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August 21, 2012

VIA COURIER

Mr. David L. Bimber
Regional Permit Administrator
New York State Department of Environmental Conservation
Division of Environmental Permits, Region 7
6274 East Avon-Lima Road
Avon, New York 14414-9519

Re: *Letter of Transmittal*
Brine Pond Design Plans and Reports
Finger Lakes LPG Storage, LLC
DEC Facility ID 8-4432-00085
Liquefied Petroleum Gas Storage Facility
Town of Reading, Schuyler County, New York

Dear Mr. Bimber:

Please accept this submittal as a response to your review comment letter dated July 23, 2012. Your letter contained staff review comments relative to Finger Lakes Design Drawings, Engineering Report and Geotechnical Investigation detailing the project proposed by Finger Lakes LPG Storage, LLC. We have incorporated the Department's comments and suggestions into the revised design. Modified drawings and response text have been included with this submittal and is intended to address all questions and review comments.

If you have any questions, or need clarification regarding any information contained in this submittal, please contact me at 518.786.7613 or by email at r.liuzzo@ctmale.com.

Respectfully,

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, P.C.

Raymond T. Liuzzo, P.L.S.
Survey Group Manager / Project Manager

RECEIVED
AUG 22 2012
DEP-REGION 8

cc: R. Phaneuf, NYSDEC (w/enclosure)
S. Sheeley, NYSDEC (w/enclosure)
S. Foti, NYSDEC (w/ enclosure)
J. Swanson, NYSDEC (w/ enclosure)
M. Domagala, NYSDEC (w/enclosure)
K. Bernstein, BOND, SCHOENECK, & KING (w/ enclosure)
B. Moler, INERGY (w/o enclosure)
B. Cigich, INERGY (w/o enclosure)
B. Moon, INERGY (w/o enclosure)

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 7
615 Erie Boulevard West, Syracuse, New York 13204-2400 Phone: (315) 426-7438 •
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Joe Martens Commissioner

23 July 2012

FINAL RESPONSE in red text below

Kevin Bernstein, Esq.
Bond, Schoeneck & King, PLLC
One Lincoln Center
Syracuse, New York 13202-1355

RECEIVED
AUG 22 2012
DEP-REGION 8

Dear Mr. Bernstein:

Re: DEC Facility No. 8-4432-00085
Brine Pond Plans and Reports Review Comments Finger Lakes, LLC
Underground LPG Storage Facility Town of Reading, Schuyler County

Technical Staff have had an opportunity to review Volume 1, Engineering Report and Volume 2, Geotechnical Evaluation for the Finger Lakes Storage East and West Brine Ponds; and your 15 June 2012 response to R. Phaneuf's email to R. Wakeman dated 8 June 2012. We have the following comments and require additional information to evaluate the information provided in the above-noted documents.

Underdrain and Leak Detection Systems: The original comments are cited below in italics for clarity in terms of what was originally requested:

1. *(9) Design Related: The plans for the proposed ponds could use more detailed depiction of the pond underdrains and their outfall locations, the details of the leak detection piping and metering vaults should also be provided in more detail. Consideration should be given to coating the internal concrete vault walls with an elastic type waterproofing to ensure against leakage. Vault subbase and backfill material and drainage should be included to reduce potential for infiltration. Pump on and off levels should be identified on the drawings.*

   a. There were two areas of concern raised in the above comment, both concerns focused on the level of site specific detail provided for in the proposed design regarding information needed for staffs review of the underdrain outfall locations and the design details of each of the leak detection metering vaults.

      Response: The underdrain outfall location for each pond is clearly labeled on the revised design drawings. Drawing P4 identifies the underdrain outfall location for the East Pond and Drawing P5 identifies the location for the West Pond.

      Design details for the leak detection metering vaults are provided on revised Drawing D3. Key elements added to these details include a staff gauge within the metering vaults, flow meters on the discharge side of each pump and "sight" tubes. The flow meters are shown mounted at locations and elevations which allow for easy reading by operations personnel. Staff gauges mounted on the sides of each vault are also located for easy reading. "Sight" tubes extend through the top of the vaults and have a return into the vaults, the purpose of the "sight" tubes being to provide a means of determining the head of brine within the leak detection pipes and to ascertain that it is below the level which would impose a head of brine on the secondary liner of each pond. Profiles of the leak detection pipes, from the ponds to the metering vaults, are shown on Drawing D5.

b. The June 15th reply failed to show in sufficient detail to allow staff to evaluate the adequacy of the proposed underdrain outfalls for both ponds. The plans should provide sufficient detailing to clearly show how these outfalls are proposed to be located and where they would drain to existing drainage channels on both pond sites. These are critical pond design components which will need to be kept clear of obstructions and protected from any impacts from area flooding, future site work or grading and as such they should be prominently designed and detailed so they can be adequately protected, monitored and maintained.

Response:

Profiles of the underdrain outfall piping for each pond are shown on Drawing D6. A headwall will be constructed at the end of each outfall for their protection and to facilitate their observation and monitoring. Each headwall will be a cast-in-place concrete structure with marker poles cast into the concrete and projecting five (5) feet above grade to clearly identify their location. A detail of the headwall is provided on Drawing D6.

The locations of the underdrain outfalls are clearly identified on revised Drawings P4 and P5 and Drawings ESC1, ESC2, ESC3 and ESC4. They are shown to direct the outfall to temporary sediment traps. The temporary sediment traps will be infilled once liner installation has been completed and erosion control blankets have been installed on the exterior slopes of the ponds and a vegetative growth established. These outfalls will then have their flow directed to drainage swales that outfall to existing drainage channels which convey flow downgradient to Seneca Lake. The drainage swale to be constructed at the West Pond has been located in close proximity to a reinforced grass surfaced service drive which skirts the toe of the pond's exterior slope, thereby providing ready access to maintain the drainage swale. Maintenance of the drainage swale skirting the East Pond may be accomplished using track-mounted equipment.

Profiles of the underdrain piping illustrate that their inlet elevations at each pond are several feet above the top of the sediment traps or drainage swale into which they outfall. Accordingly, positive drainage of groundwater collected by the underdrain piping will be maintained during times of area flooding.

Following construction of the brine ponds, monitoring of flow from the underdrain piping by operations personnel will include determination of the rate of flow and analysis of samples of the water collected by the underdrains. As the rate of flow is expected to be on the order of 1 gpm (see calculation in Appendix E of the Engineer's Report), the flow rates will be determined using a calibrated container and stop watch. The outfall pipe is noted to project a couple of inches from the face of the headwall to allow for this method of flow rate determination and to collect water quality samples for analysis.

c. The June 15th reply failed to show sufficient detail of the separate metering vaults for each of the ponds. Understanding the need for daily access of the metering vaults to manually monitor/measure flows from the double-liner system's leak detection system, this component needed to provide more site specific detail for full assessment of the system's overall operation. Construction detailed drawings need to clearly detail how the system will be monitored. Details were not immediately clear from the drawings as to how the upper liner leakage would be conveyed back to the pond. Sufficient detail for the pipe-in-pipe monitoring should be shown. The cross section indicates that an external drainage pipe on one side of the vault, but fails to provide sufficient detail for where this drainage system will outfall to.

Response: As indicated in the response to Comment 1a above, changes have been made in the revised drawings to eliminate the need to manually monitor the leakage rate using a stop watch and calibrated container approach. The changes involve the installation of flow meters on the discharge side of the metering vault pumps and the mounting of staff gauges on the inside of the vaults. These changes/additions are detailed on Drawing D3. Attachment A contains the manufacturer's literature on the flow meter identified for use on these plans.

Clamp-on flow transducers will be mounted on the discharge lines and the pump and flow meter control panels will be mounted on supports on top of the metering vaults so that they can be visually read standing on the top of the vaults. Along with recording the volume pumped and run time of the pumps, the level within the vaults will be recorded against staff gauges mounted on the interior side wall of the vaults. Accordingly in the event flows into the vaults are quite low and the pumps are not activated between observation times, the volume of brine entering the vaults can be computed and the rate of flow established by dividing these volumes by the time between observations.

Details of the leak detection pipes as they enter the metering vaults are shown on Drawing D3. The detail illustrates how far the leak detection pipes extend into the vaults and how they are supported. The 10-inch diameter containment pipe extends only 2 inches into the vaults and has a dual containment end termination fitting which has a ¾" drain at its bottom to allow visual observation of any flow from the same. Likewise the ends of 6-inch diameter primary leak detection (carrier) pipes extend further into the vault and will also be visible for monitoring. Two sets of pipes are shown at the metering vault of the West Pond as the area of potential leakage has been subdivided into two zones. Should one zone be leaking more than the other, it will be clearly visible.

Drawings P4 and P5 have been modified to show that the metering vault pumps will discharge their flow into the 10" brine return pipe adjacent to the metering vaults.

External underdrains about the vault perimeters have been eliminated. Notes have been added to Drawing D3 to indicate the type of soil to be used to backfill the vaults and their degree of compaction. These notes have been developed to inhibit infiltration of surface runoff into backfill. As the bottom of the vaults will not extend below the groundwater table and surface runoff will be inhibited from infiltrating the backfill, any concern over hydrostatic uplift of the vaults is negated.

Interiors of the metering vaults will be coated at the precast plant to inhibit exfiltration of brine through the vaults. The specification presented in Attachment B has been developed for the supplier of the precast vaults to comply with requirement. The type of coating is also indicated in a note on Drawing D3.

2. *(10) Design Related: The maximum hydraulic design of the leak detection systems for both ponds needs to be provided. The controlling factor for this design needs to be identified to ensure the a confined head condition will not exist for the maximum flow threshold and that the acceptable ALR is established so that it ensures no confined head between the upper and lower liners and that it factors in the drainage outlets for leak detection systems. Based on the information provided leak detection system is drained by a single 6" pipe that is capped with only a 3/4 inch orifice.*

   a. The June 15th response to our comments failed to provide information needed to fully evaluate the design adequacy of the proposed leak detection monitoring system. Critical information that is missing from this analysis is information concerning the maximum flow capacity of the geocomposite drainage layer for each of the ponds. Due to site specific differences in the size, shape, slopes and maximum flow distances within each of the ponds it may be necessary to prescribe individual maximum and allowable leakage rates for each pond based on the ponds design characteristics.

      Response: The maximum flow capacity for the geocomposite drainage layer was estimated based upon the results of hydraulic conductivity testing (ASTM D 4716) performed upon samples of the Syntec Tenflow 770-2 geocomposite provided by the manufacturer. The flow rate, in gallons per minute per foot of width of geocomposite, was estimated at several different hydraulic gradients taking into consideration the size, shape and flow distances in each pond. These calculations are presented in Attachment C.

   b. The leak detection layer maximum flow capacity needs to be defined to ensure that there will be not be a confined flow condition within the geocomposite drainage layer as one of the controlling factors for setting the maximum allowable leakage rates.

      Response: As shown in the calculations presented in Attachment C, the flow capacity of the geocomposite drainage layer was determined to be significant. By referring to the responses to Comments 2c and 2d below, the "action" flow rates have been established to

ensure a confined flow condition will not develop within the geocomposite drainage layer. The "action" flow rates are well below the flow capacity of the geocomposite drainage layer and "sight" tubes at each vault have been added to provide a visual assessment of the actual head in the 6-inch carrier pipes. The "action" flow rates have been established by limiting the head developed in the 6-inch carrier pipes to levels below those which would begin to develop a confined flow condition within the geocomposite drainage layer and thereby impose head upon the secondary liner.

c. The proposed allowable leakage rates for West Pond at 0.47 gpm for the two metering outfalls and the 0.33 gpm for the East Pond appear acceptable, however, these thresholds need to be checked against the maximum flow capacity of the drainage geocomposite to demonstrate the assurance that a confined flow condition will not occur between the upper and lower geomembrane liners.

Response: As indicated in the response to Paragraphs 2a and 2b above, the maximum flow rates within the geocomposite drainage layer for the East and West Ponds are well above the operational threshold rates. With the ponds having been reduced in size, these operational rates are now 0.31 gpm and 0.88 gpm total (0.44 gpm for each leak detection pipe) for the East and West Ponds, respectively. These rates have been computed using 200 gallons per acre per day as the allowable leakage rate and with the revised sizes of the East and West Ponds being 2.25 acres and 6.36 acres, respectively. The rates are well below the maximum flow rate of the geocomposite drainage layer, calculations for which are presented in Attachment C. Accordingly, for the acceptable operational threshold rates, a confined flow condition will not develop between the upper and lower geomembrane liners.

d. Based on the design characteristics of East Pond, the upper leakage rate threshold of 25 gpm as proposed appears to be quite high. This threshold (25 gpm) is also as high as the Department would be able to approve for the West Pond, without further technical justification and assurance that exceedences of the threshold would require immediate attention to mitigate the excessive leakage rate. The proposed immediate action threshold of 250 gpm is too high and will likely exceed the capacity of the geocomposite drainage layer.

Response: Three "action" flow rates will be defined in the revised Engineer's Report. The "action" rates will be: (1) an acceptable operational threshold (as discussed in the response to Comment 2c above); (2) a notification threshold whereby DEC will be notified of increased flows and operations will be closely monitored and upon the next scheduled draw down of the ponds the defect(s) will be located and repaired to effectuate re-establishing an acceptable flow condition; and, (3) a maximum flow condition that requires immediate DEC notification and that the pond will be taken out of service and repaired to establish an acceptable operational threshold.

The initial and immediate DEC notification thresholds ("action" flow rates (2) and (3) above) have also been established to ensure a confined head condition between the upper and lower liners does not develop. Also they have been established so that the maximum flow into the metering vaults will be well below the capacity of a single pump to return brine to the ponds, thereby providing a comfortable factor of safety against the pumping capacity of a single pump. A second "backup" pump will be present in the event the primary pump needs to be serviced.

In establishing these two higher "action" flow rates, different size orifices affixed to the end of the 6-inch carrier pipe were considered along with limiting the head developed within the carrier pipes. A spreadsheet summarizing these calculations is presented in Attachment D. Limiting heads developed within the carrier pipes were selected to be 45 percent of the maximum head differential of the 6-inch carrier pipe for the first notification threshold and 90 percent of the maximum head differential of the 6-inch carrier pipe for the higher "immediate" notification threshold. At the West Pond, which has two leak detection pipes, the lowest of the maximum head differential of a carrier pipe was used to establish the notification rates. The "sight" tubes at each metering vault will be marked with the lower ("Initial") notification levels for ready identification and to alert operations personnel that DEC notification is required. For the "Immediate" notification level, the "sight" tube at

the East Pond will also be marked with this higher level. At the West Pond, however, the "sight" tubes would extend far above grade to be of similar use. Accordingly Drawing D3 shows the "sight" tubes have a return to the vaults, leaving, at the West Pond, identification that the "immediate" notification threshold has been reached solely from the metered flow rate.

With a ¾"-inch orifice affixed to the end of the 6-inch carrier pipes, the following notification thresholds have been selected for each pond:

Pond	Maximum Head Differential	Initial Notification Threshold		"Immediate" Notification Threshold		Pumping Capacity Factor of Safety
		Allowable Head (45%)	Notification Rate	Maximum Head (90%)	Notification Rate	
East	3.97'	1.97'	8.9 gpm	3.57'	12.5 gpm	20
West	10.97	4.94'	14.7 gpm	9.87'	74.5 gpm	3.6

With the pumps having a rated capacity of 250 gpm, their pumping capacity will be 3.6 to 20 times greater than the flow rates corresponding to the "immediate" notification threshold.

Brine Pond Construction and Stability:

3. Please provide calculations for the soil mass balance for both brine ponds. Existing soils should be segregated by type including topsoil, silts, demolition debris, glacial tills and sands. It should be clearly stated how each soils type is to be managed and where additional soils would be obtained to replace any soils deemed to be unsuitable for construction of the brine pond berms.

Response: Attachment E contains the cut/fill analysis for each site. The East Pond site has an excess cut volume of approximately 30,188 cubic yards whereas the West Pond site has an excess fill requirement of approximately 132,660 cubic yards.

Other than the volume of topsoil needed to cover areas to be restored with a grass cover and the limited amount of demolition debris found to be present locally at each site, it is the intent to use all on-site soils as fill material for the construction of the brine pond embankments. Excess cut from the East Pond site will be used as fill material for the West Pond site. The balance of fill material required for the West Pond site will be obtained from a local sand and gravel supplier, Padua Ridge Sand & Gravel, located approximately 3 miles south/southwest of the site.

Topsoil stripped from each site will be stockpiled at the locations shown on Drawings ESC1 and ESC2. The stockpiles will be shaped to promote drainage, temporarily stabilized through the placement of straw and encircled with silt fence. The volume of topsoil required for use at each site will be obtained from these stockpiles. Once the volume of topsoil needed for this purpose is borrowed from the stockpiles, they will be reshaped, seeded and covered with straw for their permanent stabilization.

Excavation of soils at each site will result in their mixing and an inability to segregate one material type from another. Earthwork specifications have been developed with this understanding and include the need to cull oversize particles from the excavated soils as they are placed as fill. It is the intent to construct the lower portions of the West Pond's embankment using the excavated site soils as the wider base of its embankments will allow for these materials to be spread out over greater area. Should the excavated materials require drying prior to their compaction, these greater working areas will facilitate that process and have a lesser impact on the work's progress. Oversize particles culled from the excavations will be removed from the immediate work areas and, upon initiating the importation of run-of-bank sand and gravel, these particles will be loaded onto trucks and transported to Padua Ridge Sand & Gravel for their processing.

The Earthwork specifications are presented in Attachment F and, included within these specifications, are the gradation requirements for run-of-bank sand and gravel which will be imported for the balance of fill material needed at the West Pond site. Key elements of these specifications are included as "Earthwork Notes" on Drawings XS1 and XS2.

Please provide a thorough discussion of the locations and geotechnical properties of the sand underlying the west brine pond footprint. This discussion should be of at least the same level as that provided for the glacial tills found in the geotechnical report and elsewhere in the application.

Response: The locations of the test borings and test pits where the sand was encountered are shown on the plan contained in Attachment G. Following this plan is a table that lists these test borings and test pits, the depth to the deposit below grade and its interpolated thickness at each location, and a general description of the sand's gradation. Highlighted on the table are the test pit locations where the sand was encountered but will be removed with excavation of the pond. Through inspection of this plan and table, it can be seen that the sand is not present beneath the entire footprint of the brine pond and its depth below grade and its thickness varies considerably between locations.

Attachment H contains Figures 3 and 7 which are presented in the Naval Facilities Command (NAVFAC) Design Manual 7.1. These figures allow for the sand's relative density to be estimated from its standard penetration resistance, and its unit weight and angle of internal friction to be estimated based upon its gradation and relative density. Using these figures, the sand's relative density is estimated to range from 40 to 55 percent and its corresponding angle of internal friction is shown to range from 31 to 34 degrees. Dry unit weights for the sand's relative density and gradation range from 95 to 113 pounds per cubic foot (pcf). For an average dry unit weight of 104 pcf and an assumed saturated moisture content of 13 percent, the unit weight of the sand would equal approximately 118 pcf. Accordingly, the geotechnical properties of the sand utilized in the stability analyses were assigned based upon their measured standard penetration resistance and apparent relative density, and their gradation following this methodology.

4. The presence of loose saturated sands in the area of the eastern berm of the western brine pond is of great concern. Additional stability analysis needs to be provided for the construction of this area. Specifically, both drained and un-drained load cases need to be provided for every ten feet of berm constructed. Also, the location of the trench for the three 10 inch pipelines shall be included as a tension crack in these analyses.

Response: Analysis of the embankment at its full height at the end-of-construction (Load Case I) resulted in a factor of safety against slope failure in excess of the minimum required. The computed factor of safety was equal to 1.76 while the required factor of safety is 1.50. Additional analyses of the embankment at lesser heights will result in a factor of safety greater than that determined under the full height of the embankment; i.e. 1.76. Accordingly analyses for every 10 feet of berm height have not been conducted as it follows that these safety factors would also be well above the minimum required value of 1.50.

The analysis of the embankment's stability for its full height was performed using published effective stress parameters consistent with the referenced Corps of Engineers protocol. The embankment soils will be primarily granular in texture (both the excavated site soils and the imported run-of-bank sand and gravel) and compacted at or dry of the optimum moisture content for their compaction, hence they will not be cohesive in nature nor saturated leaving an undrained analysis of the embankment stability inconsistent with generally accepted geotechnical engineering practice.

Standard geotechnical practices model the presence of tension cracks at the crest of slopes comprised of cohesive soils. As such soils will not be present in the embankment, modeling of the presence of a tension crack in close proximity to the toe of the slope is not consistent with standard geotechnical practice. Regardless, in accordance with the Department's request, the stability of the toe of the berm's slope was analyzed considering a 12 foot wide "tension crack" is present. Attachment I presents the results of this analysis and indicates that the toe of the berm has a safety factor against failure of 3.00, a value twice that of the minimum required value of 1.50.

To help illustrate the embankment's stability with the presence of the sand layer, a sensitivity analysis was performed. The factor of safety against failure of the embankment slope was determined assuming the sand's angle of internal friction ranged from 28 to 34 degrees, the lower bound being 3 degrees lower than the lowest value estimated from the NAVFAC publication referenced above. Graphical displays of these analyses are presented in Attachment J and illustrate that the computed factor of safety, assuming the lowest angle of internal friction, is well above the minimum required value of 1.50, i.e. these computed factors of safety were determined to range from 1.57 to 1.87. These displays illustrate that the sand layer has been assumed to be continuous beneath the embankment and of a thickness of 12 feet. The table and plan contained in Attachment H indicates that the sand is not present at all locations and that its thickness varies from as little as 1 foot to as much as 13 feet.

5. The stability analysis for the southern berm of the western brine pond needs to clearly show and analyze the presence of the existing ravine.

   Response: A separate load case was included in the Volume 2 report analyzing the stability of the existing ravine under the long-term conditions of the pond. The analysis has been repeated as regrading of the pond to accommodate stormwater management basins has resulted in the toe of the southern berm being 7 to 15 feet farther from the crest of the ravine. This analysis has been supplemented by analyzing other sections along the southern berm. All of the analyses indicate the factor of safety will be approximately equal to or greater than 1.5. Graphical displays of these analyses are presented in Attachment K along with a plan illustrating the locations of the sections analyzed.

6. The outlet pipe for both the east and west brine ponds underdrains will likely be the discharge point for the bulk of the groundwater seepage and stormwater to be managed within the brine ponds during construction. The outfalls of these pipes need to be designed with stormwater and sediment retention sufficient to prevent the release of sediment laden water to the local drainageways.

   Response: Revised Drawings P4, P5, ESC1, ESC2, ESC3 and ESC4 show the presence of sediment traps to address this comment. Calculations supporting the sizing of these traps are presented on Drawings ESC1 and ESC2.

7. The lone significant sediment management feature proposed for the west brine pond site is located at the northeast corner of the site on the proposed 33% berm slope and on the alignment of the triple ten inch pipeline trench. It would seem there should be a more practical location.

   Response: Drawing P5 has been revised to lessen the size of the brine ponds to accommodate stormwater management and sediment traps. Also the alignment of the triple 10-inch pipeline has been modified and is shown on the revised Drawing P5.

Groundwater Monitoring Plan:

9. The construction of the monitoring well must be completed to ensure that the wells maintain integrity for the life of the brine ponds. The monitoring well completion logs show the lack of a surface seal around the well casing, any protective casing and security.

   Response: Several of the wells which will serve as long-term monitoring wells are located near the toe of the brine pond embankments. These wells and others which will serve the life of the brine ponds have been identified on Drawings P4 and P5. Some of these wells have been installed to date while others are indicated for installation prior to placing the brine ponds into service. Wells to remain in service and which are located close to the toes of the ponds' embankments will be extended to 2 to 3 feet above the final embankment grades. These wells as well as all others to remain in service will be provided with a surface seal, guard pipes and locks, keyed alike. This work will be performed in the early stages of the pond embankment construction.

10. Many of the monitoring wells are not constructed to isolate the top of bedrock aquifer.

Although the well screen straddles the top of rock zone, the sand pack above the well screen extends into the sand horizon in some wells.

Response: Attachment L contains a table listing all monitoring wells installed to date at each brine pond site and the geologic horizon(s) within/across which they are screened. The majority of the wells are screened across the broken bedrock/glacial till interface while some are screened across the sand layer, where present. Installation of additional monitoring wells within only the sand layer was requested by the Department. Logs of the test borings advanced and monitoring wells installed after the submission of the Engineer's Report follow the table presented in Attachment L.

Additional wells will be installed at each pond site upgradient, downgradient and along the sides of the ponds at the locations identified on Drawings P4 and P5. Some of these wells will be shallow and screened to straddle the surface of the glacial till deposit which may be locally winnowed and more permeable or potentially overlain by sand. Others will be installed and screened in bedrock. The screened section of the bedrock wells will be isolated from the overburden soils to allow sampling and analysis of groundwater from only the bedrock fractures the boreholes intercept. These wells are being added as the survey of residential supply wells downgradient of the West Pond indicate that several are constructed in bedrock.

11. The groundwater monitoring plan must to include the underdrain discharge.

    Response: Page 27, Section 5.8, of the Engineer's Report presenting the monitoring plan will be amended to read: "Monitoring of groundwater quality will consist of collecting groundwater samples from groundwater monitoring wells at each pond site and collecting groundwater quality samples from the underdrain pipes at each site."

12. Background groundwater quality needs to capture seasonal high and low groundwater levels.

    Response: The groundwater samples collected this past spring are considered representative of the annual high groundwater occurrence. Additional samples will be obtained in the fall of this year prior to operation of the facility and will be considered representative of the annual low groundwater levels.

13. Monitoring well decommissioning needs to clarify that overdrilling and removal of all well construction media and tremie grouting from total depth to surface will be completed.

    Response: The well decommissioning procedures will clearly define that overdrilling and removal of all well construction media will occur prior to tremie grouting of the borehole. The specification for this work will also reference and comply with NYSDEC CP-43: Groundwater Monitoring Well Decommissioning Policy, dated November 3, 2009.

14. The possible sources of elevated sodium identified in two groundwater monitoring wells need further explanation. Specific sources of possible 'ongoing salt processing' must be evaluated to determine potential impacts to the groundwater in the area of the east brine pond.

    Response: The source of elevated sodium in the referenced two monitoring wells is considered to be road salt and will be restated in Section 2.2.4 of the Engineer's Report (at the bottom of page 8) to read as "As monitoring wells MW-22 and MW-24 are located in close proximity to Route 14, the source of elevated sodium is considered to be road salt."

15. Identification, location and description of potable water supply wells at residential locations have not been provided.

    Response: Door-to-door inquires have been made to assess the details of residential well construction. Non-responsive/uncooperative property owners have been identified. Questionnaires completed from this survey are contained in Attachment M along with an aerial image identifying the locations of the residences surveyed.

The information requested above raises substantive concerns about the suitability of brine pond location and design, and it is critical to the Department's review and key to our ability to prepare

positive findings at the completion of the SEQR process.

