DESIGN AND CONSTRUCTION GROUP
THE GOVERNOR NELSON A. ROCKEFELLER
EMPIRE STATE PLAZA
ALBANY, NY 12242

ADDENDUM NO. 2 TO PROJECT NO. 44561

CONSTRUCTION, HVAC, PLUMBING, ELECTRICAL WORK

NEW YORK STATE POLICE ZONE HEADQUARTERS
MERRICK AVENUE
EAST MEADOW, NY 11554

February 5, 2016

NOTE: This Addendum forms a part of the Contract Documents. Insert it in the Project Manual. Acknowledge receipt of this Addendum in the space provided on the Bid Form.

1. ALL TRADES SPECIFICATIONS (none added)

2. "C" CONTRACT SPECIFICATIONS

a. SECTION 000101: DELETE Specification Section 000101 Title Page (Cover) in its entirety and REPLACE with Specification Section 000101 Title Page (Cover).

b. SECTION 015213: DELETE Specification Section 015213 State Field Office in its entirety from Addendum #1 and REPLACE with Specification Section 015213 State Field Office inclusive of pages 015213-1 through to 015213-5

c. SECTION 102813: DELETE Specification Section 102813 Toilet and Bath Accessories in its entirety and REPLACE with Specification Section 102813 Toilet and Bath Accessories inclusive of pages 102813-1 through 102813-4.

3. "H" CONTRACT SPECIFICATIONS

a. SECTION 000101: DELETE Specification Section 000101 Title Page (Cover) in its entirety and REPLACE with Specification Section 000101 Title Page (Cover).

b. SECTION 000110: DELETE Specification Section 000110 Table of Contents in its entirety and REPLACE with Specification Section 000110 Table of Contents inclusive of pages 000110-1 through 000110-4.

c. SECTION 238149.01: ADD Specification Section 238149.01 GRTI Formation Thermal Conductivity Test and Data Analysis.

4. "P" CONTRACT SPECIFICATIONS

a. SECTION 000101: DELETE Specification Section 000101 Title Page (Cover) in its entirety and REPLACE with Specification Section 000101 Title Page (Cover).

5. "E" CONTRACT SPECIFICATIONS

a. SECTION 000101: DELETE Specification Section 000101 Title Page (Cover) in its entirety and REPLACE with Specification Section 000101 Title Page (Cover).

6. ALL TRADES DRAWINGS (none added)

7. "C" CONTRACT DRAWINGS (none added)

8. "H" CONTRACT DRAWINGS (None added)

9. "P" CONTRACT DRAWINGS (none added)

10. "E" CONTRACT DRAWINGS (none added)

ATTACHMENTS

1. C Trade Specification Section 000101 Title Page (Cover)
2. C Trade Contract Specification Section 015213 State Field Office
3. C Trade Contract Specification Section 102813 Toilet and Bath Accessories
4. H Trade Specification Section 000101 Title Page (Cover)
5. H Trade Contract Specification Section 000110 Table of Contents
6. H Trade Contract Specification Section 238149.01 GRTI Formation Thermal Conductivity Test and Data Analysis.
7. P Trade Specification Section 000101 Title Page (Cover)
8. E Trade Specification Section 000101 Title Page (Cover)

END OF ADDENDUM

Margaret F. Larkin
Executive Director
Design and Construction

PROJECT MANUAL

PRE-BID SITE VISIT SCHEDULED

ON JANUARY 28, 2016
SEE ADVERTISEMENT FOR BIDS INSIDE

PROJECT NO. 44561-C

CONSTRUCTION WORK

NEW YORK STATE POLICE ZONE HEADQUARTERS

MERRICK AVENUE
EAST MEADOW, N.Y. 11554

DECEMBER 1, 2015

ANDREW M. CUOMO
Governor
ROANN M. DESTITO
OGS Commissioner

NEW YORK STATE OF OPPORTUNITY. | Office of General Services
DESIGN AND CONSTRUCTION

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SECTION 015213

STATE FIELD OFFICE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide and maintain a field office comprised of new custom built mobile or relocatable office units, new furniture, and new equipment, stair and ramp for the sole use of the Director's Representative and staff. Include temporary services and accessories necessary for use of the items specified.

1.02 SUBMITTALS

A. Waiver of Submittals: The "Waiver of Certain Submittal Requirements" in Section 013300 does not apply to this Section.

B. Shop Drawings:
   1. Site Plan: Show location of field office where directed. Indicate holding tank, utility services, and connections.

C. Product Data: Catalog sheets, specifications, and installation instructions, for all major items. Submit within 15 days after award of Contract.

