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Construction Operations Plan
Interim Remedial Measures
for the Hempstead Intersection Street
Former Manufactured Gas Plant Site

Villages of Hempstead & Garden City
Nassau County, New York

Prepared for:

National Grid
175 East Old Country Road
Hicksville, New York 11801

Prepared by:

URS Corporation - New York
77 Goodell Street
Buffalo, New York 14203

URS

August 2008

CONSTRUCTION OPERATIONS PLAN
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HEMPSTEAD INTERSECTION STREET FORMER MGP SITE
VILLAGES OF HEMPSTEAD AND GARDEN CITY, NASSAU COUNTY, NEW YORK

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EXECUTIVE SUMMARY

This Construction Operations Plan (COP) describes construction operations that will be performed during an Interim Remedial Measure (IRM) that National Grid will be undertaking at the Hempstead Intersection Street Former Manufactured Gas Plant (MGP) Site, prior to implementing site-wide remediation. The IRM consists of the excavation and off-site treatment/disposal of shallow soil source material (i.e. less than 18 feet below ground surface) and the restoration of site areas that are disturbed during the IRM. The IRM excavations will support the future site-wide remedy for areas containing deep soil contamination by providing additional areas for construction staging, soil stockpiling, and possible temporary vehicle parking. National Grid will perform the IRM using ENTACT & Associates, LLC (ENTACT) as the Construction Contractor. National Grid will also employ a full-time Resident Engineer to oversee and document the construction activities. On-site facilities will be provided for the New York State Department of Environmental Conservation (NYSDEC). The IRM construction activities described in this COP are expected to occur between September and December, 2008.

The following activities are described in this COP:

- mobilization and site preparation;
- routing of construction traffic through the local communities;
- community air monitoring;
- site worker health and safety;
- construction quality assurance/quality control;
- soil erosion and sediment control;
- utility protection;
- soil excavation and backfill;
- stockpile management;
- bulking of wet soil;
- dewatering;
- underground storage tank closure;
- demolition;
- dust control;
- waste management; and
- site security.

Site preparation will consist of installing temporary trailers, sanitary facilities, utilities, perimeter air monitoring stations, and establishing construction laydown and vehicle parking areas. The COP incorporates a traffic assessment performed by a National Grid consultant that evaluates and recommends routes for construction truck traffic to and from the site. The assessment recommends alternating two routes, one through the Village of Hempstead and the other through the Village of Garden City.

The COP includes a discussion of the following programs that will be implemented during IRM construction activities:

- Community Air Monitoring Program, which documents air monitoring that will be conducted during significant ground intrusive activities to ensure and document that potential airborne contaminants do not leave the site. The program consists of a network of fixed and portable monitoring stations that will provide air monitoring data on a real-time basis. Alert and action levels are established together with a contingency plan that identifies actions to be taken if the levels are exceeded.

- Site worker health and safety requirements are documented in a Health and Safety Plan prepared by the contractor, ENTACT.

- A system of construction quality assurance/quality control that will be used is documented in a Construction Operations Plan.

Four (4) areas, designated A, B, C, and E, will be excavated to remove shallow (i.e. < 18 feet deep) contaminated soil that meets the requirements of "soil source material" as defined in the IRM Remedial Action Work Plan (URS, 2007). Areas A, B, and C are located in the vicinity of an active 16-inch gas line that is operated by National Grid. The COP identifies clearance activities that will be performed to evaluate if soil source material extents beneath the gas line. High-voltage overhead electrical lines are also located off-site in the vicinity of IRM excavation Area E. The COP identifies safety procedures that will be implemented and excavation methods that will be used in Area E due to the proximity of the electrical lines.

Except for the relatively small areas above the 16-inch gas line and adjacent to the overhead electrical lines, all excavation and backfilling activities will be conducted beneath a temporary enclosure equipped with a vapor management system that will prevent the migration of airborne contaminants and odors from the excavations. All excavated soil source material will be loaded into trucks and transported off-site for treatment and disposal. Excavated material that does not meet the source material definition will be placed back into the excavations and clean imported fill will be used to bring the excavations up to the existing grade. A concrete slab beneath Area A and a boiler blow sump within Area E will also be removed and taken off-site for disposal. All trucks and construction equipment leaving the site will be processed through a decontamination station to ensure that MGP contaminants are not tracked through the surrounding communities.

The excavations will not penetrate the water table, which occurs at approximately 25 feet below ground surface. Any wet soils or perched water conditions that may be encountered will be managed using portable pumps and liquid storage equipment or bulking agents. Handling and disposal of any recovered liquids and the use of bulking agents will meet federal, State, and local laws and requirements.

Dust and odor controls will be implemented during the construction operations, if necessary, to ensure that established action levels are not exceeded and that community concerns are not warranted. Site security will be used around the clock during site construction activities.

1.0 INTRODUCTION

This Construction Operations Plan (COP) has been prepared to outline the sequence, means and methods for completion of interim remedial measures (IRMs) to be performed at the Hempstead Intersection Street Former Manufactured Gas Plant (MGP) Site located in the Village of Hempstead and Village of Garden City, Long Island, New York (site). This COP has been developed in accordance with the Technical Specifications (Specifications), the Final IRM Remedial Action Work Plan (RAWP), the Final Remedial Investigation Report (RI), Design Drawings (Drawings), associated attachments and addenda.

In general, IRM activities include removal of impacted soil from designated areas across the site to depths ranging from 3 to 18 feet (ft) below ground surface (bgs), backfill, and restoration of excavated areas. Previous site investigations indicate soils may contain polycyclic aromatic hydrocarbons (PAHs) and benzene, toluene, ethyl benzene and xylene (BTEX) associated with former MGP operations greater than 1,000 milligrams per kilogram (mg/kg) and 50 mg/kg respectively. The majority of excavation and backfill activities will be conducted under a temporary containment structure equipped with a vapor management system (VMS).

This COP contains sections detailing the following IRM activities that will be implemented:

- Mobilization and Site Preparation
- Traffic Assessment
- Community Air Monitoring
- Site Worker Health and Safety
- Construction Quality Assurance/Quality Control
- Soil Erosion and Sediment Control
- Utility Protection
- Excavation and Backfill
- Stockpile Management Procedures
- Methods for Bulking of Wet Soil
- Dewatering
- Underground Storage Tank (UST) Closure

- Demolition Activities
- Dust Control
- Waste Management
- Site Security Plan

A Project Construction Schedule showing sequencing and duration of activities is included as Appendix A.

At the conclusion of construction, an IRM Completion Report will be prepared to document the construction work. The report will include a summary of the daily field construction reports, all relevant documentation such as photo logs, sampling/testing results, and waste disposal manifests, and any approved variances to the RAWP. The table of contents for the report will generally adhere to the following format:

DRAFT IRM COMPLETION REPORT
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2.0 MOBILIZATION AND SITE PREPARATION

2.1 Equipment Mobilization

The table below outlines the type and quantity of major equipment to be utilized throughout the project (note; these lists may be revised to reflect changes in field conditions). An updated equipment list will be included in the daily construction reports to be maintained by the construction contractor, ENTACT.

Equipment Type	Quantity	Equipment Use
D5 Dozer (or equal)	1	Backfill placement and structure relocation
4-CY Wheel Loader w/Forks	1	General material handling and loading
CAT 330 Excavator (or equal)	1	Soil excavation, loading and structure relocation
CAT 325 Excavator w/Demolition Hammer	1	Breaking and removal of MGP features
66" Smooth Drum Vibratory Roller	1	Backfill compaction
Rusmar Foam Machine	1	Dust and odor control
Water Truck – 2,000 gallon	1	Dust and odor control
60' Telescopic Man Lift	2	Structure assembly, relocation and disassembly
ICON 24'x10'x8' Trench Box	1	Excavation Area-B shoring
320 Kilowatt Generator & Cables	1	Power VMS systems

2.2 Site Preparation

The following activities will be completed during the site preparation phase. Figure 1 - Site Plan/Erosion and Sediment Control Plan depicts site set up and also depicts the delineated areas A, B, C and E that require excavation and backfill. Appendix B presents the documentation that supports the delineation limits shown on Figure 1.

- Temporary facilities including furnished trailers, sanitary facilities, utilities (telephone, water, and electric), and storage and staging areas will be established. Work zones (exclusion, contamination reduction and support) will be established and clearly identified with orange safety fence and signage. Work zones may be reconfigured as work progresses across the site. Figure 1 shows the locations where the parking area and trailers will be placed. If the 0.8-acre sold portion of

the property is acquired by National Grid prior to site preparation, the trailers and parking area will be located as shown on Figure 1A (Alternate Site Layout).

- Personnel and equipment decontamination stations will be constructed per the contractor's health and safety plan (HASP) (Appendix C), which will include a steam cleaner.

- A land surveyor licensed in the State of New York will perform survey activities. Initial surveying will include establishment and preservation of survey control points, pre-remedial site survey, establishment of work areas, and establishment of utility and subsurface structure locations.

- Vegetation and debris will be removed from the work zones and other areas where remedial activities may occur. Debris, stumps, roots and other vegetation generated during clearing operations will be stockpiled, characterized and disposed of off site at an appropriate disposal facility in accordance with applicable regulations and pending the approval of National Grid.

2.3 Traffic Assessment

A traffic assessment was performed to identify the most suitable routes for trucks to travel between the site and the identified treatment/disposal facilities or clean fill source suppliers. The assessment is included in Appendix E and identifies two preferred transportation routes. One route goes through the Village of Hempstead and the other goes through the Village of Garden City.

- **Truck Route #1** (through the Village of Hempstead to the Hempstead Turnpike) – trucks originating at the site will travel south to North Franklin Street to westbound Fulton Street. The route continues west on Fulton Street until it becomes Hempstead Turnpike (NYS Route 24) and continues along Jamaica Avenue. At the intersection of Francis Lewis Boulevard and Jamaica Avenue, the route turns north to reach Hillside Avenue (NYS Route 25) where it continues east a short distance to the Clearview Expressway entrance. The northbound Clearview Expressway leads to the westbound Long Island Expressway (I-495) and then the Brooklyn-Queens Expressway to the Verrazano Narrows Bridge (refer to maps presented in Appendix E). The return route from the Verrazano Narrows Bridge to the site would be the reverse of the outgoing route described above, except that approaching trucks traveling northbound on North Franklin Street would divert to Atlantic Street and thereafter to Seeley Avenue to reach the Intersection Street site entrance. This would avoid left turn movements at an unsignalized intersection (at North Franklin and Intersection streets).

- **Truck Route #2** (through the Village of Garden City to the Jericho Turnpike) – trucks originating at the site travel north on Franklin Avenue to westbound Old Country Road and then to northbound Herricks Road to westbound Jericho Turnpike (NYS Route 25), which becomes Braddock Avenue in Queens. The route continues west to Hillside Avenue (also NYS Route 25) to the northbound Clearview Expressway (I-295), which leads to the westbound Long Island Expressway (I-495) and the Brooklyn-Queens Expressway that terminates at the Verrazano Narrrows Bridge (refer to maps presented in Appendix E). The return route from the Verrazano Narrows Bridge to the site would be the reverse of the outgoing route described above.

The traffic assessment recommends a procedure of alternating the routes to balance the truck traffic through the communities.

2.4 Community Air Monitoring Program

A Community Air Monitoring Program (CAMP) will be performed to measure, document, and respond to potential airborne contaminants during significant ground intrusive activities associated with the IRM. The CAMP will include the monitoring of airborne contaminants at the site perimeter and will compliment work zone monitoring that will be conducted pursuant to the Contractor's Health and Safety Plan (HASP). The CAMP is presented in Appendix D and builds upon guidelines established by the New York Department of Health (NYSDOH) in the NYSDEC DER-10 Draft Technical Guidance for Site Investigation and Remediation (DER-10) (December, 2002). The CAMP includes monitoring procedures, Alert Limits, Action Limits, and contingency measures if Action Limits are approached. An Alert Limit is a contaminant concentration or odor intensity that will serve as a screening tool to trigger contingent measures, if necessary, to assist in minimizing offsite transport of contaminants and odors during remedial activities. An Action Limit is a contaminant concentration or odor intensity that triggers work stoppage.

During times of ground intrusive activities, fence line perimeter air monitoring will be conducted using a combination of real-time air monitoring at fixed (24 hours a day/7 days a week) and portable stations. Contaminants that will be monitored include volatile organic compounds (VOCs), particulate (PM_{10}), and hydrogen cyanide (HCN) if cyanide

materials are encountered during excavation or if work area monitoring (i.e. HASP) detects a confirmed measurement of cyanide. Relative odor intensity will also be monitored using an American Society for Testing Materials (ASTM) method. A contingency plan included in the CAMP defines the Alert Levels, Action Levels, and specific response activities to be implemented during working hours if an exceedance of an Alert Limit or Action Limit occurs. The response actions are intended to prevent or significantly reduce the migration of airborne contaminants from the site. The CAMP also specifies data management and analysis procedures.

The objectives of the CAMP are as follows:

- Provide an early warning system to alert National Grid that concentrations of TVOCs or dust in ambient air are approaching Action Levels due to site activities.
- Provide details for a site contingency plan that is designed to reduce the off-site migration of contaminants/odors if established Action Limits are approached or exceeded.
- Determine whether construction controls are effective in reducing ambient air concentrations to below Action Limits and make appropriate and necessary adjustments.
- Develop a permanent record that includes a database of perimeter air monitoring results and meteorological conditions, equipment maintenance, calibration records, and other pertinent information.

2.5 Health and Safety Requirements

Summary

The Contractor is responsible for providing all personnel, facilities, equipment and materials to protect all on-site workers from physical injury and adverse health effects due to exposure to site hazards. All on-site personnel will comply with the requirements of the HASP that meets all requirements presented in the most recent versions of the following publications:

- 29CFR Part 1910.120 - Occupational Health and Safety Standards;

- 29CFR Part 1926 - Safety and Health Regulations for Construction;
- 29CFR Part 1910, Subpart I - Personal Protective Equipment;
- NIOSH Publication No. 85-115;
- ANSI Z358.1, Emergency Eyewash and Shower Equipment;
- ANSI Z88.2, Practices for Respirator Protection; and,
- ANSI Z87.1, Practice for Occupational and Educational Eye and Face Protection.

A copy of the HASP is included in Appendix C and contains information and requirements that are summarized below.

Introduction/Purpose/Scope of Plan/Application

This section describes the major work activities expected during construction and their hazards.

Organizational Roles and Responsibilities

This section includes a description of the responsibilities of the Construction Superintendent, Resident Engineer, Site Safety Officer (SSO), Corporate Health and Safety Manager, and other workers. The SSO will be present on site during all working hours from mobilization through demobilization.

Site Description and Scope of Work

This section provides a description of the site and identifies the scope of the IRM.

Task Safety/Health Risk and Activity Hazard Analysis

This section provides a list of chemicals of concern (COC), a summary of analytical data, the frequency of detection, health effects of each COC, and details of a hazard communication program. For each activity, specific hazards and control measures are detailed with the expected standard operating procedures that are to be followed.

A discussion of physical hazards and biological hazards is also included.

Training

This section includes a description of the training required for site workers, other site personnel and site visitors.

Personal Protective Equipment (PPE)

This section provides details for personal protective equipment (PPE) to be used by personnel for each work task, and criteria for a change to a higher or lower level of protection. The selection of PPE will be based upon a hazard assessment as required by 29CFR 1910.132(d).

Medical Surveillance

This section includes a description of the medical surveillance program to be implemented by the Contractor. All National Grid, Engineer, and Contractor personnel performing field work where potential exposure to contaminants exist at the site are required to have passed a medical surveillance examination in accordance with 29 CFR 1910.120(f).

Respiratory Training and Fit Testing Requirements

This section provides details for individual fit test requirements, compliance and record keeping, and individual training on respirator selection, use, maintenance, storage, and cleaning. This section also identifies the method of selection and limitations of cartridges, end of service life indicators and change-out schedule. Fit test requirements, record keeping and other compliance requirements in accordance with OSHA 29 CFR 1910.134 are included.

Respiratory Protection Devices

This section provides standard operating procedures for the use of air purifying respirators (APR). Details include proper use, limitations and restrictions, cleaning and disinfecting, the daily cleaning routine, procedures after routine use, inspection and checkout, and storage. This includes a cartridge change-out schedule as required by 29CFR 191 0.134(d) (3) (iii) (B) (2).

Air Monitoring Requirements and Action Levels for Site Worker Protection

This section includes a description of the air-monitoring program to be implemented at the Site, which is summarized below.

- Photoionization detector (PID), MiniRae with 10.6 eV lamp or equivalent (1);
- Portable dust monitor – MIE 1000 Miniram (2);
- 420-IQ stationary gas meters (LEL) with interface to 3-way alarm system (2);
- ENMET MX2100 or Multi Rae combustible gas indicator (CGI)/O2/H2S/LEL/CO monitor inside of the temporary containment structure (1);
- T-82 Industrial Scientific HCN monitor (1);
- Drager tubes for benzene and nitrogen dioxide (diesel combustion byproduct) used inside the temporary containment structure (1); and
- Vapor monitors (OVMs) for benzene, toluene, ethylbenzene, and xylenes (quantity as needed).

Action levels are identified that required an upgrade of PPE as well as tasks being performed that require air monitoring and locations of air monitoring (refer to Table 1).

Site Control and Standard Operating Procedures

This section provides details for the locations, procedures for entering and exiting, and the procedures for delineating the support, contamination reduction and exclusion zones. Details for the standard operating procedures in each zone are provided.

Decontamination Procedures

This section provides a description of equipment, personnel decontamination procedures, the method used to verify decontamination, and the person designated to make this decision.

Contingency Plan and Emergency Procedures

A Site-Specific Contingency Plan and Emergency Procedure (Contingency Plan) provides the phone numbers for the fire, police, ambulance, Long Island Rail Road, hospital, poison control center, and directions to the hospital from the site, emergency equipment, general emergency procedures, and the responsibilities of the SSO, the

Construction Superintendent (as applicable) and the Resident Engineer (as applicable) during emergencies.

The HASP includes detail and maps for responding to medical emergencies, fires or explosions, and spills or leaks. The plan also includes procedures for reporting incidents, completing incident reports and spill prevention and response procedures.

High Loss Potential and Permitted Activities

High loss potential and permitted activities that may be performed on-site are identified.

Inspection/Audit Program

An Inspection/Audit Program is established to identify substandard conditions and employee work practices that could potentially cause or lead to personal injuries or illnesses, and/or equipment damage; and to recognize and reinforce good housekeeping, good work practices, and compliance with regulatory standards. The Inspection/Audit Program includes the following items:

- A weekly inspection conducted by the Construction Superintendent accompanied by the SSO, which will identify the date, time, site conditions/operations, personnel conducting the inspection, findings, and recommended corrective actions;
- A monthly inspection conducted by the Resident Engineer accompanied by the SSO, which will follow a similar format to the weekly inspection; and
- A quarterly inspection (at least one) conducted by the Contractor's Corporate Health and Safety Manager.

Table 1
Real-Time Air Monitoring Action Levels

Air Monitoring Instrument	Monitoring Location	Action Level	Site Action	Reason
PID	Breathing zone	0.5 ppm	Use detector tube for benzene	½ of PEL for benzene
PID	Breathing zone	0 – 10 ppm	No respiratory protection required	
		10 – 250 ppm	Level C	
		> 250 ppm	Stop work, withdraw from work area and notify CESM	
Oxygen meter	Breathing zone	< 19.5 %	Stop work, withdraw from work area and notify CESM	Low oxygen
		> 22%	Stop work, withdraw from work area and notify CESM	Oxygen enriched atmosphere, explosion hazard
H_2S meter	Breathing zone	< 5 ppm	No respiratory protection required	
		> 5 ppm	Stop work, withdraw from work area and notify CESM	
HCN meter	Breathing zone	< 2.5 ppm	No respiratory protection required	
		> 2.5 ppm	Stop work, withdraw from work area and notify CESM	
CGI	Excavation	< 10% LEL	Investigate possible causes, allow excavation to ventilate, use caution during procedures.	Increasing potential for ignition of vapors
		> 10% LEL	Stop work, allow excavation to ventilate to <10% LEL. If ventilation does not result in a decrease to <10% LEL, withdraw from work area & notify CSEM	
Detector Tube	Benzene exposure	< 0.5 ppm	Level D	
		0.5 – 10 ppm	Level C half-face air required	
		10 – 50 ppm	Level C full-face air required	

Table 1
Real-Time Air Monitoring Action Levels

Air Monitoring Instrument	Monitoring Location	Action Level	Site Action	Reason
		> 50 ppm	Stop work until elevated readings subside. Contact PHSC for possible upgrade to Level B	

2.6 Construction Quality Assurance/Quality Control

A system of construction quality assurance/quality control (QA/QC) will be in effect during the IRM construction. National Grid and their Engineer will provide the quality assurance oversight to ensure that the Contractor's Construction Quality Control Plan (CQCP), provided in Appendix F, is strictly enforced. The CQCP addresses the following items:

- Roles and responsibilities of involved parties;
- Responsibilities of the contractor's personnel;
- Lines of communication;
- Meetings related to construction QC;
- Documentation and reporting procedures related to construction QC;
- QC requirements associated with the specific work activities;
- Summary of QC testing procedures and frequency;
- Problem resolution including nonconformance with contract documents.

Each major construction activity is addressed from the standpoint of QC requirements. The CQCP also provides example forms that will be used to track the work such as a soil sampling log, imported backfill summary, and a daily project summary report.

3.0 SOIL EROSION AND SEDIMENT CONTROL PLAN

Soil erosion and sediment controls that will be installed during the project preparation phase and as work progresses are described below. Soil erosion and sediment controls and approximate locations are shown on Figure 1.

3.1 Stabilized Construction Entrance/Exit

Existing paved construction entrance/exits are located off of Second Street and Intersection Street. ENTACT currently plans to utilize Intersection Street as the entrance and Second Street as the exit. The construction exit will be covered with a non-woven geotextile overlain with coarse aggregate to clean truck tires prior to exiting the site. The construction exit will be inspected and redressed as needed while in use. Trucks will be inspected prior to exiting the site to ensure contamination is not migrating onto off site roadways via truck tires. A decontamination pad will be constructed at the site exit to decontaminate trucks and equipment as needed. Truck routes on and off site will be monitored for excessive dirt or dust. Proper cleaning of trucks exiting the site will aid in minimizing dusty conditions on roadways. A 2,000 gallon water truck will be on site to wet down on and off site travel routes.

3.2 Silt Fence and Hay Bales

At a minimum, silt fence will be installed around the perimeter of the excavation areas. Additional sediment/silt fence will be installed as required in strategic locations based on visual observance of flow patterns and topography of work areas to control sediment entrained storm water from entering and exiting work areas. Silt fence may be installed around excavation areas as work progresses across the site to allow movement of the temporary containment structure to be placed over the areas to be excavated. Sediment/silt fence will also be installed around the perimeter of the decontamination pad and any stockpile areas, which may be constructed.

Hay bales will be available on site to be used in conjunction with silt fence in areas with the potential for higher flow patterns. Hay bales will also be installed around inlets that may be present on site.

3.3 Seeding and Mulching

ENTACT does not anticipate leaving a disturbed area inactive for more than 21 days from the date of initial disturbance. However, in the event a disturbed area is to remain inactive for more than 21 days it will be seeded and mulched within 14 days of the most recent disturbance. Seeding may be for temporary vegetation in conformance with the New York Standards for Soil, Erosion and Sediment Control for Critical Area Plantings.

3.4 Erosion Control Blankets

Erosion control blankets (ECB) may be installed over seeded and/or sloped areas to prevent soil erosion and migration. ECB will be installed per the manufacturers recommended instructions and will be secured in place using staples.

3.5 Maintenance

All erosion and sediment control practices will be inspected on a weekly basis and following every storm event greater than 0.5 inches, or at any evidence of the failure of a sediment erosion control measure. Any needed repairs will be made immediately to maintain all practices as designed. Sediment will be removed from behind the sediment fence and hay bales when it becomes about 6 inches deep at the fence. The sediment fence will be repaired as necessary to maintain a barrier.

4.0 UTILITY PROTECTION PLAN

4.1 Utility Location

The location of utilities will be identified and marked prior to beginning land-disturbing activities. ENTACT will contact the New York City- Long Island One Call center and/or the new 811 Utility Dig to locate and mark out utilities that may enter or exit the perimeter of the IRM excavation work areas and associated bench back zones around excavation areas. National Grid will locate and mark out underground utilities and piping known to them within the IRM excavation areas limits.

In the event utilities are identified in close proximity to the excavation work areas, National Grid will be notified and procedures for protecting the utility will be implemented. At a minimum, identified utilities will be documented and visually marked, and protected against vibration, settlement, undermining, and other potential hazards associated with excavation and backfilling activities to be performed. Clearance and protection of an existing 16-inch gas line is discussed below.

ENTACT will coordinate with the appropriate utility owners to remove and re-route utilities should it become necessary. Caution and awareness of underground and overhead utilities and other identified obstructions that remain in place will be emphasized in daily health and safety meetings.

4.2 Protection of Existing 16-Inch Gas Line

4.2.1 16-Inch Gas Line Location and Clearance

A 16-inch (99 psi) natural gas line currently runs to the south of Area A and to the north of Area B (refer to Figures 1 and 2). The gas line is an older vintage line and National Grid's Gas Department has requested that any work near the line be performed carefully. The following steps will be implemented while performing locating and clearance activities in the vicinity of the gas line.

1. Coordinate with National Grid to reduce the pressure in the 16-inch gas line.

2. Survey and mark the approximate location of the gas line.

3. Perform air monitoring when working in the vicinity of gas line to assess for the presence of any leakage from the line.

4. Perform initial test pitting along the gas line using air knife/vacuum excavator to confirm pipeline alignment.

5. Install flags or markers to mark gas line alignment, and install steel plating over the line where traffic lanes are established.

6. Dig test pits along either side of marked pipeline and visually observe soil in vicinity of the pipeline for the presence of impacted soil. Test pits will be hand dug at approximately 15 to 20-foot intervals for a total of approximately 10 pits.

7. Immediately backfill the test pits with clean overburden or imported soil.

If visible source material is identified under or near the gas line during the gas line location and clearance excavation, it will be documented (and surveyed) so that it can be addressed later when the gas line is identified for retirement. The documentation will include appropriate MGP related sampling. Test pitting and/or excavation near the gas line will need to be performed carefully to minimize any potential undermining of the backfill support underlying this older vintage gas line. Figure 2 shows the extent of the gas line clearance area.

4.2.2 Area A Excavation Near Gas Line

The anticipated location of the gas line is within close proximity to the Area A excavation limits. It will be necessary to excavate and backfill a 15-foot wide area along the south edge of Area A as a clean zone for subsequent structure placement in order to avoid placing the temporary structure on or over the gas line (refer to Figure 2). An excavator will be positioned in Area A and will excavate by pulling soil away from the gas line in a south to north motion. Positioning the excavator in this manner will avoid placing excessive weight and vibration directly over or near the gas line. Due to the shallow proposed excavation depth in Area A and assuming a typical installation depth of

at least 3 feet for the gas line, the area will be excavated with a vertical 3-foot cut along the south edge of Area A to minimize excavation activity directly over or within 3 feet of the gas line. A vertical cut of 3 feet is within OSHA standards and will minimize excavation risk near the gas line. Extreme care will be taken with any excavation in close proximity to the gas line. Excavation directly over or next to the gas line will be done by hand as necessary.

To minimize the extent of gas line potentially exposed at any one time as well as to control odors and dust emissions, the excavation will be performed in small sections with foam applied as necessary to control odors and dust. Backfill material will be available on site to concurrently backfill the excavation to minimize the amount of area open at any one time. Backfilling will be in close coordination with and will adhere to National Grid standards and will be accomplished by placing and spreading the backfill with a bulldozer and compacting with a static drum roller in thin lifts of 8-12 inches. This process will not require the use of vibratory compaction near the gas line and will further minimize risk of damage to the gas line.

4.2.3 Monitoring Along Gas Line

While work is performed around the gas line, monitoring of vibration and settlement will be conducted in accordance with National Grid standards and as directed by National Grid. If vibration exceeds specified tolerance levels, means and methods for completing the work will be evaluated and modified to ensure vibrations are maintained below the action levels. If any settlement of the gas line is identified the work activities will be terminated and the cause evaluated and corrected. If necessary, temporary pipe supports may be installed to ensure proper support is maintained until backfilling can be completed and the pipe secured.

Air monitoring will also be performed when working near the gas line using a handheld 4 Gas Meter and a Photoionization Detector (PID) unit (ENMET MX 2100 or equivalent) to observe levels of hydrogen sulfide (H_2S), lower explosive limit (LEL), carbon

monoxide (CO) and oxygen (O_2). In addition to the portable gas meter, two (2) 420-IQ Stationary Gas meters will be utilized to monitor LEL. The monitoring will supplement work zone monitoring that will be conducted in accordance with a HASP for ENTACT employees and site visitors (refer to Section 2.5). It is anticipated that one meter would be temporarily mounted outside the enclosure in close proximity to the gas line and the other meter would be mounted inside the enclosure temporarily in close proximity to an air intake duct of the VMS. The model 420-IQ is a completely self contained, intelligent transmitter module, housed in a Class 1, Division 1, Group B, C & D explosion proof housing. Interfacing with the 420-IQ for span to zero adjustment is done via magnetic sensors located on the front panel that are activated using a magnetic-tipped wand. It does not require the removal of the housing cover for calibration and other functions needed for the transmitter to work properly. This is especially important in hazardous or explosive locations where exposure of the sensor's electronics to the ambient environment is not acceptable. The transmitter can operate as a "stand alone" unit or can be utilized in conjunction with a variety of controllers. When used with model 9928-beacon horn, an alert will be provided in three ways; 1) audible alarm, 2) LED read-out, and 3) vibrating horn.

4.2.4 Gas Main Emergencies

If a gas main emergency occurs, the objectives of any response action will be to protect human health and safety and then the environment. Contingency procedures will immediately be implemented upon notification that a gas leak has occurred.

If a gas release is identified, the magnitude and potential seriousness of the release will be immediately assessed by ENTACT, National Grid, and the Resident Engineer based upon the following:

- Source of the release;
- An estimate of the quantity released and the rate at which the gas is being released;

- The direction that the release is moving;
- Personnel who may be or may have been in contact with the release, and possible injury or sickness as a result;
- Potential for fire and/or explosion resulting from the situation; and
- Estimates of area under influence of the release.

If the release is determined to be within the on-site emergency response capabilities, ENTACT will ensure that the corrective action is implemented. If the corrective action is beyond the capabilities of the operating crew, all personnel not involved with emergency response activities will be evacuated from the immediate area and the appropriate emergency response group(s) will be contacted. The call list provided in the HASP will be followed.

Any evacuation procedures will follow those required by the HASP. Should emergency assistance be required to treat injures injuries or carry out the evacuation; ENTACT and National Grid will request assistance of the appropriate parties. ENTACT will contact the local health department in cases when there are possible risks to human health from emergency situations.

Upon notification that an injury has been sustained or severe symptoms of exposure are being experienced, ENTACT will notify the hospital and ambulance of the occurrence and will provide, to the extent possible, the following information:

- The nature of the injury (e.g., eyes contaminated);
- The contaminant(s) involved;
- The present condition of the injured worker (e.g., conscious, breathing);
- Whether the injured worker will be decontaminated prior to transport; and
- When and where the injury was sustained.

Steps will immediately be taken to remove the victim from the incident site using whatever PPE and safety equipment is necessary. Rescuers will check for vital signs and, if possible, remove contaminated outer clothing. If the victim's eyes have been contaminated, personnel trained in administering first aid shall flush the victim's eyes with eyewash solution until the emergency response team arrives.

Details on the nature of the contaminant and methods for treating exposure or injury can be obtained from the MSDS or Occupational Health Guidelines that will be maintained on-site with the HASP.

4.3 Overhead Wires and Utility Poles

ENTACT will exercise extreme caution when the temporary containment structure and equipment are in the vicinity of aboveground Long Island Power Authority electrical transmission lines and utility poles located on the Long Island Rail Road (LIRR) property adjacent to excavation Area E (refer to Figure 1). Proper signage will be posted to meet the requirements of the High Voltage Proximity Act. At a minimum, the protective radii will be maintained near the utility poles (10 ft radial offset) and overhead wires (11 ft radial offset). Since the temporary containment structure will be constructed near Area B and C, it will be initially crane lifted and positioned in Area E then subsequently dragged from north to south, reducing the hazard of interfering with radii offsets.

ENTACT will initially excavate at strip in Area E along the fence that is adjacent with the LIRR property outside the temporary enclosure. This would allow excavation up to the fence line and creation of a clean zone approximately 15 ft wide that would support the structure for the remainder of the excavation. This process will further eliminate the risk of encroaching within the utility pole and overhead wire protective radii during structure placement and relocation. Excavation will be performed with a standard excavator positioned within Area E approximately 25 ft from the fence line. The excavator will remove soils from the toe of the fence line by pulling the soils from east to

west away from the fence line and the nearby poles and electric lines. This position will not allow the excavator to reach the poles or electric line inadvertently while excavating or swinging to load transport trucks with the removed soils. When the excavation nears one of the pole bases the 10 ft offset will be staked and the excavation will proceed around the offset limits without encroaching or removing any soils within the offset limits. This should minimize potential vibration as well as settlement of the utility poles since support soils around the poles will remain untouched. Foam will be used to control odors and dust within the excavation until backfill soils can be placed. Backfill with clean overburden or imported clean fill will immediately follow behind the excavation and all open excavations will be backfilled at the end of each workday. The edge of the excavation will be demarcated so it can be easily identified when excavation resumes the next day.

