MAY 15, 2018

ADDENDUM NO. 1
TO THE CONTRACT DOCUMENTS

SYRACUSE HANCOCK INTERNATIONAL AIRPORT
REHABILITATION OF DEICING STORAGE FACILITIES

FAA AIP PROJECTS NO. 3-36-0114-XXX-18

SYRACUSE REGIONAL AIRPORT AUTHORITY
IFB REFERENCE #2018-02

TO ALL HOLDERS OF THE CONTRACT DOCUMENTS:

This addendum is part of the Contract Documents in accordance with the provisions of the Agreement and Information for Bidders.

A. PRE-BID MEETING:

1. See ATTACHMENT NO. 1 for the Pre-Bid Meeting Minutes. These meeting minutes are provided for information only and are not part of the Contract Documents.

B. SECTION 300 – FORM OF PROPOSAL:

1. Bid, Page 300-2A, Payment Item No. 1.1

   a. Delete: "Two Hundred Fifty Dollars"

      Insert: "Two Hundred Fifty Thousand Dollars"

C. IN THE CONTRACT TECHNICAL SPECIFICATIONS:

1. Section 01 51 41

   a. Part 2.1.A.3

      Delete:

      "3. Temporary pumps shall be diesel-powered."

      Insert:

      "3. Temporary pumps shall be either electric or diesel-powered."

b. Part 2.1.A

Insert:

"4. Each pump shall be capable of pumping over a range of flows between 25 and 125 gallons per minute from Lagoon No. 4 to the discharge point at the sanitary sewer."

c. Part 3.2.A

Insert:

"3. Each bypass pump shall be capable of meeting the design pumping requirements. The second pump shall function as a backup unit."

2. Section 01 75 11, Part 3.1.B

a. Insert:

"4. Supplier shall provide OEM-trained and qualified personnel to provide on-site startup testing and training."

3. Section 13 34 33, Part 2.3

a. Delete: Section F. HVAC: in its entirety

Insert: "F. HVAC: Provide HVAC system as shown on the Contract Drawings"

4. Section 22 13 33, Part 2.3 after D.

a. Insert:

"E. Spare Pump: For each location, provide one uninstalled spare pump to OWNER"

5. Section 32 31 00, Part 2.2.B.5.b

a. Delete: "b. No. 9-gauge wires"

6. Section 32 92 00, Part 2.1 after I.

a. Insert:

"J. Dry Pond Seed Mix:

Provide mixture of hard fescue at 105-138 lbs./acre and perennial ryegrass at 25-37 lbs./acre for a total of 130-175 lbs./acre.

K. Dry Swale Seed Mix:

Provide mixture of Kentucky bluegrass blend (use two or more varieties for disease resistance) at 25 lbs./acre, creeping red fescue at 20 lbs./acre, and perennial ryegrass at 10 lbs./acre for a total of 55 lbs./acre."

7. Section 33 16 13.16

   a. Delete: Section 33 16 16.16 in its entirety

      Insert: Attached Section 33 16 16.16

8. Section 40 24 93, after Part 2.3.H.4

   a. Insert:

      "5. Flow Rating: 100 GPM
      6. Line Size: 2"Ø "

9. Section 40 24 93, Part 2.3 Section F. Static Mixer

   a. Delete: Section label "F. Static Mixer"

      Insert: Section label "H. Static Mixer"

10. Section 40 24 93, after Part 2.3.H. Static Mixer:

    a. Insert:

       "I. Stainless Steel Ball Check Valves:
          1. Manufacturers: Provide products of one of the following:
             a. Apollo 6210501
             b. Or equal.
          2. Provide stainless steel ball check valves for Caustic Soda service.
          3. Materials and Construction:
             a. Materials: Type 316 Stainless steel
             b. End Connections: Threaded

       J. Stainless Steel Ball Valves:
          1. Manufacturers: Provide products of one of the following:
             a. Victaulic Company, Series 569 Vic-Press 316.
             b. Or equal.
          2. Provide stainless steel ball valves for Caustic Soda service.
             a. Materials and Construction:
             b. Body and Trim: Type 316 stainless steel (CF8M), rated for service up to 300 psi with Pressfit ends (plain end).
             c. Ball: Type 316 stainless steel (CF8M).
             d. Seats: PTFE.
             e. Stem: Type 316 stainless steel.
             f. Handle, Bolts, Nuts and Washers: Type 304 stainless steel.
             g. Extruded Ends: Schedule 5S Type 316 stainless steel."

11. Section 40 70 05, after Part 2.6.F.

    a. Insert:

       "2.7 LEVEL SWITCH - FLOAT TYPE

       A. Type: Direct acting, pear shaped, eccentric weighted, displacement type liquid level sensor.

B. Construction Features:
   1. Float Body: Hollow hermetically sealed, rigidly molded of polypropylene containing mechanical switch and eccentric metal weight.
   2. Mechanical Switch: SPDT switch rated 16 amps resistive at 120 VAC and five amps resistive at 30 VDC.
   3. Weight: Weight to cause sensor to hang straight down from cable when not immersed and only allow float to pivot when immersed in liquid.
   4. Electrical Cable:
      a. Heavy duty, three conductor, flexible and submersible cable, sheathed in PVC and connected to float and switch with watertight seal.
      b. Length furnished to be sufficient to extend to junction box.

C. Products and Manufacturers: Provide one of the following:
   1. Flygt, Model ENM-10.
   2. Or equal. "

12. Section 41 22 23, Part 2.3 after C.

    a. Insert:

    "D. Provide waterproof vinyl winch covers for each davit crane installation. Winch covers shall securely fasten around the winch and to the winch base to prevent loss during use of winch or during heavy wind."

13. Section 43 21 39, Part 1.4.A.3:

    a. Insert:

    "c. Submittals shall demonstrate that pumps will be non-overloading in all pumping scenarios"

14. Section 43 21 39, Part 2.1.B:

    a. Delete:

Design Total Head (ft)	115	115

    Insert:

Minimum Design Head (ft)	75	75
Maximum Design Head (ft)	115	115

15. Section 46 41 23

    a. Part 2.1.B.1.c:

    Delete:

    "c. Total Number of Units: three per tank"

    Insert:

    "c. Total Number of Units: two per tank plus one uninstalled spare. Total of five units."

16. Section 46 41 23, Part 2.3.A.1

    a. Delete:

    "ASTM A48/A 48M, Class 30 gray cast-iron" and "of ASTM A36/A 36M steel"

17. Section 46 41 23, Part 2.3.K

    a. Delete:

    Section K. Control Panel in its entirety

    Insert:

    "K. Combination Motor Starter Panel:
    1. Provide combination motor starter panel conforming to the requirements of 26 29 37, Low-Voltage Combination Magnetic Motor Starters."

18. Section 46 41 23, Part 2.5.

    a. Delete: Part 2.5 in its entirety

D. IN THE CONTRACT DRAWINGS:

1. Contract Drawing COVER SHEET, under "Index to Drawings":

   Insert "H-001 STORAGE TANK CHEMICAL BUILDING HVAC PLANS AND DIAGRAMS" after E-404.

2. Contract Drawing G-005:

   a. Insert the following notes:

   "3. CONTRACTOR SHALL INSPECT ALL CLEVIS HANGER INSTALLATIONS WITHIN 72" Ø RCP STORM PIPE BETWEEN LOCATIONS 9 AND 13. CONTRACTOR SHALL TORQUE ANY LOOSE CROSS BARS.

   4. CONTRACTOR SHALL DEWATER ± 450 GAL. FROM EACH AIR RELEASE VAULT. ALL ACTIVE LEAK POINTS INSIDE STRUCTURES SHALL BE REPAIRED WITH SIKASET PLUG OR EQUAL.

   5. CONTRACTOR SHALL REMOVE ± 110 JOINT RESTRAINTS ON PVC FORCEMAIN BETWEEN LOCATIONS 9 AND 13. ALL BELL AND SPIGOT JOINT RESTRAINT HARNESSES SHALL BE REMOVED AND REPLACED WITH SERIES 1900 RESTRAINT HARNESSES BY EBAA IRON, INC. OR EQUAL. ALL DUCTILE IRON FITTING JOINT RESTRAINT HARNESSES SHALL BE REMOVED AND REPLACED WITH SERIES 19MJ00 MECHANICAL JOINT RESTRAINT BY EBAA IRON, INC. OR EQUAL.

   6. CONTRACTOR SHALL REMOVE VEGETATION AND REPAIR STRUCTURAL CRACKS IN THE GROUT AROUND THE MANHOLE FRAME AT LOCATION 7. FRAME SHALL BE CLEANED AND CAPPED WITH SIKADUR 31 HI-MOD GEL BY SIKA CORPORATION OR EQUAL AND PLUGGED WITH SIKADUR 35 HI-MOD LV LPL BY SIKA CORPORATION OR EQUAL.

7. ALL EXPOSED DUCTILE IRON PIPE AND FITTINGS SHALL BE CLEANED TO REMOVE LOOSE / BLISTERED EPOXY AND RUST AND COATED WITH HI-BUILD EPOXOLINE II V69 BY TNEMEC COMPANY, INC. OR EQUAL."

3. Contract Drawing G-006:

   a. Insert the following note at bypass pump suction line:

      "Each bypass pump shall have its own inlet suction line"

4. Contract Drawing G-009:

   a. Delete callout to inside piping on north side of building:

      "Fill piping with flowable fill to blind flanges"

   b. Insert callout with arrow to underground pipe outside building on west side of building:

      "Fill buried piping with flowable fill to flanges"

   c. Insert callout with arrow to piping in control building stating:

      "All exposed piping shall be removed flush with floor slab and filled with concrete"

5. Contract Drawing G-102: in two locations on drawing

   a. Delete from 2" Ø PVC Sump Discharge/Effluent Line:

      "2" Ø PVC SUMP DISCHARGE" and "2" Ø PVC SUMP EFFLUENT"

      Insert: Two Places

      "2" Ø HDPE BW SUMP DISCHARGE"

6. Contract Drawing G-103:

   a. Drain Valve Vault Section 2, Delete callout "4" Ø PRESSURE TRANSDUCER (TYP. OF 2) (SEE NOTE 1.)".

      Insert:

      "MOUNT PRESSURE TRANSDUCER ON TOP OF RISER WITH 1"Ø TAP AND 1"Ø BALL VALVE AND 4"Ø BLIND FLANGE."

   b. Injection Valve Vault, Top Slab Plan EL. 405.0', Delete callout to 24" x 24" double leaf access hatch with safety grate and the hatch itself.

      Insert:

      Callout and show: "30" x 48" DOUBLE LEAF ACCESS HATCH WITH SAFETY GRATE"

c. Drain Valve Vault, Top Slab Plan EL. 403.50', Delete callout to 24" x 24" double leaf access hatch with safety grate and the hatch itself.

Insert:

Callout and show: "30" x 48" DOUBLE LEAF ACCESS HATCH WITH SAFETY GRATE"

d. Insert callout to bottom of Injection Valve Vault Section:

"BOTTOM OF SLAB ELEVATION ± 397.00'"

7. Contract Drawing G-104, Chemical Transfer Trench Detail:

a. Insert:

"NOTE:

1. "2" Ø PIPES IN TRENCH SHALL BE HEAT-TRACED AND INSULATED"

8. Contract Drawing G-105:

a. Insert: Attached Figure 1 "CONCRETE WALL ANCHOR SECTION"

9. Contract Drawing G-106:

a. Delete: from Bollard

"8" DIA. 3/8" THICK STEEL POST FILLED WITH CONCRETE PAINTED YELLOW."

Insert:

"6" Ø SCH. 40 STEEL PIPE FILLED WITH CONCRETE WITH ¼" THICK LDPE COVER."

10. Contract Drawing M-101:

a. Section 1, Delete: "TOP EL. 449.0'"

Insert:

"TOP EL. MAX. 456.0'"

b. Section 2, Delete: "DOME REF. LINE EL. 441.9'"

Insert:

"DOME REF. LINE EL. MIN. 441.5'"

c. Within Note 18, Delete: "31 62 16 16" and Insert: "33 16 13.16"

d. Section 1, Delete: "DRAIN EL. 399.00'"

Insert:

"DRAIN EL. 398.50'"

e. Section 2, Delete: callout "12" MIN. GRANULAR LEVELING BASE, SUBBASE MATERIAL WRAPPED IN GEOTEXTILE"

Insert:

"GRANULAR LEVELING BASE PER TANK FOUNDATION DELEGATED DESIGN"

11. Contract Drawing M-200:

a. Flow-Metering Vault, Section 1, Insert:

"NOTE:

1. PINCH-VALVE ACTUATOR SHALL BE MOUNTED TO TOP SLAB WITH EXTENDED STEM. CONTRACTOR SHALL CORE DRILL HOLE IN EXISTING CONCRETE TOP SLAB. ANCHOR BOLTS FOR MOUNTING THE ACTUATOR STAND TO THE EXISTING CONCRETE TOP SLAB SHALL BE STAINLESS STEEL, BE AS RECOMMENDED BY THE VALVE MANUFACTURER AND AS SPECIFEID IN SECTION 05 05 33"

b. Mixer Positioning, Section 2, Insert:

"NOTE:
1. MIXER MOUNTING RAILS SHALL RUN ENTIRE HEIGHT OF TANK SIDEWALL."

12. Contract Drawing M-300, Section 2:

a. Insert callout at pump discharge elbow:

"INSTALL NEW DISCHARGE ELBOW ONTO BASE SLAB WITH STAINLESS STEEL ANCHOR BOLTS"

13. Contract Drawing E-006:

a. Interior Gate Access Detail and Card Reader Detail, Delete callouts from Bollards: "4" CONCRETE FILLED PIPE BOLLARD"

Insert:

"6" Ø BOLLARD BY CONTRACT NO. 1 – GENERAL"

b. Delete from Note 1: "CONTRACTOR"

Insert:

"CONTRACT NO. 1 – GENERAL"

c. Delete from Note 3: "CONTRACTOR"

Insert:

"CONTRACT NO. 2 – ELECTRICAL"

14. Contract Drawing H-001, attached to this Addendum: Insert Contract Drawing "H-001 STORAGE TANK CHEMICAL BUILDING HVAC PLANS AND DIAGRAMS" in its entirety after all electrical "E" drawings.

E. IN THE REFERENCE INFORMATION:

1. See ATTACHMENT NO. 2 for Subsurface Exploration Site Characterization Report.

   a. Delete within Appendix B Reference Information, second part titled "Subsurface Exploration Report" in it's entirety.

      Insert ATTACHMENT NO. 2 "Subsurface Exploration Site Characterization Report".

2. See ATTACHMENT NO. 3 for 7460-1 "Notice of Proposed Construction or Alteration" applications and determination letters for the proposed permanent tanks and the temporary crane locations.

   a. Insert ATTACHMENT NO. 3 as "APPENDIX C: 7460-1 Notice of Proposed Construction or Alteration applications and determination letters for the proposed permanent tanks and temporary crane locations."

F. CLARIFICATIONS:

1. General

   a. Question: Please provide an accurate Engineer's Estimate/Project Budget.

      Answer: The anticipated construction cost for Contract No. 1-General is between 8.5M and 9.5M USD. The anticipated construction cost for Contract No.2-Electrical is 0.5M USD.

   b. Question: What is the RFI Deadline or Deadline for Questions?

      Answer: The final deadline for questions will be Friday, May 18, 2018, at close of business (5:00 PM EST). Please submit all questions in writing to Ben Tillotson (Benjamin.Tillotson@arcadis.com).

   c. Question: What is the anticipated Award Date?

      Answer: The SRAA will endeavor to award the contracts within 60 days of receiving acceptable bids and obtaining FAA grant funding.

   d. Question: What is the anticipated Notice to Proceed date?

      Answer: The anticipated Notice to Proceed date is dependent of the Award Date and the receipt of required insurance, bonds, and required contract information.

2. Specifications

   a. Question: Section 300, Bid Schedule, Bid Item 1.1 Mobilization – written words for the $250,000 lump sum are incorrect – currently says "Two Hundred Fifty Dollars".

      Answer: Refer to Section B, Item 1 of this addendum.

b. Question: Section 700 - Para 700-11 and Section 900 – Para 900-07.D reference supervision of the Work. Please confirm that the tank contractor's subcontractor superintendents may be assigned by the tank contractor as their superintendent representative when the tank contractor is not on site.

Answer: Subcontractor Superintendents may be assigned as Superintendent Representatives provided they are fully authorized as agents of the work as specified in Section 900-07.D.

c. Question: Section 700 - Para 700-17, Section 31 11 00 – Para 3.1.B.1, and Section 31 20 00 – Para 1.4.C.2 indicate that the Contractor shall obtain and pay for all construction permits and licenses for this project. Please confirm specifically what permits, if any, the Tank Contractor will need to obtain for this project and the associated fees for those permits. In particular, will a local building permit be required? And if so, will the Building Permit fee be assessed or waived?

Answer: Contractor shall be responsible for City of Syracuse Electrical Permit, City of Syracuse Building Permits, DOH Backflow Preventer Permit, OCWA Application for Water Service. It is anticipated that the local permit fees will be waived.

Arcadis Acknowledges that additional permits for wetland disturbance may be necessary and will file the appropriate applications.

d. Question: Section 900, Para 900-12.C indicates that the Quality Control Program Administrator shall have a minimum of 5 years of experience in airport and/or highway construction. There are also several references in this section to airport paving experience. Please confirm that the Tank Contractor may use his own employees with construction experience to administer the Quality Control Program for this project.

Answer: Yes, this Section is not applicable to the nature of this project work and; therefore, does not apply.

e. Question: Section 900, Para 900-15.D.4 indicates that the Contractor shall furnish all necessary equipment and appliances for testing the underground cable circuits. Please confirm whether or not this applies to Contract No. 1 – General.

Answer: Testing of underground cable circuits shall be provided as part of Contract No.2-Electrical.

f. Question: Section 01 45 53, Para 3.2.C.1 states that the test elevation shall be 2 feet below top of structure. Please confirm that we are only testing to the overflow elevation and not inside the dome of the tanks.

Answer: Tank testing shall be performed to the top elevation of the overflow inlet.

g. Question: Section 01 57 05, Para 3.6.A.8.b references Section 01 41 26 – Stormwater Pollution Prevention Plan and Permit. We are unable to locate this section in the bid documents.

Answer: A Stormwater Pollution Prevention Plan and Permit is being developed by Arcadis and will be provided to the Contractors.

h. Question: Section 32 31 00, Para 1.7.D.1 references a 10-year warranty against cracking and peeling of PVC coating, and against rusting or corrosion of metal. Please confirm the fencing for this project is galvanized and not PVC coated.

Answer: Any damaged fencing at the security perimeter shall be galvanized steel.

i. Question: Section 32 39 13 indicates that bollards for this project are to be 6-inch diameter Schedule 40 pipe filled with concrete and covered with a ¼-inch thick LDPE yellow shield. Drawing G-106 shows a bollard detail for an 8-inch diameter 3/8-inch thick steel post filled with concrete and painted yellow. Drawing E-006 shows 4-inch diameter concrete filled pipe bollards being installed at the card reader locations. Please confirm the bollard types/sizes required and also that the bollards indicated on Drawing E-006 are to be furnished and installed by Contract No. 2 – Electrical.

Answer: Bollards shall be 6-inch diameter schedule 40 pipe filled with concrete and covered with ¼ inch yellow LDPE shield at all locations. All bollards shall be provided as part of Contract No. 1- General.

j. Question: Section 33 16 13.16, Para 1.4.A.3.a requires the hiring of an independent testing laboratory to design concrete and shotcrete mixes. We recommend the design of the concrete and shotcrete mixes for the tanks be by the Tank Manufacturer with testing being performed by the Independent Testing Agency. Please confirm this is acceptable.

Answer: Refer to Section C., Item 7. of this addendum.

k. Question: Section 33 16 13.16, Para 2.1.A.1.a notes baffle walls as part of the scope of this project, however there are none shown on the contract documents. Please confirm there are no baffle walls required for this project.

Answer: Refer to Section C., Item 7. of this addendum.

l. Question: Please confirm tank dimensions, finish floor elevations, and dome elevations. As currently shown on drawings, the dome elevation is not obtainable given the tank dimensions and code restraints on the rise/run of the concrete dome.

Answer: Refer to Section D., Item 10. of this addendum. In addition, Arcadis reapplied on May 8, 2018 for the "7460-1 Notice of Proposed Construction or Alteration" for permanent structure height of EL. 460.0. This application was accepted by the FAA and any determinations will be given to the Contractor.

m. Question: Section 33 16 13.16, Para 2.1.B.2.m & 2.11.E require overflow rates of 0.65 MGD and 1.0 MGD respectively. Additionally, Para 2.11.E requires the overflow pipes to be three times the area of the largest pipe. Does this requirement allow us to look at the overflows for each tank concurrently and do they need to be sized at three times the 12-inch drain, or just the 8-inch inlet? Also, the plans show 12-inch interior overflow pipes with 8-inch on the exterior of the tanks. Please confirm the tank manufacturer may size the overflow pipes based on the given overflow rate and by combining both tank overflows to meet the area requirement.

Answer: Refer to Section C., Item 7. of this addendum.

n. Question: Section 33 16 13.16, Para 2.7.C.1: Please confirm concrete dobies and plastic slab bolsters are acceptable means to support reinforcing.

Answer: Refer to Section C., Item 7. of this addendum.

o. Question: Section 33 16 13.16, Para 3.6.J requires continuous horizontal reinforcement at 36-inches on center. Please confirm this only applies to the precast panels and this does not need to extend through the wall slots of the tanks.

Answer: If tank manufacturer does not require that horizontal reinforcing of the precast panels extend through the wall slot of the tank as part of the delegated design, then reinforcement may terminate at precast panel.

p. Question: Section 33 16 13.16, Para 3.8.A requires continuous horizontal reinforcement at 36-inches on center. Please confirm this only applies to the precast panels and this does not need to extend through the radial dome slots of the tanks.

Answer: If tank manufacturer does not require that horizontal reinforcing of the precast panels extend through the radial dome slot of the tank as part of the delegated design, then reinforcement may terminate at the radial dome slot of the tank.

q. Question: Section 46 33 45, Para 2.5.A.1 instructs the Contractor to provide field instruments as shown on the Drawings and specified in Division 40 70 05, Primary Sensors and Field Instruments, however the payment item description for Item 1.2 states that the work of Section 40 70 05 is not part of Contract No. 1. Please clarify.

Answer: Section 40 70 05, Primary Sensors and Field Instruments shall be provided as part of Contract No.2-Electrical.

r. Question: Section 46 41 23, Para 2.1.B.1.c indicates that three submersible mixers are required per tank whereas Drawing M-200 indicates that two are required. Please confirm that two submersible mixers are required per tank for this project.

Answer: Refer to Section C., Item 15. of this addendum.

s. Question: Appendix C, Article 3.3 provides milestones for this project which vary from those provided in Section 900. Please confirm that the milestones provided in Section 900 are the most current and are the milestones applicable to this project.

Answer: The milestones in Section 900 are the most current and applicable for this contract.

t. Question: Provide design requirements for static mixer.

Answer: Refer to Section C., Item 8. of this addendum.

u. Question: Specification Section 33 16 13.16, Part 1.2 references A. 57. NSF/ANSI 61, Drinking Water System Components – Health Effects. Please delete Item No. 57; NSF 61 is not applicable as the proposed tanks are not designed to contain drinking water.

Answer: Refer to Section C., Item 7. of this addendum.

v. Question: Section 46 41 32 Submersible Mixers (as listed below) makes reference to Section 40 67 17, Process Control Panels and Enclosures. Section 40 67 17 is not included.

Answer: Refer to Section C., Item 17. of this addendum.

w. Question: Float Switches are called out in Section 43 21 39, reference Spec 40 70 05 but no float switch specification is included in section 40 70 05, Primary field Sensors and Instruments.

Answer: Refer to Section C., Item 11. of this addendum.

3. Contract Drawings

a. Question: Drawing G-103 provides an approximate bottom of slab elevation for the Drain Valve Vault. Please provide an approximate bottom of slab elevation for the Injection Valve Vault as well.

Answer: Refer to Section D., Item 6.d. of this addendum.

b. Question: Drawing M-100 shows 4'x4' access platforms at the top of the exterior ladders. Please confirm if the low sloping (1:12) concrete dome ring will suffice for a walking surface in lieu of the access platforms at the top of the exterior ladders.

Answer: The low sloping concrete dome ring may be used as a walking surface providing all OSHA requirements for railings and traction are met.

c. Question: Drawing M-101 references a dome height of 449.0 to the apex of the concrete surface. This will not be achievable given the diameter, freeboard and finish floor elevation as shown. Please advise.

Answer: Refer to Section D., Item 10. of this addendum.

d. Question: Drawing M-101, Note 18 references Specification Section 31 62 16 16 for information regarding the deep pile foundation. We are unable to locate this section. Please provide.

Answer: Refer to Section D., Item 10.c. of this addendum.

e. Question: Drawing M-101 shows a 6 mil vapor barrier, however Section 33 16 13.16 Para 2.11 calls out a 10 mil vapor retarder. Please confirm that the 6 mil polyethylene film will be adequate for use as a vapor barrier beneath the tank floors.

Answer: Refer to Section C., Item 7. of this addendum.

f. Question: Drawing M-101 shows a floor with a 3.5% slope. This results in a 2' drop to the center of the tank. The drain sump is 6" deep. This would result in a bottom of sump elevation of 398.50. Drawing M-103 shows an elevation of 399.00. Please confirm these elevations and slopes.

Answer: Refer to Section D., Item 10.d. of this addendum.

g. Question: With respect to Section 2 in Sheet M-101, (a) Please note the apparent error in the note 'Min. 12" Granular Leveling Base' which seems to point to the floor slab instead of the subbase; and (b) Please advise if the requirement for a 12" leveling base specifically applies to the pile-foundations design.

Answer: Refer to Section D., Item 10.e. of this addendum.

h. Question: Drawing M-103 shows the overflow exiting the tank at elevation 398.70 which is below the tank floor elevation of 401.00. Please confirm the overflow should exit through the foundation and not through the wall.

Answer: Overflow shall exit tank through the bottom slab at invert elevation 398.7'.

i. Question: Drawing M-104, Dome Hatch and Wall Access Hatch Details note that one of each is required. Please confirm that two Dome Hatches and two Wall Access Hatches are required as shown on Drawing M-100.

Answer: Two dome hatches and two wall manways are required as shown on Drawing M-100.

j. Question: Drawing M-200 shows a submersible mixer at each dome hatch. Please confirm that a 6" flanged dome sleeve will suffice to attach necessary electrical and cabling hardware at each location.

Answer: A 6" flanged dome sleeve is adequate to provide necessary electrical hardware to dome hatches and submersible mixers.

k. Question: Drawing E-006, Note 1 states that the Contractor is responsible for providing and installing bollards, concrete equipment pad, concrete base for card reader gooseneck, and card reader gooseneck. Please confirm this reference is to the Contract No. 2 Contractor and not Contract No.

Answer: All concrete pads, bollards, and card reader gooseneck shall be provided by Contract No.1-General. All conduit and cable and security components shall be provided by Contract No.2-Electrical.

Sincerely,

Arcadis of New York

John C. Perriello, PE
Project Manager

SECTION 33 16 13.16

PRESTRESSED CONCRETE ABOVEGROUND STORAGE TANKS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall provide all professional services, labor, materials, tools, equipment and incidentals as shown, specified, and required to design, furnish, install, test and coat all prestressed concrete tanks of the specified type, diameter and capacity, capable of withstanding specified structural loads without excessive cracking or deflection.
   2. Included are:
      a. Site work, excavation and fill, foundation, dome, concrete work, reinforcing, coating, disinfection, testing, and appurtenances directly related to the prestressed concrete tanks unless otherwise specified.
      b. Providing openings in and attachments to prestressed concrete tanks to accommodate the Work under this and other Sections and providing for prestressed concrete tanks all items required for which provision is not specifically included under other Sections.
   3. Extent of prestressed concrete tanks Work is shown on the Drawings.
   4. Tanks shall be designed to store spent deicing fluid (propylene glycol) and stormwater runoff.

B. Coordination:
   1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before prestressed concrete tanks Work.

C. Related Sections:
   1. Section 01 45 53, Cleaning and Testing of Hydraulic Structures.
   2. Section 31 20 00, Earth Moving.
   3. Section 33 05 05, Buried Pipe Installation.
   4. Section 40 05 05, Exposed Piping Installation.
   5. Section 40 05 19, Ductile Iron Process Pipe.

1.2 REFERENCES

A. Standards referenced in this Section are:
   1. ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
   2. ACI 301, Specifications for Structural Concrete.
   3. ACI 302.1R, Guide for Concrete Floor and Slab Construction.