1.03 SCHEDULING

A. Provide units, ready for occupancy by the Director's Representative and staff, within 30 days after shop drawings specified above are approved.

1.04 QUALITY ASSURANCE

A. Accessibility Requirements: Provide fully accessible units including stairs and ramps that comply with ICC/ANSI A117.1 as referenced by the Building Code of New York State.

B. Provide units and all related utility connections in accordance with the NYS Uniform Fire Prevention and Building Code.

C. Provide certification insignia from New York Department of State that certifies trailer unit is code compliant.

PART 2 PRODUCTS

2.01 MOBILE OR RELOCATABLE OFFICE UNITS

A. Manufacturers/Companies:
   1. Cassone, 1950 Lakeland Avenue, Ronkonkoma, NY 11779, (800) 640-8844, www.cassone.com.
   2. ModSpace, 1620 Route 9, Clifton Park, NY 12065-0511, (518) 371-0384, www.modspace.com.
   3. Williams Scotsman, Corporate Headquarters, 8211 Town Center Dr., Baltimore, MD 21236, (800) 782-1500, www.willscot.com.
   4. Anchor Modular Buildings, PO Box 100, Medford, NJ 08055, (866) 396-0227, www.anchormodular.com.

B. Number, Approximate Size and Model:
   1. One, 24 x 60 feet, double-wide office unit with four (4) private offices, a large common area, and a half bathroom.

C. Office Unit Requirements:
   1. Ceiling Height: 8'-0" minimum.
   2. Insulation: Exceed code required minimums for insulation. If wood frame construction, exceed the following values, walls: R-19, floor: R-30 and roof: R-30.
   3. Exterior Doors: Minimum 2, minimum 34 inches wide, with key-in-lever locksets (U-factor to exceed 0).
   4. Windows: Approximately 7 percent of exterior wall area with insect screens (U-factor to exceed 0).
   5. Complete ducted heating, ventilating, and air conditioning system with sufficient capacity to maintain a summer office temperature of 75 degrees F and a winter office temperature of 70 degrees F.
   6. Water Heater: 6 gal minimum.
   7. VCT or sheet vinyl floor finish.
   8. Interior partitions to be wood 2 x 4 framing with ½" vinyl covered gypsum board.
   9. Fluorescent lights in all rooms as required to maintain a minimum of 60-foot candles at desktop level.
   10. Bulletin board (4 feet x 6 feet).
   11. Toilet room with toilet, grab bars, toilet tissue dispenser, lavatory, built-in medicine cabinet, paper towel dispenser and mirror with 300 gal. potable water holding tank with winterizing package, and a 300 gal. waste water holding tank with winterizing package.
   12. Insulated skirting from bottom of units to grade, around entire unit. Skirting is to be 2' x 4' wood or metal framing with 2" rigid insulation type SM and white ventilated vinyl siding to match unit.
   13. Electric energy and fuel for the duration of the Contract.
   14. Pre-wire unit for voice and data (5 connections each) as shown on approved shop drawings.

2.02 FURNITURE AND EQUIPMENT

A. Furniture:

1. Six swivel type chairs with arms suitable for use at office desks.
2. Ten straight back stackable chairs.
3. Six lockable metal office desk, 30 x 60 inches, double pedestal type with keys.
4. One drafting table, 37 x 60 inches.
5. One conference table, 44 x 96 inches.
6. One "Planhold" plan rack, adjustable height, floor supported cantilever type, with plan clamps or plan rack sticks.
7. Two lockable 4-drawer letter size file cabinets.
8. One 4'x 6' wall mounted dry erase board.

B. Office Equipment:

1. One multifunction Printer – Konica Bizhub C284e Printer, Copier , Fax. Network Scan, stapler, hole puncher, and stitcher finishing kit, Multi-Function Machine with printing options and with trays for 8 ½" x 11, 8 ½" x 14 and 11" x 17" paper. If this model is no longer available substitute the Konica replacement model with the same options as a minimum. Provide one-year service agreement, paid in advance.
   a. Supplies: paper, sizes as directed and toner cartridges for the duration of the project.