Comments regarding Revision 3 dated 30 May 2012 to the SWPPP will be forthcoming. Additionally, staff have not had an opportunity to thoroughly review your comments provided in a letter to me dated 16 July 2012, and we will be responding, as appropriate, at a later date.

Based on the project plans and information provided to date, the Department has determined that the activities authorized by the US Army Corps of Engineers on 18 May 2012 under the NWP program is also covered by the Department's blanket water quality certification and an individual permit will not be required. This determination may be subject to change, given the close proximity of federally-regulated wetlands and streams to the construction proposed on this site, and the possibility that plans may yet be revised to address the above comments, as well as forthcoming comments related to the SWPPP.

Please contact me at 315-426-7440 or email at dlbimber@gw.dec.state.ny.us if you have any questions relating to the status of the transfer applications or the information discussed in this letter. Thank you for your time and assistance in this matter.

Sincerely,

David L. Bimber
Regional Permit Administrator
Division of Environmental Permits

acc: S. Jones, Bureau of Habitat
L. Bracci, Regional Attorney
S. Sheeley, Regional Permit Administrator R8
L. Schwartz, Assistant Regional Attorney
L. Weintraub, DEC, Albany
P. Briggs, DEC Albany
R. Phaneuf, DEC, Albany
S. Metivier, US ACE, Buffalo
M. Crawford, US ACE, Auburn

ATTACHMENTS

A

ATTACHMENT A

Flow Meter Product Literature & Specifications

DOPPLER FLOWMETER

1. The flowmeter shall utilize ultrasonic, digital Doppler technology to measure the flow of sewage in the force main.

2. The flow range shall be from 0.5 to 32 feet per second. Accuracy will be +/- 1% of velocity or better, repeatability +/- 0.05% full scale and linearity +/- 0.3% full scale.

3. The flowmeter will be suitable for pipe sizes from 0.5 inches minimum to 48 inches maximum. The transducers shall be complete with 20 feet (6m) cable and be suitable for submersible/underground service. Transducer cable lengths to 500 feet (152m) will be available.

4. A remote-mounted display keypad transmitter shall be provided. Displays to include present and total flow rates, flow velocity, signal strength, and percent of span outputs.

5. The flowmeter will incorporate a data logger with a logging adjustable-rate program. One output alarm relay will be included. A 4-20mA DC output signal will be included.

7. The enclosure of the transmitter will be environmentally sealed to NEMA 4X.

8. The ambient temperature limits for the transducers and transmitter will be -4° to +131°F.

9. The flowmeter will operate from a 120VAC, 1 phase power supply.

12. The flowmeter will incorporate a programmable zero/low flow cut-off and automatic gain control.

14. The manufacturer shall provide calibration for the instrument.

15. The flowmeter will be manufactured by an ISO 9001 certified facility.

16. The instrument will be the GE Panametrics Model DF868 Digital Flowmeter.

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Applications

The DF868 liquid flowmeter is a complete ultrasonic flow metering system for measurement of:

- Refined hydrocarbons
- Petroleum products
- Crude oil
- Lubricating oils
- Diesel and fuel oils
- Solvents
- Water and wastewater
- Hot/chilled water
- Water/glycol solutions
- Chemicals
- Other liquids

Features

- Economical, nonintrusive flow measurement
- Hazardous (classified) location certification
- Simple setup and installation
- Suitable for a wide range of pipe sizes and materials
- Two-channel/two-path version available
- Energy measurement option
- Large backlit LCD display
- Velocity, volumetric and energy flow rates
- Totalized flow and trend data

DigitalFlow™ DF868

Panametrics Liquid Ultrasonic Flowmeter

DigitalFlow DF868 is a Panametrics product. Panametrics has joined other GE high-technology sensing businesses under a new name–GE Industrial, Sensing.

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Panametrics Ultrasonic Liquid Flowmeter

The DigitalFlow DF868 is a full-featured, fixed-installation liquid flowmeter designed to meet all your flow metering and energy measurement needs. Its patented Correlation Transit-Time™ digital signal processing provides drift-free measurements in ultraclean and most "dirty" liquids. This includes fluids with gas bubbles and entrained solids that have previously required Doppler-type meters.

Dual-Channel Version Reduces Costs and Improves Performance

The optional dual-channel/dual-path model can be user-configured for a variety of applications. It can be set up to measure flow in two separate pipes with one meter to reduce the cost-per-measurement point. To minimize the effects of flow profile distortions, flow swirl and cross flow, and to provide maximum accuracy, two sets of transducers can be installed on the same pipe.

Measure Flow from Outside the Pipe

Using clamp-on flow transducers, the DigitalFlow DF868 measures flow rate through metal, plastic or even concrete-lined pipes without penetrating the pipe wall. To hold clamp-on transducers in place, a variety of clamping fixtures are available to accommodate different pipe sizes, transducer types and attachment methods (e.g., chain, wire rope, Velcro® strap or a magnetic, bolt-on, or weldable steel yoke with metal band). Our universal clamping fixture includes ruled slide tracks to simplify transducer spacing for accurate flow measurements. There's even a special small-pipe clamping fixture with miniaturized transducers to simplify flow measurement on 0.5 to 2 inch (15 to 50 mm) lines.

Wetted Transducers for Maximum Accuracy

Obstructionless wetted transducers are readily available for maximum performance. After proper installation, transit-time accuracies of better than 1 percent are achievable in most applications, matching the performance of expensive factory-calibrated meters. Measurement range is 0.1 to 40 ft/s (0.03 to 12.2 m/s) for a turndown ratio of 400 to 1 in pipes from 1 to over 200 inches in diameter. Measurement is noncontaminating, obstructionless and causes no pressure drop. The DigitalFlow DF868 is all digital so measurements don't drift, and it doesn't need regular maintenance since there are no moving parts to wear out or orifices to clog.

Dual-LCD Display, Datalogger and a Wide Variety of I/O Options

Whether single-channel or dual-channel, all DF868 meters feature two independent, user-programmable, graphic LCDs, giving you simultaneous access to more data. There is complete flexibility to display any parameter on either LCD in a variety of numerical and graphic formats. Examples include numerical display of real time flow measurements, real time flow graphs and diagnostic waveforms, and numerical/graphic display of data from the meter's built-in 43,000 point datalogger. Up to 12 isolated 4 to 20 mA outputs, up to six hermetically sealed or standard alarm relays, and up to 12 frequency/totalizer outputs can be added.

Built-In Energy Measurement Capability

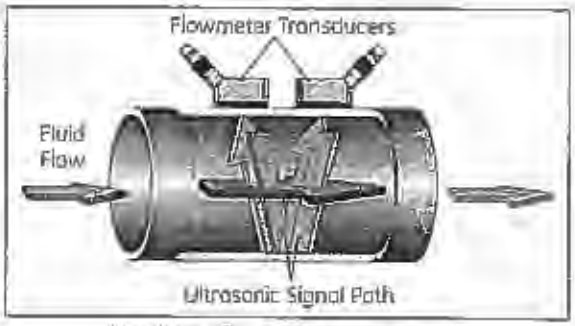
Another feature that makes the DigitalFlow DF868 meter such a powerful and versatile flowmeter is the energy measurement software included in every meter. The DigitalFlow DF868, with optional RTDs and input boards, extends the benefits of ultrasonic flow measurement to energy measurement. Benefits include measurement of flow and temperature without pipe penetration, and compatibility with pipes from 1 to 200 in (25.4 mm to 5 m) in diameter. The DigitalFlow DF868 meter measures energy flow in water and water/glycol heating and cooling systems with temperatures from -4°F to 410°F (-20°C to 210°C). Consult GE for use with other liquid systems.

To ensure compatibility with existing or preferred temperature instrumentation, the DigitalFlow DF868 meter is available with three analog input boards. The transmitter input board provides 24 VDC loop power and two isolated 4 to 20 mA inputs for transmitters. For applications requiring raw RTDs, the RTD input board provides two isolated, three-wire RTD inputs for temperatures from -148°F to 662°F (-100°C to 350°C)

The difference between the downstream and upstream transit times is proportional to the velocity of the flowing liquid and its sign indicates the direction of flow.

The DF868 Flowmeter Uses the Transit-Time Flow Measurement Technique

The transit-time technique uses a pair of transducers, with each transducer sending and receiving coded ultrasonic signals through the fluid. When the fluid is flowing, signal transit time in the downstream direction is shorter than in the upstream direction. The difference between these transit times is proportional to the velocity of the flow. The DigitalFlow DF868 measures this time difference and uses programmed pipe parameters to determine flow rate and direction.



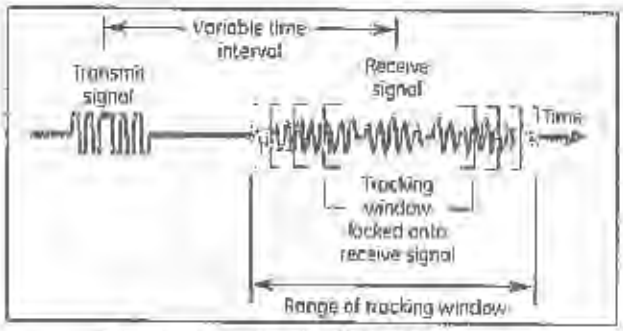
Transit-time flow measurement technique

Automatically Adjusts to Changing Fluid Properties

Our unique Automatic Tracking Window™ (ATW™) feature, standard in all DigitalFlow DF868 meters, ensures accurate flow measurements even when fluid properties are unknown or changing. Like the seek mode on a car stereo, ATW dynamically sweeps the receiver window whenever the sound speed of the fluid changes. This powerful feature enables flow measurement when the fluid sound speed is unknown, when it is changing due to large temperature shifts, or when a new liquid starts to flow in a multiproduct pipeline.

ATW works for both clamp-on and wetted transducer applications by searching for a reliable ultrasonic receive signal. It does this by varying the time between the transmit signal and the receive signal window until the receive signal is found. The tracking window automatically sweeps through a range of time intervals based on the minimum and maximum expected sound speeds programmed by the user.

The window moves (tracks) in response to changes in the fluid sound speed. Once the optimal signal is found, ATW locks onto it until another large change in sound speed occurs. When this happens, ATW returns to the seek mode until the optimal signal is found again.



ATW recovers accuracy when fluid sound speed changes

Is Built to Be Economical and Stay Economical

To be of real value, a flowmeter must be as economical to own and operate as it is capable in the field. Using the latest microcircuit and manufacturing technologies, the DigitalFlow DF868 flowmeter is built to stay in service for many years. Completely solid state, the DigitalFlow DF868 rarely wears out or needs servicing, resulting in little downtime and low maintenance costs.

The DigitalFlow DF868 will continue to save money by streamlining the measurement process and trimming labor costs.

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DF868 Specifications

Operation and Performance

Fluid Types
Acoustically conductive fluids, including most clean liquids, and many liquids with entrained solids or gas bubbles. (Maximum void fraction depends on transducer, interrogation carrier frequency, path length and pipe configuration.)

Pipe Sizes
- Using clamp-on transducers: 0.5 to 300 in (12.7 mm to 7.6 m) and larger
- Using wetted transducers: 1 to 200 in (25.4 mm to 5 m) and larger

Pipe Wall Thickness
Up to 3 in (76.2 mm)

Pipe Materials
All metals and most plastics. Consult GE for concrete, composite materials, and highly corroded or lined pipes.

Flow Accuracy (Velocity)
±0.5% of reading (achievable with process calibration)

Typical Clamp-On Flow Accuracy (Velocity)
- Pipe ID>6 in (150 mm): ±1% to 2% of reading
- Pipe ID<6 in (150 mm): ±2% to 5% of reading

Typical Wetted Flow Accuracy (Velocity)
±1% of reading

Accuracy depends on pipe size, installation and whether measurement is one-path or two-path

Repeatability
±0.1% to 0.3% of reading

Range (Bidirectional)
-40 to 40 ft/s (-12.2 to 12.2 m/s)

Rangeability (Overall)
400:1

Specifications assume a fully developed flow profile (typically 10 diameters upstream and 5 diameters downstream of straight pipe run) and flow velocity greater than 1 ft/s (0.3 m/s)

Measurement Parameters
Volumetric flow, totalized flow and flow velocity

Electronics

Flow Measurement
Patented Correlation Transit-Time mode

Enclosures
- Standard: Epoxy-coated aluminum weatherproof Type 4X/IP66 Class I, Division 2, Groups A,B,C&D
- Optional: Stainless steel, fiberglass, explosion-proof, flameproof

Dimensions (Standard)
Weight 11 lb (5 kg)
Size (h x w x d) 14.24 in x 11.4 in x 5.1 in (362 mm x 290 mm x 130 mm)

Channels
- Standard: One channel
- Optional: Two channels (for two pipes or two-path averaging)

Display
Two independent software-configurable 64 x 128-pixel backlit LCD graphic displays

Keypad
39-key tactile feedback membrane keypad

Power Supplies
- Standard: 100 to 130 VAC, 50/60 Hz or 200 to 265 VAC, 50/60 Hz
- Optional: 12 to 28 VDC ±5%

Power Consumption
20 W maximum

Operating Temperature
-4°F to 131°F (-20°C to 55°C)

DF868 Specifications

Storage Temperature
-67°F to 167°F (-55°C to 75°C)

Standard Inputs/Outputs
Two 0/4 to 20 mA isolated outputs, 550 Ω maximum load

Optional Inputs/Outputs
There are six additional slots available for any combination of the following I/O boards:

- Analog outputs: Select up to three additional output boards, each with four isolated 0/4 to 20 mA outputs, 1000 Ω maximum load
- Analog inputs: Select up to three boards of one of the following types:
  - Analog input board with two isolated 4 to 20 mA inputs and 24 V loop power
  - RTD input board with two isolated, three-wire, RTD inputs, span -148°F to 662°F (-100°C to 350°C), 100 Ω
- Totalizer/frequency outputs: Select up to three totalizer/frequency output boards, each with four outputs per board, 10 kHz maximum. All boards allow software-selectable functioning in two modes:
  - Totalizer mode: Pulse per defined unit of parameter (e.g., 1 pulse/gal)
  - Frequency mode: Pulse frequency proportional to magnitude of parameter (e.g., 10 Hz = 1 gpm)
- Alarm relays: Select up to two boards of one of the following types:
  - General purpose: Relay board with three Form C relays, 120 VAC, 28 VDC maximum, 5 A maximum; DC 30 W maximum, AC 60 VA
  - Hermetically sealed: Relay board with three hermetically sealed Form C relays, 120 VAC, 28 VDC maximum, 2 A maximum, DC 56 W maximum, AC 60 VA

Digital Interfaces
- Standard: RS232
- Optional: RS485 (multiuser)
- Optional: Modbus® RTU
- Optional: Modbus TCP
- Optional: OPC server
- Optional: Ethernet

Site Parameter Programming
- Menu-driven operator interface using keypad and "soft" function keys
- Storage for 10 sites

Data Logging
Memory capacity (linear and/or circular type) to log over 43,000 flow data points

Display Functions
- Graphic display shows flow in numerical or graphic format
- Displays logged data and diagnostics

European Compliance
System complies with EMC Directive 89/336/EEC, 73/23/EEC LVD (Installation Category II, Pollution Degree 2)

Clamp-On Ultrasonic Flow Transducers

Temperature Ranges
- Standard: -40°F to 300°F (-40°C to 150°C)
- Optional (overall range): -310°F to 572°F (-190°C to 300°C)

Mountings
Stainless steel chain or strap, welded or magnetic clamping fixtures

Area Classifications
- Standard: General purpose
- Optional: Weatherproof Type 4/IP65
- Optional: Explosion-proof Class I, Division 1, Groups B,C&D; Class II, Groups E,F&G; Class III
- Optional: Flameproof
  Ⓔx II 2 G EEx ma IIC T6-T3
- Optional: Submersible

DF868 Specifications

Wetted Ultrasonic Flow Transducers

Temperature Ranges
- Standard: -40°F to 212°F (-40°C to 100°C)
- Optional (overall range): -310°F to 1112°F (-190°C to 600°C)

Pressure Ranges
- Standard: 0 to 3,000 psig (0 to 207 bar)
- Optional: Higher pressures on request

Materials
- Standard: Stainless steel
- Optional (for Pan-Adapta® plugs): Titanium, Hastelloy® alloy, Monel® alloy, duplex

Pan-Adapta plugs allow installation and removal of wetted transducers without interrupting the process or emptying the pipe.

Process Connections
- Standard: 1 in or 3/8 in NPTM
- Optional: RF flanged, socket weld, fuse bond and others

Mountings
Flanged flowcell, hot tap or cold tap

Area Classifications
- Standard: General purpose
- Optional: Weatherproof Type 4/IP65
- Optional: Explosion-proof Class I, Division 1, Groups C&D, Class II, Groups E,F&G, Class III
- Optional: Flameproof (Ex) I 2 G EEx d IC T6
- Optional: Submersible

MCerts Product Conformity Certificate
Sira MC 050061/00 for continuous water monitoring (EU IPPC)

Transducer Cables

- Standard: One pair of coaxial cables, type RG62 AU or as specified for transducer type
- Optional: Lengths up to 1,000 ft (330 m) maximum

High-Temperature and High-Pressure Ultrasonic Flow Transducers

Bundle Waveguide Technology™ System transducer and holder (see BWT™ System specifications)

Measurement

Energy Measurement
Calculates energy flow rate and totalized energy. Requires optional RTD or analog I/O board.

Temperature Transducers
Loop-powered, three-wire, platinum RTDs, clamp-on and wetted (thermo-well) types are available

Accuracy
±0.08°F ±0.15°C with wetted RTDs (matched pairs)

Range
-4°F to 500°F (-20°C to 260°C)

The accuracy of the energy measurement is a combination of the accuracy of the associated flow and temperature measurements. 1% to 2% of reading is typical for calibrated systems. Not all extremes of parameters can be achieved simultaneously.

Additional Options

PanaView™ PC-Interface Software
The DigitalFlow DF868 communicates with a PC through a serial interface and Windows® operating systems. Consult the manual for details on sites, logs and other operations with a PC.

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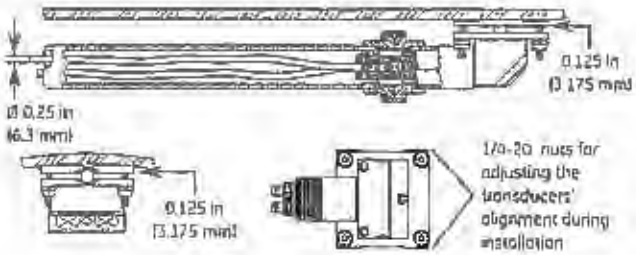
DF868 Application Notes In Brief



Clamp-In Capability
GE offers a wide variety of ways to install transducers to adapt to each piping and application situation. For large buried pipes, where access to the outside of the pipe prevents using clamp-on or standard wetted transducers, GE offers clamp-in transducers. These transducers offer the unique ability to be attached to the inner wall of large pipes. With a precision laser alignment tool, the transducers can be set up properly facing each other, so when the water fills the pipe, the transducers will work flawlessly. The clamp-on transducer is design with a dual element head for 100% redundancy. GE is an industry leader in transducer design with extremely low failure rates. By making these transducers with two elements, ensures years of operation without their ever having to be serviced.

Clamp-On Avoids Plugged Impulse Lines
GE offers clamp-on transducers for a wide variety of installations. One customer purchased the C-RS transducer with a DigitalFlow DF868 to measure flow on a 12 in (300 mm) crude resid stream. Previously, an orifice plate was used for the measurement. The impulse lines for the DP transmitter were consistently getting plugged, resulting in the need for service and unreliable flow measurements. The clamp-on system offered by GE was a preferred measurement setup because installation could be done while the unit was operating, and no additional restrictions that could cause pressure drop were introduced. The customer saved approximately US $50,000 in the first year, due to reduced maintenance costs.

Fig. (1) C-RS transducers

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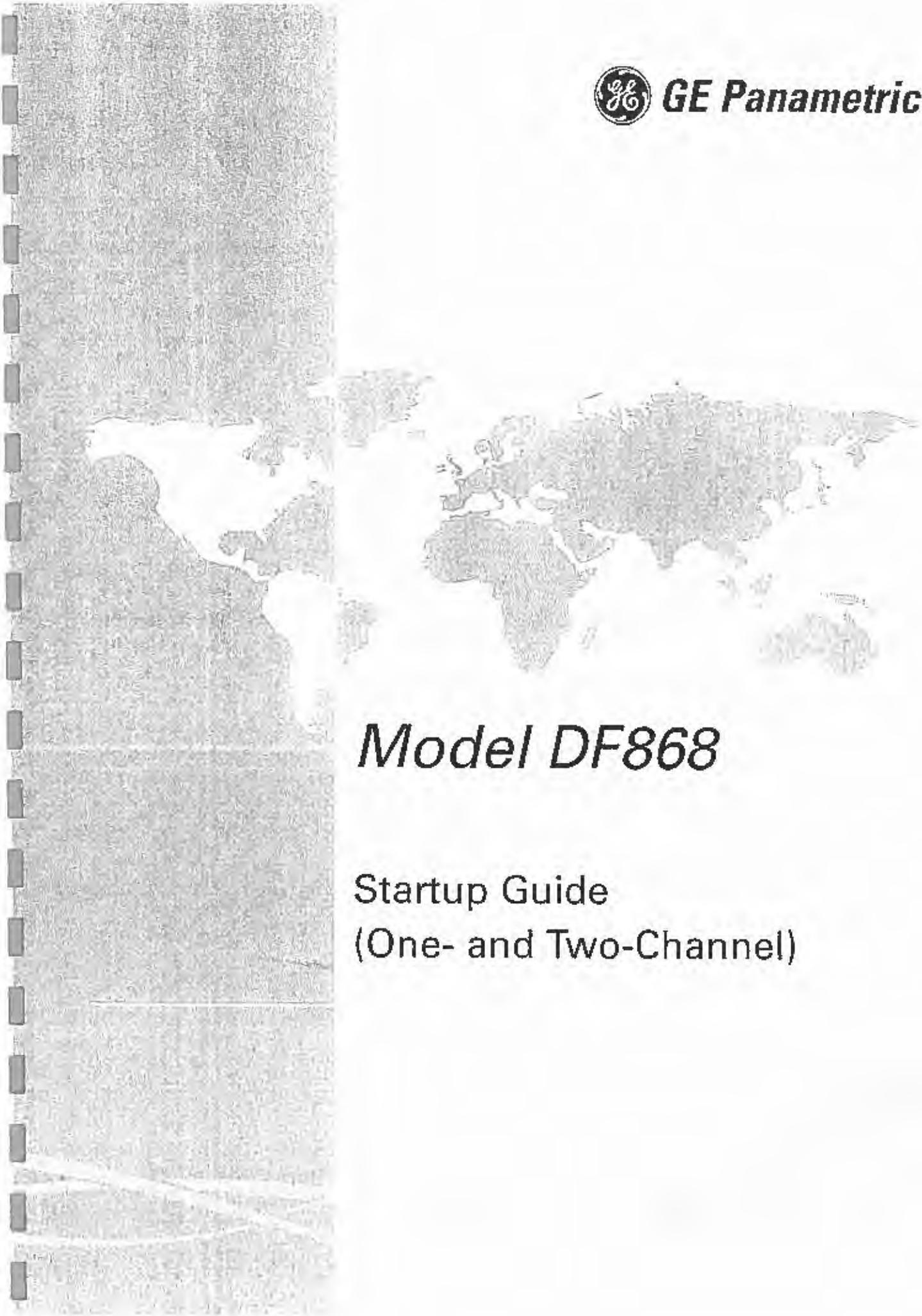


Model DF868

Startup Guide
(One- and Two-Channel)

June 2004

Process Control Instruments

Model DF868 (1 & 2 Channel) Multipurpose Ultrasonic Liquid Flowmeter

Startup Guide *910-176UB1*

GE Panametrics

B

ATTACHMENT B

Protective Lining for Concrete Structures
Technical Specifications

099659 - PROTECTIVE LINING FOR CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section covers all workmanship, materials and quality requirements for concrete resurfacing and lining work. Provide and apply resinous (epoxy) resurfacing materials as specified and as indicated on drawings.

1.2 RELATED DOCUMENTS:

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.3 RELATED WORK:

A. Section 310000 - Earthwork.

B. Section 330516.14 - Square and Rectangular Concrete Structures.

C. Section 331113.01 - Ductile Iron Pipe.

D. Section 331240 - Miscellaneous Piping Accessories.

1.4 REFERENCES:

A. This section contains references to the documents listed below. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the more stringent of the requirements shall prevail.

B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of receipt of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued, or replaced.

C. Referenced publications found within this specification shall be the latest revision unless otherwise specified; and applicable parts of the referenced publications shall become a part of this specification as if fully included.

Reference	Title
ASTM (American Society for Testing and Materials)	
ASTM C 920	Specification for Elastomeric Joint Sealants.
ASTM D 3960	Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings

ASTM D 4259	Practice for Abrading Concrete.
ASTM E 337	Standard Practice Test Method for Measuring Humidity with a Psychrometer.
ASTM F 710	Practice for Preparing Concrete Floors and Other Monolithic Surfaces to Receive Resilient Flooring
FEDERAL STANDARD COLORS	
F 595 B	Federal Standard Colors
Guideline No. 03732	Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays
ICRI (International Concrete Restoration Institute)	
Guideline No. 03732	Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
Reference	**Title**
NACE (National Association of Corrosion Engineers)	
NACE Publication 6D-173	"A Manual for Painter Safety"
NACE Publication 6G-164	"Surface Preparation Abrasives for Industrial Maintenance Painting"
NACE Publication 6G-164	"Surface Preparation Abrasives for Industrial Maintenance Painting"
NACE Publication TPC2	Coatings and Linings for Immersion Service: Chapter 1 Safety, Chapter Surface Preparation, Chapter 3 Curing, and Chapter 4 Inspection
NACE Publication 6F-163	"Surface Preparation of Steel or Concrete Tank Interiors."
NACE RP0892-92	Standard Recommended Practice, Lining over Concrete in Immersion Service.
NACE RP0288-88	Standard Recommended Practice, Inspection of Linings on Steel and Concrete.
SSPC (Steel Structures Painting Council)	
SSPC-SP 12	Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultrahigh Pressure Water Jetting Prior to Recoating.
SSPC-SP13	Surface Preparation of Concrete
SSPC-PA-3	"A Guide to Safety in Paint Application"
SSPC-Guide 12	Guide for Illumination of Industrial Painting Project.
OSHA (Occupational Safety & Health Administration.)	
1915.35	Standards—29 CFR - Painting.
ANSI (American National Standards Institute)	
ANSI/ASC 29.4 Exhaust Systems	Abrasive Blasting Operations — Ventilation and Safe Practice

1.5 QUALITY ASSURANCE

A. Requirements:

1. Do not use or retain contaminated, outdated, or diluted materials for resurfacing. Do not use materials from previously opened containers.