4. CI 305R, Guide to Hot Weather Concreting.
5. ACI 306R, Guide to Cold Weather Concreting.
6. ACI 318, Building Code Requirements for Structural Concrete and Commentary.
7. ACI 350, Code Requirements for Environmental Engineering Concrete Structures and Commentary.
8. ACI 350.3, Seismic Design of Liquid-Containing Concrete Structures and Commentary.
9. ACI 372R, Design and Construction of Circular Wire- and Strand-Wrapped Prestressed Concrete Structures.
10. ACI 506R, Guide to Shotcrete.
11. ACI CP-60, Craftsman Workbook for ACI Certification of Shotcrete Nozzleman.
12. ANSI/AWWA D110, Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks.
13. ASCE 7, Minimum design loads for buildings and other structures.
14. ASTM A185/A185M, Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
15. ASTM A416/A416M, Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
16. ASTM A475, Specification for Zinc-Coated Steel Wire Strand.
17. ASTM A586, Specification for Zinc-Coated Parallel and Helical Steel Wire Structural Strand.
18. ASTM A603, Specification for Zinc-Coated Steel Structural Wire Rope.
19. ASTM A615/A615M, Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
20. ASTM A641/A641M, Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
21. ASTM A706/A706M, Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
22. ASTM A821/A821M, Specification for Steel Wire, Hard-Drawn for Prestressed Concrete Tanks.
23. ASTM A1008/A1008M, Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
24. ASTM C31/C31M, Practice for Making and Curing Concrete Test Specimens in the Field.
25. ASTM C33/C33M, Specification for Concrete Aggregates.
26. ASTM C39/C39M, Test Method for Compressive Strength of Cylindrical Concrete Specimens.
27. ASTM C94/C94M, Specification for Ready-Mixed Concrete.
28. ASTM C143/C143M, Test Method for Slump of Hydraulic-Cement Concrete.
29. ASTM C150/C150M, Specification for Portland Cement.
30. ASTM C172/C172M, Practice for Sampling Freshly Mixed Concrete.
31. ASTM C231/C231M, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

32. ASTM C260/C260M, Specification for Air-Entraining Admixtures for Concrete.
33. ASTM C494/C494M, Specification for Chemical Admixtures for Concrete.
34. ASTM C618, Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
35. ASTM C881/C881M, Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
36. ASTM C882/C882M, Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
37. ASTM C920 Specification for Elastomeric Joint Sealants.
38. ASTM C1064/C1064M, Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
39. ASTM C1107/C1107M, Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink).
40. ASTM C1140, Practice for Preparing and Testing Specimens from Shotcrete Test Panels.
41. ASTM C1141/C1141M, Specification for Admixtures for Shotcrete.
42. ASTM C1218/C1218M, Test Method for Water-Soluble Chloride in Mortar and Concrete.
43. ASTM D395, Test Methods for Rubber Property—Compression Set.
44. ASTM D412, Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
45. ASTM D638, Test Method for Tensile Properties of Plastics.
46. ASTM D1056, Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
47. ASTM D1752, Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
48. ASTM D2000, Classification System for Rubber Products in Automotive Applications.
49. ASTM D2240, Test Method for Rubber Property—Durometer Hardness.
50. ASTM E96/E96M, Test Methods for Water Vapor Transmission of Materials.
51. ASTM E329, Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
52. ASTM E1745, Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
53. AWS D1.1/D1.1M, Structural Welding Code – Steel.
54. AWS D1.2/D1.2M, Structural Welding Code – Aluminum.
55. AWS D1.4/D1.4M, Structural Welding Code – Reinforcing Steel.
56. CRSI MSP-1, Manual of Standard Practice.
57. US Army Corps of Engineers Specification CRD-C572, Specification for PVC Waterstop.

1.3 TERMINOLOGY

A. Terminology used in this Section shall comply with ANSI/AWWA D110 for definitions of terms relating to prestressed concrete tanks construction.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer's Qualifications:
      a. All tank Work shall be performed by a manufacturer that specializes in the design and construction of wire- and strand- wound, circular prestressed ANSI/AWWA D110 Type III concrete water tanks, which is capable of meeting all the requirements of these specifications. No manufacturer will be considered qualified unless it has designed and built in its own name or under one of its divisions at least ten prestressed concrete tanks of equal or greater size as those specified herein, conforming to ANSI/AWWA D110 Type III, in the last fifteen years, and which have been in successful service for a minimum of five years.
   2. Professional Engineer:
      a. Tank manufacturer shall employ a registered professional engineer legally qualified to practice in the same state as the Site. Professional engineer shall have at least ten years' experience in design and field construction of wire- and strand- wound, circular prestressed ANSI/AWWA D110 Type III concrete tanks.
      b. Responsibilities include:
         1) Reviewing prestressed concrete tanks system performance and design criteria stated in the Contract Documents.
         2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to ENGINEER by CONTRACTOR.
         3) Preparing or supervising preparation of design calculations, tank design drawings, and related Shop Drawings.
         4) Signing and sealing all calculations, tank design drawings, and Shop Drawings.
   3. Testing Laboratory:
      a. Retain the services of independent testing laboratory experienced in testing of concrete materials and mixes to perform material evaluation tests.
      b. Testing laboratory shall comply with the requirements of Section 01 45 29.13, Testing Laboratory Services Furnished by Contractor, and demonstrate to ENGINEER's satisfaction, based on evaluation of criteria submitted by testing agency, that it has the experience and capability to satisfactorily conduct the testing indicated, in accordance with ASTM E329.

4. Welding:
    a. Qualify procedures and personnel according to AWS D1.1/D1.1M, AWS D1.2/D1.2M or AWS D1.4/D1.4M, as required.
    b. Submit certification that each welder employed on or to be employed for the Work possesses current AWS certification in the welding process with which welder will be working. Certifications shall be current and valid throughout the Work.
5. Shotcrete Crew:
    a. Shotcrete crew foreman, nozzle operator, finisher and gun operator shall be qualified per ACI 506R and as specified herein.
    b. Nozzle and gun operators shall have no less than two years' experience in the shotcreting work similar to the Project and be certified in accordance with ACI CP-60. Shotcrete pool and ditch construction shall not be considered as qualifying experience.

B. Component Supply and Compatibility:
1. Obtain all prestressed concrete tanks components through a single source and from a single manufacturer.
2. Prestressed concrete tanks manufacturer shall review and approve or prepare all Shop Drawings and other submittals for all components furnished under this Section.
3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by prestressed concrete tanks manufacturer.

C. Regulatory Requirements: Conform to the following:
1. Fabricate prestressed concrete tanks to comply with material verification and special inspection requirements of the governing Building Code and Authorities Having Jurisdiction at the Site.
2. 29 CFR 1910, Occupational Health and Safety Standards, Sections 1910.24 and 1910.27, for stairs and ladders, respectively.

D. Pre-installation Conference:
1. Prior to erection of prestressed concrete tanks and associated Work, CONTRACTOR shall schedule and meet at the Site with the prestressed concrete tank manufacturer and installer, the installers of substrate construction to receive the prestressed concrete tanks, the installers of other Work in and around the prestressed concrete tank that follows the prestressed concrete tank Work, ENGINEER, and other representatives directly concerned with performance of the Work. Review foreseeable methods and procedures related to the prestressed concrete tank Work, including, but not necessarily limited to the following:
    a. Project requirements and the Contract Documents.
    b. Required submittals, both completed and yet to be completed.
    c. Status of foundation work, including approval of surface preparations, structural loading limitations and similar considerations.

d. Detailed requirements of CONTRACTOR's proposed concrete and shotcrete design mixes.
e. Discuss procedures for producing proper concrete and shotcrete construction, and to clarify roles of the parties involved.
f. Construction schedule and availability of materials, tradesmen, equipment and facilities needed to make progress and avoid delays.
g. Environmental conditions, other Project conditions, and procedures for coping with unfavorable conditions.
h. Regulations concerning code compliance, environmental protection, health, safety, fire and similar considerations.
i. Required inspection, testing, and certifying procedures.

2. Record the discussions of the conference and the decisions and agreements or disagreements reached and furnish a copy of the record to each party attending.
3. Record all revisions or changes agreed upon, reasons therefore, and parties agreeing or disagreeing with them.
4. Reconvene the meeting at the earliest opportunity if additional information must be developed in order to conclude the subjects under consideration

1.5 SUBMITTALS

A. Action Submittals:
1. Shop Drawings:
a. Shop Drawings for the construction of prestressed concrete tanks system, including plans, elevations, sections, and details of entire system showing full dimensions and identification marks, joints, reinforcing details, anchorage, piping details, and dome, wall, and floor construction, including penetration locations and details. Indicate the locations of all appurtenances.
1) Shop Drawings shall be signed, sealed, and dated by CONTRACTOR's professional engineer. State of professional engineer's registration, registration number, and name on seal shall be clearly legible.
b. CONTRACTOR shall also note Work not supplied by tank manufacturer and who is to supply such Work.
2. Product Data:
a. Manufacturer's complete product information, specifications and installation instructions for prestressed concrete tanks components and accessories. Include material descriptions, dimensions, and profiles of individual system components, such as pre-manufactured pipe supports, ladder and safety cage, railing, hatches, manways, vent, waterstops, and all other accessories.
b. Copies of coating manufacturer's technical data sheets, including surface preparation, number of coats, dry film thickness, test performance data including paint analysis, and application instructions for each product proposed for use.

B. Delegated Design Submittals:
   1. Design Data: Submit the following:
      a. Laboratory Trial Batch Reports:
         1) Submit laboratory test reports for materials, and mix design tests, including list of concrete and shotcrete materials and proportions for the proposed concrete and shotcrete mix designs. Include data sheets, test results, certifications, and mill reports to qualify the materials proposed for use in the mix designs, including admixtures.
      b. Tank Design Calculations:
         1) Complete calculations for the prestressed concrete tanks, as one package with the Shop Drawings. Structural calculations shall include all specified performance criteria, required load cases and load combinations used in the design and resulting forces. All calculations and assumptions shall be presented so that ENGINEER can easily follow the progress and logic of CONTRACTOR'S professional engineer. The design analysis shall include the name and office phone number of the designer to answer questions during the shop drawing review.
         2) Design calculations shall be signed, sealed, and dated by CONTRACTOR's professional engineer. State of professional engineer's registration, registration number, and name on seal shall be clearly legible.
      c. Foundation Design Calculations:
         1) Complete calculations for pile foundation design as one package with the shop drawings. This submittal shall include, but is not limited to, Axial Service Capacity, Factor of Safety, Downdrag Load, Required Ultimate Pile Capacity to account for Downdrag Load, Bearing Stratum and Installation Criteria, Pile Hammer Type and Rated Energy, and WEAP analysis to support hammer selection.
         2) Shop Drawings shall show pile location, pile type, and specifications. Shop Drawings shall also include, but is not limited to, test pile locations and load test specifications, pile cutoff elevations, pile cap/grade beam details, and pile to pile cap connection details.
         3) Design calculations shall be signed, sealed, and dated by CONTRACTOR's professional engineer. State of professional engineer's registration, registration number, and name on seal shall be clearly legible.

C. Informational Submittals: Submit the following:
   1. Submittals pertaining to excavation plan, soil protection, and backfill materials and procedures, according to the requirements of Section 31 23 05, Excavation and Fill.
   2. Delivery Tickets: Copies of all delivery tickets for each load of concrete or shotcrete delivered to or mixed at the Site. Each delivery ticket shall contain the information in accordance with ASTM C94/C94M along with project identification name and number (if any), date, mix type, mix time, quantity and

amount of water introduced.

3. Certificates.
    a. Welder's certifications.
4. Qualification Statements: Submit qualifications for the following:
    a. Manufacturer.
    b. Professional Engineer.
    c. Testing Laboratory.
    d. Shotcrete crew.
5. Field Quality Control Submittals:
    a. Report of field testing results.

D. Closeout Submittals: Submit the following:
1. Warranty Documentation:
    a. Copies of special warranties, as specified.
2. Record Documentation:
    a. Immediately upon completion of the Work submit three copies of Record Drawings showing the actual in place installation of all work specified in this Section.

1.6 DELIVERY, STORAGE AND HANDLING

A. Transportation, Delivery, and Handling:
1. Deliver concrete reinforcing products to Site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings on approved Shop Drawings.
2. Materials used for concrete shall be clean and free from foreign matter during transportation and handling and kept separate until measured and placed into concrete mixer.
3. Implement suitable measures during hauling, piling, and handling to ensure that segregation of coarse and fine aggregate particles does not occur and grading is not affected.
4. Deliver grout materials from manufacturers in unopened containers that bear intact manufacturer labeling.
5. Comply with Section 01 65 00, Product Delivery Requirements.

B. Storage:
1. Store formwork materials above ground on framework or blocking. Cover wood for forms and other accessory materials with protective, waterproof covering. Provide for adequate air circulation or ventilation under cover.
2. Store concrete reinforcing materials to prevent damage and accumulation of dirt and excessive rust. Store on heavy wood blocking so that reinforcing does not come into contact with the ground. Space framework or blocking supports to prevent excessive deformation of stored materials.
3. For storage of concrete materials, provide bins or platforms with hard, clean surfaces.
4. Comply with Section 01 66 00, Product Storage and Handling Requirements.

1.7 SITE CONDITIONS

A. Site Information:
   1. Information on subsurface conditions is available in the reports listed in the Supplementary Conditions. Refer to Section 31 20 00, Earth Moving for excavation and fill requirements.

1.8 WARRANTY

A. General Warranty: The special warranties specified in this Article shall not deprive OWNER of other rights or remedies OWNER may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by CONTRACTOR under the Contract Documents. The obligations of CONTRACTOR under the Contract Documents shall not be limited in any way by the provisions of the specified special warranties. Warranty shall be made to the OWNER.

B. Special Warranties:
   1. Tank manufacturer shall guarantee workmanship and materials on the prestressed concrete tanks systems and components for a period of five years from date of OWNER's acceptance. In case leakage or other defects appear within the five-year period, tank manufacturer will make repairs promptly upon written notice by OWNER that such defects have been found.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. System Description
   1. General:
      a. Provide two 3.0 million gallon (MG) prestressed concrete tanks. Tanks shall be designed and constructed in accordance with the provisions of ANSI/AWWA D110, Type III, and shall consist of a cast-in-place reinforced concrete floor, a precast, wire or strand wound prestressed concrete wall with continuous mechanically bonded steel diaphragm, concrete dome, piping, hatches, vents, and appurtenances as shown or specified.
   2. Tank Wall:
      a. Precast concrete vertical panels curved to tank radius with a full height, vertically fluted steel diaphragm, prestressed circumferentially by wrapping either high strength steel wire or strand. Waterstop shall be as required per tank design requirements. Horizontal prestressing shall be continuous. Discontinuous prestressing tendons or strands will not be allowed.

3. Tank Floor Slab:
    a. Designed as a cast-in-place reinforced concrete structural floor not less than 6 inches thick. The floor shall be sloped-bottomed to center drain. Floor shall be placed continuously in sections as large as practicable to limit the length of construction joints and the potential for leakage. Construction joints shall be allowed only where shown on the approved Shop Drawings.
    b. Floor shall be designed to resist bending moments and shears induced by loads specified. Tank floor slab reinforcing shall be designed in accordance with ACI 350. Minimum reinforcing shall be no less than that required for temperature and shrinkage, in accordance with ACI 350. Minimum bar size shall be #4.
    c. Rational analysis shall as calculate c. Circumferential steel. In wall footings monolithic with the floor, the minimum ratio of circumferential reinforcement to concrete area shall be no less than 0.5 percent, placed within a minimum width of thirty inches.
4. Tank Dome:
    a. Dome shall be free-spanning and have a rise to span ratio within the range of 1:8 to 1:14The dome shall be either precast concrete or cast-in-place concrete.
    b. The dome shall be fixed or pinned to the tank wall. If dome is separated from tank wall, a positive means shall be provided to prevent lateral displacement of the dome. Columns or interior supports will not be allowed.
    c. Design shall consider the bending, thrusts, and shears that result from prestressing of the dome ring and dome live load on the edge region of the dome.
    d. A circular prestressed dome ring shall be provided to resist dome thrust. The dome ring shall be prestressed to counteract the dead load and live load thrusts and shall be of sufficient cross section to resist applied prestressing force.
    e. Requirements for precast or cast-in-place concrete dome:
        1) Dome design shall be based on elastic spherical shell analysis and shell thickness shall be governed by buckling or maximum stress considerations in accordance with ANSI/AWWA D110, but not less than 4 inches for precast dome, and 3 inches for a cast-in-place dome to provide a minimum concrete cover of 1.5 inches at each face in accordance with ACI 350.
        2) Dome reinforcing shall consist of wire mesh or reinforcing bars as required by design, minimum reinforcing area shall be no less than 0.25 percent. Minimum thickness for buckling resistance shall be in accordance with ACI 350, ANSI/AWWA D110 and ACI 372R.

B. Design Criteria:
    1. Materials, design, workmanship and all other aspects of prestressed concrete tanks design and construction shall be in accordance with ANSI/AWWA D110

and ACI 372R except as modified herein.

2. Use the following loadings and requirements in the design calculations:
   a. Nominal capacity: 3.0 million gallons.
   b. Dimensions: 113-foot inside diameter.
   c. Operating Level: To tank overflow.
   d. In general, loads and load combinations shall comply with the requirements of ANSI/AWWA D110, ASCE 7, and applicable Building Code.
   e. Dead Load shall be the estimated weight of all permanent imposed loads. Unit weight of concrete 150 pounds per cubic foot; steel 490 pounds per cubic foot.
   f. Live Loads: Internal pressures resulting from the water pressure at maximum overflow level. Unit weight of liquid 68.7 pounds per cubic foot.
   g. Dome Live Load: Dome live load shall be the more severe of earth, snow, ice and other live loads per the requirements of the provisions of ANSI/AWWA D110, ASCE 7, and applicable Building Code. Construction loads shall also be considered in the design of the dome.
   h. Backfill Pressure: The lateral pressure from earth backfill and surcharge, including those caused by unequal fill, shall be determined by the Foundation Delegated Design Engineer.
      1) Backfill pressure shall not be used to reduce the amount of required pre-stressing.
      2) Minimum vertical surcharge load shall be 300 psf.
   i. Foundation Loads: The tank foundations shall be designed by the Foundation Delegated Design Engineer. Information is given in the Subsurface Exploration Site Characterization Report (Not Part of Contract).
   j. Seismic Loads: The effects of seismic loads shall be considered in the design of all structural and non-structural components of the prestressed concrete tanks system per ANSI/AWWA D110, ASCE 7, ACI 350.3, and applicable Building Code requirements.
      1) Seismic Design Criteria: Seismic design shall be based on the applicable sections of AWWA D110-04, ACI 350.3, ASCE 7, TID 7024 and the local jurisdictional building code. The comparative value of 80% as specified in ASCE 7, Section 15.4.1 paragraph 6 shall be used to determine the total base shear from ASCE 7. Impulsive and convective forces, as well as, fluid spectral velocity shall be calculated utilizing each code and the maximum value of each component shall be used to calculate the total base shear.
      2) ASCE 7/AWWA D110-13 Design Criteria:
         a) Mapped Spectral Accelerations for Short Periods, S_s: 0.146g
         b) Mapped Spectral Accelerations for 1-Second Period; S_1: 0.063g
         c) Site Class: E
         d) Long-period Transition Period, T_L: 6
         e) Occupancy/Risk Category: III

3) Dome, walls, foundation and appurtenances shall be investigated for the effects of earthquake loads such as, but not limited to, induced impulsive and convective forces, uplift pressures on the dome caused by the height of the sloshing wave, etc. The dynamic forces caused by the backfill surrounding the tank shall also be taken into account during design. Dynamic backfill forces shall not be used to reduce the dynamic effects of the sloshing water in the tank.
4) Freeboard: Sloshing height shall be calculated per the requirements of ANSI/AWWA D110 and ACI 350.3. The effects of the sloshing wave shall be accounted for by providing sufficient freeboard between the normal operating surface and the underside of the dome, or dome structure shall be designed to resist the uplift pressures. Provide a minimum of 6 inches freeboard between the operating water level and the top of the dome/wall intersection.
5) Required seismic joints at the wall/foundation and wall/dome interaction shall be provided to resist dynamic seismic forces and its effects and shall comply with the strength and ductility requirements of ASCE 7. Tank design engineer shall be responsible for selecting and determining adequacy of the joints for the design requirements specified above.

k. Wind Loads: Shall be per the requirements of ANSI/AWWA D110, ASCE 7, and applicable Building Code requirements.
l. Vent Capacity Requirements:
1) Maximum fill rate: 0.65 MGD.
2) Maximum drawdown rate: 0.22 MGD.
m. Overflow Rate: 0.65 MGD

2.2 MANUFACTURERS

A. Manufacturer: Provide product of one of the following:
1. DN Tanks.
2. Preload, LLC.
3. Or Equal.

2.3 CONCRETE

A. Concrete shall conform to ACI 301, and as specified herein:
1. Minimum compressive strength:
a. 4,000 psi at 28 days.
2. Portland Cement: ASTM C150/C150M, Type I or II.
3. Aggregates: ASTM C33/C33M, except local aggregates of proven durability may be used when acceptable to ENGINEER.
4. Water: Clean, free of oils, acids and organic matter.
5. Admixtures, other than air-entraining and water reducing admixtures, will not be allowed unless approved by ENGINEER. Water reducing admixtures shall conform to ASTM C494/C494M, Type A. Air-Entraining Admixture shall

conform to ASTM C260/C260M. Do not use calcium chloride.

6. Use air-entraining admixture in all concrete. Provide not less than four percent, nor more than eight percent, entrained air for concrete exposed to freezing and thawing, and provide from three to five percent entrained air for other concrete.
7. Concrete in contact with prestressing steel shall have a maximum water-soluble chloride ion concentration of 0.06 percent by mass of cementitious material as determined by ASTM C1218/C1218M. Non-prestressed members shall meet the allowable chloride ions limit of ACI 350.

2.4 SHOTCRETE

A. Shotcrete shall conform to ACI 506R, and as modified herein.
   1. The wet-mix process shall be employed for shotcreting.
   2. Minimum compressive strength shall be 4,500 psi at 28 days.
   3. Portland Cement: ASTM C150/C150M, Type I or II.
   4. Fly ash mineral admixture: A maximum 25 percent cementitious material in the final tank overcoat may be replaced with fly ash, conforming to ASTM C618, Class F in accordance with ACI 350 and ANSI/AWWA D110.
   5. Aggregates: ASTM C33/C33M, except local aggregates of proven durability may be used when acceptable to ENGINEER.
   6. Water: Clean, free of oils, acids and organic matter.
   7. Admixtures for shotcrete shall conform to C1141/C1141M. Do not use calcium chloride.
   8. Shotcrete used for covering prestressing shall consist of not more than three parts sand to one part Portland cement by weight. Additional coats of shotcrete shall consist of no more than four parts sand to one part Portland cement by weight.
   9. Shotcrete in contact with prestressing steel shall have a maximum water-soluble chloride ion concentration of 0.06 percent by mass of cementitious material as determined by ASTM C1218/C1218M.
   10. All shotcrete shall be air entrained with 7.5 percent air plus or minus 1.5 percent.
   11. Polypropylene fibers shall be included in the shotcrete used for the finish covercoat. The amount of fibers used shall conform to the manufacturer's recommendations.

2.5 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type of concrete and shotcrete required.

B. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the Project for each type of concrete or shotcrete required, complying with ACI 211.1.

C. Adjustment to Mixes: Mix design adjustments may be requested when characteristics of materials, job conditions, weather, test results or other circumstances warrant. Laboratory test data for revised mix designs and strength results shall be submitted to and accepted by ENGINEER before being incorporated into the Work.

2.6 STEEL DIAPHRAGM

A. Sheet steel diaphragm shall conform to ASTM A1008/A1008M and shall be a minimum thickness of 0.017 inches. It shall be vertically ribbed with reentrant angles. The back of the channels shall be wider than the front, thus providing a mechanical keyway anchorage with the concrete and shotcrete encasement.

B. Diaphragm steel may be considered as contributing to the vertical reinforcing of the wall.

2.7 NON-PRESTRESSED REINFORCING

A. Reinforcing bars shall be deformed in accordance with ASTM A615/A615M, and as follows:
   1. Provide Grade 60 for all bars, unless indicated otherwise.
   2. Where welding of reinforcing bars is allowed or required by tank professional engineer, provide ASTM A706/A706M reinforcing bars.

B. Welded Smooth Wire Fabric: Shall be in accordance with ASTM A185/A185M.
   1. Furnish in flat sheets, not rolls.

C. Provide supports for reinforcing including plastic slab bolsters, dobies, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing in place.
   1. Use wire bar-type supports complying with CRSI MSP-1 recommendations, except as specified in this Section. Do not use wood, brick, or other unacceptable materials.
   2. Provide precast concrete supports over waterproof membranes.

D. Seismic Cables:
   1. Galvanized strand for seismic cables shall meet the requirements of ASTM A416/A416M, Grade 250 or 270, before galvanizing, and ASTM A586, ASTM A603, or ASTM A475 after galvanizing. Zinc coating shall meet the requirements of ASTM A475, Class A or ASTM A603, Class A.

2.8 PRESTRESSING REINFORCING

A. Circumferential prestressing reinforcing:
   1. Prestressing reinforcing shall be one of the following:
      a. Uncoated, cold drawn, high carbon wire meeting the requirements of

ASTM A821/A821M, having a minimum ultimate tensile strength of 210,000 psi.

b. Galvanized strand shall meet the requirements of ASTM A416/A416M with zinc coating for galvanizing meeting the requirements of ASTM A641/A641M or ASTM A475. Each wire shall be individually hot-dipped galvanized before being stranded if strand if being used. The minimum weight of zinc coating per unit area of uncoated wire surface shall be 0.85 ounces per square foot.

2. Splices for horizontal prestressing reinforcing shall be ferrous material compatible with the reinforcing and shall develop full strength of the prestressing reinforcing. Wire splice and anchorage accessories shall not nick or otherwise damage the prestressing reinforcing.

2.9 MORTAR AND GROUT

A. Non-shrink Grout:
   1. Non-shrink cement grout used for repair or honeycomb and other concrete repair and for patching form tie holes shall be a nonhydrogen-gas-liberating, nonmetallic grout meeting all the requirements of ASTM C1107, grade A or C, for non-shrink grout. This grout shall not be used for bonding of prestressed tendons and shall not come in contact with the wire or strand prestressed reinforcement.

B. Cement Mortar:
   1. Mortar used for repair of concrete, encasement of waterstop, and for patching form tie holes shall consist of not more than three parts sand to one part Portland cement by weight and shall conform to the requirements of ACI 301. Mortar shall not contain water-soluble chloride ions in excess of 0.06 percent of the weight of the cement in the mortar.

C. Epoxy Mortar:
   1. Epoxy mortar used for concrete repair shall be a non-corrosive and non-contaminating mixture of epoxy resin, catalyst, and fine aggregate proportioned in strict accordance with the manufacturer's instructions for product and intended use.

2.10 ELASTOMERIC MATERIALS

A. Waterstops:
   1. Waterstops shall be extruded from elastomeric PVC compound containing plasticizers, resins, stabilizers, and other materials necessary to meet requirements of the Contract Documents and requirements of CRD-C572. Do not use reclaimed or scrap material.
      a. Tensile strength: 2,000 psi, minimum, per ASTM D638.
      b. Ultimate elongation: 350 percent, minimum, per ASTM D638.
      c. Waterstop profile and size shall be suitable for the hydrostatic pressure

and movements to which it is exposed and shall be chosen by tank design professional engineer.

B. Bearing pads: Shall be neoprene or natural rubber:
   1. Neoprene bearing pads shall have a hardness of 40 to 50 durometer (ASTM D2240, Type A Durometer), a minimum tensile strength of 1,500 psi, a minimum elongation of 500 percent (ASTM D412), and a maximum compressive set of 50 percent (ASTM D395, Method A). Pads shall meet the requirement of ASTM D2000, Line Call-Out M 2 BC 410 A1 4 B14 or M 2 BC 414 A1 4 C12 F17 for 40 durometer material.
   2. Natural rubber bearing pads shall contain only virgin natural polyisoprene as the raw polymer and the physical properties shall comply with ASTM D2000, Line Call-Out M 4 AA 4 14 A1 3.

C. Sponge Filler:
   1. Sponge rubber filler shall be closed cell neoprene or rubber conforming to ASTM D1752, type 1, or ASTM D1056, Grade 2A1 with compression deflection limited to 25 percent at 2 to 5 psi.

D. Sealant:
   1. Epoxy sealant shall conform to the requirements of ASTM C881/C881M, Type III, Grade 1, and should be a 100 percent solids, moisture-insensitive, low modulus, two part epoxy system. Epoxy sealant shall have proven characteristics of bond to metal surface and resistance to extrusion by hydrostatic pressure.
   2. Polysulfide sealant shall be a two-component elastomeric compound meeting the requirements of ASTM C920, Type M. Sealants must have permanent characteristics of bond to metal surfaces, flexibility, and resistance to extrusion due to hydrostatic pressure. Air cured sealants shall not be used.

E. Epoxy Bonding Agent:
   1. Provide a two-component, 100 percent solids, moisture-insensitive epoxy adhesive meeting the requirements of ASTM C881/C881M, type II, grade 2. Bonding agent shall produce a bonding strength, as determined by ASTM C882/C882M, greater than 1,500 psi, 14 days after the plastic concrete is placed. Epoxy in contact with water shall not impart taste, or odor, or leach toxic elements into the water.

2.11 APPURTENANCES

A. General:
   1. Provide and install all accessories as specified and as shown on the Drawings.

B. Anchor Systems:
   1. Conform to the requirements of Section 05 05 33, Anchor Systems.

C. Vapor Retarder:
   1. Vapor retarder membrane shall comply with the following:
      a. Water Vapor Transmission Rate, ASTM E96/E96M: 0.04 perms or lower.
      b. Water Vapor Retarder, ASTM E1745: Meets or exceeds Class C.
      c. Thickness of Retarder (plastic), ACI 302 1R: Not less than 10 mils.
   2. Products and Manufacturers: Provide one of the following:
      a. Stego Wrap Vapor Retarder, by Stego Industries LLC.
      b. Griffolyn, by Reef Industries.
      c. Moistop Ultra, by Fortifiber Industries.
      d. Or equal.
   3. Vapor Retarder Accessories: Provide accessories by same manufacturer as vapor retarder.
      a. Seam Tape:
         1) Tape shall have water vapor transmission rate (ASTM E96/E96M) of 0.3 perms or lower.
      b. Products and Manufacturers: Provide one of the following:
         1) Stego Tape by Stego Industries LLC.
         2) Griffolyn Fab Tape by Reef Industries.
         3) Moistop Tape by Fortifiber Industries.
         4) Or equal.
      c. Vapor Proofing Mastic: Mastic shall have a water vapor transmission rate ASTM E96/E96M, 0.3 perms or lower.

D. Inlet and Outlet piping: Shall conform to Section 33 05 05, Buried Piping Installation, and 40 05 05, Exposed Piping Installation, 40 05 19, Ductile Iron Process Pipe, as applicable. Piping shall be constructed in accordance with the Drawings.