3. One Panasonic Voicemail system installed, with programming and maintenance for the duration of the project to handle 3 outside lines and 5 compatible instruments. Provide the instruments and all wiring.
   a. System - Panasonic KX-TDA50 Digital Hybrid IP-PBX with wall rack.
   b. Voicemail System - Panasonic KX-TVA50.
   c. Telephones - Main 2 each KX-T7636.
   d. Telephone - Regular 3 ea. KX-T7625.
   e. Provide all wiring between all stations, equipment rack, etc. such that a complete system is installed and operates properly. Maintain the system for the life of the contract.
4. One refrigerated bottled water dispenser,(Hot & Cold Type) with cups, bottled water and necessary supplies. Provide water and cups for duration of contract.
5. One first aid kit.
6. One 15 cubic foot refrigerator, EnergyStar energy efficient model.
7. Fire Extinguisher: Multipurpose Dry-Chemical Type in Steel Container UL-rated 20-A:120-B:C, 20-lb nominal capacity, with mono-ammonium phosphate-based dry chemical in enameled-steel container.
8. Security System
   a. Acceptable manufacturer: X10 Wireless Technology, Inc. 19823 58th Place South, Kent, WA 98032, Telephone # 1-800-675-3044, Website address: http://www.x10.com
   b. Acceptable Model: Protector Plus Voice Dialer, 12 piece system, http://www.x10.com/security/ds7000_s_12pc_ps152.html

1. Base Station Voice Dialer Console for Protector Plus - X10 Model # PS561 - Quantity: 1.
2. Lamp Module - X10 Model # LM465 - Quantity: 2.
3. Door/Window Sensor - X10 Model # DS10A - Quantity: One for each door and window.
4. Security Motion Detector - X10 Model # MS10A - Quantity: 2.
5. Security Remote Control - X10 Model # SH624 - Quantity: 1.
6. Security Keychain Remote - X10 Model # KR10A - Quantity: 2.
7. Battery back-up power.

c. Maintain the system for the life of the contract.

2.03 TEMPORARY MAINTENANCE SHELTER

A. Manufacturers/Companies:

1. Storage Master Elite by ClearSpan Fabric Structures
   1395 John Fitch Blvd, South Windsor, CT 06074, 1.866.643.1010
   http://www.clearspan.com/fabric/structures/ext;Contact.html

B. Number, Approximate Size and Model:

1. One, 12 feet wide x 20 feet long x 12’-4” high, unit by ClearSpan.

   a. Extra heavy-duty frame is manufactured from 14 gauge USA-made, triple-galvanized structural steel tubing.
   b. 12'W use 2" square tubing with 5' rafter spacing.
   c. Sidewall height to bend: 9'6"H.
   d. UV-resistant 12.5 oz., 24 mil premium, forest green, rip-stop poly cover comes with a 15 year warranty.
   e. Custom colors are also available at a premium.
   f. SolarGuard™ white skylight lets the sun shine in.
   g. One solid and one zippered end panel that allows the entire end to be opened and closed.
   h. 12'W has one 8'W x 8'H double-zippered door and a 4'W skylight.
   i. All associated accessories for the shelter erection and its anchoring to concrete slab.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units where directed. Remove wheels and store them where directed.

B. Provide manufacturer’s stair with platform at one exterior door and ramp with platform(s) at one exterior entrance.

C. Provide 20’ x 50’ parking area of 6” Sub-base Course Type 2 and maintain for the duration of the contract including snow removal.

D. For the duration of the project, provide a self contained toilet and waste water system with weekly service, at a minimum, of the waste water holding tank. Maintain the tank to keep it in working order.

E. For the duration of the project, provide a sink in the toilet room of the trailer with service to fill potable water holding tank once a week, minimum, and maintain the tank.

F. Until a permanent electric service is available on-site, provide temporary electric service via a diesel or propane fuel generator capable of providing a minimum of 100 amps, 120/208V 3 phase service. Maintain and service fuel generator until the permanent electric connection has been made to the field office.

G. Install security system and set up per manufacturer’s instructions.

3.02 MAINTENANCE AND CLEANING

A. Maintain and clean the office units for the duration of this Contract. Include the following:
   1. Daily removal of rubbish.
   2. Daily cleaning of toilet room, including the plumbing fixtures. Replenish toilet room supplies as needed.
   3. Weekly mopping of floors.
   4. Weekly dusting of offices and other rooms.

B. Maintain approaches free of mud and snow.

C. Protect water lines from freezing.

3.03 OWNERSHIP

A. Upon completion of this Project, all office equipment items included in this Section shall become the property of the New York State Police (NYSP) and will be removed by the NYSP to another location.

3.04 REMOVALS

A. Remove the trailer unit and all temporary utility services serving it, including any furniture and office equipment not retained by the New York State Police (NYSP), when directed by the Director’s Representative. Once the trailer unit is removed, contractor to complete its respective scope of work with the materials indicated on the drawings.

END OF SECTION

SECTION 102813

TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Toilet Compartments: Section 102100.