2. Use only products of the approved Manufacturer. Use products of one manufacturer in any one resurfacing system with compatible materials. Provide same material product for touch-up as for original material.
3. If any requirements of this specification conflict with a referenced standard, the more stringent requirement shall apply.
4. Take available all locations and phases of the work for access by the Engineer or other personnel designated by the Engineer. The Contractor shall provide ventilation and egress to safely access the coating work areas for inspection.
5. Conduct work so that the resurfacing system is installed as specified herein. Inspect work continually to ensure that the resurfacing system is installed as specified herein. The Contractor shall inspect the work to determine conformance with the specifications and referenced documents. The Contractor shall inform the Engineer of the progress and the quality of the work through daily reports as specified below. Any nonconforming coating system work shall be corrected as specified herein or as recommended by the Manufacturer.
6. Summarize test data, work progress, areas covered, ambient conditions, quality control inspection test findings, and other information pertinent to the resurfacing system installation in daily reports to be submitted to the Engineer or the Engineer's Representative.
7. The methods of construction shall be in accordance with all requirements of this specification.
8. Employ only trades people who have at least five years of experience performing resurfacing work of similar size and complexity as the work specified in this Section. Submittals to verify these qualifications are to be made within thirty (30) days of the Notice-to-Proceed and are subject to approval by the Engineer.

1.6 SUBMITTALS

A. Submit the following prior to commencing with any phase of the work covered by this Section:
1. Manufacturer's current printed recommendations and product data sheets for all coating system products supplied under this section including performance criteria, surface preparation and applications, volatile organic compound (V.O.C.) data, and safety requirements.
2. Material Safety Data Sheets (MSDS) for any materials brought on-site including all resurfacing system materials, solvents, and abrasive blast media.
3. Storage requirements including temperature, humidity, and ventilation for resurfacing system materials.
4. Manufacturer's requirements, including application procedures for resurfacing materials shall be in writing and shall be followed in detail. All safety precautions recommended by the Manufacturer shall be strictly adhered to at all times when work is in progress.
5. Color samples for all surfaces to be resurfaced that have been field-matched to existing colors.
6. Submit applicators' certification that resurfacing materials comply with Federal, State, and Local regulations for VOC (Volatile Organic Compounds).
7. Submit daily reports that contain the following information: Substrate conditions, ambient conditions, application procedures, work completed and location thereof. Mark-up drawings that show location of work.
8. Submit letter(s) with associated product data signed by Manufacturer certifying that submitted products are suitable for application on the surfaces to be resurfaced and for the service conditions.

1.7 DELIVERIES AND STORAGE

A. Materials shall be stored in accordance with Manufacturer's recommendations in enclosed structures and shall be protected from weather and adverse temperature conditions. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding storage life recommended by the manufacturer shall be removed from the site.
1. Store all materials only in area or areas designated by the Engineer solely for this purpose. Confine mixing, thinning, clean-up and associated operations, and storage of materials-related debris before authorized disposal, to these areas. All materials are to be stored on pallets or similar

storage/handling skids off the ground in sheltered areas in which the temperature is maintained between 70°F and 90°F.

2. Mix all resurfacing materials in an enclosed mixing area designated by the Engineer. This enclosed area must protect the mixing operation and materials from direct sunlight, inclement weather, freezing, or other means of damage or contamination. Protect all other concrete and metallic surfaces and finishes from any spillage of material(s) within the mixing area.
3. Do not use floor drains, dikes or storm drains for disposal of resurfacing systems materials.
4. The Contractor shall take all precautions and implement all measures necessary to avert potential hazards associated with the resurfacing system materials as described on the pertinent Material Safety Data Sheets or container labels.
5. Deliver all materials to the job site in their original, unopened containers. Each container shall bear the Manufacturer's name and label.
   a. Labels on all material containers must show the following information:
      1) Name or title of product.
      2) Federal Specification Number if applicable.
      3) Manufacturer's batch number and date of manufacture.
      4) Manufacturer s name.
      5) Generic type of material.
      6) Application and mixing instructions.
      7) Hazardous material identification label.
      8) Shelf life date.
      9) Storage requirements.
   b. All containers shall be clearly marked indicating any personnel safety hazards associated with the use of or exposure to the materials.
   c. All materials shall be handled and stored to prevent damage or loss of label.
   d. The Engineer shall designate resurfacing material storage and mixing areas.
   e. Do not use or retain contaminated, outdated, prematurely opened, diluted materials, or materials which have exceeded their shelf life.

1.8 COORDINATION OF WORK

A. Work Areas: The work areas on the job site will be designated by the Engineer. The Contractor's personnel shall not be permitted in any area other than those expressly designated by the Engineer.

B. Coordination: The contractor shall coordinate with the Engineer regarding availability of work areas, completion times, safety, access and other factors, which can impact plant operations.

1.9 SAFETY

A. The Contractor's work forces should comply with the provisions outlined in the following documents:
   1. SSPC-PA-3 "A Guide to Safety in Paint Application"
   2. NACE Pub. "A Manual for Painter Safety"

B. The Contractor shall provide personnel with all safety equipment necessary to protect them during any phase of the work. This shall include, but not be limited to safety glasses, goggles, earplugs, hard hats, steel toed work shoes, appropriate personal protective clothing, gloves, and plant approved escape respirators (where required).

C. No work shall be performed until the appropriate Work Requests and lockouts are approved by the Engineer. The Work Request system provides a mechanism to advise plant staff of a contractor's work activities. The Lockout system is a safety procedure to prevent unintended equipment activation.

D. Keep any flammable materials such as cleaning solvents, thinners, or resurfacing materials away from open flames, sparks or temperatures higher than 150°F. Drums containing flammable materials will be grounded. No solvent in any quantity shall be allowed inside containment enclosures or permitted confined spaces at any time during resurfacing work.

E. Power tools are to be in good working order to avoid open sparking. No spark producing tools shall be utilized in restricted areas as indicated herein.

F. The Contractor shall fireproof all work areas by maintaining a clean work area and having Underwriter's Laboratories approved fire extinguishers on-hand. The Contractor shall furnish these fire extinguishers.

G. Workers doing abrasive blasting operations shall wear a fresh air supplied protective helmet and hood and personal protective clothing acceptable to industry standards and all government regulations.

H. Dispose of rags used for wiping up resurfacing materials, solvents, and thinners by drenching them with water and placing in a metal container with a tight fitting metal cover. Complete this disposal process at the end of each day. Final disposal of these materials is the Contractor's responsibility.

I. Matches, smoking, flames, or sparks resulting from any source including welding, must be remote from the work area during coating work. Smoking is permitted only in designated areas of the plant.

1.10 JOB CONDITIONS:

A. Work involved in installing protective lining for concrete shall be performed by a qualified Tnemec (or approved equal) applicator at the precaster's offsite facility.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Materials specified are those that have been evaluated for the specific service. Products of the Tnemec Company, Inc. are listed to establish a standard of performance and quality. Equivalent materials of other manufacturer's may be submitted on written approval of the Engineer. As part of the proof of equality, the Engineer will require at the cost of the Contractor, certified test reports from a nationally known, reputable and independent testing laboratory conducting comparative tests as directed by the Engineer between the product specified and the requested substitution.

B. Requests for substitution shall include manufacturer's literature for each product giving name, product number, generic type, descriptive information, solids by volume, recommended dry film thickness and certified lab test reports showing results to equal the performance criteria of the products specified herein. In addition, a list of five projects shall be submitted in which each product has been used and rendered satisfactory service.

C. All requests for product substitution shall be made at least 10 days prior to the bid date.

D. Any material savings shall be passed to the owner in the form of a contract dollar reduction.

2.2 MATERIALS

A. Epoxy Lining System

1. Materials specified herein are the only approved standard coating systems unless an "approved equal" is approved in writing by the Engineer 1 week prior to the bid date.
2. The following list specifies the material requirements for resurfacing systems. The approved products are as follows:
   a. Lining: Tnemec Series 434 Perma-Shield H2S

B. Sealants (Not Used)

C. Abrasive Blast Media
1. If dry or wet abrasive blast cleaning is the selected method of surface preparation, provide slag grit of a sieve size, gradation, and quality necessary to produce the degree of cleanliness and surface profile required herein.

PART 3 - EXECUTION

3.1 GENERAL

A. Hoisting, Scaffolding, Staging, And Planking:
1. Provide, set-up, and maintain all required hoists, scaffolds, and staging and planking, and perform all access related hoisting work required to complete the Work of this section as indicated and specified.
2. Scaffolds shall have solid backs and floors to prevent dropping materials from there to the floors or ground below.

B. Environmental Requirements:
1. Comply with the Manufacturer's recommendations as to environmental conditions under which resurfacing system materials can be applied.
2. Do not apply resurfacing system materials when dust is in work site.
3. The Contractor shall provide all temporary lighting during the work.

C. Protection:
1. Cover or otherwise protect finish work or other surfaces not being resurfaced.
2. Erect and maintain protective tarps, enclosures and/or maskings to contain debris (such as dust or airborne particles resulting from surface preparation) generated during any and all work activities. This includes, but is not limited to the use of dust/debris collection apparatus as required.

D. Initial Inspection Of Surfaces To Be Coated:
1. It is the responsibility of the Contractor to inspect and report unacceptable concrete substrate surface conditions to the Engineer prior to the commencement of surface preparation activities. Unacceptable surface conditions are defined as the presence of cracked surfaces or concrete deteriorated to a depth of greater than 1" or otherwise unable to withstand surface preparation as specified herein.

E. Thinners And Solvents:
1. The Contractor shall use only solvents and thinners as recommended by the Manufacturer.

3.2 SURFACE PREPARATION REQUIREMENTS

A. General:
1. All specified surface preparation shall be performed in accordance with the latest version of the SSPC, NACE, ICRI and other standards referenced in this section.

2. Concrete surfaces shall be prepared in accordance with SSPC-SP 13 / NACE 6, Reference ICRI CSP 5-6 visual standards for appropriate surface profile. This preparation will be followed by vacuum cleaning to remove all dust, dirt or friable substances leaving clean, dust free surfaces for resurfacing.
3. Oil and grease shall be removed before mechanical cleaning is started via an alkaline-based emulsifying detergent as recommended by the resurfacing material manufacturer. Where mechanical cleaning is accomplished by blast cleaning, the abrasive used shall be washed, graded and free of contaminants that might interfere with the adhesion of the resurfacing materials.
4. The air used for blast cleaning shall be free of oil and moisture to not cause contamination of the surfaces to be resurfaced.
5. Clean cloths and clean fluids shall be used in solvent cleaning.
6. Cleaning and resurfacing shall be scheduled so that dust and other contaminants from the cleaning process will not fall on wet, newly resurfaced areas.
7. Prepare concrete joint and install sealant following resurfacing material installation per protective lining manufacturer's recommendations.

B. Abrasive Blast Cleaning
1. Used or spent blast abrasive shall not be reused on work covered by this section.
2. The compressed air used for blast cleaning will be filtered free of condensed water or oil. Moisture traps will be cleaned at least once every four hours or more frequently as is appropriate.
3. Oil separators shall be installed just downstream of compressor discharge valves and at the discharge of the blast pot discharges. Oil separators shall be cleaned at least once every four hours or more frequently as is appropriate.
4. A paper blotter test shall be performed by the Contractor when requested by the Engineer or the Engineer's representative to determine if the air is sufficiently free of oil and moisture.
5. Regulators, gauges, filters, and separators will be in good working order for all of the compressor air lines to blasting nozzles at all times during this work.
6. An air dryer or drying unit shall be installed which dries the compressed air prior to blast connections. This dryer shall be used and maintained for the duration of surface preparation work.
7. The quality, volume, and velocity of life support and ventilation air used during surface preparation shall be in accordance with applicable safety standards and as required to ensure adequate visibility and proper dissipation of volatiles without impacting the prepared surface or the health of the public or personnel working for the Contractor, Subcontractors, Engineer, Engineer's Representatives, or anyone who may be affected by on-site maintenance coating work activities.
8. The abrasive blast nozzles used shall be the venturi or other high velocity type supplied with a minimum of 100 psig air pressure and the necessary volume to obtain the required blast cleaning production rates and specified degree of cleanliness.
9. The Contractor must provide adequate ventilation for airborne particulate evacuation and lighting (meeting all pertinent safety standards) to optimize visibility for both blast cleaning and observation of the substrate during surface preparation work.
10. All phases of surface preparation work specified herein must be inspected by the Engineer before the Contractor proceeds with the subsequent phase of surface preparation.
11. If, between final surface preparation work and coating application, contamination of the prepared and cleaned substrate occurs, or if the prepared concrete's appearance darkens or changes color, reblasting will be required until the specified degree of cleanliness is established.

3.3 APPLICATION REQUIREMENTS

A. General:
1. Areas not to be resurfaced shall be masked using dust tape or other protection materials to prevent these surfaces from being resurfaced.
2. Ensure straight even termination of resurfacing/topcoat materials on wall edges and flush with embedded steel. The Contractor must follow the minimum and maximum single coating thickness.

3. Limitation times and related temperature range restrictions between successive lifts for all products specified herein per Manufacturer's stated requirements.
4. All equipment and procedures used for resurfacing system application shall be as recommended by the Manufacturer. Unless specified elsewhere herein, the Contractor shall comply with the Manufacturer's most recent written instructions with respect to the following:
   a. Mixing of All Materials.
   b. Protection and Handling of All Materials.
   c. Recoat Limitation and Cure Times.
   d. Minimum Ambient and Substrate Temperatures, Substrate's Degree of dryness, Relative Humidity, and Dew Point of Air.
   e. Application.
   f. Final Curing.
   g. Use of Proper Application Equipment.
5. Curing of Resurfacing System:
   a. The applied resurfacing system shall be protected from damage during curing and shall be cured as recommended by the Manufacturer. Ambient conditions shall be controlled by the Contractor during curing to ensure the minimum air temperature and minimum relative humidity as required by the Manufacturer is maintained.

B. Patching And Surfacing The Concrete:
   1. Repair spalls and deep bugholes with Tnemec Series 218 MortarClad (or approved equal) at a maximum of ½"

C. Chemical Resistant Lining
   1. General Note: The Contractor is advised that with all thick-film, quick curing materials applied to concrete surfaces, outgassing of the concrete can occur. Possible remedies include applying materials when the temperature of the concrete surfaces are descending, or applying a thin (1/8") layer of the specified surfacing material. Other remedies may exist, and may be submitted for the Engineer's approval.
   2. Apply Tnemec Series 434 Perma-Shield chemical resistant lining to all ceiling, wall and floor areas scheduled to be coated at a nominal thickness of 125 mils. Application shall be either by trowel or spray. If spray applied, material shall be finish-troweled to a hard, dense film.

D. Safety And Ventilation Requirements:
   1. Requirements for safety and ventilation shall be in accordance with SSPC Paint Application Guide No. 3.

3.4 FIELD QUALITY CONTROL INSPECTION AND TESTING

A. Inspection by the Engineer or others does not limit the Contractor's responsibilities for quality control inspection and testing as specified herein or as required by the Manufacturer's instructions.

B. Perform the quality control procedures listed below in conjunction with the requirements of this Section.
   1. Inspect all materials upon receipt to ensure that all are supplied by the Manufacturer.
   2. Provide specified storage conditions for the resurfacing system materials, solvents, and abrasives.
   3. Inspect and record findings for the degree of cleanliness of substrates using. The pH of the concrete substrate will be measured using pH-indicating papers. pH testing is to be performed once every 50 sq. ft. Acceptable pH values shall be between 10.0 and 11.0 as measured by a full range (1-12) color indicating pH paper with readable color calibrations and a scale at whole numbers (minimum). Use Hydrion Insta-Check Jumbo 0-13 or 1-12 or equal. The paper shall be touched to the surface once using moderate gloved finger pressure. The surface shall not be wiped or moved laterally to disturb the surface during pH testing. Following the one touch, lift the paper vertically to not "wipe" the surface. Compare the color indicated with the scale provided and record the pH.

4. Inspect and record substrate profile (anchor pattern). Surfaces shall be abraded, as a minimum, equal to the roughness of 40 grit sand paper.
5. Measure and record ambient air temperature once every two hours of each shift using a thermometer and measure and record substrate temperature once every two hours using a surface thermometer.
6. Measure and record relative humidity every two hours of each shift using a sling psychrometer in accordance with ASTM E337.
7. Provide correct mixing of resurfacing materials in accordance with the Manufacturer's instructions.
8. Inspect and record that the "pot life" of resurfacing materials are not exceeded during installation.
9. Verify curing of the resurfacing materials in accordance with the Manufacturer's instructions.
10. Upon full cure of the mortar and lining material, the installed system shall be checked by high voltage spark detection in accordance with NACE RP0188-88BN to verify a pinhole-free surface. Voltage shall be set at 11,000 volts. Areas, which do not pass the spark detection test, shall be corrected at no cost to the Owner and rechecked.
11. Upon completion of the lining system installation the lined area shall be cleaned and prepared to permit close visual inspection by the Engineer or the Engineer's Representative. Any and all deficiencies or defective work (not in compliance with this section or related sections) will be marked for repair or removal/replacement by the Contractor at no additional cost to the Owner.

3.5 ACCEPTANCE CRITERIA

A. Acceptance Criteria For Surface Preparation Work:
   1. All surfaces shall be prepared in accordance with the specification and referenced standards therein.

B. Acceptance Criteria for Coating System Application Work
   1. Acceptable coating work will be based upon the following:
      a. No pockmarks, trowel marks, depressions, unconsolidated areas, waviness or ridges, pinholes or holidays in either size or frequency.
      b. Proper curing of coatings.
   2. Resurfaced areas shall pitch to drains.
   3. There shall be no areas that puddle when flood tested.
   4. The Engineer or Engineer's Representative shall, at their discretion, inspect the following:
      a. Profile and degree of cleanliness of substrate.
      b. Thickness of materials/coverage rate confirmation.
      c. Ambient temperature and humidity requirements, and substrate temperature.
      d. Curing and recoat times.
      e. Proper curing of the resurfacing materials.
   5. Rework required on any holidays or any other inadequacies found by the Engineer or the Engineer's representative in the quality of the coating work should be marked. Such areas shall be recleaned and reworked by the Contractor according to these specifications and the manufacturer's recommendations at no additional cost to the Owner.
   6. The Contractor is responsible for keeping the Engineer informed of all progress so that inspection for quality can be achieved.
   7. The Contractor is ultimately responsible for the quality performance of the applied materials and workmanship. Inspections by the Engineer or the Engineer's Representative do not limit this responsibility.

3.6 FINAL INSPECTION

A. Perform a final inspection to determine whether the resurfacing system work meets the requirements of the specifications. The Engineer and the Engineer's Representative will conduct final inspection with the Contractor.

3.7 CLEANUP

A. Upon completion of work, the Contractor shall remove surplus materials, equipment, protective coverings, and accumulated rubbish, and thoroughly clean all surfaces and repair any work-related damage. The surrounding surface areas including roadways, and all other surfaces shall be restored to their pre-project condition.

END OF SECTION 099659

C

ATTACHMENT C

Geocomposite Drainage Layer Flow Rate Calculations

C.T. MALE ASSOCIATES
50 Century Hill Drive
Latham, NY 12110

JOB: Geocomposite Drainage Layer Flow Rate
SHEET NO. 1 OF 2
CALCULATED BY: TM DATE:
CHECKED BY: DATE:
SCALE

- Estimate maximum flow that geocomposite drainage layer can safely convey @ each pond

- Estimate hydraulic gradient, i, @ each site

East Pond

$$\bar{i} = \frac{\Delta h}{\Delta x} = \frac{834\,ft - 812\,ft}{311\,ft} = 0.071$$

From Product Lab Testing Sheet, for $\bar{i} = 0.071$, get transmissivity (Θ) of $0.01\ m^2/s$, or $6.5\ ft^2/min/ft$ ($48.6\ gal/min/ft$)

Estimate $\bar{Q}$ as $\bar{Q} = \Theta \times i$

$$\bar{Q}_{east} = 48.6\ gal/min/ft \times 0.071$$

$$\bar{Q}_{east} = 3.45\ gal/min/ft$$

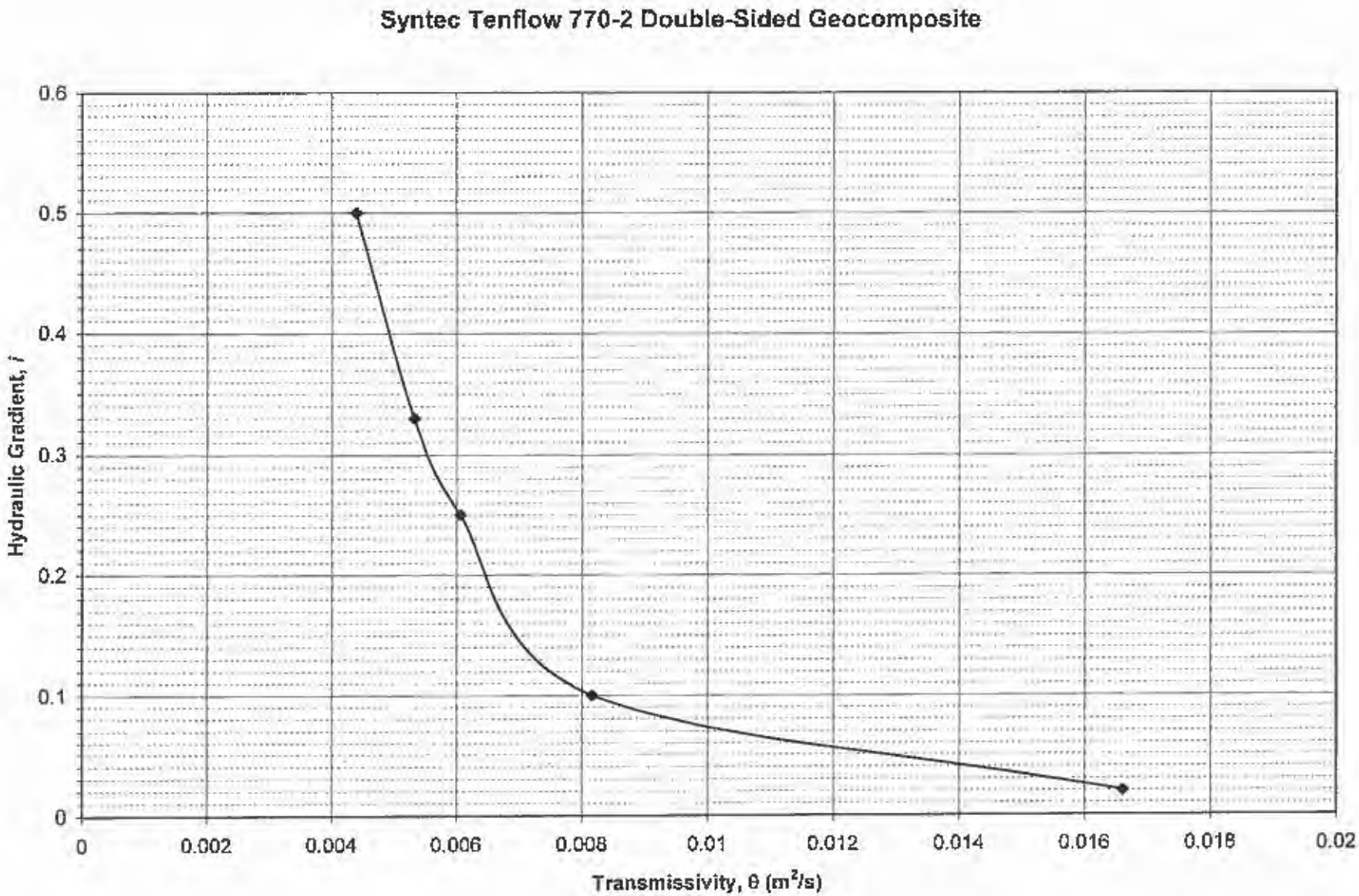
West Pond

$$\bar{i} = \frac{\Delta h}{\Delta x} = \frac{1035 - 1000\,ft}{649\,ft} = 0.054$$

For $\bar{i} = 0.054$, $\Theta = 0.012\ m^2/s$, or $7.75\ ft^2/min/ft$ ($58\ gal/min/ft$)

$$\bar{Q}_{west} = 58\ gal/min/ft \times 0.054$$

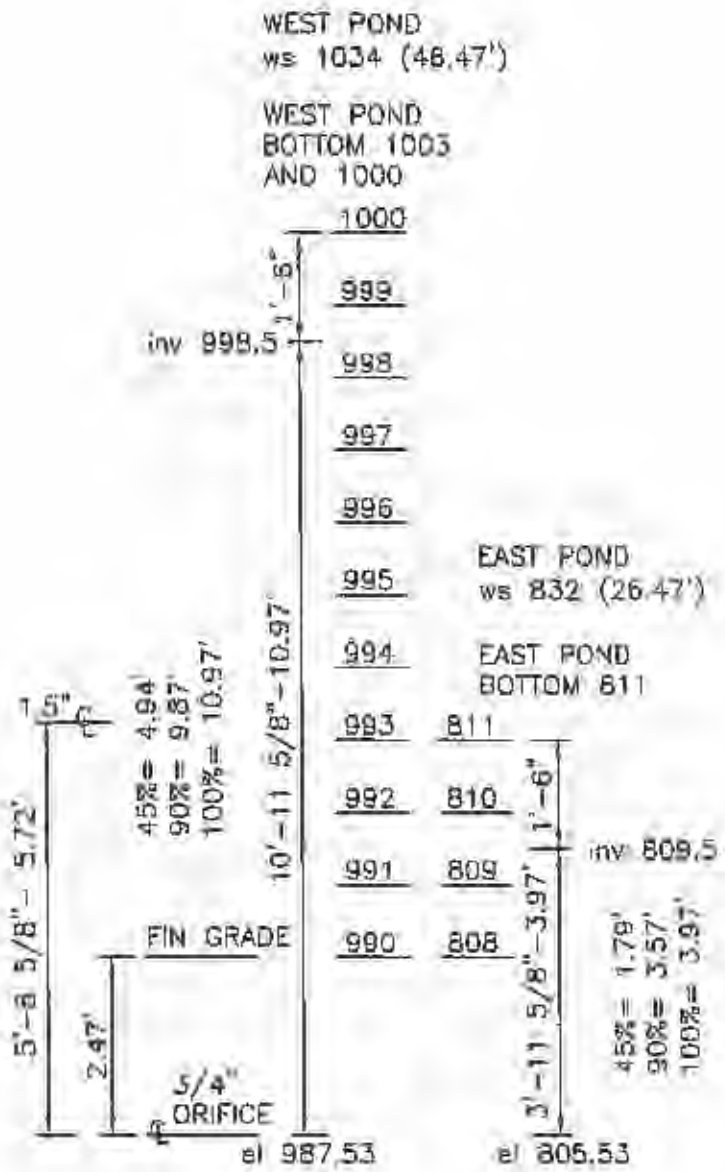
$$\bar{Q}_{west} = 3.132\ gal/min/ft$$


Syntec Tenflow 770-2 Double-Sided Geocomposite
Hydraulic Gradient, i
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.002
0.004
0.006
0.008
0.01
0.012
0.014
0.016
0.018
0.02
Transmissivity, θ (m²/s)

D

ATTACHMENT D

Operational Threshold Rate Calculations



HEAD / ELEVATION SCHEMATIC

Discharge from Detention Basin in GPM
Low Flow Orifice

h (FT)	Orifice Diameter (Inches) 1	1.5	2	2.5	3	4	6	8
0.5	8.3	18.8	33.3	52.1	75.0	133.4	300.0	533.4
1	11.8	26.5	47.1	73.7	106.1	188.6	424.3	754.4
1.5	14.4	32.5	57.7	90.2	129.9	231.0	519.7	923.9
2	16.7	37.5	66.7	104.2	150.0	266.7	600.1	1066.8
2.5	18.6	41.9	74.5	116.5	167.7	298.2	670.9	1192.6
3	20.4	45.9	81.7	127.6	183.7	326.7	735.0	1306.6
3.5	22.1	49.6	88.2	137.8	198.5	352.8	793.9	1411.3
4	23.6	53.0	94.3	147.3	212.2	377.2	848.7	1508.7

(1) - Based on Q = C a (2*g*h)^1/2

where:

C = orifice coefficient, assumed 0.600 (King's handbook of hydraulics)

a = cross sectional area of orifice (sq ft)

g = gravitational constant (32.2 ft/sec^2)

h = height above center of orifice

EAST BRINE POND ONE PIPE

	45% 1	90% 2	3	4	5
Enter height above center of orifice (ft.) -->	1.79	3.57			
Enter Orifice diameter (inches) -->	0.75	0.75			
Discharge flow from detention basin in GPM =	8.9	12.5			

45% TOTAL 8.9 GPM 90% TOTAL 12.5 GPM

Discharge from Detention Basin in GPM
Low Flow Orifice

h (FT)	Orifice Diameter (Inches) 1	1.5	2	2.5	3	4	5	6
0.5	8.3	18.8	33.3	52.1	75.0	133.4	300.0	533.4
1	11.8	26.6	47.1	73.7	106.1	188.6	424.3	754.4
1.5	14.4	32.5	57.7	90.2	129.9	231.0	519.7	923.9
2	16.7	37.5	66.7	104.2	150.0	266.7	600.1	1066.8
2.5	18.6	41.9	74.5	116.5	167.7	298.2	670.9	1192.8
3	20.4	45.9	81.7	127.6	183.7	326.7	735.0	1306.6
3.5	22.1	49.6	88.2	137.8	198.5	352.8	793.9	1411.3
4	23.6	53.0	94.3	147.3	212.2	377.2	848.7	1508.7

(1) - Based on Q = C a (2*g*h)^1/2
where:
C = orifice coefficient, assumed 0.600 (King's handbook of hydraulics)
a = cross sectional area of orifice (sq ft)
g = gravitational constant (32.2 ft/sec^2)
h = height above center of orifice

WEST BRINE POND TWO PIPES

	45% 1	90% 2	90% 1.5" 3	4	5
Enter height above center of orifice (ft.) -->	4.94	9.87	4.15		
Enter Orifice diameter (inches) -->	0.75	0.75	1.5		
Discharge flow from detention basin in GPM =	14.7	20.8	54.0		

45% TOTAL 14.7 GPM 90% TOTAL 74.5 GPM

E

ATTACHMENT E

Cut/Fill Analysis

XREFS: BBLOCK.DWG, NGK MAX8D4.0 BOTTOM GRADING.DWG

PROJECT NUMBER:08.8696

Index	Base Surface	Comparison Surface	Cut	Fill	Net	Cut Factor	Fill Factor	Cut (adjusted)	Fill (adjusted)	Net (adjusted)
1	Existing Ground	Eastpond-combinedFG	53854.40 Cu. Yd.	23664.77 Cu. Yd.	30189.63 Cu. Yd.<Cut>	1.000	1.000	53854.40 Cu. Yd.	23664.77 Cu. Yd.	30189.63 Cu. Yd.<Cut>

RECEIVED
AUG 22 2012
DEP-REGION 8

PERMIT PLANS

BAR SCALE
0 15 30 60
1 inch = 30 ft.