E. Overflow and Weir piping:
   1. Provide overflow and weir piping designed to pass .65 MGD of overflow without causing any uplift pressure on the dome of the tank. In no case shall the height of the water over the weir crest exceed 12 inches. The overflow pipe and weir shall be supported from the tank wall. The overflow shall exit the tank as shown on the Drawings. Piping shall conform to Section 40 05 19, Ductile Iron Pipe.

F. Wall Manway:
   1. Provide a circular manhole with a minimum inside diameter of 31 inches or a 15”x42” minimum manhole frame and cover fabricated from type 316 or type 304 stainless steel. Number, location, and elevation of the wall manhole shall be as shown on the Drawings. Manhole covers shall be bolted to the frame using stainless steel bolts and neoprene gaskets and shall be designed to resist hydrostatic pressures without excessive deflection.

G. Dome Hatch:
   1. Lockable, not less than 42 inches x 42 inches, gasketed, aluminum or fiberglass dome hatch. All hardware shall be type 316 stainless steel. Number and location as shown on the Drawings.

H. Dome Ventilator:
   1. Fiberglass, with minimum 16-mesh stainless steel bird screen. The vent shall be mushroom type reinforced to withstand wind force without damage. Connection of vent to dome shall be gasketed and all fasteners shall be type 316 stainless steel. The vent shall be designed to provide fail-safe operation in the event the insect screen frosts over.

I. Exterior Ladder and Railing System:
   1. An exterior aluminum ladder with safety cage and dome railing system of aluminum alloy 6061-T6, complete with mounting brackets and stainless steel anchors, shall be installed as shown on the Drawings.

J. Drain:
   1. A drain pipe shall be provided as shown on the Drawings.

2.12 COATINGS

A. Interior paint system (Floor and Sidewalls) shall consist of the following:
   1. Surface Preparation: New Concrete with minimum compressive strength of 3,000 psi, dry and be free of release agents or curing compounds. Prepare surface to an ICRI Concrete Surface Profile of 5 to 6 to expose aggregate. Repair any bugholes, check for moisture of concrete surface and follow manufacturer's recommendations prior to application.
   2. Primer (Optional): Apply an epoxy primer at a minimum rate of 5 wet mils. Additional applications of primer may be necessary to obtain a pinhole free primer coat. The primer coat is optional and shall be determined if needed. Epoxy primer shall be 61BG as manufacturer by C.I.M. Industries, Inc., or approved equal.
   3. Finish Coating: Apply to concrete at a rate of 60 wet mils, which can be achieved in a single coat on horizontal surfaces. For vertical surfaces, apply a minimum of two (2) applications of 30 wet mils each. Finish coating shall be a liquid, two-component urethane, CIM 1000 by C.I.M. Industries, Inc., or approved equal.
   4. Coverage: Apply to entire floor of the concrete storage tanks and up the side walls from the bottom (3-feet) for protection.

B. Exterior paint system (Walls and Dome) shall consist of one of the following systems:
   1. Two-coat decorative finish consisting of one coat of cementitious based damp-proofing product such as "Tamoseal", or equal, and one coat of a non-cementitious, high build, 100 percent acrylic resin polymer such as "Tammscoat Smooth" textured protective coating, or equal.

2. Two-coat decorative finish consisting of two coats of an acrylic coating such as high build, 100 percent acrylic resin polymer such as "Tammscoat Smooth" textured protective coating as manufactured by The Euclid Chemical Company, Inc. or equal.
3. Two-coat Tnemec Series 156 Enviro-Crete Modified Waterborne Acrylate, or equal.

C. New and Existing Aluminum in Contact with Dissimilar Materials:
   1. Primer/Finish:
      a. Generic Components:
         1) Minimum 100 percent volume solids, high-build, two-component, polyamido-amine or polyamine epoxy; 49 grams per gallon VOC, maximum.
      b. Products and Manufacturers: Provide one of the following:
         1) Series 165 Epoxoline 100 (TCI); Carboguard 954 HB (TCC); Dura-Plate UHS (SWC): Two coats, 8.0 to 15.0 dry mils, per coat.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION INSPECTION

A. CONTRACTOR shall examine the areas and conditions under which prestressed concrete tank is to be erected and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 INSTALLATION

A. Site Preparation:
   1. CONTRACTOR shall prepare prestressed concrete tanks foundation and final grading in accordance with the requirement of Section 31 20 00, Earth Moving, and as shown on the Drawings.

3.3 CONCRETE INSTALLATION

A. Concrete placement, finishing, and curing shall be in accordance with the requirements of ACI 301.

B. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placing, and curing.
   1. In hot weather comply with ACI 305R.
   2. In cold weather comply with ACI 306R.

C. Finishes:
   1. Tank floor slab: Float or Fresno finish.
   2. Interior wall: Light broom finish.
   3. Exterior wall: Shotcrete nozzle or natural gun finish.
   4. Dome Soffit: Formed finish chipped of extrusions.
   5. Exterior dome surfaces: Light broom finish.

D. Curing shall be by membrane-forming curing compound, by covering exposed surfaces with polyethylene sheets, or by water curing.

3.4 SHOTCRETE

A. All materials, methods of preparation, mixing, field-testing, and curing shall conform to the requirements of ACI 506R, and shall be applied by experienced nozzlemen.
   1. In lieu of manually applied shotcrete, shotcrete may be applied by nozzles mounted on power-driven machinery located a uniform distance from the wall surface, traveling at a uniform speed around the wall circumference to provide the required coatings. Proposed machinery shall be submitted for approval.

B. The nozzle shall be held at such a distance and position that the stream of flowing material shall be as near as practical to the surface being covered. Shotcrete shall be applied in such a way that it flows into position. No air pockets shall form and good bond shall develop between reinforcing and shotcrete. Any deposit of loose sand shall be removed prior to placing of any succeeding layers. No shotcrete shall be applied to reinforcing steel or diaphragm that is encrusted with overspray.

C. Coating of Steel Diaphragm:
   1. Steel diaphragm shall be covered with a layer of shotcrete no less than 0.5 inch thick prior to prestressing.
   2. Total minimum coating over steel diaphragm shall be 1.5 inches including diaphragm cover, wire cover, and finish overcoat.

D. Coating over prestressing wire:
   1. Each prestress wire shall be individually encased in shotcrete. Wire coat thickness shall be sufficient to provide clear cover over the wire of at least 0.25 inch.
   2. Finish covercoat shotcrete shall be applied as soon as practical after the last application of wire coat. The total thickness of shotcrete shall not be less than one inch over the wire.

E. Shotcrete shall not be placed in freezing weather without provisions for protection of shotcrete against freezing. Shotcrete placement can start without special protection when the temperature is 35 degrees F and rising and must be suspended when the temperature is 40 degrees F and falling. The surface to which the shotcrete is applied shall be free from frost. Cold weather shotcreting shall be in accordance with ACI

301 and ACI 306R.

F. Hot weather shotcreting shall be in accordance with the requirements of ACI 301 and ACI 305R.

G. Shotcrete shall not be applied under strong wind conditions.

H. Shotcrete damaged by rain or frost prior to setting up shall be removed and replaced. CONTRACTOR shall obtain ENGINEER's approval prior to placing additional shotcrete over layers with potential damage from rain or frost.

I. Interior and exterior shotcrete shall be moist by fog spraying or sprinkling for a minimum of seven days. Curing compounds will not be allowed. Curing shall be started at soon as possible without damaging the shotcrete. Curing may be interrupted for subsequent application of prestressing and shotcreting.

3.5 FLOOR

A. After installation of below grade piping the wall footings shall be constructed to the dimensions shown on approved Shop Drawings.

B. Place vapor retarder membrane over prepared subbase, prior to floor placement. Install vapor retarder in accordance with the manufacturer's instructions and approved shop drawings.

C. Prior to placement of floor, all piping that penetrates the floor shall be set and encased in concrete as required to provide watertight connections into the prestressed concrete tank.

D. Waterstops:
   1. A continuous waterstop shall be cast into the wall footing and be positioned to be constructed into the wall. Waterstops shall be positively held from displacement during concrete placing and shall be supported without puncturing any portion of the waterstop unless it is manufactured with grommets or hog rings. Continuously inspect waterstops during concrete placing to ensure proper positioning.
   2. Perform splicing in waterstops by heat sealing adjacent waterstop sections in accordance with manufacturer's printed recommendations.
      a. Material shall not be damaged by heat sealing.
      b. Splices shall have tensile strength of not less than 60 percent of unspliced material's tensile strength.
      c. Maintain the continuity of waterstop ribs and of its tubular center axis.

3.6 WALL

A. Precast wall shall be constructed with a continuous waterproof steel diaphragm embedded in the exterior of the precast panel. Horizontal joints in the diaphragm will not be allowed.

B. No punctures will be allowed in the diaphragm except those required for pipe sleeves, temporary construction openings, or special appurtenances. Details of such openings, as necessary, shall be approved by ENGINEER. All such openings shall be completely edge sealed with sealant.

C. Temporary wall openings may be provided for access and removal of construction materials from the tank interior subject to the approval of ENGINEER.

D. Vertical joints within a wall panel shall be roll seamed or otherwise fastened in a fashion that results in a firm mechanical lock. All vertical joints in the diaphragm shall be sealed.

E. Precast panel beds shall be located around the periphery of the tank as required. The beds shall be constructed to provide finished panels with the proper curvature of the tank.

F. Polyethylene sheathing shall be place between successive pours to provide a high moisture environment and a long slow cure for the concrete.

G. Erecting crane and lifting equipment shall be capable of lifting and placing the precast panels to their proper location without causing damage to the panel.

H. Precast panels shall be erected to the correct vertical and circumferential alignment. The edges of adjoining panels shall not vary inwardly or outwardly by more than 3/8 inch and shall be placed to the tank radius within +/- 3/8 inch.

I. Joints between precast wall panels shall be bridged with a 10-gage steel plate edge sealed with sealant and filled with mortar as shown on approved Shop Drawings. Alternatively, joints between precast wall panels shall be bridged with overlapping, edge sealed, straight 26 gage galvanized steel diaphragm extensions, integrally seamed with the steel diaphragm embedded in the precast panel, with the gap filled with shotcrete as shown on approved Shop Drawings. No through wall ties shall be allowed.

J. Precast wall panels shall have continuous reinforcing at a maximum vertical spacing of 36 inches on center.

K. Minimum precast panel thickness shall be four inches.

3.7 PRESTRESSING

A. Prestressing steel shall be placed on the wall with a machine capable of consistently producing a stress in the prestressing steel within range of -7 percent to +7 percent of the stress required by the design. No circumferential movement of the prestressing steel along the tank wall will be allowed during or after stressing. Stressing may be accomplished by drawing wire through a die or by another process that results in uninterrupted elongation, thus assuring uniform stress throughout its length and over the periphery of the tank.

B. Each coil of prestressing steel shall be temporarily anchored at sufficient intervals to minimize the loss of prestress in case a wire breaks during wrapping.

C. Minimum clear space between prestressing wires shall be 5/16 inch or 1.5 wire diameters, whichever is greater. Minimum clear distance between prestressing strands shall be 3/8 inch or 1.5 strand diameters, whichever is greater. Any wraps/strands not meeting the spacing requirements shall be re-spaced. Prestressing shall be placed no closer than two inches from the top of the wall, edges of openings, or inserts, nor closer than three inches from the base of walls or floors where radial movement may occur.

D. The band of prestressing normally required over the height of an opening shall be displaced into circumferential bands immediately above and below the opening to maintain the required prestress force. Bundling of prestressing steel shall not be allowed.

E. A stress plate shall be used at all permanent wall penetrations that result in a displacement of wire or strand equal to or greater than 24” in height above grade. The stress plate shall accommodate a portion of the prestressing wraps normally required for the height of the opening. The remaining prestressing normally required shall be displaced into circumferential bands immediately above and below the penetration. The effect of banded prestressing shall be taken into account in the design.

F. Ends of individual coils shall be joined by suitable steel splicing devices capable of developing the full strength of the prestressing steel.

G. CONTRACTOR shall furnish a calibrated stress recording device, which can be recalibrated, to be used in determining wire or strand stress levels on the wall during and after the prestressing process. At least one stress reading per vertical foot or one stress reading for every roll of prestressing steel, whichever is greater, shall be taken immediately after the wire or strand has been applied on the wall. Readings shall be recorded and shall refer to the applicable height and layer of prestressing steel for which the stress is being taken. A written record of stress readings shall be kept by the CONTRACTOR. All stress readings shall be made on straight lengths of wire. If applied stress falls below the design stress in the steel, additional wire or strand will

be provided to bring the force on the corewall up to the required design force. If the stress in the steel is more than 7 percent over the required design stress, the wrapping operation shall be discontinued, and satisfactory adjustment made to the stressing equipment before proceeding.

3.8 TANK DOME INSTALLATION

A. Precast dome panel construction:
   1. Dome panel casting beds shall be constructed to provide finished dome panels to the dimensions and curvature as shown in the approved Shop Drawings.
   2. Polyethylene sheeting shall be placed between successive concrete placements to provide a high moisture environment and a long slow cure for the concrete.
   3. The erecting crane and lifting equipment shall be capable of lifting and placing the precast shall be capable of lifting and placing the precast dome panels to their proper location without causing damage to the panels.
   4. Precast dome panels shall be erected to the correct radial and circumferential alignment as shown on the approved Shop Drawings. Adjacent joint panels shall be constructed to a tolerance of 3/8 inch.
   5. Precast dome panels shall have continuous reinforcing in the radial and circumferential directions at a maximum spacing of 36 inches on center.

B. Cast-In-Place dome construction:
   1. Dome shall be constructed to the dimensions and curvature as shown in the approved Shop Drawings.
   2. Dome decking shall not vary from level to level, or the curvature shown, more than 0.25 inch in 10 feet or 0.5 inch maximum in 20 feet or more.
   3. Dome shall be reinforced in accordance with the approved Shop Drawings with the spacing not varying more than 1.0 inch.
   4. Dome shall be constructed to the thickness shown on the approved Shop Drawings. Screed rails shall be provided to ensure proper curvature and reinforcing cover.
   5. Dome forms shall be designed to resist all forces acting with respect to its sloped surface. No portion of formwork shall be removed until the concrete has attained sufficient strength, and until the full circumferential prestressing force has been applied to the dome ring.
   6. A curing compound, compatible with the decorative coating systems shall be applied to the dome in accordance with manufacturer's recommendations. Water curing may be used in conjunction with the curing compound.

3.9 CONCRETE REPAIR

A. All defects in concrete shall be repaired. Prior to repairing, submit and obtain ENGINEER's approval of proposed repair procedures. Submitted repair shall include approval from CONTRACTOR's professional engineer and corresponding information or calculations required to substantiate the repair procedures.

B. All cracks of any width shall be repaired prior to disinfection and leakage testing.

3.10 COATINGS

A. Apply in strict accordance with manufacturer's recommendations, approved shop drawings, and as specified herein.

B. All coatings shall be applied a minimum of 28 days after final application of concrete or shotcrete. Successfully perform hydrostatic testing of prestressed concrete tank before applying coatings.

C. All exposed concrete surfaces shall be coated. Surfaces to be coated shall be clean, free from laitance, dirt, grease, and foreign material. All defective surfaces shall be repaired to the satisfaction of the ENGINEER prior to application of coating. Application shall be in full accordance with manufacturer's instructions.

D. Color will be selected by ENGINEER, in consultation with the OWNER.

E. Coat surfaces of aluminum that will contact dissimilar materials such as concrete, masonry, and steel, with specified paint system.

3.11 FIELD QUALITY CONTROL

A. Furnish services of independent testing laboratory to perform field quality control sampling and testing during concrete and shotcrete placement as follows:
   1. Concrete: Perform sampling and testing for field quality control during placement of concrete, as follows:
      a. Sampling Fresh Concrete: ASTM C172/C172M.
      b. Slump: ASTM C143/C143M; one test for each concrete load at point of discharge.
      c. Concrete Temperature: ASTM C1064/C1064M; one for every two concrete loads at point of discharge, and when a change in the concrete is observed. Test each load when time from batching to placement exceeds 75 minutes.
      d. Air Content: ASTM C231/C231M; one for every two concrete load at point of discharge, and when a change in the concrete is observed.
      e. Compression Test Specimens:
         1) In accordance with ASTM C31/C31M; make one set of compression cylinders for each 50 cubic yards of concrete, or fraction thereof, of each mix design placed each day. Each set shall be four standard cylinders, unless otherwise directed by ENGINEER.
         2) Cast, store, and cure specimens in accordance with ASTM C31/C31M.
         3) Test and record the following when cylinders are cast: slump, concrete temperature, air content, and unit weight.

f. Compressive Strength Tests:
   1) In accordance with ASTM C39/C39M; one specimen tested at seven days, and three specimens tested at 28 days.
   2) Adjust mix design if test results are unsatisfactory and resubmit for approval.
   3) Concrete that does not comply with strength requirements will be considered as defective Work.

g. Submit test results, certified by testing laboratory, to ENGINEER within 24 hours of completion of test.

2. Shotcrete:
   a. Strength test specimens shall be initially cured onsite, in the same manner as the production shotcrete, then transported in an approved manner to testing laboratory.
   b. One test panel shall be made for every 50 cubic yards of shotcrete placed but no less than one per each shift during which shotcrete is placed. Panels shall be 18 inches x 4 inches minimum and shall be gunned in the same position as the work represented during the course of the work by the CONTRACTOR's regular nozzleman. Three 3-inch diameter cores shall be drilled from each panel at least 40 hours prior to testing and shall be tested in accordance with ASTM C1140.
   c. In addition, panels with rebar shall be shot, cored and graded in accordance with ACI 506R for every fifth day of shotcreting operations. Minimum acceptable grade shall be 2.5.

B. Prestressing wire:
   1. Testing tension in pre-stressing wire/strand as it is installed shall be completed according to ANSI/AWWA D110 section 5.6.1.7, with a calibrated stress-measuring device or a continuous stress-recording device. A written record of stress readings shall be maintained and delivered to ENGINEER following the completion of pre-stressing and installation of the cover coats.

C. Special Inspections:
   1. Special inspections for applicable Work, as required by the 2015 IBC as Amended by NYS, shall be provided in accordance with Section 01 45 33, Code Required Special Inspections and Procedures.

3.12 HYDROSTATIC TESTING AND CLEANING

A. CONTRACTOR shall thoroughly clean and flush the interior of the tank and remove all dirt and contaminating materials at the completion of the tank and prior to filling for hydrostatic testing. Water and debris from interior of tank is not allowed to be discharge through tanks discharge system.

B. Hydrostatic Test:
   1. Comply with the requirements of Section 01 45 53, Cleaning and Testing of Hydraulic Structures, and as specified herein.

2. OWNER will only furnish water for initial filling of the prestressed concrete tanks and absorption make-up period. Additional water required for retesting shall be furnished at CONTRACTOR's expense. The prestressed concrete tank filling operation will be subject to scheduling and approval by ENGINEER and OWNER.
3. Damp spots which glisten on the surface of the tank and spots where moisture can be picked up on a dry hand will not be allowed. The source of water movement through the wall shall be located and permanently sealed in a manner acceptable to ENGINEER. No leakage that includes visible flow through the wall-floor joint shall be allowed. Damp spots on the footing will be accepted.
4. If prestressed concrete tank does not meet these criteria, the ENGINEER may require prestressed concrete tank to be repaired and retested. If such repairs and retesting are required, they shall be performed by CONTRACTOR at no additional cost to the OWNER.

3.13 ANNIVERSARY INSPECTION

A. Prestressed concrete tanks shall be inspected by OWNER, ENGINEER and CONTRACTOR approximately one year after completion of the Work. Inspection and remedial work, if required, shall be per the requirements of ANSI/AWWA D110, and shall cover tanks and appurtenances. Cost of anniversary inspection, including repairs, shall be considered as being included in the Contract price.

++ END OF SECTION ++

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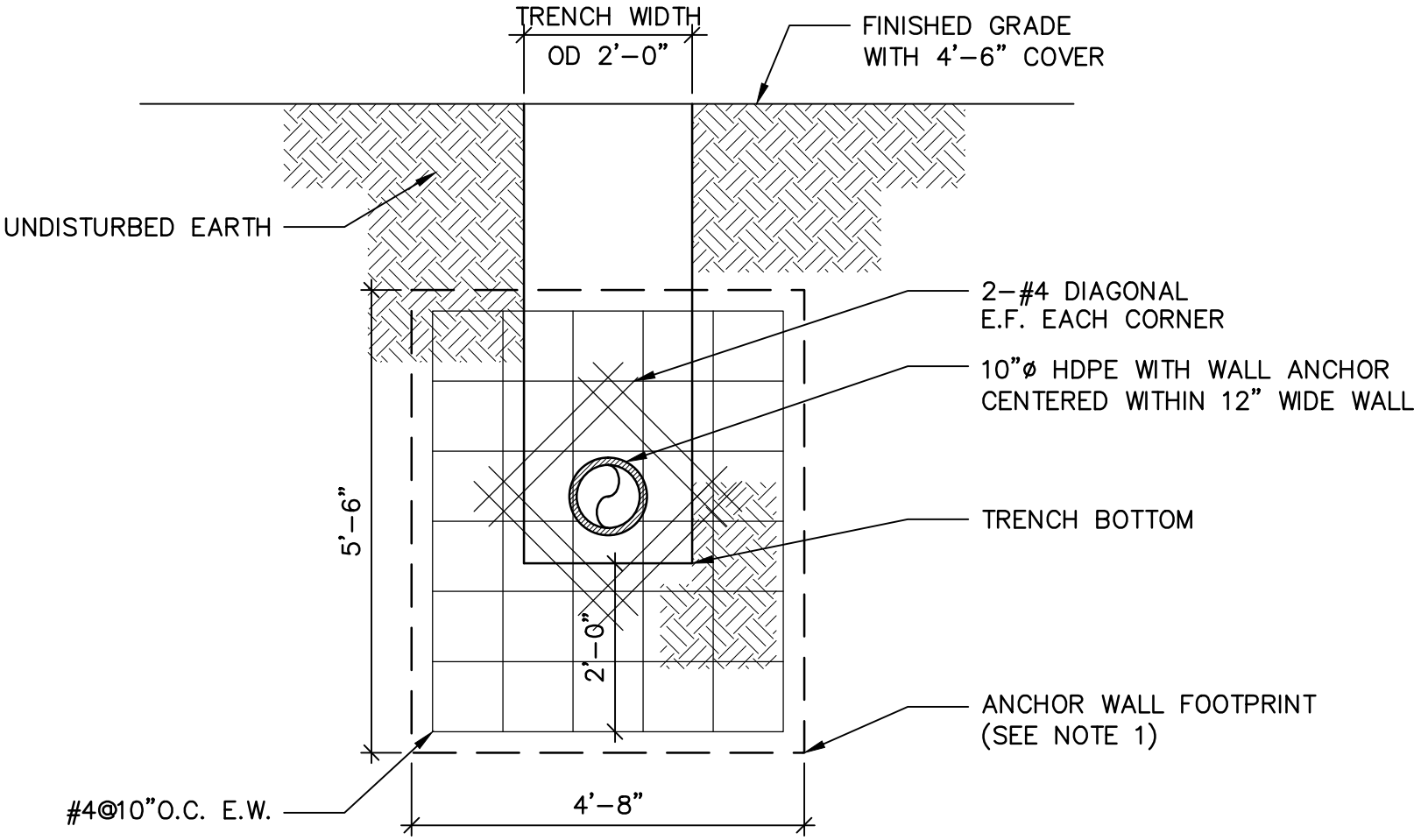


7 / G–105 CONCRETE WALL ANCHOR SECTION

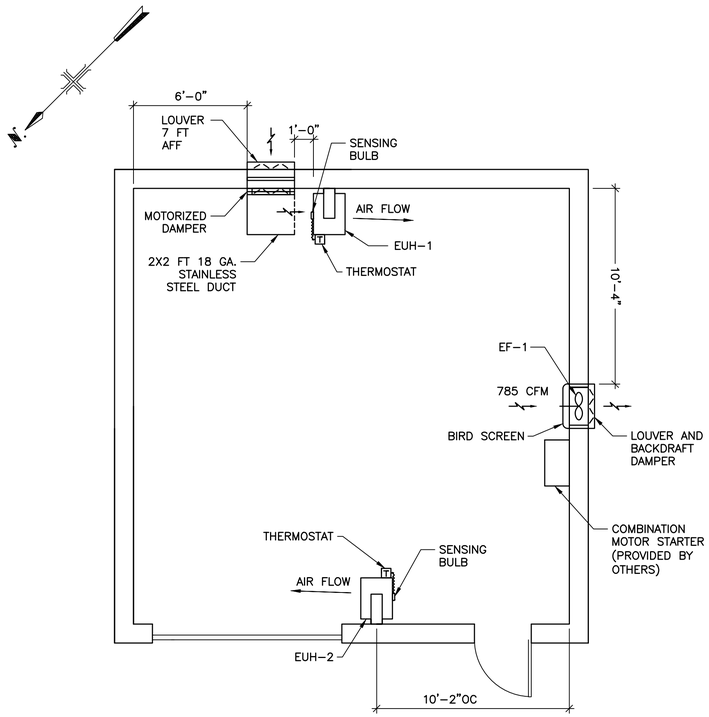
NOT TO SCALE

NOTE:
1. CONCRETE ANCHOR WALL SHALL HAVE MIN. 17 SQ FT AREA TO BEAR AGAINST UNDISTURBED EARTH.

PORTION OF SHEET G-105

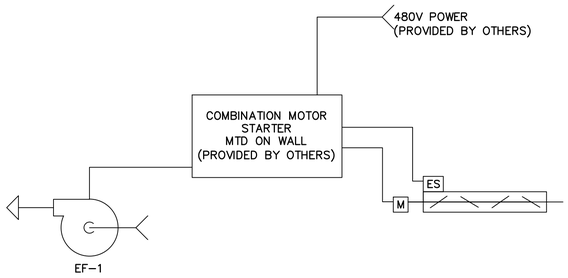
MAY 2018, ADDENDUM NO. 1

FIGURE 1



HVAC FLOOR PLAN

1/4"=1'-0" 2 0 2 4 6



EXHAUST SYSTEM CONTROL DIAGRAM

NOT TO SCALE

SEQUENCE OF OPERATION:

1. NORMAL OPERATION; MOTORIZED DAMPER TO FULL OPEN POSITION, ENERGIZING END SWITCH.
2. WHEN END SWITCH IS ENERGIZED SIGNAL TO START EXHAUST FAN.
3. IF MOTORIZED DAMPER FAILS TO OPEN, EXHAUST FAN WILL NOT START.
4. ALL INTERCONNECTING WIRING TO EXHAUST FAN AND DAMPERS BY OTHERS.

MOTORIZED DAMPER SPECIFICATION:

1. DAMPER; M.K. PLASTICS MODEL K-PD OPPOSED BLADE DAMPER. COORDINATE EXACT SIZE WITH LOUVER. LOUVER BY OTHER.
2. DAMPER ACTUATOR; BELIMO: MODEL NFBUP-S; ON-OFF, 120V SPRING RETURN, 2-SPOT AUXILIARY SWITCHES. COORDINATE TORQUE REQUIREMENT WITH DAMPER FACE AREA.
3. ALL STAINLESS STEEL DUCTWORK, ACCESSORIES, HARDWARE, AND FASTENERS SHALL BE TYPE 316 STAINLESS STEEL.
4. ALL METAL DUCTWORK SHALL CONFORM ACCURATELY TO THE DIMENSIONS SHOWN, THE DUCTS SHALL BE STRAIGHT AND SMOOTH INSIDE WITH JOINTS NEATLY FINISHED. METAL DUCTWORK SHALL BE INSTALLED SO AS TO PRECLUDE THE POSSIBILITY OF VIBRATION UNDER ALL OPERATING CONDITIONS.
5. PROVISIONS SHALL BE MADE FOR SUPPORTING ALL METAL DUCTWORK, DAMPERS, AND OTHER DUCTWORK ACCESSORIES, WHERE NECESSARY.
6. SEAL ALL JOINTS IN ACCORDANCE WITH SMACNA STANDARDS.
7. ALL WIRING AND RIGID CONDUIT TO BE PROVIDED BY OTHERS.

ELECTRIC UNIT HEATER SPECIFICATION:

A. EQUIPMENT:
1. PROVIDE ELECTRIC UNIT HEATERS AND APPURTENANCES SUITABLE FOR THE HEATING FUNCTIONS INDICATED.
2. UNIT HEATERS SHALL BE RATED IN ACCORDANCE WITH ANSI/AMCA 210-ANSI/ASHRAE 51.
3. EQUIPMENT SHALL BEAR THE UL LABEL.
4. PROVIDE TYPE 316 STAINLESS STEEL HANGERS, RODS, SUPPORTS, BOLTS, NUTS, WASHERS, INSERTS, AND APPURTENANCES REQUIRED FOR MOUNTING EQUIPMENT AS SHOWN.

B. INSTALLATION:
1. INSTALL THE EQUIPMENT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND BY MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.
2. INSTALL EQUIPMENT PLUMB AND LEVEL.
3. UNTIL START-UP AND OPERATION, TIGHTLY COVER AND PROTECT EQUIPMENT FROM DIRT, WATER, AND CHEMICAL AND MECHANICAL DAMAGE.

C. MAINTENANCE MATERIAL SUBMITTALS: FURNISH TWO SETS OF SPECIAL TOOLS, IF ANY, REQUIRED FOR NORMAL OPERATION AND MAINTENANCE.