4.4 Utility Restoration

ENTACT will install warning tape (resistant to the elements and manufactured for marking and identifying underground utilities) overlaid on the bedding material during backfill placement. The tape will be 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, and colored as follows:

a. Red: Electric.

b. Yellow: Gas, oil, steam, and dangerous materials.

c. Orange: Telephone and other communications.

d. Blue: Water systems.

e. Green: Sewer systems.

5.0 EXCAVATION AND BACKFILL PLAN

The criteria for determining the limits of excavation is visual-based, as follows:

- Soils exhibiting a petroleum-like sheen will be removed;
- Soils exhibiting coal tar staining (typically black or brown staining) will be removed if they exhibit a sheen when tested with a jar shake test;
- Below a depth of 8 feet bgs, when the total aggregate vertical thickness of visible impacts of sheens and staining and/or residual NAPL in soils is less than 6 inches, the excavation in the horizontal direction will be terminated;
- Soils exhibiting a coal tar odor only, or odor and minor staining and no sheen will not be excavated.

5.1 Temporary Containment Structure

The majority of excavation and load out activities will be conducted under a temporary containment structure. The structure will meet the design criteria requirements for the local geographic area (such as wind and snow loads and foundation requirements) and will be delivered and assembled during the project preparation phase. The structure will be a crane liftable, 96 ft wide by 115 ft long PVC coated membrane structure with cargo doors on each gable end. A skid system will be mounted to the structure to aid in movement and repositioning of the structure. Calculations that support the temporary containment building design are provided in Appendix G.

The structure will be equipped with a vapor management system (VMS) designed to provide a minimum of six (6) air exchanges per hour and to process recovered air from within the structure. To achieve 6 air exchanges per hour the VMS will require two units with each unit consisting of a 20,000 cubic feet per minute (cfm) blower and damper, adsorber with 16,000 lbs of reactivated vapor phase carbon, particulate filter and breakthrough indicator. For ease of movement, the VMS components will be stationed on flatbed trucks and connected to the structure components with flexible ducts. A 320 kilowatt generator will be used to power the VMS components. When the structure is

ready to be moved the VMS components and generator will be disconnected and moved via truck to the next location where the structure will be repositioned and the components reconnected. Placement of the VMS will be coordinated with excavation sequencing and structure movement to ensure there is sufficient room for the flatbed trucks and generator to park outside the structure. Emissions from the VMS will be routinely monitored using a PID and/or detector tubes, if needed, to monitor emissions. The design back-up for the VMS is provided in Appendix H.

Once assembled, the structure will be moved by either pulling with a dozer and/or excavator or picking the structure up with a crane. The configuration and repositioning of the structure over the excavation areas is demonstrated on Figures 3 and 6. The placement of the structure has been planned to minimize the number of relocations required. Configurations and relocations may be adjusted based on actual field conditions. Structural details of the temporary containment structure are shown on Figure 7 and provided in Appendix G.

The mode of movement will depend on where the structure is positioned and where it will be positioned next. Once in position, the structure will be ballasted in place with concrete anchor blocks, chain and cable binders at each structure rib. Specific discussion of structure relocation is included in the following sections.

5.2 Excavation Activities

5.2.1 General Excavation Activities

Excavation activities within the delineated areas will proceed once all site preparation is complete and the temporary structure and VMS are operable. Where possible, all impacted soils will be removed and loaded directly into transport vehicles within the temporary structure for off site disposal. Transport trucks will back the bed of the truck into the structure while the cabs remain outside of the structure. Truck drivers will be instructed to remain in the truck cabs while on site. If direct loading is not feasible,

excavated source materials may be temporarily stockpiled within the structures in accordance with stockpile management procedures described in Section 6.0.

In Area A and parts of Area E the uppermost 2 ft of overburden soil will be removed during excavation activities and stockpiled under the structure for potential re-use as backfill pending approval by NYSDEC, National Grid or the Engineer. Overburden stockpiles will be placed on top of polyethylene sheeting pending approval. The overburden will be used as backfill as soon as approval is granted. In the event approval is not granted prior to repositioning the structure over the next excavation area, the overburden will be covered with polyethylene sheeting in preparation for stockpiling outside of the structure. The polyethylene cover will be secured in place with sand bags or other weighted material capable of completely covering stockpiles and preventing run on and run off or other exposures.

If non-aqueous phase liquid (NAPL) is observed during excavation in soils or on the surface of stormwater run-on within an excavation, booms or absorbent pads will be used to isolate the NAPL. Once isolated and if present in a volume better managed by pumping, a drum vacuum will be used to pump the NAPL into a 55-gallon drum for storage prior to off site disposal. If the NAPL is not pumpable, it may be absorbed with pads and the pads will be placed in drums or disposed of with the impacted soil. In the event large quantities are discovered, a vacuum truck will be brought on site to remove the NAPL and dispose of it properly. The NAPL will be disposed of at a National Grid approved disposal facility.

Once excavation depths are achieved and the excavation is determined by the Engineer to be visually clean, post excavation samples will be collected by ENTACT from the excavation bottom at a minimum of one sample per 900 square ft. The sample will be provided to National Grid or the Engineer for analytical testing in accordance with NYSDEC DER-10 for the specified parameters. Following sampling, and as directed by National Grid, the area will be immediately backfilled with either imported clean fill or stockpiled clean overburden soils. Excavation limits will extend beyond the delineated

limits shown on the Design Drawings if dictated by visual evidence of impacted soils and as required by NYSDEC

The temporary structure will be positioned first over excavation Areas B and C, followed by Area A, and lastly Area E. The progression of excavation has been carefully thought out and sequenced to maximize time utilization and minimize the number of structure relocations. Specific activities relating to the excavation of Areas A, B, C and E will be completed by December 22, 2008 and are described in the following sections. A schedule is provided in Appendix A.

5.2.2 Excavation of Areas B and C

Areas B and C include 16-foot and 18-foot deep excavations respectively, both underlain by concrete slabs. The excavations will proceed once the structure is placed in Position 1, which encompasses both areas (refer to Figure 3). The VMS air intakes will be placed on the east side of the structure with the blowers on the west side (refer to Figure 7). This positioning will keep the VMS off of the gas line and air intakes away from any potential release of natural gas from the gas line. The temporary structures will be rotated 90 degrees when it is relocated to Area A.

Areas B and C will be safely excavated by initially creating a bench down zone utilizing a perimeter side slope of 1V:1.25H to remove the initial 8 to 10 ft of soil along the north side of Area B. Bench down soils will be segregated from source material and stockpiled on polyethylene sheeting for potential reuse following completion of the excavation activities. A 24 ft x 10 ft x 8 ft deep ICON trench box with steel plates sealing the ends, will then be installed to serve as structural support for the final 8 ft cut as shown on Figures 4 and 5. NYSDEC is not requiring the removal of the underlying slabs in Areas B and C based on their review of the soil boring results, which did not show deeper soil impacts around the slabs. It is also noted that these slabs cannot be safely removed using the excavation shoring boxes so field changes with this approach will not be feasible. Once the excavation is completed within the trench box, clean excavated or imported

soils will be placed and compacted within the trench box as the box is carefully removed in approximately 12 inch lifts to maintain the integrity of the excavation side walls. Enough backfill will be placed (within the 16 ft bgs to 8 ft bgs zone) to allow safe removal of the trench box and to provide support along the gas line located on the northwest side of the excavation. Backfill soils will be placed and spread with the excavator bucket and compacted within the trench box with hand operated compaction equipment or a small remote control operated roller. The trench box will be used in two positions (East and West) as shown in Figure 4 to allow full excavation along the north side of Area B while minimizing the bench back zone in relation to the edge of the temporary structure and gas line. This will also provide a clean zone that can then be benched into to allow the remainder of the Areas B and C excavation to be open cut with sidewalls benched back. Excavations will cease once the underlying concrete slab is exposed.

Impacted soil will be removed with a standard excavator and placed directly into transport vehicles within the temporary structure. Once the required depths are achieved, the area will be backfilled and compacted. Vibratory monitoring will be performed during excavation and backfilling activities within close proximity to the gas line in accordance with National Grid standards if directed by National Grid.

5.2.3 Area A Excavation

The structure will be placed over Area A in Position 2 as shown on Figure 3. This will require removal of the existing inner and outer fences within the footprint of Position 2. Trees and vegetation will be cleared as necessary to provide stable footing for the structure. A temporary fence will be installed around the structure and tied into both ends of the standing outer fence to keep the site secure. As discussed in Section 4, previous activities will include clearance of the existing 16-inch gas line and excavation of a 15 ft horizontal section within Area A to accommodate the structure foot print. The VMS air intakes will be placed on the north side of the structure with the blowers on the south side and ducts running over the gas line foot print while in position over Area A as shown on

Figure 7. This positioning should not affect the existing gas line since the VMS will not be directly over it and will eliminate the possibility of drawing any leaking natural gas (if present) into the building through the air intake louvers. Air monitoring as described in Section 4.2.3 will be performed along the gas line in the vicinity of the ducts running over the gas line footprint.

Area A consists of a shallow excavation down to 3 ft below ground surface (bgs) and removal of the underlying concrete slab. The excavation will be safely benched back with a perimeter side slope of 1V:1.25H. The uppermost 2 ft will be removed and stockpiled under the temporary structure for potential re-use as general fill, resulting in removal and disposal of approximately 150 cubic yards (cy) of total source material from the area. The concrete slab will be broken up with a hammer attachment and removed with the excavator for off site disposal.

Areas located within the temporary structure that are outside the limits of excavation will be protected from cross contamination by placing a geosynthetic covering over the areas.

Upon completion of remediation at Area A, the temporary fence will be removed and the previous fence alignment will be replaced with in-kind materials.

5.2.4 Area E Excavation

Area E contains approximately 1,700 cy of source material to be removed down to varying depths of 3 to 5 feet bgs. The temporary structure first will be placed at the northern end of Area E along the inactive LIRR ROW. The structure will not encroach upon the LIRR ROW, which will minimize the dangers of working in close proximity to the overhead electric lines. Placement outside the limits of the ROW will limit the area of excavation along the existing fence line that can be completed under the structure. To allow excavation up to the fence line, an open-air excavation method outside of the structure will be performed in small controllable segments prior to placing the structure in position as described in Section 4.3.

The limits of excavation scheduled for future site-wide remediation will be differentiated from IRM excavations prior to backfilling using a geotextile demarcation barrier. The Area E western perimeter will be cutback at a 1V:1.25H side slope to the specified excavation depth. The northeast corner may require excavation prior to placement of the structure at Position 1. In the event the northeast corner is excavated outside of the structure foam will be used to control odors and dust within the excavation until backfill soils can be placed. Sequenced structure positions are described below and shown on Figure 6.

Position 1: The structure will initially be placed over Area E. Subsequent moves along the excavation (north to south) will be performed by hooking a dozer and excavator to the gable side of the structure and pulling it into the next position. Position 1 will facilitate the removal of a 4 ft cut within the northern most excavation limits of Area E, post-excavation sampling and analysis, backfill and compaction activities.

Position 2: Activities to be carried out during Position 2 include continuation of the 4 ft excavation of Area E; removing and stockpiling the uppermost 2 ft of overburden for potential re-use; excavation to minimum depths of 3, 4 and 5 ft bgs; post-excavation sampling and analysis; backfill and compaction activities.

Position 3: Activities to be carried out during Position 3 include removal of source material to depths of 3, 4 and 5 ft bgs; post-excavation sampling and analysis; backfill and compaction activities

Position 4: Activities to be carried out during Position 4 include completion of the 3 ft excavation; post-excavation sampling and analysis; backfill and compaction activities. The boiler blowdown sump located in the southern portion of Area E will be broken up with the hammer attachment and removed during the 3 ft excavation

Following completion of remedial efforts at Area E, the structure will be disassembled and demobilized from the site.

5.3 Backfill and Site Restoration

Partial backfilling will be performed concurrently with excavation activities when possible to minimize the amount of time an excavated area remains open, to aid in odor control and to maintain level surfaces for movement of the temporary enclosure. The excavation limits at each area will be demarcated using a polyester or polypropylene geotextile barrier that meets the following minimum properties:

- Grab strength - minimum 80 pounds (lbs) as determined by ASTM D 4632.
- Puncture Strength – minimum 25 lbs as determined by ASTM D 4833.
- Burst Strength – minimum 25 lbs as determined by ASTM D 3786.
- Trapezoid Tear Strength - minimum 130 lbs as determined by ASTM D 4533.

Imported material will consist of New York State Department of Transportation (NYSDOT) Type 1 coarse aggregate (select stone fill and stone cover) and clean fill (general fill) or approved equivalent(s). Imported materials will be from a NYSDOT approved certified clean source and will meet NYSDOT gradation requirements or as otherwise required by the project specifications. Proposed source(s) require National Grid approval prior to delivery of material to the site. Once source(s) are approved, samples will be obtained for each fill type per source at a frequency of one sample for every 5,000 cy brought in site and analyzed at a New York State Department of Health (NYSDOH) certified Environmental Laboratory Accreditation Program (ELAP) approved laboratory for total PAH, total volatile organic compounds (VOCs) and metals in accordance with the listing in 6 NYCRR Part 375 Table 375-6.8 (b) for residential use. Ten percent of the samples will also be analyzed for polychlorinated biphenyl (PCB) parameters listed in the table. ENTACT has submitted acceptable data for the following material sources to date:

- General Fill (backfill) chemical and sieve analyses – Stony Creek Industries, Inc, Oceanside, New York;

- Select Stone Fill, NYSDOT Source (backfill) sieve analysis – Tilcon of New York, West Nyack, New York;

- Topsoil, NYSDOT Source sieve analysis and organic matter – Watral Brothers, N. BayShore, New York.

Clean overburden materials free of visual source material may potentially be re-used on site as backfill within the general fill zone as determined by NYSDEC, National Grid or the Engineer. These clean overburden materials will be placed a minimum 2 ft deeper than the proposed final grade. General fill imported from offsite will be placed to within 6 inches of proposed final grade. The fill will be placed with a dozer in approximately 12 inch lifts and compacted with a roller or hand operated compaction equipment when near sensitive structures to a minimum 95% of the maximum dry density per ASTM D698. In-place quality control compaction testing will be performed by an independent geotechnical testing firm to ensure specified compaction has been achieved. Each lift will be tested at a frequency of one test per 2,500 square feet, with a minimum of 2 tests per backfill lift per each backfill area.

If directed by National Grid select stone fill may be used as backfill instead of general fill below depths of 8 ft bgs. Stone fill will be placed in loose lifts and tamped in place with the excavator bucket. In the event vibration becomes unacceptable to National Grid or the Engineer, the stone fill may be compacted with a plate compactor that would have a much smaller zone of influence than the bucket of the excavator.

Following geotechnical testing, a surface cover will be placed in a non-compacted single 6 inch lift over the general fill layer and spread with the dozer to re-establish existing grades. The surface cover will consist of a stone layer, unless directed by National Grid to substitute a topsoil layer. If required, topsoil, seed, mulch and fertilizer will meet the requirements of New York Standards for Soil Erosion and Sediment Control for Permanent Critical Area Plantings. ENTACT will restore any areas that may have been disturbed during remediation.

6.0 STOCKPILE MANAGEMENT PROCEDURES

6.1 Stockpiling of Fill Material and Impacted Material

Fill material will include imported fill and overburden removed from the uppermost 2 ft of Excavation Area A and sections of Area E. The majority of imported fill will be delivered and placed directly into open excavations. In the event stockpiling of imported fill becomes necessary it may be stockpiled inside or outside of the temporary containment structure depending on site activities at the time the material is delivered.

The overburden removed from Excavation Areas A and portions of Area E will be excavated and stockpiled for potential reuse pending approval by National Grid or the Engineer. Once approval is granted, the overburden will be used as backfill. In the event approval is not granted prior to repositioning the temporary containment structure over the next excavation area, the overburden will be covered with polyethylene sheeting in preparation for stockpiling outside of the structure.

In general, impacted soil will be excavated and placed directly into transport vehicles for off site transportation and disposal. Most of the excavation and backfill activities will occur under the temporary containment structure. In the event excavated impacted material cannot be directly loaded for transportation and disposal, it will be stockpiled under the temporary structure on top of an impacted area scheduled for excavation.

6.2 General Stockpile Management Procedures

The following general stockpiling procedures will be implemented in the event stockpiling of fill material or impacted material becomes necessary inside or outside of the temporary containment structure:

- Stockpile location and duration of staging will be approved by National Grid or the Engineer;
- Stockpiles will be graded and shaped as necessary to drain surface water.
- Stockpiles will be placed a minimum of 5 ft from the edge of open excavations;

- Stockpiles located outside of the temporary containment structure will be covered with polyethylene covers anchored down with tie down systems. The stockpiles will have a slope sufficient to prevent the accumulation of water in the covers;

- Stockpiles of fill material placed inside of the structure will be placed on a non-impacted clean surface located a safe distance from contaminated material and in locations that will not inhibit the execution of construction activities;

- Silt fence, hay bales or earthen berms will be installed around the perimeter of the stockpiles located outside of the structure to reduce sediment migration;

- If stockpiles located outside the structure are inactive for 21 days or more, a temporary seed in compliance with the local soil erosion and sediment control district will be applied; and

- Stockpiles located outside of the structure will be visually monitored on a regular basis. In addition, prior to and after severe weather events the stockpiles, tie down systems and tarps will be inspected to ensure the material is protected from the elements. A daily stockpile investigation inspection report will be submitted to the Engineer.

7.0 METHODS FOR BULKING WET SOIL

Groundwater is present on site at approximately 25 feet bgs and the water table will not be encountered during shallow excavations. However if wet soils are encountered during excavation, they will be allowed to gravity drain back into the excavation. Drier soils and/or a drying agent may be used to mix with the wet soils until soils are adequately dried for loading into transport vehicles. If needed, the drying agent will meet NYSDEC requirements presented in their May 20, 2008 directive regarding use of quick lime and similar materials, unless otherwise approved by NYSDEC and National Grid. Dried soils will then be loaded into transport vehicles for off site treatment/disposal.

An adequate supply of drying agent will be maintained on site throughout excavation activities and used as a drying agent for soil stockpiles that may not pass the paint filter test (SW86-9095) or proposed low temperature thermal desorption (LTTD) facility moisture requirements. The drying agent will be blended into the wet soils with the excavator bucket until a homogeneous mix is achieved. Sprayers and misters will be available to control dust generated during placement and mixing of the drying agent. Drying agents stored on site will be covered when not in use to protect from the elements.

8.0 DEWATERING PLAN

Due to the depth of groundwater, large scale dewatering is not anticipated to be required during excavation activities. However localized dewatering may be necessary. If during these activities the need to dewater arises, the following methodologies will be implemented.

Localized dewatering will be accomplished by constructing sumps within the low elevations of an excavation area. Sumps will be prefabricated corrugated metal or high density polyethylene (HDPE) sumps set in a gravel packed area lined with a geotextile filter fabric. A submersible pump will be placed in the sump to transfer collected water from the sump to an adequately sized container via discharge hoses. Discharge hoses that cross high traffic areas will be protected from truck and equipment traffic.

In the event dewatering of a larger area is necessary, a series of dewatering wells may be installed. Based on the size of the area to be dewatered, an adequate amount of wells will be manually installed and tied into a header pipe. Pumps, discharge piping and hoses will be installed or attached to the wells to allow for pumping and dewatering of the area. Generated water will be pumped to an adequately sized container via discharge hoses.

Depending on the anticipated volume of dewatering fluids, containers will be 55-gallon drums or frac tanks. The drums and/or frac tank will be staged in a dedicated staging area. The staging areas will be bermed and the floor and berms covered with polyethylene sheeting. All containerized water generated from dewatering operations and scheduled for off site disposal will be properly sampled for waste characterization analysis in accordance with the selected disposal facility's acceptance criteria prior to off-site disposal.

An ENTACT representative will be on site at all times during implementation of dewatering activities to ensure the integrity of the excavation/trenches as well as to

determine potential impacts to adjacent areas. When no longer needed, the dewatering systems will be removed from the excavation areas.

9.0 UST CLOSURE PLAN

While it is not currently anticipated, UST removal will be performed in accordance with 6NYCRR Part 613, and the following guidance documents and requirements:

- NYSDEC, Division of Environmental Remediation, Draft DER-10, Technical Guidance for Site Investigation and Remediation, December, 2002;
- NYSDEC, Division of Spills and Response, Permanent Closure of Petroleum Storage Tanks, January 20, 1987;
- NYSDEC, Division of Spills Management Bureau of Source Control, Spill Prevention Operations Technology Series (SPOTS) Memo #14, Site Assessments at Bulk Storage Facilities, August 1, 1994; and
- Nassau County Board of Health and the Nassau County Department of Health Notification Requirements.

Once a UST is identified potential connecting pipes will be traced and marked. The pipes will be drained and flushed into the tank. The tank contents will be sampled for waste characterization analysis. A vacuum truck and/or pump will be used to remove tank contents. Any tank bottoms will also be pumped out and the tank will be rinsed. Tank contents and rinse waters will be transported off site for disposal at an approved disposal facility based on the waste characterization results.

The upper half of the tank will be exposed and fill tubes, gauges, and vent pipes will be removed or disconnected. All tank openings will be temporarily plugged. The tank excavation will then be completed and the tank will be removed and placed in a secure location. The removed UST will be rendered vapor free using an approved method (dry ice, CO_2, nitrogen gas, positive ventilation). The tank atmosphere will be tested to ensure the tank has been rendered inert using an oxygen meter or an explosion meter depending on the method used. If testing indicates the tank is not safe, the purging or inerting process will continue. Trained and properly equipped personnel will only enter tanks. Once the tank is deemed inert it can be transported off site for disposal or recycling. The tank may be cut into manageable pieces prior to transport off site.

After the tank is exhumed, underlying and adjacent soils will be examined for evidence of contamination. Field instruments such as a PID unit may be used for initial field measurements. If there is no evidence of contamination, a minimum of one (1) soil sample will be collected from the centerline of the tank excavation. If there is evidence of a discharge soil will be excavated until contamination is removed based on field instrument readings and visual observance. Once excavation is complete, bottom and sidewall soil samples will be collected to demonstrate contamination is removed

Subsurface piping that is encountered will be examined for product or product residue. If product is observed or elevated readings with a PID unit are detected, the pipe will be cleaned of residue prior to removal. Any remaining fluids will be removed and disposed of properly. If the pipe is insulated or wrapped with asbestos containing material (ACM), the ACM will be abated in accordance with state and federal regulations.

Any waste material generated as a result of UST closures will be transported off site to a National Grid approved disposal facility. Only approved transportation and disposal facilities included in the attached Disposal Matrix (Appendix I), or disposal facilities approved post approval of the Disposal Matrix, will be utilized.

A description and photographic documentation of the tank and pipelines will be prepared. Field notes and observations will be recorded. UST closure will be documented with the Nassau County Department of Health and NYSDEC.

10.0 SELECTIVE DEMOLITION ACTIVITIES

Subsurface structures that will require removal include the concrete slab underlying Excavation Area A at a depth of 3 feet bgs and a boiler blow-down sump located on the south end of excavation Area E at an approximate depth of 6 feet bgs. Other structures may include footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances or other man made stationary features constructed above or below the ground surface.

Subsurface structures encountered within the excavation areas will be removed during excavation activities within the temporary structure. The dates of the demolition of subsurface structures will correspond with excavation work within the excavation areas the subsurface structures are located. The Project Construction Schedule (Appendix A) includes estimated start and finish dates for each excavation area.

In general, a CAT 325 excavator (or equivalent) with a demolition hammer attachment will be used to remove and crush the concrete slab, sump and other concrete and brick structures that are encountered. The structures will be broken up with the hammer, removed with an excavator and staged adjacent to the removal area. The hammer may be used to further crush the concrete and bricks. Dust controls will be maintained during the concrete and brick processing by continuous spraying of water on the work surface and the hammer to ensure concrete and brick remain moist and less susceptible to dust generation.

Demolition debris will be visually inspected to determine if it is contaminated with MGP waste material. In the event the demolition debris appears to be contaminated it will be loaded separately for off site disposal. If the demolition debris appears to be clean, it will be loaded into transport vehicles for off site disposal/recycling. Disposal facilities for clean and contaminated demolition debris are included in the Disposal Matrix (Appendix I). Visually contaminated debris will be sampled and analyzed for waste characterization purposes if required by the disposal facility.

Subsurface piping that is encountered will be examined for product or product residue. If product is observed or elevated readings with a PID unit are detected, the pipe will be cleaned of residue prior to removal. Any remaining fluids will be removed and disposed of properly. If the pipe is insulated or wrapped with asbestos-containing material(ACM), the ACM will be abated in accordance with state and federal regulations. The asbestos abatement contractor will be Iron Eagle Environmental.

In the event utilities are identified in proximity to demolition work areas, National Grid will be notified and proper procedures for protecting the utility will be implemented. At a minimum, identified utilities will be documented and visually marked, and protected against vibration, settlement, undermining, and other potential hazards associated with excavation and demolition activities to be performed. ENTACT will coordinate with the appropriate utility owners to remove and re-route utilities should it become necessary. Procedures for protecting underground utilities are detailed in Section 4.0

11.0 DUST AND ODOR CONTROL PLAN

11.1 Dust Controls

As designed, the use of the temporary containment structure and the vapor management system are to serve as the primary odor and dust control measure being employed at the site. The majority of earthwork known to present the biggest point source of odor will be performed within the temporary structure.

Dust control measures will be implemented to minimize the potential for dust generation during soil excavation and handling, and placement of fill. The main dust control device will include water trucks and/or lay flat hose connected to on-site hydrants. Heavily traveled truck routes will be wet down with the water truck to minimize dust emissions. Truck routes on site will be continuously monitored for excessive dirt or dust. Proper cleaning of trucks exiting the site will aid in minimizing/eliminate dusty conditions on site. Stabilized construction entrances/exits consisting of smoothly graded areas large enough to accommodate equipment and truck traffic will be constructed at exit points to clean tires of transport trucks exiting the Site. The base will be covered with non-woven geotextile and coarse aggregate and will be maintained and redressed while in use.

Truck routes on and off site will be inspected during high truck traffic periods for excessive dirt or dust. Proper cleaning of trucks exiting the site will eliminate dusty conditions on adjacent roadways. Transport trucks exiting the Site will pass through an inspection area and/or be inspected by ENTACT personnel to ensure tires and undercarriages are clean and that tarps are secured. Excessive mud and loose dirt observed on the trucks will be manually removed with brooms and brushes as necessary.

Perimeter and work zone air monitoring will be performed in accordance with the CAMP and HASP to evaluate the effectiveness of dust control measures. In general, real time air monitoring equipment will be utilized to monitor dust and VOC levels. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action measures will be implemented. Corrective action measures may include

increasing water coverage, ceasing select activities during high wind, reducing speed of equipment that may reduce dust generation, and utilizing different sizes or types of equipment that may cause less dust generation.

11.1.1 Dust Control in Freezing Conditions

ENTACT will use best management practices when performing dust control in freezing weather conditions and will eliminate the use of the water truck and/or incorporate pumps and hose runs from the existing site fire hydrant for dust suppression. BMPs will include ensuring pumps, hoses and any other water spraying systems are drained daily or when not in use for extended periods of time to prevent freeze up; using water heating pressure washers to mist work surfaces during dust generating activities; utilization of additional stone on haul roads to minimize dust from truck and equipment traffic; and possibly modification of tasks being performed with an emphasis on work being performed under the temporary structures where the VMS system can help in maintaining dust control.

ENTACT will also monitor water freezing and collecting on ground surfaces and work zone. Ponding of water that has the potential for freezing will not be allowed. Areas that collect water will be positively drained as practicable and/or salted as needed. Attention will be paid not to over-salt surfaces as dust created from dried salt will become a nuisance.

11.1.2 Dust Controls During Selective Demolition

All subsurface features located within the excavation areas will be removed/demolished using an excavator with demolition hammer attachment concurrent with the excavation activities while inside and outside of the structure. Dust control during concrete and brick processing will be maintained by continuous spraying with water or misting the work surface and equipment contact points to ensure the concrete and brick is moist and dust is controlled. Continuous spraying of water will not result in off-site run-off.

11.2 Odor Controls

Odor will be monitored during excavation and handling of impacted soils from the site. In the event that odor emissions exceed the specified intensity, controls will be implemented. Controls will also be implemented as directed by National Grid and/or NYSDEC. Odor controls will include foam and foaming devices or tarps to cover open excavations or stockpiles.

Odor will be controlled by sequencing excavation in a manner that will results in manageable areas of open excavation. Offensive odors will be mitigated, if necessary, by placing a layer of non-odorous soils or polyethylene sheeting over the excavation area or stockpile (overnight and off-hours). In addition, foam application equipment and an adequate supply of odor reducing foaming agent will be available for application to the excavation area or stockpiles as needed.

Contingency monitoring and actions will be implemented in accordance with the CAMP in the event an odor complaint is received from the neighboring community.

12.0 WASTE MANAGEMENT

Waste generated during IRM activities will include excavated impacted soils, demolition debris including concrete and asphalt, containerized or absorbed NAPL, rinse-waters from decontamination procedures, spent PPE and miscellaneous refuse. A list of proposed transport and disposal facilities is included in Appendix I.

ENTACT will coordinate with the transport and disposal facilities to schedule an appropriate amount of transport trucks and to schedule slots with the disposal facilities. A Waste Tracking Log will be developed and maintained to track each shipment of waste transported off site. The log will identify the waste type being transported, the date and time the material left the site, the disposal facility, the truck identification number, the manifest number accompanying the load and the weight or estimated weight of each loaded truck.

A bill of lading/manifest form will accompany each load and will be signed by an approved agent for National Grid before the material leaves the site; by the truck driver before leaving the site; and by a representative of disposal facility when the load is received. A copy of the signed bill of lading/manifest will be filed in the ENTACT administrative trailer. Upon arrival at the disposal facility the bill of lading/manifest will be signed and a copy returned to ENTACT, complete with all applicable signatures as proof of delivery. The returned bill of lading/manifests will be cross checked and matched with the original copy of the manifest already on file. The Waste Tracking Log will be used to track the receipt of completed and signed bill of lading/manifests. On a weekly basis and at project completion a summary report as well as bill of ladings/manifests, weight tickets and certificates of destruction will be provided to National Grid and the Engineer.

13.0 SITE SECURITY PLAN

13.1 Work and Non-Work Hour Controls

ENTACT personnel will control site access during normal working hours. All visitors, workers and subcontractors will be required to sign a daily log maintained by ENTACT personnel. The log will include date, name of visitor, company, address and time on and off site. The presence of unauthorized personnel will be immediately communicated to National Grid and the Engineer and appropriate actions will be taken as directed. The site will be secured at days end and gates will be locked during non-working hours. Keys to the site will be provided to National Grid and the Engineer.

ENTACT will utilize a subcontracted site security company to provide manned site security during non-working or inactive site periods. ENTACT will work with the subcontracted security service to generate a Site Security Program. The program will define the services to be provided at the project site and means and methods for managing the overall security of the site after hours. Once this plan has been drafted, ENTACT will submit it to the project team for review.

ENTACT will provide an area designated for security operations. This area may be part of the Contractor's offices, or a separate enclosure and will contain, as a minimum, a designated phone line and two way radios if more than one guard or attendant is utilized. ENTACT may install additional security fencing for localized security measures with approval by National Grid and/or the Engineer.

Personnel assigned to performing site security will not be required to adhere to the training, certification and medical monitoring program defined in the Site HASP for Site Workers (Appendix C). However, site security personnel will be briefed on the site hazards. Security personnel will not be allowed into or instructed to enter any on-site exclusion zones (EZs). All EZs will be clearly delineated as such. Security personnel

will be limited to patrolling the perimeter of the delineated EZ. All security personnel will be routinely briefed on those areas deemed inaccessible.

The following security controls will be implemented during both working and non-working hours:

- One independent telephone line and telephone will be provided;
- Control of all persons, equipment, and vehicles entering and leaving the site will be provided by ENTACT in coordination with National Grid's requirements;
- ENTACT will require each person to display proper photo identification;
- ENTACT will maintain a list of persons authorized for site entry;
- ENTACT will require all personnel and visitors having access to the site to sign in and sign out, and will keep a record of all site access. A log of all visitors will be maintained in coordination with National Grid's existing security requirements;
- Site visitors will not be permitted to enter active work areas unless authorized by National Grid and/or the Engineer;
- Vehicular access will be restricted to authorized vehicles only. National Grid and/or the Engineer reserve the right to search all contractor vehicles;
- Personal vehicles will not be authorized to enter the active work zones;
- The perimeter of the site will be sealed and locked and maintained during hours of non-production. Perimeter security checks will be performed hourly and conditions will be logged;
- A Detex Guard Tour System, or similar will be utilized to ensure that each extent of the perimeter is surveyed. A unit will be installed and maintained at each corner of the exterior of the project perimeter. A checklist may also be completed daily and entered into log. Refer to *Attachment U – Site Security Check List*, of the HASP for the process by which ENTACT will review the site;
- Any perimeter fence that will be removed or modified to allow for construction activities to occur will be temporarily replaced with fence panels and all connections will be bolted together. Anchors may also be utilized along with privacy screening fabric.