T. JAMES HOUSTON
NYS PE NO. 063618

DATE	REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			

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C.T. MALE ASSOCIATES

DESIGNED : TJH
DRAFTED : MLG
CHECKED : ELV / TJH
PROJ. NO: 08.8696
SCALE : 1"=20'
DATE : AUG 20, 2012

CUT-FILL VOLUMES - EAST POND

FINGER LAKES LPG STORAGE, LLC
EAST AND WEST BRINE PONDS

TOWN OF READING — SCHUYLER COUNTY, N.Y.

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 * FAX 518.786.7299

V1
SHEET 1 OF 2
DWG. NO: 12-0254

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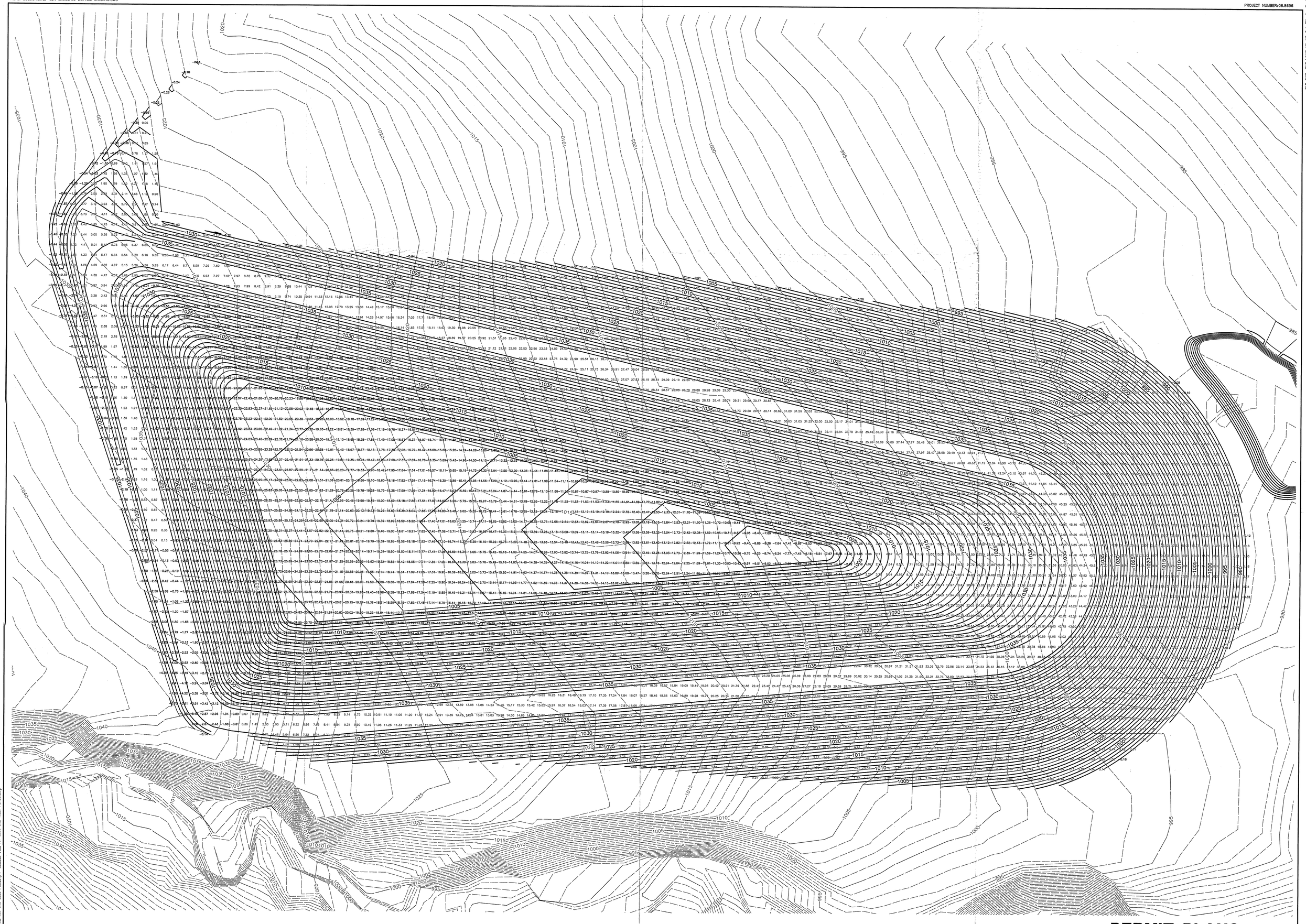
CAD DWG. FILE NAME: K:\Projects\08696FL\LD\C_West and East Ponds\V1-V2_Cut-Fills for East and West Ponds.dwg

CAD DWG. FILE NAME: V1-V2_Cut-Fills for East o

XREFS: BBLOCK.DWG, NGK MAXB04.0 BOTTOM GRADING.DWG

PROJECT NUMBER:08.8696



Index	Base Surface	Comparison Surface	Cut	Fill	Net	Cut Factor	Fill Factor	Cut (adjusted)	Fill (adjusted)	Net (adjusted)
2	Existing Ground	combinedfg	75144.65 Cu. Yd.	207543.00 Cu. Yd.	132398.35 Cu. Yd.<Fill>	1.000	1.000	75144.65 Cu. Yd.	207543.00 Cu. Yd.	132398.35 Cu. Yd.<Fill>

BAR SCALE
0 15 30 60
1 inch = 30 ft.

PERMIT PLANS

T. JAMES HOUSTON
NYS PE NO. 063618

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.
	1				
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C.T. MALE ASSOCIATES

DESIGNED : NGK
DRAFTED : NGK
CHECKED : ELV / TJH
PROJ. NO: 08.8696
SCALE : 1"=30'
DATE : AUG 20, 2012

CUT-FILL VOLUMES -WEST POND

RECEIVED
AUG 22 2
DEP-REGION 8

FINGER LAKES LPG STORAGE, LLC
EAST AND WEST BRINE PONDS

TOWN OF READING
SCHUYLER COUNTY, N.Y.

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, P.C.
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V2

SHEET 2 OF 2
DWG. NO:12-0254

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CAD DWG. FILE NAME: K:\Projects\08696NE\LD\G_West and East Ponds\V1-V2_Cut-Fills for East and West Ponds.dwg

F

ATTACHMENT F

Earthwork Specifications

SECTION 310000 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Site Restoration: Section 310101.

B. Rock Removal: Section 312316.

C. Topsoil: Section 329120.

D. Seeding: Section 329219.

1.2 DEFINITIONS

A. The following terms shall have the meanings ascribed to them in this Article, wherever they appear in this Section.

1. Earth Excavation: The removal of all surface and subsurface material not classified as rock (as defined below).
2. Rock: Limestone, sandstone, shale, granite, and similar material in solid beds or masses in its original or stratified position which can be removed only by blasting operations, drilling, wedging, or use of pneumatic tools, and boulders with a volume greater than 1.0 cu yd. Concrete building foundations and concrete slabs, not indicated, with a volume greater than 1.0 cu yd shall be classified as rock.
   a. Limestone, sandstone, shale, granite, and similar material in a broken or weathered condition which can be removed with an excavator or backhoe equipped with a bucket with ripping teeth or any other style bucket shall be classified as earth excavation.
   b. Masonry building foundations, whether indicated or not, shall be classified as earth excavation.
3. Subgrade Surface: Surface upon which subbase or topsoil is placed.
4. Subbase: Subbase course Type 2 which is placed for access roads.
5. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at "Optimum Moisture Content" when determined by ASTM D 698 (Standard Proctor).
6. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
7. Landscaped Areas: Areas outside of embankments.
8. Unauthorized Excavation: The removal of material below required elevation indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by the Engineer.
9. Grading Limit Line (Shown on Drawings): Limits of grading, excavations and filling required for the work of this contract. Unless specifically noted otherwise, the Grading Limit Line and Contract Limit Line shall be considered the same.

1.3 SUBMITTALS

A. Product Data:

1. Filter Fabric: Manufacturer's catalog sheets, specifications, and installation instructions.

B. Samples: Submit samples as follows. Take the samples in the presence of the Director's Representative, and submit to the Engineer the laboratory test results for gradation, proctors and soundness tests, when required. These tests shall be performed in accordance with ASTM standards, shall be performed and signed by a certified soils laboratory, and shall be submitted as part of the original submittal. At a minimum the samples taken shall be of the following quantities:
   1. Run-of-Bank Sand & Gravel: 40 - 50 lb.
   2. Subbase Course Type 2: 50 - 60 lb. (Two Samples).
   3. Crushed Stone: 30 lb (Each Gradation).

C. Quality Control Submittals:
   1. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for the Director's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.
   2. Subbase Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
   3. Other Aggregates: Name and location of source and soil laboratory test results.

1.9 PROJECT CONDITIONS

A. Cold Weather Requirements:
   1. Excavation: When freezing temperatures are anticipated, do not excavate to final required elevations for concrete work unless concrete can be placed immediately.
   2. Backfilling: If backfill is being placed during freezing temperatures the backfilling operations shall be monitored by the Engineer and the following procedures shall be followed:
      a. Frozen ground shall be removed in its entirety from beneath the area of fill placement.
      b. The fill material placed shall consist of on-site soils excavated from areas of cut or imported run-of-bank sand & gravel and shall be free of all frozen chunks that exceed four inches in size. Material transported to the project site shall only consist of material excavated from below the frost depth.
      c. At the end of the work day, the area of fill placement shall be covered with insulated blankets, or left unprotected. Other means of protection (hay, wood chips, etc.) may also be used for protection provided it is approved by the Engineer.
      d. Following work day, remove the insulated blankets and/or strip the area of all frozen material as specified previously.
      e. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the exposed earth surface from frost. This additional fill or protective material shall be stripped just prior to pouring concrete.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Run-of-Bank Sand & Gravel: Sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
4 inch	101.6	100
No. 40	0.425	0-70
No. 200	0.075	0-15

B. Subbase Course Type 1: Stockpiled, crushed ledge rock or approved blast furnace slag. Comply the gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	25-60
No. 40	0.425	5-40
No. 200	0.075	0-10

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

C. Suitable Material (Fill and Backfill): On-site soils excavated from areas of cut. Maximum particle size shall not exceed 12 inches. NOTE: Material containing cinders, industrial waste, sludge, building rubble, land fill, muck, and peat shall be considered unsuitable for fill and backfill, except topsoil and organic silt may be used as suitable material in landscaped areas provided it is placed in the top layer of the subgrade surface.

D. Rip Rap: Fine, Light, Medium or Heavy Stone Filling that complies with DOT Article 620-2.02 for stone filling.

E. No. 1 Coarse Aggregate: Crushed Stone that complies with material requirements of DOT Article 703-02 and meets the following gradation:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1 inch	25.4	100
1/2 inch	12.7	90-100
1/4 inch	6.35	0-15

F. No. 1A Coarse Aggregate: Crushed Stone that complies with material requirements of DOT Article 703-02 and meets the following gradation:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1/2 inch	12.7	100
¼ inch	6.35	90-100
1/8 inch	3.18	0-15

G. No. 2 Coarse Aggregate: Crushed Stone that complies with material requirements of DOT Article 703-02 and meets the following gradation:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1-1/2 inch	38.1	100
1 inch	25.4	90-100
1/2 inch	12.7	0-15

2.2 GEOTECHNICAL FABRICS

A. Filter Fabric (GeoTextile)
   1. Drainage and Erosion Control: Propex 401 & 601, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.
   2. Heavy duty non-woven geotextile drainage fabric for installation beneath the textured 60 mil HDPE geomembrane: Mirafi 180N (24 oz/SY) or equivalent. Interface friction testing shall be performed and reported by the General Contractor in accordance with Section 014529.1.

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

A. Clear and grub the site within the Grading Limit Line (GLL) of trees, shrubs, brush, other prominent vegetation, debris, and obstructions except for those items indicated to remain. Completely remove stumps and roots protruding through the ground surface.

B. Fill depressions caused by the clearing and grubbing operations in accordance with the requirements for filling and backfilling, unless further excavation is indicated.

3.2 EXCAVATION

A. Excavate earth as required for the Work.

B. Install and maintain all erosion and sedimentation controls during all earthwork operations as specified on the Contract Drawings or as directed by local officials. If the erosion and sedimentation controls specified by the local officials are more stringent than those specified on the Contract Drawings contact the Engineer.

C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).
   1. Trenches: Deposit excavated material on one side of trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.

D. Stockpile excavated materials classified as suitable material where directed, until required for fill. Place, grade, and shape stockpiles for proper drainage as approved by the Engineer.

E. Excavation for Structures: Conform to elevations, lines, and limits indicated. Excavate to a vertical tolerance of plus or minus 1 inch. Extend excavation a sufficient lateral distance to provide clearance to execute the Work.

F. Pipe Trenches and/or Bell and Spigot Pipe Trenches: Open only enough trench length to facilitate laying pipe sections. Unless otherwise indicated on the Drawings, excavate trenches approximately 24 inches wide plus the outside pipe diameter, equally divided on each side of pipe centerline. Cut trenches to cross section, elevation, profile, line, and grade indicated. Accurately grade and shape trench bottom for uniform bearing of pipe.

1. Trench in Rock: Excavate an additional 6 inches below bottom of pipe for pipe bedding material.

G. Piping (other than Bell and Spigot): Provide sufficient trench width for installation and to accommodate special backfill when specified.

H. Open Swales: Cut swales to cross sections and grades indicated.

I. Unauthorized Excavations: Unless otherwise directed, backfill unauthorized excavation with compacted suitable material.

J. Notify the Engineer upon completion of excavation operations. Do not proceed with the Work until the excavation is inspected and approved. Inspection of the excavation by the Engineer will be made on 3 working days notice.

3.3 DEWATERING

A. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.

B. Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of excavation bottoms and soil changes detrimental to the stability of subgrade. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site until underdrain system is completed and operational.

C. Convey water removed from excavations, and rain water, to collecting or run-off area. Cut and maintain temporary drainage ditches and provide other necessary diversions outside excavation limits. Do not use trench excavations as temporary drainage ditches.

D. Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

3.4 PLACING FILTER FABRIC

A. Place and overlap filter fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.

B. Cover tears and other damaged areas with additional filter fabric layer extending 3 feet beyond the damage.

C. Do not permit traffic or construction equipment directly on filter fabric.

3.5 PLACING FILL AND BACKFILL

A. Surface Preparation of Fill Areas: Strip topsoil, remaining vegetation, and other deleterious materials prior to placement of fill. Prior to placement of fill, smooth out and compact areas where wheel rutting has occurred due to stripping or earthwork operations.

B. Excavations: Backfill as promptly as practicable, but only after approval by the Engineer.

C. Place backfill and fill materials in layers not more than 12 inches thick in loose depth unless otherwise specified. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or covered with ice. Do not use material containing rocks over four inches in diameter.
   1. For Open Graded Stone/Clean Stone (No. 1 crushed stone, No. 2 crushed stone, etc.) with thickness in excess of six inches: Material must be wrapped in separation fabric.

D. Prevent wedging action of backfill against structures by placing backfill uniformly around structure to approximately same elevation in each layer.

E. Plastic Pipe in Trenches: Place cushion material a minimum of six inches deep under pipe, 12 inches on both sides, and 12 inches above top of pipe. Complete balance of backfill as specified.

3.6 COMPACTION

A. All materials with exception of open graded stone (No. 1 crushed stone, No. 2 crushed stone, etc.):
   1. Compact each layer of fill and backfill to 95 percent of the material's maximum dry density and at a moisture content at or within three percent below the optimum moisture content as determined by ASTM D 698 (Standard Proctor).
   2. If a compacted layer fails to meet the specified percentage of maximum density, the layer will be re-compacted and retested. If compaction cannot be achieved the material/layer will be removed and replaced. No additional material may be placed over a compacted layer until the specified density is achieved

B. Open graded Stone (No. 1 crushed stone, etc): Place material in maximum twelve inch lifts. Each lift shall be raked smooth and compacted through several passes of a walk behind vibratory roller. Compaction Testing is <u>not</u> required.

3.7 GRADING

A. Rough Grading: Trim and grade area within the Grading Limit Line and excavations outside the limit line, required by this Contract, to a level of four inches below the finished grades indicated unless otherwise specified herein or where greater depths are indicated. Provide smooth uniform transition to adjacent areas.

B. Finish Grading: Finish surfaces free from irregular surface changes, and as follows:
   1. Grassed Areas: Finish areas to receive topsoil to within 1 inch above or below the required subgrade surface elevations.
   2. Roads: Place and compact subbase material as specified. Shape surface of areas to required line, grade and cross section, with the finish surface not more than 1/2 inch above or below the required subbase elevation.

C. Spread approved topsoil directly upon prepared subgrade surface to a depth measuring 4 inches after natural settlement of the topsoil has occurred in areas to be seeded or to receive sod. Place to greater depth when necessary to adjust grades to required elevations.

1. Approved existing topsoil within the Grading Limit Line may be used. Provide additional topsoil from outside sources as required.

D. Finish topsoil surface free of depressions which will trap water, free of stones over 1 inch in any dimension, and free of debris.

3.8 RESTORATION

A. Restore roads, lawns, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

B. Topsoil and seed or sod damaged lawn areas outside the GLL and new lawn areas inside the GLL. Water as required until physical completion of the Work.

3.9 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

A. Transport excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements, to spoil areas on Client property designated by the Client, and dispose of such materials as directed.

3.10 FIELD QUALITY CONTROL

A. Compaction Testing: Compaction testing will be performed by the Engineer to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on a frequent basis to ascertain that the compaction specification is being met. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

3.11 PROTECTION

A. Protect graded areas from traffic and erosion, and keep them free of trash and debris.

END OF SECTION 310000

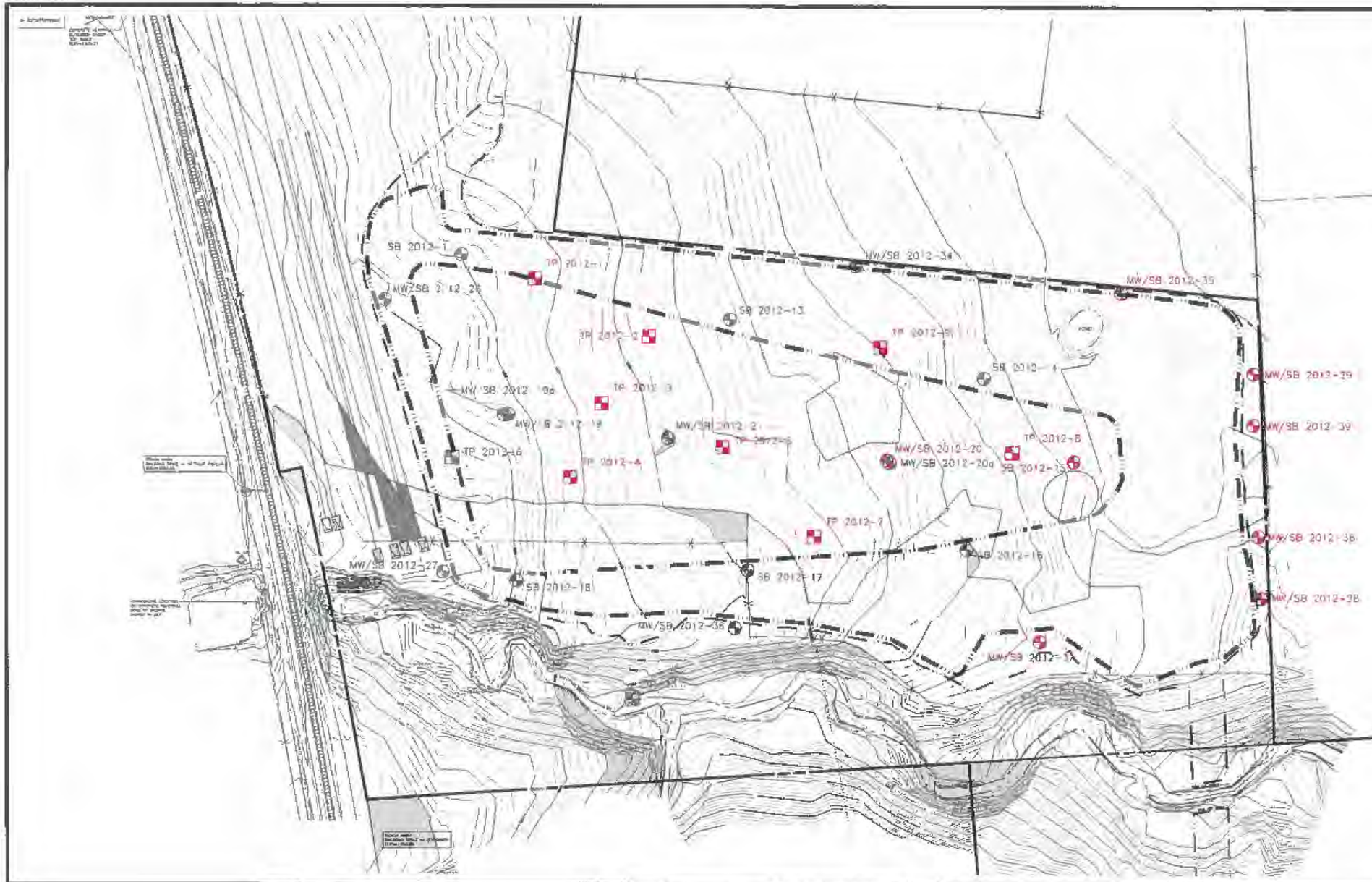
G

ATTACHMENT G

Locations of Sand at West Pond Site

XREFS: NONE

PROJECT NUMBER: 08.8696



NOTES:

1. LOCATIONS SHOWN IN RED ENCOUNTERED GRANULAR SOILS DURING ADVANCEMENT / EXCAVATION. THOSE IN GRAY DID NOT ENCOUNTER GRANULAR SOILS.
2. ONLY AT LOCATIONS MW 2012-28, 29, 38, 39 WERE SAND SEAMS ENCOUNTERED WHICH CONTAINED TRACE TO LITTLE AMOUNTS OF SILT.

CAD DWG. FILE NAME/FILENAME

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
	1				
	2				
	3				
	4				
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DESIGNED : TJM
DRAFTED : MLG
CHECKED : RCW
PROJ. NO: 08.8696
SCALE : 1"=150'
DATE : AUG. 13, 2012

LOCATION OF SEAMS OR POCKETS OF GRANULAR SOILS

FINGER LAKES LPG STORAGE, LLC EAST AND WEST BRINE PONDS

TOWN OF READING — SCHUYLER COUNTY, N.Y.