EXHAUST FAN SPECIFICATION:

A. EQUIPMENT:
1. PRODUCT AND MANUFACTURER: PROVIDE ONE OF THE FOLLOWING: SERIES AXPR, AS MANUFACTURED BY MK PLASTICS CORPORATION, OR EQUAL.
2. FAN BEARINGS SHALL BE RATED FOR A MINIMUM L-10 LIFE OF 100,000 HOURS AT THE FAN'S MAXIMUM OPERATING SPEED IN ACCORDANCE WITH ABMA 9 OR 11.
3. FANS SHALL BE BALANCED IN ACCORDANCE WITH AMCA STANDARD 204.
4. FIBERGLASS REINFORCED PLASTIC FAN CONSTRUCTION SHALL CONFORM TO ASTM D4167.
5. PROVIDE 1-INCH BY 1-INCH, 0.120-WIRE DIAMETER, TYPE 316 STAINLESS STEEL MESH BIRD SCREEN SECURELY ANCHORED TO HOUSING.
6. PROVIDE FRP EXTERIOR LOUVER AND INTEGRATED BACKDRAFT DAMPER.
7. PROVIDE TYPE 316 STAINLESS STEEL MOUNTING HARDWARE FOR ALL FAN INSTALLATION.

B. INSTALLATION:
1. INSTALL THE FAN IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND BY MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.
2. INSTALL EQUIPMENT PLUMB AND LEVEL.
3. UNTIL START-UP AND OPERATION, TIGHTLY COVER AND PROTECT EQUIPMENT FROM DIRT, WATER, AND CHEMICAL AND MECHANICAL DAMAGE.

C. MAINTENANCE MATERIAL SUBMITTALS: FURNISH THE FOLLOWING:
1. TOUCH UP PAINT FOR UNIT.
2. TWO SETS OF SPECIAL TOOLS, IF ANY, REQUIRED FOR NORMAL OPERATION AND MAINTENANCE.
3. SPARE PARTS, EXTRA STOCK MATERIALS, AND TOOLS SHALL BE PACKED IN STURDY CONTAINERS WITH CLEAR INDELIBLE IDENTIFICATION MARKINGS AND SHALL BE STORED IN A DRY, WARM LOCATION UNTIL TRANSFERRED TO THE OWNER AT THE CONCLUSION OF THE PROJECT.

D. EXECUTION:
1. WHILE SYSTEM IS OPERABLE, BALANCE ALL EQUIPMENT TO ACHIEVE DESIGN CONDITIONS.
2. SUBMIT COMPLETE INSTALLATION, OPERATION AND MAINTENANCE MANUALS, INCLUDING, TEST REPORTS, MAINTENANCE DATA AND SCHEDULES, DESCRIPTION OF OPERATION, AND SPARE PARTS INFORMATION.

EQUIPMENT SCHEDULE

MARK NO.	LOCATION	TECHNOLOGY	MOTOR DATA			AIRFLOW (CFM)	AIR TEMPERATURE RISE (°F)	THROW (FT)	DISCHARGE ORIENTATION	STATIC PRESSURE (WG)	ELECTRICAL DATA			MTG. HEIGHT (AFF)	APPROX. WEIGHT (LBS)	DESIGN BASE		NOTES
			RPM	HP	BHP						V/PH	AMPS	POWER (kW)			MFGR.	MODEL	
EUH-1 AND 2	STORAGE TANK CHEMICAL BUILDING	ELECTRIC	N/A	N/A	N/A	2400	21	50	HORIZONTAL	N/A	480/3	22.5	15	8 FT	130	REZNOR	EWHB 15	1,2,3,4,5,6
EF-1	STORAGE TANK CHEMICAL BUILDING	ELECTRIC	1725	1/4	0.11	785	N/A	N/A	HORIZONTAL	0.125	480/3	1.1		7 FT	130	M.K. PLASTICS	AXPR-12	1,3,4,5,7

NOTE
1. INTEGRAL DISCONNECT SWITCH.
2. PROVIDE SWIVEL TYPE WALL MOUNT
3. TEFC FAN MOTOR
4. COORDINATE MOUNTING HEIGHTS WITH OTHER TRADES TO AVOID INTERFERENCE.
5. MUST MEET ALL REQUIREMENTS OF SPACE CLASSIFICATION.
6. LINE VOLTAGE THERMOSTAT WITH REMOTE SENSING BULB.
7. INTEGRAL LOUVER AND BACKDRAFT DAMPER, M.K. PLASTICS SERIES F-BD OR EQUAL.

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

Professional Engineer's Name: JOHN C. PERRIELLO
Professional Engineer's No.: 081662

State	Date Signed	Project Mgr.
NY	04/16/18	JCP
Designed by PFC	Drawn by JMM	Checked by BRT

STATE OF NEW YORK JOHN C. PERRIELLO No. 081662 LICENSED PROFESSIONAL ENGINEER

ARCADIS

SYRACUSE, NEW YORK • SYRACUSE HANCOCK INTERNATIONAL AIRPORT
REHABILITATION OF DEICING STORAGE FACILITIES

STORAGE TANK CHEMICAL BUILDING HVAC PLANS AND DIAGRAMS

HVAC

ARCADIS Project No. B0001738.0004

Date APRIL 2018

ARCADIS OF NEW YORK, INC.
ONE LINCOLN CENTER
110 W FAYETTE ST. SUITE 300
SYRACUSE, NY 13202
TEL. 315.446.9120

H-001

CITY: SYRACUSE DIV/GROUP: WATER DB: LD: PIC: PM: J. PERRIELLO TM: LYR:ON=*;OFF=*REF*
G:\Projects\B0001738.0004\CADD\HVAC\01738H001.dwg LAYOUT: H-001 SAVED: 5/4/2018 8:04 AM BY: WELSHANS, MATTHEW
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ATTACHMENT 1

Arcadis
One Lincoln Center
110 West Fayette Street
Suite 300
Syracuse, New York 13202
Tel 315.446.9120
Fax 315.449.0017

MEETING MINUTES

Syracuse Hancock International Airport (SHIA) Rehabilitation of Deicing Storage Facilities

May 4, 2018 10:00 A.M. SHIA Terminal Building – Veronica Room

TYPE OF MEETING	Pre-bid Meeting	
MINUTES PREPARED BY	Benjamin R. Tillotson, PE	
ATTENDEES	Linda Ryan, SRAA	Mark Seefeldt, Whiting-Turner
	Tim McMahon, SRAA	Jeff Lantiegue, the Wesson Group
	Antimo Pascarella, SRAA	Brandon Reese, Weydman Electric
	Hal Boyd, Preload	Doug Murra, C&S
	Jamie Howard, DN Tanks, Inc	John Perriello, Arcadis
	Nick Gambino, W. D. Malone	Benjamin Tillotson, Arcadis
	Devin Reese, Whiting-Turner	James Gowans, Arcadis

A pre-bid meeting was held to provide contractors information, clarifications, a site tour, and an opportunity to ask questions for the Rehabilitation of Deicing Storage Facilities**:**

1. Project Overview

- Project Personnel Introduction: All present parties introduced themselves to the group. If applicable, parties from SRAA and Arcadis described their roles in the project. (Sign-in sheet attached)
- Project Overview and Description: Project consists of work for Contract Nos. 1 – General and 2 – Electrical. The project generally includes the demolition of three existing deicing storage lagoons and existing site features and the construction of two above grade (3.0 MG each) prestressed concrete storage tanks on a deep pile foundation. The project will also include all associated site work, yard piping, stormwater restoration, a new pre-engineered metal building and associated electrical upgrades.

  The project will also include airfield rehabilitation of the deicing system involving upgrades to the duplex submersible pump stations, as well as rehabilitation of the air-release vaults, and force main restraints and hangers.
- Construction Safety and Phasing Plan: The requirements of the CSPP are shown on Contract Drawings G-002 and G-003. A copy of the CSPP is included in the reference information, Appendix C. Additional requirements are listed in Section 900-15. The current advisory circular for Operational Safety on Airports has been included in the reference information, Appendix A.

- Work Area and Milestones: The Work Area, proposed Sequence of Construction, and Milestones are listed in Section 900-15, Part B and C. The project consists of work both outside and inside the secure (airside) operations area.
- Security Requirements: The Contractor must comply with the current security clearances and requirements to work inside the operations area. Refer to Section 900-15, Part F.
- Delegated Design: This project includes prestressed concrete tanks meeting ANSI/AWWA D110 Type III. All structural design calculations for the tanks, including the deep pile foundation shall be provided by the manufacturer's professional engineer. All calculations shall be signed, sealed and dated by the manufacturer's professional engineer in the State of New York (Section 33 16 13.16). A subsurface exploration report is included in the reference information, Appendix B.
- Equipment Testing: The requirements for equipment testing and startup procedures are listed in Section 01 75 11 and in the individual equipment specifications. Also, requirements for training owner's personnel on new equipment is included in Division 01.

2. Administrative

- Bid Date: Bids will be received until 1:30 PM, local time, on May 24, 2018 at the Offices of Executive Director, SHIA, 1000 Col. Eileen Collins Blvd., Syracuse NY, 13212.
- Questions and Interpretations: All questions in writing to Benjamin R. Tillotson, PE, Arcadis (benjamin.tillotson@arcadis.com) Contact information is included in Section 200-05 of the Information for Bidders. For this project, the last day for questions is May 18, 2018 at close of business at 5:00 pm. EST.
- Construction Duration: 365 calendar days. Section 200-08 of the information for bidders.
- Damages for Delay/Liquidated Damages: Liquidated Damages in the amount of $2,500/day do apply in accordance with Section 900-10, Part H and 900-15, Part C.10.
- Shop Drawings: Requirements are included in 900-07, Part Q.
- Record Drawings: Requirements are listed in Section 01 78 39.
- Permits: A SPDES General Permit Associated with construction activity is required. A Notice of Intent will be submitted, prior to construction, to the NYS DEC by the Owner.

  Arcadis has filed a FAA form 7460-1 "Notice of Proposed Construction or Alteration" for temporary crane use and the permanent dome height for each tank. The determinations of the 7460-1 will be provided for information in an upcoming addendum. If the Contractor determines that a different height or arrangement is needed for crane or the dome height, then a new FAA form 7460-1 case(s) will need to be filed by the Contractor before construction. Section 900-10, Part M.

  Should a contractor make any additional alterations to the crane location/height or tank structure height, the 7460-1 permitting process can be anticipated to be reviewed and determined by the FAA (minimum 1 month, but can be up to 2 months).
- Working Hours/Working Limits: Working hours are generally 7:00 am to 3:30 pm, Monday to Friday. Any time outside of this shall be coordinated with the Owner.
- Material Delivery and Storage: Requirements for delivery are included in Section 01 65 00, Product Delivery Requirements and Section 01 66 00, Product Storage and Handling Requirements.

  Contractor Staging areas are shown on contract Drawings.
- Demolition and Disposal: Requirements are listed in Section 02 41 00, Demolition.
- Coordination of Facility Operations During Construction: Requirements are included under Section 01 14 16, Coordination with Owner's Operations.

During deicing season (approx. October-May), Lagoon No. 4 will be used for storage and release during construction. A bypass site plan with requirements can be found on Sheet G-006 of the Contract Drawings. Lagoon No. 4 has a working capacity of 2.2 MG. The current discharge permit to the Onondaga County Sanitary Sewer limits deicing discharge to the lesser of 100 gpm, or 10,000 lbs. of BOD per day.

- Progress and Coordination Meetings: Meetings will be held bi-weekly during the project, Section 01 31 16, Part 1.2.
- Disadvantage Business Enterprise (DBE) Requirements: L. Ryan gave an update on the DBE requirements for this project. The Contract Documents contain goals for DBE. A DBE contract goal of 6.7 percent has been established for this contract. Each bidder is directed to Appendix C of Section 300 for Syracuse Regional Airport Authority DBE forms.

  A list of accepted DBEs can be found at https://nysucp.newnycontracts.com
- Civil Rights Provisions: Each bidder is directed to Appendix A of Section 200 for Title Assurance and Information on Programs or Activities Receiving Federal Financial Assistance.
- Wage Rates/Certified Payrolls: NYS/Federal Wage rates in effect for this job (Contractor's responsible for utilizing current rates, the highest of the two if applicable). The current rates are given after Section 700.
- Insurance: Requirements are listed in Section 100-15 of Instructions to Bidders.
- Bonds: Bid bond (5%) and Surety bonds (100% of bid amount), Section 100-03 and 100-09.
- Form of Proposal: Each bidder shall be a plan holder to be considered responsive. Two (2) completed proposal sections shall be returned, one original and one copy.

3. Questions and Answers:

- A question was asked about the Bid Opening being public.

  Answer: Yes, the Bid Opening will be public and bids will be read aloud. The bid opening will be in the board room at the SHIA terminal building on May 24, 2018 at 1:30 PM EST. The SHIA terminal building is currently under construction, so bidders are directed to the second floor (using detour) just past the TSA security check point (if you are walking north). There is a red phone in the hall past the TSA security check point (on the left if you are walking north), pick up the phone and someone will let you into the SHIA offices with your bid. They will also direct you to the board room for the bid opening.
- A question was asked about if a Project Labor Agreement is required for this project.

  Answer: A Project Labor Agreement is not applicable to this project.
- A question was asked whether NSF 61 requirements apply to the storage tanks?

  Answer: NSF-61 requirements contained in Specifications section 33 16 13.16 are not applicable.
- Numerous questions were asked about the tank specification 33 16 13.16. These types of questions have also been asked in writing before this meeting.

  Answer: Arcadis will be reissuing Specification Section 33 16 13.16 as part of an upcoming addendum.
- A question was asked regarding additional permits that may be required.

  Answer: Additional permits are required and Arcadis has acknowledged that these requirements will be issued as part of an addendum.
- What is the engineer's estimate?

  Answer: For bonding purposes, the estimate is between $8.5M and $9.5M for Contract 1-General, and 0.5M for Contract 2-Electrical.

- A comment was added about the milestones in the contract and that they may be affected by the anticipated award date/NTP date. In addition, the NTP date may affect construction timing/schedule for tank construction to avoid a winter shutdown.

  Answer: Arcadis will review the milestones in the contract and possibly change by addendum based on the anticipated award date. The anticipated Notice to Proceed date is September 2018.

- Further clarification was requested regarding the current airspace 7460-1 applications and determinations.

  Answer: Arcadis will review the current determinations filed and received from the FAA. The current determination letters will be given to the bidders (for reference only) by an upcoming addendum.

- A question was asked about additional permits needed for the project.

  Answer: Arcadis will provide a list of necessary permits in an upcoming addendum. The permits will include, but not limited to, City of Syracuse Electrical code/permit, City of Syracuse building permit, NYSDEC wetlands permit (Arcadis will apply for this if needed), OCWA/DOH permits for new water service and backflow preventer.

If the recipient of these meeting minutes requires any corrections, modifications, or clarifications, please provide them in writing to the undersigned:

Benjamin R. Tillotson, PE
Arcadis
110 W. Fayette Street, Suite 300
Syracuse, New York 13202

Distribution:

Attendees
Robert Levine, Airport Engineer, FAA NYADO

Attachments:

Meeting Sign-in Sheet

Sign in Sheet
May 4, 2018
Rehabilitation of Deicing Storage Facilities
IFB #2018-02

Name	Title	Company	Phone Number	E-Mail Address
Hal Boyd	District Sales Mgr	PRELOAD	972-841-7922	hboyd@preload.com
Jamie Howard	Regional Manager	DN Tanks	917-826-2544	jamie.howard@dntanks.com
NICK GAMBINO	PROJECT MANAGER	WD MALONE	315-564-6784 315-402-4453	NICK@WDMALONE.COM
Doug Mura	Electric MANAGER	C+S	315 427-6494	dmura@cscos.com
Devin Reese	Project Manager	Whiting-Turner	315-576-3790	devin.reese@whiting-turner.com
MARK SEEFELDT	PROJ MANAGER	WHITING-TURNER	443-324-3808	mark.seefeldt@whiting-turner.com
Antimo Passariello	DOA	SYRA	455-3666.	APassariello@syrairport.org
Jeff Lantiegne	V.P.	The Wesson Group	(315) 385-9846	jeffl@twg.us.com

Sign in Sheet
May 4, 2018
Rehabilitation of Deicing Storage Facilities
IFB #2018-02

Name	Title	Company	Phone Number	E-Mail Address
BRANDON REESE	PM/ESTIMATOR	WEYDMAN ELEC.	315 795-8269	BREESE@WEYDMANELECTRIC.COM
Tim McMahon		SRAA	315 3915802	mcmahonT@SYRAIRPORT.ORG
Benjamin Tillotson	Project Manager	ARCADIS ~~SRAA~~	315-671-9212	benjamin.tillotson@arcadis.com
James Gowans	Engineer	ARCADIS	~~315~~ 315-671-9117	james.gowans@arcadis.com
John Perrello	Engineer	Arcadis	315-671-9240	john.perrello@arcadis.com
Linda Ryan	Aviation Contracting officer	SRAA	315-454-3263	ryanl@syrairport.org

ATTACHMENT 2

CME Associates, Inc.

6035 Corporate Drive
East Syracuse, New York 13057
(315) 701-0522
(315) 701-0526 (Fax)

www.cmeassociates.com

Transmittal

May 4, 2018

Arcadis U.S., Inc.
One Lincoln Center
110 West Fayette Street, Suite 300
Syracuse, New York 13202

Attn: Mr. Benjamin Tillotson, P.E., Senior Water Engineer

Re: SHIA Rehabilitation of Deicing Facilities – Hancock International Airport
Syracuse, New York
CME Project No.: 27313-05

Gentlepeople:

Enclosed you will find….

Number of Copies	Report Number/Description
3	27313B-03-0518/Subsurface Exploration Site Characterization Report

This report was emailed to Mr. Benjamin Tillotson at benjamin.tillotson@arcadis.com on 05/04/18.

Respectfully submitted,
CME Associates, Inc.

Anas N. Anasthas, P.E.
Geotechnical Engineer

AA.cw

Subsurface Exploration Site Characterization Report

SHIA Rehabilitation of Deicing Facilities
Hancock International Airport
Syracuse, New York

Prepared For: (Client)

Arcadis U.S., Inc.
Attn: Mr. Benjamin Tillotson, P.E., Senior Water Engineer
One Lincoln Center
110 West Fayette Street, Suite 300
Syracuse, New York 13202
Phone: 315.446.9120
Fax: 315.449.0017
Email: benjamin.tillotson@arcadis.com

Prepared By: (Geotechnical Engineer)

CME Associates, Inc.
Attn: Anas N. Anasthas, P.E.
6035 Corporate Drive
East Syracuse, New York 13057
Phone: 315.701.0522
Fax: 315.701.0526
Email: an@cmeassociates.com

CME Report No.: 27313B-03-0518
May 4, 2018

Table of Contents

Attachment Listing:

Subsurface Exploration and Site Characterization Report
SHIA Rehabilitation of Deicing Facilities
Hancock International Airport
Syracuse, New York

1.0 INTRODUCTION

CME Associates, Inc. (CME) conducted a subsurface exploration for the subject project in November 2017, pursuant to the written authorization of CME Proposal/Agreement Number :05.5258R(1), dated 10/11/17, and Change order Number 1, dated 11/29/17, by Arcadis, U.S. Inc. (Client). The subsurface exploration consists of advancing 9 Test Borings and conducting laboratory testing on selected soil samples.

This report provides a brief description of the proposed development, site description and geology, a summary of subsurface conditions identified in the explorations, site characterization and a seismic site classification.

All Test Boring Logs, along with an Exploration Location Plan, are attached to this report. The laboratory test results are presented in the attached Laboratory Test Summary Report. Other attachments to this report include Google Earth Maps, Cross Sections (showing generalized subsurface profiles below the proposed tanks), USGS Design Maps Summary and Detailed Reports and a Key (General Information & Key to Test Boring Logs).

2.0 PROPOSED DEVELOPMENT

The subject project will include two above-ground Deicing Storage Tanks, 117 feet diameter x 40 feet tall each. Finish tank floor is planned at elevation 401, near the perimeter, and elevation 396.5 near the center. Tank floor loading at full capacity will be about 3,000 psf. Significant amounts of cuts and fills are planned to remove existing lagoons and to achieve finish grade elevation. Please see Site Plans labeled Figure 2 and G-102 for existing and proposed grades.

3.0 SITE DESCRIPTION AND GEOLOGY

The subject project site is located at the Syracuse Hancock International Airport, between runways and Thompson Road. Please refer to the attached Google Earth Maps for historical aerial images of the site. The site used to be a low land consisting of swamp-like areas, marsh and woods. The existing lagoons at this site were constructed somewhere between 1995 and 2003, based on a review of the attached Google Earth Maps. These lagoons serve as the current Deicing Storage Facility.

The natural geology of the site consists of organic swamp bottom or organic rich surfacings underlain by Lacustrine (lakebed) deposits, underlain by Glacial Till soils. Lacustrine deposits are unconsolidated sediments deposited in a lake environment. Lacustrine Deposits at this site consist of Clayey Silt underlain by Silty Sand. Glacial Till occurs as glaciers move over the land, carving and transforming landscape. Glacial Till at this site is a heterogeneous mixture of everything the glacier has picked up along the way, and consists of a mixture of Silt, Sand, Gravel, and Clay with possible Cobbles and Boulders.

4.0 EXPLORATION METHODOLOGY

The Test Boring locations (B-1 through B-8 and B-8A) were selected and staked in the field by Client. Please refer to the attached Exploration Location Plan, labeled EX-1, for location of the explorations. Client is responsible for providing elevation at grade at exploration locations, however, this information was not provided to CME at the time of this report preparation. Therefore, at the request of Client, CME estimated approximate elevation at grade at exploration locations, based on the elevation contours shown on EX-1. Elevation at grade at exploration locations was estimated to the nearest one foot.

Test Borings were advanced using a Central Mining Equipment Model 550X, ATV-mounted, rotary exploration drill rig, equipped with 3-¼" I.D. hollow stem augers and drive sampling tools. Soil Sampling and Standard Penetration Testing (SPT) were conducted using a 140-pound automatic hammer dropping through a distance of 30 inches to drive a 2" O.D. split barrel sampler in general conformance with ASTM Standard Practice D1586. Upon completion, each borehole was backfilled with auger cuttings to grade to closely match existing grade.

The Test Boring samples were logged and visually classified in the field by a CME Staff Geologist and/or the CME Drillers, and a portion of each soil sample was placed and sealed in a glass jar. The soil classifications were later reviewed by the undersigned engineer in CME's AMRL[1] Accredited East Syracuse Laboratory using the modified Burmister Soil Classification System, as described in the attached document entitled, "*General Information & Key to Test Boring Logs*" (Key).

The undersigned engineer selected soil samples for laboratory testing in CME's AMRL accredited East Syracuse Laboratory. The standard methods used, and the test results are presented in the attached *Laboratory Test Summary Report*.

5.0 SUBSURFACE CONDITIONS

The subsurface conditions presented herein have been generalized for simplicity and brevity by the undersigned CME Engineer from the actual data obtained from the Subsurface Exploration conducted at the subject project site. It is possible for the subsurface conditions between the sampling intervals and the exploration locations to vary from that inferred and/or given in this section. Please, refer to the attached CME Test Boring Logs for actual conditions encountered at the time, location and elevation of each sampling.

5.1 Surface Conditions and Subsurface Profile

The bottom of existing lagoons is approximately at elevation 396. Top of lagoon berms are approximately at elevation 412, which is about 16 feet above lagoon bottom. All Test Borings, except Boring B-1, were selected at top of berms due to easy access. Boring B-1 was selected outside the lagoon near the toe of the berm.

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[1] **AMRL** – American Association of State Highway & Transportation Officials (AASHTO) Materials Reference Laboratory, a Federal Agency having jurisdiction to assess laboratory competency according to the Standards of the United States of America. CME East Syracuse accreditation includes testing of Portland Cement Concrete, Aggregate and Soil Materials. www.amrl.net.

All Test Borings penetrated Man-placed Fill (Existing Fill) at grade. Boring B-1 (advanced outside the lagoon near the bottom of the berm) penetrated about 4 feet of Existing Fill. All other Borings (advanced at the top of the berm) penetrated Existing Fill to about 14 to 18 feet below top of berm. Below Existing Fill, the explorations identified a subsurface profile consisting of a Buried Organic Layer, underlain by Lacustrine Deposits (Clayey Silt over Silty Sand), underlain by Glacial Till soils. Please see attached Cross Sections 1 and 2 for Generalized Subsurface Profiles plotted using the information obtained from the Test Borings. A brief description of each stratum is given below.

Existing Fill: Existing Fill, for the most part, consists of a mixture of Silt, Sand, Gravel, Clay and Crushed Stone. Trace amounts of Cinders and Shale/Siltstone fragments were also noted in the Existing Fill, occasionally. The Existing Fill was penetrated to about 4 feet below grade in Boring B-1, corresponding to about elevation 393. Bottom of Existing Fill in all other Borings is at about 14 to 18 feet below top of berm, corresponding to about elevation 398 to 396.

Buried Organic Layer: The Existing Fill has been placed over a Buried Organic Layer (pre-existing Topsoil and/or Swamp Bottom). The Buried Organic Layer is about 2 to 4 feet in thickness. Moisture Content testing conducted on two samples from this layer indicates Natural Moisture Contents of 26.4% and 24.4%. One sample from this layer subject to Organic Content testing revealed an Organic Content of 3.4%.

Lacustrine Deposits: Below Fill or Buried Organic Layer, all Borings penetrated Lacustrine Deposits consisting of Clayey Silt underlain by Silty Sand. Lacustrine Deposits were penetrated to about 34 to 61 feet below existing grade, corresponding to about elevation 364 to 351.

The Clayey Silt soils are represented by USCS[2] Class Symbols ML (non-plastic to slightly plastic Silt) and ML-CL (slightly plastic to plastic Silty Clay). These soils are very soft to soft in consistency, in general, based on Standard Penetration Testing (SPT), and are susceptible for consolidation under new loading.

The Silty Sand Soils are represented by USCS Class Symbols SM (Silty Sand) and SP-SM (Poorly graded Sand with Silt), and are non-plastic granular soils. Based on SPT, the Silty Sand has a relative density of very loose to loose, in general.

Glacial Till: Below Lacustrine Deposits, very dense Glacial Till soils were encountered. The Glacial Till at this site is a heterogenous mixture of Silt, Sand, Gravel and Clay with possible Cobbles/Boulders, and was penetrated to boring termination depth, where encountered.

5.2 Groundwater Observations

Groundwater level observations and measurements were made by the CME Crew when groundwater accumulates in the borehole. The CME Drillers noted water levels inside the boreholes during advancement and following casing removal. If the hole caves-in after casing removal, the depth of cave-in is noted on the CME Boring logs. The drillers also note whether samples retrieved are dry, moist, wet or saturated. The conditions and times of groundwater level observations are noted on the individual Test Boring Logs.

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[2] USCS = Unified Soil Classification System

Groundwater was observed in all Borings, while drilling, at depths ranging from about 13 to 28 feet below existing grade, corresponding to about elevation 399 to 378. Observed groundwater elevation in a majority of the Borings is between 399 and 395. First encounter into wet soil in the Borings was noted at depths ranging from 6 to 18 feet below existing grade, corresponding to about elevation 400 to 391. Wet soil in a majority of the Borings was encountered at elevation between 400 and 394.

Groundwater fluctuations should be expected to occur at this site depending on several factors such as rainfall, seasonal changes, prevailing climate, ambient weather conditions, and adjacent construction operations, among other factors.

6.0 SUBSURFACE CHARACTERIZATION

In CME's opinion, the subsurface conditions identified in the explorations are not suitable to support the proposed tanks utilizing the proposed conventional slab-on-grade and circumferential footing foundation system, due to reasons outlined below. A structural slab and grade beam framing to a deep foundation system will be required. Also, all underlab utilities will be required to be hung from the structural slab, with utility trenches backfilled with pea gravel.

1. **Unsuitable Subgrade Materials:** Existing Fill is underlain by a Buried Organic Layer. The bottom of the Buried Organic Layer is approximately elevation 394 to 392, or about 7 to 9 feet below proposed tank floor elevation. The Building Code[3] defines the Existing Fill and Buried Organic Layer as questionable soils exhibiting no presumptive bearing capacity. CME's exploration and testing confirms that these materials are unreliable and unsuitable to remain in-place below the proposed new tanks. Options include removal/replacement or improvement in-place. In CME's opinion, neither of these options are reasonable solutions.

2. **Shallow Groundwater:** Groundwater was observed close to and above the Buried Organic Layer, approximately at elevation 400 to 395. Mass-excavation to remove Buried Organic Layer will result in unstable, very soft to soft Clayey Silt grade which will lack strength to support construction equipment. Excavation bottom instability and bottom heave are concerns that will require design and installation of temporary excavation protection, dewatering systems and a working mat.

3. **Very Soft Compressible Soils:** The Lacustrine Deposits (aka: glacial lakebed sediments) present below the Buried Organic Layer are susceptible to long term consolidation and compression under new loads imposed. The upper 15 to 20 feet of the Lacustrine Deposits consists of very soft to soft, saturated Clayey Silt exhibiting a consistency similar to peanut butter. The new loading (approximately 3,000 psf) to be imposed by the proposed tank is too heavy for these unconsolidated Lacustrine deposits. The long-term consolidation of these soils under a full tank loading will cause tank settlement, estimated to be up to about one foot.

[3] Building Code = 2015 International Building Code as amended for New York State.

4. **Differential Stress History**: The subsurface soils under the existing lagoon exhibit a highly variable loading history over the past two decades. The soft soil under the berms have been loaded (by the weight of the berm) and have gone through a consolidation process[4]. Therefore, soil outside the berm footprint is more susceptible to consolidation under the new tank loading than that under the berm. This condition results in differential tank slab settlement since the tank footprints overlap existing berms and lagoon bottoms. Additionally, removal of existing berms and filling of lagoon bottoms (to achieve tank floor elevation) further increases the differential settlement estimate.

