/m²	80 gpm/ft² 3,260 lpm/m²	160 gpm/ft² 6,520 lpm/m²	150 gpm/ft² 6,113 lpm/m²
Root Barrier Fabric		None	None	None	None	Copper Hydroxide Treated Nonwoven, Needle-punched Polypropylene Available	None	None
Core								
Material		Polystyrene	Polystyrene	Polystyrene	Polystyrene	Polystyrene	Polystyrene	Polystyrene
Thickness		1/4 in. 6.35mm	7/16 in. 11mm	7/16 in. 11mm	1/4 in. 6.35mm	1/2 in., 1 in. 12mm, 25mm	1/4 in. 6.35mm	7/16 in., 1 in. 11mm, 25mm
Compressive Strength	D1621	10,800 lb/ft² 527 kN/m²	15,000 lb/ft² 732 kN/m²	21,000 lb/ft² 1025 kN/m²	30,000 lb/ft² 1,440 kN/m²	15,000 lb/ft², 9,000 lb/ft² 732 kN/m², 431 kN/m²	33,000 lb/ft² 1,650 kN/m²	9,000 lb/ft² 431 kN/m²

Tremco Commercial Sealants & Waterproofing
3735 Green Road, Beachwood, OH 44122 // Phone: 216.292.5000 // 800.321.7906
220 Wicksteed Avenue, Toronto, ON M4H 1G7 // Phone: 416.421.3300 // 800.363.3213
1451 Jacobson Avenue, Ashland OH 44805 // Phone: 419.289.2050 // 800.321.6357

An RPM Company

www.tremcosealants.com

NOTE:
Consult Tremco Technical Service
Or Your Local Tremco Representitive
For Appropriate Paraseal And Tremdrain Products.



Backfilled Wall Installation with Exterior Drain Pipe.

No.	Date	Description	By

TREMCO
3735 Green Road
Beachwood, Ohio 44122 216-292-500

Project:

Drainage Systems

Drawn by:	Scale:	Date:	Drawing/Index No.
J. Davis	Not To Scale	07/26/01	DS-01

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