B. Plumbing: Division 22.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.03 LEED REQUIREMENTS

A. The materials and/or equipment specified in this section may contribute towards the prerequisites and credits required to obtain LEED certification for the Project. Refer to spec section '018113 LEED Documentation Requirements' for information on submittals, procedures, material properties, and credit requirements.

B. LEED submittals identified in this section, if any, are only applicable for the Project. A complete list of LEED submittals have been identified in spec section '018113 LEED Documentation Requirements'. The contractor is required to submit information for materials and/or equipment as outlined in spec section 018113 - even if this section does not indicate the submittal being required.

C. Submit LEED submittals in accordance with Specification Section 013300 Submittals and 018113 LEED Documentation Requirements.

1.04 SUBMITTALS

A. LEED Submittal Package: In accordance with Section 018113 "Sustainable Design Requirements", LEED Focus Materials (LFMs) for this section:
   1. Toilet Accessories.

B. LEED Design Submittals:
   1. MR Credit 4.1 and MR Credit 4.2: Identify manufacturer's name, the percentage of post-consumer recycled content by weight, the pre-consumer recycled content by weight, and the cost of the product.
   2. MR Credit 5.1 and MR Credit 5.2: Identify source, cost, and the fraction by weight that is considered regional.

C. Shop Drawings: Details for grab bars.

D. Product Data: Specifications or data sheets and installation instructions for each product required.

E. Samples: One full size sample of each product required, unless otherwise specified, complete with mounting devices and fasteners. These samples will be returned unless otherwise specified. If approved, samples may be used in the Work.
   1. Shower Curtain: 12 x 12 inch corner with grommets. This sample will not be returned.

F. Contract Closeout Submittals: Furnish the following, as applicable, for each product required:
   1. Operation and maintenance data.
   2. Parts list.
   3. Keys and tools.

1.05 QUALITY ASSURANCE

A. Provide products from more than one manufacturer if necessary to meet the requirements of this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's original protective packaging.
   1. Furnish items with protective wrappings or covers as required to protect finishes. Do not remove protective coverings until completion of other Work liable to damage accessory finish.

B. Pack products with required trim, mounting devices, fasteners, service tools or keys, and complete installation instructions.

PART 2 PRODUCTS

2.01 LEED SUSTAINABILITY CHARACTERISTICS

A. Toilet Accessories:
   1. Recycled content: Report only.
   2. Regional materials: Report only.

2.02 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering accessories that may be incorporated into the Work include, but are not limited to, the following:
   1. A & J Washroom Accessories, Inc.
   2. American Specialties, Inc.
   3. Bobrick Washroom Equipment, Inc.
   4. McKinney/Parker Washroom Accessories Corp.

2.03 MATERIALS

A. Stainless Steel: AISI Type 302/304 with No. 4 satin finish, unless otherwise indicated.

B. Brass: Cast or forged quality alloy, FS WW-P-541D/GEN.

C. Sheet Steel: Cold rolled, commercial quality, ASTM A 366.
   1. Galvanized: Zinc coated, ASTM A 123.

D. Mounting Devices and Fasteners: Stainless steel, unless otherwise indicated.

E. Chromium Plating: Nickel and chromium electro-deposited on metal; ASTM B 456, Type SC 2, satin finish unless otherwise indicated.

2.04 FABRICATION

A. Fabricate stainless steel dispenser and disposal units of one-piece welded construction with seamless corners, unless otherwise specified.
   1. Recessed Units: Fabricate with integral, continuous, one piece stainless steel trim flange one inch wide with 1/4 inch return. Furnish flanges free of open mitres.

B. Equip units with keyed vandal-resistant lock where key access is specified.

C. Mounting Devices: If not indicated, furnish type and size compatible with accessory unit specified which will securely mount accessory to wall or partition construction indicated.
   1. Grab Bars: Furnish anchoring devices which will withstand minimum downward pull of 500 pounds.

D. Exposed Mounting Devices and Fasteners:
   1. Type: Theft-resistant.
   2. Finish: Match accessory finish, unless otherwise indicated.
   3. Masonry Construction: Furnish stainless steel machine screws in nonferrous expansion anchors except furnish stainless steel toggle bolts where anchorage occurs in masonry cavities.

2.05 KEYS AND TOOLS

A. Keys: Furnish minimum of 2 keys and an additional 2 keys for every 6 key operated accessories.
   1. Key similar key access units alike unless otherwise specified.

B. Tools: Furnish socket wrenches compatible with set screws of concealed theft-resistant fastenings. Furnish minimum of 2 wrenches and an additional 2 wrenches for every 6 accessories having such fastenings.