7.0 SEISMIC SITE CLASS

Based on a computational analysis using the CME Subsurface Exploration data and the 2015 New York Amended International Building Code (IBC), Section 1613, which references Chapter 20 of ASCE 7-10, the subject project site is defined as a "Soft Clay Profile," representative of a Seismic Site Class "E." The Test Borings did not reveal soils vulnerable to liquefaction, sudden collapse or failure under seismic loading conditions.

Please refer to the attached USGS Design Maps Summary and Detailed Reports for the Design Spectral Response Curves for this site, applicable to Risk Category I/II/III Structures.

According to Client the proposed tank structures planned at this site are considered Seismic Risk Category III (Non-essential Facility) Structures. According to the attached USGS Design Maps Summary and Detailed Reports, Seismic Design Category for the tank structural design will be Seismic Design Category "C".

Please note, the Seismic Design Category may be upgraded to a Seismic Design Category "B" if Seismic Site Class can be upgraded from Seismic Site Class "E" to Seismic Site Class "D". This site may qualify for a Seismic Site Class "D" if determined via actual Seismic Shear Wave Velocity measured at this site. Please contact CME if you would desire CME to explore this possibility via a Geophysical Investigation.

8.0 CLOSING COMMENTS

CME has endeavored to conduct the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the geotechnical engineering profession currently practicing in the same locality and under similar conditions as this project. No warranty, either expressed or implied, is made or intended by CME's proposal, contract, and written and oral reports, all of which warranties are hereby expressly disclaimed. CME shall not be responsible for the acts or omissions of Client, its contractors, agents and consultants. CME has relied upon information supplied by Client, its contractors, agents and consultants, or information available from generally accepted reputable sources, without independent verification, and CME assumes no responsibility for the accuracy thereof.

No other representations, expressed or implied, are intended or made with respect to the information provided herein, and including but not limited to, its suitability for use by others.

[4] Consolidation occurs slowly as load is applied and as pore water dissipates (squeezes out) over time causing volume loss and settlement.

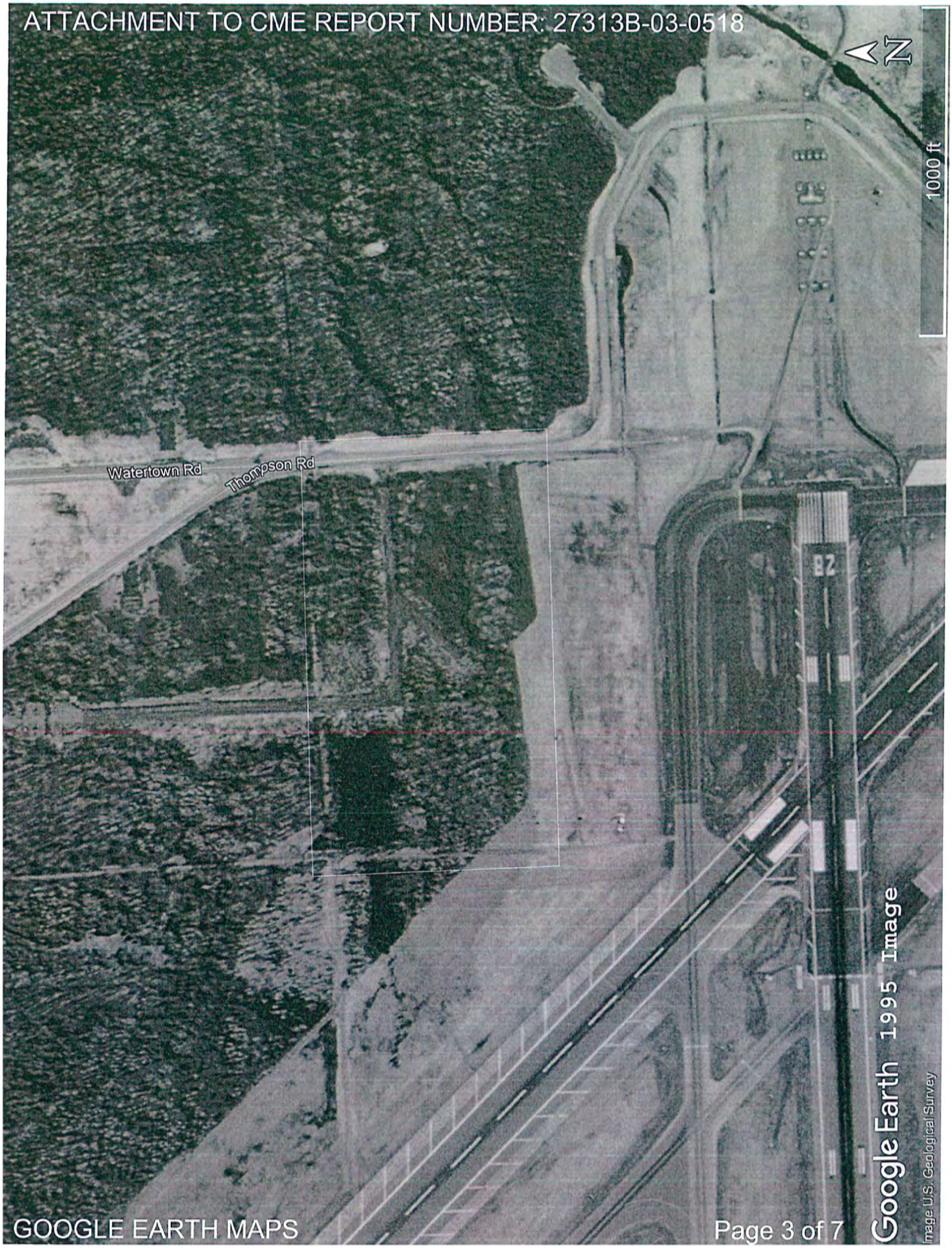
Please feel free to contact CME with any questions you may have regarding this report.

Respectfully Submitted,
CME Associates, Inc.

Anas N. Anasthas, P.E.
Geotechnical Engineer


ATTACHMENT TO CME REPORT NUMBER: 27313B-03-0518
Corporate Dr
N
Hancock Dr
F St E
Watertown Rd
Bucks Harbor
Bangor Rd
E Taft Rd
Gene St
Irwin Blvd
Sage Pl
2nd St
Thompson Rd
4000 ft
PROJECT SITE
William Barry Blvd
Leroy Rd
W Dover Ave
Trelign Dr
Constellation Way N
Air Cargo Rd
Tuskegee Rd
Cobra Ln
Gateway Park Dr
Pleasant Ave
Melrose Dr
John St
Google Earth
GOOGLE EARTH MAPS
Page 1 of 7


N
300 ft
Google Earth
© 2017 Google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1000 ft
Watertown Rd
Thompson Rd
BZ
Google Earth 1995 Image
Image U.S. Geological Survey


N
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Thompson Rd
Google Earth 2003 Image
Image © 2017 New York GIS


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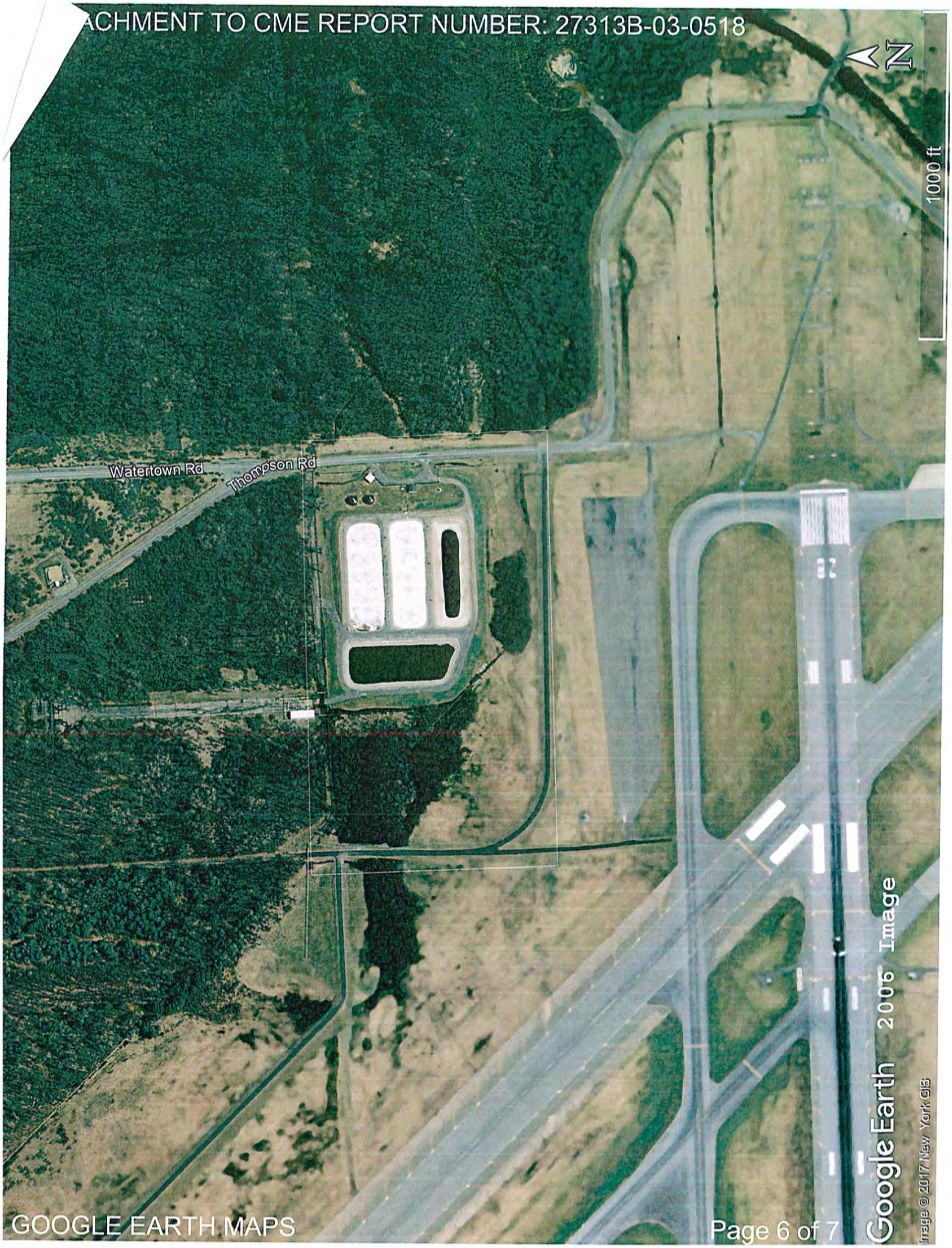
Thompson Rd
BZ
Google Earth
2005 Image
Image © 2017 DigitalGlobe

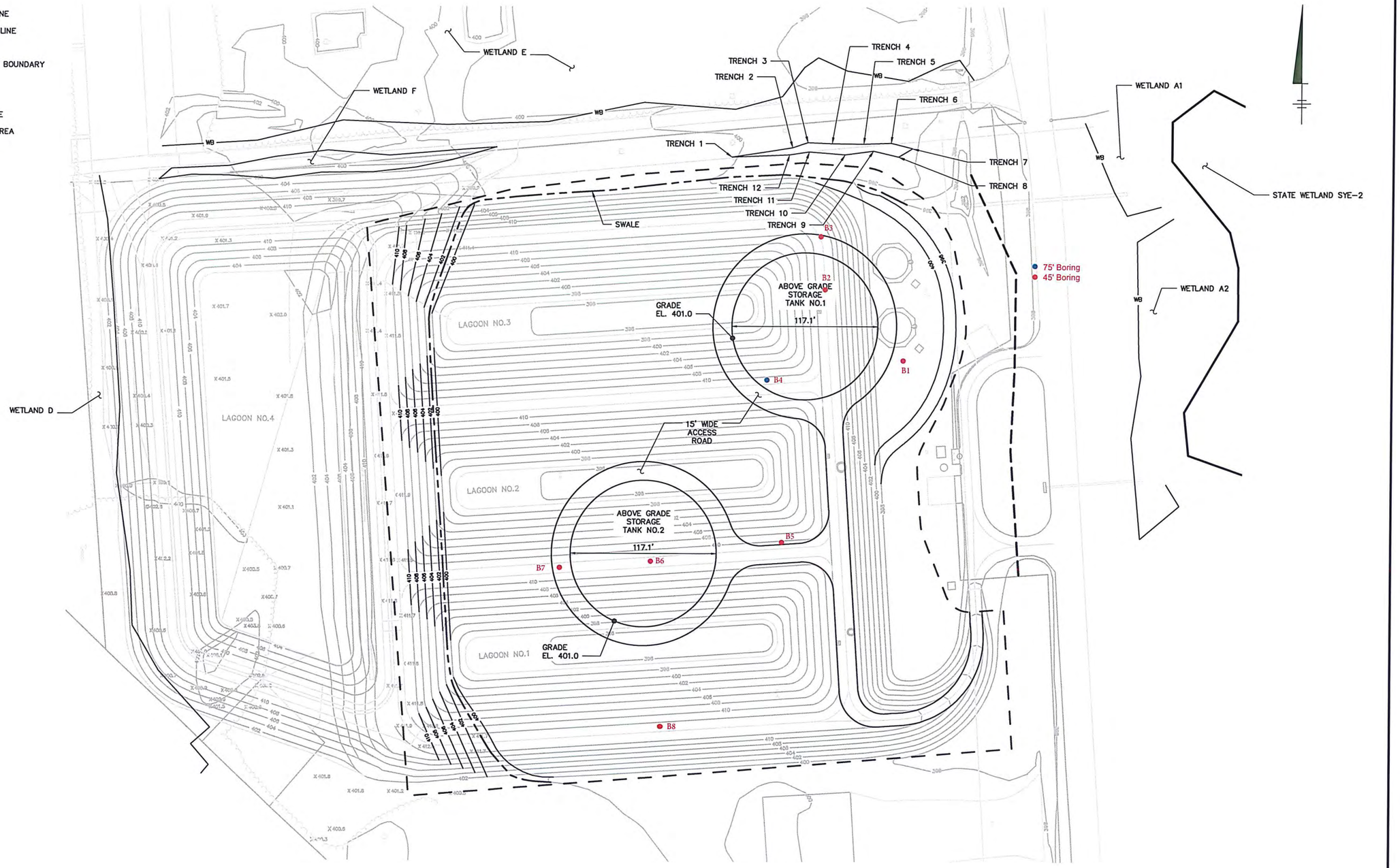

N
1000 ft
Watertown Rd
Thompson Rd
Google Earth
2006 Image
Image © 2017 New York GIS


N
1000 ft
Watertown Rd
Thompson Rd
82
Google Earth 2017 Image

ATTACHMENT TO CME REPORT NUMBER: 27313B-03-0518

LEGEND:

- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- WETLAND FLAG
- DELINEATED WETLAND BOUNDARY
- 100FT BUFFER
- DRAINAGE SWALE
- PROPOSED STRUCTURE
- PROJECT LOCATION/AREA OF DISTURBANCE



XREFS: 01738x00, 01738X03, 01738X01
IMAGES: PROJECTNAME: ----, 2015_Esri_aerial.jpg

CITY: SYRACUSE, NY DIV/GROUP: ENV/141 DB: KMD K.SARTORI LD: K.SARTORI PIC:D.GEISSER PM:J.PERRIELLO TM:B.TILLITSON LYR:ON=*;OFF=*REF*
C:\B0001738.0003\CADD\Sheets\01738G02.dwg LAYOUT: G-2 SAVED: 7/12/2017 3:26 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: AUS-NCSMOD FULL MONO.CTB PLOTTED: 7/13/2017 3:51 PM BY: KASPEREK, KATIE

SCALE: 1" = 40'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

Professional Engineer's Name: JOHN C. PERRIELLO
Professional Engineer's No.: 081662

State	Date Signed	Project Mgr.
NY	-	JCP
Designed by	Drawn by	Checked by
BRT	KK	JSB

NOT FOR CONSTRUCTION

ARCADIS OF NEW YORK, INC.

CITY OF SYRACUSE, NEW YORK • SYRACUSE HANCOCK INTERNATIONAL AIRPORT
DEICING LAGOON REHABILITATION

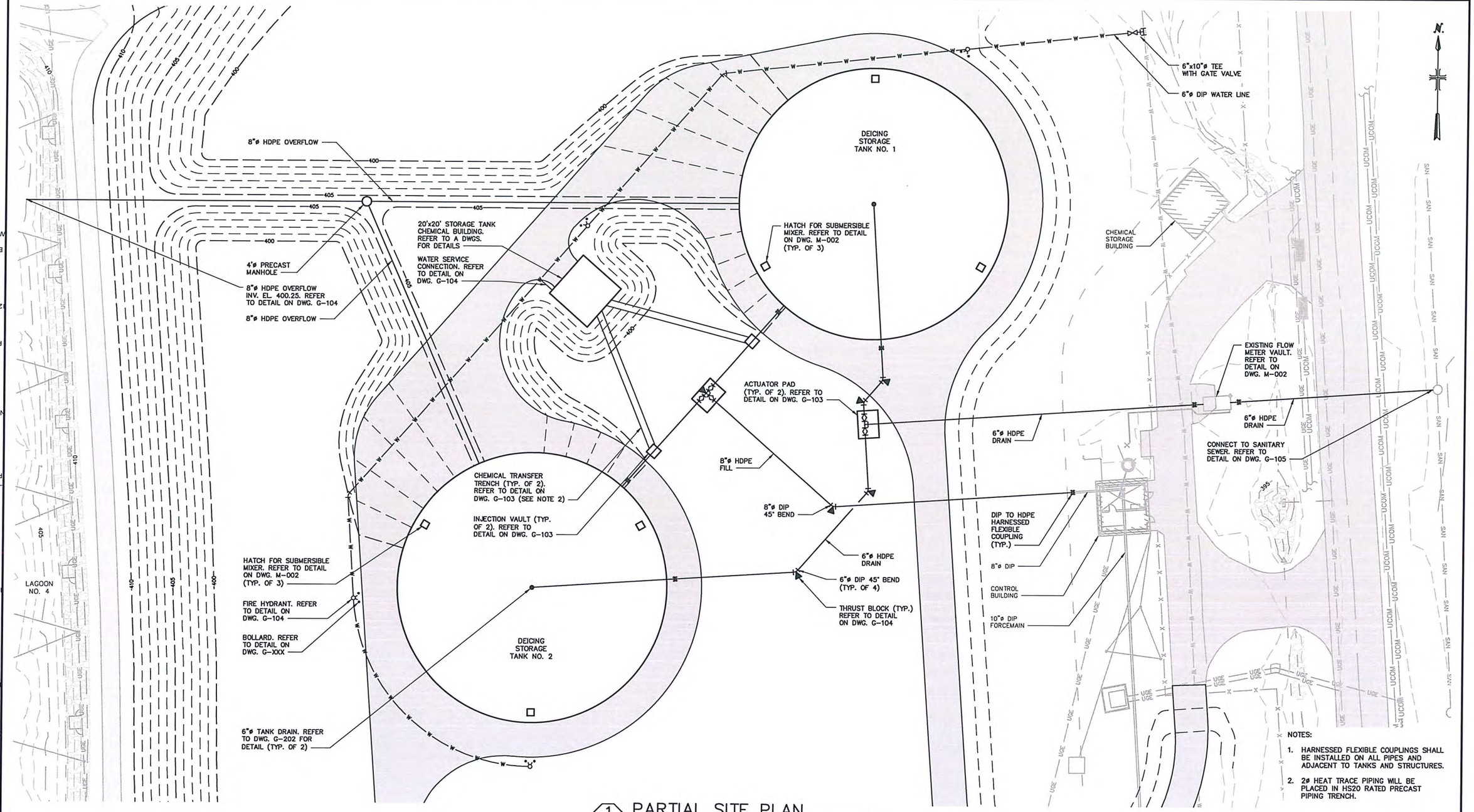
DEICING STORAGE SITE PLAN

GENERAL

ARCADIS Project No.: B0001738.0003.00100
Date: JULY 2017

ARCADIS
ONE LINCOLN CENTER
110 W FAYETTE ST. SUITE 300
SYRACUSE, NY 13202
TEL. 315.446.9120

FIGURE 2



1 G-102 PARTIAL SITE PLAN

1"=20' 20 0 20

NOTES:

1. HARNESSED FLEXIBLE COUPLINGS SHALL BE INSTALLED ON ALL PIPES AND ADJACENT TO TANKS AND STRUCTURES.
2. 2ø HEAT TRACE PIPING WILL BE PLACED IN HS20 RATED PRECAST PIPING TRENCH.

SCALE AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

Professional Engineer's Name: JOHN C. PERRIELLO
Professional Engineer's No.: 081662

State	Date Signed	Project Mgr.
NY	XX/XX/XX	JCP
Designed by	Drawn by	Checked by
JAG	MAW	BRT

IN PROGRESS
DRAFT
NOT FOR CONSTRUCTION

ARCADIS

CITY OF SYRACUSE, NEW YORK • SYRACUSE HANCOCK INTERNATIONAL AIRPORT
REHABILITATION OF DEICING STORAGE FACILITIES

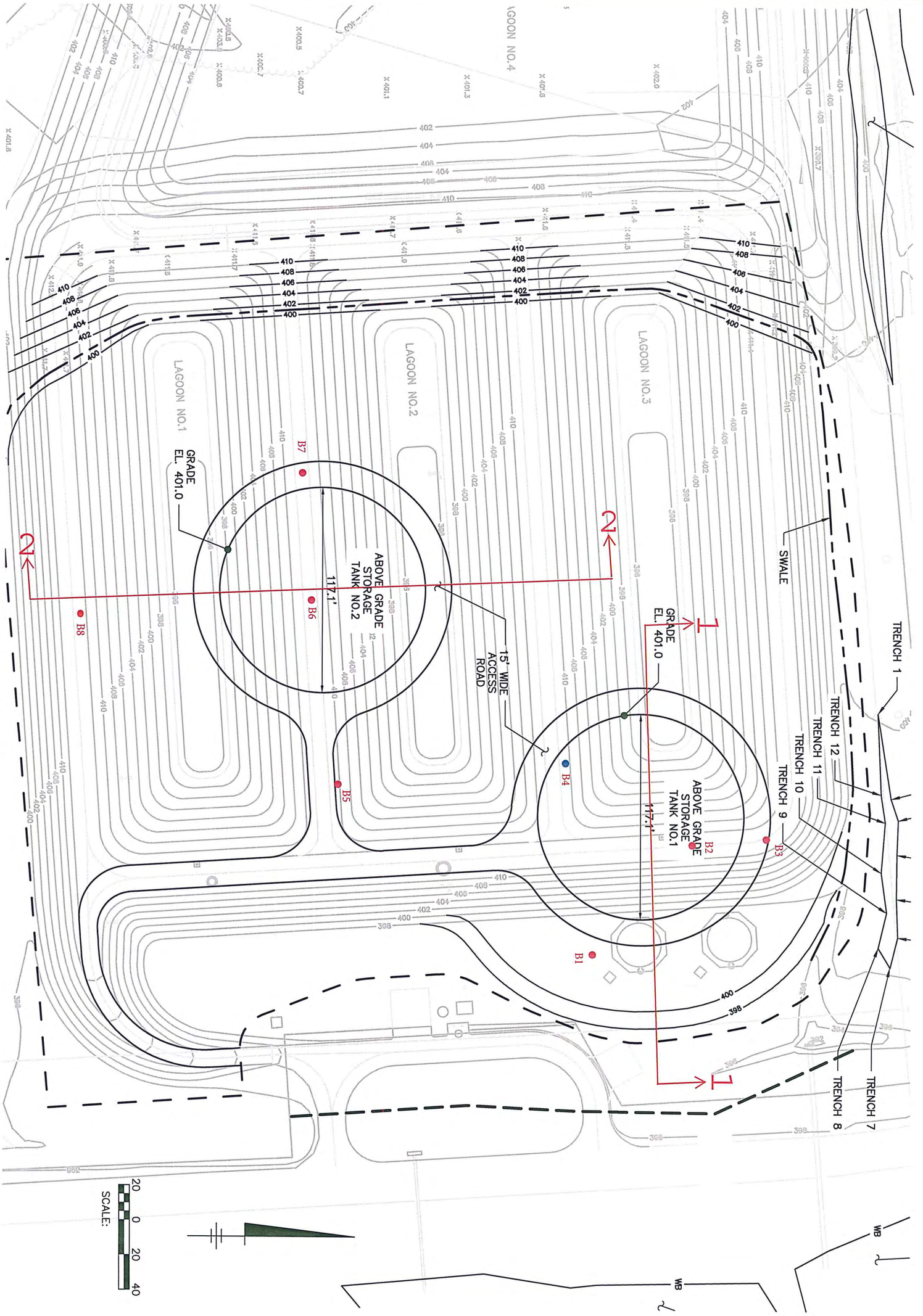
PARTIAL SITE PLAN

GENERAL

ARCADIS Project No.: B0001738.0004
Date: DECEMBER 2017

ARCADIS
6723 TOWPATH ROAD
PO BOX 66
SYRACUSE, NY 13214-0066
TEL. 315.446.9120

G-102



Deicing Storage Site Plan, Figure 2, dated July 2017, showing as-staked Boring locations, provided by Arcadis, incorporated.

Drawing Number : EX-1	SHIA REHABILITATION OF DEICING STORAGE FACILITIES SYRACUSE HANCOCK INTERNATIONAL AIRPORT SYRACUSE, NEW YORK
Date : 11-27-17	EXPLORATION LOACTION PLAN
Report Number : 27313B-03-0518	

CME Associates, Inc.
6035 Corporate Drive
East Syracuse, New York 13057
Tel.: 315.701.0522
Fax: 315.701.0526
www.cmeassociates.com

CROSS SECTION 1

ATTACHMENT TO CME REPORT NUMBER: 27218B-03-0518

Elevation (ft)

PROPOSED TANK

B-4

FILL

FF ELEV. 401.0

FF ELEV. 396.5

ORGANIC LAYER

WET SOIL DEPTH

OBSERVED GROUNDWATER

CLAYEY SILT

SILTY SAND

SPT N-VALUE

GLACIAL TILL

B-5

B-1

B-4	B-5	B-1
8	23	20
18	47	24
25	1	6
11	5	8
14	8	1
10	3	1
3	3	2
3	1	2
1	2	6
2	4	100+
4	0	
2	4	
7	2	
4	7	
13	9	
11	16	
57	83	
100+	100+	

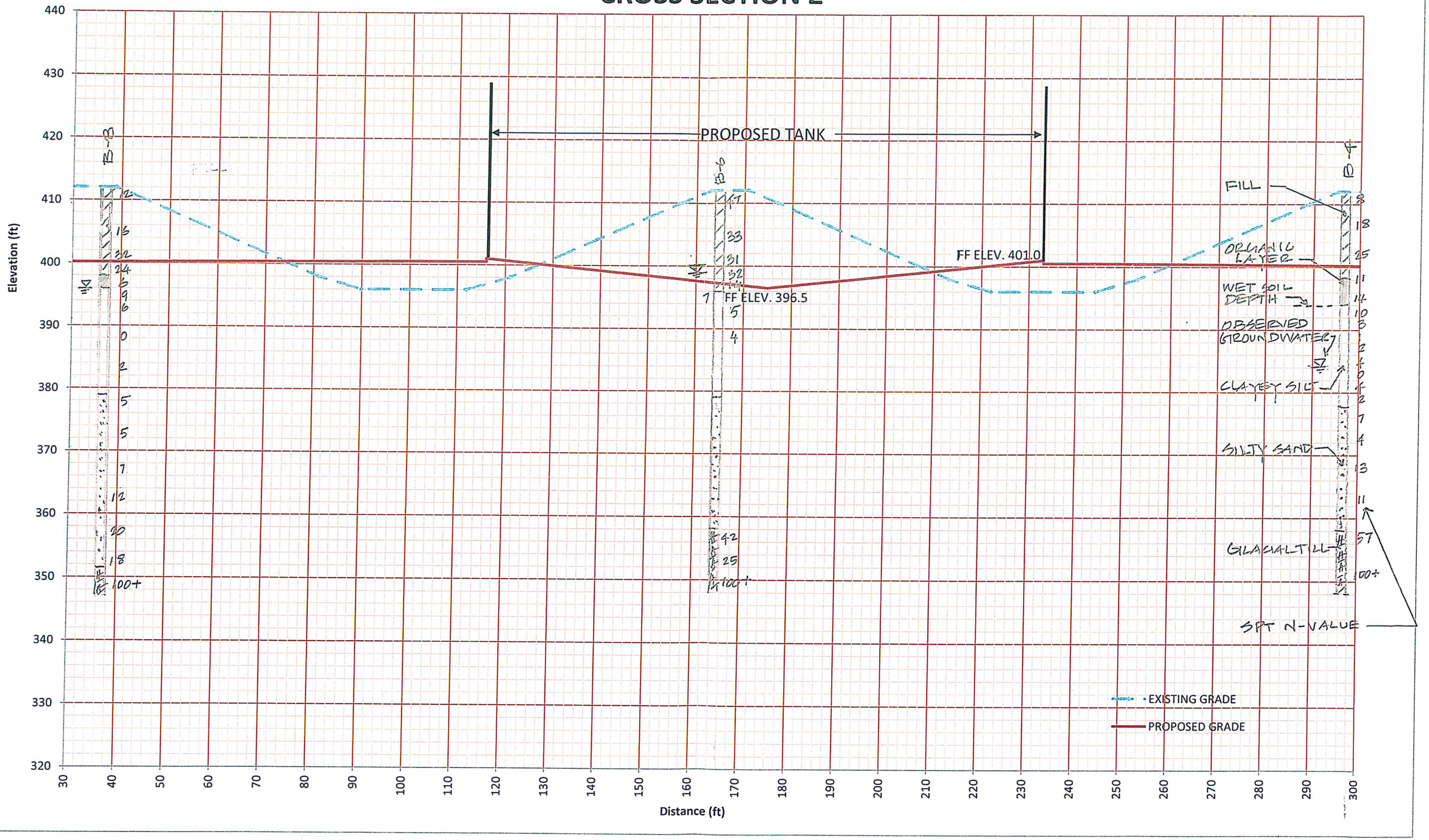
EXISTING GRADE

PROPOSED GRADE

Distance (ft)

ATTACHMENT TO CME REPORT NUMBER: 273138-03-0518

CROSS SECTION 2



CME Associates, Inc.