13.2 Security Breaches, Trespass, and Vandalism

In the event of forced entry, trespass and/or vandalism to the project site, the ENTACT subcontracted security service will notify ENTACT emergency contact personnel listed below and engage the local police and law enforcement.

Signs of forced entry (successful or otherwise), trespass and/or vandalism will be investigated to fully understand the circumstance by which the event happened. Law enforcement will be engaged as needed to ensure that the proper attention and notifications are provided.

Breaches resulting in forced entry, regardless of routes and/or locations entered and accessed, will be managed by engaging local law enforcement. At no time will the subcontracted service provider have the capacity to use firearms, restraint tools (Electrical Shock Devices, nets, etc.), or any weaponry associated with criminal intervention.

Damage to property resulting from forced entry will be repaired as soon as possible and as determined by ENTACT.

ENTACT will complete the required documentation and submit the resulting report to our internal operations personnel and the project team for review and comment.

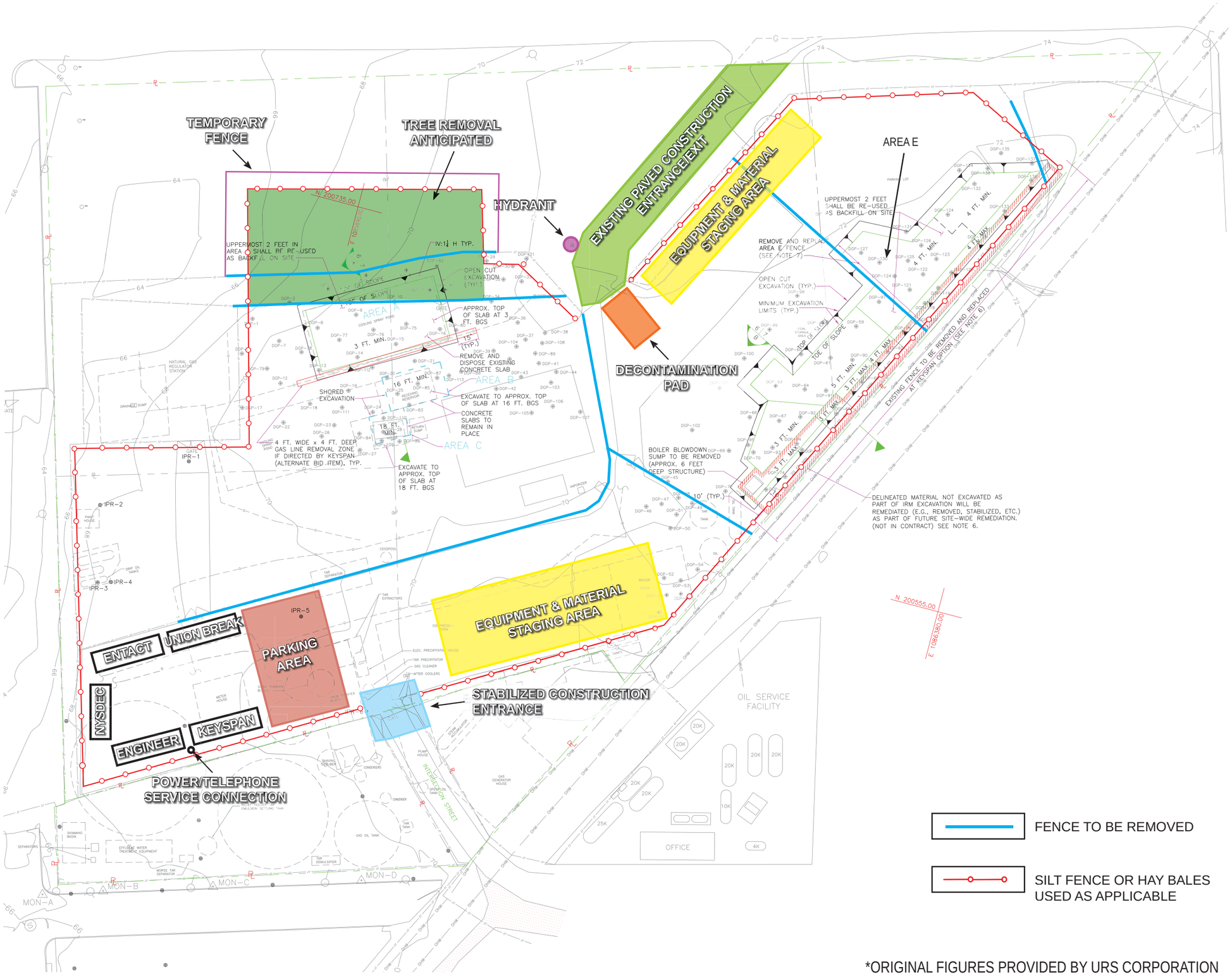
13.3 Emergency Contact Information

ENTACT personnel responsible for site security in order of precedence:

a. Kurt Sutliff (630) 461-5563

b. Dan Duncan (630) 461-7128

c. Eddie Acosta (630) 675-4095



*ORIGINAL FIGURES PROVIDED BY URS CORPORATION

CONSTRUCTION SCHEDULE & SEQUENCING

1. Project preparation including preparation of project plans and obtain applicable project permits
2. Personnel and equipment mobilization and site preparation
3. Establish work zones delineated with orange fencing and signs (support, contaminant reduction and exclusion zones)
4. Install erosion and sediment controls
5. Construct temporary facilities (trailers, utilities, storage areas)
6. Site clearing and grubbing
7. 16 inch gas main clearance excavation
8. Assemble temporary containment structure and VMS and place into first position
9. Excavate and backfill Excavation Areas B and C under the temporary containment structure
10. Reposition the temporary containment structure to Excavation Area A
11. Excavate and backfill Excavation Area A under the temporary containment structure
12. Reposition the temporary containment structure to Excavation Area E1
13. Excavate and backfill Excavation Area E1 under the temporary containment structure
14. Repeat steps 12 and 13 in Excavation Areas E2, E3 and E4
15. Decontaminate and disassemble the temporary containment structure and VMS
16. Removal of SESC features
17. Final site restoration and demobilization
18. Estimated time for project completion and final stabilization – 3 and ½ months

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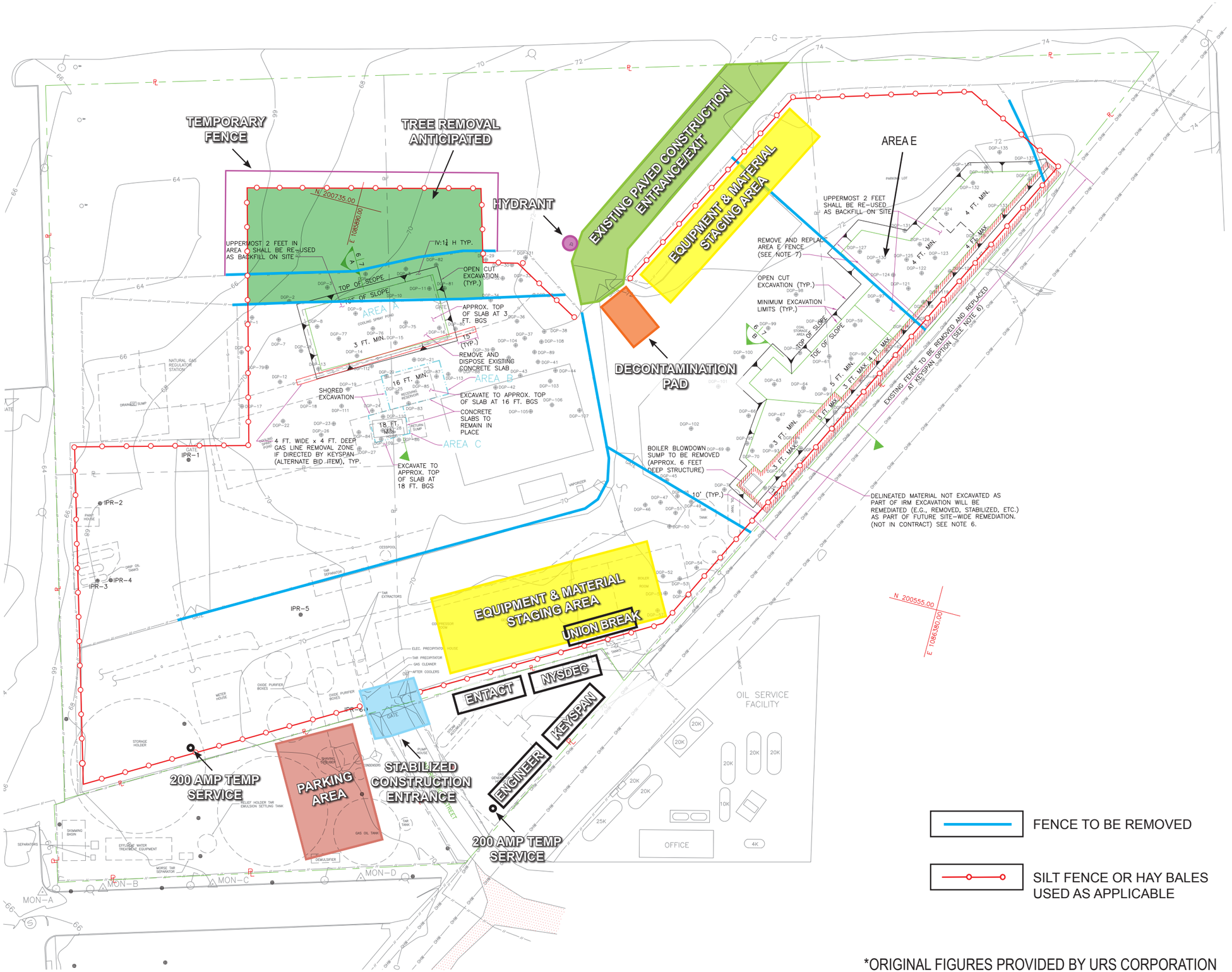
SITE PLAN

SOIL EROSION SEDIMENT CONTROL PLAN

Project No.	E7370		
Figure No.	1	Date	05/12/2008
		Updated	06/13/2008



FENCE TO BE REMOVED

SILT FENCE OR HAY BALES USED AS APPLICABLE

*ORIGINAL FIGURES PROVIDED BY URS CORPORATION

CONSTRUCTION SCHEDULE & SEQUENCING

1. Project preparation including preparation of project plans and obtain applicable project permits
2. Personnel and equipment mobilization and site preparation
3. Establish work zones delineated with orange fencing and signs (support, contaminant reduction and exclusion zones)
4. Install erosion and sediment controls
5. Construct temporary facilities (trailers, utilities, storage areas)
6. Site clearing and grubbing
7. 16 inch gas main clearance excavation
8. Assemble temporary containment structure and VMS and place into first position
9. Excavate and backfill Excavation Areas B and C under the temporary containment structure
10. Reposition the temporary containment structure to Excavation Area A
11. Excavate and backfill Excavation Area A under the temporary containment structure
12. Reposition the temporary containment structure to Excavation Area E1
13. Excavate and backfill Excavation Area E1 under the temporary containment structure
14. Repeat steps 12 and 13 in Excavation Areas E2, E3 and E4
15. Decontaminate and disassemble the temporary containment structure and VMS
16. Removal of SESC features
17. Final site restoration and demobilization
18. Estimated time for project completion and final stabilization – 3 and ½ months

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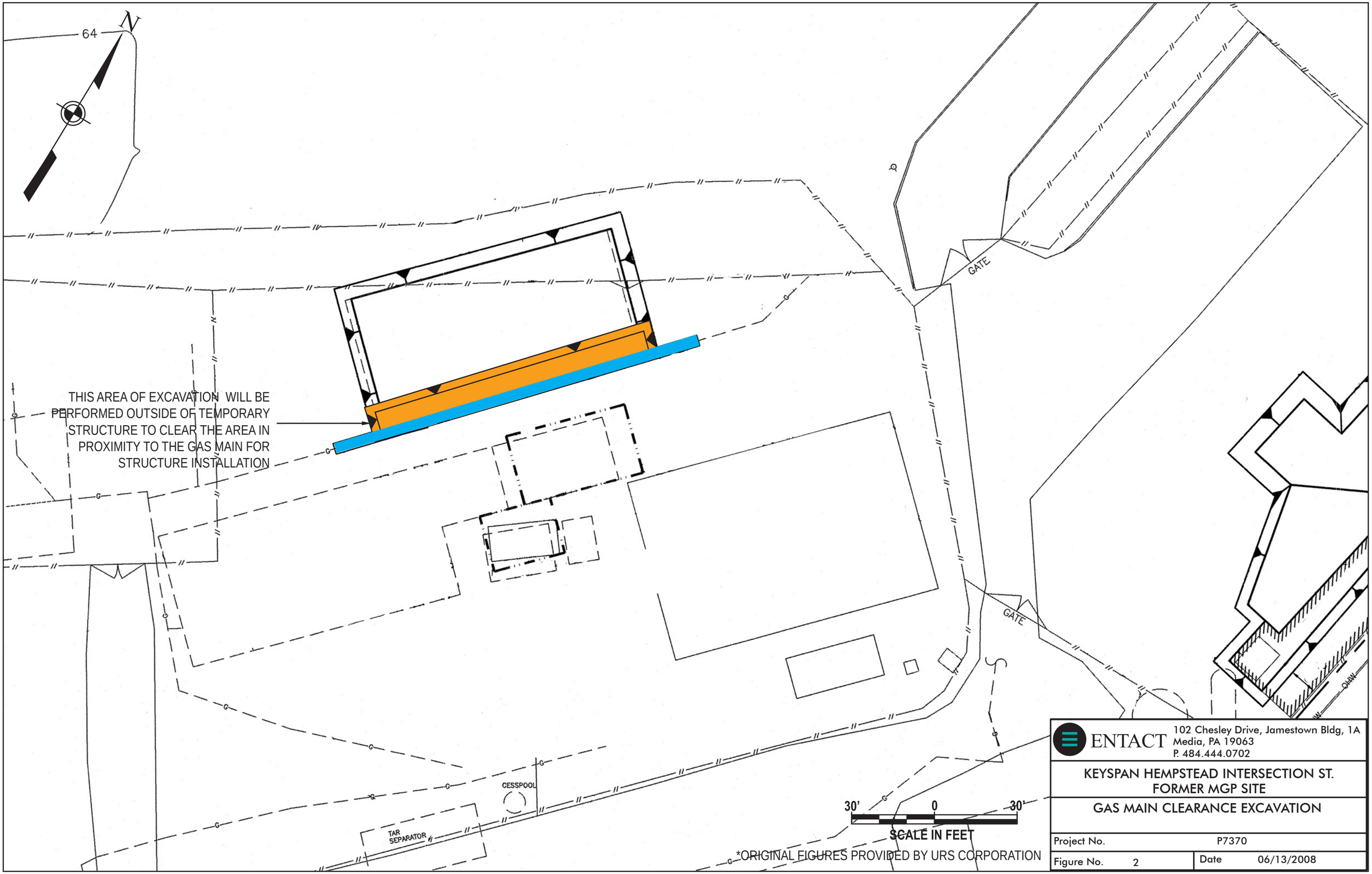
SITE PLAN

ALTERNATE SITE LAYOUT

Project No.	E7370		
Figure No.	1A	Date	05/12/2008
		Updated	08/6/2008



*ORIGINAL FIGURES PROVIDED BY URS CORPORATION

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KEYSPAN HEMPSTEAD INTERSECTION ST.
FORMER MGP SITE

GAS MAIN CLEARANCE EXCAVATION

Project No.	P7370		
Figure No.	2	Date	06/13/2008

30’ 0 30’

SCALE IN FEET

N

NOTES:
1. ANCHOR BLOCKS WILL BE POSITIONED AROUND THE PERIMETER OF THE STRUCTURE AT ALL POSITIONS AS SHOWN IN POSITION 1

64

POSITION 2

POSITION 1

A

B

THIS AREA OF EXCAVATION WILL BE PERFORMED OUTSIDE OF TEMPORARY STRUCTURE TO CLEAR THE AREA IN PROXIMITY TO THE GAS MAIN FOR STRUCTURE INSTALLATION

3’X3’X6’ PRE-CAST CONCRETE STRUCTURE ANCHOR BLOCKS (TYP.)

GATE

GATE

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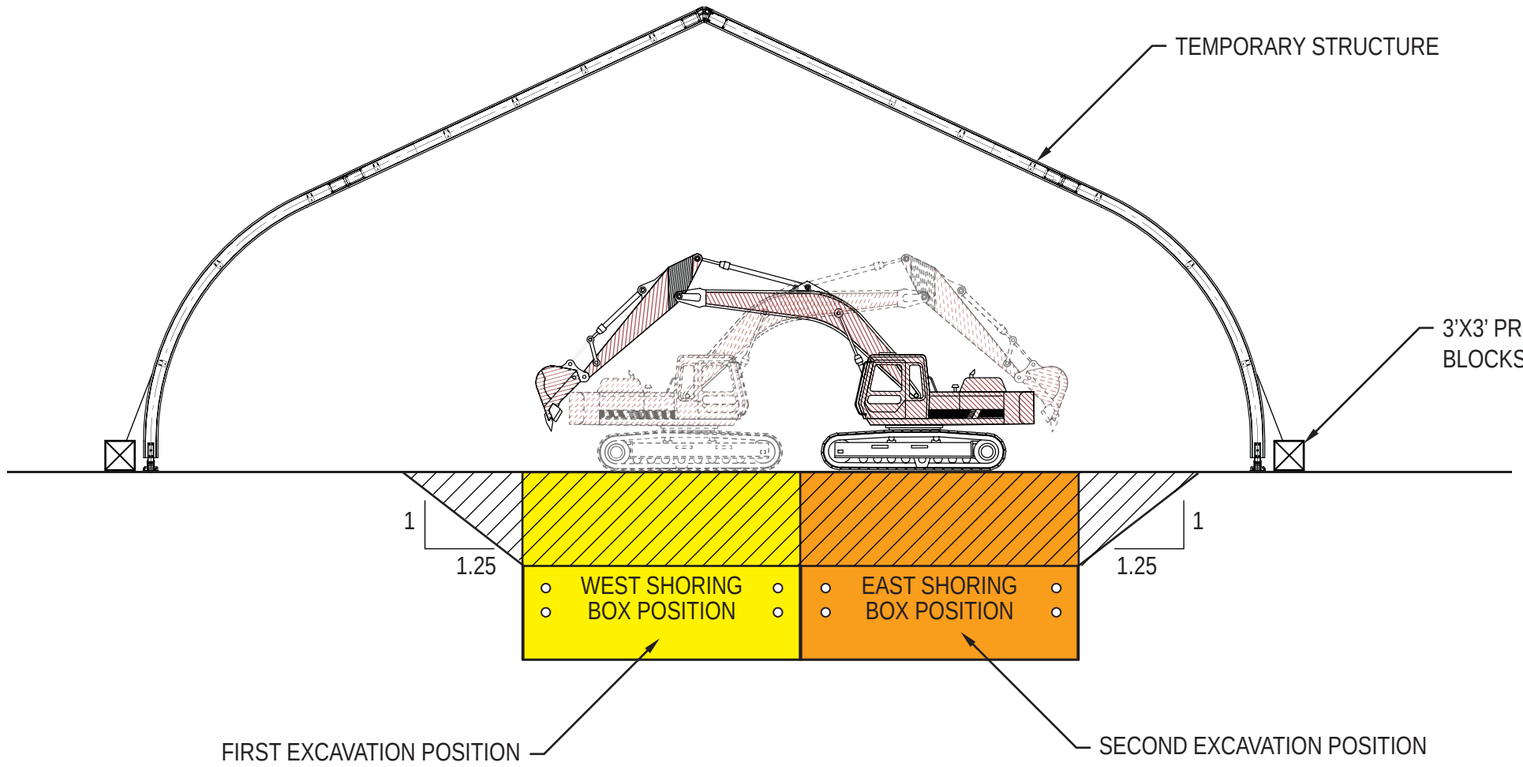
KEYSPAN HEMPSTEAD INTERSECTION ST.
FORMER MGP SITE

TEMPORARY STRUCTURE LAYOUT
AND EXCAVATION SEQUENCING PHASE 1

Project No.	P7370		
Figure No.	3	Date	06/13/2008

NOTES:
1. EXCAVATORS ARE POSITIONED ON THE EXISTING GRADE AND WILL BE SLIGHTLY BENCHED IN FOR ACTUAL EXCAVATION



A-A CROSS SECTION

N.T.S.

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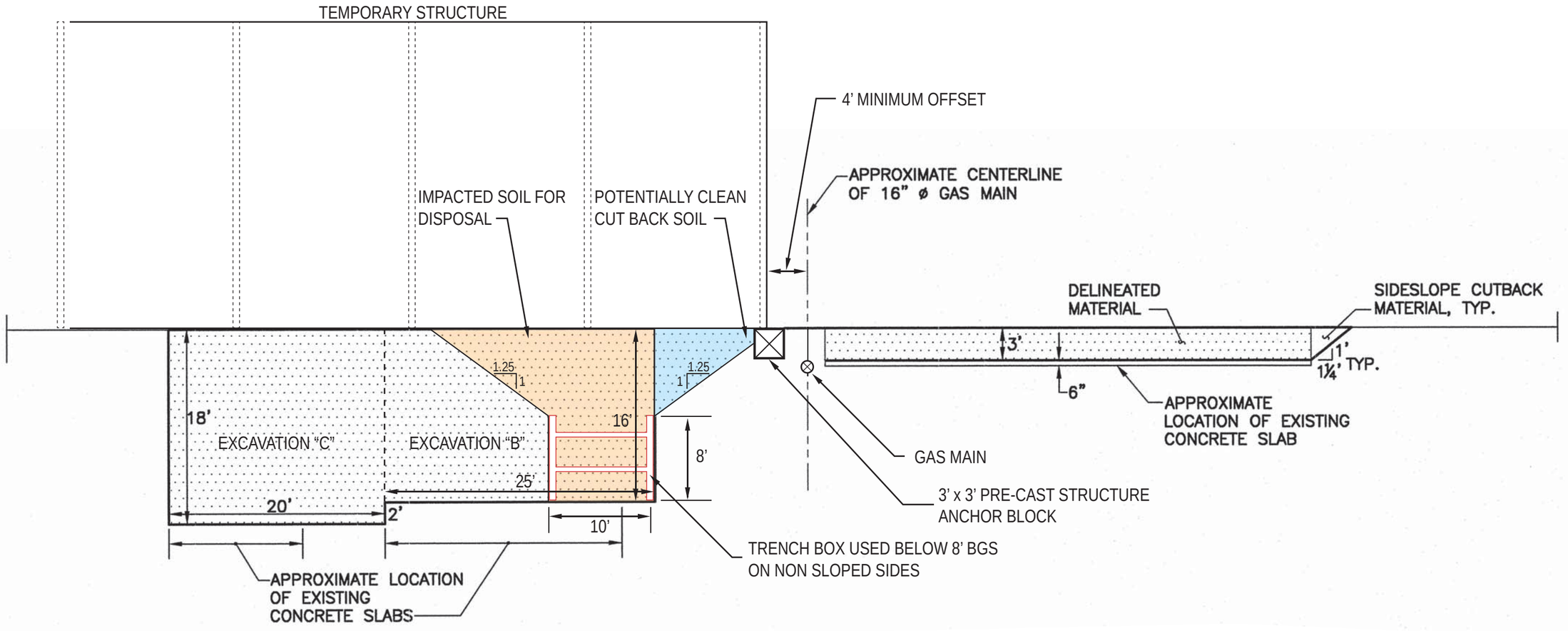
KEYSPAN HEMPSTEAD INTERSECTION ST.
FORMER MGP SITE

EXCAVATION DETAILS CROSS SECTION A-A

Project No.	P7370		
Figure No.	4	Date	06/13/2008



B-B CROSS SECTION

10' 0 10'

SCALE IN FEET

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KEYSPAN HEMPSTEAD INTERSECTION ST.
FORMER MGP SITE

EXCAVATION DETAILS CROSS SECTION B-B

Project No.	P7370		
Figure No.	5	Date	06/13/2008

30’ 0 30’
SCALE IN FEET

N

POSITION 1

POSITION 2

POSITION 3

POSITION 4

INACTIVE L.I.R.R. RIGHT OF WAY

OIL TANK

NOTES:
1. FOR ANCHOR BLOCK POSITIONS PLEASE REFER TO FIGURE 2

*ORIGINAL FIGURES PROVIDED BY URS CORPORATION

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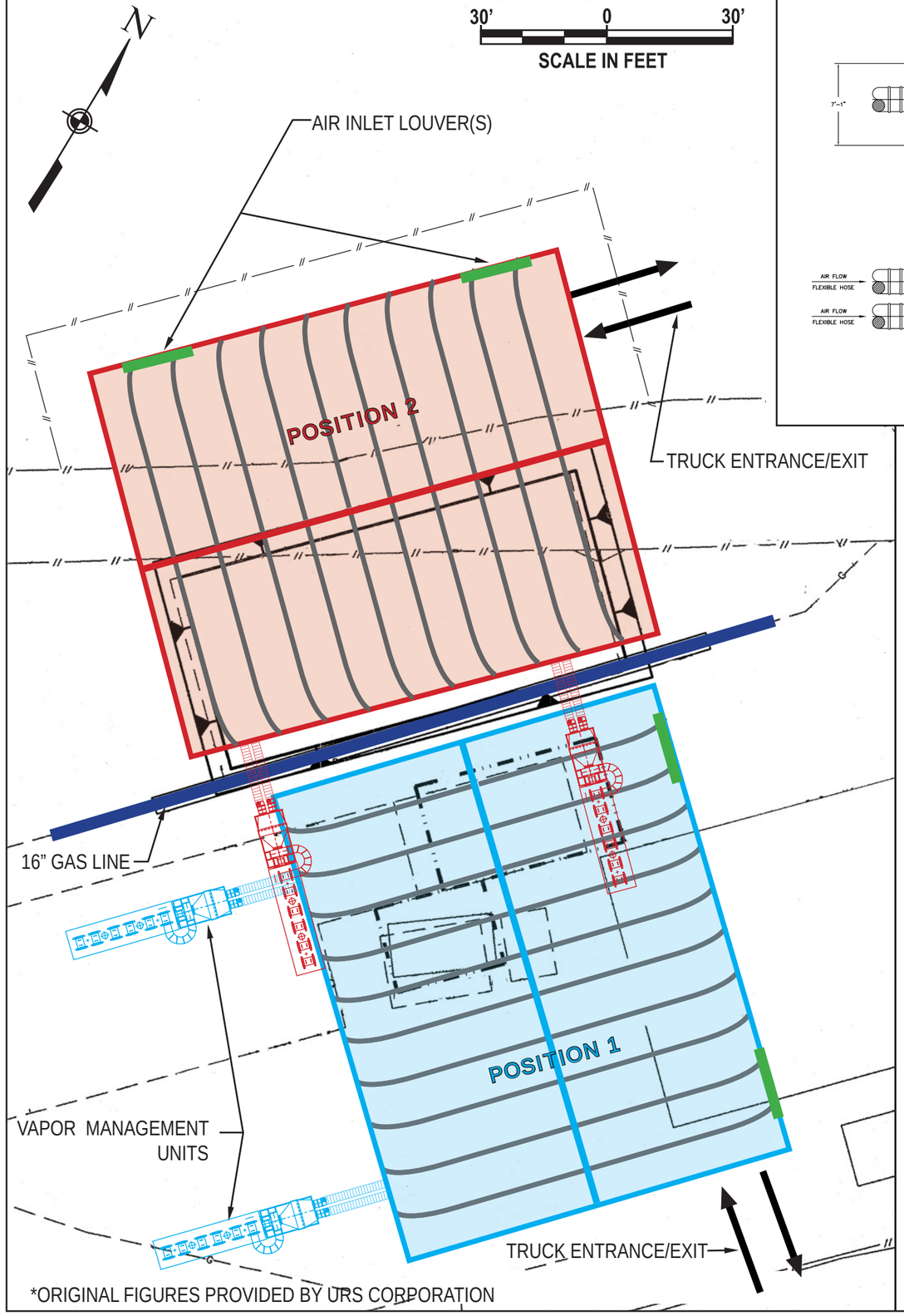
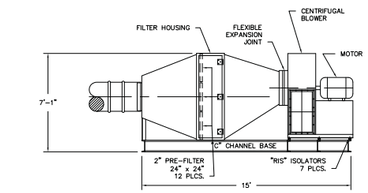
KEYSPAN HEMPSTEAD INTERSECTION ST.
FORMER MGP SITE

TEMPORARY STRUCTURE LAYOUT
AND EXCAVATION SEQUENCING PHASE 2

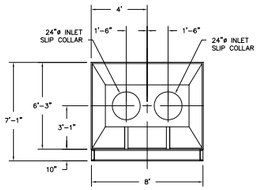
Project No.	P7370	
Figure No.	6	Date 06/13/2008



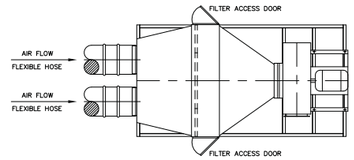
*ORIGINAL FIGURES PROVIDED BY URS CORPORATION



ELEVATION VIEW



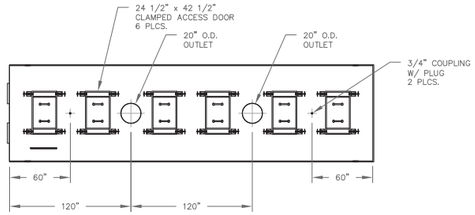
END VIEW



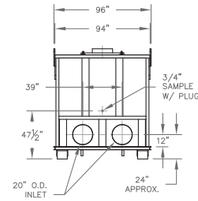
PLAN VIEW

NOTES: TIGG CORPORATION RESERVES THE RIGHT TO CHANGE ANY AND ALL DIMENSIONS-- AND DESIGNS
OVERALL OUT TO OUT DIMENSIONS AND INLET/OUTLET LOCATIONS ARE FIXED.

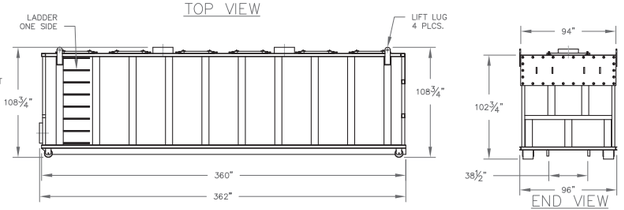
CONTAMINATED AIR SHALL ENTER UNIT THROUGH BOTH INLETS AND MUST EXIT USING BOTH OUTLETS.