2.06 TOILET ACCESSORY SCHEDULE

A. Refer to drawings for Toilet Accessory Schedule.

2.07 SHOWER CURTAIN RODS (SCR)

A. Rods of 18 gage x 1-1/4 inch o.d. stainless steel tubing with 1/8 inch thick x 3 inch diameter one-piece die-formed stainless steel flanges at each end, all with satin finish. Equip rods with chromium plated brass or stainless steel hooks spaced on 6 inch centers for 10 percent oversized curtains.

2.08 SHOWER CURTAINS (SC)

A. Curtains of 8 oz. white duck, 10 percent oversized, mildew resistant treated and water repellent finished, with hemmed edges all 4 sides. Curtains shall have rust proof metal grommets for hooks on 6 inch centers along top hem. Length as required by curtain hook height.

PART 3 EXECUTION

3.01 INSTALLATION

A. Unless otherwise indicated, install Work of this Section in strict accordance with the manufacturer's instructions.
   1. Install all attachments, anchorage devices, and fasteners as required to securely mount accessory units to types of wall or partition construction indicated.

B. Toilet Tissue Dispensers - Surface Mounted: Install units back-to-back where possible when indicated for 2 or more compartments with dividing stall partitions. Fasten dispensers through backs with stainless steel through bolts and bonnet nuts.

C. Shower Curtain Tracks - Surface Mounted: Secure track with fasteners 18 inches on center.

3.02 CLEANING AND POLISHING

A. Remove protective wrappings from installed accessories after completion of other Work liable to damage accessory finish. Remove residue, if any, and polish exposed surfaces.

END OF SECTION

PROJECT MANUAL

PRE-BID SITE VISIT SCHEDULED

ON JANUARY 28, 2016
SEE ADVERTISEMENT FOR BIDS INSIDE

PROJECT NO. 44561-H

HVAC WORK

NEW YORK STATE POLICE ZONE HEADQUARTERS

MERRICK AVENUE
EAST MEADOW, N.Y. 11554

DECEMBER 1, 2015

ANDREW M. CUOMO
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Formation Thermal Conductivity
Test & Data Analysis

Test Location **New York State Police Headquarters**
East Meadow, NY

Test Date May 28-30, 2014

Analysis For American Well & Pump Company
21 Prince Street
Farmingdale, NY 11735
Phone: (516) 586-4131
Fax: (516) 586-5375

Test Performed By American Well & Pump Company

WESTERN OFFICE
PO Box 256, Elkton, SD 57026
P: 866-991-4784 F: 605-542-3941

MAIN OFFICE
PO Box 150, Bowie, TX 76230
P: 940-872-2222 F: 940-872-3678

EASTERN OFFICE
PO Box 16143, Asheville, NC 28816
P: 828-225-9166 F: 828-281-4139

EXECUTIVE SUMMARY

A formation thermal conductivity test was performed at the New York State Police Headquarters site at Meadowbrook Parkway and Hempstead Turnpike in East Meadow, New York. The vertical bore was completed on May 22, 2014 by American Well & Pump Company. Geothermal Resource Technologies' (GRTI) test unit was attached to the vertical bore on the afternoon of May 28, 2014.

This report provides an overview of the test procedures and analysis process, along with plots of the loop temperature and input heat rate data. The collected data was analyzed using the "line source" method and the following average formation thermal conductivity was determined.

Formation Thermal Conductivity = 1.49 Btu/hr-ft-°F

Due to the necessity of a thermal diffusivity value in the design calculation process, an estimate of the average thermal diffusivity was made for the encountered formation.

Formation Thermal Diffusivity ≈ 1.12 ft^2/day

The undisturbed formation temperature for the tested bore was established from the initial loop temperature data collected at startup.

Undisturbed Formation Temperature ≈ 54.4-55.9°F

The formation thermal properties determined by this test do not directly translate into a loop length requirement (i.e. feet of bore per ton). These parameters, along with many others, are inputs to commercially available loop-field design software to determine the required loop length. Additional questions concerning the use of these results are discussed in the frequently asked question (FAQ) section at www.grti.com.

TEST PROCEDURES

The American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) has published recommended procedures for performing formation thermal conductivity tests in the ASHRAE HVAC Applications Handbook, Geothermal Energy Chapter. The International Ground Source Heat Pump Association (IGSHPA) also lists test procedures in their Design and Installation Standards. GRTI's test procedures meet or exceed those recommended by ASHRAE and IGSHPA, with the specific procedures described below:

Grouting Procedure for Test Loops – To ensure against bridging and voids, it is recommended that the bore annulus is uniformly grouted from the bottom to the top via tremie pipe.