6035 Corporate Drive
East Syracuse, New York 13057
(315) 701-0522
(315) 701-0526 (Fax)
www.cmeassociates.com

LABORATORY TEST SUMMARY
SHIA Rehabilitation of Deicing Facilities
CME Report No.: 27313L-01-1217
December 6, 2017

CME Representatives obtained soil samples from Test Borings advanced as part of the Subsurface Exploration Program conducted for the subject project. Selected samples were delivered to CME's East Syracuse facility, an AASTHO AMRL[1] accredited laboratory for various laboratory testing. The results are presented below:

Sample ID Notations: B - Test Boring, S – Sample

I. Natural Moisture Content (ASTM D2216)

Sample ID	Natural Moisture (%)
B-1; S-1	10.2
B-1; S-2	19.7
B-1; S-3	26.4
B-1; S-4	24.5
B-1; S-5	25.3
B-1; S-6	23.4
B-1; S-7	23.1
B-1; S-8A	21.6
B-1; S-8B	25.5
B-1; S-9	21.8
B-1; S-10	7.4
B-3; S-1	3.4
B-3; S-2	7.5
B-3; S-3	13.2
B-3; S-4	24.4
B-3; S-5	24.5
B-3; S-6	24.6
B-3; S-7	21.0
B-3; S-8A	25.5
B-3; S-8B	25.3
B-4; S-9	25.7

[1] **AMRL** – American Association of State Highway & Transportation Officials (AASHTO) Materials Reference Laboratory. AMRL is a Federal Agency having jurisdiction to assess laboratory competence according to the standards of the United States. **CME** East Syracuse accreditation includes tests of Portland Cement Concrete, Aggregate and Soil Materials. www.amrl.net

CME Associates, Inc.

II. Atterberg Limits Testing (ASTM D4318)

Sample ID	Liquid Limit	Plastic Limit	Plasticity Index	Natural Moisture (%)
B-1; S-6	Non-Plastic			23.4
B-3; S-8A	22	17	5	25.5
B-4; S-9	Non-Plastic			25.7

III. Organic Content (ASTM D2974)

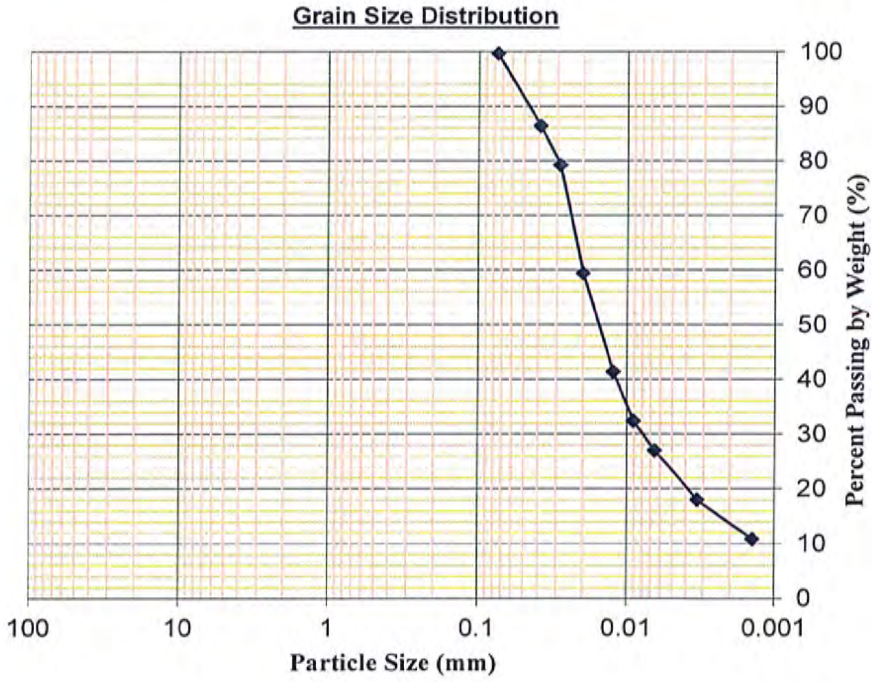
Sample ID	Organic Content (%)
B-3; S-4	3.4

IV. Mechanical Analysis ASTM D422

Sample #
B-1; S-5

Classification
Brown SILT, some CLAY

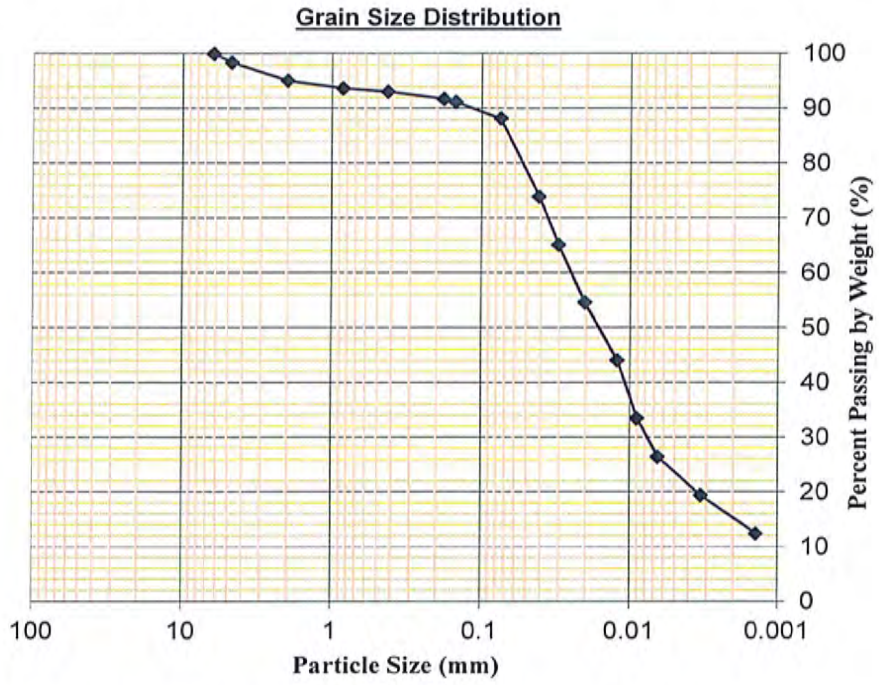
Sieve Designation	Size (mm)	Percent Passing by Weight (%)
No.200	0.075	100
Hydrometer	0.039	86
	0.029	79
	0.020	59
	0.012	41
	0.009	32
	0.007	27
	0.003	18
	0.001	11



Sample #
B-3; S-8A

Classification
Brown SILT, some CLAY, little cmf SAND, trace fine GRAVEL

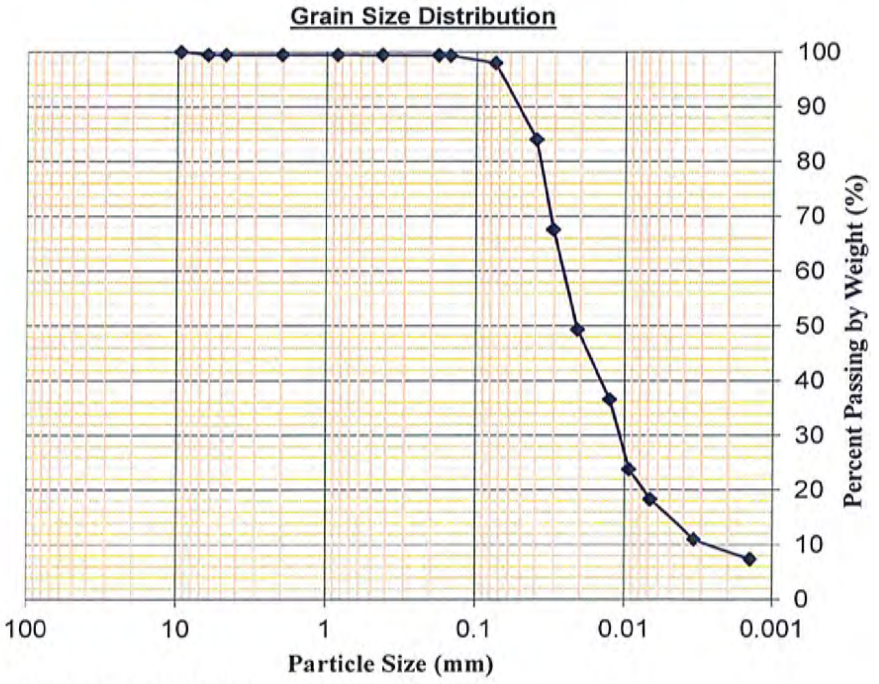
Sieve Designation	Size (mm)	Percent Passing by Weight (%)
1/4"	6.25	100
No.4	4.75	98
No.10	2.00	95
No.20	0.850	94
No.40	0.425	93
No.80	0.180	92
No.100	0.150	91
No.200	0.075	88
Hydrometer	0.041	74
	0.030	65
	0.020	55
	0.012	44
	0.009	33
	0.007	26
	0.003	19
	0.001	12



Sample #
B-4; S-9

Classification
Brown SILT, little CLAY, trace fine SAND, trace fine GRAVEL

Sieve Designation	Size (mm)	Percent Passing by Weight (%)
3/8"	9.50	100
1/4"	6.25	99
No.4	4.75	99
No.10	2.00	99
No.20	0.850	99
No.40	0.425	99
No.80	0.180	99
No.100	0.150	99
No.200	0.075	98
Hydrometer	0.040	84
	0.030	68
	0.021	49
	0.013	37
	0.009	24
	0.007	18
	0.003	11
	0.001	7.3



If you have any questions regarding this report please contact our office.

Yvonne Chu
Laboratory Supervisor

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: SHIA Rehabilitation of Deicing Storage Facilities, Syracuse, New York
Report No.: 27313B-03-0518
Client: Arcadis, U.S. Inc.
Date Started: 11/28/17 **Finished:** 11/28/17
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: Approximately 397'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Beau Fletcher
Casing Hammer: **Driller:** William Murphy
Other: **Inspector:** Bryan Reles
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550X ATV Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
11/28/17	While drilling	22.5'	24.0'
11/28/17	Before casing removed	18.7'	35.4'
11/28/17	After casing removed	7.8'	out
11/28/17	After casing removed	caved @ 9.9'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/14	5-9-11-14		FILL; Brown silt, mf sand, crushed stone (moist) **~FILL~**	20
	H O L L O W S T E M A U G E R	2	2.0	4.0	SS/21	9-12-12-10	4	FILL; Brown silt, clay, fine sand (moist)	24
5		3	4.0	6.0	SS/23	2-3-3-3	6	Brown/Grey SILT and CLAY, trace ORGANIC MATERIAL (moist, medium stiff) **~Buried Organic Layer~**	6
		4	6.0	8.0	SS/19	5-4-4-4		Grey SILT, some CLAY (moist, stiff)	8
10		5	8.0	10.0	SS/24	WH-WH-1-WH		Grey/Brown SILT, little CLAY (wet, very soft) **~Clayey Silt~**	1
15		6	14.0	16.0	SS/18	WH-WH-1-1		Grey/Brown SILT, little CLAY, trace fine SAND (wet, very soft)	1
20		7	19.0	21.0	SS/22	WH-WH-2-2		Grey/Brown SILT, trace CLAY (wet, very soft) Continued on page 2	2

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse **and** – 35 to 50 % m – medium **some** – 20 to 35 % f – fine **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
20								Continued from page 1	
	H O L L O W								
		8A	24.0	24.6	SS/24	WH-WH-2-3	24.6	Similar as above (wet, very soft)	2
25		8B	24.6	26.0				Red/Grey fine SAND, trace SILT (wet, very loose)	
	S T E M							**~Silty Sand~**	
		9	29.0	31.0	SS/24	3-4-2-6		Red/Grey mf SAND, trace SILT (wet, loose)	6
30									
	A U G E R						33.5	*Augers harder @ 33.5'*	
		10	34.0	35.4	SS/5	57-86-100@4"		Red/Grey SILT and cmf SAND, trace fine GRAVEL (moist, hard) **~Glacial Till~**	100+
35	XXX							Bottom of Boring @ 35.4'	
40									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: SHIA Rehabilitation of Deicing Storage Facilities, Syracuse, New York
Report No.: 27313B-03-0518
Client: Arcadis, U.S. Inc.
Date Started: 11/27/17 **Finished:** 11/27/17
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: Approximately 412'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** William Murphy
Casing Hammer: **Driller:** Gary Richards
Other: **Inspector:** Nick Smith
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550X ATV Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
11/27/17	While drilling	15.8'	16.0'
11/27/17	Before casing removed	17.5'	20.0'
11/27/17	After casing removed	None Noted	out
11/27/17	After casing removed	caved @ 13.1'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	Classification of Material (c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %)	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/19	6-14-17-16		Miscellaneous FILL; Grey silt, crushed stone, cmf sand, cmf gravel, cinders (moist)	31
	H								
	O	2	2.0	4.0	SS/18	16-23-20-15		Similar as above (moist)	43
	L							**~FILL~**	
	L	3	4.0	6.0	SS/14	9-10-5-4		Similar as above (moist)	15
5	O								
	W	4	6.0	8.0	SS/13	4-6-7-4		FILL; Brown silt, crushed stone, mf sand (moist)	13
		5	8.0	10.0	SS/16	6-6-6-6		Similar as above (moist)	12
	S								
10	T								
		6	10.0	12.0	SS/11	5-2-2-3		Similar as above (moist)	4
	E								
	M								
		7	12.0	14.0	SS/9	3-2-3-4		Similar as above (wet)	5
	A	8	14.0	16.0	SS/8	4-2-2-2		Similar as above (wet)	4
15									
	U								
	G	9	16.0	18.0	SS/9	3-2-2-2		FILL; Grey silt, clay, crushed stone (wet) *appears reworked*	4
	E								
							18		
	R	10	18.0	20.0	SS/10	3-2-2-2		Grey SILT, some CLAY, trace fine SAND (wet, medium stiff) **~Clayey Silt~**	4
20	XXX							Bottom of Boring @ 20.0'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: SHIA Rehabilitation of Deicing Storage Facilities, Syracuse, New York
Report No.: 27313B-03-0518
Client: Arcadis, U.S. Inc.
Date Started: 11/27/17 **Finished:** 11/28/17
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: Approximately 412'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** William Murphy
Casing Hammer: **Driller:** Gary Richards
Other: **Inspector:** Nick Smith
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550X ATV Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
11/28/17	While drilling	20.2'*	34.0'
11/28/17	Before casing removed	29.0'	59.0'
11/28/17	After casing removed	13.5'	out
11/28/17	After casing removed	caved @ 27.8'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse; m – medium; f – fine; and – 35 to 50 %; some – 20 to 35 %; little – 10 to 20 %; trace – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/16	6-12-15-18		Miscellaneous FILL; Brown silt, crushed stone, mf sand, plastic liner material, insulation material (moist)	27
	H O L L O W S T E M A U G E R							**~FILL~**	
5									
		2	6.0	8.0	SS/19	19-31-16-18		FILL; Brown silt, crushed stone, mf sand (moist)	47
10									
		3	12.0	14.0	SS/7	7-1-WR-WR		FILL; Brown/Grey crushed stone, silt, (wet)	1
							14		
15		4	14.0	16.0	SS/18	1-2-4-4		Brown SILT, little cmf SAND, trace ORGANIC MATERIAL (moist, medium stiff)	6
								~Buried Organic Layer~	
		5	18.0	20.0	SS/19	4-3-5-6		Grey SILT, some fine SAND, little CLAY (moist, stiff)	8
20								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod
Remarks: *11/27/17 reading is 32.0' when casing was at 34.0'

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
20								Continued from page 1	
	H O L L O W S T E M A U G E R	6	24.0	26.0	SS/12	WR-1-2-2		Grey SILT, some CLAY, trace fine SAND (wet, soft)	3
25								**~Clayey Silt~**	
		7	29.0	31.0	SS/19	2-1-WR-1		Grey SILT, some fine SAND, little CLAY (wet, very soft)	1
30									
		8A	34.0	35.5	SS/22	WR-WR-WH-1		Grey SILT, some CLAY, trace fine SAND (wet, very soft)	0
35							35.5		
		8B	35.5	36.0				Red/Grey fine SAND, some SILT, trace CLAY (wet, very loose)	
								~Silty Sand~	
		9	39.0	41.0	SS/22	5-5-4-5		Red/Grey mf SAND, little SILT (wet, loose)	9
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES								CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse and – 35 to 50 % m – medium some – 20 to 35 % f – fine little – 10 to 20 % trace – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	H O L L O W S T E M A U G E R	10	44.0	46.0	SS/12	5-4-5-5		Red/Grey mf SAND, some SILT (wet, loose)	9
45								**~Silty Sand~**	
		11	49.0	51.0	SS/20	7-8-8-12		Grey mf SAND, little SILT (wet, medium compact)	16
50									
		12A	54.0	55.4	SS/23	11-42-41-74		Grey cmf SAND, some mf GRAVEL, trace SILT (wet, very compact)	83
55							55.4		
		12B	55.4	56.0				Red/Brown SILT, some fine SAND, little mf GRAVEL (moist)	
								~Glacial Till~	
		13	59.0	61.0	SS/8	70-100@3"		Red/Brown SILT, little fine SAND, little mf GRAVEL (moist, hard)	100+
60									
	XXX							Bottom of Boring @ 61.0'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: SHIA Rehabilitation of Deicing Storage Facilities, Syracuse, New York
Report No.: 27313B-03-0518
Client: Arcadis, U.S. Inc.
Date Started: 11/27/17 **Finished:** 11/27/17
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: Approximately 411'

METHODS OF INVESTIGATION

Casing:	3-1/4" ID H. Stem Auger	**Driller:**	William Murphy
Casing Hammer:		**Driller:**	Gary Richards
Other:		**Inspector:**	Nick Smith
Soil Sampler:	2" OD Split Barrel	**Rod Size:**	AWJ
Sampler Hammer: Wt.	140 lbs.	**Fall:**	30 in.
Make & Model of Drill Rig:		CME 550X ATV Mounted	

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
11/27/17	While drilling	24.8'	34.0'
11/27/17	Before casing removed	35.1'	63.3'
11/27/17	After casing removed	None Noted	out
11/27/17	After casing removed	caved @ 10.2'	out

LOG OF BORING SAMPLES / **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/5	3-4-4-7		Miscellaneous FILL; Brown/Grey coarse stone, cmf gravel, silt, cmf sand, insulation material, plastic liner material (moist)	8
	H O L L O W S T E M A U G E R							**~FILL~**	
5	L	2	4.0	6.0	SS/16	7-7-11-15		FILL; Brown silt, crushed stone, cmf sand (moist)	18
10		3	9.0	11.0	SS/23	9-10-15-25		Similar as above (moist)	25
15		4	14.0	16.0	SS/20	4-5-6-7		Brown SILT, little mf SAND, little ORGANIC MATERIAL (moist, stiff)	11
								~Buried Organic Layer~	
		5	16.0	18.0	SS/6	5-7-7-7		Brown SILT, trace CLAY, trace ORGANIC MATERIAL (moist, stiff)	14
		6	18.0	20.0	SS/21	3-4-6-5		Grey/Brown SILT, little CLAY, little fine SAND (wet, stiff)	10
20								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse **and** – 35 to 50 % m – medium **some** – 20 to 35 % f – fine **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
20								Continued from page 1	
		7	20.0	22.0	SS/16	WR-1-2-WH		Similar as above (wet, soft) *Approximately 1" thick Layered Sandy & Clayey portions noted*	3
	H								
	O	8	22.0	24.0	SS/20	1-2-1-2		Grey SILT, some CLAY (wet, soft) *Less than 1" thick fine Sand Seams noted*	3
	L								
	L	9	24.0	26.0	SS/20	WR-WH-1-2		Grey SILT, little fine SAND, little CLAY (wet, very soft)	1
25								**~Clayey Silt~**	
	O								
	W	10	26.0	28.0	SS/24	WR-1-1-2		Similar as above (wet, soft)	2
		11	28.0	30.0	SS/24	WR-2-2-3		Grey SILT, some CLAY, trace fine SAND (wet, medium stiff)	4
	S								
30	T								
		12	30.0	32.0	SS/12	WR-WR-WH-1		Grey SILT, little mf SAND, little CLAY, trace fine GRAVEL (wet, very soft)	0
	E								
	M								
		13	32.0	34.0	SS/19	2-3-1-2		Red/Grey SILT, some fine SAND, trace CLAY (wet, medium stiff)	4
							34		
	A	14	34.0	36.0	SS/18	WR-WH-2-3		Red/Grey mf SAND, little SILT (wet, very loose)	2
35									
	U								
	G	15	36.0	38.0	SS/17	4-3-4-5		Brown/Red mf SAND, little SILT (wet, loose)	7
	E								
								~Silty Sand~	
	R								
		16	39.0	41.0	SS/15	2-2-2-3		Brown/Red mf SAND, some SILT (wet, loose)	4
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	H O L L O W S T E M A U G E R	17	44.0	46.0	SS/18	3-5-8-6		Brown/Grey mf SAND, little SILT (wet, medium compact)	13
45								**~Silty Sand~**	
		18	49.0	51.0	SS/13	6-5-6-5		Grey cmf SAND, little SILT, trace mf GRAVEL (wet, medium compact)	11
50							52.2	*Augering hard @ 52.2'*	
		19	54.0	56.0	SS/10	25-42-15-18		Brown SILT, little mf SAND, little mf GRAVEL, trace CLAY (moist, hard)	57
55								**~Glacial Till~**	
		20	59.0	61.0	SS/3	100@3.5"		Brown SILT, some cmf SAND, little cmf GRAVEL, trace CLAY (moist, hard)	100+
60								Continued on page 4	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
60								Continued from page 3	
	H O L L	21	63.0	65.0	SS/10	71-100@4"		Brown/Red Similar as above (moist, hard)	100+
65	XXX							Bottom of Boring @ 65.0'	
70									
75									
80									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: SHIA Rehabilitation of Deicing Storage Facilities, Syracuse, New York
Report No.: 27313B-03-0518
Client: Arcadis, U.S. Inc.
Date Started: 11/29/17 **Finished:** 11/29/17
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: Approximately 410'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Dave Lyons
Casing Hammer: **Driller:** John Winks
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550X ATV Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
11/29/17	While drilling	14.9'	18.0'
11/29/17	Before casing removed	28.0'	58.5'
11/29/17	After casing removed	12.0'	out
11/29/17	After casing removed	caved @ 20.0'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/11	2-10-20-13		FILL; Brown silt, gravel, clay, sand, crushed stone (moist)	30
	H								
	O							*plastic & geotextile fabric noted @ 2'*	
	L								
	L								
5	O								
	W	2	6.0	8.0	SS/22	12-12-8-8		FILL; silt, gravel, sand (moist)	20
	S								
10	T								
	E	3	10.0	12.0	SS/17	7-7-5-4		Similar as above (moist)	12
	M								
		4	12.0	14.0	SS/20	4-9-8-14		Similar as above (moist)	17
15	A								
	U								
	G							*Drills quiet at 16.0'*	
	E								
	R	5	18.0	20.0	SS/19	3-5-5-5		Grey/Brown SILT, little CLAY, trace fine SAND (wet, stiff)	10
20								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod
Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
20								Continued from page 1	
	H O L L O W S T E M A U G E R	6	23.5	25.0	SS/22	WH-WH-WH		Grey SILT, little CLAY (wet, very soft)	0
25									
		7	28.5	30.0	SS/16	WR-WH-1		Brown SILT, little CLAY, trace fine SAND (wet, very soft)	1
30									
		8	33.5	35.0	SS/17	WR-1-2		Red/Brown SILT, trace fine SAND, trace CLAY (wet, very soft)	3
35									
		9	38.5	40.0	SS/16	2-1-1		Red/Brown SILT and fine SAND, trace CLAY (wet, soft)	2
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse **and** – 35 to 50 % m – medium **some** – 20 to 35 % f – fine **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	H								
	O								
	L								
	L	10	43.5	45.0	SS/17	3-5-6		Brown fine SAND and SILT (wet, medium compact)	11
45	O								
	W								
							46.6	*Drills gravelly @ 46.6'*	
	S	11	48.5	50.0	SS/12	23-29-24		Grey/Brown cmf SAND and SILT, little mf GRAVEL (wet, very compact)	53
50	T								
	E								
	M							**~Glacial Till~**	
		12	53.5	55.0	SS/18	12-18-26		Brown SILT, some fine SAND (wet, hard (wet, very compact)	44
	A								
55	U								
	G								
	E								
	R								
		13	58.5	59.5	SS/9	64-109@5"		Red/Brown SILT, some cmf SAND, trace fine GRAVEL (moist, hard)	100+
60	XXX							Bottom of Boring @ 59.5'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: SHIA Rehabilitation of Deicing Storage Facilities, Syracuse, New York
Report No.: 27313B-03-0518
Client: Arcadis, U.S. Inc.
Date Started: 11/30/17 **Finished:** 11/30/17
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: Approximately 412'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** William Murphy
Casing Hammer: **Driller:** Gary Richards
Other: **Inspector:** Nick Smith
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550X ATV Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
11/27/17	While drilling	13.0'	14.0'
11/27/17	Before casing removed	22.4'	63.5'
11/27/17	After casing removed	14.3'	out
11/27/17	After casing removed	caved @ 28.3'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/21	7-18-29-40		FILL; Grey/Brown silt, gravel, sand (moist)	47
	H							*Plastic and textile fabric present*	
	O								
	L							~FILL~	
5	L								
	O								
	W	2	6.0	8.0	SS/24	4-22-11-9		Grey/Brown silt, gravel, sand, clay (moist)	33
	S								
10	T								
		3	10.0	12.0	SS/22	7-8-23-25		Grey/Brown silt, gravel, sand, siltstone/shale fragments (moist)	31
	E								
	M	4	12.0	14.0	SS/19	25-21-11-13		Similar as above (moist)	32
	A	5	14.0	16.0	SS/0	9-7-7-7		Brown silt, clay, sand, crushed stone (moist) *See remark 1*	14
15	U								
							16		
	G	6	16.0	18.0	SS/20	3-3-4-8		Brown SILT, some CLAY (moist, medium stiff)	7
	E								
	R	7	18.0	20.0	SS/19	2-2-3-2		Grey SILT, some CLAY (wet, medium stiff)	5
20								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod
Remarks: 1. No recovery with a 2" split spoon, therefore a 3" split spoon was utilized.

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse m – medium f – fine / **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
20	XXX							Continued from page 1	
	H								
	O								
	L	8	23.0	25.0	SS/23	2-2-2-1		Similar as above (wet, medium stiff)	4
	L								
25	O								
	W								
	S								
30	T								
	E								
	M								
	A								
35	U								
	G								
	E								
	R								
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse m – medium f – fine / **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
40	XXX							Continued from page 2	
	H								
	O								
	L								
	L								
45	O								
	W								
	S								
50	T								
	E								
	M								
							53.8	*Drills hard and gravelly @ 53.8'*	
55	A								
	U	9	55.0	57.0	SS/12	45-25-17-9		Red/Brown mf GRAVEL, some cmf SAND, some SILT (wet, compact)	42
	G								
	E							**~Glacial Till~**	
	R								
		10	58.5	60.0	SS/14	10-13-12		Red/Brown cmf SAND and SILT, little mf GRAVEL (wet, medium compact)	25
60								Continued on page 4	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES								CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – coarse **m** – medium **f** – fine / **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
60	XXX							Continued from page 3	
	H								
	S								
		11	63.5	64.4	SS/10	40-100@4"		Red/Brown SILT, little mf SAND, trace mf GRAVEL (moist, hard)	100+
	A								
65	XXX							Bottom of Boring @ 64.4'	
70									
75									
80									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: SHIA Rehabilitation of Deicing Storage Facilities, Syracuse, New York
Report No.: 27313B-03-0518
Client: Arcadis, U.S. Inc.
Date Started: 11/29/17 **Finished:** 11/29/17
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: Approximately 412'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Dave Lyons
Casing Hammer: **Driller:** John Winks
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550X ATV Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
11/29/17	While drilling	28.1'	33.5'
11/29/17	Before casing removed	37.0'	58.5'
11/29/17	After casing removed	None Noted	out
11/29/17	After casing removed	caved @ 15.4'	out

LOG OF BORING SAMPLES / **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/0	2-17-1-13		No recovery. *Cobble size rip-rap stone noted at grade*	18
	H O L L O W S T E M A U G E R							~FILL~	
5									
		2	6.0	8.0	SS/24	13-7-12-12		FILL; Grey silt, gravel, sand, crushed stone (moist)	19
10		3	10.0	12.0	SS/21	9-30-17-23		FILL; Brown/Grey silt, gravel, sand, siltstone/ shale fragments (moist)	47
		4	12.0	14.0	SS/24	20-11-8-11		FILL; silt, clay, sand, gravel (moist)	19
15									
		5A	18.0	19.0	SS/24	3-2-2-2		Brown/Grey SILT, little CLAY, trace fine SAND (wet, medium stiff)	4
		5B	19.0	20.0				Grey SILT and CLAY (wet, medium stiff)	
20								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod
Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
20								Continued from page 1	
	H O L L O W S T E M A U G E R	6	23.5	25.0	SS/18	WH-WH-2		Grey/Brown SILT, little CLAY, trace fine SAND (wet, very soft)	2
25									
		7	28.5	30.0	SS/18	WH-WH-2		Red/Brown fine SAND, some SILT (wet, very loose)	2
30								**~Silty Sand~**	
		8	33.5	35.0	SS/18	3-4-5		Red/Brown fine SAND, trace SILT (wet, loose)	9
35									
		9	38.5	40.0	SS/18	5-3-2		Similar as above (wet, loose)	5
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	H								
	O								
	L								
	L	10	43.5	45.0	SS/18	1-3-5		Grey fine SAND, little SILT (wet, loose)	8
45									
	O								
	W								
	S	11	48.5	50.0	SS/18	2-4-4		Grey fine SAND, trace SILT (wet, loose)	8
50	T								
	E								
	M								
							53.0	*Drills hard and gravelly @ 53.0'*	
		12	53.5	55.0	SS/14	19-15-11		Red/Grey mf GRAVEL, some cmf SAND, trace SILT (wet, medium compact)	26
55	A								
	U								
	G							**~Glacial Till~**	
	E								
	R								
		13	58.5	59.3	SS/5	72-100@3"		Red SILT, little mf SAND, little mf GRAVEL (moist, hard)	100+
60	XXX							Bottom of Boring @ 59.3'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: SHIA Rehabilitation of Deicing Storage Facilities, Syracuse, New York
Report No.: 27313B-03-0518
Client: Arcadis, U.S. Inc.
Date Started: 11/29/17 **Finished:** 11/29/17
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: Approximately 412'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Dave Lyons
Casing Hammer: **Driller:** John Winks
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550X ATV Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
11/29/17	While drilling	16.0'	18.0'
11/29/17	Before casing removed	22.2'	63.5'
11/29/17	After casing removed	14.6'	out
11/29/17	After casing removed	caved @ 28.5'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse; m – medium; f – fine; and – 35 to 50 %; some – 20 to 35 %; little – 10 to 20 %; trace – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/0	3-3-9-22		FILL; mf gravel, mf sand, silt, plastic and geotextile fabric (moist) *See remark 1*	12
	H O L L O W S T E M A U G E R							**~FILL~**	
5		2	6.0	8.0	SS/23	13-9-7-6		FILL; Brown silt, clay, gravel, sand (moist)	16
10		3	10.0	12.0	SS/19	10-16-16-16		FILL; silt, gravel, sand (moist)	32
		4	12.0	14.0	SS/21	4-9-15-14		Similar as above (moist)	24
							14		
15								**~Buried Organic Layer~** *See Boring Log B-8A for details*	
							16	*Drills softer @ 15.6'*	
		5	18.0	20.0	SS/20	1-3-3-3		Brown SILT, some CLAY (wet, medium stiff)	6
20								**~Clayey Silt~** Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod
Remarks: 1. No recovery with a 2" split spoon, therefore a 3" split spoon was utilized.