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 • FAX 518.786.7299

LS

SHEET 1 OF 01

DWG. NO: 12-0254

CAD DWG. FILE NAME/FILENAME

Locations Encountering Sand at West Brine Pond Site

Investigated Location	Existing Ground Surface Elevation (feet)	Proposed Ground Surface Elevation (feet)	Depth to Top of Layer (feet)	Thickness of Layer (feet)	Soil Description	Height of Embankment (feet)	Remarks
SB2012-15	993.2	1014	9	0.5	Fine SAND, trace to little silt	45 (east)	
SB2012-20	1007.64	999	4	7	Fine to Medium SAND, little silt, trace gravel, grading to fine SAND, little coarse sand and gravel at 10'	45 (east), 27 (north), 31 (south)	Nearly all removed during excavation
SB2012-28	986.23	986.23	3.5	12	Fine to Medium SAND, Some Silt & Gravel, frequent rock fragments, grading to little silt at 10'	51 (east)	Outside limits of work
SB2012-29	988.7	988.7	8.5	15	Fine to Medium SAND, Some Gravel, little silt, grading to no gravel at 15', little coarse sand and gravel at 20'	49 (east)	Outside limits of work
SB2012-35	990.4	990.4	8.5	5	Fine to Coarse SAND, Some Silt, little gravel	47 (north)	Outside limits of work
SB2012-37	1000.8	1000.8	11.2	1	Fine to Coarse SAND, little silt	37 (south)	Outside limits of work
SB2012-38	993.6	993.6	4	>8	Fine to Medium SAND, little silt & gravel	47 (east)	Outside limits of work
SB2012-39	992.5	992.5	8	>6	Fine to Coarse SAND, little to Some Silt, little gravel	48 (east)	Outside limits of work
TP2012-1	1026.86	1036	3	5	Fine to Coarse SAND, Some Gravel & Silt, occasional cobbles	11 (north)	
TP2012-2	1018.07	1025	5	3	Fine to Medium SAND, Some Silt, little gravel, occasional cobbles	20 (north)	
TP2012-3	1022.8	1003	2	3	Fine to Medium SAND, Some Silt & Gravel, occasional cobbles	17 (north), 11 (south)	Completely removed during excavation
TP2012-4	1026.16	1004	4	2	Fine to Medium SAND, little silt, trace gravel, occasional cobbles	14 (north), 11 (south)	Completely removed during excavation
TP2012-5	1015.59	1002	3.5	3.5	Fine to Medium SAND, Some Gravel, little silt, frequent cobbles	27 (north), 18 (south)	Completely removed during excavation
TP2012-7	1016.29	1026	8	6	Fine to Medium SAND, Some Gravel, little to Some Silt, frequent cobbles	23 (south)	
TP2012-8	997.83	1011	3	8	Fine to Medium Sand & Gravel, little silt, occasional cobbles	48 (north), 45 (east)	
TP2012-9	1004.82	1036	4	9	Fine to Medium SAND, Some Gravel, little silt, frequent cobbles	38 (north)	

H

ATTACHMENT H

NAVFAC Design Manual 7.1
Figures 3 & 7

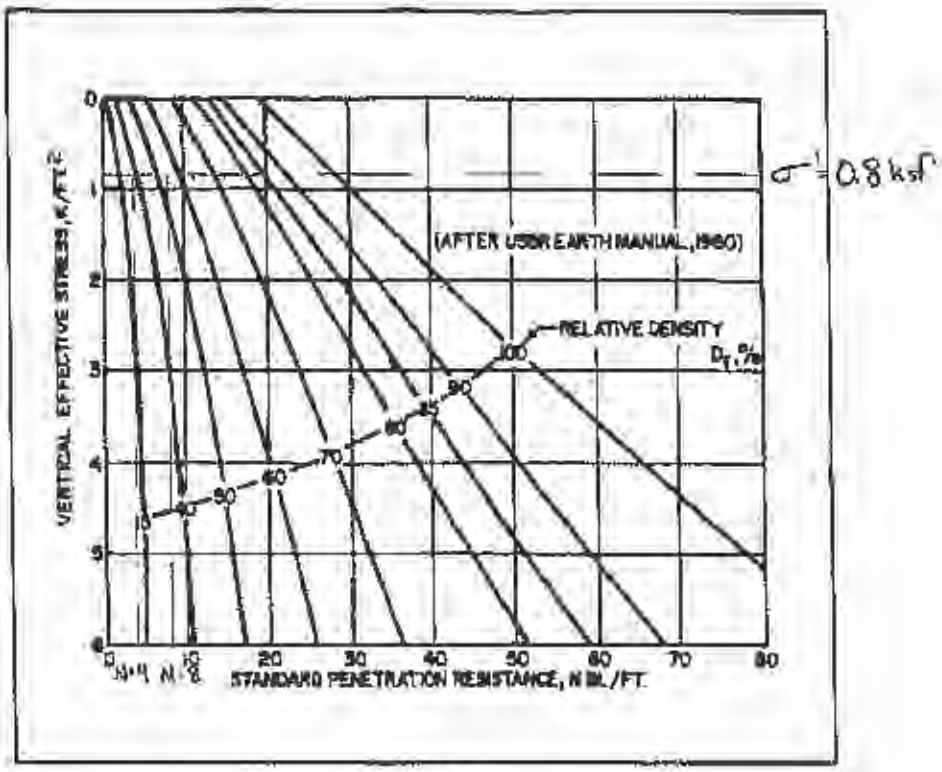


FIGURE 3
Correlations Between Relative Density and Standard Penetration Resistance in Accordance with Gibbs and Holtz

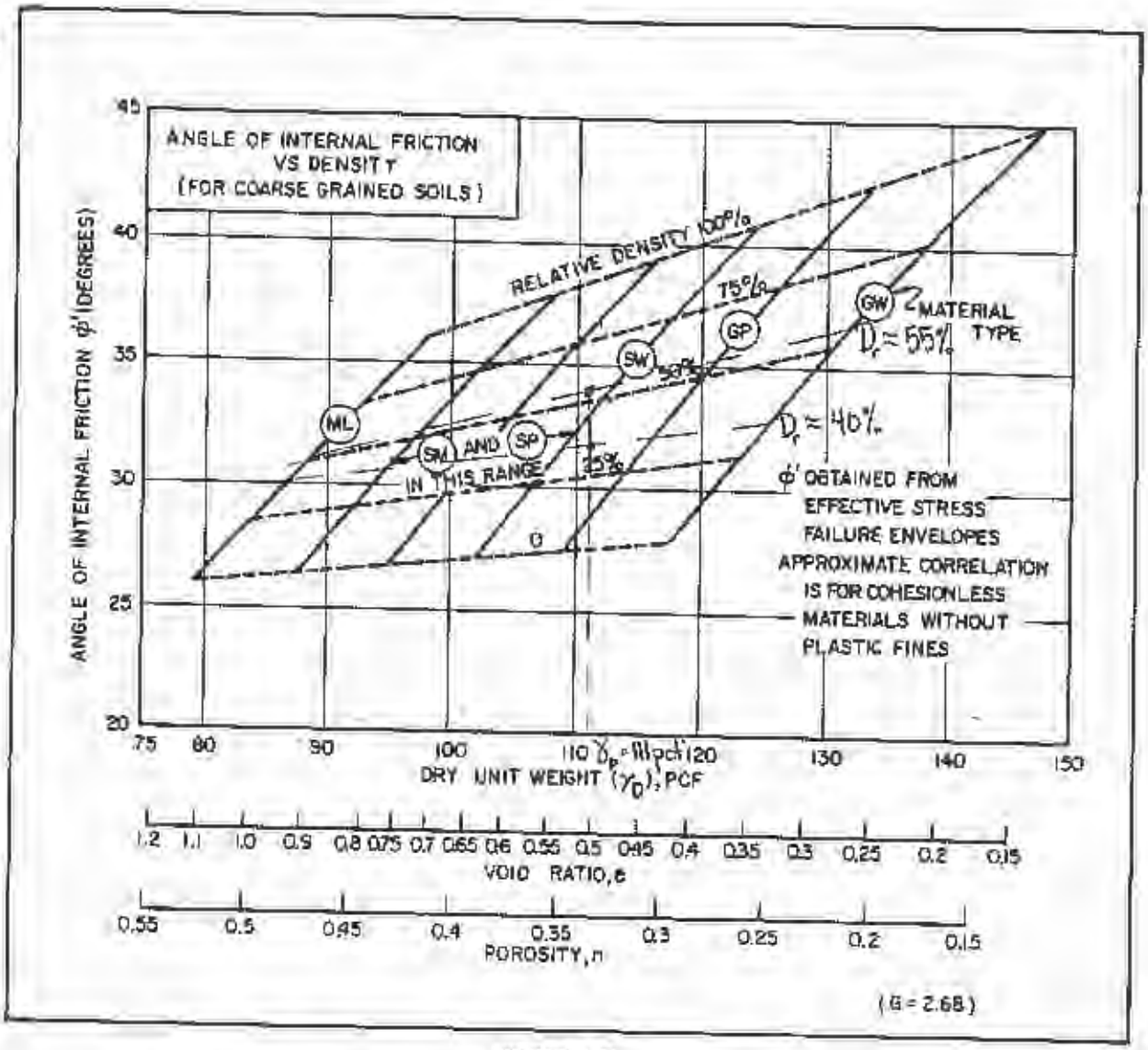


FIGURE 7
Correlations of Strength Characteristics for Granular Soils

C.T. MALE ASSOCIATES
50 Century Hill Drive
Latham, NY 12110

JOB Strength Parameters - Sand @ West Pond Site
SHEET NO. 1 OF
CALCULATED BY: TM DATE: 8/7/2012
CHECKED BY: DATE:
SCALE

Estimate relative density of sand deposit present along eastern end of west pond site from SPT data beneath Section 1/X55

At test borings MW/SB2012-28, -29 & -39, sand was encountered at depths ranging from 3.5 to 15 ft below the ground surface.

→ At MW/SB2012-28, an N-value of 4 was recorded at a depth of 10 ft below the ground surface + @ other locations, min. was '8'

→ Estimate vertical effective stress @ depth of 10 ft

@ MW/SB2012-28, overburden is 3.5 ft of silt overlying sand

Assumed $\gamma_{silt} = 115$ pcf, $\gamma_{sand} = 120$ pcf, $\gamma'_{sand} = 60$ pcf, depth to water is 3.5 ft

$\sigma'_{10ft} = 115\text{pcf} \times 3.5\text{ft} + 60\text{pcf} \times 6.5\text{ft} = 800$ psf, or 0.8 ksf

→ From NAVFAC DM-7.1, Section 7, Figure 3, for N = 4 & $\sigma' = 0.8$ksf,

D_r (relative density) ≈ 45%.

For N = 8 + $\sigma' = 0.8$ ksf, $D_r \approx 50\%$.

→ From "Principles of Foundation Engineering, 4th Edition" by Das, Figure 1.33 relates internal angle of friction, ϕ, to relative density & dry unit weight

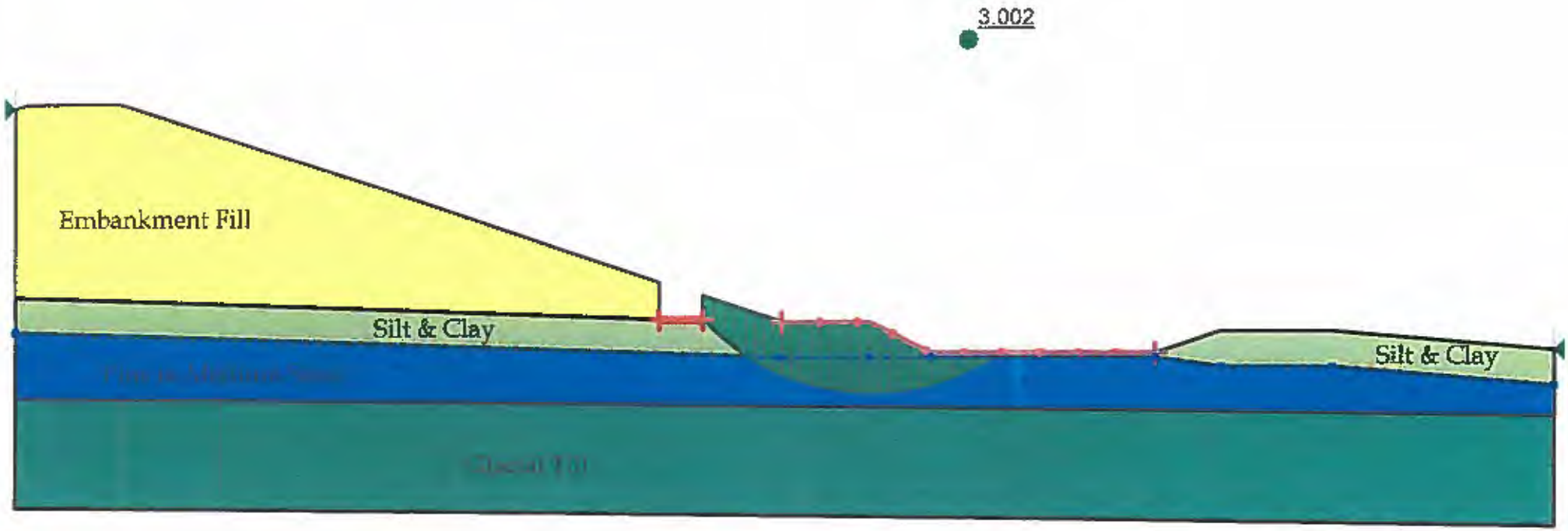
Assume $\gamma_{Dsand} = 115$ pcf

For $D_r \approx 45\%$, $\phi = \pm 31°$

For $D_r \approx 50\%$, $\phi = \pm 34°$

ATTACHMENT I

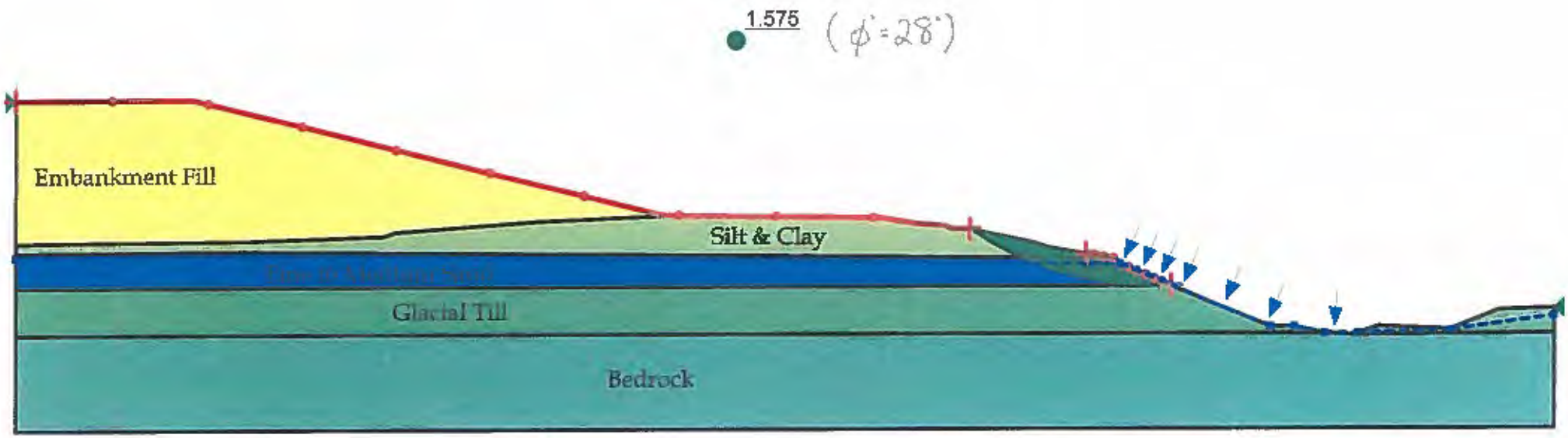
Stability Analysis – Pipe Trench

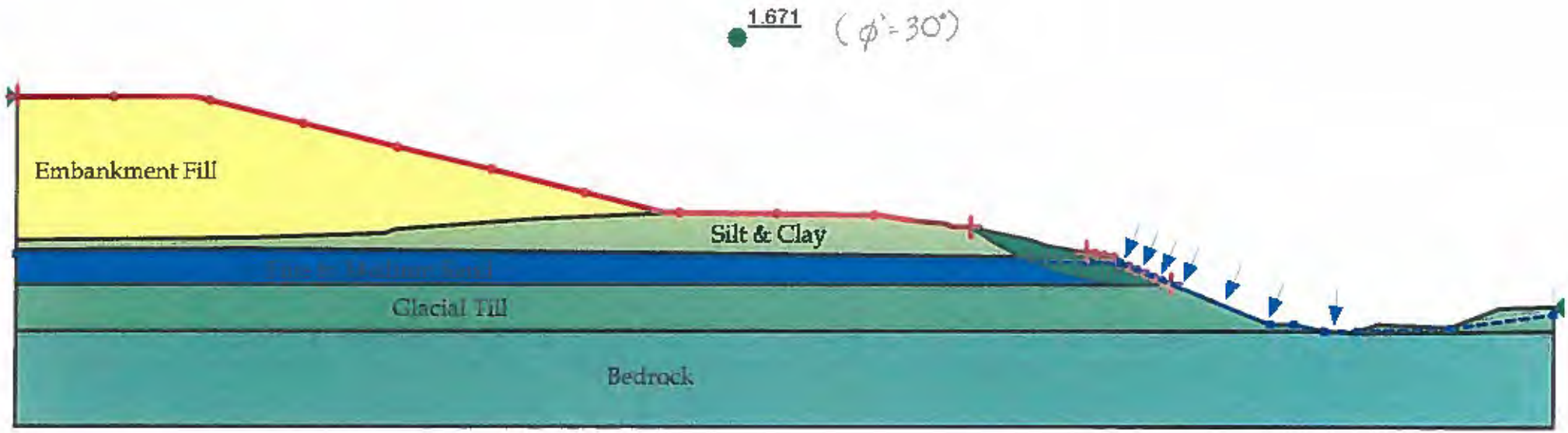

3.002
Embankment Fill
Silt & Clay
Silt & Clay

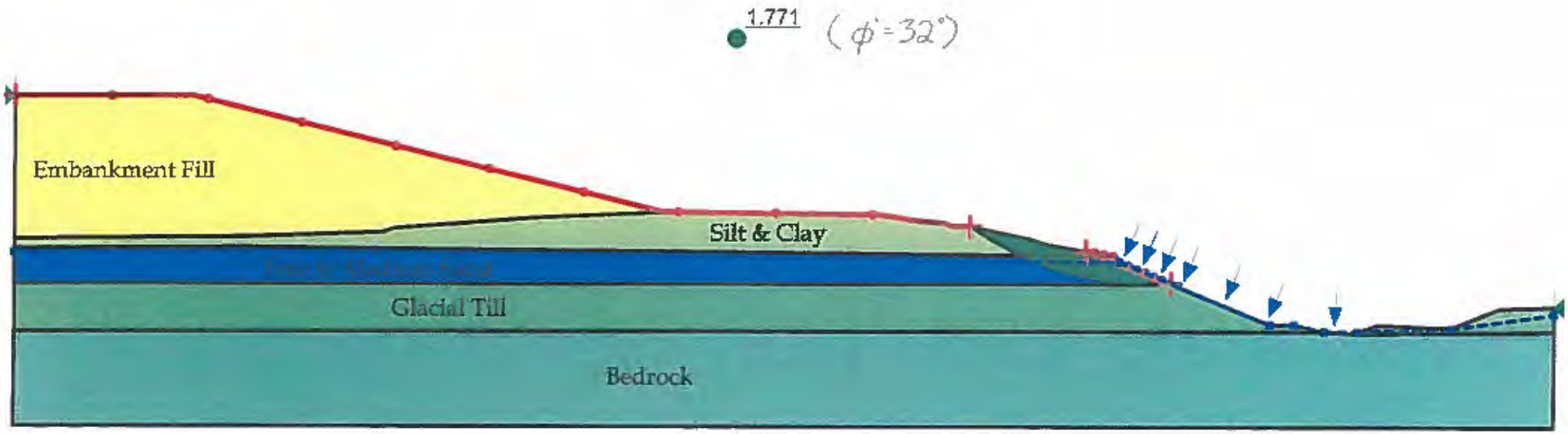
J

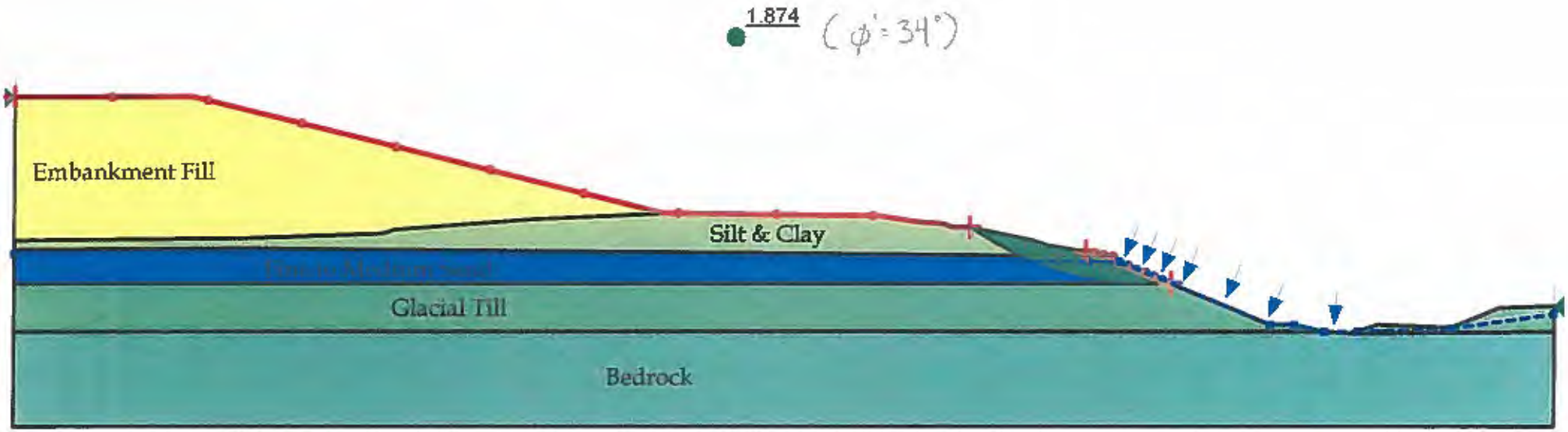
ATTACHMENT I

West Pond Site - Embankment Stability Analysis with Sand Layer and Varying Internal Angles of Friction