TOP VIEW



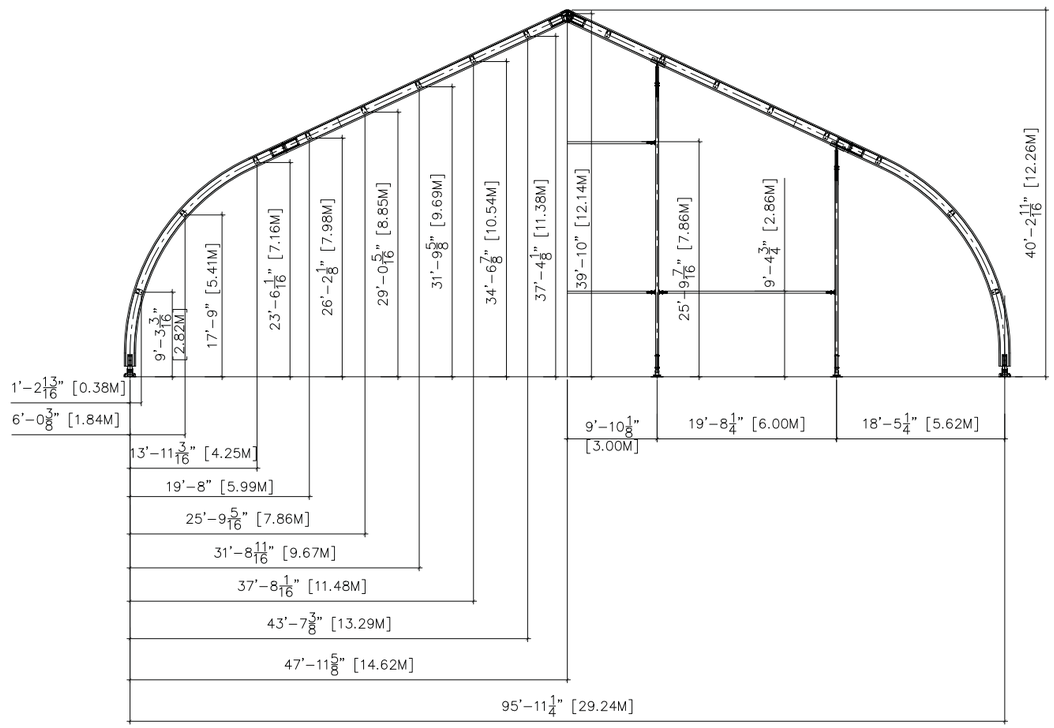
FRONT VIEW



SIDE VIEW

END VIEW

*ORIGINAL FIGURES PROVIDED TIGG CORPORATION



*ORIGINAL FIGURE PROVIDED UNIVERSAL RENTALS

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KEYSPAN HEMPSTEAD INTERSECTION ST. FORMER MGP SITE

TEMPORARY STRUCTURE DETAIL

Project No.	P7370		
Figure No.	7	Date	06/13/2008

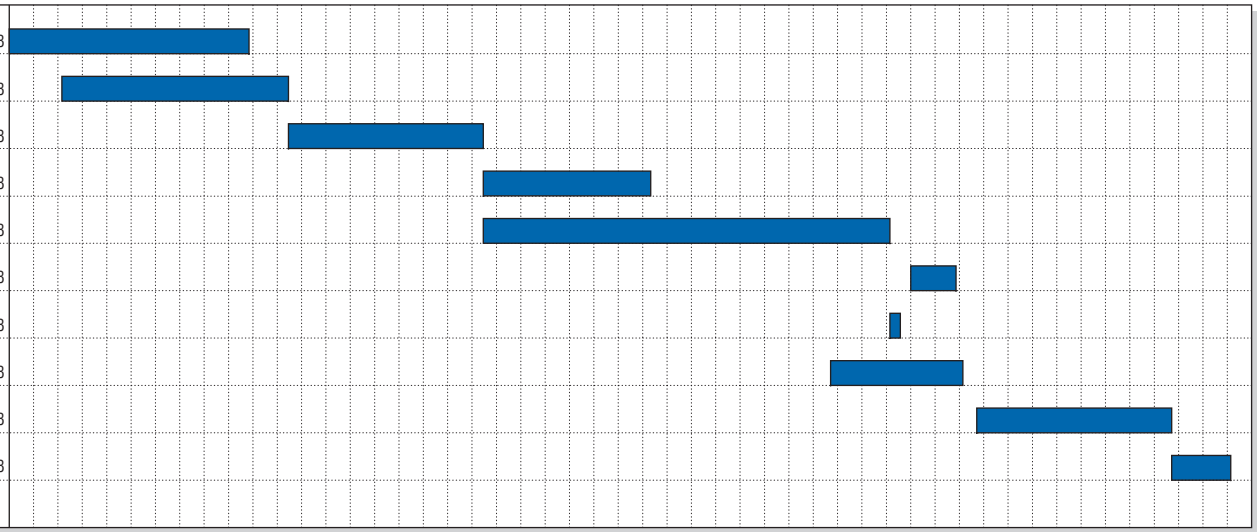
Appendix A

Construction Project Schedule

IRM SOIL EXCAVATION SCHEDULE

Hempstead Intersection Street
Former MGP Site

Task Description	Start Date	End Date
Pre-Design Investigation	12/01/07	02/13/08
Construction Specifications & Drawings	12/15/07	02/26/08
Contractor Procurement	02/26/08	04/25/08
Prepare Construction Operations Plan	04/25/08	06/23/08
Prepare Submittals and Procure Materials	04/25/08	09/08/08
Mobilization and Site Setup	09/15/08	09/29/08
Gas Main Clearance Excavation	09/10/08	09/12/08
Community Air Monitoring System Installation & Background Sampling	08/20/08	10/01/08
Impacted Soil Excavation and MGP Feature Removal	10/06/08	12/05/08
Site Restoration & Demobilization	12/06/08	12/22/08



URS

Figure 1

Appendix B

IRM Delineation Letter Report

(IRM Delineation Boring Logs Provided in Electronic Format Only)

nationalgrid

June 13, 2008

Mr. Amen Omorogbe, P.E.
Project Manager - MGP Remedial Section
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau C, 11th Floor
625 Broadway
Albany, New York 12233-7014

Re: Hempstead Former MGP Site- Site # 1-30-086
Responses to NYSDEC Comments on IRM Delineation and Revised Excavation Areas

Dear Mr. Omorogbe:

We have reviewed your comment letter dated April 24, 2008 regarding the April 11, 2008 letter report that summarized the IRM excavation area changes based on the delineation completed in February 2008. Responses to your comment letter are provided below and a revised IRM Delineation letter report is also attached.

COMMENT 1: Please show the location of the 16-inch gas pipe mentioned in the document. In addition, references were made to a buried concrete pad. Will the pad be removed as part of the IRM? If not please provide the rationale for leaving it in-place.

RESPONSE 1: The revised letter report shows the location of the 16-inch gas pipe and also describes the disposition of concrete pads located beneath areas A, B, and C. A 3-foot deep pad associated with the former cooling spray pond (revised Area A) will be removed during IRM construction. A concrete pad associated with a former receiving reservoir (revised Area B) is located 16-feet deep, and another 18-foot deep concrete pad associated with a former pump house (revised Area C) will be left in place since they are both outside the planned future in-situ solidification area. Furthermore, the borings do not indicate that MGP source material is present below these pads and the pads do not qualify as source material in accordance with the IRM Remedial Action Work Plan. There are also negative aspects associated with removing these pads, which include increased truck traffic through the communities and an increased potential for safety and exposure risks to the construction workers.

COMMENT 2: The document made reference to MGP impacted perched water located above the cooling spray pond and receiving reservoir slabs. How do you plan on addressing the impacted perched water during the IRM to ensure that it does not re-contaminated adjacent areas?

RESPONSE 2: The Construction Operations Plan will address methods to remove liquids above the slabs, which may include pumping into temporary containers (for off-site treatment) or using bulking agents such as soil or cement kiln dust prior to excavation and off-site treatment/disposal. The contractor has been informed of NYSDEC's May 20, 2008 letter regarding the use of quick lime and similar materials and they will comply with the requirements contained in the letter.

COMMENT 3: We assume that a comprehensive report will be submitted at a later date detailing findings from the delineation work. Specifically, we are awaiting results of the borings/wells installed adjacent to the Oswego Oil Service Corp, Facility.

RESPONSE 3: The IRM Delineation letter report is intended to serve as final documentation for delineation associated with the IRM excavation areas. In addition, the boring logs from the IRM delineation have now

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been included with the revised letter report. A complete copy of this report along with the boring logs will also be incorporated into the IRM Construction Operation's Plan, which will be issued for NYSDEC review. A separate letter report will be issued that addresses the results of borings and wells that were installed adjacent to the Oswego Oil Facility.

COMMENT 4: Figure 5 needs revision for clarity.

RESPONSE 4: Figure 5 has been revised for clarity and is included in the revised letter report as Figure 5A.

FINAL (UN-NUMBERED) COMMENT: While we do not object to the revised footprints of the excavation areas, however, a contingency plan must be in-place that would allow for additional excavation beyond the proposed excavation limits based on field conditions and as determined by a Department on-site representative.

RESPONSE TO UN-NUMBERED COMMENT: A contingency plan that allows for additional excavation based on field conditions is described in section 4.3.7 of the IRM Remedial Action Work Plan (November 2007). The Construction Operations Plan will also contain provisions for allowing excavation to continue beyond delineated limits based on field conditions and review with the NYSDEC on-site representative.

If you have any questions, please call me at (516) 545-2578.

Sincerely,

for

Patrick J. Van Rossem
Senior Environmental Engineer/Project Manager
National Grid Environmental Department

Attachment: URS Letter – Delineation of IRM Areas (Document Revised per April 24 NYSDEC Comments)

Cc: W. Parish, NYSDEC Region 1
S. McLelland, NYSDOH
R. Weitzman, NCHD
T. Leissing
F. Murphy
M. Akerbergs (URS)
J. Stachowski (URS)

175 East Old Country Road, Hicksville, NY 11801
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URS

June 13, 2008

Mr. Patrick J. Van Rossem
Senior Environmental Engineer/Project Manager
National Grid Environmental Department
175 East Old Country Road
Hicksville, New York 11801

Re: **Hempstead Intersection Street**
Former Manufactured Gas Plant Site
Delineation of IRM Areas (Document Revised per April 24 NYSDEC Comments)

Dear Mr. Van Rossem:

This letter describes the basis for the final IRM excavation areas that were established on the basis of the IRM delineation activities completed in February 2008. The preliminary IRM excavation areas were presented in the Remedial Action Work Plan (URS, November 2007). The comments from NYSDEC's April 24, 2008 letter have been addressed in this revised version of the document. Also included is a discussion of subsurface information in the vicinity of the 16-inch diameter gas pipe that is located on the site (refer to Figure 1). The attached tables and figures provide a summary of visual observations, analytical results, and jar shake test results that were used to delineate the areas. It is noted that the Construction Operations Plan and the IRM Remedial Action Work Plan contain provisions for allowing excavation to continue beyond delineated limits based on field conditions and review with the NYSDEC on-site representative.

IRM EXCAVATION AREAS PRESENTED IN THE FEBRUARY 2008 CONSTRUCTION CONTRACT DOCUMENTS

138 direct-push borings were sampled to delineate source material in the vicinity of the IRM areas established in the RAWP (refer to Drawing 4). The delineation was based on visual criteria, described below, that were presented in Appendix A of the RAWP.

- Soils exhibiting a petroleum-like sheen will be removed.
- Soils exhibiting coal tar staining (typically black or brown staining) will be removed if they exhibit a sheen when tested with a jar shake test.
- Below an elevation of 8 feet bgs, when the total aggregate vertical thickness of visible impacts of sheens and staining and/or residual NAPL in soils is less than 6 inches, the excavation in the horizontal direction will be terminated.
- Soils exhibiting a coal tar odor only, or odor and minor staining and no sheen will not be excavated.

Four separate IRM areas (A, B, C, and E) were established. Visual observations and jar shake test results that were used to delineate the areas are summarized in Table 1. Drawing. 5A depicts the extent of the excavation areas.

The extent of the IRM excavations will be further confirmed during construction by using the same visual criteria, except where vertical sidewall shoring will be implemented for deep excavations.

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URS

IRM EXCAVATION AREAS PRESENTED IN THE NOVEMBER 2007 RAWP

Six IRM excavation areas, designated as A through F, were identified in the RAWP and are shown on Figure 1. Field observations and analytical data used to establish the areas are summarized in Table 2. The areas were delineated based on information presented in the Remedial Investigation (RI) report prepared by Paulus, Sokolowski, and Sartor Engineering, P.C. (PS&S, 2006). The following criteria was used to establish the excavation areas:

- Tar-saturated soils;
- Soils containing total PAHs greater than 1,000 parts per million (ppm); and/or
- Soils containing total BTEX greater than 50 ppm.

Soils meeting these criteria were defined as "source material" and were considered to provide the greatest potential for affecting groundwater and soil vapor and represent a potential direct contact exposure point for construction workers at the site.

The IRM excavation areas presented in the RAWP were used as a starting point for a field delineation program that was performed in 2007 and 2008.

ESTIMATED IRM EXCAVATION VOLUMES

Estimated excavation volumes from the November 2007 RAWP and the February 2008 Technical Specifications/Contract Documents are presented below for comparison.

NOVEMBER 2007 RAWP

IRM Area	Area (ft^2)	Depth (ft)	Volume (yd^3)
A	11,860	8	3,510
B	960	8	280
C	1,500	8 to 24	980
D	900	8	270
E	6,080	8 to 24	2,380
F	510	8	150
Side slope Cuts	(varies)	(varies)	2,920
TOTAL	21,810	**(varies)**	**10,490**

FEBRUARY 2008 TECHNICAL SPECIFICATIONS/CONTRACT DOCUMENTS

IRM Area	Area (ft^2)	Depth (ft)	Volume (yd^3)
A	5,340	3	590
B	1,150	16	680
C	550	18	360
E-1	3,240	3	360
E-2	3,620	5	670

E-3	7,650	4	1,130
TOTAL	**21,550**	**(varies)**	**3,790**

The Construction Operations Plan and the IRM Remedial Action Work Plan contain provisions for allowing the excavations to continue beyond delineated limits based on field conditions and review with the NYSDEC on-site representative.

SUBSURFACE INFORMATION IN THE VICINITY OF THE 16-INCH DIAMETER GAS PIPE

A 16-inch gas pipe is located immediately beyond the southern edge of a buried concrete slab (3 ft. deep) that is associated with a former cooling spray pond and 15 feet north of a buried concrete slab (16 ft. deep) associated with a former receiving reservoir (refer to Figure 1 and Drawing 5A). Perched water with MGP-related contamination was documented during the IRM field delineation above the cooling spray pond and receiving reservoir slabs. The cooling spray pond footprint generally coincides with the extent of source material to be excavated at Area A and the receiving reservoir slab footprint generally coincides with the extent of source material to be excavated at Area B.

A 3-foot deep concrete slab associated with the former cooling spray pond will be removed during IRM construction. A 16-foot deep slab associated with a former receiving reservoir and an 18-foot deep concrete pad associated with a former pump house will be left in place during IRM construction since they are outside the planned in-situ solidification area. Furthermore, the borings do not indicate that MGP source material is present below the pads. The Construction Operations Plan will address methods to remove liquids above the slabs, which may include pumping into temporary containers (for off-site treatment) or using bulking agents such as soil or cement kiln dust prior to excavation and off-site treatment/disposal. The contractor has been informed of NYSDEC's May 20, 2008 letter regarding the use of quick lime and similar materials and will comply with the requirements contained in the letter.

Information from IRM delineation borings sampled in the vicinity of the gas pipe is summarized in Table 3, which indicates that MGP-impacted soil is present immediately above the cooling spray pond concrete pad to the north of the gas pipe in the vicinity of borings DGP – 14, 15, and 16. Contaminated soil in this area is within the 6-foot buffer recommended by National Grid for work around the pipe. MGP contamination is also present to the south of the gas pipe in the vicinity of boring DGP-20. Borings sampled in this area were not placed close enough to the pipe to determine if a 6-foot soil buffer can be maintained in this area.

Sincerely,

URS CORPORATION

James R. Stachowski, PE
Senior Project Engineer

Enc.

cc: Mike Akerbergs, URS Wayne, NJ

Hempstead Intersection Street Former MGP Site
IRM Area Delineation - Borings Exhibiting Source Material
February 2008 Contract Documents
Table 1

Boring [1]	Depth (feet bgs)	Key Visual Descriptions on Log [2]	Jar Shake Test Results
		IRM Area A	
DGP-8	2 to 3	black-stained, perched water with sheen	---
DGP-9	2 to 3	black stained-coated, ALM, sheen	---
DGP-10	2 to 3	black coated, black tar (viscous), ALM, sheen	---
DGP-11	2 to 3	black stained and coated	---
DGP-14	2 to 3	black stained, coated	---
DGP-15	2 to 3	(perched water)	---
DGP-16	2 to 3	black stained, tar (viscous)	---
DGP-75	2 to 3	black stained and coated, tar phase (viscous), sheen	---
DGP-76	2 to 3	black stained and coated, tar phase (viscous)	---
DGP-77	2 to 3	black stained and coated, tar (viscous), black, sheen	---
		IRM Area B	
DGP-20	0 to 16	black stained and coated, DNAPL, tarry	---
DGP-25	0 to 16	black saturated, DNAPL saturated	---
DGP-83	0 to 16	(No MGP impact - at Area B perimeter)	---
DGP-85	0 to 16	black stained, sheen	---
DGP-87	0 to 16	black stained and coated, tarry	---
		IRM Area C	
DGP-28	0 to 18	black stained and coated	13 to 15 ft sheen
		IRM Area E	
DGP-58	0 to 3	black stained, coated, ALM	
DGP-59	0 to 5	black stained, coated, ALM, some tar	0 to 5 ft sheen
DGP-60	0 to 1.5	stained, coated, ALM, wood fibers	No sheen
DGP-61	0 to 5	black stained and coated, ALM	---
DGP-62	0 to 4	black stained and coated, sheen	No sheen
DGP-63	0 to 5	black stained, ALM	0 to 5 ft sheen
DGP-64	0 to 5	black stained, ALM, coated, sheen	0 to 5 ft sheen
DGP-65	0 to 3	black stained, ALM	---
DGP-66	0 to 3	black stained, ALM	No sheen
DGP-67	0 to 3	black stained and coated, sheen	---
DGP-68	0 to 21	black stained and coated, sheen, gas type odor	9 to 13 ft. sheen
DGP-70	0 to 3	black stained and coated	---
DGP-71	0 to 20	ALM, sheen, black stained, degraded gas coated	8-12, 12-16, & 16-20 ft sheen
DGP-72	0 to 2	black stained, ALM	No sheen
DGP-73	0 to 20	black stained and some coating, oily, gas odor/impact	5-10, 10-15, 15-20, & 20-21 ft sheen
DGP-74	0 to 20	coal, ALM, black stained and coated, tarry, gas impact	15 to 20 ft sheen
DGP-90	0 to 5	stained, ALM, coal	0 to 5 ft sheen
DGP-91	0 to 5	black stained, slight black coating, sheen	---
DGP-92	0 to 3	black stained and coated, sheen	---
DGP-93	0 to 4	black stained and coated, gas odor	---
DGP-94	0 to 20	black stained, tarry lens, coated, gas odor	---

Hempstead Intersection Street Former MGP Site
IRM Area Delineation - Borings Exhibiting Source Material
February 2008 Contract Documents
Table 1

Boring [1]	Depth (feet bgs)	Key Visual Descriptions on Log [2]	Jar Shake Test Results
DGP-95	0 to 3.5	black stained and coated, sheen, ALM	---
DGP-96	0 to 5.5	ALM, black stained, sheen, tarry, wood chips	No sheen
DGP-97	0 to 3	ALM, coal fragments	No sheen
DGP-117	0 to 4	ALM, stained and coated, sheen, slightly tarry	---
DGP-118	0 to 4	ALM, coal fragments, slight sheen	---
DGP-119	0 to 4	ALM, slight sheen, stained	---
DGP-120	0 to 4	ALM, coal fragments, stained,	---
DGP-121	0 to 4	ALM, stained, sheen	---
DGP-122	0 to 4	ALM, sheen	---
DGP-123	0 to 4	ALM, stained, sheen	---
DGP-124	0 to 4	ALM, sheen	---
DGP-125	0 to 4	ALM, sheen	---
DGP-126	0 to 4	ALM, wood fragments/chips, sheen	---
DGP-127	0 to 2	ALM, coal fragments	---
DGP-128	0 to 4	black ALM, coal fragments, trace black staining/sheen	---
DGP-129	0 to 3	ALM, coal fragments, sheen	
DGP-130	0 to 3	ALM, trace black staining	heavy sheen
DGP-132	0 to 4	black ALM, coal	sheen
DGP-133	0 to 4.5	ALM, slag, coal, sheen	---
DGP-136	0 to 3	black ALM, coal	sheen

(1) Refer to Dwg. 4 for boring locations and Dwg. 5 for IRM Area locations

(2) Refer to Attachment D of the Technical Specifications/Contract Documents (URS, 2008) for additional details

ALM = ash-like material.

--- = no sheen or jar shake test not performed

Hempstead Intersection Street Former MGP Site
IRM Area Delineation - Data Evaluated for Source Material
November 2007 RAWP
Table 2

Sample Point	Location [1]	Depth (ft bgs)	Observed NAPL	BTEX (mg/Kg)	PAH (mg/Kg)	Reference
IRM Area A						
HCP-14	NE corner of cooling spray pond	0 - 8	no	1,284	6,762	RI Report, Dwgs. 4A1, 4A2 & 4A3
HIGP-05 S,I	South side of coolong spray pond	0 - >34	no	---	---	RI Report Dwgs. 4A1, 4B1, 4C1, 4D1, & 4E1
HISB-08	SE end of cooling spray pond	0 - >34	no	---	---	As above
HISB-74	East of cooling spray pond	0 - 8	yes	---	---	RI Report, Dwg. 4A1
HITP-01	South-central location in cooling spray pond	2.5 - 3 & 3 - 5	yes	680	3,003	RI Report, Dwgs. 4A1, 4A2, & 4A3
HP-04(B)	Off SE corner of cooling spray pond	0 - 8	stain	---	---	RI Report, Dwg. 4A1
HP-06(B)	Near regulator station	0 - 8	yes	---	---	As above
PB-08(B)	Between regulator station & cooling spray pond	0 - 8	yes	---	---	As above
TP-08(A)	SE corner of cooling spray pond	0 - 24	no	---	---	RI Report Dwgs. 4A1, 4B1, 4C1, & 4D1
PB-09(B)	Between cooling spray pond and regulator station	0 - 24	no	---	---	RI Report Dwgs. 4A1, 4B1, 4C1, & 4D1
TP-10A	NW corner of cooing spray pond	0 - 24	no	---	---	RI Report Dwgs. 4A1, 4B1, 4C1, & 4D1
TP-26(B)	North side in cooling spray pond	0 - 8	no	---	---	RI Report Dwg. 4A1
		2.5 - 3	no	3,074	896	RI Report, Dwgs. 4A2, & 4A3
TP-28(B)	North of pump house, south of receving reservoir	0 - 8	yes	---	---	RI Report, Dwg. 4A1
		6 - 9	---	---	138.8	RI report, Dwg. 4A3
TP-30B	North side of cooling spray pond, west of receiving reservoir	0 - >34	no	---	---	RI Report Dwgs. 4A1, 4B1, 4C1, 4D1, & 4E1
TP-32 (B)	West side in cooling spray pond	2.5 - 3	yes	2,520	8,128	RI Report, Dwgs. 4A1, 4A2, & 4A3
IRM Area B						
TP-39(B)	Center	6	no	---	1,709	RI Report, Dwg. 4A3
IRM Area C						
PZ-01(B)	North of Liquid Propane Tank area	16 - 24	yes	---	---	RI Report, Dwg. 4C1
TP-29(B)	North of Liquid Propane Tank area	0 - 8	yes	---	---	RI Report, Dwg. 4A1
IRM Area D						
TP-42(B)	Near tar tank	6'	no	251	1,817.4	RI Report, Dwg. 4A2 & 4A3

Hempstead Intersection Street Former MGP Site
IRM Area Delineation - Data Evaluated for Source Material
November 2007 RAWP
Table 2

Sample Point	Location [1]	Depth (ft bgs)	Observed NAPL	BTEX (mg/Kg)	PAH (mg/Kg)	Reference
IRM Area E						
HCP-13	SE side	0 - 8	no	566.2	4,566	RI Report Dwg. 4A1
HIGP-11S,I	East side	0 - 8	stain	---	---	RI Report Dwg. 4A1
HISB-11	Middle, adjacent to property line.	0 - 8	stain	---	---	RI Report Dwg. 4A1
		4 - 6	---	325	2,489	RI Report Dwgs. 4A2 & 4A3
		8 - 16	yes	---	---	RI Report Dwg. 4B1
		16 - 24	stain	---	---	RI Report Dwg. 4C1
HITP-02	North side	3 - 5	no	84.8	687.9	RI Report Dwgs. 4A2 & 4A3
PZ-04(B)	West side	0 - 8	stain	---	---	RI Report Dwg. 4A1
PB-10(B)	NW side	8 - 24	no	---	---	RI Report Dwgs. 4B1, 4C1, & 4D1
PB-12(B)	South side	0 - 24	no	---	---	RI Report Dwgs. 4A1, 4B1, 4C1, & 4D1
TP-06(A)	Center	0 - 8	yes	---	---	RI Report, Dwg. 4A1
TP-40(B)	SW side near boiler blow-down sump	0 - 8	yes	---	---	RI Report, Dwg. 4A1
		8 - 16	yes	---	---	RI Report, Dwg. 4B1
TP-41(B)	Center	0 - 8	yes	---	---	RI Report, Dwg. 4A1
		4.5 - 5	---	138.8	1488.2	RI Report, Dwgs. 4A2 & 4A3
IRM Area F						
HCP-11	DGP-56 area	0 - 8	no	79.5	3,959.9	RI Report Dwgs. 4A2 & 4A3
HISB-44	In LIRR ROW (outside of Area F)	8 - 16	stain	---	---	RI Report Dwg. 4B1
		16 - 24	yes	---	---	RI Report Dwg. 4C1
		24 - 34	yes	---	---	RI Report Dwg. 4D1

(1) Refer to Figure 1 for sample point and IRM Area locations

--- = no data or information provided within RI report

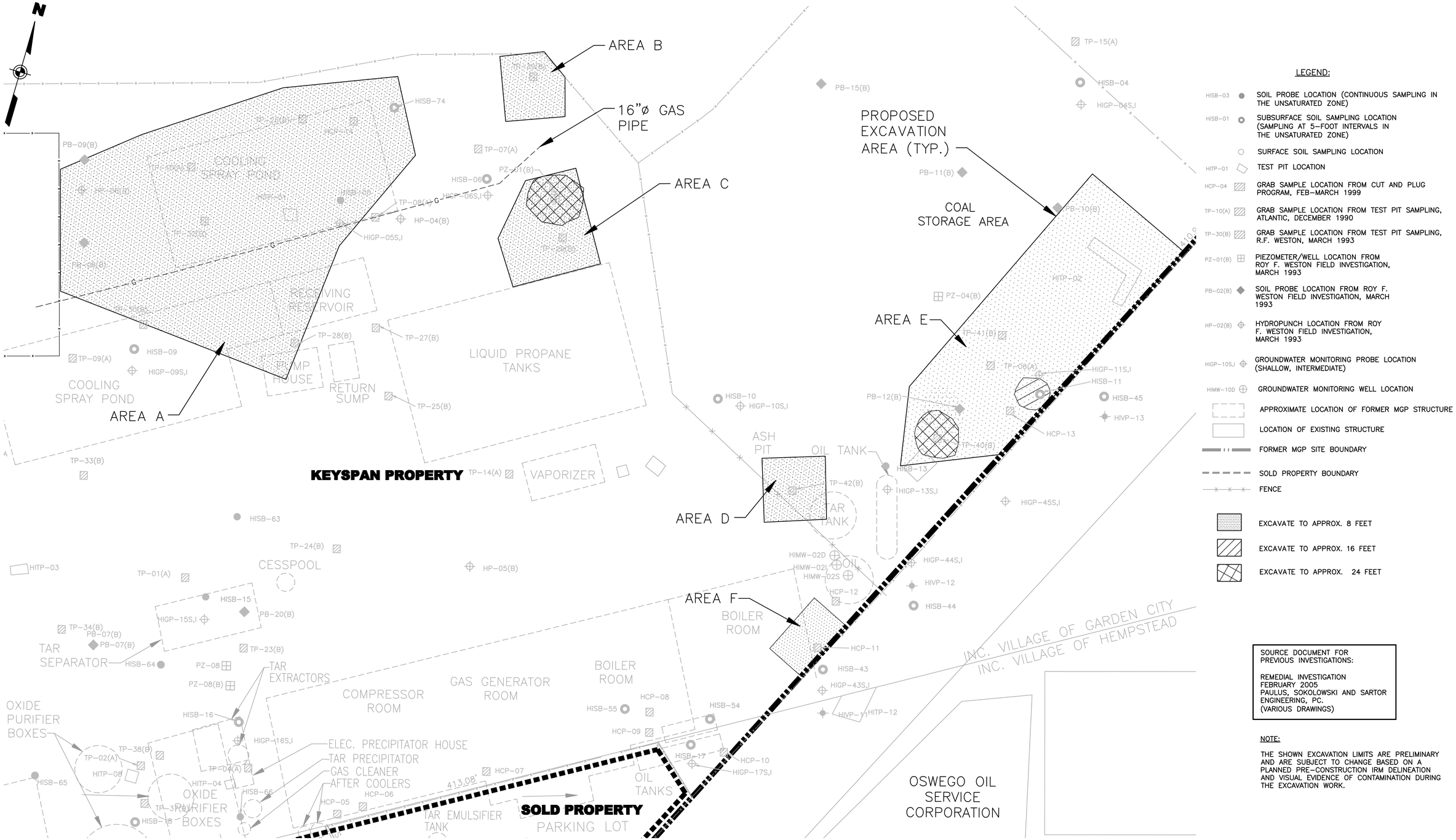
Hempstead Intersection Street Former MGP Site
Subsurface Information From IRM Delineation Borings in the Vicinity of 16-Inch Gas Pipe
Table 3

Boring*	Depth (feet bgs)	Key Visual Descriptions on Log	Jar Shake Test Results
Borings North of 16-Inch Gas Pipe			
DGP-12	0 to 5	fine to medium sand, some ALM, brick & concrete, no MGP impacts	---
	5 to 9	medium to coarse sand, no MGP impacts	---
DGP-13	0 to 9	fine to coarse sand, no MGP impacts	---
DGP-14	0 to 3	fine to coarse sand, trace gravel, black stained, coated, partially saturated, MGP odor	---
	3 to 3.5	concrete	---
	3.5 to 8	fine to coarse sand, no MGP impacts	---
DGP-15	0 to 3	fine to coarse sand, some gravel, perched water	---
	3 to 3.5	concrete	---
	3.5 to 8	fine to coarse sand, no MGP impacts	---
DGP-16	0 to 3	fine to coarse sand, black stained, viscous tar	---
	3 to 3.5	concrete	---
	3.5 to 8	fine to medium sand, no MGP impacts	---
DGP-35	0 to 9	fine to coarse sand, no MGP impacts	---
DGP-80	0 to 9	fine to coarse sand, no MGP impacts	---
Borings South of 16-Inch Gas Pipe			
DGP-17	0 to 2	topsoil and fill (sand with brick)	---
	2 to 9	fine to coarse sand, no MGP impacts	---
DGP-19	0 to 3	fine to coarse sand, trace gravel, no MGP impacts	---
	3 to 4	concrete	---
	4 to 9	fine to coarse sand, little to some gravel, no MGP impacts	---
DGP-20	0 to 2	topsoil and fine to coarse sand, no MGP impacts	---
	2 to 2.5	concrete	---
	2.5 to 16	fine to coarse sand, black stained and coated, DNAPL, tarry	---
DGP-21	0 to 15	medium to coarse sand, no MGP impacts	---
DGP-36	0 to 9	fine to coarse sand, no MGP impacts	---

(1) Refer to Drawing 4 for boring locations

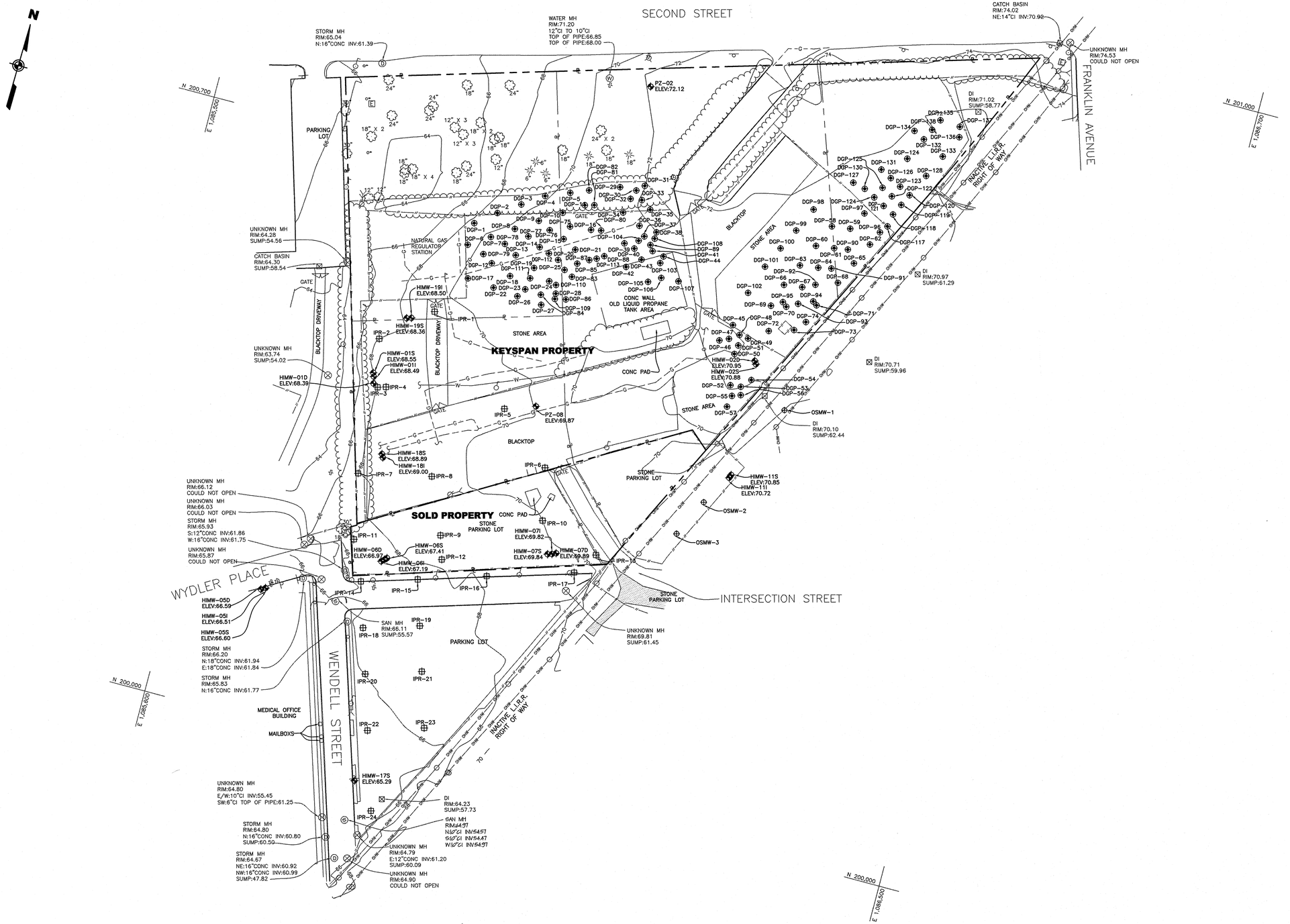
ALM ALM = ash-like material.