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse **and** – 35 to 50 % m – medium **some** – 20 to 35 % f – fine **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
20								Continued from page 1	
	H O L L O W S T E M A U G E R	6	23.5	25.0	SS/18	WH-WH-WH		Brown SILT, some CLAY (wet, very soft)	0
25									
		7	28.5	30.0	SS/18	WH-1-1		Grey/Brown SILT, some fine SAND, little CLAY (wet, soft)	2
30									
		8	33.5	35.0	SS/12	WH-2-3		Red/Brown fine SAND, some SILT (wet, loose)	5
35									
								~Silty Sand~	
		9	38.5	40.0	SS/16	1-2-3		Brown fine SAND, little SILT (wet, loose)	5
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse **and** – 35 to 50 % m – medium **some** – 20 to 35 % f – fine **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	H O L L O W S T E M A U G E R	10	43.5	45.0	SS/17	2-4-3		Brown fine SAND, some SILT (wet, loose)	7
45								**~Silty Sand~**	
		11	48.5	50.0	SS/17	4-5-7		Brown fine SAND, little SILT (wet, medium compact)	12
50								*Drills gravelly @ 52.8'*	
		12	53.5	55.0	SS/13	11-10-10		Brown cmf SAND, some SILT, little mf GRAVEL (wet, medium compact)	20
55									
		13	58.5	60.0	SS/18	7-3-15		Brown fine SAND, some SILT, trace mf GRAVEL, trace CLAY (moist, medium compact)	18
60								Continued on page 4	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse **and** – 35 to 50 % m – medium **some** – 20 to 35 % f – fine **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
60								Continued from page 3	
							60.5	*Drills very hard @ 60.5'*	
	H O L L	14	63.5	65.0	SS/10	90-108@6"		Red/Brown SILT, little mf SAND, trace mf GRAVEL, trace CLAY (moist, hard)	100+
65								**~Glacial Till~**	
	XXX							Bottom of Boring @ 65.0'	
70									
75									
80									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: SHIA Rehabilitation of Deicing Storage Facilities, Syracuse, New York
Report No.: 27313B-03-0518
Client: Arcadis, U.S. Inc.
Date Started: 11/29/17 **Finished:** 11/29/17
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: Approximately 412'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Dave Lyons
Casing Hammer: **Driller:** John Winks
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550X ATV Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
11/29/17	While drilling	See Log B-8	
11/29/17	Before casing removed	See Log B-8	
11/29/17	After casing removed	See Log B-8	
11/29/17	After casing removed	See Log B-8	

LOG OF BORING SAMPLES / **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
0	XXX							*Boring B-8A advanced at 5' West of B-8. Augered to 14.0' and began sampling.*	
	H								
	O								
	L								
5	L								
	O								
	W								
								~FILL~	
	S							*See Boring Log B-8*	
	T								
10	E								
	M								
							14		
	A	1	14.0	16.0	SS/23	3-3-3-3		Grey/Brown SILT and CLAY, trace fine SAND, trace ORGANIC MATERIAL (wet, medium stiff)	6
15	U								
	G						16	**~Buried Organic Layer~**	
		2	16.0	18.0	SS/0	3-4-5-6		Brown CLAY and SILT, trace fine SAND (wet, stiff)	9
	E								
	R							**~Clayey Silt~**	
	XXX							Bottom of Boring @ 18.0'	
20									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks: 1. No recovery with a 2" split spoon, therefore a 3" split spoon was utilized.

Design Maps Summary Report USGS

Attachment to CME Report Number:27313B-03-0518

User–Specified Input

Report Title Rehabilitation of Deicing Storage Facilities at SHIA, Syracuse, NY
Mon November 27, 2017 21:02:33 UTC

Building Code Reference Document 2012/2015 International Building Code
(which utilizes USGS hazard data available in 2008)

Site Coordinates 43.11119°N, 76.10631°W

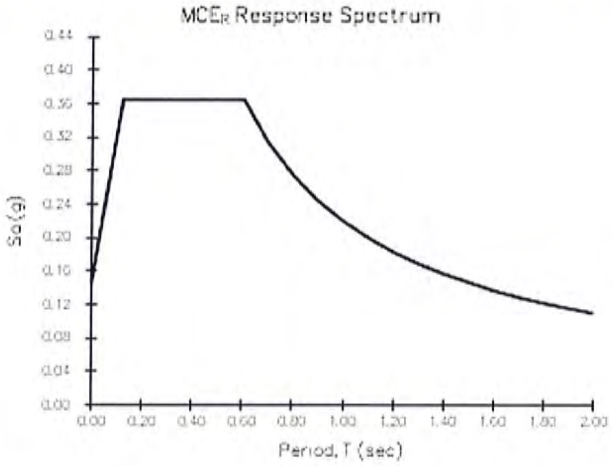
Site Soil Classification Site Class E – "Soft Clay Soil"

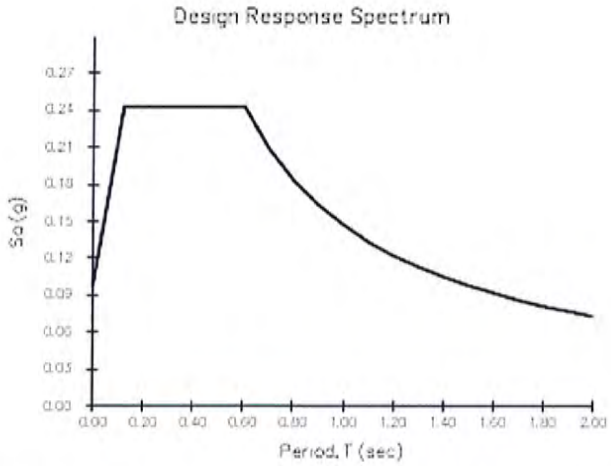
Risk Category I/II/III

USGS–Provided Output

S_S =	0.146 g	S_{MS} =	0.365 g	S_{DS} =	0.243 g
S_1 =	0.063 g	S_{M1} =	0.220 g	S_{D1} =	0.147 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





Design Maps Detailed Report USGS

Attachment to CME Report Number:27313B-03-0518

2012/2015 International Building Code (43.11119°N, 76.10631°W)

Site Class E – "Soft Clay Soil", Risk Category I/II/III

Section 1613.3.1 — Mapped acceleration parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2012/2015 International Building Code are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 1613.3.3.

From Figure 1613.3.1(1) [1] $S_S = 0.146$ g

From Figure 1613.3.1(2) [2] $S_1 = 0.063$ g

Section 1613.3.2 — Site class definitions

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class E, based on the site soil properties in accordance with Section 1613.

2010 ASCE-7 Standard – Table 20.3-1
SITE CLASS DEFINITIONS

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Attachment to CME Report Number:27313B-03-0518

Section 1613.3.3 — Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters

TABLE 1613.3.3(1)
VALUES OF SITE COEFFICIENT F_a

Site Class	Mapped Spectral Response Acceleration at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = E and S_S = 0.146 g, F_a = 2.500

TABLE 1613.3.3(2)
VALUES OF SITE COEFFICIENT F_v

Site Class	Mapped Spectral Response Acceleration at 1-s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = E and S_1 = 0.063 g, F_v = 3.500

Attachment to CME Report Number:27313B-03-0518

Equation (16-37): $S_{MS} = F_a S_S = 2.500 \times 0.146 = 0.365$ g

Equation (16-38): $S_{M1} = F_v S_1 = 3.500 \times 0.063 = 0.220$ g

Section 1613.3.4 — Design spectral response acceleration parameters

Equation (16-39): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 0.365 = 0.243$ g

Equation (16-40): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.220 = 0.147$ g

Attachment to CME Report Number:27313B-03-0518

Section 1613.3.5 — Determination of seismic design category

TABLE 1613.3.5(1)
SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATION

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.243 g, Seismic Design Category = B

TABLE 1613.3.5(2)
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.147 g, Seismic Design Category = C

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 1613.3.5(1) or 1613.3.5(2)" = C

Note: See Section 1613.3.5.1 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 1613.3.1(1)*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(1).pdf
2. *Figure 1613.3.1(2)*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(2).pdf

GENERAL INFORMATION & KEY TO TEST BORING LOGS

The **Subsurface Exploration – Test Boring Logs produced by CME Associates, Inc**. present the observations and mechanical data collected by the driller while at the site, supplemented, at times, by classification of the materials removed from the borings determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed from the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface conditions between adjacent borings or between the sampled intervals. The data presented on the Exploration Logs together with the recovered samples will provide a basis for evaluating the character of the subsurface conditions relative to the proposed construction. The evaluation must consider all the recorded details and their significance relative to each other. Often, analyses of standard boring data indicate the need for additional testing and sampling procedures to more accurately evaluate the subsurface conditions. Any evaluations of the contents of CME's report and the recovered samples must be performed by Licensed Professionals having experience in Soil Mechanics and Foundation Engineering. The information presented in this Key defines some of the procedures and terms used on the CME Exploration Logs to describe the conditions encountered. Refer to the Log on page 4 for key number.

Key No. **Description**

1. The figures in the **DEPTH SCALE** column define the vertical scale of the Boring Log.

2. **CASING BLOWS/FOOT** – shows the number of blows required to advance the casing a distance of 12 inches. The casing size, the hammer weight and the length of drop are noted under the **Methods of Investigation**. If the casing is advanced by means other than driving, the method of advancement will be indicated under **Methods of Investigation** at the top of the Log. If Hollow Stem Augers or Coring is used, it will be so noted in this column.

3. The **SAMPLE I.D.** is used for identification on the sample containers and in the Laboratory Test Report or Summary.

4. The **DEPTH OF SAMPLE** column gives the exact depth range from which a sample was recovered.

5. The **SAMPLE TYPE/RECOVERY** column is used to signify the various type of sample attempt. "SS is Split Spoon, "P" is Piston tube, "U" is Undisturbed tube. For soil samples, the recovered length of the sample is also indicated, in inches. If a rock core sample is taken, the core bit size designation is given here.

6. **BLOWS ON SAMPLER** – shows the results of the "Standard Penetration Test (SPT) ASTM D1586", recording the number of blows required to drive a split spoon sampler into the soil beneath the casing. The number of blows required for each six inches of penetration is recorded. The total number of blows required for the 6 inch to 18 inch interval is summarized in the **SPT "N"** column and represents the "Standard Penetration Number". The outside diameter of the sampler, the hammer weight and the length of drop are noted in the **Methods of Investigation** portion of the log. A "WH" or "WR" in this column indicates that the sample spoon advanced the 6 inch interval under **W**eight of **H**ammer or **W**eight of **R**ods, respectively.

7. The **DEPTH OF CHANGE** column designates the depth (in feet) that the driller noted a compactness or stratum change. In soft materials or soil strata exhibiting a consistent relative density, it is difficult for the driller to determine the exact change from one stratum to the next. In addition, a grading or gradual change may exist. In such cases the depth noted is approximate or estimated only and may be represented by a dashed line.

8. **CLASSIFICATION OF MATERIAL** – **Soil materials** encountered and sampled are described by the driller on the original log. Notes of the driller observations are also placed in this column. Recovered samples may also be visually classified by a Soil Technician upon receipt in the Laboratory. Visual sample classification is by Burmister System and strata may be classified additionally by the Unified System. The Burmister System is a type of visual-manual textural classification estimated by the Driller or Technician on the basis of weight-fraction of the recovered soil. See Table 1 **"Classification of Materials"**. The description of the relative soil compactness or consistency is based upon the standard penetration number as defined in Table 2. The description of the soil moisture condition is described as dry, moist, wet, or saturated. Water used to advance the boring may have affected the in-situ moisture content of the sample. Special terms are used as required to describe materials in greater detail, such terms are listed in ASTM D653. When sampling gravelly soils with a standard two-inch O.D. Split Spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders, cobbles, and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and sampler blows or through the "action" of the drill rig as reported by the driller.

   The Description of **Rock** is based upon the recovered rock core. Terms frequently used in the description are included in Table 3. The length of core run is defined as length of penetration between retrievals of the core barrel from the bore hole, expressed in inches. The core recovery expressed the length of core recovered from the core barrel per core run, in percent. The size core barrel used is noted in **Column 5**. The more commonly used sizes of core barrels are denoted "AX" and "NX". An "NX" core, being larger in diameter than "AX" core, often produces better recovery, and is frequently utilized where accurate information regarding the geologic conditions and engineering

properties is needed. A better estimate of in-situ rock quality is provided by a modified core recovery ratio known as the **"Rock Quality Designation" (RQD)**. This ratio is determined by considering only pieces of core that are at least 4 inches long and are hard and sound. Breaks obviously caused by drilling are ignored. The diameter of the core should preferably be not less than 2 inches (NX). The percentage ratio between the total length of such core recovered and the length of core drilled on a given run is the RQD. Table 4 gives the rock quality description as related to the **RQD**.

9. The **SPT "N"** or **RQD** is given in this column as applicable to the specific sample taken. In Very Compact coarse grained soils the N-value may be indicated as 50+, and in Hard fine-grained soils the N-value may be indicated as 30+. This typically means that the blow count was achieved prior to driving the sampler the entire 6 inch interval or the sampler refused further penetration. For the "NX" rock cores, the RQD is reported here, expressed in percent.

10. **GROUND WATER OBSERVATIONS** and timing noted by the driller are shown in this section. It is important to realize that the reliability of the water level observations depend upon the soil type (water does not readily stabilize in a hole through fine grained soils), and that drill water used to advance the borings may have influenced the observations. Ground water levels typically fluctuate seasonally so those noted on the log are only representative of that exhibited during the period of time noted on the log. One or more perched or trapped water levels may exist in the ground seasonally. All the available readings should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or ground water observation well installations.

TABLE 1 - VISUAL CLASSIFICATION OF MATERIALS (BURMISTER)	
GROUP	**TEXTURAL CLASSIFICATION SIZES**
BOULDERS	larger than 12" diameter
COBBLES	12" diameter to 3" sieve
GRAVEL	3" - coarse - 1" - medium - 1/2" - fine - #4 sieve
SAND	#4 - coarse - #10 - medium - #40 - fine - #200 sieve
SILT	#200 sieve (0.074mm) to 0.005mm size (see below *)
CLAY	0.005mm size to 0.001 mm size (see below *)

ABBREVIATIONS	**PERCENT OF TOTAL SAMPLE BY WEIGHT**	
f - fine	and	35 to 50%
m - medium	some	20 to 35%
c - coarse	little	10 to 20%
	trace	0 to 10%

***PLASTICITY DESCRIPTIONS**			
TERM	**PLASTICITY INDEX**	**DRY STRENGTH**	**FIELD TEST**
Non-plastic	0-3	Very low	falls apart easily
Slightly plastic	4 - 15	Slight	easily crushed by fingers
Plastic	15 - 30	Medium	difficult to crush
Highly plastic	31 or more	High	impossible to crush with fingers

*TABLE 2 - DESCRIPTION OF SOIL COMPACTNESS OR CONSISTENCY based on SPT "N"**		
Primary Soil Type	**Descriptive Term of Compactness**	**Range of Standard Penetration Resistance (N)**
COARSE GRAINED SOILS	Very loose	less than 4 blows per foot
(More than half of Material is larger than No. 200 sieve size.)	Loose	4 to 10
	Medium compact	10 to 30
	Compact	30 to 50
	Very compact	Greater than 50
FINE GRAINED SOILS	Descriptive Term of Consistency	Range of Standard Penetration Resistance (N)
(more than half of material is smaller that No. 200 sieve size)	Very soft	less than 2 blows per foot
	Soft	2 to 4
	Medium stiff	4 tp 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	Greater than 30
*The number of blows of 140 pound weight falling 30 inches to drive 2 inch O.D., 1-3/8 inch I.D. sampler 12 inches is defined as the Standard Penetration Resistance designated "N".		

TABLE 3 - ROCK CLASSIFICATION TERMS		
Rock Classification Terms		**Field Test or Meaning of Term**
Hardness	Soft	Scratched by fingernail
	Medium Hard	Scratched easily by penknife
	Hard	Scratched with difficulty by penknife
	Very Hard	Cannot be scratched by penknife
Weathering	Very Weathered Weathered Sound	Judged from the relative amounts of disintegration, iron staining, core recovery, clay seams, etc.
Bedding (Natural Breaks in Rock Layers)	Laminated Thinly bedded Bedded Thickly bedded Massive	less than 1 inch 1 inch to 4 inches 4 inches to 12 inches 12 inches to 36 inches greater than 36 inches

TABLE 4 **Relation OF Rock Quality Designation (RQD) and in-situ Rock Quality**	
RQD %	**Rock Quality Term Used**
90 to 100	Excellent
75 to 90	Good
50 to 75	Fair
25 to 50	Poor
0 to 25	Very Poor

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: **Report No.:**
Client: **Date Started:** **Finished:**
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:**

METHODS OF INVESTIGATION			
Casing: 3-1/4" ID H. Stem Auger	**Driller:**		
Casing Hammer:	**Driller:**		
Other:	**Inspector:**		
Soil Sampler: 2" OD Split Barrel	**Rod Size:** AWJ		
Sampler Hammer: Wt. 140 lbs.	**Fall:** 30 in.		
Make & Model of Drill Rig:			

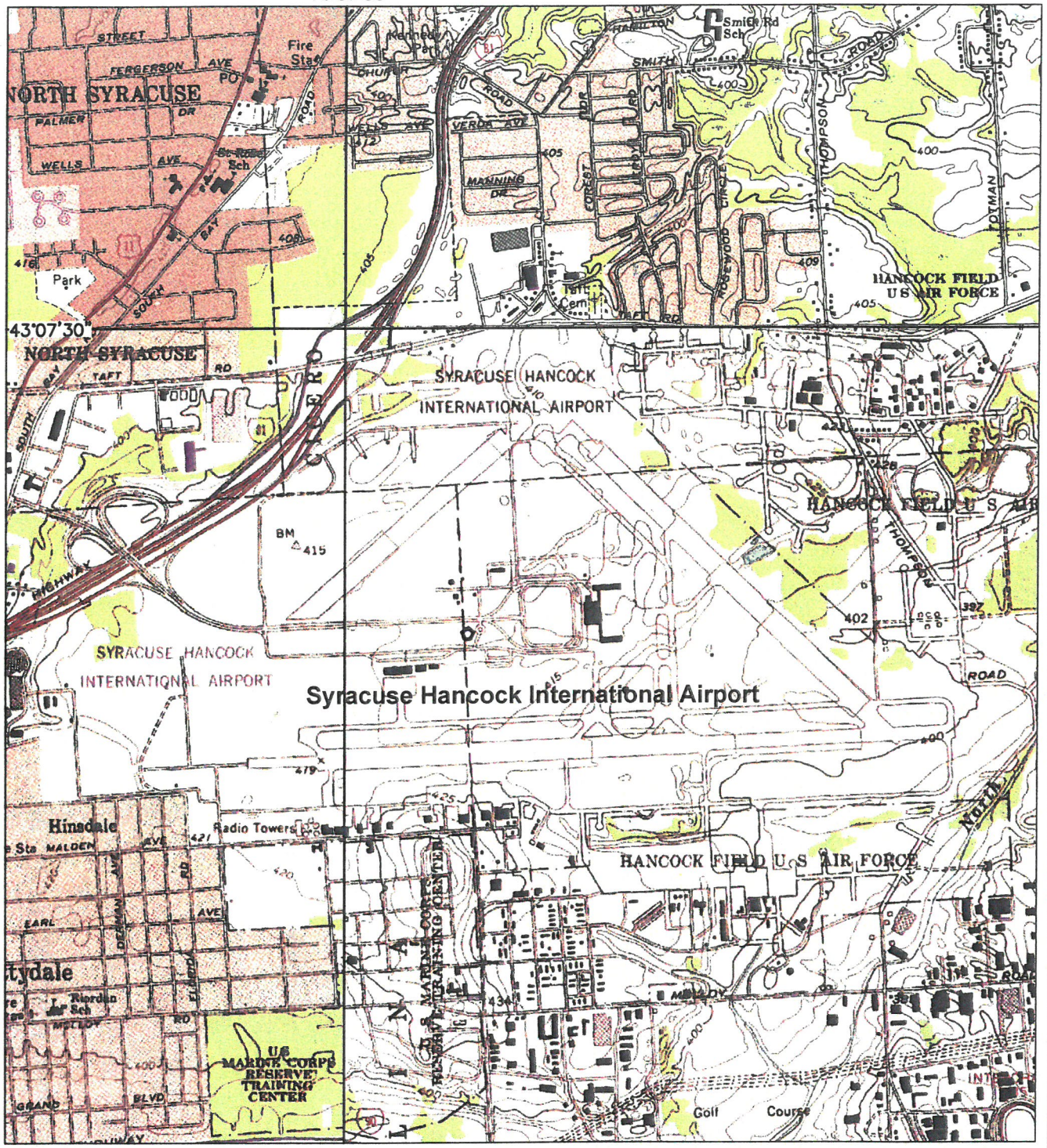
GROUND WATER OBSERVATIONS			
Date	Time	Depth	Casing At
	While drilling		
	Before casing removed		
	After casing removed		
	After casing removed		

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
1	**2**	**3**	**4**	**4**	**5**	**6**	**7**	**8**	**9**
5									
10									
15									
20									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

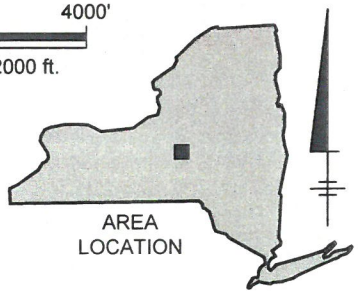
ATTACHMENT 3



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD.,SYRACUSE E., 1957. SYRACUSE W., CICERO, BREWERTON NEW YORK, 1973, PHOTOREVISED 1978.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



CITY OF SYRACUSE, NEW YORK
SYRACUSE HANCOCK INTERNATIONAL AIRPORT
REHABILITATION OF DEICING STORAGE FACILITIES

7460-1 SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

CITY: SYRACUSE, NY DIV/GROUP:ENV/CAD DB: LJP K.SARTORI LD:K.SARTORI PIC:D.GEISSER PM:J.PERRIELLO TM:B.TILLITSON, J.DAVENPORT LYR:ON=*;OFF=*REF*
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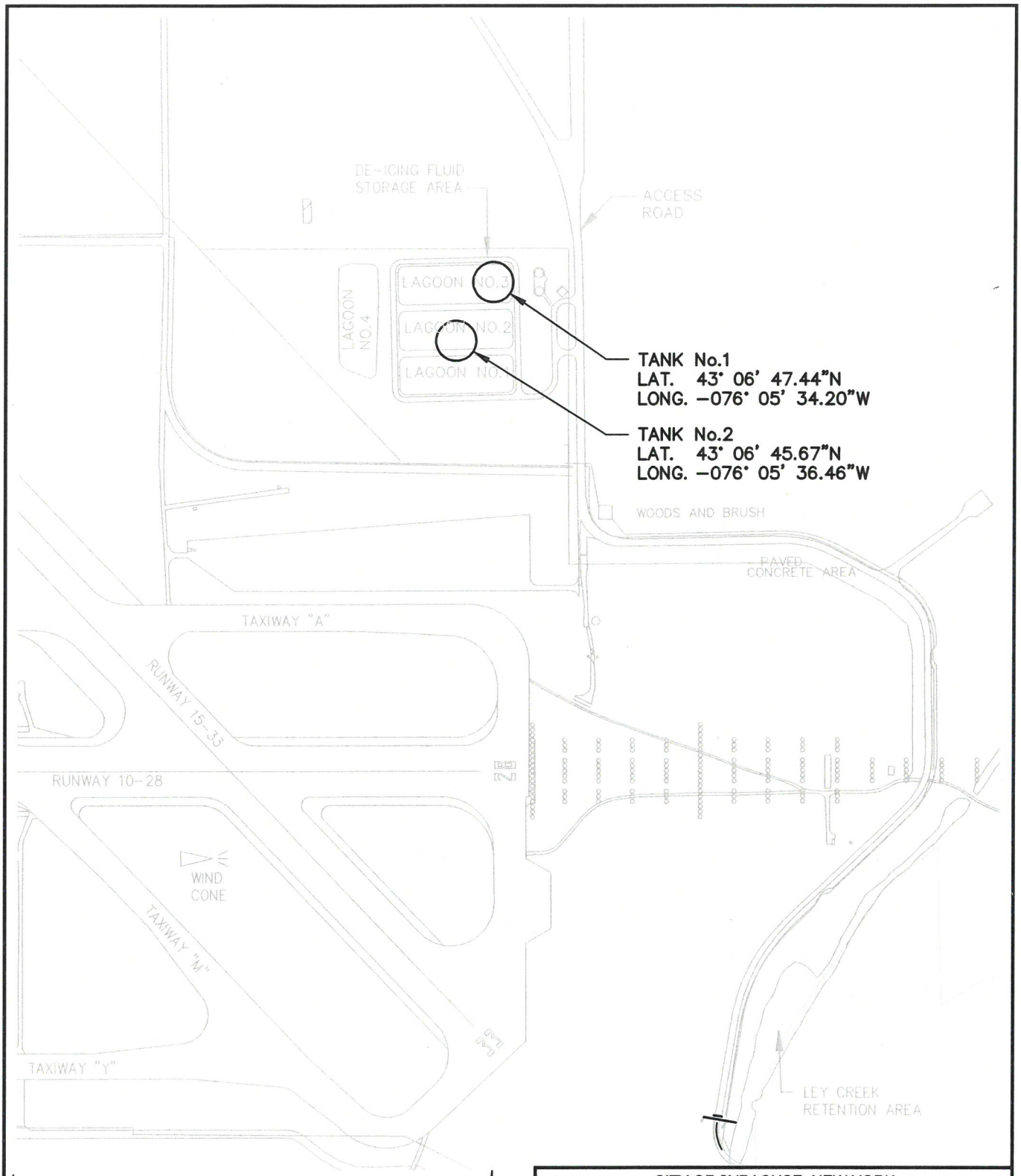
XREFS: 01733XPA
IMAGES: 01733X07.tiff 01733X08.tiff 01733X09.tiff 01733X10.tiff
PROJECTNAME: —



CITY OF SYRACUSE, NEW YORK
SYRACUSE HANCOCK INTERNATIONAL AIRPORT
REHABILITATION OF DEICING STORAGE FACILITIES

7460-1 PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2

CITY: SYRACUSE, NY DIV/GROUP: ENV/CAD DB: LJP K.SARTORI LD:K.SARTORI PIC:D.GEISSER PM:J.PERRIELLO TM:B.TILLITSON, J.DAVENPORT LYR:ON=*;OFF=*REF*
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XREFS: IMAGES:
01733XPA
01733X01
01738GSP
PROJECTNAME: —

Federal Aviation Administration

April 12, 2018

TO:
Syracuse Hancock International
Airport
Attn: Christina Callahan, Executive
Director
1000 Col. Eileen Collins Blvd.
Syracuse, NY 13212
callahanc@syrairport.org

CC:
ARCADIS
Attn: Benjamin Tillotson
6723 Towpath Road
Syracuse, NY 13214
benjamin.tillotson@arcadis-us.com

RE: *(See attached Table 1 for referenced case(s))*
FINAL DETERMINATION

Table 1 - Letter Referenced Case(s)

ASN	Prior ASN	Location	Latitude (NAD83)	Longitude (NAD83)	AGL (Feet)	AMSL (Feet)
2018-AEA-561-NRA	2017-AEA-2612-NRA	SYRACUSE,NY	43-06-47.44N	76-05-34.20W	50	451

Description: Revised Tank No. 1 location as compared to previous case. Two permanent deicing storage tanks, each tank will be 50-feet tall.