1.575
(ϕ'=28°)
Embankment Fill
Silt & Clay
Glacial Till
Bedrock


1.671
(φ' = 30°)
Embankment Fill
Silt & Clay
Glacial Till
Bedrock


1.771
(φ' = 32°)
Embankment Fill
Silt & Clay
Glacial Till
Bedrock

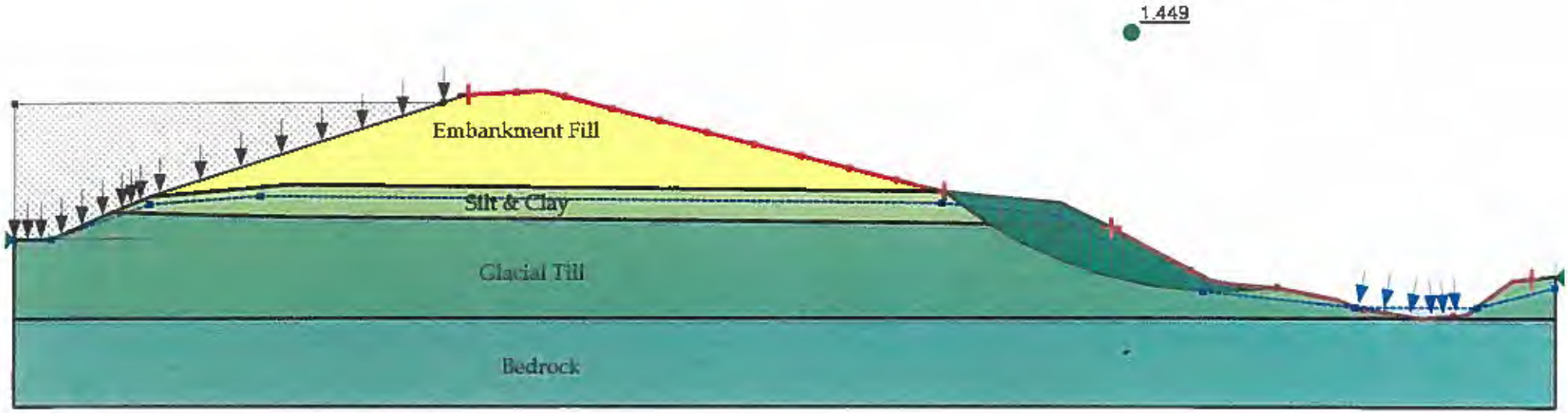

1.874
(φ' = 34°)
Embankment Fill
Silt & Clay
Glacial Till
Bedrock

K

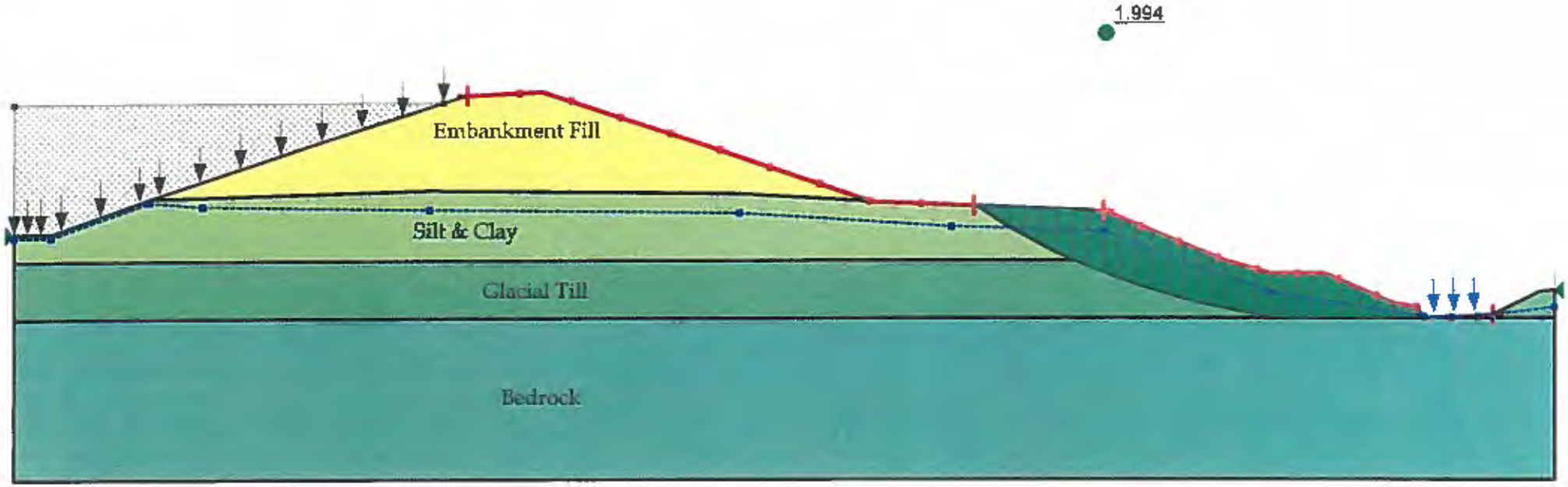
ATTACHMENT K

West Pond Site – Ravine Stability Analysis

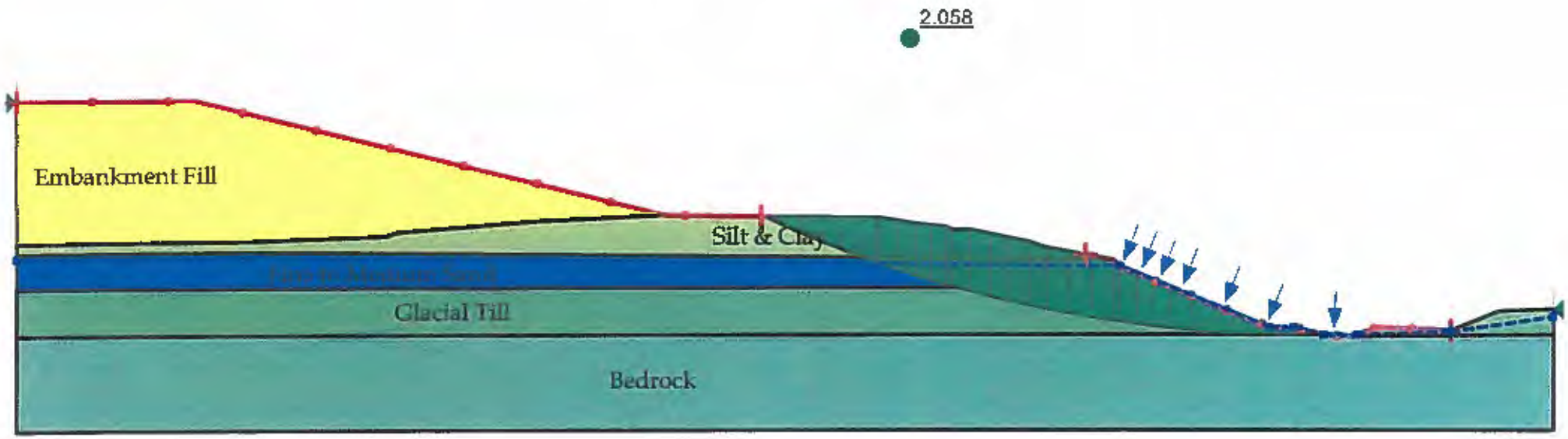
Station 5+00



Station 7+50



Station 10+19



L

ATTACHMENT L

Groundwater Monitoring Well Tables & Installation Logs

MONITORING WELL SUMMARY
EAST BRINE POND
FINGER LAKES LPG STORAGE
TOWN OF READING, SCHUYLER COUNTY

Monitoring Well ID	MW/SB 2012-*	MW/SB 2012-1a	MW/SB 2012-8	MW/SB 2012-10	MW/SB 2012-10a	MW/SB 2012-22	MW/SB 2012-23
Installation Date	2/21/2012	4/23/2012	2/21/2012	2/14/2012	4/20/2012	4/18/2012	4/19/2012
Approximate Ground Surface Elevation (feet)	845.6	844.88	819.6	832.0	851.8	850.99	851.10
Approximate Top of PVC Riser Elevation (feet)	847.4	848.67	822.1	834.7	834.54	854.09	854.28
Approximate Total Depth of Monitoring Well (feet bgs)	25	12	20	35	15	30	25
Approximate Depth to Top of Screen (feet bgs)	20	7	15	30	10	25	20
Length of Screen (feet)	5	5	5	5	5	5	5
Approximate Depth to Top of Filter Pack (feet bgs)	15	5.1	14.5	24.7	8.4	23	17.9
Approximate Thickness of Filter Pack (feet)	10	6.9	5.5	10.3	6.6	7	7.1
Type of Seal Above Filter Pack	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite
Approximate Depth to Groundwater (feet below top of PVC riser)	7.73 on 5/1/12	10.05 on 5/3/12	3.98 on 5/4/12	12.26 on 5/4/12	7.30 on 5/3/12	12.52 on 5/4/12	13.78 on 5/4/12
Soil Lithology in Screened Interval	Bedrock	Silt & Clay	Glacial Till/Broken Bedrock Interface	Bedrock	Glacial Till	Glacial Till/Broken Bedrock Interface	Glacial Till/Broken Bedrock Interface

Monitoring Well ID	MW/SB 2012-24	MW/SB 2012-25	MW/SB 2012-30	MW/SB 2012-31	MW/SB 2012-32	MW/SB 2012-33
Installation Date	4/19-20/2012	4/23-24/2012	6/18-19/2012	6/19-20/2012	6/20-22/2012	6/25-26/2012
Approximate Ground Surface Elevation (feet)	812.78	811.34	821.53	810.48	820.51	812.44
Approximate Top of PVC Riser Elevation (feet)	814.60	813.90	824.53	813.48	824.01	813.94
Approximate Total Depth of Monitoring Well (feet bgs)	41	38.2	35	33	53.5	42
Approximate Depth to Top of Screen (feet bgs)	31	28.2	30	28	33.5	37
Length of Screen (feet)	10	10	5	5	20	5
Approximate Depth to Top of Filter Pack (feet bgs)	13.7	12.2	12	3	12	8
Approximate Thickness of Filter Pack (feet)	27.3	26	17	30	41.5	37
Type of Seal Above Filter Pack	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite
Approximate Depth to Groundwater (feet below top of PVC riser)	6.82 on 5/3/12	6.86 on 5/4/12	4.5 on 7/3/12	6.7 on 7/3/12	5.7 on 7/3/12	1.3 on 7/3/12
Soil Lithology in Screened Interval	Glacial Till	Glacial Till/Broken Bedrock Interface	Glacial Till	Glacial Till	Glacial Till/Broken Bedrock Interface	Glacial Till/Broken Bedrock Interface

bgs=Below Ground Surface

MONITORING WELL SUMMARY
WEST BRINE POND
FINGER LAKES LPG STORAGE
TOWN OF READING, SCHUYLER COUNTY

Monitoring Well ID	MW/SB 2012-19	MW/SB 2012-19a	MW/SB 2012-20	MW/SB 2012-20a	MW/SB 2012-26	MW/SB 2012-27	MW/SB 2012-28
Installation Date	2/22/2012	4/27/2012	2/24/2012	4/27/2012	4/24-4/25/2012	4/26/2012	4/26/2012
Approximate Ground Surface Elevation (feet)	1,032.6	1,032.5	1,001.54	1,007.5	1,034.95	1,041.51	986.23
Approximate Top of PVC Riser Elevation (feet)	1,034.3	1,034.6	1,009.82	1,009.3	1,037.25	1,043.27	989.16
Approximate Total Depth of Monitoring Well (feet bgs)	37.5	15	26	15	35	26	32.7
Approximate Depth to Top of Screen (feet bgs)	32.5	10	21	10	30	21	22.7
Length of Screen (feet)	5	5	5	5	5	5	10
Approximate Depth to Top of Filter Pack (feet bgs)	27	7.9	20.5	7.7	27.7	18	4.8
Approximate Thickness of Filter Pack (feet)	10.5	7.1	5.5	7.3	7.3	8	27.9
Type of Seal Above Filter Pack	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite
Approximate Depth to Groundwater (feet below top of PVC riser)	9.62 on 5/1/12	11.44 on 5/1/12	Dry on 2/24/12	12.38 on 5/1/12	11.30 on 5/1/12	12.95 on 5/1/12	6.11 on 5/1/12
Soil Lithology in Screened Interval	Glacial Till/Broken Bedrock Interface	Silt & Clay	Glacial Till/Broken Bedrock Interface	Silt & Clay	Glacial Till/Broken Bedrock Interface	Glacial Till/Broken Bedrock Interface	Glacial Till/Broken Bedrock Interface

Monitoring Well ID	MW/SB 2012-29	MW/SB 2012-34	MW/SB 2012-35	MW/SB 2012-36	MW/SB 2012-37	MW/SB 2012-38	MW/SB 2012-39
Installation Date	4/30/2012	6/26-27/2012	6/28/2012	7/3/2012	6/29-7/2/2012	6/28/2012	6/28/2012
Approximate Ground Surface Elevation (feet)	989.7	1,001.41	987.40	1,018.44	999.31	990.59	989.55
Approximate Top of PVC Riser Elevation (feet)	991.40	1,004.91	990.49	1,022.44	1,000.81	993.59	992.55
Approximate Total Depth of Monitoring Well (feet bgs)	43	37	37.1	35	34	18	13
Approximate Depth to Top of Screen (feet bgs)	33	32	32	30	29	5	8
Length of Screen (feet)	10	5	5.1	5	5	3	5
Approximate Depth to Top of Filter Pack (feet bgs)	5	3	3	18	3	3	7
Approximate Thickness of Filter Pack (feet)	28	34	34.1	13	31	7	6
Type of Seal Above Filter Pack	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite	Bentonite
Approximate Depth to Groundwater (feet below top of PVC riser)	7.81 on 5/1/12	7.9 on 7/3/12	4.9 on 7/3/12	Not Measured	12.9 on 7/3/12	9.1 on 7/3/12	7.7 on 7/3/12
Soil Lithology in Screened Interval	Glacial Till/Broken Bedrock Interface	Glacial Till/Broken Bedrock Interface	Glacial Till/Broken Bedrock Interface	Glacial Till/Broken Bedrock Interface	Glacial Till/Broken Bedrock Interface	Fine to Coarse Sand, trace silt & gravel	Fine to Coarse Sand, little to Some Silt, little gravel

bgs=Below Ground Surface

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-32
ELEV.: ±820.51 ft DATUM: NAVD88
START DATE: 06/20/2012 FINISH DATE: 06/22/2012
SHEET 1 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: East Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
5		1	9	13	17	21	30	1.8'	Brown SILT, little clay, trace coarse sand & gravel (Moist)
									(Moist - Compact) ±8.5'
10		2	26	27	40	36	67	1.9'	GLACIAL TILL: Brown SILT & fine SAND, little embedded coarse sand & gravel, trace clay, frequent cobble fragments (Moist)
15		3	25	50	50/0.1'	–	100+	1.5'	- grades Some Silt
20		4	31	38	30	50/0.2'	68	1.5'	- grades SILT, Some fine Sand, little clay, weathered rock fragment seam ±21.0' - 21.3'
25		5	40	50/0.3'	–	–	100+	1.6'	- grades & fine SAND
30									

NOTES

Note 1: Upon completion of SB2012-32, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-32' for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired ATV rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME
6/26	39'	42'	EOB

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-30
ELEV.: ±821.53 ft DATUM: NAVD88
START DATE: 06/18/2012 FINISH DATE: 06/19/2012
SHEET 1 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: East Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
5		1	7	10	14	17	24	1.9'	Brown SILT, little to Some Clay, trace fine sand (Moist)
10		2	14	24	31	50/0.4'	55	2.0'	- grades little clay, trace to little coarse sand & gravel
									(Moist - Stiff to Hard) ±13.5'
15		3	22	31	50	50/0.4'	81	1.8'	GLACIAL TILL: Gray SILT, little to Some embedded coarse Sand & Gravel, little clay, occasional rock fragments (Moist)
20		4	50/0.4'	–	–	–	100+	0.3'	- highly weathered BOULDER fragments
25		5	50/0.1'	–	–	–	100+	0.1'	- cobble fragments
30									

NOTES

Note 1: Hole abandoned and offset 8' east of original location upon encountering auger refusal @ 12.6'.

Note 2: Upon completion of SB2012-30, a groundwater monitoring well was installed. See monitoring well installation log "MW2012-30" for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired ATV rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-30
ELEV.: ±821.53 ft DATUM: NAVD88
START DATE: 06/18/2012 FINISH DATE: 06/19/2012
SHEET 2 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: East Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION	NOTES
		6	50/0.1'	–	–	–	100+	0.1'	GLACIAL TILL: Gray SILT, Some embedded coarse Sand & Gravel, little clay, frequent cobble/rock fragments (Moist)	Note 1: Hole abandoned and offset 8' east of original location upon encountering auger refusal @ 12.5'.
35									(Moist - Very Compact)	
		7	50/0	–	–	–	100+	NR	End of Boring @ 35' (Sampler Refusal)	Note 2: Upon completion of SB2012-30, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-30' for well installation details.
40										
45										
50										
55										
60										

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.
DRILL RIG TYPE: CME 550-X rubber tired rig
METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-31
ELEV.: ±810.40 ft DATUM: NAVD88
START DATE: 06/19/2012 FINISH DATE: 06/20/2012
SHEET 1 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: East Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
5		1	9	14	15	22	29	1.8'	Brown SILT, Some Clay, little coarse sand & gravel (Moist)
									(Moist - Hard) ±8.5'
10		2	12	25	50	50/0.2'	75	1.8'	GLACIAL TILL: Brown SILT, little embedded coarse sand & gravel, trace to little clay (Moist)
15		3	82	50/0.3'	–	–	100+	1.5'	- grades Gray, little fine sand, occasional cobble fragments
20		4	44	50/0.3'	–	–	100+	1.0'	- grades little to Some embedded coarse Sand & Gravel
25		5	50/0.1'	–	–	–	100+	0.1'	- cobble fragments
30									

NOTES

Note 1: Upon completion of SB2012-31, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-31' for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired ATV rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-31
ELEV.: ±810.48 ft DATUM: NAVD88
START DATE: 06/18/2012 FINISH DATE: 06/19/2012
SHEET 2 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: East Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION	NOTES
		6	50/0.1'	–	–	–	100+	0.1'	GLACIAL TILL: Gray SILT, little to Some embedded coarse Sand & Gravel, trace to little clay, occasional cobble fragments (Moist)	Note 1: Upon completion of SB2012-31, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-31' for well installation details.
		7	50/0	–	–	–	100+	NR	(Moist - Very Compact)	
35									End of Boring @ 33' (Sampler Refusal)	
40										
45										
50										
55										
60										

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-32
ELEV.: 1820.51 ft DATUM: NAVD88
START DATE: 06/20/2012 FINISH DATE: 06/22/2012
SHEET 2 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: East Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
		6	50/0.1'	–	–	–	100+	NR	
35		7	7	6	9	50/0.4'	15	1.1'	Gray SILT & CLAY, trace fine sand & gravel, occasional cobble fragments
40		8	50/0.1'	–	–	–	100+	0.1'	GLACIAL TILL: Gray SILT, little embedded coarse sand & gravel, trace to little clay (Moist)
45		9	50/0	–	–	–	100+	NR	
50									(Moist - Very Compact)
		10	50/0	–	–	–	100+	NR	End of Boring @ 50' (Sampler Refusal)
55									
60									

NOTES

Note 1: Upon completion of SB2012-32, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-32' for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME
6/26	39'	42'	60s

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-33
ELEV.: ±812.44 ft DATUM: NAVD88
START DATE: 06/25/2012 FINISH DATE: 06/28/2012
SHEET 1 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: East Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
5		1	4	8	8	12	16	1.8'	Brown SILT, little to Some Clay, trace fine sand (Moist)
									(Moist - Stiff) ±8.5'
10		2	7	12	17	19	29	1.9'	Brown SILT, little clay & coarse sand & gravel, cobble fragments (Moist)
									(Moist - Firm) ±13.5'
15		3	50	50/0.1'	--	--	100+	1.6'	GLACIAL TILL: Brown fine SAND, Some Silt, little embedded coarse sand & gravel, occasional fine to coarse sand partings & cobble fragments
20		4	50/0.4'	--	--	--	100+	0.1'	cobble fragments
25		5	50/0.1	--	--	--	100+	0.1'	
30									

NOTES

Note 1: Upon completion of SB2012-33, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-33' for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired ATV rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME
6/28	39'	47'	End of Boring

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-33
ELEV.: ±812.44 ft DATUM: NAVD88
START DATE: 06/26/2012 FINISH DATE: 06/26/2012
SHEET 2 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO. 08.8696
LOCATION: East Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION	NOTES
		6	50/0.2'	–	–	–	100+	0.2'	GLACIAL TILL: Gray SILT, Some fine Sand, little to Some embedded coarse Sand & Gravel, trace clay (Moist)	Note 1: Upon completion of SB2012-33, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-33' for well installation details.
35		7	50/0.3'	–	–	–	100+	0.2'	- cobble fragments	
40		8	24	50/0.5'	–	–	100+	0.5'	- grades little fine sand, frequent rock fragments (Moist to Wet)	
		9	50/0.1'	–	–	–	100+	0.1'	- cobble/rock fragments (Moist to Wet - Very Compact)	
45									End of Boring @ 42.1' (Sampler Refusal)	
50										
55										
60										

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME
6/26	35'	42'	End of Boring

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-34
ELEV.: ±1,001.41 ft — DATUM: NAVD88
START DATE: 06/26/2012 — FINISH DATE: 06/27/2012
SHEET 1 OF 2

PROJECT: Proposed East & West Brine Ponds — CTM PROJECT NO.: 08.8696
LOCATION: West Pond Site, Reading Center, NY — CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
5		1	9	5	6	5	11	0.6'	Brown SILT, little fine sand, trace gravel & clay, occasional cobble fragments (Moist)
10		2	5	16	15	12	31	0.6'	- no cobble fragments (Moist to Wet)
									(Moist - Firm to Compact) ±13.5'
15		3	7	13	20	18	33	1.1'	GLACIAL TILL: Gray SILT, little embedded coarse sand & gravel, trace clay, frequent rock fragments (Moist)
20		4	12	21	24	34	45	1.0'	
25		5	17	50/0.4'	–	–	100+	0.8'	- grades little to Some Clay, trace to little embedded coarse sand & gravel (Moist to Wet)
30									

NOTES

Note 1: Upon completion of SB2012-34, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-31' for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired ATV rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME
6/27	12.8	33'	19 hours

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-34
ELEV.: ±1,001.41 ft DATUM: NAVD88
START DATE: 06/26/2012 FINISH DATE: 06/27/2012
SHEET 2 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: West Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION	NOTES
		6	47	17	46	50/0.3	63	1.8'	GLACIAL TILL: Gray SILT, little to Some Clay, little embedded coarse sand & gravel, frequent rock fragments (Moist - Compact to Very Compact) ±33'	Note 1: Upon completion of SB2012-34, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-34' for well installation details.
		7	50/0.1	–	–	–	100+	0.2'	Highly weathered BOULDER or ROCK fragments	
35		8	50/0.1	–	–	–	100+	0.1'		
		9	50/0.1	–	–	–	100+	0.1'	- cobble/rock fragments	
40									End of Boring @ 37.1' (Sampler Refusal)	
45										
50										
55										
60										

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME
6/27	12.8'	33'	19 hours

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-35
ELEV.: 2987.40 ft — DATUM: NAVD88
START DATE: 06/27/2012 — FINISH DATE: 06/28/2012
SHEET 1 OF 2

PROJECT: Proposed East & West Brine Ponds — CTM PROJECT NO: 08.8696
LOCATION: West Pond Site, Reading Center, NY — CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
5									
		1	7	12	23	23	35	1.7'	Brown SILT, little to Some fine Sand, little clay & coarse sand & gravel (Moist - Compact) ±8.5'
10		2	11	8	6	5	14	1.1'	Brown fine to medium SAND, little silt, trace clay & gravel, occasional silt partings (Moist to Wet - Firm) @13.5'
15		3	8	12	17	15	29	1.0'	Gray SILT, Some fine Sand & Gravel, trace clay, frequent rock fragments (Wet)
20		4	21	20	23	44	43	1.2'	- Becomes GLACIAL TILL: Gray SILT, little to Some fine sand, little embedded coarse sand & gravel, trace clay
25		5	22	39	38	48	77	1.1'	- frequent rock fragments
30									

NOTES

Note 1: Hole abandoned and offset 15' northeast of original location upon encountering auger refusal @ 35'.

Note 2: Upon completion of SB2012-35, a groundwater monitoring well was installed. See monitoring well installation log "MW2012-36" for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired ATV rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-35
ELEV.: ±987.40 ft — DATUM: NAVD88
START DATE: 06/27/2012 — FINISH DATE: 06/28/2012
SHEET 2 OF 2

PROJECT: Proposed East & West Brine Ponds — CTM PROJECT NO.: 08.8696
LOCATION: West Fond Site, Reading Center, NY — CTM OBSERVER: R. Smake

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
		6	16	40	50/0.4'	–	63	1.0'	GLACIAL TILL: Gray SILT, little to Some embedded coarse Sand & Gravel, little clay, frequent rock fragments (Moist)
									(Moist - Firm to Very Compact) ±34'
35		7	50/0.3'	–	–	–	100+	0.3'	Highly weathered ROCK or BOULDER
		8	50/0.1'	–	–	–	100+	0.1'	- rock/cobble fragments
40									End of Boring @ 37.1' (Sampler Refusal)
45									
50									
55									
60									

NOTES

Note 1: Upon completion of SB2012-35, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-35' for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.
DRILL RIG TYPE: CME 550-X rubber tired rig
METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-36
ELEV.: ±1,019.44 ft DATUM: NAVD88
START DATE: 07/02/2012 FINISH DATE: 07/03/2012
SHEET 1 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: West Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (Ft.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
5		1	9	9	14	16	23	1.2'	Brown SILT, Some fine Sand, little clay, occasional cobble & rock fragments (Moist)
10		2	13	22	40	50/0.4	62	1.2'	- grades little to Some fine Sand
									(Moist - Firm to Very Compact) ±13.5'
15		3	22	31	46	27	77	1.8'	GLACIAL TILL: Gray fine SAND, little silt & embedded coarse sand & gravel, trace clay (Moist)
20		4	16	28	50	50/0.4	78	1.5'	- grades occasional cobble fragments
25		5	25	28	50/0.4'	–	100+	1.7'	- grades & SILT, trace to little clay
30									

NOTES

Note 1: Upon completion of SB2012-36, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-36' for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired ATV rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-36
ELEV.: ±1,010.44 ft
DATUM: NAVD88
START DATE: 07/02/2012
FINISH DATE: 07/03/2012
SHEET 2 OF 2

PROJECT: Proposed East & West Brine Ponds
CTM PROJECT NO.: 08.8696
LOCATION: West Pond Site, Reading Center, NY
CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION	NOTES
		6	29	50	50/0.4'	–	100+	1.6'	GLACIAL TILL: Gray SILT & fine SAND, little embedded coarse sand & gravel, trace clay, occasional cobble fragments (Moist)	Note 1: Upon completion of SB2012-36, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-36' for well installation details.
35		7	50/0.1'	–	–	–	100+	0.1'	cobble/rock fragments (Moist - Very Compact)	
									End of Boring @ 35.1' (Sampler Refusal)	
40										
45										
50										
55										
60										

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-37
ELEV.: 1599.31 ft DATUM: NAVD88
START DATE: 06/29/2012 FINISH DATE: 07/02/2012
SHEET 1 OF 2

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: West Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
5		1	2	2	3	2	5	1.2'	Brown SILT, Some fine Sand, trace gravel & clay (Moist)
10		2	4	5	9	9	14	1.4'	- grades little clay, trace fine sand, no gravel, fine to coarse sand partings 11.2' - 11.4'
									(Moist - Loose to Firm) ±13.5'
15		3	20	29	31	50/0.3'	60	1.2'	GLACIAL TILL: Gray SILT, Some fine Sand, little to Some embedded coarse Sand & Gravel, occasional cobbles & rock fragments (Moist)
20		4	26	15	17	15	32	1.2'	- grades little clay, trace fine sand & embedded coarse sand & gravel, no fragments (Moist)
25		5	13	18	22	24	41	1.7'	
30									

NOTES

Note 1: Upon completion of SB2012-37, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-37' for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired ATV rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-37
ELEV.: ±999.31 ft
DATUM: NAVD88
START DATE: 06/29/2012
FINISH DATE: 07/02/2012
SHEET 2 OF 2

PROJECT: Proposed East & West Brine Ponds
CTM PROJECT NO.: 08.6695
LOCATION: West Pond Site, Reading Center, NY
CTM OBSERVER: R. Smake

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION	NOTES
		6	25	26	39	50	65	1.9'	GLACIAL TILL: Gray SILT, Some fine Sand, little embedded coarse sand & gravel, trace clay, occasional cobble fragments (Moist - Compact to Very Compact) ±33.8'	Note 1: Upon completion of SB2012-37, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-37' for well installation details.
35		7	50/2"	–	–	–	100+		Highly weathered ROCK fragments	
									End of Boring @ 34.2' (Sampler Refusal)	
40										
45										
50										
55										
60										

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tread rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-38
ELEV.: ±890.59 ft DATUM: NAVD88
START DATE: 06/28/2012 FINISH DATE: 06/28/2012
SHEET 1 OF 1

PROJECT: Proposed East & West Brine Ponds CTM PROJECT NO.: 08.8696
LOCATION: West Pond Site, Reading Center, NY CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
		1	3	16	13	14	29	1.1'	Brown SILT, Some fine Sand, trace clay, occasional cobble fragments (Moist)
		2	17	11	12	13	23	0.1'	- grades little fine sand, trace to little clay - grades & SAND, little coarse sand & gravel (Moist to Wet)
5		3	8	9	8	9	17	1.4'	(Moist to Wet - Firm) ±5'
		4	8	5	6	6	11	1.8'	Brown fine to medium SAND, trace to little silt (Moist to Wet) - grades Brown-Gray mottled, Some Silt, trace coarse sand & gravel (Moist to Wet) ±6'
10		5	8	4	6	5	10	1.7'	- grades fine to coarse SAND, little silt, trace gravel, occasional silt seams ±8' (Moist to Wet - Loose to Firm) End of Boring @ 10'
15									
20									
25									
30									

NOTES

Note 1: Upon completion of SB2012-38, a groundwater monitoring well was installed. See monitoring well installation log 'MW2012-38' for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired ATV rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

C.T. MALE ASSOCIATES

SUBSURFACE EXPLORATION LOG

BORING NO.: SB2012-39
ELEV.: ±989.55 ft — DATUM: NAVD88
START DATE: 06/28/2012 — FINISH DATE: 06/28/2012
SHEET 1 OF 1

PROJECT: Proposed East & West Brine Ponds — CTM PROJECT NO.: 08.8696
LOCATION: West Pond Site, Reading Center, NY — CTM OBSERVER: R. Smaka

DEPTH (FT.)	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	RECOVERY	SAMPLE CLASSIFICATION
		1	3	9	13	13	22	1.0'	Brown SILT, little fine sand, trace clay, occasional cobble & rock fragments (Moist)
		2	15	11	9	7	20	1.4'	- grades little coarse sand & gravel, occasional fine sand partings, no cobbles or rock fragments
5		3	8	8	8	12	16	1.2'	- grades trace to little clay, no partings (Moist to Wet)
		4	9	11	10	8	21	1.0'	- grades Brown-Gray mottled SILT, little fine sand, clay & coarse sand & gravel, occasional rock fragments (Moist to Wet - Firm) ±8'
10		5	3	3	5	4	8	1.0'	Brown fine to medium SAND, Some Silt, little clay, frequent cobble fragments (Moist to Wet)
		6	1	4	5	7	10	0.4'	- grades little silt, trace clay & gravel (Wet) ±10'
		7	6	13	20	20	33	1.4'	- grades fine to coarse SAND, trace to little silt, trace gravel, no clay
15									- occasional seams of SILT, little coarse sand & gravel (Moist to Wet) (Moist to Wet - Loose to Compact)
									End of Boring @ 14'
20									
25									
30									

NOTES

Note 1: Upon completion of SB2012-39, a groundwater monitoring well was installed. See monitoring well installation log "MW2012-31" for well installation details.