Time Between Loop Installation and Testing – A minimum delay of five days between loop installation and test startup is recommended for bores that are air drilled, and a minimum waiting period of two days for mud rotary drilling.

Undisturbed Formation Temperature Measurement – The undisturbed formation temperature should be determined by recording the loop temperature as the water returns from the u-bend at test startup.

Required Test Duration – A minimum test duration of 36 hours is recommended, with a preference toward 48 hours**.**

Data Acquisition Frequency - Test data is recorded at five minute intervals.

Equipment Calibration/Accuracy – Transducers and datalogger are calibrated per manufacturer recommendations. Manufacturer stated accuracy of power transducers is less than ±2%. Temperature sensor accuracy is periodically checked via ice water bath.

Power Quality – The standard deviation of the power should be less than or equal to 1.5% of the average power, with maximum power variation of less than or equal to 10% of the average power.

Input Heat Rate – The heat flux rate should be 51 Btu/hr (15 W) to 85 Btu/hr (25 W) per foot of installed bore depth to best simulate the expected peak loads on the u-bend.

Insulation – GRTI's equipment has 1 inch of foam insulation on the FTC unit and 1/2 inch of insulation on the hose kit connection. An additional 2 inches of insulation is provided for both the FTC unit and loop connections by insulating blankets.

Retesting in the Event of Failure – In the event that a test fails prematurely, a retest may not be performed until the bore temperature is within 0.5°F of the original undisturbed formation temperature or until a period of 14 days has elapsed.

DATA ANALYSIS

Geothermal Resource Technologies, Inc. (GRTI) uses the "line source" method of data analysis to determine the thermal conductivity of the formation. The line source method assumes an infinitely thin line source of heat in a continuous medium. A plot of the late-time temperature rise of the line source temperature versus the natural log of elapsed time will follow a linear trend. The linear slope is inversely proportional to the thermal conductivity of the medium. When a u-bend grouted in a borehole is used to inject heat into the ground at a constant rate in order to determine the average formation thermal conductivity, the test must be run long enough to allow the finite dimensions of the u-bend pipes and the grout to become insignificant. Experience has shown that approximately ten hours is required to allow the error of early test times and the effects of finite borehole dimensions to become insignificant.

In order to analyze real data from a formation thermal conductivity test, the average temperature of the water entering and exiting the u-bend heat exchanger is plotted versus the natural log of elapsed testing time. Using the Method of Least Squares, linear coefficients are then calculated to produce a line that fits the data. This procedure is repeated for various time intervals to ensure that variations in the power or other effects are not producing inaccurate results.

The calculated results are based on test bore information submitted by the driller/testing agency. GRTI is not responsible for inaccuracies in the results due to erroneous bore information. All data analysis is performed by personnel that have an engineering degree from an accredited university with a background in heat transfer and experience with line source theory. The test results apply specifically to the tested bore. Additional bores at the site may have significantly different results depending upon variations in geology and hydrology.

Through the analysis process, the collected raw data is converted to spreadsheet format (Microsoft Excel®) for final analysis. If desired, please contact GRTI and a copy of the data will be made available in either a hard copy or electronic format.

CONTACT: Chad Martin
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(828) 225-9166
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Test Bore Details
(As Provided by American Well & Pump Company)

Site Name	New York State Police Headquarters
Location	East Meadow, NY
Driller	American Well & Pump Company
Installed Date	May 22, 2014
Borehole Diameter	6 inches
U-Bend Size	1 1/4 inch HDPE
U-Bend Depth Below Grade	350 ft
Grout Type	GeoPro TG Select
Grout Solids	71.4% (400 lb sand per 50 lb bentonite)
Grouted Portion	Entire bore

Drill Log

Formation Description	Depth (ft)
Gravel, sand	0'-40'
Sandy clay	40'-60'
Gritty sand	60'-80'
Hard clay	80'-100'
Sand	100'-105'
Gravel, clay	105'-160'
Clay	160'-170'
Sand, gravel	170'-210'
Clay	210'-212'
Sand, small gravel, pyrite	212'-275'
Hard grey clay	275'-293'
Sand, gravel	293'-360'