We do not object with conditions to the construction described in this proposal provided:

You comply with the requirements set forth in FAA Advisory Circular 150/5370-2, "Operational Safety on Airports During Construction."

For current Advisory Circulars go to www.oeaaa.faa.gov

A separate notice to the FAA is required for any construction equipment, such as temporary cranes, whose working limits would exceed the height and lateral dimensions of your proposal.

This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

This determination expires on October 12, 2019 unless:
(a) extended, revised or terminated by the issuing office.

(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for the completion of construction, or the date the FCC denies the application.

NOTE: Request for extension of the effective period of this determination must be obtained at least 15 days prior to expiration date specified in this letter.

If you have any questions concerning this determination contact Robert Levine (718) 995-5761 robert.levine@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2018-AEA-561-NRA.

Robert Levine
ADO
Signature Control No: 360550860-362428160
cc:
ARCADIS

Federal Aviation Administration

April 12, 2018

TO:
Syracuse Hancock International
Airport
Attn: Christina Callahan, Executive
Director
1000 Col. Eileen Collins Blvd.
Syracuse, NY 13212
callahanc@syrairport.org

CC:
ARCADIS
Attn: Benjamin Tillotson
6723 Towpath Road
Syracuse, NY 13214
benjamin.tillotson@arcadis-us.com

RE: *(See attached Table 1 for referenced case(s))*
FINAL DETERMINATION

Table 1 - Letter Referenced Case(s)

ASN	Prior ASN	Location	Latitude (NAD83)	Longitude (NAD83)	AGL (Feet)	AMSL (Feet)
2018-AEA-562-NRA	2017-AEA-2612-NRA	SYRACUSE,NY	43-06-45.67N	76-05-36.46W	50	451

Description: Revised Tank No. 1 location as compared to previous case. Two permanent deicing storage tanks, each tank will be 50-feet tall.

We do not object with conditions to the construction described in this proposal provided:

You comply with the requirements set forth in FAA Advisory Circular 150/5370-2, "Operational Safety on Airports During Construction."

For current Advisory Circulars go to www.oeaaa.faa.gov

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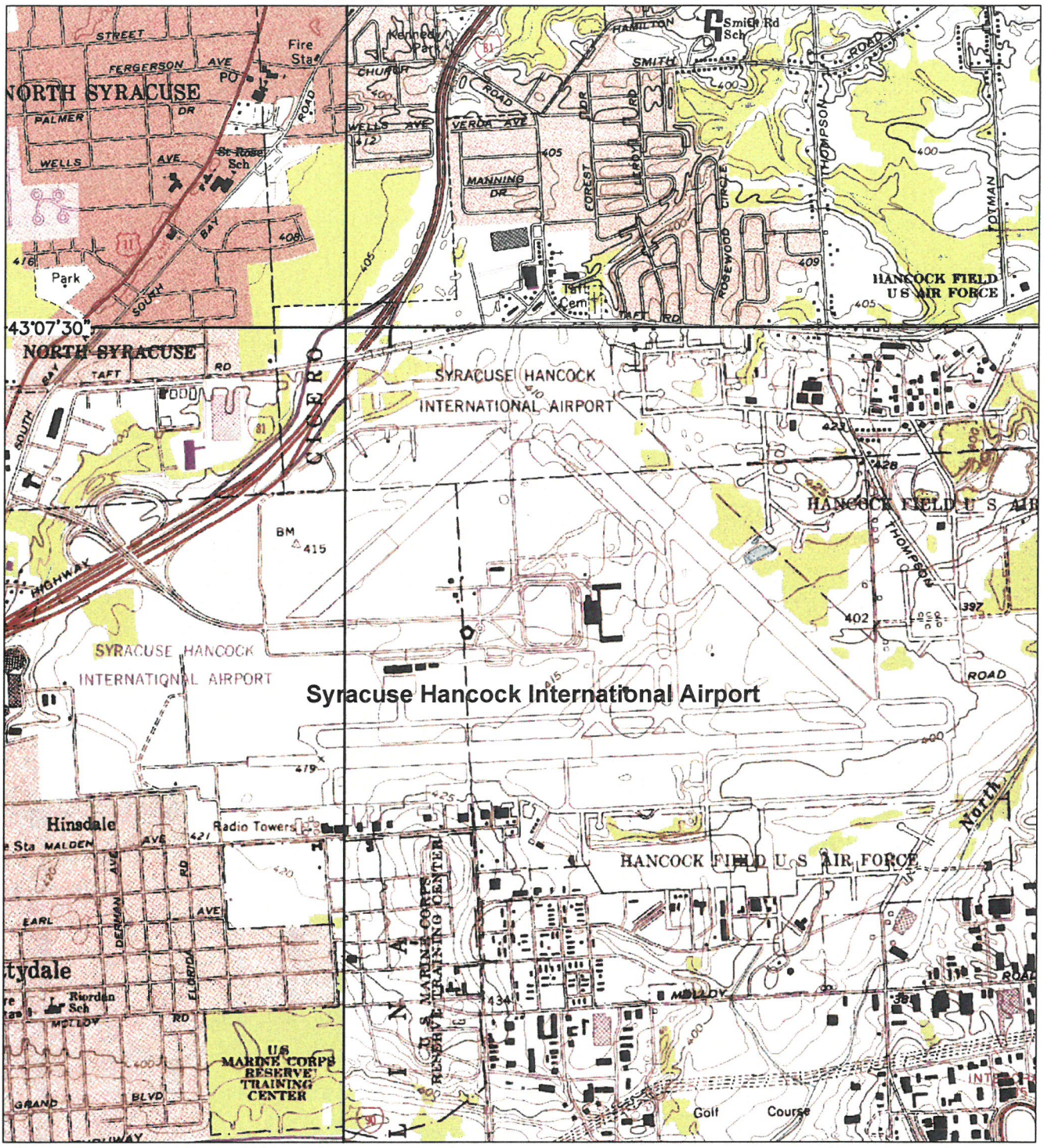
If you have any questions concerning this determination contact Robert Levine (718) 995-5761 robert.levine@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2018-AEA-562-NRA.

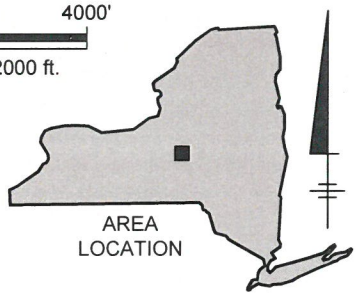
Robert Levine
ADO
Signature Control No: 360550861-362426927
cc:
ARCADIS



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD.,SYRACUSE E., 1957. SYRACUSE W., CICERO, BREWERTON NEW YORK, 1973, PHOTOREVISED 1978.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



CITY OF SYRACUSE, NEW YORK
SYRACUSE HANCOCK INTERNATIONAL AIRPORT

REHABILITATION OF DEICING STORAGE FACILITIES

7460-1 SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

CITY: SYRACUSE_NY DIV/GROUP:ENV/CAD DB: LJP K.SARTORI LD:K.SARTORI PIC:D.GEISSER PM:J.PERRIELLO TM:B.TILLITSON, J.DAVENPORT LYR:ON=*;OFF=*REF*
C:\Users\gsteinberger\OneDrive - ARCADIS\ENVCAD\SYRACUSE\ACTIB0001738\0004\00003\DWG\7460-101733B01.dwg LAYOUT:1 SAVED: 4/1/2014 3:03 PM ACADVER: 20.1S (LMS TECH) PAGESETUP: — PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 11/28/2017 12:41 PM BY: STEINBERGER, GEORGE
XREFS: 01733XPA
IMAGES: 01733X07.tiff 01733X08.tif 01733X09.tif 01733X10.tiff
PROJECTNAME: —

CITY: SYRACUSE, NY DIV/GROUP:ENV/CAD DB: LJP K.SARTORI LD:K.SARTORI PIC:D.GEISSER PM:J.PERRIELLO TM:B.TILLITSON, J.DAVENPORT LYR:ON=*;OFF=*REF*
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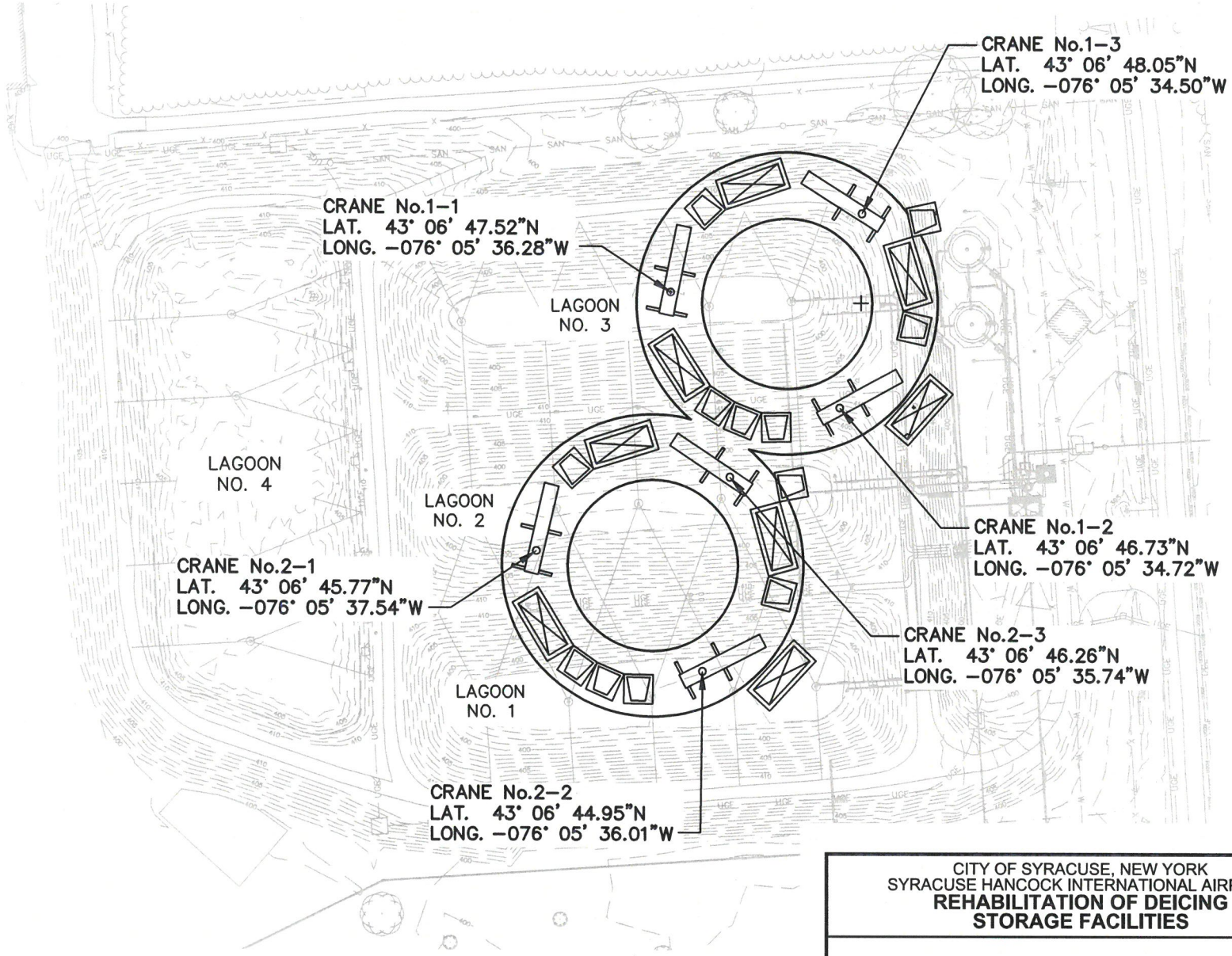

CITY OF SYRACUSE, NEW YORK
SYRACUSE HANCOCK INTERNATIONAL AIRPORT
REHABILITATION OF DEICING STORAGE FACILITIES

7460-1 PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2

Federal Aviation Administration

April 16, 2018

TO:
Syracuse Hancock International
Airport
Attn: Christina Callahan, Executive
Director
1000 Col. Eileen Collins Blvd.
Syracuse, NY 13212
callahanc@syrairport.org

CC:
ARCADIS
Attn: Benjamin Tillotson
6723 Towpath Road
Syracuse, NY 13214
benjamin.tillotson@arcadis-us.com

RE: *(See attached Table 1 for referenced case(s))*
FINAL DETERMINATION

Table 1 - Letter Referenced Case(s)

ASN	Prior ASN	Location	Latitude (NAD83)	Longitude (NAD83)	AGL (Feet)	AMSL (Feet)
2018-AEA-555-NRA	2017-AEA-2611-NRA	SYRACUSE,NY	43-06-47.52N	76-05-36.28W	140	541

Description: New Crane locations as compared to previous case.

We do not object with conditions to the construction described in this proposal provided:

You comply with the requirements set forth in FAA Advisory Circular 150/5370-2, "Operational Safety on Airports During Construction."

Air Traffic Obstruction Evaluation Group: Mark and light in accordance with FAA AC70/7460-1L, chapters 3, 4, 5 and 12. Flags and red lights.

Flight Procedures: FPT reviewed this case at Syracuse Hancock Intl Airport and the temporary Crane has the following effects: The Temp. Crane penetrates. RNAV(GPS)Z RWY 28 LNAV mins raising the MDA from 820ft to 860ft NEH 538ft W/4D NO IFR W/1A - - - - - - - IF FDC NOTAMS ARE REQUIRED. All requests for FDC NOTAM action must be made utilizing the users OE/AAA account. The Sponsor (or Sponsor's representative) is to log into their OE/AAA account and go to "Search Archives". The aeronautical study number (ASN) associated with the proposed obstruction is to be entered (see FAA determination letter for ASN). If the Sponsor (or Sponsor's representative) is having difficulty using the tool, please contact the OE/ AAA support desk at 202-580-7500 or refer to the online instructions. Request must be initiated a minimum of 5 business days prior to conducting operations/construction to allow for processing and issuance of NOTAMS. The Sponsor (or Sponsor's representative) is responsible to verify NOTAMS are active prior to beginning operations.

Flight Standards: Ensure information dissemination to all tenants/operators using all appropriate means, including, without limitation, NOTAM(S) and ATIS.

For current Advisory Circulars go to www.oeaaa.faa.gov

Further, you should contact the Airport Traffic Control Tower (ATCT) Watch Supervisor at prior to the crane(s) being raised for purposes of establishing a procedure to have the crane(s) immediately lowered upon request of the ATCT. When the crane(s) is no longer needed and has been permanently lowered, you should contact the ATCT and Airport District Office (ADO) at the telephone numbers given above to provide notification that the NOTAM can be cancelled. The ADO will need the aeronautical study given on the subject line of this letter in order to cancel the NOTAM.

A separate notice to the FAA is required for any construction equipment, such as temporary cranes, whose working limits would exceed the height and lateral dimensions of your proposal.

This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

This determination expires on October 16, 2019 unless:
(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for the completion of construction, or the date the FCC denies the application.

NOTE: Request for extension of the effective period of this determination must be obtained at least 15 days prior to expiration date specified in this letter.

If you have any questions concerning this determination contact Robert Levine (718) 995-5761 robert.levine@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2018-AEA-555-NRA.

Robert Levine
ADO
Signature Control No: 360549731-362746009
cc:
ARCADIS

Federal Aviation Administration

April 16, 2018

TO:
Syracuse Hancock International
Airport
Attn: Christina Callahan, Executive
Director
1000 Col. Eileen Collins Blvd.
Syracuse, NY 13212
callahanc@syrairport.org

CC:
ARCADIS
Attn: Benjamin Tillotson
6723 Towpath Road
Syracuse, NY 13214
benjamin.tillotson@arcadis-us.com

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2018-AEA-556-NRA	2017-AEA-2611-NRA	SYRACUSE,NY	43-06-46.73N	76-05-34.72W	140	541

Description: New Crane locations as compared to previous case.

We do not object with conditions to the construction described in this proposal provided:

You comply with the requirements set forth in FAA Advisory Circular 150/5370-2, "Operational Safety on Airports During Construction."

Air Traffic Obstruction Evaluation Group: Mark and light in accordance with FAA AC70/7460-1L, chapters 3, 4, 5 and 12. Flags and red lights.

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Flight Standards: Ensure information dissemination to all tenants/operators using all appropriate means, including, without limitation, NOTAM(S) and ATIS.

You comply with Chapters 3, 4, 5, 12 of Advisory Circular 70/7460-1L, Obstruction Marking and Lighting.

For current Advisory Circulars go to www.oeaaa.faa.gov

Further, you should contact the Airport Traffic Control Tower (ATCT) Watch Supervisor at prior to the crane(s) being raised for purposes of establishing a procedure to have the crane(s) immediately lowered upon request of the ATCT. When the crane(s) is no longer needed and has been permanently lowered, you should contact the ATCT and Airport District Office (ADO) at the telephone numbers given above to provide notification that the NOTAM can be cancelled. The ADO will need the aeronautical study given on the subject line of this letter in order to cancel the NOTAM.

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If you have any questions concerning this determination contact Robert Levine (718) 995-5761 robert.levine@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2018-AEA-556-NRA.

Robert Levine
ADO
Signature Control No: 360549732-362735096
cc:
ARCADIS

Federal Aviation Administration

April 16, 2018

TO:
Syracuse Hancock International
Airport
Attn: Christina Callahan, Executive
Director
1000 Col. Eileen Collins Blvd.
Syracuse, NY 13212
callahanc@syrairport.org

CC:
ARCADIS
Attn: Benjamin Tillotson
6723 Towpath Road
Syracuse, NY 13214
benjamin.tillotson@arcadis-us.com

RE: *(See attached Table 1 for referenced case(s))*
FINAL DETERMINATION

Table 1 - Letter Referenced Case(s)

ASN	Prior ASN	Location	Latitude (NAD83)	Longitude (NAD83)	AGL (Feet)	AMSL (Feet)
2018-AEA-557-NRA	2017-AEA-2611-NRA	SYRACUSE,NY	43-06-48.05N	76-05-34.50W	140	541

Description: New Crane locations as compared to previous case.

We do not object with conditions to the construction described in this proposal provided:

You comply with the requirements set forth in FAA Advisory Circular 150/5370-2, "Operational Safety on Airports During Construction."

Air Traffic Obstruction Evaluation Group: Mark and light in accordance with FAA AC70/7460-1L, chapters 3, 4, 5 and 12. Flags and red lights.

Flight Procedures: FPT reviewed this case at Syracuse Hancock Intl Airport and the temporary Crane has the following effects: The Temp. Crane penetrates. RNAV(GPS)Z RWY 28 LNAV mins raising the MDA from 820ft to 860ft NEH 538ft W/4D NO IFR W/1A - - - - - - - IF FDC NOTAMS ARE REQUIRED. All requests for FDC NOTAM action must be made utilizing the users OE/AAA account. The Sponsor (or Sponsor's representative) is to log into their OE/AAA account and go to "Search Archives". The aeronautical study number (ASN) associated with the proposed obstruction is to be entered (see FAA determination letter for ASN). If the Sponsor (or Sponsor's representative) is having difficulty using the tool, please contact the OE/ AAA support desk at 202-580-7500 or refer to the online instructions. Request must be initiated a minimum of 5 business days prior to conducting operations/construction to allow for processing and issuance of NOTAMS. The Sponsor (or Sponsor's representative) is responsible to verify NOTAMS are active prior to beginning operations.

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Robert Levine
ADO
Signature Control No: 360549733-362748212
cc:
ARCADIS

Federal Aviation Administration

April 17, 2018

TO:
Syracuse Hancock International
Airport
Attn: Christina Callahan, Executive
Director
1000 Col. Eileen Collins Blvd.
Syracuse, NY 13212
callahanc@syrairport.org

CC:
ARCADIS
Attn: Benjamin Tillotson
6723 Towpath Road
Syracuse, NY 13214
benjamin.tillotson@arcadis-us.com

RE: *(See attached Table 1 for referenced case(s))*
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Description: New Crane locations as compared to previous case.

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You comply with the requirements set forth in FAA Advisory Circular 150/5370-2, "Operational Safety on Airports During Construction."

Air Traffic Obstruction Evaluation Group: Mark and light in accordance with FAA AC70/7460-1L, chapters 3, 4, 5 and 12. Flags and red lights.

Flight Procedures: FPT reviewed this case at Syracuse Hancock Intl Airport and the temporary Crane has the following effects: The Temp. Crane penetrates. ILSorLOC RWY28 missed approach section 1c raising the DA from HATh from 200ft to 263ft, NEH 528ft W/4D, HATh to 213ft W1A, ILS RWY 28 SA CAT I & CAT II N/A, it also penetrates the RNAV(GPS)Z RWY 28 LNAV mins raising the MDA from 820ft to 860ft NEH 538ft W/4D NO IFR W/1A - - - - - - - IF FDC NOTAMS ARE REQUIRED. All requests for FDC NOTAM action must be made utilizing the users OE/AAA account. The Sponsor (or Sponsor's representative) is to log into their OE/AAA account and go to "Search Archives". The aeronautical study number (ASN) associated with the proposed obstruction is to be entered (see FAA determination letter for ASN). If the Sponsor (or Sponsor's representative) is having difficulty using the tool, please contact the OE/AAA support desk at 202-580-7500 or refer to the online instructions. Request must be initiated a minimum of 5 business days prior to conducting operations/construction to allow for processing and issuance of NOTAMS. The Sponsor (or Sponsor's representative) is responsible to verify NOTAMS are active prior to beginning operations.

Flight Standards:Ensure information dissemination to all tenants/operators using all appropriate means, including, without limitation, NOTAM(S) and ATIS.

You comply with Chapters 3, 4, 5, 12 of Advisory Circular 70/7460-1L, Obstruction Marking and Lighting.

For current Advisory Circulars go to www.oeaaa.faa.gov

Further, you should contact the Airport Traffic Control Tower (ATCT) Watch Supervisor at prior to the crane(s) being raised for purposes of establishing a procedure to have the crane(s) immediately lowered upon request of the ATCT. When the crane(s) is no longer needed and has been permanently lowered, you should contact the ATCT and Airport District Office (ADO) at the telephone numbers given above to provide notification that the NOTAM can be cancelled. The ADO will need the aeronautical study given on the subject line of this letter in order to cancel the NOTAM.

A separate notice to the FAA is required for any construction equipment, such as temporary cranes, whose working limits would exceed the height and lateral dimensions of your proposal.

This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

This determination expires on October 17, 2019 unless:
(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for the completion of construction, or the date the FCC denies the application.

NOTE: Request for extension of the effective period of this determination must be obtained at least 15 days prior to expiration date specified in this letter.

If you have any questions concerning this determination contact Robert Levine (718) 995-5761 robert.levine@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2018-AEA-558-NRA.

Robert Levine
ADO
Signature Control No: 360549734-362815422
cc:
ARCADIS

Federal Aviation Administration

May 01, 2018

TO:
Syracuse Hancock International
Airport
Attn: Christina Callahan, Executive
Director
1000 Col. Eileen Collins Blvd.
Syracuse, NY 13212
callahanc@syrairport.org

CC:
ARCADIS
Attn: Benjamin Tillotson
6723 Towpath Road
Syracuse, NY 13214
benjamin.tillotson@arcadis-us.com

RE: *(See attached Table 1 for referenced case(s))*
FINAL DETERMINATION

Table 1 - Letter Referenced Case(s)

ASN	Prior ASN	Location	Latitude (NAD83)	Longitude (NAD83)	AGL (Feet)	AMSL (Feet)
2018-AEA-559-NRA	2017-AEA-2611-NRA	SYRACUSE,NY	43-06-44.95N	76-05-36.01W	140	541

Description: New Crane locations as compared to previous case.

We do not object with conditions to the construction described in this proposal provided:

You comply with the requirements set forth in FAA Advisory Circular 150/5370-2, "Operational Safety on Airports During Construction."

Air Traffic Obstruction Evaluation Group: Mark and light in accordance with FAA AC70/7460-1L, chapters 3, 4, 5 and 12. Flags and red lights.

Flight Procedures: FPT reviewed this case at Syracuse Hancock Intl Airport and the temporary Crane has the following effects: The Temp. Crane penetrates. ILSorLOC RWY28 missed approach section 1c raising the DA from HATh from 200ft to 263ft ILS RWY 28 SA CAT I & CAT II N/A NEH 528ft W/4D or 1A, it also penetrates the RNAV(GPS)Z RWY 28 LNAV mins raising the MDA from 820ft to 860ft NEH 538ft W/4D NO IFR W/1A - - - - - - - IF FDC NOTAMS ARE REQUIRED. All requests for FDC NOTAM action must be made utilizing the users OE/AAA account. The Sponsor (or Sponsor's representative) is to log into their OE/ AAA account and go to "Search Archives". The aeronautical study number (ASN) associated with the proposed obstruction is to be entered (see FAA determination letter for ASN). If the Sponsor (or Sponsor's representative) is having difficulty using the tool, please contact the OE/AAA support desk at 202-580-7500 or refer to the online instructions. Request must be initiated a minimum of 5 business days prior to conducting operations/ construction to allow for processing and issuance of NOTAMS. The Sponsor (or Sponsor's representative) is responsible to verify NOTAMS are active prior to beginning operations.

Flight Standards: Coordinate with Syracuse ATCT when crane height exceeds NEH of 528 FT thereby lessoning the impact the crane will have on airport operations.

You comply with Chapters 3, 4, 5, 12 of Advisory Circular 70/7460-1L, Obstruction Marking and Lighting.

For current Advisory Circulars go to www.oeaaa.faa.gov

Further, you should contact the Airport Traffic Control Tower (ATCT) Watch Supervisor at prior to the crane(s) being raised for purposes of establishing a procedure to have the crane(s) immediately lowered upon request of the ATCT. When the crane(s) is no longer needed and has been permanently lowered, you should contact the ATCT and Airport District Office (ADO) at the telephone numbers given above to provide notification that the NOTAM can be cancelled. The ADO will need the aeronautical study given on the subject line of this letter in order to cancel the NOTAM.

A separate notice to the FAA is required for any construction equipment, such as temporary cranes, whose working limits would exceed the height and lateral dimensions of your proposal.

This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

This determination expires on November 1, 2019 unless:
(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for the completion of construction, or the date the FCC denies the application.

NOTE: Request for extension of the effective period of this determination must be obtained at least 15 days prior to expiration date specified in this letter.

If you have any questions concerning this determination contact Robert Levine (718) 995-5761 robert.levine@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2018-AEA-559-NRA.

Robert Levine
ADO
Signature Control No: 360549735-363903622
cc:
ARCADIS

Federal Aviation Administration

April 17, 2018

TO:
Syracuse Hancock International
Airport
Attn: Christina Callahan, Executive
Director
1000 Col. Eileen Collins Blvd.
Syracuse, NY 13212
callahanc@syrairport.org

CC:
ARCADIS
Attn: Benjamin Tillotson
6723 Towpath Road
Syracuse, NY 13214
benjamin.tillotson@arcadis-us.com

RE: *(See attached Table 1 for referenced case(s))*
FINAL DETERMINATION

Table 1 - Letter Referenced Case(s)

ASN	Prior ASN	Location	Latitude (NAD83)	Longitude (NAD83)	AGL (Feet)	AMSL (Feet)
2018-AEA-560-NRA	2017-AEA-2611-NRA	SYRACUSE,NY	43-06-46.26N	76-05-35.74W	140	541

Description: New Crane locations as compared to previous case.

We do not object with conditions to the construction described in this proposal provided:

You comply with the requirements set forth in FAA Advisory Circular 150/5370-2, "Operational Safety on Airports During Construction."

Air Traffic Obstruction Evaluation Group: Mark and light in accordance with FAA AC70/7460-1L, chapters 3, 4, 5 and 12. Flags and red lights.
FPT reviewed this case at Syracuse Hancock Intl Airport and the temporary Crane has the following effects: The Temp. Crane penetrates. RNAV(GPS)Z RWY 28 LNAV mins raising the MDA from 820ft to 860ft NEH 538ft W/4D NO IFR W/1A - - - - - - - IF FDC NOTAMS ARE REQUIRED. All requests for FDC NOTAM action must be made utilizing the users OE/AAA account. The Sponsor (or Sponsor's representative) is to log into their OE/AAA account and go to "Search Archives". The aeronautical study number (ASN) associated with the proposed obstruction is to be entered (see FAA determination letter for ASN). If the Sponsor (or Sponsor's representative) is having difficulty using the tool, please contact the OE/AAA support desk at 202-580-7500 or refer to the online instructions. Request must be initiated a minimum of 5 business days prior to conducting operations/construction to allow for processing and issuance of NOTAMS. The Sponsor (or Sponsor's representative) is responsible to verify NOTAMS are active prior to beginning operations.
Flight Procedures:

You comply with Chapters 3, 4, 5, 12 of Advisory Circular 70/7460-1L, Obstruction Marking and Lighting.

For current Advisory Circulars go to www.oeaaa.faa.gov

Further, you should contact the Airport Traffic Control Tower (ATCT) Watch Supervisor at prior to the crane(s) being raised for purposes of establishing a procedure to have the crane(s) immediately lowered upon request of the ATCT. When the crane(s) is no longer needed and has been permanently lowered, you should contact the ATCT and Airport District Office (ADO) at the telephone numbers given above to provide notification that the NOTAM can be cancelled. The ADO will need the aeronautical study given on the subject line of this letter in order to cancel the NOTAM.

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This determination expires on October 17, 2019 unless:
(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for the completion of construction, or the date the FCC denies the application.

NOTE: Request for extension of the effective period of this determination must be obtained at least 15 days prior to expiration date specified in this letter.

If you have any questions concerning this determination contact Robert Levine (718) 995-5761 robert.levine@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2018-AEA-560-NRA.

Robert Levine
ADO
Signature Control No: 360549736-362808502
cc:
ARCADIS