N = NO. OF BLOWS TO DRIVE 2" SAMPLER 12" WITH A 140 LB. WT. FALLING 30" PER BLOW

DRILLING CONTRACTOR: SJB Services, Inc.

DRILL RIG TYPE: CME 550-X rubber tired ATV rig

METHOD OF INVESTIGATION: 4-1/4-inch hollow stem augers with automatic safety hammer.

GROUNDWATER LEVEL

DATE	LEVEL	CASING	STABILIZATION TIME

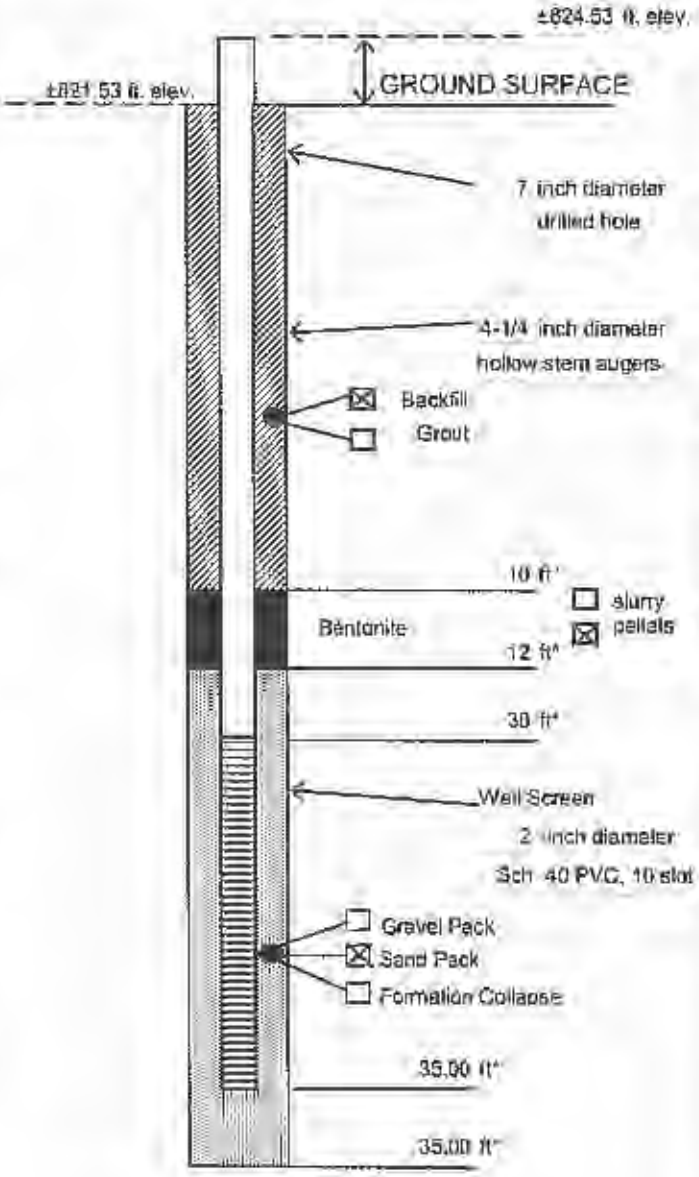
THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR C.T. MALE DESIGN PURPOSES. IT IS MADE AVAILABLE TO AUTHORIZED USERS ONLY THAT THEY MAY HAVE ACCESS TO THE SAME INFORMATION AVAILABLE TO C.T. MALE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF SUCH AUTHORIZED USERS.

SAMPLE CLASSIFICATION BY: T. Morgan

Well No. MW2012-30

C.T. MALE ASSOCIATES

MONITORING WELL CONSTRUCTION LOG



* Depth below ground surface.

Project Number 08.8696

Project Name Proposed East & West Brine Ponds

Well No. MW2012-30 Boring No. SB2012-30

Town/City Reading Center

County Schuyler State NY

Installation Date(s) 6/18 - 6/19/2012

Drilling Contractor SJB Services, Inc.

Drilling Method 4-1/4 inch hollow stem augers

Water Depth From Top of Riser 4.5 ft 7/3/2012 Date

C.T. Male Observer R. Smalka

Notes:

Well No. MW2012-31

C.T. MALE ASSOCIATES

MONITORING WELL CONSTRUCTION LOG

Project Number 08.3696

Project Name Proposed East & West Brine Ponds

Well No. MW2012-31 Boring No. SB2012-31

Town/City Reading Center

County Schuyler State NY

Installation Date(s) 6/19 - 6/20/2012

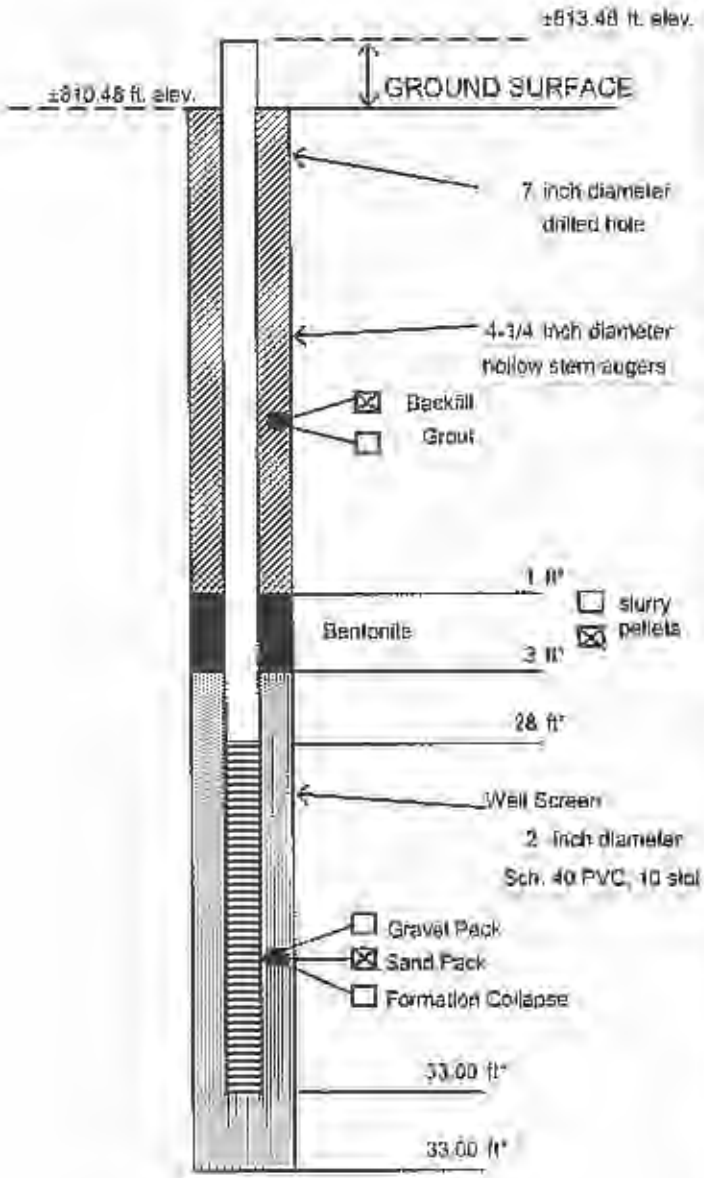
Drilling Contractor SJB Services, Inc.

Drilling Method 4-1/4 inch hollow stem augers

Water Depth From Top of Riser 6.7 ft 7/3/2012 Date

C.T. Male Observer R. Smaka

Notes:

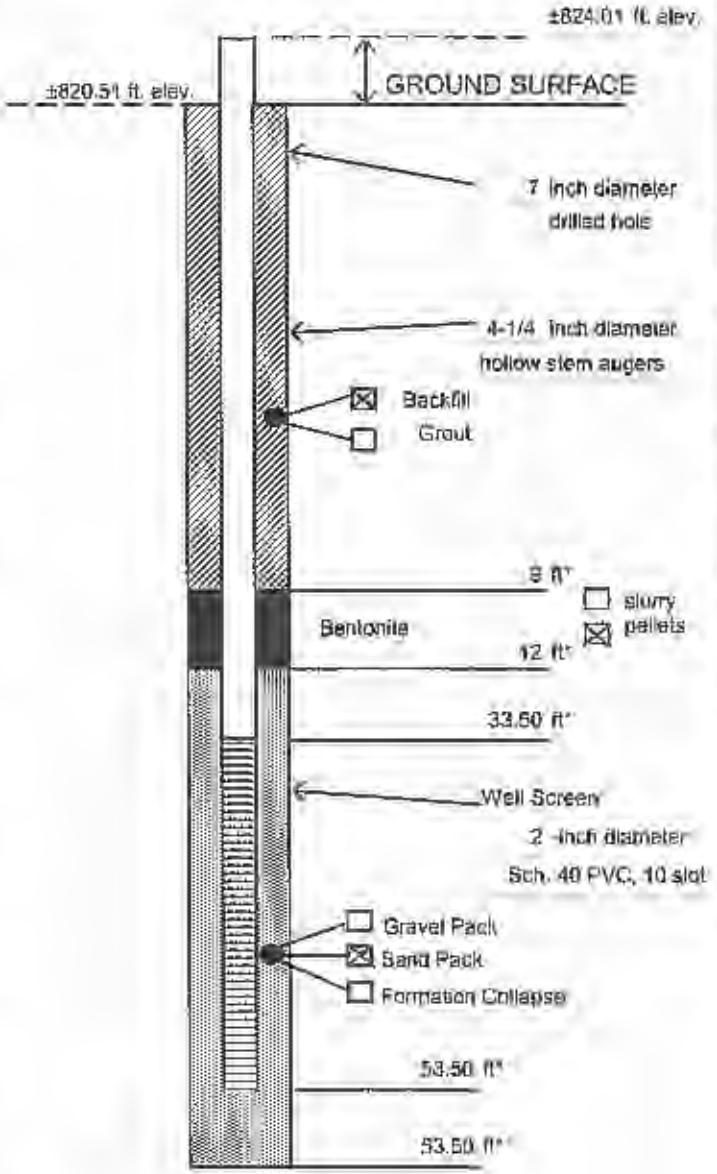


* Depth below ground surface

Well No. MW2012-32

MONITORING WELL CONSTRUCTION LOG

C.T. MALE ASSOCIATES



* Depth below ground surface.

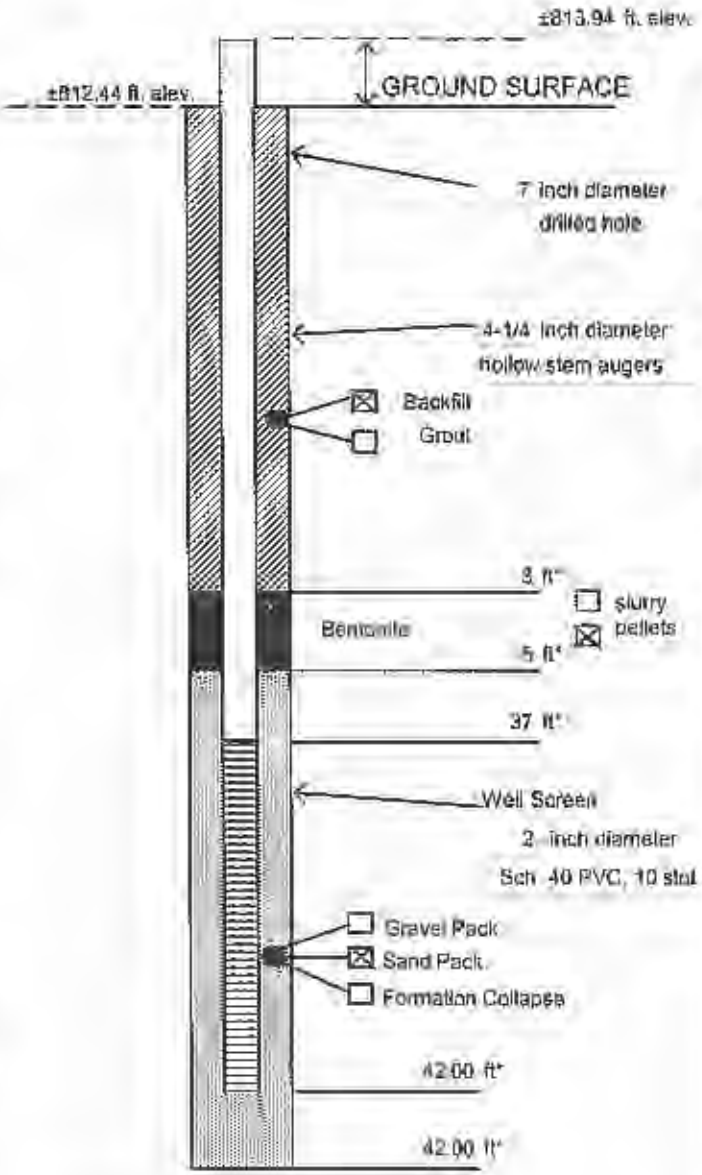
Project Number	08.8696
Project Name	Proposed East & West Brine Ponds
Well No.	MW2012-32 Boring No. SB2012-32
Town/City	Reading Center
County	Schuyler State NY
Installation Date(s)	6/20 - 6/22/2012
Drilling Contractor	SJB Services, Inc.
Drilling Method	4-1/4 inch hollow stem augers
Water Depth From Top of Riser	5.7 ft 7/3/2012 Date
C.T. Male Observer	R. Suraka

Notes:

Well No. MW2012-33

C.T. MALE ASSOCIATES

MONITORING WELL CONSTRUCTION LOG



* Depth below ground surface

Project Number 08.8696

Project Name Proposed East & West Brine Ponds

Well No. MW2012-33 Boring No. SB2012-33

Town/City Reading Center

County Schuyler State NY

Installation Date(s) 6/25 – 6/26/2012

Drilling Contractor SJB Services, Inc.

Drilling Method 4-1/4 inch hollow stem augers

Water Depth From Top of Riser 1.3 ft 7/3/2012 Date

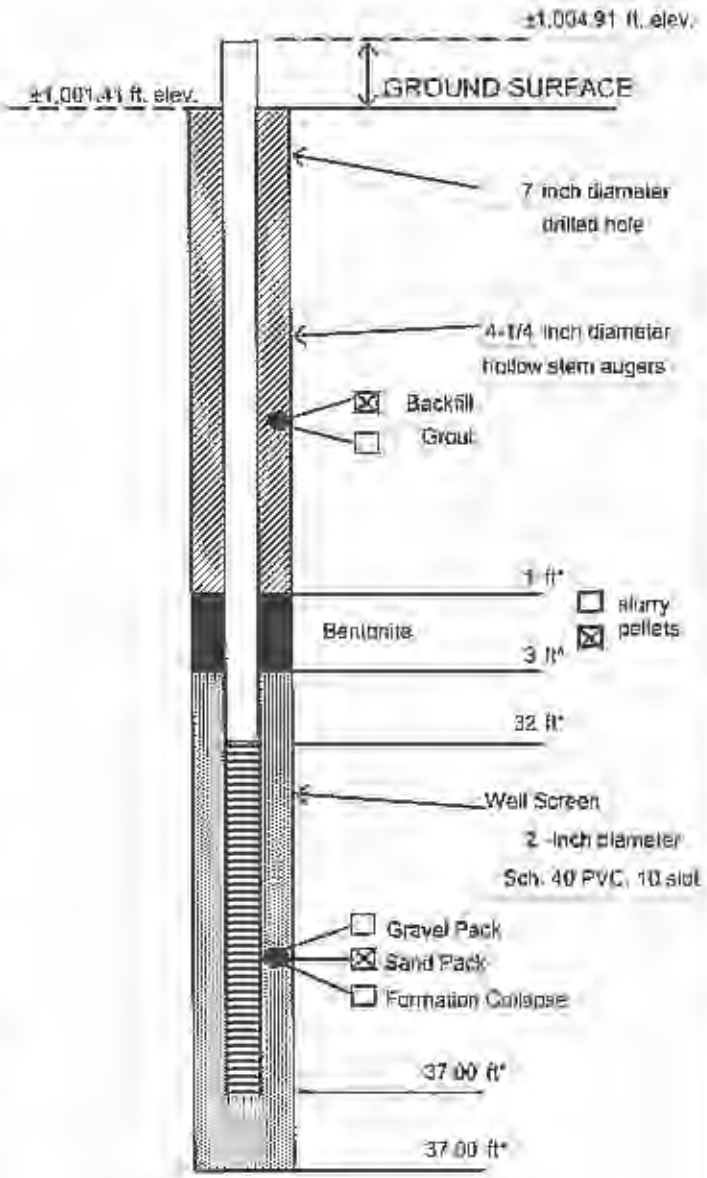
C.T. Male Observer R. Smaka

Notes:

Well No. MW2012-34

C.T. MALE ASSOCIATES

MONITORING WELL CONSTRUCTION LOG



* Depth below ground surface.

Project Number	08.8696
Project Name	Proposed East & West Brine Ponds
Well No.	MW2012-34 Boring No. SB2012-34
Town/City	Reading Center
County	Schuyler State NY
Installation Date(s)	6/26 - 6/27/2012
Drilling Contractor	SJB Services, Inc.
Drilling Method	4-1/4 inch hollow stem augers
Water Depth From Top of Riser	7.9 ft 7/3/2012 Date
C.T. Male Observer	R. Smaka

Notes:

Well No. MW2012-35A

C.T. MALE ASSOCIATES

MONITORING WELL CONSTRUCTION LOG

Project Number 08.8696

Project Name Proposed East & West Brine Ponds

Well No. MW2012-35A Boring No. SB2012-35A

Town/City Reading Center

County Schuyler State NY

Installation Date(s) 6/28/2012

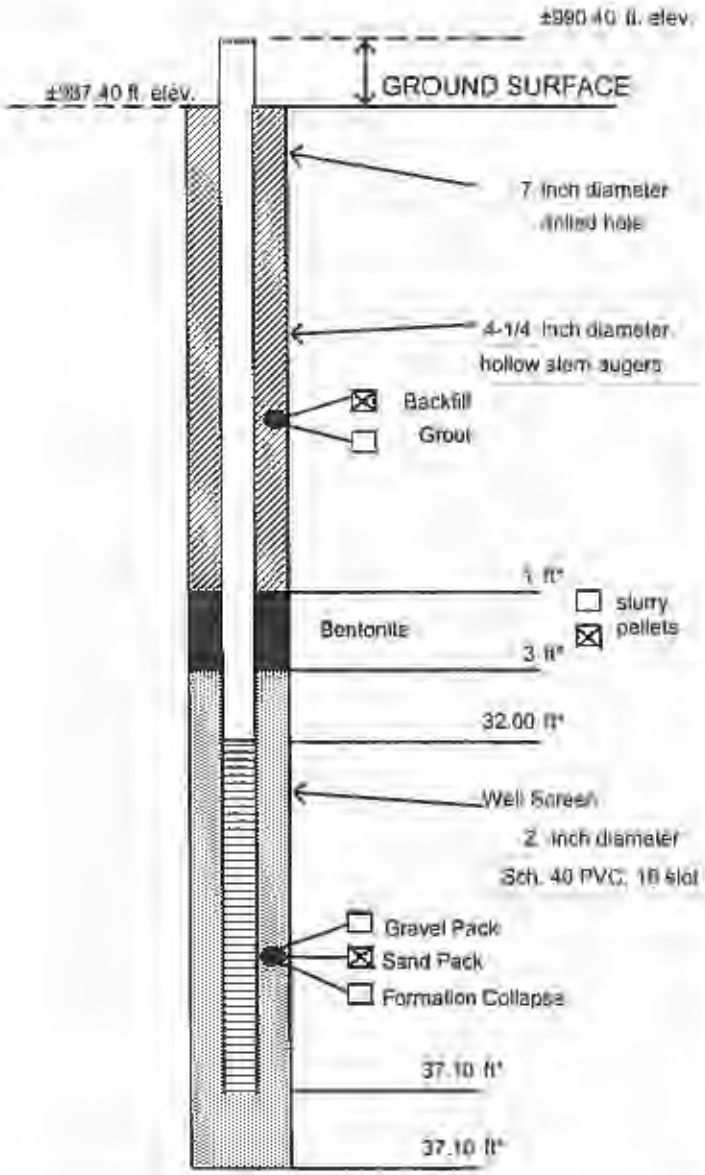
Drilling Contractor SJB Services, Inc.

Drilling Method 4-1/4 inch hollow stem augers

Water Depth From Top of Riser 4.9 ft 7/3/2012 Date

C.T. Male Observer R. Smaka

Notes:

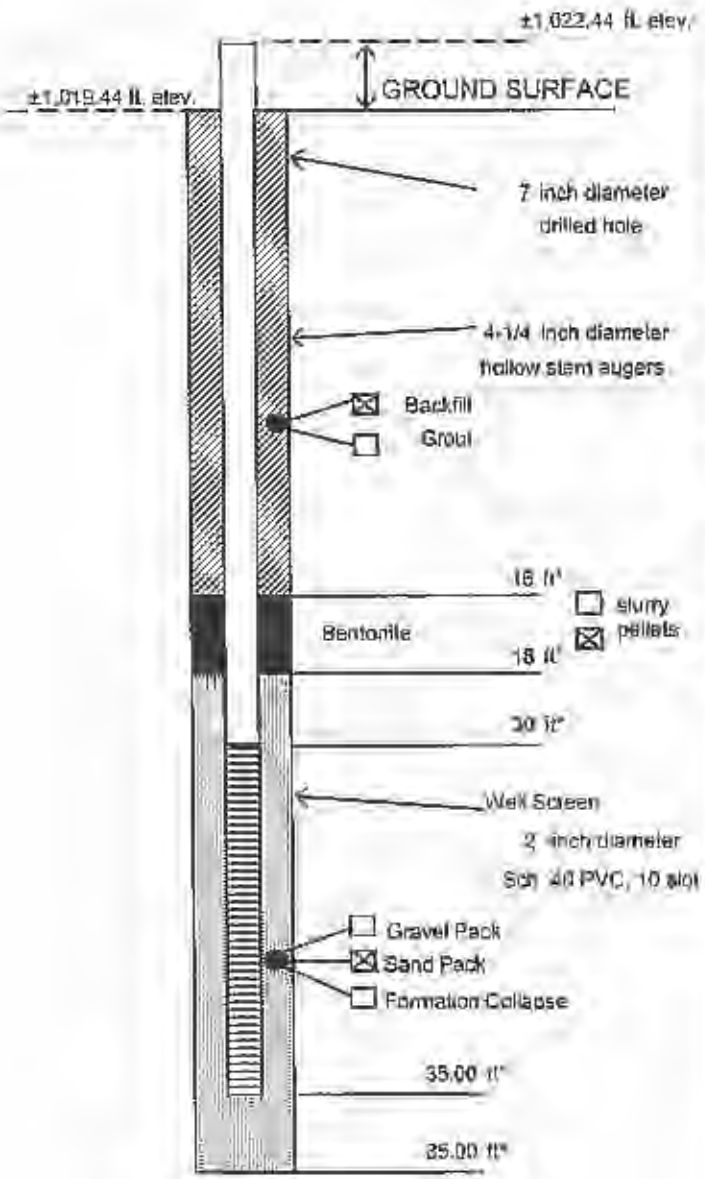


* Depth below ground surface

Well No. MW2012-36

C.T. MALE ASSOCIATES

MONITORING WELL CONSTRUCTION LOG



* Depth below ground surface.

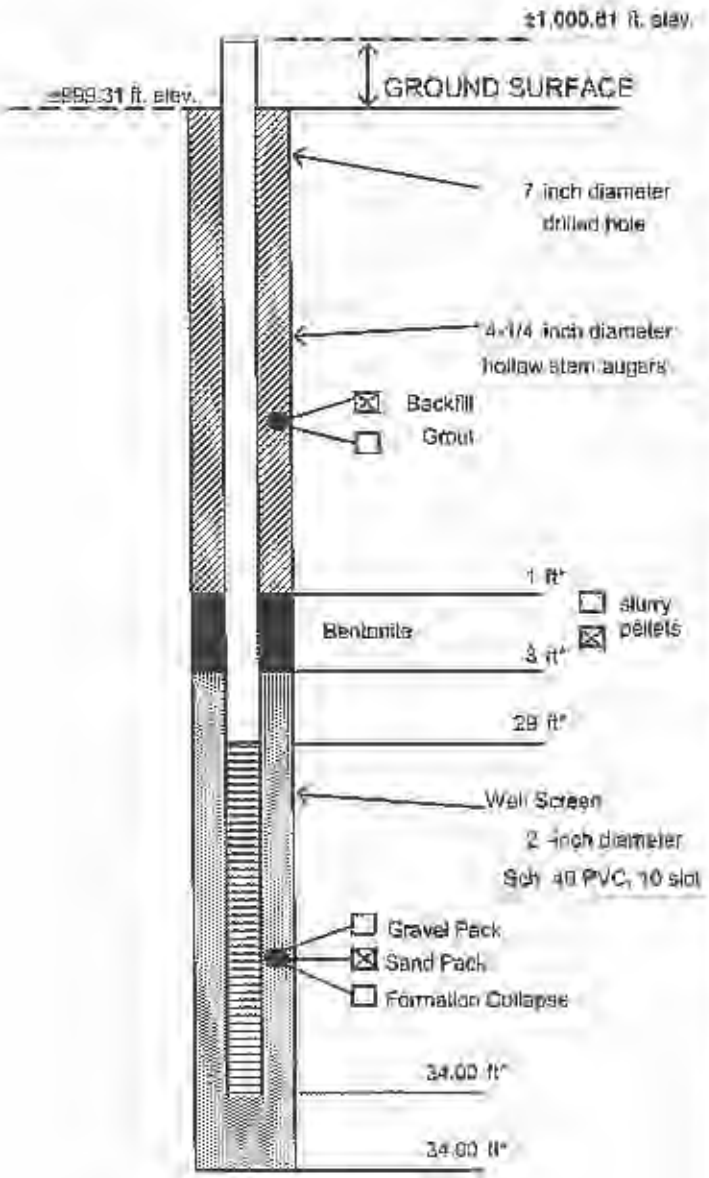
Project Number	08.8696
Project Name	Proposed East & West Brine Ponds
Well No.	MW2012-36 Boring No. SB2012-36
Town/City	Reading Center
County	Schuyler State NY
Installation Date(s)	7/3/2012
Drilling Contractor	SJB Services, Inc.
Drilling Method	4-1/4 inch hollow stem augers
Water Depth From Top of Riser	ft Date
C.T. Male Observer	R. Smaka

Notes:

Well No. MW2012-37

C.T. MALE ASSOCIATES

MONITORING WELL CONSTRUCTION LOG



*Depth below ground surface.