THERMAL CONDUCTIVITY TEST DATA

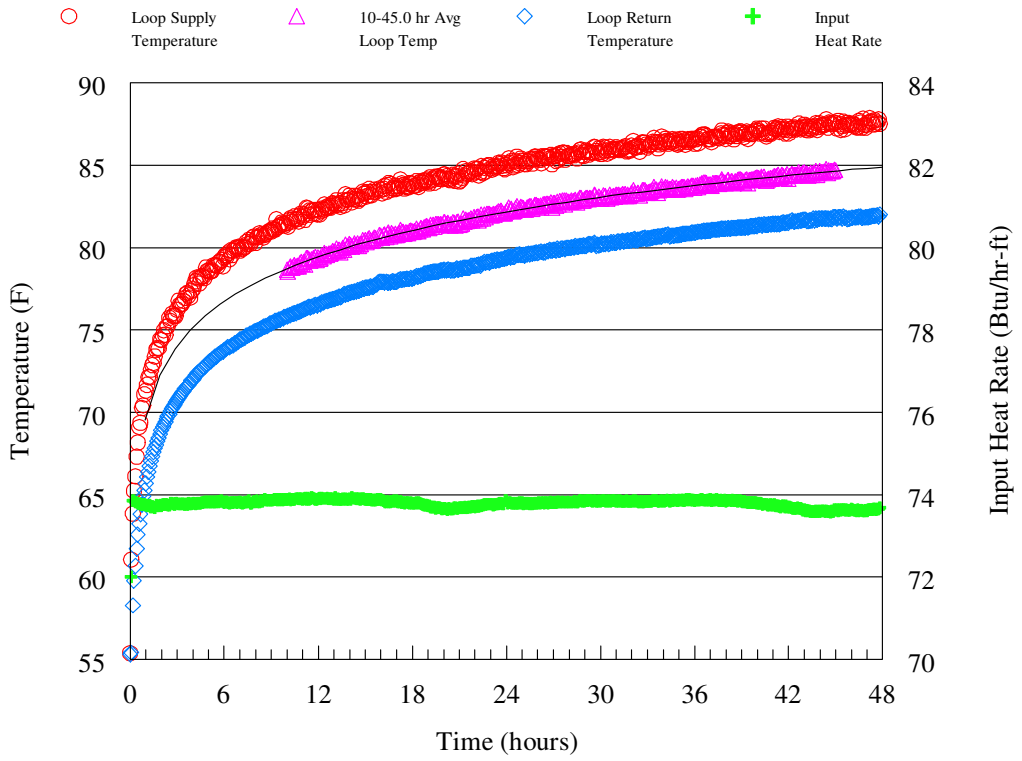

FIG. 1: TEMPERATURE & HEAT RATE DATA VS TIME

Figure 1 above shows the loop temperature and heat input rate data versus the elapsed time of the test. The temperature of the fluid supplied to and returning from the U-bend are plotted on the left axis, while the amount of heat supplied to the fluid is plotted on the right axis on a per foot of bore basis. In the test statistics below, calculations on the power data were performed over the analysis time period listed in the Line Source Data Analysis section.

SUMMARY TEST STATISTICS

Test Date	May 28-30, 2014
Undisturbed Formation Temperature	Approx. 54.4-55.9°F
Duration	47.8 hr
Average Voltage	231.3 V
Average Heat Input Rate	25,832 Btu/hr (7,569 W)
Avg Heat Input Rate per Foot of Bore	73.8 Btu/hr-ft (21.6 W/ft)
Calculated Circulator Flow Rate	9.1 gpm
Standard Deviation of Power	0.11%
Maximum Variation in Power	0.31%