--- = no sheen or jar shake test not performed



J:\11175065.00000\CAD\DRAFT\TASK2\HEMPSTEAD\IRM.DWP FIGURE 1-rev-1.dwg, Layout1, 1:1, 5/6/08 -2-EJH

URS Corporation	**KEYSPAN CORPORATION** **HEMPSTEAD INTERSECTION STREET** **FORMER MGP SITE** **GARDEN CITY/HEMPSTEAD, NY**	**IRM EXCAVATION AREAS (NOV.2007 RAWP) AND PREVIOUS SAMPLING/MONITORING LOCATIONS**	**FIGURE 1**



LEGEND:

IPR–1 ⊕ IRM PRODUCT RECOVERY WELL BY URS

DGP–25 ⊕ DELINEATION SOIL BORING BY URS

OSMW–2 ⊕ GROUNDWATER MONITORING WELL BY URS

NOTES:

1. REFER TO TABLE ON THIS DRAWING FOR DELINEATION SOIL BORINGS THAT INDICATED REFUSAL AND/OR APPARENT CONCRETE (E.G., SLABS).
2. DGP–117 TO DGP–138 WERE FIELD LOCATED BY APPROXIMATE METHODS. THESE POINTS WILL BE SURVEYED BY URS.

DELINEATION BORING	DEPTH BGS (FEET)	REMARKS
DGP–8	3 TO 3.5	CONCRETE SLAB
DGP–9	3 TO 3.5	CONCRETE SLAB
DGP–10	3 TO 3.5	CONCRETE SLAB
DGP–11	3 TO 3.5	CONCRETE SLAB
DGP–14	3 TO 3.5	CONCRETE SLAB
DGP–15	3 TO 3.5	CONCRETE SLAB
DGP–16	3 TO 3.5	CONCRETE SLAB
DGP–18	1 TO 3	CONCRETE SLAB OR RUBBLE
DGP–19	3 TO 4	CONCRETE SLAB
DGP–20	2.2 TO 2.8	CONCRETE SLAB
DGP–20	16	REFUSAL
DGP–22	3 TO 3.5	CONCRETE SLAB
DGP–25	16	REFUSAL
DGP–26	3 TO 3.5	CONCRETE SLAB
DGP–27	3 TO 4	CONCRETE SLAB
DGP–28	17	REFUSAL
DGP–75	3 TO 3.5	CONCRETE SLAB
DGP–76	3 TO 3.5	CONCRETE SLAB
DGP–77	3 TO 3.5	CONCRETE SLAB
DGP–83	16	REFUSAL
DGP–84	3 TO 4	CONCRETE SLAB
DGP–85	16	REFUSAL
DGP–87	16	REFUSAL

60' 0 60'
SCALE IN FEET

NO.	MADE BY	APPROVED BY	DATE	DESCRIPTION

REVISIONS

DESIGNED BY: RJP
DRAWN BY: RAL
CHECKED BY: JRS
PROJ. ENGR. MA

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JOB NO. 11175065

STATE OF NEW YORK JACK E. RUSSELL LICENSED PROFESSIONAL ENGINEER NO. 089236

KEYSPAN CORPORATION
(A NATIONAL GRID COMPANY)
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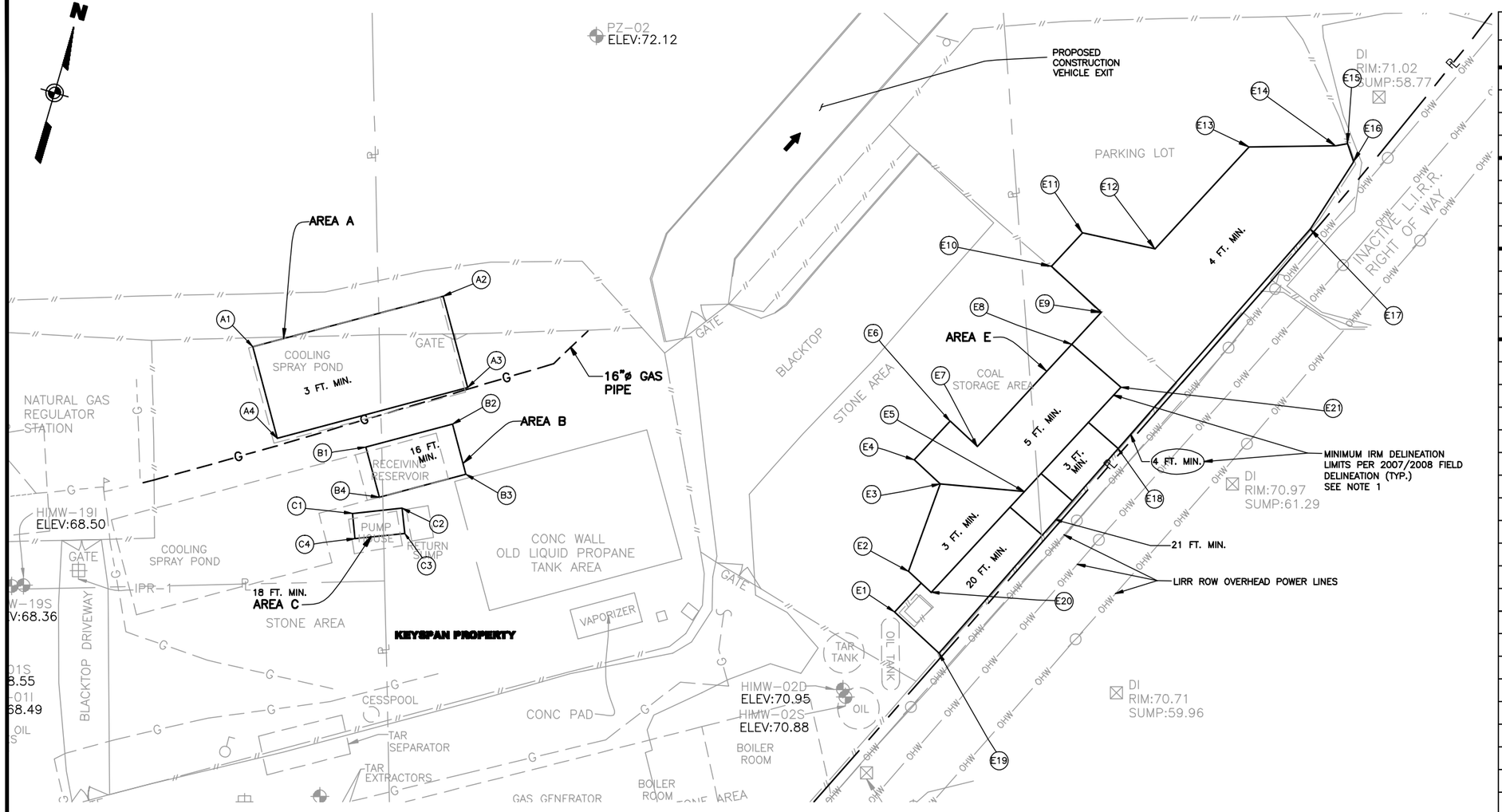
HICKSVILLE, NEW YORK 11801

THE HEMPSTEAD INTERSECTION STREET FORMER MANUFACTURED GAS PLANT SITE
INTERIM REMEDIAL MEASURES

IRM DELINEATION BORINGS AND PRODUCT RECOVERY WELLS

Scale: AS SHOWN | Date: FEB. 2008 | DWG. 4



PROPOSED EXCAVATION AREA LAYOUT (SEE NOTE 4)		
POINT	NORTHING (FEET)	EASTING (FEET)
A1	200615.17	1085871.89
A2	200699.92	1085956.65
A3	200659.18	1085980.08
A4	200610.43	1085895.32
B1	200617.58	1085938.98
B2	200639.78	1085977.57
B3	200617.48	1085990.40
B4	200595.28	1085951.81
C1	200584.06	1085941.00
C2	200592.98	1085964.16
C3	200581.22	1085968.69
C4	200572.30	1085945.52
E1	200606.48	1086213.55
E2	200627.78	1086214.96
E3	200673.72	1086219.03
E4	200681.91	1086203.46
E5	200680.87	1086260.33
E6	200705.12	1086215.67
E7	200696.51	1086232.03
E8	200757.55	1086264.15
E9	200776.70	1086274.23
E10	200792.39	1086244.42
E11	200812.44	1086254.97
E12	200814.07	1086291.80
E13	200874.97	1086323.86
E14	200886.69	1086365.18
E15	200889.26	1086370.58
E16	200881.32	1086375.87
E17	200843.53	1086363.71
E18	200713.54	1086299.81
E19	200592.42	1086240.26
E20	200620.60	1086228.60
E21	200743.28	1086293.17

PROPOSED PRODUCT RECOVERY WELL LAYOUT		
POINT	NORTHING (FEET)	EASTING (FEET)
IPR-1	200521.52	1085817.04
IPR-2	200473.71	1085761.96
IPR-3	200417.95	1085774.71
IPR-4	200420.77	1085784.10
IPR-5	200431.90	1085926.33
IPR-6	200376.39	1085990.76
IPR-7	200313.13	1085778.42
IPR-8	200331.97	1085863.76
IPR-9	200267.21	1085891.55
IPR-10	200315.08	1086003.95
IPR-11	200236.51	1085793.45
IPR-12	200240.32	1085900.13
IPR-13	200292.40	1086075.46
IPR-14	200190.77	1085814.17
IPR-15	200210.29	1085878.58
IPR-16	200235.01	1085956.46
IPR-17	200265.80	1086055.76
IPR-18	200138.11	1085830.63
IPR-19	200157.63	1085895.03
IPR-20	200086.07	1085847.10
IPR-21	200106.08	1085911.13
IPR-22	200022.63	1085866.71
IPR-23	200042.59	1085930.89
IPR-24	199932.15	1085894.99

NOTES:

1. FOR REQUIRED LOCATION OF SLOPE CUTBACK, SHORING AREAS, AND IRM EXCAVATION LIMITS, REFER TO DRAWING NO. 6
2. FOR SURVEY CONTROL POINTS, REFER TO DRAWING NO.2.
3. STAGING AND LAYDOWN AREA TO BE DETERMINED BY KEYSPAN AND/OR ENGINEER.
4. SHOWN LAYOUT POINTS FOR AREAS A AND E TYPICALLY REPRESENT TOE OF SLOPE SHOWN ON DRAWING 6.

30' 0 30'
SCALE IN FEET

URS Corporation	NATIONAL GRID HEMPSTEAD INTERSECTION STREET FORMER MGP SITE GARDEN CITY/HEMPSTEAD, NY	PROJECT LAYOUT	DRAWING 5A

J:\11175065.00000\CAD\DRAFT\TASK2\HEMPSTEAD\SITE-WIDE REMEDY\Drawing 5.dwg, FIG 5A, 1:2, 6/5/08 -7-EJH

URS Corporation

TEST BORING LOG

BORING NO:	DGP-1
PROJECT: KeySpan Hempstead MGP	**LOCATION:** Area A
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley & Nicol	**DRILLING METHOD:** Hand Auger/ Geoprobe
GROUNDWATER:	**TOTAL DEPTH:** 9'
DATE STARTED:	12/03/07
DATE FINISHED:	12/05/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			DK Brown		Loamy topsoil with some organic matter, trace coarse sand & fine gravel, trace silt.	SW	0.0	Moist-Dry
1						Lt Brown		Fine to medium SAND, trace coarse sand, little-some fine gravel (subrounded), poorly graded, trace coarse gravel, trace silt.	SP	0.0	Moist-Dry
2											
3											
4											
5											
		S-2	Macro core		35"	Lt Brown		Loose to medium dense, medium to coarse SAND, some fine to coarse gravel (poorly graded). No MGP impact.	GP	0.0	Dry
6											
7											
8											
								End of boring: 9' bgs			
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated with post hole digger.

PROJECT NO.	11175065
BORING NO.	DGP-1

URS Corporation

TEST BORING LOG

BORING NO:	DGP-2
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/ Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	10'
DATE STARTED:	12/04/07
DATE FINISHED:	12/04/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				DK Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter (roots), trace-little fine gravel.	SW	0.0	Moist-Dry
1												
2												
3												
4												
5							Lt Brown		Fine to medium to coarse sand, little-some fine gravel, no MGOP impact.	GP	0.0	Dry
6		S-2	Macro core			54"	Lt Brown		Loose, medium to coarse SAND, with some fine to coarse gravel (well graded). No MGP impact.	GW	0.0	Dry
7												
8												
9												
10												
11									End of boring: 10' bgs			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by hand auger.

PROJECT NO.	11175065
BORING NO.	DGP-2

URS Corporation

TEST BORING LOG

BORING NO:	DGP-3
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/ Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	10'
DATE STARTED:	12/04/07
DATE FINISHED:	12/06/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter, trace-little fine gravel.	SP	0.0	Dry
1												
2												
3												
4												
5							Lt Brown		Fine to medium to coarse SAND, little fine gravel. No MGP impact.	GP	0.0	Dry
6		S-2	Macro core			40"	Lt Brown		Loose, fine to medium to coarse SAND, some fine to coarse gravel (well graded), trace coarse gravel. No MGP impact.	GW/SW	0.0	Dry
7												
8												
9												
10												
11									End of boring: 10' bgs			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by hand auger.

PROJECT NO.	11175065
BORING NO.	DGP-3

URS Corporation

TEST BORING LOG

BORING NO:	DGP-4		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area A
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol	**DRILLING METHOD:**	Hand Auger/ Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/04/07		
DATE FINISHED:	12/04/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter (roots), trace fine gravel (subround to round).	SP	0.0	Dry
1												
2												
3												
4												
5							Lt Brown		Fine to medium to coarse SAND, some fine gravel. No MGP impact.	GP	0.0	Dry
6		S-2	Macro core			40"	Lt Brown		Loose, medium to coarse SAND, trace fine sand some well graded fine to coarse gravel. No MGP impact.	GW	0.0	Dry
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by hand auger.

PROJECT NO.	11175065
BORING NO.	DGP-4

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-5
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area A
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/ Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	10'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/04/07
				DIA.						**DATE FINISHED:**	12/06/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						**DESCRIPTION**					
DEPTH FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**		**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**REMARKS PID**	**Moist**
0		S-1	Grab				Dk Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter (roots), trace fine gravel.	SP	0.0	Dry
1												
2												
3												
4							Lt Brown		Fine to medium to coarse SAND, some fine gravel (subround to round). No MGP impact.	GP	0.0	Dry
5												
6		S-2	Macro core			48"	Lt Brown /Orange		Loose, medium to coarse to very coarse SAND, little fine to coarse gravel (well graded). No MGP impact.	GW	0.0	Dry
7												
8												
9												
10												
11									End or boring: 10' bgs			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by hand auger.

PROJECT NO.	11175065
BORING NO.	DGP-5

URS Corporation

TEST BORING LOG

BORING NO:	DGP-6
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/ Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DATE STARTED:	12/03/07
DATE FINISHED:	12/05/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DEPTH FEET	SAMPLE STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Dk Brown		Loamy topsoil, very fine to fine to medium SAND, with some organic matter (roots), little fine gravel, trace silt.	SP	0.0	Dry
1											
2						Lt Brown / Brown		Fine to medium to coarse SAND, with some fine gravel (subrounded to rounded), poorly graded, trace coarse gravel, trace silt.	SP	0.0	Moist to Dry
3											
4											
5						Black Stained		Fine to medium SAND, napth. Odor, with some fine gravel, poorly graded.	GP	0.2	Moist
6		S-2	Macro core		34"	Orange / Brown		Loose to medium dense, fine to medium to coarse SAND, with some fine to coarse gravel (poorly graded). No MGP impact.	GP	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated with post hole digger. SP 0' to 1' and SP 1' to 4' sample used in composite sample CS-A-1. GP 4' to 5' GS-A-1 sample. GP 5' to 9' CS-A-5.

PROJECT NO.	11175065
BORING NO.	DGP-6

URS Corporation

TEST BORING LOG

								BORING NO:	DGP-7
PROJECT:	KeySpan Hempstead MGP							**LOCATION:**	Area A
CLIENT:	KeySpan							**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol							**DRILLING METHOD:**	Hand Auger/ Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore		**DATE STARTED:**	12/03/07
				DIA.				**DATE FINISHED:**	12/05/07
				WT.				**DRILLER:**	M. Meade
				FALL				**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**				**REVIEWED BY:**	K. Connare

	SAMPLE					DESCRIPTION					
DEPTH FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**	**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**REMARKS PID**	**Moist**
0		S-1	Grab			Dk Brown		Loamy topsoil, some organic matter, trace coarse sand and fine gravel, trace silt.	SW	0.0	Moist to Dry
1											
2						Lt Brown		Fine to medium SAND, trace coarse sand, little to some fine gravel (subrounded), poorly graded, trace coarse gravel.	SP	0.0	Dry
3											
4											
5											
6		S-2	Macro core		27"	5' to 7' Dk Brown 7' to 9' Lt Brown		Very fine to fine SAND, trace fine gravel. Loose to medium dense, trace fine sand, some fine gravel (poorly graded). No MGP impact.	GP/SP	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated with post hole digger. SW 0' to 1' and SP 1' to 4' sample used in composite sample CS-A-1. GP/SP 5' to 9' CS-A-5.

PROJECT NO.	11175065
BORING NO.	DGP-7

URS Corporation

TEST BORING LOG

BORING NO:	DGP-8
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	8'
DATE STARTED:	12/03/07
DATE FINISHED:	12/10/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, some organic matter, trace to little fine gravel.	SP	0.0	Moist
1							Lt. Brown		Fine to medium SAND, little to some fine gravel, trace black-staining with MGP odor (napth). Perched water with sheen.	SP/GP	0.0	Moist
2												
3												
									Concrete Slab			
4		S-2	Macro core			52"	3' to 4' Dk. Brown 4' to 8' Lt. Brown		Fine to medium SAND, trace coarse sand, little fine gravel. No MGP impact.	GW	0.0	Moist
5									Medium dense, fine to coarse SAND, little to some fine gravel (well graded). No MGP impact.			Dry
6												
7												
8												
									End of boring: 8' bgs			
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Concrete slab encountered at ~3' bgs. SP 0' to 1' composite sample CS-A-1. SP/GP 1' to 3' GS-A-3 sample. GW 3' to 8' CS-A-9.

PROJECT NO.	11175065
BORING NO.	DGP-8

URS Corporation

TEST BORING LOG

BORING NO:	DGP-9
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	8'
DATE STARTED:	12/04/07
DATE FINISHED:	12/10/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter, trace to little fine gravel.	SP	0.0	Moist
1												
2							Lt. Brown / Orange		Fine to coarse SAND, little to some fine gravel (subround to round), trace coarse gravel. MGP impacted soil at 2.5' to 3.0' bgs, black stained - coated, ALM, partially saturated, moderate MGP odor, sheen.	GP	58.9	Moist
3												
									Concrete Slab			
4		S-2	Macro core			36"	Lt. Brown		Loose to medium dense, fine to coarse SAND, some poorly graded fine gravel. No visable MGP impact. Very faint MGP odor possible.	GP	0.0	Dry
5												
6												
7												
8												
									End of boring: 8' bgs			
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Concrete slab encountered at ~3' bgs (perched water). SP 0' to 1' and GP 1' to 3' CS-A-2. GP 3' to 8' CS-A-9.

PROJECT NO.	11175065
BORING NO.	DGP-9

URS Corporation

TEST BORING LOG

BORING NO:	DGP-10
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	7'
DATE STARTED:	12/04/07
DATE FINISHED:	12/12/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, little organic matter, trace fine gravel.	SP	0.0	Moist
1											
2						Lt. Brown		Fine to coarse SAND, little to some fine gravel, trace coarse gravel. MGP impacts at 2.5' to 3.0' bgs, black coated soil, partially saturated, black tar (viscous), trace ALM, moderate MGP odor, sheen.	GP	51.8	Wet
3											
								Concrete Slab			
4		S-2	Macro core		38"	Lt. Brown / Tan		Loose, fine to coarse SAND, some well graded fine gravel. 4" band of brown stained sand at 4'. Very faint MGP odor. No MGP impact from 4.5' to 7'.	GP	2.0	
5											
6											
7											
8								End of boring: 7' bgs			
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Concrete slab encountered at ~3' bgs (perched water). SP 0' to 1' CS-A-3, GP 1' to 3' GS-A-7. 3' to 7' CS-A-10.

PROJECT NO.	11175065
BORING NO.	DGP-10

URS Corporation

TEST BORING LOG

BORING NO:	DGP-11
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	7'
DATE STARTED:	12/03/07
DATE FINISHED:	12/10/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, some organic matter, trace fine gravel.	SP	0.0	
1						Lt. Brown		Fine to medium SAND, trace coarse sand, little to some fine gravel (subround to round). MGP impact at 2.5', black stained and coated with partial saturation, faint MGP odor.	GP	7.2	Wet
2											
3											
								Concrete Slab			
4		S-2	Macro core		36"	Lt. Brown / Tan		Loose, fine to coarse SAND, some poorly graded fine gravel. No MGP impact.	GP	0.0	Dry
5											
6											
7											
8								End of boring: 7' bgs			
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Concrete slab encountered at 3' bgs (perched water). GP 3' to 7' CS-A-10 and GS-A-16.

PROJECT NO.	11175065
BORING NO.	DGP-11

URS Corporation

TEST BORING LOG

BORING NO:	DGP-12
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'
DATE STARTED:	12/03/07
DATE FINISHED:	12/03/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, with some organic matter, trace coarse sand and fine gravel, trace bricks and concrete.	SP	0.0	Moist to Dry
1						Brown		Fine to medium SAND, trace coarse sand, trace to little fine gravel , poorly graded (subrounded), trace coarse gravel, trace ALM.	SP	0.5	Moist to Dry
2											
3											
4											
5											
6		S-2	Macro core		38"	Lt. Brown		Loose to medium dense, medium to coarse SAND, trace fine sand, little to some fine gravel (poorly graded). No MGP impact.	GP	0.0	
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated with post hole digger. SP 0' to 1' sample used in composite sample CS-A-1, SP 1' to 4' CS-A-2 sample. GP 5' to 9' CS-A-5.

PROJECT NO.	11175065
BORING NO.	DGP-12

URS Corporation

TEST BORING LOG

BORING NO:	DGP-13		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area A
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/03/07		
DATE FINISHED:	12/03/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to medium SAND, trace coarse sand and fine gravel.	SP	0.0	Moist
1												
2							Lt. Brown		Fine to coarse SAND, with with some to little fine gravel (subrounded), trace coarse gravel.	GP	0.0	Dry
3												
4												
5												
6		S-2	Macro core			42"	Lt. Brown		Medium dense, fine to coarse SAND, little fine gravel (well graded). No MGP impact.	GW	0.0	Dry
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated with post hole digger. GP 1' to 5' sample used in composite sample CS-A-1.

PROJECT NO.	11175065
BORING NO.	DGP-13

URS Corporation

TEST BORING LOG

BORING NO:	DGP-14		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area A
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	8'
DATE STARTED:	12/04/07		
DATE FINISHED:	12/10/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter, trace fine gravel.	SP	0.0	Moist
1							Lt. Brown		Fine to coarse SAND, with some fine gravel (subrounded to round), trace coarse gravel. MGP impact at 2.5' to 3' bgs, black stained, coated, partially saturated, moderate, MGP odor.	GP	54.2	Wet
2												
3												
									Concrete Slab			
4		S-2	Macro Core			44"	3' to 4' Dk. Brown		Very fine to fine SAND, trace medium to coarse sand, trace to little fine gravel. No MGP impact.	GW	0.0	Moist
5							4' to 8' Lt. Brown		Medium dense, fine to coarse SAND, little well graded fine gravel. No MGP impact.			Dry
6												
7												
8												
									End of boring: 8' bgs			
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Concrete slab at ~ 3'bgs (perched water). SP 0' to 1' used in CS-A-2 sample, GP 1'to 3' used in GS-A-5 sample, GW 3' to 8' CS-A-9 sample.

PROJECT NO.	11175065
BORING NO.	DGP-14

URS Corporation

TEST BORING LOG

BORING NO:	DGP-15
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	8'
DATE STARTED:	12/04/07
DATE FINISHED:	12/10/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, very fine to medium SAND, little organic matter, trace fine gravel.	SP	0.0	Moist
1											
2						Lt. Brown		Fine to coarse SAND, little to some fine gravel (subround to round), trace coarse gravel, (perched water).	GP	0.0	Wet
3											
								Concrete Slab			
4		S-2	Macro core		38"	3.5' to 4.5' Dk. Brown		Very fine to fine SAND, trace medium to coarse sand, little fine gravel. No MGP impact.	GW	0.0	Moist
5						4.5' to 8'		Loose to medium dense, fine to coarse SAND, little well graded fine to coarse gravel. No MGP impact.			Dry
6											
7											
8											
9								End of boring: 8' bgs			
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Concrete slab at ~3' bgs (perched water). GP 1'to 3' used in CS-A-3 sample, GW used in CS-A-10 and GS-A-15 samples.

PROJECT NO.	11175065
BORING NO.	DGP-15

URS Corporation

TEST BORING LOG

BORING NO:	DGP-16
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	8'
DATE STARTED:	12/04/07
DATE FINISHED:	12/04/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH	SAMPLE			BLOWS		REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"		RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to fine SAND, organic matter, trace fine gravel.	SP	0.0	Moist
1												
2							Lt. Brown		Fine to coarse SAND, with some fine gravel. MGP impact at 2.5', black stained soil, faint MGP odor, tar (viscous), balck.	GP	12.6	Moist to Wet
3												
									Concrete Slab			
4		S-2	Marco Core			40"			MGP impacted. Black to brown fine to medium SAND, little fine to coarse gravel. Faint MGP odor.		6.6	Dry
5												
6												
7												
8												
9									Macro core stuck, unable to remove. End of Boring at 8'			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Concrete slab at ~ 3' bgs (perched water). SP 0' to 1' part of composite CS-A-3 sample, GP 1' to 3' used in GP-A-8 sample, 3' to 8' used in both CS-A-10 and GS-A-14 sample.

PROJECT NO.	11175065
BORING NO.	DGP-16

URS Corporation

TEST BORING LOG

								BORING NO:	DGP-17
PROJECT:	KeySpan Hempstead MGP							**LOCATION:**	Area A
CLIENT:	KeySpan							**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol							**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore		**DATE STARTED:**	12/03/07
				DIA.				**DATE FINISHED:**	12/05/07
				WT.				**DRILLER:**	M. Meade
				FALL				**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**				**REVIEWED BY:**	K. Connare

	SAMPLE					DESCRIPTION					
DEPTH				**BLOWS**	**REC**		**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**	**RQD%**	**COLOR**	**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab			Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, with some organic matter (roots), some fine gravel, trace silt.	SW Fill	0.0	
1						Red Dk. Brown		Fill material. Red brick with some fine to medium sand, some fine gravel.		0.0	
2											
3						Brown to Lt. Brown		Fine to medium to coarse SAND and fine gravel (sudrounded to rounded), trace silt, trace coarse gravel.	GP	0.0	Moist to Dry
4											
5											
6		S-2	Macro core		48"	Lt. Brown		Loose to medium dense, fine to medium SAND, little fine to coarse gravel (well graded). No MGP impact.	SW	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated with post hole digger.

PROJECT NO.	11175065
BORING NO.	DGP-17

URS Corporation

TEST BORING LOG

BORING NO:	DGP-18
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	8'
DATE STARTED:	12/03/07
DATE FINISHED:	12/03/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, fine to medium SAND, some fine to coarse gravel. Concrete slab.	GP Fill	0.0	Moist to Dry
1												
2									Concrete slab? Concrete blocks to rubble.			
3												
4		S-2	Macro core			42"	Dk. Brown		3' to 5', Fine to medium SAND, trace fine gravel.	GP	0.0	Moist
5									5' to 8', Loose to medium dense, fine to medium to coarse SAND, little to some fine gravel, trace coarse gravel. No MGP impact.			Dry
6												
7												
8												
9									End of boring: 8' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Concrete slab at ~1' bgs. GP 0' to 1' used in CS-A-2 sample.

PROJECT NO.	11175065
BORING NO.	DGP-18

URS Corporation

TEST BORING LOG

BORING NO:	DGP-19
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'
DATE STARTED:	12/04/07
DATE FINISHED:	12/06/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, trace coarse sand and fine gravel.	SP	0.0	Moist
1						Lt. Brown		Fine to medium to coarse SAND, with some fine gravel (subround to round), poorly graded.	GP	0.0	Dry
2											
3											
4								Concrete slab?			
5		S-2	Macro core		46"	Dk. Brown		4' to 6', Very fine to fine to medium SAND, little fine gravel.	GP	0.0	Moist
6											
7								6' to 9', Medium dense, fine to medium to coarse SAND, with some fine gravel			
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated with post hole digger.

PROJECT NO.	11175065
BORING NO.	DGP-19

URS Corporation

TEST BORING LOG

BORING NO:	DGP-20		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area A
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	16'
DATE STARTED:	12/04/07		
DATE FINISHED:	12/07/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to medium SAND, organic matter (roots), trace fine gravel.	SP	0.0	Moist
1												
2							Lt. Brown		Fine to coarse SAND, little to some fine gravel, trace concrete, trace coarse gravel.	GP		Dry
									Concrete slab			
3		S-2	Macro core			32"	3' to 5' Brown / Orange		Fine to coarse SAND, little fine gravel.	GP	172.0	Moist
4												
5									5' to 7' MGP impacted SAND and GRAVEL, black stained and coated, little tar (gooey and viscous, moist), possibly some coal, moderate MGP odor.			
6												
7												
8		S-3	Macro core			40"			7' to 10', MGP impacted SAND and GRAVEL, black, DNAPL saturated, tarry. Moderate MGP odor.	GP	108.0	Moist
9									10' to 11', MGP impact, black stained and coated SAND and GRAVEL. Moderate MGP odor.			Moist
10												
11												
12		S-4	Macro core			40"			MGP impacted SAND and GRAVEL, black, DNAPL saturated , wet with product (DNAPL), trace of wood in tip of Macrocore. Strong MGP odor.	GP	181.0	Wet
13												
14												
15												
16									MGP impacted sand and gravel. Macrocore refusal at 16' bgs.			
17									End of boring: 16' bgs			
18												
19												
20												

Comments: Concrete slab at ~2 'bgs. SP 0' to 1' used in CS-A-3 sample, GP 3' to 7' used in CS-A-7, used in CS-A-7 sample, GP 7' to 11' and GP 11' to 16' used in CS-A-8 sample

PROJECT NO.	11175065
BORING NO.	DGP-20

URS Corporation

TEST BORING LOG

BORING NO:	DGP-21										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area A
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	15'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/04/07
				DIA.						**DATE FINISHED:**	12/04/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						DESCRIPTION					
DEPTH FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**	**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**REMARKS PID**	**Moist**
0		S-1	Grab			Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter (roots), trace fine gravel.	SP	0.0	Moist
1						Lt. Brown		Fine to medium to coarse SAND, little to some fine gravel (subround to round). No MGP impact.	GP	0.7	Dry
2											
3											
4											
5											
6		S-2	Macro core		47"	Dk. Brown to Lt. Brown		Loose, medium to coarse SAND, trace to little fine sand, little well graded fine to coarse gravel. No MGP impact.	GW	0.0	Moist to Dry
7											
8											
9											
10											
11		S-3	Macro core		24"	Brown		Medium dense, fine to medium to coarse SAND, little fine to coarse gravel (well graded). No MGP impact.	GW	0.0	Moist to Dry
12											
13											
14											
15											
16								End of Boring: 15' bgs			
17											
18											
19											
20											

Comments:	Ecavate 0'-5' bgs by hand auger.	**PROJECT NO.**	11175065
		BORING NO.	DGP-21

URS Corporation

TEST BORING LOG

BORING NO:	DGP-22
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	8'
DATE STARTED:	12/03/07
DATE FINISHED:	12/06/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter, trace coarse gravel.	SP Fill	0.0	Moist
1							Lt. Brown		Fine to medium to coarse SAND, with little to some fine gravel (subrounded to rounded), poorly graded, little coarse gravel, some concrete. Refusal on slab at 3' bgs.	GP Fill	0.0	
2												
3												
									Concrete Slab?			
4		S-2	Macro core			36"	Lt. Brown		Loose to medium dense, fine to medium to coarse SAND, some fine to coarse gravel (poorly graded). No MGP impact.	GP	0.0	Dry
5												
6												
7												
8												
									End of boring: 8' bgs			
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Concrete slab at ~3' bgs. Grab samples collected via post hole dig.

PROJECT NO.	11175065
BORING NO.	DGP-22

URS Corporation

TEST BORING LOG

								BORING NO:	DGP-23
PROJECT:	KeySpan Hempstead MGP							**LOCATION:**	Area A
CLIENT:	KeySpan							**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol							**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TOTAL DEPTH:**	8'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore		**DATE STARTED:**	12/04/07
				DIA.				**DATE FINISHED:**	12/06/07
				WT.				**DRILLER:**	M. Meade
				FALL				**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**				**REVIEWED BY:**	K. Connare

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, fine to medium SAND, some fine to coarse gravel. Concrete slab.	SP		
1											
2						Lt. Brown		Fine to medium to coarse SAND, with some fine to coarse gravel (subround to round). Trace to little black stained soil and ALM/clinker. Vey faint MGP/Napth odor.	GP	0.0	Moist to Dry
3											
4											
5											
6		S-2	Macro core			Lt. Brown / Orange		Loose, fine to medium to coarse SAND, with some well sorted fine to coarse gravel. No MGP impact.	GW	0.0	Dry
7											
8											
9								End of boring: 8' bgs			
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5' interval excavated by posthole digger/hand auger. SP and GP 0' to 5' used in CS-A-2 and GS-A-4 samples. GW 5' to 8' CS-A-7 samples.