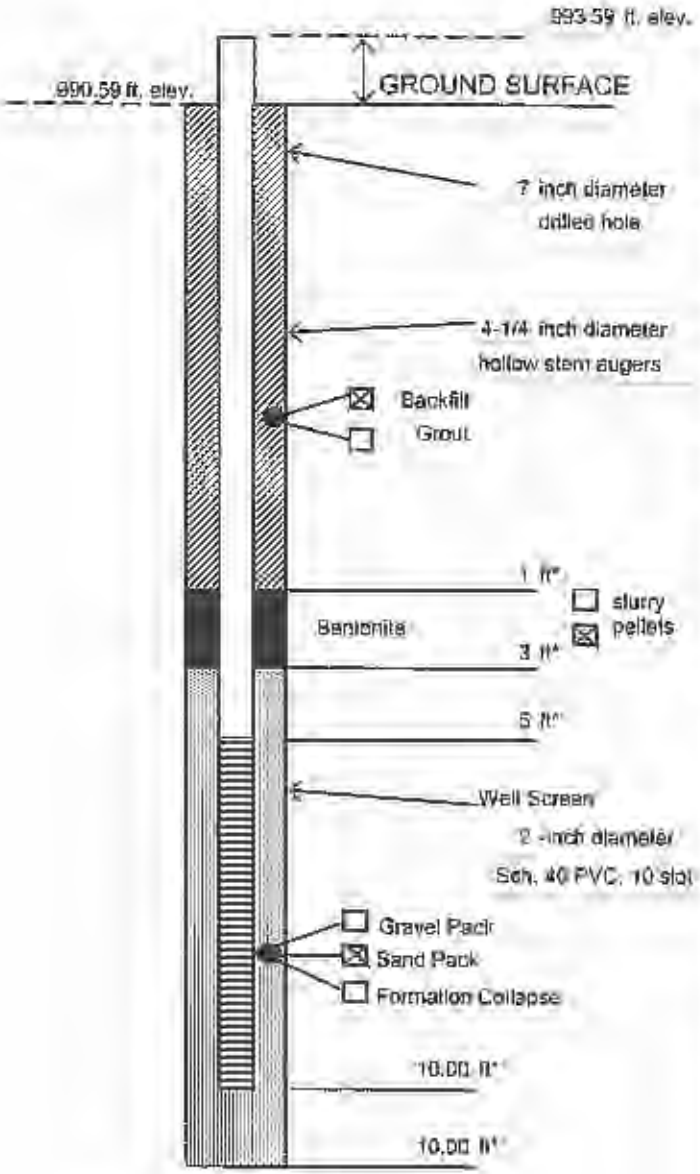
Project Number	08.8696
Project Name	Proposed East & West Brine Ponds
Well No.	MW2012-37 Boring No. SB2012-37
Town/City	Reading Center
County	Schuyler State NY
Installation Date(s)	6/29 - 7/2/2012
Drilling Contractor	SJB Services, Inc.
Drilling Method	4-1/4 inch hollow stem augers
Water Depth From Top of Riser	12.4 ft 7/3/2012 Date
C.T. Male Observer	R. Smaka

Notes:

Well No. MW2012-38

C.T. MALE ASSOCIATES

MONITORING WELL CONSTRUCTION LOG



* Depth below ground surface.

Project Number 08.8696

Project Name Proposed East & West Brine Ponds

Well No. MW2012-38 Boring No. SB2012-38

Town/City Reading Center

County Schuyler State NY

Installation Date(s) 6/28/2012

Drilling Contractor SJB Services, Inc

Drilling Method 4-1/4 inch hollow stem augers

Water Depth From Top of Riser 9.1 ft 7/3/2012 Date

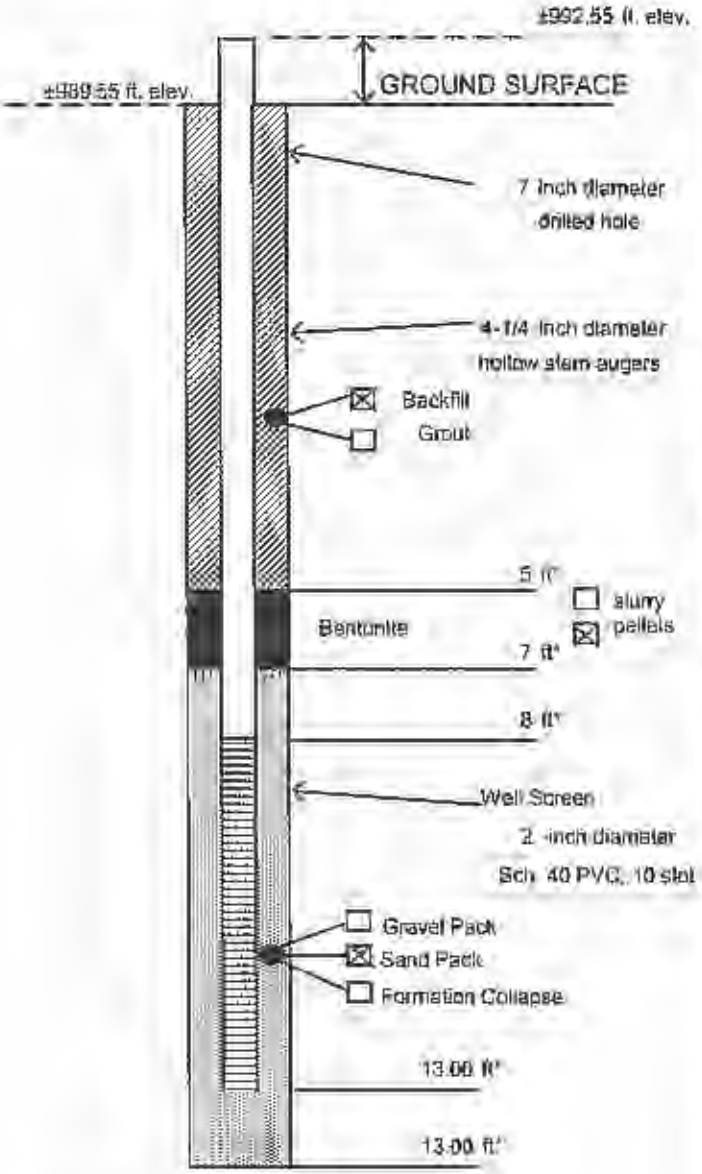
C.T. Male Observer R. Smaka

Notes:

Well No. MW2012-39

C.T. MALE ASSOCIATES

MONITORING WELL CONSTRUCTION LOG



* Depth below ground surface.

Project Number 08.8696

Project Name Proposed East & West Brine Ponds

Well No. MW2012-39 Boring No. SB2012-39

Town/City Reading Center

County Schuyler State NY

Installation Date(s) 6/28/2012

Drilling Contractor S/B Services, Inc.

Drilling Method 4-1/4 inch hollow stem augers

Water Depth From Top of Riser 7.7 ft 7/3/2012 Date

C.T. Male Observer R. Smalia

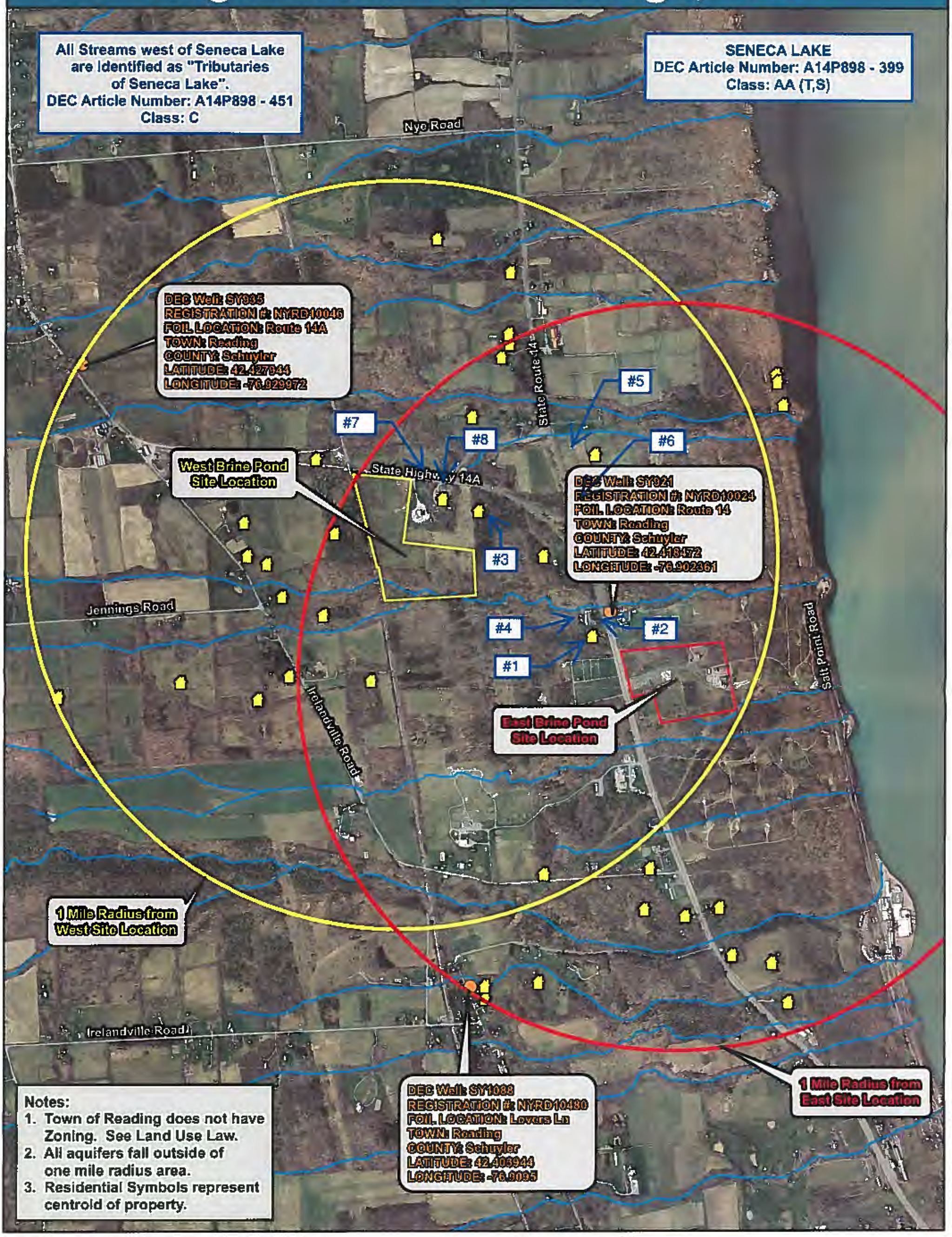
Notes:

M

ATTACHMENT M

Residential Supply Wells Survey Results

Finger Lakes LPG Storage, LLC



Map Note: Aerial Photography Flown spring 2011, 6" resolution

0 625 1,250 2,500 Feet

1 inch = 1,250 feet

Project Number: 08.0696
Data Source: NYSGIS Clearinghouse,
Projection: State Plane NAD83 NY Central
Date: May 22, 2012
File: US_Salt_Aquifer_Wells11x17_update.mxd
GIS: CH/RK

Legend

- Public Water Wells
- Residential Property (Count: 50)
- East Site Location: Tax ID 43.00-1-15
- West Site Location: Tax ID 43.00-1-29.12
- DEC Streams
- #1 Surveyed Location of Residential Wells

N W E S

Figure 1: Vicinity Map
Proposed Finger Lakes LPG Storage Brine Ponds

Town of Reading — Schuyler County, New York

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FOUNDED IN 1910

C.T. MALE ASSOCIATES, P.C.

WATER WELL SURVEY

1

Please answer the following questions as completely as possible:

PROPERTY OWNER'S NAME: ANTHONY & SHERRY VENTRA

NAME OF PERSON COMPLETING FORM: JERRY KRAUS

ADDRESS (Please include box number and street address):

3801 NYS ROUTE 14

WATKINS GLEN, NY 14891

DO YOU HAVE A WELL ON YOUR PROPERTY? YES ✓ NO ____

IF YES, HOW MANY? 2 (1 IN USE) (Please continue with questionnaire.)

IF NO, PLEASE INDICATE YOUR SOURCE OF WATER SUPPLY: ____

WELL LOCATION (Please give approximate location of well or wells on property i.e., front yard, 15' from house): 1) IN USE – BEHIND HOUSE

2) NOT IN USE – 15-30' FROM SOUTH BOUNDARY, 10-15' FROM WEST

APPROXIMATE DEPTH OF WELL: 1) 140' ; 2) 82' (WAS 138' – TEPPLO CAVED IN)

LENGTH & DIAMETER OF CASING 1) 6" 15' ; 2) 6" ?

STRATIGRAPHIC UNIT SCREENED (Is well finished in bedrock or sand and gravel)

APPROXIMATE AGE OF WELL: 1) 2000 ; 2) 1982 OR PRIOR

USE OF WELL (Please indicate all uses of well water i.e. domestic, agricultural, commercial, etc.): DOMESTIC

STATIC WATER LEVEL (What is the approximate depth of water in the well and/or what is the pump intake setting?): 2 VEINS – 19' & 27'

C.T. MALE ASSOCIATES, P.C. VENTRA - CONT.

WELL YIELD (Please estimate the maximum amount of water you could pump from your well in gallons per minute or gallons per day.): 1) 36 GAL/MIN
2) NOT USED

PERCEIVED WATER QUALITY (Please indicate if your water is hard, soft, cloudy, etc., or has a noticeable odor. Also please indicate if you treat your water for any of the above conditions): 1) HARD, SULFUR
TREATED/FILTERED

PLEASE INCLUDE ANY ADDITIONAL COMMENTS:

k:\groups\environm\forms\waterwellsurvey.doc

C.T. MALE ASSOCIATES, P.C.

(2)

WATER WELL SURVEY

Please answer the following questions as completely as possible:

PROPERTY OWNER'S NAME: MICHAEL & MARY LISOWSKI

NAME OF PERSON COMPLETING FORM: JERRY KRAMS

ADDRESS (Please include box number and street address):

3811 NYS ROUTE 14A

WATKINS GLEN, NY 14891

DO YOU HAVE A WELL ON YOUR PROPERTY? YES ✓ NO ____

IF YES, HOW MANY? 1 (Please continue with questionnaire.)

IF NO, PLEASE INDICATE YOUR SOURCE OF WATER SUPPLY: ____

WELL LOCATION (Please give approximate location of well or wells on property i.e., front yard, 15' from house): DIRECTLY BEHIND HOUSE

APPROXIMATE DEPTH OF WELL: 85'

LENGTH & DIAMETER OF CASING 7"; 40'

STRATIGRAPHIC UNIT SCREENED (Is well finished in bedrock or sand and gravel)

UNK

APPROXIMATE AGE OF WELL: 1980-85

USE OF WELL (Please indicate all uses of well water i.e. domestic, agricultural, commercial, etc.): DOMESTIC

STATIC WATER LEVEL (What is the approximate depth of water in the well and/or what is the pump intake setting?): VARIES – 10' – DRY

C.T. MALE ASSOCIATES, P.C. LISOWSKI CONT'

WELL YIELD (Please estimate the maximum amount of water you could pump from your well in gallons per minute or gallons per day.): 6-8 GAL/MIN VARIES - 500 GAL/DAY IN SPRING

PERCEIVED WATER QUALITY (Please indicate if your water is hard, soft, cloudy, etc., or has a noticeable odor. Also please indicate if you treat your water for any of the above conditions): HARD, SULFUR, IRON BACTERIA - TREATED

PLEASE INCLUDE ANY ADDITIONAL COMMENTS:

C.T. MALE ASSOCIATES, P.C.

(3)

WATER WELL SURVEY

Please answer the following questions as completely as possible:

PROPERTY OWNER'S NAME: RICK & BARBARA HUGHEY

NAME OF PERSON COMPLETING FORM: JERRY KRAUS

ADDRESS (Please include box number and street address):

3836 NYS ROUTE 14A

WATKINS GLEN, NY 14891

DO YOU HAVE A WELL ON YOUR PROPERTY? YES ✓ NO ____

IF YES, HOW MANY? 1 (Please continue with questionnaire.)

IF NO, PLEASE INDICATE YOUR SOURCE OF WATER SUPPLY: ____

WELL LOCATION (Please give approximate location of well or wells on property i.e., front yard, 15' from house): SOUTHWEST CORNER OF HOUSE, 70' FROM PROPERTY LINE

APPROXIMATE DEPTH OF WELL: 110'

LENGTH & DIAMETER OF CASING 8-10" ; 30'

STRATIGRAPHIC UNIT SCREENED (Is well finished in bedrock or sand and gravel)

APPROXIMATE AGE OF WELL: 1991

USE OF WELL (Please indicate all uses of well water i.e. domestic, agricultural, commercial, etc.): DOMESTIC

STATIC WATER LEVEL (What is the approximate depth of water in the well and/or what is the pump intake setting?): 60-80'

C.T. MALE ASSOCIATES, P.C. HUGHEY CONT.

WELL YIELD (Please estimate the maximum amount of water you could pump from your well in gallons per minute or gallons per day.): 5-8 GAL/MIN VARIES

PERCEIVED WATER QUALITY (Please indicate if your water is hard, soft, cloudy, etc., or has a noticeable odor. Also please indicate if you treat your water for any of the above conditions): NO SULFUR ; HARD WATER TREATED WITH SOFTENER

PLEASE INCLUDE ANY ADDITIONAL COMMENTS:

C.T. MALE ASSOCIATES, P.C.

(4)

WATER WELL SURVEY

Please answer the following questions as completely as possible:

PROPERTY OWNER'S NAME: CHIEFTAIN MOTEL – GREGG BITTLER

NAME OF PERSON COMPLETING FORM: JERRY KRAUS

ADDRESS (Please include box number and street address):

3815 NYS ROUTE 14

WATKINS GLEN, NY 14891

DO YOU HAVE A WELL ON YOUR PROPERTY? YES ✓ NO ____

IF YES, HOW MANY? 4 (Please continue with questionnaire.)

IF NO, PLEASE INDICATE YOUR SOURCE OF WATER SUPPLY: 1)

WELL LOCATION (Please give approximate location of well or wells on property i.e., front yard, 15' from house): 1) FRONT OF MOTEL ABOUT 3/4 WAY DOWN; 2) BACK OF "L" CLOSE TO RAVINE; 3) BEHIND HOUSE APPROX. 60'; 4) BEHIND HOUSE APPROX 8'

APPROXIMATE DEPTH OF WELL: 1) UNK; 2) UNK; 3) 1400'; 4) 75'

LENGTH & DIAMETER OF CASING 1) UNK; 2) UNK; 3) 7"; 4) 8"

STRATIGRAPHIC UNIT SCREENED (Is well finished in bedrock or sand and gravel)

UNKNOWN

APPROXIMATE AGE OF WELL: 1) UNK; 2) UNK; 3) 1940's; 4) 1990

USE OF WELL (Please indicate all uses of well water i.e. domestic, agricultural, commercial, etc.): COMMERCIAL & DOMESTIC

HAS "MINI MUNICIPAL" SYSTEM FOR PRESSURE, FILTER, & CHLORINATION

STATIC WATER LEVEL (What is the approximate depth of water in the well and/or what is the pump intake setting?): VARIES ON TIME OF YEAR & WEATHER

C.T. MALE ASSOCIATES, P.C. CHIEFTAIN MOTEL CONT.

WELL YIELD (Please estimate the maximum amount of water you could pump from your well in gallons per minute or gallons per day.): VARIES - 1400' DEEP WELL PRODUCES MOST - MAIN WELL

PERCEIVED WATER QUALITY (Please indicate if your water is hard, soft, cloudy, etc., or has a noticeable odor. Also please indicate if you treat your water for any of the above conditions): SOME SULFUR, TREATED WITH SYSTEM

PLEASE INCLUDE ANY ADDITIONAL COMMENTS: THERE IS A 5TH WELL THAT IS ACTUALLY ON US SALT PROPERTY THAT WAS USED IN THE PAST BY PRIOR OWNER

C.T. MALE ASSOCIATES, P.C.

(5)

WATER WELL SURVEY

Please answer the following questions as completely as possible:

PROPERTY OWNER'S NAME: BRETT & MENDY THORSLAND

NAME OF PERSON COMPLETING FORM: JERRY KRAUS

ADDRESS (Please include box number and street address):

3975 NYS RT 14

ROCK STREAM, NY 14878

DO YOU HAVE A WELL ON YOUR PROPERTY? YES ✓ NO

IF YES, HOW MANY? 1 (Please continue with questionnaire.)

IF NO, PLEASE INDICATE YOUR SOURCE OF WATER SUPPLY:

WELL LOCATION (Please give approximate location of well or wells on property i.e., front yard, 15' from house): SPRING FED CISTERN –

UP ON HILL BY GRAPEVINES

APPROXIMATE DEPTH OF WELL: 12' } SPRING FED

LENGTH & DIAMETER OF CASING 8' } CISTERN

STRATIGRAPHIC UNIT SCREENED (Is well finished in bedrock or sand and gravel)

APPROXIMATE AGE OF WELL: 30 YRS

USE OF WELL (Please indicate all uses of well water i.e. domestic, agricultural, commercial, etc.): NO LONGER

A BED & BREAKFAST

STATIC WATER LEVEL (What is the approximate depth of water in the well and/or what is the pump intake setting?): 6'

C.T. MALE ASSOCIATES, P.C. THORSLAND CONT.

WELL YIELD (Please estimate the maximum amount of water you could pump from your well in gallons per minute or gallons per day.): ?

PERCEIVED WATER QUALITY (Please indicate if your water is hard, soft, cloudy, etc., or has a noticeable odor. Also please indicate if you treat your water for any of the above conditions): EXCELLENT WATER QUALITY

PLEASE INCLUDE ANY ADDITIONAL COMMENTS:

C.T. MALE ASSOCIATES, P.C.

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WATER WELL SURVEY

Please answer the following questions as completely as possible:

PROPERTY OWNER'S NAME: DAVID & HARRIET YOUNG

NAME OF PERSON COMPLETING FORM: JERRY KRAUS

ADDRESS (Please include box number and street address):

3988 NYS ROUTE 14

ROCK STREAM, NY 14878

DO YOU HAVE A WELL ON YOUR PROPERTY? YES ✓ NO ____

IF YES, HOW MANY? 2 (Please continue with questionnaire.)

IF NO, PLEASE INDICATE YOUR SOURCE OF WATER SUPPLY: ____

WELL LOCATION (Please give approximate location of well or wells on property i.e., front yard, 15' from house): BOTH WELLS SOUTH OF DRIVEWAY IN FIELD

APPROXIMATE DEPTH OF WELL: TBD

LENGTH & DIAMETER OF CASING

STRATIGRAPHIC UNIT SCREENED (Is well finished in bedrock or sand and gravel)

APPROXIMATE AGE OF WELL: ____

USE OF WELL (Please indicate all uses of well water i.e. domestic, agricultural, commercial, etc.): ____

STATIC WATER LEVEL (What is the approximate depth of water in the well and/or what is the pump intake setting?): ____

C.T. MALE ASSOCIATES, P.C. YOUNG CONT.

WELL YIELD (Please estimate the maximum amount of water you could pump from your well in gallons per minute or gallons per day.):_____

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PERCEIVED WATER QUALITY (Please indicate if your water is hard, soft, cloudy, etc., or has a noticeable odor. Also please indicate if you treat your water for any of the above conditions):_____

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PLEASE INCLUDE ANY ADDITIONAL COMMENTS:_____

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C.T. MALE ASSOCIATES, P.C.

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WATER WELL SURVEY

Please answer the following questions as completely as possible: CONTACT: DARREN HAVENS

PROPERTY OWNER'S NAME: PALPROSS INC. / LP TRANSPORTATION

NAME OF PERSON COMPLETING FORM: JERRY KRAUS

ADDRESS (Please include box number and street address):

3875 NYS ROUTE 14A

WATKINS GLEN, NY 14891

DO YOU HAVE A WELL ON YOUR PROPERTY? YES ✓ NO ____

IF YES, HOW MANY? 1 (Please continue with questionnaire.)

IF NO, PLEASE INDICATE YOUR SOURCE OF WATER SUPPLY: ____

WELL LOCATION (Please give approximate location of well or wells on property i.e., front yard, 15' from house): APPROX 50' WEST OF DRIVEWAY, 200' FROM 14A

APPROXIMATE DEPTH OF WELL: TBD

LENGTH & DIAMETER OF CASING ____

STRATIGRAPHIC UNIT SCREENED (Is well finished in bedrock or sand and gravel) ____

APPROXIMATE AGE OF WELL: ____

USE OF WELL (Please indicate all uses of well water i.e. domestic, agricultural, commercial, etc.): ____

STATIC WATER LEVEL (What is the approximate depth of water in the well and/or what is the pump intake setting?): ____

C.T. MALE ASSOCIATES, P.C.

WELL YIELD (Please estimate the maximum amount of water you could pump from your well in gallons per minute or gallons per day.):_____

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PERCEIVED WATER QUALITY (Please indicate if your water is hard, soft, cloudy, etc., or has a noticeable odor. Also please indicate if you treat your water for any of the above conditions):_____

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PLEASE INCLUDE ANY ADDITIONAL COMMENTS:_____

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C.T. MALE ASSOCIATES, P.C.

WATER WELL SURVEY

Please answer the following questions as completely as possible:

PROPERTY OWNER'S NAME: CASELLA WASTE MANAGEMENT

NAME OF PERSON COMPLETING FORM: JERRY KRAMS

ADDRESS (Please include box number and street address):

3871 NYS ROUTE 14A

WATKINS GLEN, NY 14891

DO YOU HAVE A WELL ON YOUR PROPERTY? YES_____ NO_____

IF YES, HOW MANY?_____ (Please continue with questionnaire.)

IF NO, PLEASE INDICATE YOUR SOURCE OF WATER SUPPLY:

WELL LOCATION (Please give approximate location of well or wells on property i.e., front yard, 15' from house):

APPROXIMATE DEPTH OF WELL: N/D

LENGTH & DIAMETER OF CASING

STRATIGRAPHIC UNIT SCREENED (Is well finished in bedrock or sand and gravel)

APPROXIMATE AGE OF WELL:

USE OF WELL (Please indicate all uses of well water i.e. domestic, agricultural, commercial, etc.):

STATIC WATER LEVEL (What is the approximate depth of water in the well and/or what is the pump intake setting?):

C.T. MALE ASSOCIATES, P.C.

WELL YIELD (Please estimate the maximum amount of water you could pump from your well in gallons per minute or gallons per day.):_____

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PERCEIVED WATER QUALITY (Please indicate if your water is hard, soft, cloudy, etc., or has a noticeable odor. Also please indicate if you treat your water for any of the above conditions):_____

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PLEASE INCLUDE ANY ADDITIONAL COMMENTS:_____

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