LINE SOURCE DATA ANALYSIS

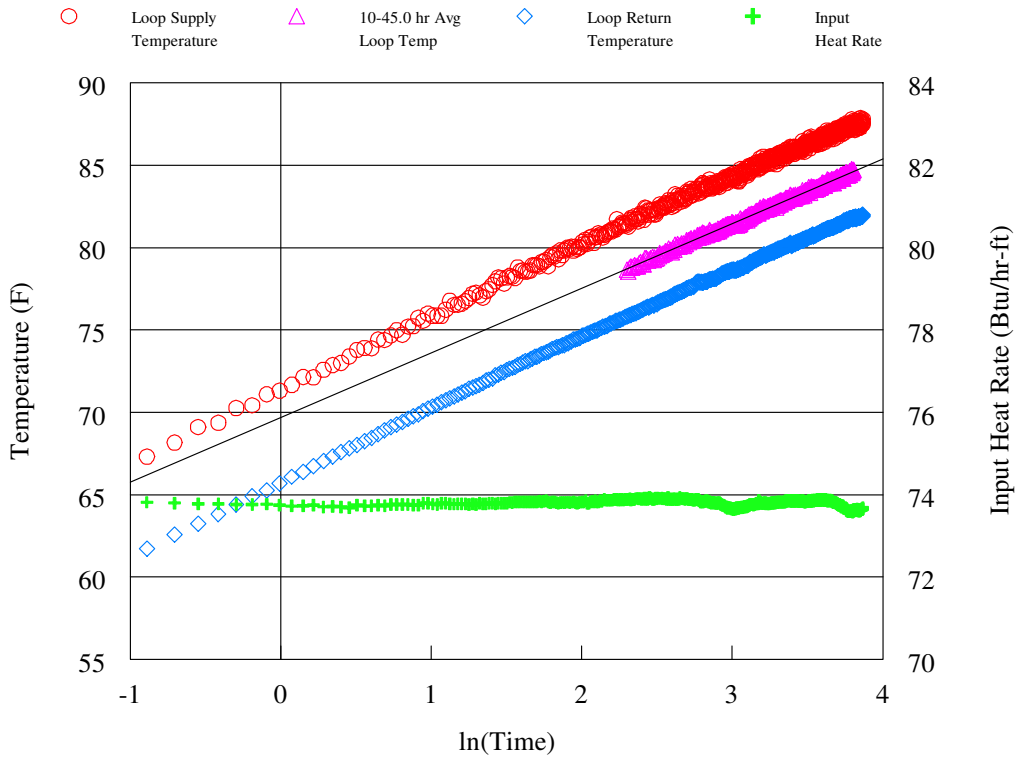

FIG. 2: TEMPERATURE & HEAT RATE VS NATURAL LOG OF TIME

The loop temperature and input heat rate data versus the natural log of elapsed time are shown above in Figure 2. The temperature versus time data was analyzed using the line source method (see page 3) in conformity with ASHRAE and IGSHPA guidelines. A linear curve fit was applied to the average of the supply and return loop temperature data between 10 and 45.0 hr. The slope of the curve fit was found to be 3.93. The resulting thermal conductivity was found to be **1.49 Btu/hr-ft-°F**.

THERMAL DIFFUSIVITY

The reported drilling log for this test borehole indicated that the formation consisted of sand, gravel, pyrite, and clay. A weighted average of heat capacity values based on the indicated formation was used to determine an average heat capacity of 32.0 Btu/ft^3-°F for the formation. A diffusivity value was then found using the calculated formation thermal conductivity and the estimated heat capacity. The thermal diffusivity for this formation was estimated to be **1.12 ft^2/day**.

CERTIFICATE OF CALIBRATION

GRTI maintains calibration of the datalogger, current transducer and voltage transducer on a biannual schedule per the manufacturers recommendations. The components are calibrated by the manufacturer using recognized national or international measurement standards such as those maintained by the National Institute of Standards and Technology (NIST).

FTC Unit 221

DA Unit 44

PRIMARY EQUIPMENT		
COMPONENT	LAST CALIBRATION DATE	CALIBRATION DUE DATE
Datalogger	4/24/2013	4/24/2015
Current Transducer	4/25/2013	4/25/2015
Voltage Transducer	4/25/2013	4/25/2015

GRTI periodically verifies the combined temperature sensor/datalogger accuracy via an ice water bath. Temperature readings are simultaneously taken with a digital thermometer that has been calibrated using instruments traceable to NIST.

DATE	4/15/2014			
THERMOCOUPLE 1 (°F)	31.8 31.8 31.8			
THERMOCOUPLE 2 (°F)	31.7 31.7 31.7			
THERMOCOUPLE 3 (°F)	31.7 31.7 31.7			
THERMOCOUPLE 4 (°F)	31.7 31.7 31.7			
DIGITAL THERMOMETER (°F)	31.9 31.9 31.9			

PROJECT MANUAL

PRE-BID SITE VISIT SCHEDULED

ON JANUARY 28, 2016
SEE ADVERTISEMENT FOR BIDS INSIDE

PROJECT NO. 44561-P

PLUMBING WORK

NEW YORK STATE POLICE ZONE HEADQUARTERS

MERRICK AVENUE
EAST MEADOW, N.Y. 11554

DECEMBER 1, 2015

ANDREW M. CUOMO
Governor
ROANN M. DESTITO
OGS Commissioner

NEW YORK STATE OF OPPORTUNITY. | Office of General Services
DESIGN AND CONSTRUCTION

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PROJECT MANUAL

PRE-BID SITE VISIT SCHEDULED

ON JANUARY 28, 2016
SEE ADVERTISEMENT FOR BIDS INSIDE

PROJECT NO. 44561-E

ELECTRICAL WORK

NEW YORK STATE POLICE ZONE HEADQUARTERS

MERRICK AVENUE
EAST MEADOW, N.Y. 11554

DECEMBER 1, 2015

ANDREW M. CUOMO
Governor
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