PROJECT NO.	11175065
BORING NO.	DGP-23

URS Corporation

TEST BORING LOG

BORING NO:	DGP-24										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area A
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	16'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/04/07
				DIA.						**DATE FINISHED:**	12/12/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						DESCRIPTION					
DEPTH				**BLOWS**		**REC**		**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**		**RQD%**	**COLOR**	**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to medium SAND, organic matter, trace fine gravel.	SP	0.0	Moist
1							Lt. Brown		Fine to coarse SAND, little to some fine gravel (mostly subround to round). No MGP impact.	GP	0.0	Dry
2												
3												
4												
5												
6		S-2	Macro core			24"	Lt. Brown		Fine to coarse SAND, some fine gravel. No MGP impact.	GP	0.0	Moist Dry
7												
8												
9												
10		S-3	Macro core			34"	Lt. Brown / tan		Loose, fine to coarse SAND, little to some fine gravel (well graded). No MGP impact.	GW	0.0	Dry
11												
12												
13		S-4	Macro core			44"	Lt Brown / tan		Loose, fine to coarse SAND, little fine gravel (well graded), subround to round. No MGP impact.	GW	0.0	Dry
14												
15												
16												
17									End of boring:16' bgs			
18												
19												
20												

Comments: 0-5' interval excavated by hand auger. GP 0' to 1' used in CS-A-3 sample.

PROJECT NO.	11175065
BORING NO.	DGP-24

URS Corporation

TEST BORING LOG

BORING NO:	DGP-25
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	16'
DATE STARTED:	12/04/07
DATE FINISHED:	12/05/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to medium SAND, little organic matter, trace fine gravel.	SP	0.0	Moist
1												
2							Lt. Brown		Fine to coarse SAND, little to some fine gravel. MGP impact at 4', black stained soil and gravel, faint MGP odor.	GP	14.7	Moist to Dry
3												
4												
5												
6		S-2	Macro core			16"	Lt. Brown		Medium dense to dense. MGP impacted, black stained and coated. Coarse SAND and fine GRAVEL, trace ALM. Faint to moderate MGP odor, moist.	GP	14.7	Moist
7												
8												
9												
10		S-3	Macro core			14"	Black		Black saturated SAND and GRAVEL (DNAPL), moderate to strong MGP odor	GP	208.0	
11												
12												
13		S-4	Macro core			10"			DNAPL saturated SAND and Gravel, black, DNAPL product present, very strong MGP odor.	GP	1777	Wet
14												
15												
16									DNAPL saturated. Refusal at 16' bgs			
17									End of boring: 16'bgs			
18												
19												
20												

Comments: 0-5' interval excavated by hand auger. GP 1' to 5' sample used in GS-A-6 sample GP 9' to 12' used in CS-A-8 sample, GP 12' to 16' CS-A-8 sample.

PROJECT NO.	11175065
BORING NO.	DGP-25

URS Corporation

TEST BORING LOG

BORING NO:	DGP-26
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	8'
DATE STARTED:	12/03/07
DATE FINISHED:	12/06/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, fine to medium SAND, with organic matter, trace fine gravel.	SP Fill	0.0	Moist
1						Lt. Brown		Fine to medium to coarse SAND, with little to some fine gravel (subrounded), poorly. Concrete slab encountered at ~3' bgs.	GP Fill	0.0	
2											
3											
								Concrete Slab?			
4		S-2	Macro core		42"	3' to 5' Dk. Brown		3' to 5', Very fine to fine SAND, trace to little fine gravel.	GW	0.0	Moist
5						5' to 8' Lt. Brown		5' to 8', Loose, medium to coarse SAND, little fine gravel. No MGP impact.			Dry
6											
7											
8											
								End of boring: 8' bgs			
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Concrete slab at ~3' bgs.

PROJECT NO.	11175065
BORING NO.	DGP-26

URS Corporation

TEST BORING LOG

BORING NO:	DGP-27
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'
DATE STARTED:	12/04/07
DATE FINISHED:	12/06/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter, trace fine gravel.	SP Fill	0.0	Dry
1						Lt. Brown		Fine to medium to coarse SAND, some fine to coarse gravel. No MGP impact.	GP Fill	0.0	Dry
2											
3											
4								Concrete?			
5		S-2	Macro core		52"	Lt. Brown		Loose to medium dense, medium to coarse SAND, little to some fine gravel (subround to round), poorly graded. No MGP impact.	GP	0.0	Dry
6											
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Hnad auger refusal at ~3' bgs on concrete.

PROJECT NO.	11175065
BORING NO.	DGP-27

URS Corporation

TEST BORING LOG

BORING NO:	DGP-28										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area A
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	18'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/04/07
				DIA.						**DATE FINISHED:**	12/05/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

DEPTH	SAMPLE			BLOWS	REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"	RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, organic matter, very fine to medium SAND, trace fine gravel.	SP	0.0	
1											
2						Lt. Brown		Fine to coarse SAND, with some fine gravel (mostly subround to round). No MGP impact.	GP	0.0	Dry
3											
4											
5											
6		S-2	Macro core		13"	Dk. Brown / Lt. Brown		Loose to medium dense, medium to coarse SAND, some fine gravel, trace coal. No MGP impact.	GP	0.0	Dry
7											
8											
9											
10		S-3	Macro core		28"	10' to 13' Lt. Brown / Orange		9' to10', MGP impacted sand and gravel, black stained and coated. Moderate MGP odor	GP	98.2	Wet
11											
12								10' to 13', medium dense, medium to coarse SAND, little fine gravel. No MGP impact.			Dry
13										392.0	
14		S-4	Macro core		46"			13' to 15', MGP impacted. Black stained fine to coarse SAND and fine gravel. Faint to moderate MGP odor. No DNAPL.	GW		
15						15' to17' Lt. Brown		15' to 17', fine to coarse SAND, some well graded fine gravel. 2" band of black stained sand at 16.5'. MGP impacted		80.0	Moist to Dry
16											
17											
18		S-5	Macro core		0			Macrocore refusal on possible concrete.			
19								End of boring: 18' bgs			
20											

Comments: 0-5' interval excavated by hand auger. GW 13' to 15' sample used group 2 sample.

PROJECT NO.	11175065
BORING NO.	DGP-28

URS Corporation

TEST BORING LOG

BORING NO:	DGP-29		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area B
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/11/07		
DATE FINISHED:	12/11/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown		2' to 5', Fine to coarse SAND and fine GRAVEL. No MGP impact.	GP		Dry
3												
4												
5												
		S-2	Macro core			38"	Lt Brown / Tan		Loose, fine to coarse SAND, some fine gravel (poorly graded). No MGP impact.	GP	0.0	Dry
6												
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments:	0' to 5' interval excavated by hand tools.	**PROJECT NO.**	11175065
		BORING NO.	DGP-29

URS Corporation

TEST BORING LOG

									BORING NO:	DGP-30	
PROJECT:	KeySpan Hempstead MGP								**LOCATION:**	Area B	
CLIENT:	KeySpan								**JOB NO.:**	11175065	
BORING CONTRACTOR:	Fenley and Nicol								**DRILLING METHOD:**	Hand Auger/Geoprobe	
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**	**TOTAL DEPTH:**	9'	
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore			**DATE STARTED:**	12/11/07	
				DIA.					**DATE FINISHED:**	12/12/07	
				WT.					**DRILLER:**	M. Meade	
				FALL					**GEOLOGIST:**	J. Harshman	
				*** POCKET PENETROMETER READING**					**REVIEWED BY:**	K. Connare	

	SAMPLE					**DESCRIPTION**				**REMARKS**	
DEPTH FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**	**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab			DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1											
2											
		S-1	Grab			Lt. Brown		2' to 5', Fine to coarse SAND and fine GRAVEL. No MGP impact.	GP		Dry
3											
4											
5											
		S-2	Macro		38"	Lt Brown		Loose, fine to coarse SAND, some fine gravel (poorly graded). No MGP impact.	GP	0.0	Dry
6			core			/ Tan					
7											
8											
9											
								End of boring: 9' bgs			
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments:	0' to 5' interval excavated by hand tools. SP and GP 0' to 5' used in CS-B-1sample. GP 5' to 9' used in CS-B-1 and GS-B-2 samples.	**PROJECT NO.**	11175065
		BORING NO.	DGP-30

URS Corporation

TEST BORING LOG

BORING NO:	DGP-31		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area B
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/11/07		
DATE FINISHED:	12/12/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown		2' to 5', Fine to coarse SAND and fine GRAVEL. No MGP impact.	GP		Dry
3												
4												
5												
6		S-2	Macro core			32"	Lt Brown		Loose, fine to coarse SAND, some fine gravel (poorly graded). No MGP impact.	GP	0.0	Dry
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments:	0' to 5' interval excavated by hand tools.	**PROJECT NO.**	11175065
		BORING NO.	DGP-31

URS Corporation

TEST BORING LOG

BORING NO:	DGP-32		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area B
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/11/07		
DATE FINISHED:	12/12/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown		2' to 5', Loose, fine to coarse SAND, some fine gravel (subrounded to rounded). No MGP impact.	GP		Dry
3												
4												
5												
		S-2	Macro core			34"	Lt Brown / Tan		Loose, fine to coarse SAND, some fine gravel (poorly graded). No MGP impact.	GP	0.0	Dry
6												
7												
8												
9												
									End of boring: 9' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0' to 5' interval excavated by hand tools. SP and GP 0' to 5' used in CS-B-1 and GS-B-1 samples.

PROJECT NO.	11175065
BORING NO.	DGP-32

URS Corporation

TEST BORING LOG

BORING NO:	DGP-33		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area B
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/12/07		
DATE FINISHED:	12/12/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown / Tan		2' to 5', Fine to coarse SAND, some fine gravel (poorly graded). No MGP impact.	GP		Dry
3												
4												
5												
		S-2	Macro core			42"	Lt Brown / Orange		Loose, fine to coarse SAND, some fine gravel. No MGP impact.	GP	0.0	Dry
6												
7												
8												
9												
									End of boring: 9' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0' to 5' interval excavated by hand tools. SP and GP 0' to 5' used in CS-B-1. GP 5' to 9' used in CS-B-1and GS-B-3 samples.

PROJECT NO.	11175065
BORING NO.	DGP-33

URS Corporation

TEST BORING LOG

BORING NO:	DGP-34		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area B
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/12/07		
DATE FINISHED:	12/12/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown / Tan		2' to 5', Loose, fine to coarse SAND, some fine gravel. No MGP impact.	GP		Dry
3												
4												
5												
		S-2	Macro core			42"	Lt Brown / Tan		Loose, fine to coarse SAND, some well graded fine gravel. No MGP impact.	GP	0.0	Dry
6												
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments:	0' to 5' interval excavated by hand tools.	**PROJECT NO.**	11175065
		BORING NO.	DGP-34

URS Corporation

TEST BORING LOG

BORING NO:	DGP-35		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area B
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/12/07		
DATE FINISHED:	12/12/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown / Tan		2' to 5', Loose, fine to coarse SAND, some fine gravel. No MGP impact.	GP		Dry
3												
4												
5												
		S-2	Macro core			40"	Lt Brown / Tan / Orange		Loose, fine to coarse SAND, some poorly graded fine gravel. No MGP impact.	GP	0.0	Dry
6												
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments:	0' to 5' interval excavated by hand tools.	**PROJECT NO.**	11175065
		BORING NO.	DGP-35

URS Corporation

TEST BORING LOG

BORING NO:	DGP-36		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/13/07		
DATE FINISHED:	12/13/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1											
2						Lt. Brown		2' to 5', Loose, fine to coarse SAND, some fine to coarse gravel. No MGP impact.	GP		Dry
3											
4											
5											
6		S-2	Macro core		38"	Brown to Lt. Brown to Tan		Loose, fine to coarse SAND, little very coarse sand, little to some fine gravel, trace coarse gravel. No MGP impact.	GW	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5' interval excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	DGP-36

URS Corporation

TEST BORING LOG

BORING NO:	DGP-37 1 of 2		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	24'
DATE STARTED:	12/14/07		
DATE FINISHED:	12/14/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1											
2						Lt. Brown / Tan		2' to 5', Loose, fine to very coarse SAND, some fine gravel. No MGP impact.	GP		Dry
3											
4											
5											
6		S-2	Macro core		38"	Lt Brown / Tan		Loose, fine to coarse SAND, trace very coarse sand, some fine gravel (well graded). No MGP impact.	GW	0.0	Dry
7											
8											
9											
10		S-3	Macro core		38"	Lt. Brown / Orange		Loose, fine to coarse SAND, trace very coarse sand, little fine to coarse gravel (well graded). No MGP impact.	GW	0.0	Dry
11											
12											
13											
14		S-4	Macro core		36"	Lt. Brown / Orange		Loose, fine to coarse SAND, trace very coarse sand, little fine to coarse gravel (well graded). No MGP impact.	GW	0.0	Dry
15											
16											
17											
18		S-5	Macro core		42"	Lt. Brown / Orange		Loose, fine to coarse SAND, trace very coarse sand, little fine to coarse gravel (well graded). No MGP impact.	GW	0.0	Dry
19											
20											

Comments:

0' to 5' interval excavated by hand tools. SP and GP 0' to 5' used in CS-C-1 sample. GW 5' to 9' used in GS-C-4 sample. GW 17' to 20' used in CS-C-2 sample.

PROJECT NO.	11175065
BORING NO.	DGP-37 1 of 2

URS Corporation

TEST BORING LOG

BORING NO:	DGP-37 2 of 2										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area C
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	24'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/13/07
				DIA.						**DATE FINISHED:**	12/13/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE					**DESCRIPTION**				**REMARKS**	
DEPTH FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**	**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**PID**	**Moist**
		S-6	Macro core		40"	Lt. Brown to Orange to Brown / Grey		Medium dense, fine to very coarse SAND, little fine to coarse gravel. No MGP impact.	GW	0.0	Dry
1											
2											
3											
4											
5								End of boring: 24' bgs			
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments:	GW 20' to 24' used in GS-C-5 sample.	**PROJECT NO.**	11175065
		BORING NO.	#REF!

URS Corporation

TEST BORING LOG

BORING NO:	DGP-38		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/13/07		
DATE FINISHED:	12/13/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown		2' to 5', Loose, fine to medium to coarse SAND, some fine to coarse gravel. No MGP impact.	GP		Dry
3												
4												
5												
		S-2	Macro core			40"	Brown to Lt. Brown		Loose, fine to very coarse SAND, some fine to coarse gravel (poorly graded). No MGP impact.	GP	0.0	Dry
6												
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments:	0' to 5' interval excavated by hand tools.	**PROJECT NO.**	11175065
		BORING NO.	DGP-38

URS Corporation

TEST BORING LOG

BORING NO:	DGP-39		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/12/07		
DATE FINISHED:	12/12/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 1', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1							Lt. Brown		1' to 5', Fine to coarse SAND, little to some fine gravel (well graded). No MGP impact.	GP		Dry
2												
3												
4												
5												
		S-2	Macro core			46"	Brown to Lt. Brown		Loose, fine to very coarse SAND, some fine to coarse gravel (poorly graded). No MGP impact.	GW	0.0	Dry
6												
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments:	0' to 5' interval excavated by hand tools.	**PROJECT NO.**	11175065
		BORING NO.	DGP-39

URS Corporation

TEST BORING LOG

BORING NO:	DGP-40		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/12/07		
DATE FINISHED:	12/12/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown / Tan		2' to 5', Fine to coarse SAND, some fine gravel.	GP		Dry
3												
4												
5												
		S-2	Macro core			42"	Lt. Brown / Tan		Loose, fine to coarse SAND, some fine gravel (well graded). 4" band of black sand and gravel at 8.5' (not MGP impact). No MGP impact.	GW	0.0	Dry
6												
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0' to 5' interval excavated by hand tools. SP and GP 0' to 5' used in CS-C-1 sample. GW 5' to 9' used in GS-C-2 and CS-C-2 samples.

PROJECT NO.	11175065
BORING NO.	DGP-40

URS Corporation

TEST BORING LOG

BORING NO:	DGP-41		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/13/07		
DATE FINISHED:	12/13/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1											
2						Lt. Brown / Tan		2' to 5', Fine to coarse SAND, some fine to coarse gravel. No MGP impact.	GP		Dry
3											
4											
5											
6		S-2	Macro core		36"	Lt. Brown to yellow orange		Loose, fine to coarse SAND, trace coarse sand, some well graded fine gravel. No MGP impact.	GW	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5' interval excavated by hand tools. SP and GP 0' to 5' used in CS-C-1 sample. GW 5' to 9' used in GS-C-3 and CS-C-2 samples.

PROJECT NO.	11175065
BORING NO.	DGP-41

URS Corporation

TEST BORING LOG

								BORING NO:	DGP-42
PROJECT:	KeySpan Hempstead MGP							**LOCATION:**	Area C
CLIENT:	KeySpan							**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol							**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore		**DATE STARTED:**	12/13/07
				DIA.				**DATE FINISHED:**	12/13/07
				WT.				**DRILLER:**	M. Meade
				FALL				**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**				**REVIEWED BY:**	K. Connare

DEPTH	**SAMPLE**					**DESCRIPTION**				**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**	**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab			DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1											
2						Lt. Brown		2' to 5', Loose, fine to to very coarse SAND, some fine to coarse gravel. No MGP impact.	GP		Dry
3											
4											
5											
		S-2	Macro		42"	Brown to		Loose, fine to very coarse SAND, some poorly graded fine gravel. No MGP impact.	GP	0.0	Dry
6			core			Lt. Brown					
7											
8											
9											
								End of boring: 9' bgs			
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments:	0' to 5' interval excavated by hand tools.	**PROJECT NO.**	11175065
		BORING NO.	DGP-42

URS Corporation

TEST BORING LOG

BORING NO:	DGP-43		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/13/07		
DATE FINISHED:	12/13/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown / Tan		2' to 5', Fine to coarse SAND, some fine to coarse gravel. No MGP impact.	GP		Dry
3												
4												
5												
		S-2	Macro core			38"	Lt. Brown / Tan		Loose, medium to very coarse SAND, little to some fine to coarse gravel (well graded). No MGP impact.	GW	0.0	Dry
6												
7												
8												
9												
									End of boring: 9' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0' to 5' interval excavated by hand tools. SP and GP 0' to 5' used in CS-C-1 sample. GW 5' to 9' used in CS-C-2 sample.

PROJECT NO.	11175065
BORING NO.	DGP-43

URS Corporation

TEST BORING LOG

BORING NO:	DGP-44		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/14/07		
DATE FINISHED:	12/14/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2												
							Lt. Brown / Tan		2' to 5', Loose, fine to coarse to very coarse SAND, some fine to coarse gravel. No MGP impact.	GP		Dry
3												
4												
5												
		S-2	Macro core			37"	Brown to Lt. Brown / Orange		Loose, fine to very coarse SAND, some fine to coarse poorly sorted gravel. No MGP impact.	GP	0.0	Dry
6												
7												
8												
9												
									End of boring: 9' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments:	0' to 5' interval excavated by hand tools.	**PROJECT NO.**	11175065
		BORING NO.	DGP-44

URS Corporation

TEST BORING LOG

BORING NO:	DGP-45
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area D
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Hand/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'
DATE STARTED:	12/21/07
DATE FINISHED:	12/21/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC / REC RQD%	DESCRIPTION COLOR	DESCRIPTION CONSIST HARD	DESCRIPTION MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0								Concrete a ground surface.			
1		S-1	Grab			Black		0' to 2', MGP impacted material. Black stained SAND and GRACEL, coated, ALM, some wood fibers.	Fill	0.0	Dry
2											
3						Brown		2' to 3', Stiff, clayey SILT. No impact.	ML		
4						Yellow / Orange		3' to 5', Loose, fine to coarse SAND, some fine to coarse gravel. No impact.	SP		Dry
5											
6		S-2	Macro core		40"	Yellow / Orange / Tan		Loose, fine to coarse SAND, little fine gravel, well graded. No MGP impact.	SW	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5' interval excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	DGP-45

URS Corporation

TEST BORING LOG

BORING NO:	DGP-46
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area D
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Hand/Geoprobe
GROUNDWATER:	Fenley and Nicol
TOTAL DEPTH:	9'
DATE STARTED:	12/26/07
DATE FINISHED:	12/26/07
DRILLER:	M. Meade
GEOLOGIST:	AM Casey
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION REC	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0								Asphalt at surface.			
1		S-1	Grab			Black		0' to 2', MGP impacted material. Stained SAND and GRAVEL, ALM, some wood.	FILL	0.0	Dry
2											
3						Brown		2' to 3', Stiff, clayey SILT. No impact.	ML		
4						Yellow / Orange		3' to 5', Loose, fine to coarse SAND, some fine to coarse gravel. No impact.	SP		Dry
5											
6		S-2	Macro core		40"	Yellow / Orange / Tan		Loose, fine to coarse SAND, little fine gravel, well graded. No MGP impact.	SW	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments:

PROJECT NO.	11175065
BORING NO.	DGP-46

URS Corporation

TEST BORING LOG

BORING NO:	DGP-47		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area D
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand/Geoprobe
GROUNDWATER:	Fenley and Nicol	**TOTAL DEPTH:**	8'
DATE STARTED:	12/26/07		
DATE FINISHED:	12/26/07		
DRILLER:	M. Meade		
GEOLOGIST:	AM Casey		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION REC	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Black		0' to 4', Stained, loose SAND and GRAVEL, ALM. Large concrete boulder at 4'. No MGP odors.	FILL	0.0	
1												
2												
3												
4												
5		S-2	Macro core			38"	Dk. Brown		4' to 5', Firm clayey SILT. No evidence of impact.	ML	0.0	Dry
6							Lt. Brown		5' to 6', Soft clayey SILT. No evidence of impact.			
7							Lt. Brown		6' to 8', Loose, fine to coarse SAND, with some poorly graded fine to coarse gravel. No impact.	SP		
8												
9									End of borings: 8' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0' to 4', Hand excavated, 0' to 5' hand cleared. 0' to 5', used in GS-D-3 and CS-D-1 samples.

PROJECT NO.	11175065
BORING NO.	DGP-47

URS Corporation

TEST BORING LOG

BORING NO:	DGP-48
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area D
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Hand/Geoprobe
GROUNDWATER: Dry	
TOTAL DEPTH:	9'
DATE STARTED:	12/26/07
DATE FINISHED:	12/26/07
DRILLER:	M. Meade
GEOLOGIST:	AM Casey
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION REC	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black		0' to 1', Stained loose SAND and GRAVEL, ALM. No odors.	FILL		
1											
2						Brown		1' to 4' Slightly sandy clayey SILT. No evidence of impact.	ML		Dry
3											
4								4' to 5', Loose fine to coarse SAND, some fine to coarse poorly graded gravel. No evidence of MGP impact.	SP		Dry
5						Lt. Brown					
6		S-2	Macro core			Lt. Brown / Red		Loose, fine to coarse SAND, with fine to coarse poorly graded gravel. No evidence of MGP impact.	SP	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5', used in GS-D-2 and CS-D-1 samples.

PROJECT NO.	11175065
BORING NO.	DGP-48

URS Corporation

TEST BORING LOG

BORING NO:	DGP-49
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area D
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Hand/Geoprobe
GROUNDWATER: Dry	
TOTAL DEPTH:	9'
DATE STARTED:	12/26/07
DATE FINISHED:	12/26/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION REC	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab					0' to 1', MGP impacted material, ALM. No odor.	FILL	0.0	
1											
2						Brown		1' to 5', Soft, clayey SILT. No evidence of MGP impact, no odors.	ML		
3											
4											
5											
6		S-2	Macro core		40"	Orange / Lt. Brown		Loose, fine to coarse SAND, with fine to coarse poorly graded gravel. No evidence of impact.	SP	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5', interval hand excavated.

PROJECT NO.	11175065
BORING NO.	DGP-49

URS Corporation

TEST BORING LOG

BORING NO:	DGP-50
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area D
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Finley and Nicol
DRILLING METHOD:	Hand/Geoprobe
GROUNDWATER:	Dry
TOTAL DEPTH:	9'
DATE STARTED:	12/26/07
DATE FINISHED:	12/26/07
DRILLER:	M. Meade
GEOLOGIST:	AM Casey
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION REC	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0								Asphalt at surface			
1		S-1	Grab			Black		0' to 1', MGP impacted material. Black stained sand and gravel, ALM. No odors.	FILL	0.0	
2						Brown / Orange		1' to 2', Loose, fine to medium to coarse SAND. No impact.	SP		Dry
3						Brown		2' to 3', Soft clayey SILT. No impact.	ML		
4						Yellow / Orange		3' to 5', Loose, fine to coarse SAND, some fine to coarse gravel. No impact.	SP		Dry
5											
6		S-2	Macro core		30"	Yellow / Orange / Tan		5' to 9' Loose, fine to coarse SAND, little fine gravel, well graded. No MGP impact.	SW	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5', interval hand excavated/cleared.

PROJECT NO.	11175065
BORING NO.	DGP-50

URS Corporation

TEST BORING LOG

BORING NO:	DGP-51
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area D
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Finley and Nicol
DRILLING METHOD:	Hand/Geoprobe
GROUNDWATER: Dry	
TOTAL DEPTH:	9'
DATE STARTED:	12/26/07
DATE FINISHED:	12/26/07
DRILLER:	M. Meade
GEOLOGIST:	AM Casey
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION REC	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black		0' to 1', MGP impacted material. Black stained SAND and GRAVEL, ALM. No DNAPL	FILL	0.0	Dry
1											
2						Brown		1' to 5', Soft slightly sandy clayey SILT. No evidence of impact.	ML		Dry
3											
4											
5											
6		S-2	Macro core		33"	Brown / Orange		5' to 9', Loose, fine to coarse SAND, with some fine to coarse poorly graded gravel. No evidence of MGP impact.	SP	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5', excavated with hand tools. 0' to 5', used in CS-D-1 and GS-D-1 samples.

PROJECT NO.	11175065
BORING NO.	DGP-51

URS Corporation

TEST BORING LOG

BORING NO:	DGP-52
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area F
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Hand/Geoprobe
GROUNDWATER: Dry	
TOTAL DEPTH:	9'
DATE STARTED:	12/26/07
DATE FINISHED:	12/26/07
DRILLER:	M. Meade
GEOLOGIST:	AM Casey
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Black		0' to 4', Soft, sandy gravely CLAY, some brick fragments and rootlets. No MGP impact observed.	Fill	0.0	Dry
1												
2												
3												
4												
5							Black		4' to 5', Soft, sandy gravelly CLAY. No impact observed.			
		S-2	Macro			33"					0.0	Dry
6			core									
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0' to 5', excavated with hand tools.

PROJECT NO.	11175065
BORING NO.	DGP-52

URS Corporation

TEST BORING LOG

BORING NO:	DGP-53		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area F
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	8'
DATE STARTED:	12/26/07		
DATE FINISHED:	12/26/07		
DRILLER:	M. Meade		
GEOLOGIST:	AM Casey		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black		0' to 4', Loose, slightly clayey SAND and GRAVEL, with some brick fragments and other fill material. No MGP impact observed.	Fill	0.0	Dry
1											
2											
3											
4											
5		S-2	Macro core		45"	Red / Brown		4' to 6', Soft clayey SILT. No evidence of impact.	ML	0.0	Dry
6											
7						Red / Orange		6' to 8', Loose, fine to coarse SAND with poorly graded fine gravel. No evidence of impact.	SP		Dry
8											
9								End of boring: 8' bgs			
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5' excavated by hand tools. Grab 0' to 4', used in GS-F-1 sample.

PROJECT NO.	11175065
BORING NO.	DGP-53

URS Corporation

TEST BORING LOG

								BORING NO:	DGP-54
PROJECT:	KeySpan Hempstead MGP							**LOCATION:**	Area F
CLIENT:	KeySpan							**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol							**DRILLING METHOD:**	Hand/Geoprobe
GROUNDWATER:				**CAS.**	**SAMPLER**	**CORE**	**TUBE**	**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore		**DATE STARTED:**	12/26/07
				DIA.				**DATE FINISHED:**	12/26/07
				WT.				**DRILLER:**	M. Meade
				FALL				**GEOLOGIST:**	AM Casey
				*** POCKET PENETROMETER READING**				**REVIEWED BY:**	K. Connare

	SAMPLE					**DESCRIPTION**					
DEPTH				**BLOWS**	**REC**		**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**	**RQD%**	**COLOR**	**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab			Black Stained		0' to 2', MGP impacted material. Stained SAND and GRAVEL, ALM.	Fil	11.8	Dry
1											
2											
3						Brown		2' to 5', Firm, clayey SILT with some hydrocarbon staining and moderate hydrocarbon odor (possibly gasoline). Becoming stiff at 4'. No odors observed below 4'	ML		
4											
5											
6		S-2	Macro core		41"	Dk. Brown		5' to 6', Stiff clayey SILT. No impact observed.		0.0	
7						Lt. Brown / Orange		6' to 9', Loose, fine to coarse SAND, fine to coarse gravel. No impact.	SP		Dry
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	DGP-54

URS Corporation

TEST BORING LOG

BORING NO:	DGP-55
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area F
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Hand/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'
DATE STARTED:	12/27/07
DATE FINISHED:	12/27/07
DRILLER:	M. Meade
GEOLOGIST:	AM Casey
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black		0' to 3', Loose, slightly clayey SAND and GRAVEL, with rootlets, red brick fill material. No MGP impact.	Fill	0.0	Dry
1											
2											
3											
4						Black		3' to 5' Soft clayey SILT. No MGP impact.	ML		
5											
6		S-2	Macro core		44"	Brown		5' to 6', Soft to firm clayey SILT. No evidence of MGP impact.		0.0	Dry
7						Red / Orange		6' to 9', Loose, fine to coarse SAND with some poorly graded gravel. No evidence of impact.	SP		Dry
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5' excavated by hand tools. Grab 0' to 5' used in samples CS-F-1 and GS-F-2

PROJECT NO.	11175065
BORING NO.	DGP-55

URS Corporation

TEST BORING LOG

BORING NO:	DGP-56		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area F
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	8'
DATE STARTED:	12/26/07		
DATE FINISHED:	12/26/07		
DRILLER:	M. Meade		
GEOLOGIST:	AM Casey		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black		0' to 2', Loose slightly clayey SAND and GRAVEL, with ash fragments, some MGP stainning, brick fraghments and clinker.	Fill	0.0	Dry
1											
2											
3						Black Red / Brown		2' to 4', Soft clayey SILT. No evidence of impact.	ML		Dry
4											
5		S-2	Macro core		45"	Red / Brown		4' to 6', Soft, clayey SILT. No evideince of impact.		0.0	Dry
6											
7						Red / Orange		6' to 8', Loose, fine to coarse SAND, with poorly graded fine to coarse grave. No evidence of impact.	SP		Dry
8											
9								End of boring: 8' bgs			
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5' excavated by hand tools. Grab 0' to 5' used in samples GS-F-3 and CS-F-1.

PROJECT NO.	11175065
BORING NO.	DGP-56

URS Corporation

TEST BORING LOG

BORING NO:	DGP-57
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area F
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Hand/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	8'
DATE STARTED:	12/26/07
DATE FINISHED:	12/26/07
DRILLER:	M. Meade
GEOLOGIST:	AM Casey
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black		0' to 4', Loose slightly sandy gravelly CLAY with some MGP impacted material including coal fragments, ash material and clinker. No odors.	Fill	0.0	Dry
1											
2											
3											
4											
		S_2	Macro core		100%	Black		4' to 6', Soft to firm slightlysandy clayey SILT with some red brick fragments and rootlets.		0.0	Dry
5											
6											
						Lt. Brown		6' to 8', Loose, fine to coarse SAND with some poorly graded gravel. No impact observed.	SP	0.0	Dry
7											
8											
								End of boring: 8' bgs			
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 4' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	DGP-57

URS Corporation

TEST BORING LOG

BORING NO:	DGP-58
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'
DATE STARTED:	12/19/07
DATE FINISHED:	12/19/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black Stained		0' to 3', MGP impacted material. Black stained and coated gravel, ALM, wood fibers. Faint to moderate MGP odor.	Fill	25.0	Dry
1											
2											
3											
4						Yellow / Orange		3' to 5', Loose, fine to medium to coarse SAND, some fine to coarse gravel. No MGP impact.	GW		Dry
5											
6		S-2	Macro core		46"	Yellow / Orange		Loose, fine to medium to coarse SAND, little well graded fine gravel. No MGP impact.	GW	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated by hand tools. Fill 0' to 3' used in CS-E-5 sample. GW 3' to 5' group 3 sample taken. GW 5' to 9' used in CS-E-6 sample.

PROJECT NO.	11175065
BORING NO.	DGP-58

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-59
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/19/07
				DIA.						**DATE FINISHED:**	12/19/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						**DESCRIPTION**					
DEPTH				**BLOWS**	**REC**			**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**	**RQD%**	**COLOR**		**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0									Coarse gravel at ground surface.			
		S-1	Grab						0' to 2', MGP impacted material. Black stained SAND and GRAVEL, coated, ALM, some tar (black, viscous and gooey), moderate MGP odor. Wood fibers and slag.	Fill	104.0	Dry
1												
2												
						Brown			2' to 3', medium stiff, clayey SILT. No MGP impact.	ML	0.0	
3												
						Yellow			Loose, fine to coarse SAND some fine gravel. No MGP impact.	GW	0.0	Dry
4						/ Orange						
						/ Tan						
5												
		S-2	Macro		46"	Yellow			Loose, fine to coarse SAND, little fine gravel (well graded). No MGP impact.	GW	0.0	Dry
6			core			/ Orange						
						/ Tan						
7												
8												
9												
									End of boring: 9' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments:	0-5' interval excavated by hand tools. Fill 0' to 2' used in CS-E-5 sample. Jar test equaled sheen 0' to 5'. GW 5' to 9' used in CS-E-6 sample.	**PROJECT NO.**	11175065
		BORING NO.	DGP-59

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-60
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/17/07
				DIA.						**DATE FINISHED:**	12/17/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						**DESCRIPTION**					
DEPTH				**BLOWS**		**REC**		**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**		**RQD%**	**COLOR**	**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0									Coarse gravel at ground surface.			
		S-1	Grab				Black Stained		0' to 1.5', MGP impacted material. Stained sand and gravel with coating, ALM and wood fibers. Moderate MGP odor.	Fill	189.0	Dry
1												
2							Lt. Brown		0' to 5', Loose, fine to coarse SAND with some fine to coarse gravel, well graded. No MGP impact.	GW		Dry
3												
4												
5												
		S-2	Macro core			37"	Lt. Brown / Orange		Loose to medium dense, fine to very coarse SAND, some poorly graded fine gravel. No MGP impact.	GP	0.0	Dry
6												
7												
8												
9												
									End of boring: 9' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools. Fill and GW 0' to 5', used in CS-E-1 and group 3 sample.

PROJECT NO.	11175065
BORING NO.	DGP-60

URS Corporation

TEST BORING LOG

BORING NO:	DGP-61										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/18/07
				DIA.						**DATE FINISHED:**	12/18/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

DEPTH	SAMPLE			BLOWS	REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"	RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0								Coarse gravel at ground surface.			
1		S-1	Grab					MGP impacted matrial. Black Stained and coated sand and gravel, ALM, wet (perched water), little black stained clayey silt at 2.5' to 3'. Moderate MGP odor.	Fill	34	Wet
2											
3											
4											
5											
6		S-2	Macro core		30"	5' to 6' Black		5' to 6', Black (stained ?) clayey SILT. Very faint MGP odor.	ML	0.0	
7						6' to 7' Brown		6' to 7' Soft to medium stiff, clayey SILT. No MGP impact.		0.0	
8						7' to 9' Orange / Brown		Loose, fine to coarse SAND, some fine to coarse gravel. No MGP impact.	GP	0.0	Dry
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated by hand tools. GP 0' to 5' used in CS-E-3 and GS-E-6 samples, 5' to 9' used in CS-E-4 sample.

PROJECT NO.	11175065
BORING NO.	DGP-61

URS Corporation

TEST BORING LOG

BORING NO:	DGP-62		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	8'
DATE STARTED:	12/19/07		
DATE FINISHED:	12/19/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0								Coarse gravel at ground surface.			
		S-1	Grab			Black Stained		0' to 3', MGP impacted material. Black stained and coated SAND and GRAVEL, ALM, wet (perched water), sheen. Moderate MGP odor.	Fill	50	Wet
1											
2											
3											
4						Dk. Brown Black Stain 4'-6' Dk. Brown		3'to 4', Clayey silt. Moderate MGP odor.	ML		
5		S-2	Macro core		25"			4' to 6', soft to medium stiff, clayey SILT. No MGP impact.		0.0	Dry
6						6' to l8' Orange		6' to 8', soft , clayey SILT. No MGP impact.		0.0	Dry
7											
8											
9								End of boring: 8' bgs			
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-4' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-5 sample, group 3 sample taken. 4' to 8' used in CS-E-6 sample.

PROJECT NO.	11175065
BORING NO.	DGP-62

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-63
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/19/07
				DIA.						**DATE FINISHED:**	12/19/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						**DESCRIPTION**					
DEPTH				**BLOWS**	**REC**			**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**	**RQD%**	**COLOR**		**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0									Coarse gravel at ground surface.			
1		S-1	Grab			Black Stained			0' to 2', MGP impacted material. Black stained sand and gravel, ALM. Faint MGP odor.	Fill	0.0	Dry
2												
3						Brown			Soft- medium stiff clayey SILT. No MGP impact.	ML	0.0	Dry
4						Lt. Brown / Tan			Fine to coarse SAND, little fine to coarse gravel. No MGP impact.	GW	0.0	Dry
5												
6		S-2	Macro core		44"	Tan / Brown / Orange			Loose to medium dense, fine to coarse SAND, little very coarse sand, some poorly gradedfine to coarse gravel. No MGP impact.	GP	0.0	Dry
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by hand tools. Fill 0' to 2', ML 2' to 3' and GW 3' to 5' used in CS-E-5 sample. Jar test equaled sheen 0' to 5'. GP 5' to 9' used in CS-E-6.

PROJECT NO.	11175065
BORING NO.	DGP-63

URS Corporation

TEST BORING LOG

BORING NO:	DGP-64										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	11'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/17/07
				DIA.						**DATE FINISHED:**	12/17/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						DESCRIPTION					
DEPTH FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**		**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**REMARKS PID**	**Moist**
0									Coarse gravel at ground surface.			
1		S-1	Grab				Black Stained		MGP impacted material present, black stained sand and gravel, ALM, clinker, wet (perched water), black stained and coated. Moderate MGP odor, sheen.	Fill	1.9	Wet
2									Hand tool refusal at 2' bgs, (rocks ?).			
3												
4		S-2	Macro core			38"	Black Stained		3' to 5', MGP impacted material. Sand and gravel, black stained and coated, ALM. Moderate MGP odor, sheen.	Fill	25.7	Wet
5												
6							Dk. Brown Brown		Black, peat? or clayey SILT. Slight MGP impact Soft to medium stiff clayey SILT	ML	16.0 2.0	
7							Lt. Brown Orange		Loose, fine to coarse SAND, little fine to coarse gravel.	GW	0.0	Moist to Dry
8		S-3	Macro core			39"	Lt. Brown / Orange		Loose to medium dense, fine to coarse SAND, trace very coarse sand, some fine to coarse gravel (poorly graded). No MGP impact.	GP	0.0	Dry
9												
10												
11												
12									End of boring: 11' bgs			
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by hand tools. Fill 0' to 2' used in CS-E-1 Group to sample. Jar test equaled sheen 0' to 5'.

PROJECT NO.	11175065
BORING NO.	DGP-64

URS Corporation

TEST BORING LOG

BORING NO:	DGP-65
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'
DATE STARTED:	12/18/07
DATE FINISHED:	12/18/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab					Coarse GRAVEL at ground surface.			
1						0' to 3' Black Stained		0' to 3', MGP impacted material. Black stained SAND and GRAVEL, ALM, cinder, coal, faint MGP odor.	Fill	0.0	Dry
2											
3											
4						3' to 5' Brown		3' to 5', Soft to medium stiff, clayey SILT. No MGP impact.	ML	0.0	Dry
5											
		S-2	Macro core		40"	5' to 5.5"		5' to 5.5' soft to medium stiff, clayey SILT.		0.0	Dry
6						Brown 5.5' to 9' Lt. Brown / Orange		5.5' to 9', Loose, fine to coarse SAND, some fine to coarse gravel. No MGP impact.	SP	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-3 and GS-E-8, 5' to 9' used in CS-E-4 sample.

PROJECT NO.	11175065
BORING NO.	DGP-65

URS Corporation

TEST BORING LOG

BORING NO:	DGP-66										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/17/07
				DIA.						**DATE FINISHED:**	12/17/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

DEPTH	SAMPLE					DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Grab					Coarse GRAVEL at ground surface.			
1		S-1	Grab			0' to 3' Black Stained		0' to 3', MGP impacted material. Black stained sand and gravel, ALM, clinker. Faint MGP odor. No perched water.	Fill		Dry
2		S-1	Grab			0' to 3' Black Stained		0' to 3', MGP impacted material. Black stained sand and gravel, ALM, clinker. Faint MGP odor. No perched water.	Fill		Dry
3		S-1	Grab			0' to 3' Black Stained		0' to 3', MGP impacted material. Black stained sand and gravel, ALM, clinker. Faint MGP odor. No perched water.	Fill		Dry
4		S-1	Grab			3' to 5' Lt. Brown		3' to 5', Fine to coarse SAND, some fine to coarse gravel. No MGP impact.	GW		Dry
5		S-1	Grab			3' to 5' Lt. Brown		3' to 5', Fine to coarse SAND, some fine to coarse gravel. No MGP impact.	GW		Dry
6		S-2	Macro core		38"	5' to 8" Brown / Tan		5' to 8', Loose, fine to very coarse SAND, some fine to coarse gravel. No MGP impact.	GW		Moist to Dry
7		S-2	Macro core		38"	5' to 8" Brown / Tan		5' to 8', Loose, fine to very coarse SAND, some fine to coarse gravel. No MGP impact.	GW		Moist to Dry
8		S-2	Macro core		38"	8' to 9' Brown / Orange		8' to 9', Fine to very coarse SAND, little fine gravel. No MGP impact.			Dry
9		S-2	Macro core		38"	8' to 9' Brown / Orange		8' to 9', Fine to very coarse SAND, little fine gravel. No MGP impact.			Dry
10								End of boring: 9' bgs			

Comments: 0-5' interval excavated by hand tools. Fill and GW 0' to 5' used in group 3 sample CS-E-3,GW 5' to 9' used in CS-E-4 sample.

PROJECT NO.	11175065
BORING NO.	DGP-66

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-67
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/17/07
				DIA.						**DATE FINISHED:**	12/17/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

DEPTH	**SAMPLE**					**DESCRIPTION**				**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**	**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab					Coarse GRAVEL at ground surface.			
1						0' to 3' Black Stained		0' to 3', MGP impacted material. Black stained and coated SAND and GRAVEL, ALM, clinker, (perched water), sheen on water in borehole. Moderate MGP odor.	Fill		Wet
2											
3											
4						3' to 5' Brown		3' to 5', Soft to medium stiff, clayey SILT. Not visibly impacted.	ML		Moist to Dry
5											
6		S-2	Macro core		32"	5' to 7" Brown		5' to 7', Soft to medium stiff, clayey SILT. No MGP impact visible			Moist to Dry
7											
8						7' to 9' Lt. Brown / Orange		7' to 9', Loose, fine to coarse SAND, little very coarse sand, little fine gravel. No MGP impact.	SP		Dry
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-3 and GS-E-3 samples, 5' to 9' used in CS-E-4 sample.

PROJECT NO.	11175065
BORING NO.	DGP-67

URS Corporation

TEST BORING LOG

BORING NO:	DGP-68		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	21'
DATE STARTED:	12/17/07		
DATE FINISHED:	12/18/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH	SAMPLE						DESCRIPTION					REMARKS	
				BLOWS		REC		CONSIST	MATERIAL				
FEET	STRATA	NO.	TYPE	PER 6"		RQD%	COLOR	HARD	DESCRIPTION		USCS	PID	Moist
0		S-1	Grab						Coarse GRAVEL at ground surface.				
1							0' to 1' Dk. Brown		0' to 1', Loamy topsoil, some organic matter.		SP		Dry
2							1' to 5' Black Stained		1' to 5', MGP impacted material. Black stianed and coated sand and gravel, ALM, clinker, metal scrap, (perched water present), sheen on water. Moderate MGP odor.		Fill	32.8	Wet
3													
4													
5													
6		S-2	Macro core			23"	6' to 7"' Black		6' to 7', Heavily impacted MGP material. Liquid (not DNAPL, possilbly perched water), sheens, black, coated SAND and GRAVEL, possibly trace DNAPL. Strong MGP odor.		Fill	900	Wet
7													
8							7' to 8' Black		7' to 8', Peat with little organic matter.		Pt	800	
9							8' to 9' Brown		8' to 9', Soft to medium stiff, clayey SAND and gravel. Strong MGP odor.		ML	235	
10		S-3	Macro core			32"	Black Stained		Loose, MGP impacted sand and gravel. Black stained and coated intervals of fine to coarse SAND, fine to coarse gravel. Strong MGP odor.		GW	490	
11													
12													
13									12' to 13', Loose, fine to coarse SAND and fine gravel, possible gasoline odor.				
14		S-4	Macro core			44"	Brown / Orange		Loose, fine to coarse SAND, some fine to coarse gravel. Gasoline type odor.		GW	280	
15													
16													
17													
18		S-5	Macro core			32"	Brown / Orange		Loose to medium dense, fine to coarse SAND, fine to coarse gravel. Faint gasoline type odor.		GW	10	Dry
19													
20													
21													
									End of boring: 21' bgs				

Comments: 0-5' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-3 and GS-E-8, 5' to 9' used in CS-E-4 sample.

PROJECT NO.	11175065
BORING NO.	DGP-68

URS Corporation

TEST BORING LOG

BORING NO:	DGP-69
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DATE STARTED:	12/17/07
DATE FINISHED:	12/18/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DEPTH FEET	SAMPLE STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	DESCRIPTION CONSIST HARD	DESCRIPTION MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab					Coarse GRAVEL at ground surface.			
1						Black		0 - 3': MGP impacted cinder-like material, black stained SAND and GRAVEL, ALM, faint MGP odor, no perched water.	Fill		Dry
2											
3											
4						Lt. Brown		Fine to coarse SAND, some fine to coarse gravel. No MGP impacts.	GW		Dry
5											
6		S-2	Macro core		24"			Loose to dense fine to coarse SAND, some poorly sorted gravel. No MGP impacts.	GP		Dry
7											
8											
9											
10								End of boring at 9'			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
								End of boring: 21' bgs			

Comments: 0-5' interval excavated by hand tools. Collected samples CS-E-3, CS-E-4, and GS-E-5.

PROJECT NO.	11175065
BORING NO.	DGP-69

URS Corporation									TEST BORING LOG	
									BORING NO:	DGP- 70 1 of 2
PROJECT:	KeySpan Hempstead MGP								LOCATION:	Area E
CLIENT:	KeySpan								JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol								DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:					CAS.	SAMPLER	CORE	TUBE	TOTAL DEPTH:	24'
DATE	TIME	LEVEL	TYPE	TYPE		Macrocore			DATE STARTED:	12/20/07
				DIA.					DATE FINISHED:	12/20/07
				WT.					DRILLER:	M. Meade
				FALL					GEOLOGIST:	J. Harshman
				* POCKET PENETROMETER READING					REVIEWED BY:	K. Connare

	SAMPLE					DESCRIPTION					
DEPTH				BLOWS	REC		CONSIST	MATERIAL		REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"	RQD%	COLOR	HARD	DESCRIPTION	USCS	PID	Moist
0		S-1	Grab					Coarse GRAVEL at ground surface.			
1						0' to 3' Black Stained		0' to 3', MGP impacted material. Black stained and coated SAND and GRAVEL, ALM, (perched water), sheen. MGP odor.	Fill	35.0	Wet
2											
3											
4						Black St, Brown		Black stained (MGP impact) clayey SILT. Clayey SILT. No visible impact.	ML		Wet
5		S-2	Macro Core		32"	Lt. Brown / Brown / Tan		Loose, fine to medium to coarse to very coarse SAND, poorly graded fine to coarse gravel. No visible impact.	GP	2.0	Dry
6											
7											
8											
9		S-3	Marco core		38"	Dk. Brown		8' to 9', Fine SAND, trace fine gravel. 3" interval of dark brown gooey fine sand with very faint MGP odor (like putty, viscous, not tar)	SP	4.0	
10						Orange / Lt. Brown		9' to 12', Loose, fine to coarse SAND, little fine to coarse gravel (well graded). No visible impact.	GW		Dry
11											
12											
13		S-4	Macro core		21"	Lt. Brown Tan		Loose, fine to coarse SAND, trace fine gravel. No visible impact.	SP	0.0	Dry
14											
15											
16											
17		S-5	Macro core		26"	Brown to Lt. Brown / Tan		Medium dense, fine to coarse SAND, trace very coarse sand, trace fine gravel. No visible impact.	SP/GW	1.6	Dry
18											
19											
20											

Comments: 0-4' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-7 and GS-E-14 samples, SP and GW 8' to 12' used in CS-E-16 sample.

PROJECT NO.	11175065
BORING NO.	DGP- 70 1 of 2

URS Corporation									TEST BORING LOG	
									BORING NO:	DGP-70 2 of 2
PROJECT:	KeySpan Hempstead MGP								LOCATION:	Area E
CLIENT:	KeySpan								JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol								DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:					CAS.	SAMPLER	CORE	TUBE	TOTAL DEPTH:	24'
DATE	TIME	LEVEL	TYPE	TYPE		Macrocore			DATE STARTED:	12/202007
				DIA.					DATE FINISHED:	12/20/07
				WT.					DRILLER:	M. Meade
				FALL					GEOLOGIST:	J. Harshman
				* POCKET PENETROMETER READING					REVIEWED BY:	K. Connare

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
20		S-6	Macro core		24"	Orange / Yellowish		Loose, fine to coarse SAND, trace fine gravel. No visible impact.	SW	0.0	Dry
21											
22											
23											
24											
25								End of boring: 24' bgs			
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											

Comments:

PROJECT NO.	11175065
BORING NO.	DGP-70 2 of 2

URS Corporation

TEST BORING LOG

BORING NO:	DGP-71 1 of 2
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	24'
DATE STARTED:	12/19/07
DATE FINISHED:	12/19/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black Stained		0' to 3', MGP impacted material. Black stained and coated SAND and GRAVEL, ash-like material, (perched water), sheen. Moderate MGP odor.	Fill	80.0	Wet
1											
2											
3											
4						Black Stained		0' to 4', MGP impacted clayey SILT.	ML		
5		S-2	Macro core		16"			4' to 6', MGP impacted clayey SILT. Stained black. Moderate MGP odor.	ML	288	Moist
6											
7						Brown		6' to 8', Soft to medium stiff, clayey SILT. Faint MGP odor.	ML	34.0	
8											
9		S-3	Macro core		28"	Brown		8' to 9", Slightly stained black, clayey SILT. Slight to moderate MGP odor.	ML	430.0	
10			Macro core			9' to 12' Lt. Brown		9' to 12', Loose, slightly stained, fine to coarse SAND, little fine to coarse gravel. Gasoline-type odor.	GP	433.0	Dry
11											
12											
13		S-4	Macro core		46"	Brown / Tan		Loose, with little staining. Fine to coarse SAND, some poorly graded fine gravel. Gasoline-type odor, coated.		379.0 down to 235.0	Dry
14											
15											
16											
17		S-5	Macro core		32"	Brown		Loose, slightly stained. Fine to medium SAND, trace to little coarse sand, trace to little fine gravel. Moderate to strong gasoline-type (degraded) odor.	GW/SW	417.0	Dry
18											
19											
20											

Comments: 0-5' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-7 sample.

PROJECT NO.	11175065
BORING NO.	DGP-71 1 of 2

URS Corporation									TEST BORING LOG	
									BORING NO:	DGP-71 2 of 2
PROJECT:	KeySpan Hempstead MGP								LOCATION:	Area E
CLIENT:	KeySpan								JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol								DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:					CAS.	SAMPLER	CORE	TUBE	TOTAL DEPTH:	24'
DATE	TIME	LEVEL	TYPE	TYPE		Macrocore			DATE STARTED:	12/19/07
				DIA.					DATE FINISHED:	12/19/07
				WT.					DRILLER:	M. Meade
				FALL					GEOLOGIST:	J. Harshman
				* POCKET PENETROMETER READING					REVIEWED BY:	K. Connare

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
20		S-6	Macro core			20"	Brown / Orange		Loose to medium dense. Impacted with some staining. Fine to medium to coarse SAND, some fine gravel. Moderate gasoline (degraded) odor.	GW	173.0	Dry
21												
22												
23												
24												
25									End of boring: 24' bgs			
26												
27												
28												
29												
30												
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

Comments:

PROJECT NO.	11175065
BORING NO.	DGP-71 2 of 2

URS Corporation

TEST BORING LOG

BORING NO:	DGP-72										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/20/07
				DIA.						**DATE FINISHED:**	12/20/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

DEPTH	SAMPLE					DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Grab			Black Stained		0' to 2', MGP impacted material. Black stained SAND and GRAVEL, coal, slag, ALM.	Fill	0.0	Dry
1											
2											
3						Brown		2' to 3', slightly stained clayey SILT. Very faint MGP odor.	ML		
4						Brown		3' to 5', Clayey SILT. No visible impact.			
5											
6		S-2	Macro core		28"	Dk. Brown to Lt. Brown / Tan / Orange		Fine to coarse SAND, little to some fine to coarse gravel, well graded. No visible impact.	GW	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	DGP-72

URS Corporation

TEST BORING LOG

PROJECT:	KeySpan Hempstead MGP	**BORING NO:**	DGP-73
CLIENT:	KeySpan	**LOCATION:**	Area E
BORING CONTRACTOR:	Fenley & Nicol	**JOB NO.:**	11175065
GROUNDWATER:		**DRILLING METHOD:**	Hand Auger/Geoprobe
		TOTAL DEPTH:	8'
		DATE STARTED:	12/20/07
		DATE FINISHED:	12/20/07
		DRILLER:	M. Meade
		GEOLOGIST:	J. Harshman
	* POCKET PENETROMETER READING	**REVIEWED BY:**	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab					Coarse GRAVEL at ground surface.			
1						0' to 3' Black Stained		0' to 3', MGP impacted material. Black stained and some coating of sand and gravel, ALM, (perched water), sheen. Faint MGP odor.	Fill	6.0	Wet
2											
3											
4						3' to 5' Black		3' to 4', Black stained clayey SILT, MGP impacted. Faint odor.	ML		Moist to Wet
5		S-2	Macro core		32"	Brown		4' to 5', Brown, slightly stained clayey SILT. Very faint MGP odor.		20	Moist
6								5' to 8', Loose, fine to medium to coarse SAND, poorly graded fine gravel, trace coarse gravel. Oily, gasoline (degraded) odor and impact.	SP	30.0	Moist to dry
7											
8											
9								End of boring: 8' bgs			
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-4' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-7.

PROJECT NO.	11175065
BORING NO.	DGP-73

URS Corporation

TEST BORING LOG

BORING NO:	DGP-74
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	16'
DATE STARTED:	12/19/07
DATE FINISHED:	12/19/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black Stained		0' to 2', MGP impacted material. Black stained SAND and GRAVEL, coal, ALM. Faint MGP odor.	Fill	0.0	
1											
2											
3						Black Stained		2' to 4', Black stained and coated clayey SILT. Very faint MGP odor.	ML		Moist
4											
5		S-2	Macro core		38"	Black Stained		4' to 5', Black stained and coated SILT. Faint MGP odor.	ML	0.0	
6						5' to 8' Brown		5' to 8', Loose, fine to coarse SAND, little fine gravel.	GW	0.0	Dry
7											
8											
9		S-3	Macro core			8' to 9' Brown		8' to 9', Fine to coarse, little fine gravel.	GW	33.0	
10						9' to 9.5' Black		9' to 9.5', Black, gooey/tarry, MGP impacted, tar, viscous.			
11						9.5' to 12' Brown		9' to 12', Loose, fine to coarse SAND, little fine gravel. Gasoline odor.			
12											
13		S-4	Macro core			Brown / Tan		Gasoline impacted. Fine to coarse SAND, little fine gravel. Gasoline odor.	GW	75.0	
14											
15											
16											
17								End of boring: 16' bgs			
18											
19											
20											

Comments: 0-4' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-5 sample.

PROJECT NO.	11175065
BORING NO.	DGP-74

URS Corporation

TEST BORING LOG

BORING NO:	DGP-75
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	7'
DATE STARTED:	12/04/07
DATE FINISHED:	12/10/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, very fine to medium SAND, little organic matter, trace fine gravel.	SP	0.0	
1											
2						Lt. Brown		Fine to coarse SAND, little to some fine gravel. MGP impact at 2.5', black stained and coated soil, some tar phase material (viscous), moderate MGP odor, wet, sheen.	GP	198.0	Wet
3											
								Concrete Slab			
4		S-2	Macro core		28"	3.5' to 4' Black to Brown		3.5' to 4', Slightly MGP impacted, slightly coated, faint MGP odor, some what tarry.	GP	0.0	
5						4' to 7' Lt. Brown		4' to 7', Fine to coarse SAND, some poorly graded fine gravel (subround to round). No MGP impact.			Dry
6											
7											
8								End of boring: 7' bgs			
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Concrete slab at ~3' bgs (perched water). GP 1'to 3' used in CS-A-4 sample, GP used in CS-A-10 samples.

PROJECT NO.	11175065
BORING NO.	DGP-75

URS Corporation

TEST BORING LOG

BORING NO:	DGP-76
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	8'
DATE STARTED:	12/04/07
DATE FINISHED:	12/04/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH	SAMPLE			BLOWS		REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"		RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to medium SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown		Fine to coarse SAND, little to some fine gravel. MGP impacted at 2.5', blacked stained and coated soil, trace tar phase material (viscous), moderate MGP odor.	GP	52.7	Wet
3												
									Concrete Slab			
4		S-2	Macro core			41"	Lt. Brown		Medium dense, fine to coarse SAND, some poorly graded fine gravel. No MGP impact.	GP	0.0	Dry
5												
6												
7												
8												
9									End of boring: 8' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Concrete slab at ~3' bgs (perched water). GP 1'to 3' used in CS-A-3 sample, GP used in CS-A-9 and GS-A-13 samples.

PROJECT NO.	11175065
BORING NO.	DGP-76

URS Corporation

TEST BORING LOG

BORING NO:											DGP-77
PROJECT:			KeySpan Hempstead MGP							**LOCATION:**	Area A
CLIENT:			KeySpan							**JOB NO.:**	11175065
BORING CONTRACTOR:			Fenley & Nicol							**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	8'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/04/07
				DIA.						**DATE FINISHED:**	12/10/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						DESCRIPTION					
DEPTH				**BLOWS**		**REC**		**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**		**RQD%**	**COLOR**	**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to medium SAND, trace organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown		Fine to coarse SAND, some fine gravel. MGP impact at 2.5', black stained and coated gravel, little to some tar (viscous), black, sheen. Moderate MGP odor.	GP	17.8	Wet
3												
									Concrete Slab			
4		S-2	Macro core			28"	3' to 4' Dk. Brown		Very fine to medium SAND, trace coarse sand, little fine gravel. No MGP impact.	GW	0.1	Moist
5							4' to 8' Lt. Brown / Orange		Medium dense, fine to coarse SAND, little well graded fine gravel. No MGP impact.			Dry
6												
7												
8												
9									End of boring: 8' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Concrete slab at ~3' bgs (perched water). GP 1'to 3' used in CS-A-4 sample, GW used in CS-A-9 and GS-A-12 samples.

PROJECT NO.	11175065
BORING NO.	DGP-77

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-78
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area A
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/04/07
				DIA.						**DATE FINISHED:**	12/04/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						**DESCRIPTION**					
DEPTH				**BLOWS**		**REC**		**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**		**RQD%**	**COLOR**	**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter, trace fine gravel.	SP	0.0	Dry
1												
2							Lt. Brown		Fine to medium to coarse SAND, some fine gravel (subround to round), poorly graded. No MGP impact.	GP	0.0	Moist to Dry
3												
4												
5												
6		S-2	Macro core			32"	Lt. Brown		Loose to medium dense, fine to medium to coarse SAND, some fine gravel (poorly graded). No MGP impact.	SW	0.0	Dry
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by hand auger. GP 1' to 5' used in CS-A-4 sample.

PROJECT NO.	11175065
BORING NO.	DGP-78

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-79
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area A
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/04/07
				DIA.						**DATE FINISHED:**	12/05/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						**DESCRIPTION**					
DEPTH				**BLOWS**		**REC**		**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**		**RQD%**	**COLOR**	**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter, some fine gravel.	SP	0.0	Moist to Dry
1							Lt. Brown		Fine to medium to coarse SAND, Trace coal, trace ALM, little fine gravel. No MGP impact.	GP	0.0	Dry
2												
3												
4												
5												
		S-2	Macro core			28"	Lt. Brown		Loose to medium dense, fine to medium to coarse SAND, little to some fine gravel (well graded). No MGP impact.	GW	0.0	Dry
6												
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments:	0-5' interval excavated by hand auger. GP 1' to 5' used in CS-A-4 sample. GW used in CS-A-5.	**PROJECT NO.**	11175065
		BORING NO.	DGP-79

URS Corporation

TEST BORING LOG

BORING NO:	DGP-80		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area A
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9'
DATE STARTED:	12/07/07		
DATE FINISHED:	12/07/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		0' to 1', Loamy topsoil, very fine to fine to medium SAND, trace fine gravel.	GP	0.0	Dry
1							Lt. Brown		1' to 5', Fine to medium to coarse SAND, some fine gravel. No MGP impact.	GP	0.0	Dry
2												
3												
4												
5												
6		S-2	Macro core				Lt. Brown		Loose, fine to medium to coarse SAND, some well graded fine gravel. No MGP impact.	GW	0.0	Dry
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by post hole digger.

PROJECT NO.	11175065
BORING NO.	DGP-80

URS Corporation

TEST BORING LOG

BORING NO:	DGP-81
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

DATE STARTED:	12/07/07
DATE FINISHED:	12/07/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Dk. Brown		0' to 1', Loamy topsoil, very fine to fine to medium SAND, trace fine gravel.	GP	0.0	Dry
1							Lt. Brown		1' to 5', Fine to medium to coarse SAND, some fine gravel (poorly graded). No MGP impact.	GP	0.0	Dry
2												
3												
4												
5												
		S-2	Macro core			46"	Lt. Brown		Loose, fine to medium to coarse SAND, some fine gravel (well graded). No MGP impact.	GW	0.0	Dry
6												
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by post hole digger.

PROJECT NO.	11175065
BORING NO.	DGP-81

URS Corporation

TEST BORING LOG

BORING NO:	DGP-82
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	10'
DATE STARTED:	12/04/07
DATE FINISHED:	12/04/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, little to some fine gravel.	SP	0.0	Moist to Dry
1												
2												
3												
4												
5			Grab				Lt. Brown		Fine to medium to coarse SAND, little to some fine gravel.	GP	0.0	Moist to Dry
6		S-2	Macro core			48"	Lt. Brown Dr. Brown		Loose, medium to coarse SAND, well graded fine gravel. No MGP impact.	GW	0.0	Dry
7												
8												
9												
10												
11									End of boring:10' bgs			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by hand auger. Step-out boring.

PROJECT NO.	11175065
BORING NO.	DGP-82

URS Corporation

TEST BORING LOG

BORING NO:	DGP-83
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	16'
DATE STARTED:	12/04/07
DATE FINISHED:	12/07/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Dk. Brown		Loamy topsoil, organic matter, fine to medium SAND, organic mattertrace fine gravel.	SP	0.0	Dry
1											
2						Lt. Brown		Fine to coarse SAND, with some fine gravel, trace coarse gravel. No MGP impact.	GP	0.0	Dry
3											
4											
5											
6		S-2	Macro core		16"	Brown		Medium dense, fine to coarse SAND, some fine gravel, trace coarse gravel. No MGP impact.	GP	0.0	Dry
7											
8											
9		S-3	Macro core		44"	Brown / Orange		Loose to medium dense, fine to coarse SAND, little fine gravel (well graded). No MGP impact.	GW	0.0	Dry
10											
11											
12											
13											
14		S-4	Macro core		14"	Orange to Brown		Medium dense, fine to coarse SAND, little to some fine gravel, grey sand and gravel (possibly concrete) at 15.5' to 16' bgs. No MGP impact.	GW	0.0	
15											
16								Macrocore refusal at 16' bgs.			
17								End of boring: 16' bgs			
18											
19											
20											

Comments: 0-5' interval excavated by hand auger. Step-out boring. GP 5' to 8' sample used in CS-A-7.

PROJECT NO.	11175065
BORING NO.	DGP-83

URS Corporation

TEST BORING LOG

BORING NO:	DGP-84										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area A
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/04/07
				DIA.						**DATE FINISHED:**	12/06/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						DESCRIPTION					
DEPTH FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**		**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**REMARKS PID**	**Moist**
0		S-1	Grab				Dk. Brown		Loamy topsoil, very fine to fine to medium SAND, organic matter, trace fine gravel.	SP Fill	0.0	Moist to Dry
1							Lt. Brown		Fine to medium to coarse SAND, some fine gravel. No MGP impact.	GP Fill	0.0	Dry
2												
3												
4									Concrete?			
5		S-2	Marco core			54"	Lt. Brown		Loose, medium to coarse SAND, little fine gravel (well graded). No MGP impact.	GW	0.0	Dry
6												
7												
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Hand auger refusal at ~3' on concrete. GW 4' to 9' used in sample CS-A-7 sample.

PROJECT NO.	11175065
BORING NO.	DGP-84

URS Corporation

TEST BORING LOG

BORING NO:	DGP-85
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area A
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	16'
DATE STARTED:	12/07/07
DATE FINISHED:	12/12/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		0' to 1' Loamy topsoil, fine to medium SAND, with organic matter, little fine gravel.	Fill	0.0	Dry
1							Black		1' to 4', Fill material: black sandy soils with numerous bricks, mortar and rubble.	Fill	0.0	
2												
3												
4												
5		S-2	Macro core			16"			Fill material: red bricks, mortar, fine gravel, little sand. No MGP impact.	Fill	0.0	Moist
6												
7												
8												
9		S-3	Macro core			18"			Fill material: 8' to 10', red bricks mortar, gravel and sand.	Fill	1.1	Wet
10									10' to 12', Black stained SAND and GRAVEL, lttle wood and cardboard. Faint MGP odor.	Fill		Wet
11												
12												
13		S-4	Macro core			16"			Fil Material: red bricks, mortar, gravel and sand. Trace to little MGP impact with black staining. Faint MGP odor, sheen.	Fill	14.1	Wet
14												
15												
16									Macrocore refusal at 16' bgs			
17									End of boring: 16' bgs			
18												
19												
20												

Comments: 0-5' interval excavated by post hole digger.

PROJECT NO.	11175065
BORING NO.	DGP-85

URS Corporation

TEST BORING LOG

								BORING NO:	DGP-86
PROJECT:	KeySpan Hempstead MGP							**LOCATION:**	Area A
CLIENT:	KeySpan							**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol							**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TOTAL DEPTH:**	17'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore		**DATE STARTED:**	12/11/07
				DIA.				**DATE FINISHED:**	12/12/07
				WT.				**DRILLER:**	M. Meade
				FALL				**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**				**REVIEWED BY:**	K. Connare

DEPTH	SAMPLE					DESCRIPTION					
				BLOWS	REC		CONSIST	MATERIAL		REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"	REC	COLOR	HARD	DESCRIPTION	USCS	PID	Moist
0		S-1	Grab			Dk. Brown		0' to 1' Loamy topsoil, very fine to fine SAND, trace fine gravel.	SP	0.0	
1											
2						Brown to Lt. Brown		1' to 5', Fine to medium SAND, with some fine gravel, trace black clinker-like material (CLM), coal-like conglomerate. No MGP impact, no odor.	GP	0.0	
3											
4											
5											
6		S-2	Macro core		14"	Dk. Brown		Fine to medium SAND, little to some well graded fine gravel, trace coal, trace light brown fine to mrdium to coarse sand at 9'. No MGP impact.	GW	0.0	Dry
7											
8											
9											
10		S-3	Marco core		36"	Lt. Brown / Tan		Loose, fine to medium to coarse SAND, little fine gravel (well graded). No MGP impact.	GW	0.0	Dry
11											
12											
13											
14		S-4	Macro core		42"	Lt. Brown / Tan		Loose, fine to medium to coarse SAND, little well graded fine gravel (subrounded to rounded). No MGP impact.	GW	0.0	Dry
15											
16											
17											
18								End of boring: 17' bgs			
19											
20											

Comments:	0-5' interval excavated by hand tools.	**PROJECT NO.**	11175065
		BORING NO.	DGP-86

URS Corporation

TEST BORING LOG

BORING NO:	DGP-87										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area A
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	16'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/04/07
				DIA.						**DATE FINISHED:**	12/05/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Dk. Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1											
2											
3						Brown		2' to 5', Fine to medium SAND, trace coal, trace to little fine gravel. No MGP impact.	GP	0.0	Dry
4											
5											
6		S-2	Macro core		32"	Brown to Lt. Brown		Loose to medium dense, fine to coarse SAND, little to some fine gravel (poorly graded). No MGP impact.	GP	0.0	Dry
7											
8											
9											
10		S-3	Macro core		34"	Brown to Lt. Brown		Loose to medium dense, fine to coarse SAND, little fine gravel (well graded). No MGP impact.	GW	0.0	Dry
11											
12											Dry
13											
14		S-4	Macro core		28"	13' to 15' Brown		13' to 15', Fine to coarse SAND, some fine gravel. No MGP impact.	GW	14.1	
15						15' to16' Black Stained		15' to 16', Black stained and coated sand and gravel, tarry. MGP impacted, faint to moderate odor.			
16											
17								Marcocore refusal at 16'bgs End of boring: 16' bgs			
18											
19											
20											

Comments: 0-5' interval excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	DGP-87

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-88
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area A
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	17'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/12/07
				DIA.						**DATE FINISHED:**	12/13/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						DESCRIPTION					
DEPTH FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**		**REC% RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**REMARKS PID**	**Moist**
0		S-1	Grab				Dk. Brown		0' to 2' Loamy topsoil, very fine to fine SAND, some oganic matter, trace fine gravel.	SP	0.0	Dry
1												
2												
3							Lt. Brown / Tan		2' to 5, Fine to medium SAND, some fine gravel. No MGP impact.	GP	0.0	Dry
4												
5												
6		S-2	Macro core			38"	Lt. Brown yellowish orange		Loose, fine to medium to coarse very coarse SAND, some well graded fine to coarse gravel. No MGP impact.	GW	0.0	Dry
7												
8												
9												
10		S-3	Marco core			44"	Lt. Brown yellowish orange		Loose, fine to medium to coarse to very coarse SAND, well graded fine to coarse gravel. No MGP impact.	GW	0.0	Dry
11												
12												
13												
14		S-4	Macro core			45"	Lt. Brown to Brown yellowish orange		Loose to medium dense, fine to medium to coarse SAND, trace very coarse sand, well graded fine to coarse gravel. No MGP impact.	GW	0.0	Dry
15												
16												
17												
18									End of boring: 17' bgs			
19												
20												

Comments:	0-5' interval excavated by hand tools.	**PROJECT NO.**	11175065
		BORING NO.	DGP-88

URS Corporation

TEST BORING LOG

BORING NO:	DGP-89 1 of 2		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	25'
DATE STARTED:	12/14/07		
DATE FINISHED:	12/14/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				DK Brown		0' to 2', Loamy topsoil, very fine to fine SAND, some organic matter, trace fine gravel.	SP	0.0	Dry
1												
2												
							Lt. Brown		2' to 5', Loose, fine to coarse SAND, some fine to coarse gravel. No MGP impact.	GP		Dry
3												
4												
5												
		S-2	Macro core			30"	Lt Brown to Orange		Loose, fine to coarse to very coarse SAND, little fine gravel (well graded). No MGP impact.	GW	0.0	Dry
6												
7												
8												
9												
		S-3	Macro core			44"	Lt. Brown to Orange		Loose, fine to coarse to very coarse SAND, little fine gravel (well graded). No MGP impact.	GW	0.0	Dry
10												
11												
12												
13												
		S-4	Macro core			44"	Lt. Brown / Orange Brown / Grey		Loose, fine to coarse to very coarse SAND, little fine gravel (well graded), trace medium to coarse sand. No MGP impact.	GW	0.0	Dry
14												
15												
16												
17												
		S-5	Macro core			44"	Lt. Brown to Orange		Loose, fine to coarse SAND, little well graded fine gravel, trace coarse gravel. No MGP impact.	GW	0.0	Dry
18												
19												
20												

Comments:

0' to 5' interval excavated by hand tools. SP and GP 0' to 5' used in CS-C-1 sample. GW 13' to 17' used in GS-C-6 sample. GW 17' to 21' used in CS-C-7 sample.

PROJECT NO.	11175065
BORING NO.	DGP-89 1 of 2

URS Corporation

TEST BORING LOG

BORING NO:	DGP-89 2 of 2		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	25'
DATE STARTED:	12/13/07		
DATE FINISHED:	12/13/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
		S-5	Macro			44"			See page 1	GW	0.0	Dry
21			core									
		S-6	Marco			44"	Lt. Brown		Loose, fine to coarse SAND, little well graded fine gravel, trace coarse gravel. No MGP impact.	GW	0.0	Dry
22			core				to Orange					
23												
24												
25												
									End of boring: 25' bgs			
26												
27												
28												
29												
30												

Comments: GW 21' to 25' used in GS-C-2 sample.

PROJECT NO.	11175065
BORING NO.	#REF!

URS Corporation

TEST BORING LOG

BORING NO:	DGP-90
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	9'
DATE STARTED:	12/18/07
DATE FINISHED:	12/18/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0								Coarse gravel at ground surface.			
1		S-1	Grab			Black Stained		0' to 3', MGP impacted material. Stained sand and gravel, ALM, coal, cinder-like material. Faint MGP odor.	Fill	4.9	Moist to Dry
2											
3											
4						Brown		3' to 5', Soft to medium stiff, clayey SILT. No MGP impact.	ML		Dry
5											
6		S-2	Macro core		38"	Tan / Orange		Loose to medium dense, fine to coarse SAND, trace to little very coarse SAND, littleto some fine to coarse gravel (well graded). No MGP impact.	GW	0.0	Dry
7											
8											
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0' to 5' excavated by hand tools. Fill and ML 0' to 5' used in GS-E-7 sample. Jar test equaled sheen for 0' to 5'.

PROJECT NO.	11175065
BORING NO.	DGP-90

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-91
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	9'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/17/07
				DIA.						**DATE FINISHED:**	12/17/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						**DESCRIPTION**					
DEPTH				**BLOWS**	**REC**			**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**	**RQD%**	**COLOR**		**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab						Coarse GRAVEL at ground surface.			
1						Black Stained			Loose, black stained MGP impacted material, ALM with some wood. Slight black coating on fine to medium sand and fine to coarse gravel. (perched water in borehole at 1' to 5' bgs), sheen. Moderate MGP odor.	Fill	2.0	Wet
2												
3												
4												
5												
6		S-2	Macro core			Brown			5' to 5.5', Soft to medium stiff, clayey SILT. No MGP impact visible.	ML	0.0	Moist
7						5.5' to 9' Lt. Brown to Orange			5.5' to 9', Fine to very coarse SAND, some fine to coarse grave. No visible MGP impact.	GP		Dry / Dry
8												
9												
10									End of boring: 9' bgs			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: 0-5' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-1 and GS-E-1 samples.

PROJECT NO. 11175065

BORING NO. DGP-91

URS Corporation

TEST BORING LOG

PROJECT:	KeySpan Hempstead MGP								**BORING NO:**	DGP-92	
CLIENT:	KeySpan								**LOCATION:**	Area E	
BORING CONTRACTOR:	Fenley & Nicol								**JOB NO.:**	11175065	
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**	**DRILLING METHOD:**	Hand Auger/Geoprobe	
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore			**TOTAL DEPTH:**	9'	
				DIA.					**DATE STARTED:**	12/17/07	
				WT.					**DATE FINISHED:**	12/17/07	
				FALL					**DRILLER:**	M. Meade	
				*** POCKET PENETROMETER READING**					**GEOLOGIST:**	J. Harshman	
									REVIEWED BY:	K. Connare	

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab					Coarse GRAVEL at ground surface.			
1						0' to 3' Black Stained		0' to 3', MGP impacted material. Black stained and coated SAND and GRAVEL, ALM, (perched water), sheen. MGP odor.	Fill	2.0	Wet
2											
3											
4						3' to 5' Brown		3' to 5', Soft to medium stiff, clayey SILT. No MGP impact.	ML	8.0	Moist Dry
5											
6		S-2	Macro core		24"	5' to 7' Brown		Soft to medium stiff, clayey SILT. No visible MGP impact.			Moist to Dry
7											
8						7' to 9' Lt. Brown / Orange / Tan		Fine to very coarse SAND, some fine to coarse well graded gravel. No MGP impact.	SP		Dry
9											
10								End of boring: 9' bgs			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-5' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-1 and GS-E-4 samples.

PROJECT NO. 11175065

BORING NO. DGP-92

URS Corporation

TEST BORING LOG

BORING NO:	DGP-93										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	8'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/20/07
				DIA.						**DATE FINISHED:**	12/20/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

DEPTH	**SAMPLE**					**DESCRIPTION**				**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**	**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**PID**	**Moist**
0								Coarse gravel at ground surface.			
1		S-1	Grab			Black Stained		0' to 3', MGP impacted material. Black stained and coated SAND and GRAVEL, ALM, (perched water), sheen. Moderate MGP odor.	Fill	38.0	Moist
2											
3											
4						Black Stain Dk. Brown		3'to 4', MGP impacted black stained clayey SILT. 4' to 5', Clayey SILT. No visible MGP impact.	ML		
5											
6		S-2	Macro core			Lt Brown / Tan		Medium dense, fine to coarse SAND, little to some fine to coarse gravel (poorly graded). Very faint gasoline type odor.	SP	6	Dry
7											
8											
9								End of boring: 8' bgs			
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: 0-4' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-7 and GS-A-15 sample.

PROJECT NO. 11175065

BORING NO. DGP-93

URS Corporation

TEST BORING LOG

BORING NO:	DGP-94
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley & Nicol
DRILLING METHOD:	Hand Auger/Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	19'
DATE STARTED:	12/19/07
DATE FINISHED:	12/19/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0								Coarse gravel at ground surface.			
1		S-1	Grab			Black Stained		0' to 3', MGP impacted material. Black stained sand and gravel, ALM, lens of tarry material at 1' to 5' no perched water. Faint to moderate MGP odor.	Fill	125.0	
2											
3											
4						Black Stained		3'to 4', Black stained (MGP-impacted). Clayey SILT.	ML		
5						Brown		4' to 5', Clayey SILT			Dry
6		S-2	Macro core			Brown		5' to 6', Lightly stained black. Soft clayey SILT. Faint MGP odor.	ML	82	Dry
7						Black Stained		6' to 8', Black stained (not MGP impacted). Fine to coarse SAND, little fine to coarse gravel. Gasoline impact and strong odor.	GW	422.0	Moist to Dry
8											
9						Brown / Lt. Brown		8' to 9', Loose, fine to coarse SAND, little fine to coarse gravel. Gasoline odor		300.0	Dry
10		S-3	Macro core		40"	Brown		9' to 10', Little black staining and gasoline type odor. Fine to coarse SAND, little fine gravel.	GW	177.0	Dry
11						Brown		10' to11' Fine to coarse SAND, with some fine gravel. Black stained and coated interval at 10.5' to 11' (MGP impact?), MGP odor.		87.0	
12											
13						Tan to Orange		11' to 13', Loose, fine to coarse SAND, little fine gravel. Faint gasoline odor.		14.0	
14		S-4	Macro core			Lt. Brown / Tan		13' to 15', Medium dense, fine to coarse SAND, some fine to coarse gravel, black staining at 15'. Gasoline type odor.	GW	158.0	Dry
15						Black Stained					
16						Lt. Brown / Tan / Orange		15' to 17', Medium dense, fine to coarse SAND, fine gravel. Very faint gasoline odor, dry.	GW	15.0	Dry
17											
18								End of Boring: 19' bgs			
19											
20											

Comments: 0-5' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-7 sample.

PROJECT NO.	11175065
BORING NO.	DGP-94

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-95
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley & Nicol									**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	4'
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	12/20/07
				DIA.						**DATE FINISHED:**	12/21/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						**DESCRIPTION**					
DEPTH				**BLOWS**	**REC**			**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**	**RQD%**	**COLOR**		**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0									Coarse gravel at ground surface.			
		S-1	Grab			Black			0' to 3', MGP impacted material. Black stained and coated sand and gravel, ALM, (perched water), sheen. Moderate MGP odor.	Fill	10.0	Wet
1						Stained						
2												
3												
			Grab			Black Stain			3' to 3.5', MGP impacted clayey SILT.	ML		
4						Brown			3.5' to 4', Clayey Silt. No visible impact.			
									End of boring: 4' bgs			
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments:	0-4' interval excavated by hand tools. Fill and ML 0' to 5' used in CS-E-7 sample.	**PROJECT NO.**	11175065
		BORING NO.	DGP-95

URS Corporation

TEST BORING LOG

BORING NO:	DGP-96		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/08/08		
DATE FINISHED:	02/08/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			52"			0' to 2', MGP ALM material, clinker, SAND and GRAVEL.	Fill	0.0	Dry
1												
2									2' to 3', ALM, clinker, SAND and GRAVEL.		1.0	Wet
3												
4									3' to 4', MGP impacted. Black stained, sheen, strong MGP purifier odor, wood chips.		260.0	Wet
5							Dk. Brown		4' to 5', Stiff SILT.	ML	1.0	Moist
6		S-2	Macro core			50"	Black		5' to 5.5', MGP impacted.Tarry, sheen, stained, and coated sand, gravel and wood.		50.0	
							Brown			ML	0.0	
7							Brown / Orange		5.5' to 6', SILT.	SP/GP		Dry
8									6' to 10', Loose to medium dense, fine to very coarse SAND and fine to coarse GRAVEL. No impact.			
9												
10												
11									End of boring: 10'			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at ~3'.

PROJECT NO.	11175065
BORING NO.	DGP-96

URS Corporation

TEST BORING LOG

BORING NO:	DGP-97		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/08/08		
DATE FINISHED:	02/08/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			46"	Grey		0' to 2', MGP material. ALM, coal fragments, clinker, wood. Wet at 2'.	Fill	0.0	
1												
2									2' to 3', Coal fragments.			Wet
3												
4							Dk. Brown		3' to 4', Stiff, SILT.	ML		
5							Orange		4' to 5', Loose, fine to very coarse SAND, trace fine gravel.	SP		Dry
6		S-2	Macro core			52"	Orange / Lt. Brown		Loose, fine to very coarse SAND, little to some fine gravel. No impact.	SP	0.0	Dry
7												
8												
9												
10												
11									End of boring: 10'			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at ~3'.

PROJECT NO.	11175065
BORING NO.	DGP-97

URS Corporation

TEST BORING LOG

BORING NO:	DGP-98		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand
GROUNDWATER:		**TOTAL DEPTH:**	3' bgs
DATE STARTED:	12/21/07		
DATE FINISHED:	12/21/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Grab		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Black Stained		0' to 1', MGP impacted material: Black stained sand and gravel, ALM. No sheen from jar shake test.	Fill	0.0	
1							Brown / Lt. Brown		1' to 3', Fine to coarse SAND.	Fill	0.0	Dry
2												
3									End of boring: 3' bgs			
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Stepout location (section E). Excavated by hand.

PROJECT NO.	11175065
BORING NO.	DGP-98

URS Corporation

TEST BORING LOG

BORING NO:	DGP-99
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Hand
GROUNDWATER:	
TOTAL DEPTH:	2' bgs
DATE STARTED:	12/21/07
DATE FINISHED:	12/21/07
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Grab		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Black		0' to 1', MGP impacted material: black stained sand and gravel, ALM.	Fill		Dry
							Stained					
1												
							Brown		1' to 1', Clayey silt. No evidence of impact. No sheen observed from jarshake test.	Fill		Dry
2												
									End of boring: 2' bgs			
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Stepout location (section E). Excavated by hand.

PROJECT NO.	11175065
BORING NO.	DGP-99

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-100
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol									**DRILLING METHOD:**	Hand
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	2' bgs
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Grab				**DATE STARTED:**	12/21/07
				DIA.						**DATE FINISHED:**	12/21/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE					**DESCRIPTION**				**REMARKS**	
DEPTH FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**	**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab			Black		0' to 1', MGP impacted material, black stained SAND and GRAVEL, ALM.	Fill		Dry
						Stained					
1											
						Dk. Brown		1' to 2', Clayey SILT. No visual signs of impact. No sheer from jarshake test.			
2											
								End of boring: 2' bgs			
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Stepout location (section E). Excavated by hand.

PROJECT NO.	11175065
BORING NO.	DGP-100

URS Corporation

TEST BORING LOG

										BORING NO:	DGP-101
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol									**DRILLING METHOD:**	Hand
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	2' bgs
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Grab				**DATE STARTED:**	12/21/07
				DIA.						**DATE FINISHED:**	12/21/07
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE					**DESCRIPTION**				**REMARKS**	
DEPTH FEET	**STRATA**	**NO.**	**TYPE**	**BLOWS PER 6"**	**REC RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Grab			Black		0' to 1', MGP impacted material, black stained SAND and GRAVEL, ALM.	Fill		Dry
						Stained					
1											
						Dk. Brown		1' to 2', Clayey SILT. No visual signs of impact. No sheen from jar shake test.			
2											
								End of boring: 2' bgs			
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Stepout (section E). Excavated by hand.

PROJECT NO.	11175065
BORING NO.	DGP-101

URS Corporation

TEST BORING LOG

BORING NO:	DGP-102		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand
GROUNDWATER:		**TOTAL DEPTH:**	2' bgs
DATE STARTED:	12/21/07		
DATE FINISHED:	12/21/07		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Grab		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black		0' to 1', MGP impacted material, black stained SAND and GRAVEL, ALM.	Fill		Dry
						Stained					
1											
						Dk. Brown		1' to 2', Clayey SILT. No visual signs of impact. No sheen from jar shake test.			
2											
								End of boring: 2' bgs			
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Stepout (section E). Excavated by hand.

PROJECT NO.	11175065
BORING NO.	DGP-102

URS Corporation

TEST BORING LOG

BORING NO:	DGP-103		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area C
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenely and Nicol	**DRILLING METHOD:**	Hand Auger/Geoprobe
GROUNDWATER: Not encountered		**TOTAL DEPTH:**	16'
DATE STARTED:	12/27/07		
DATE FINISHED:	12/27/07		
DRILLER:	M. Meade		
GEOLOGIST:	AM Casey		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			Brown		Soft gravelly CLAY with roots and some brick fragments. Gravel is fine to coarse. No evidence of MGP impacts.	Fill	0.0	Dry
1											
2											
3											
4											
5		S-2	Macro core		38"	Orange / Lt. Brown		Fine to coarse SAND with fine to coarse poorly graded gravel. No evidence of MGP impact At 6' to 6.5',becoming black stained. No odor, no DNAPL	GP	0.0	Dry
6											
7											
8											
9		S-3	Macro core		40"	Orange / Lt. Brown		Loose, fine to coarse SAND, some fine to coarse poorly graded gravel. At 8.5' to 9.5', becoming black stained sand with some large coarse fragments of coal. No odors, no DNAPL.		0.0	Dry
10											
11											
12											
13		S-4	Macro core		32"	Orange / Lt. Brown		Loose, fine to coarse SAND, with some fine to coarse poorly graded gravel. No evidence of impact, no odors.		0.0	Dry
14											
15											
16											
17								End of boring: 16' bgs			
18											
19											
20											

Comments:	Hand excavated from 0' to 5'. Field notes DGP 103/5 to 3/8 to 12.	**PROJECT NO.**	11175065
		BORING NO.	DGP-103

URS Corporation

TEST BORING LOG

BORING NO:	DGP-104		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	14' bgs
DATE STARTED:	01/02/08		
DATE FINISHED:	01/02/08		
DRILLER:	Charlie		
GEOLOGIST:	AM Casey		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Brown		Fill material: bricks, concrete, mortar. Fine to coarse sand, fine to coarse gravel. No MGP impact.	Fill	0.0	Dry
1												
2												
3												
4												
		S-2	Macro core			36"			4' to 7' Concrete fragments.	Fill	0.0	
5												
6												
7												
							Orange / Red		7' to 9' Loose, fine to coarse SAND, with some poorly graded fine gravel.	GP	0.0	Dry
8												
9												
		S-3	Macro core				Lt. Brown		Loose, fine to coarse SAND, with some poorly graded fine gravel.	GP	0.0	Dry
10												
11												
12												
13												
14												
									End of boring: 14' bgs			
15												
16												
17												
18												
19												
20												

Comments: 0' to 4' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	DGP-104

URS Corporation

TEST BORING LOG

BORING NO:	DGP-105		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	15' bgs
DATE STARTED:	01/02/08		
DATE FINISHED:	01/02/08		
DRILLER:	Charlie		
GEOLOGIST:	AM Casey		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Black		0' to 3', Loose, Clay with some sand, gravel, and brick fragments.	Fill	0.0	Dry
1												
2												
3												
4							Orange / Red		3' to 5', Loose, fine to coarse SAND, some fine to coarse gravel.	GP	0.0	Dry
5												
6		S-2	Macro core			58"	Orange / Red		Loose, fine to coarse SAND, with loose black fine to coarse SAND, some fine to coarse gravel. No odors.	GP/SP	0.0	Dry
7												
8												
9												
10												
11		S-3	Macro core				Red / Brown		Loose, fine to coarse SAND, with poorly graded fine gravel. No odors.	GP	0.0	Dry
12												
13												
14												
15												
16									End of boring: 15' bgs			
17												
18												
19												
20												

Comments: Boring location inside propane tank storage area.

PROJECT NO.	11175065
BORING NO.	DGP-105

URS Corporation

TEST BORING LOG

BORING NO:	DGP-106		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Hand/Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	15' bgs
DATE STARTED:	01/02/08		
DATE FINISHED:	01/02/08		
DRILLER:	Charlie		
GEOLOGIST:	AM Casey		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Black		0' to 3', Soft clay and gravel fill.	Fill	0.0	
1												
2												
3												
							Dk. Brown		3' to 5', fine to coarse SAND, with little red fine to coarse SAND, some fine to coarse gravel at 4' to 5'.	GP	0.0	Dry
4												
5												
		S-2	Macro			54"	Red /		Loose, fine to coarse SAND, with fine to coarse poorly graded gravel.	GP	0.0	Dry
6			core				Lt. Brown					
7												
8												
9												
10												
		S-3	Macro			54"	Red /		10' to 11', Loose, fine to coarse SAND, with fine to coarse poorly graded gravel.	GP	0.0	Dry
11			core				Lt. Brown					
							Black		11' to 11.3', Sandy/gravelly CLAY	CL	0.0	Dry
12							Lt. Brown /		11.3 to 15', Loose, fine to coarse SAND, little fine to coarse gravel.	GP	0.0	Dry
13							Red					
14												
15												
									End of boring: 15' bgs			
16												
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools. Located inside propane storage area.

PROJECT NO.	11175065
BORING NO.	DGP-106

URS Corporation

TEST BORING LOG

BORING NO:	DGP-107		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	15' bgs
DATE STARTED:	01/02/08		
DATE FINISHED:	01/02/08		
DRILLER:	Charlie		
GEOLOGIST:	AM Casey		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Black		0' to 2.5', Soft clay with some sand, gravel and brick fragments.	CL	0.0	Dry
1												
2												
3							Red / Brown		2.5' to 5', Loose, fine to coarse SAND, with poorly sorted fine to coarse gravel.	GP	0.0	Dry
4												
5												
		S-2	Macro core				Red / Brown		Loose, fine to coarse SAND, with poorly sorted fine to coarse gravel.	GP	0.0	Dry
6												
7												
8												
9												
10												
		S-3	Macro core				Dk. Brown		10' to 12', Loose, fine to coarse SAND with fine to coarse gravel.	GP	0.0	Dry
11												
12												
13							Red / Orange		12' to 15', Fine to coarse SAND, with poorly graded fine to coarse gravel.	GP	0.0	Dry
14												
15												
									End of boring: 15' bgs			
16												
17												
18												
19												
20												

Comments: Boring located inside propane tank yard.

PROJECT NO.	11175065
BORING NO.	DGP-107

URS Corporation

TEST BORING LOG

BORING NO:	DGP-108
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER: ~28'	**TOTAL DEPTH:** 30' bgs
DATE STARTED:	01/15/08
DATE FINISHED:	01/15/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Dk. Brown		0' to 2', Loamy topsoil over fine to medium SAND, some fine to coarse gravel.	SP	0.0	Dry
1												
2												
3							Brown to Lt. Brown		2' to 5', Loose, fine to coarse SAND, some fine to coarse gravel.	SP	0.0	Dry
4												
5												
6		S-2	Macro core			54"	Lt. Brown / Orange		Loose, fine to very coarse SAND, trace to little well graded fine gravel.	SP	0.0	Dry
7												
8												
9												
10												
11		S-3	Macro core			57"	Lt. Brown / Orange		Loose, fine to very coarse SAND, trace to little well graded fine gravel.	SP	0.0	Dry
12												
13												
14												
15												
16		S-4	Macro core			50"	Lt. Brown / Orange		Loose, fine to very coarse SAND, trace to little well graded fine gravel.	SP	0.0	Dry
17												
18												
19												
20												

Comments: 0' to 5' excavated with hand tools.

PROJECT NO.	11175065
BORING NO.	DGP-108

URS Corporation

TEST BORING LOG

BORING NO:	DGP-108
PROJECT: KeySpan Hempstead MGP	**SHEET:** 2 of 2
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** Area E

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core			46"	Lt. Brown / Orange		Loose, fine to very coarse SAND, trace to little well graded fine gravel.	SP	0.0	Dry
21												
22												
23												
24												
25												
		S-6	Macro core			40"	Lt. Brown / Orange		25' to 28', Loose, fine to very coarse SAND, trace to little well graded fine gravel.	SP	0.0	Dry
26												
27												
28												
									28' to 30', Loose, fine to coarse SAND, trace fine gravel. Water table at ~28' bgs.			Wet
29												
30												
									End of boring: 30' bgs			
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

COMMENTS:

PROJECT NO.	DGP-108
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	DGP-109										
PROJECT:	KeySpan Hempstead MGP									**LOCATION:**	Area E
CLIENT:	KeySpan									**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol									**DRILLING METHOD:**	Geoprobe
GROUNDWATER:	~29'				**CAS.**	**SAMPLER**	**CORE**	**TUBE**		**TOTAL DEPTH:**	30' bgs
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				**DATE STARTED:**	01/25/08
				DIA.						**DATE FINISHED:**	01/25/08
				WT.						**DRILLER:**	M. Meade
				FALL						**GEOLOGIST:**	J. Harshman/AM Casey
				*** POCKET PENETROMETER READING**						**REVIEWED BY:**	K. Connare

	SAMPLE						DESCRIPTION					
DEPTH				**BLOWS**	**REC**			**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**NO.**	**TYPE**	**PER 6"**	**RQD%**	**COLOR**		**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
0		S-1	Macro core			Brown			0' to 4', Loose, fine to coarse SAND, little fine to coarse gravel.	SP	0.0	Dry
5						White / Gray			4' to 5', Concrete fragments.	SP	0.0	
6		S-2	Macro core		34"	Dk. Brown			5' to 9', Loose slighty gravelly fine to coarse SAND, medium to coarse gravel.	SP	0.0	Moist
10						Orange			9' to 10', Loose fine to coarse SAND.	SP	0.0	Moist
11		S-3	Macro core		47"	Orange / Brown			Loose, fine to coarse SAND, with trace coarse gravel.	SP	0.0	Moist
16		S-4	Macro core		39"	Orange / Red			Loose, fine to coarse SAND, some medium to coarse, subangular to subrounded gravel.	SP	0.0	Dry
20												

Comments:

PROJECT NO.	11175065
BORING NO.	DGP-109

URS Corporation										TEST BORING LOG		
										BORING NO:	DGP-109	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 2	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Area E	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
21		S-5	Macro core			34"	Orange / Red		Loose, fine to coarse SAND, some medium to coarse, subangular to subrounded gravel.	SP	0.0	Dry
26		S-6	Macro core			33"	Orange / Red		Loose, fine to coarse SAND, some medium to coarse, subangular to subrounded gravel. Water table at ~29'.	SP	0.0	Dry
30												Wet
31									End of boring: 30' bgs			
40												

COMMENTS:	PROJECT NO.	DGP-109
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	DGP-110
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER: ~29'	**TOTAL DEPTH:** 30' bgs
DATE STARTED:	01/25/08
DATE FINISHED:	01/25/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH	SAMPLE						DESCRIPTION					REMARKS	
				BLOWS		REC		CONSIST	MATERIAL				
FEET	STRATA	NO.	TYPE	PER 6"		RQD%	COLOR	HARD	DESCRIPTION	USCS	PID	Moist
0		S-1	Macro core			32"	Dk. Brown		Loose to medium dense, fine to coarse SAND, little to some fine gravel. Trace concrete at 2'.	Fill	0.0	Dry
1												
2												
3												
4												
5												
		S-2	Macro core			42"	Dk. Brown		5' to 8', Loose, fine to coarse SAND, with some concrete, trace of black/brown stained and coated MGP impacted sand at 7', 2" thick. Note: Little perched water at 5'.	SP	0.0	
6												
7												
											120.0	
8												
9											0.0	
10												
		S-3	Macro core			44"	Lt. Brown / Orange		Loose, fine to coarse SAND, trace well graded fine gravel. No impact.	SP	0.0	Dry
11												
12												
13												
14												
15												
		S-4	Macro core			40"	Lt. Brown w/ intervals of Orange / Brown		Loose to medium dense, fine to very coarse SAND, with some poorly graded fine gravel.	SP	0.0	Dry
16												
17												
18												
19												
20												

Comments:

PROJECT NO.	11175065
BORING NO.	DGP-110

URS Corporation										TEST BORING LOG		
										BORING NO:	DGP-110	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 2	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Area E	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core			36"	Lt. Brown		Loose to medium dense, fine to very coarse SAND, with some poorly graded fine gravel	SP	0.0	Dry
21												
							Orange / Brown					
22												
23												
24												
25												
		S-6	Macro core			36"	Brown / Orange		Loose, fine to very coarse SAND, some well graded fine to coarse gravel. Wet at ~29'. No impact	SP	0.0	Dry
26												
27												
28												
29												
												Wet
30												
									End of boring: 30' bgs			
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

COMMENTS:	PROJECT NO.	DGP-110
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	DGP-111		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER: ~29'		**TOTAL DEPTH:**	30' bgs
DATE STARTED:	01/25/08		
DATE FINISHED:	01/25/08		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

	CAS.	SAMPLER	CORE	TUBE
TYPE		Macrocore		
DIA.				
WT.				
FALL				

DATE	TIME	LEVEL	TYPE

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Macro core		41"	DK. Brown		0' to 1', Loamy topsoil.	Fill	0.0	Dry
1								1' to 5', Loose, fine to coarse SAND, lttle fine gravel, 6" of concrete at ~3' bgs. No impacts.			
2											
3											
4						Intervals of Brown and Lt. Brown					
5											
6		S-2	Macro core		55"			Loose, fine to coarse SAND, trace very coarse sand, trace fine to coarse gravel. No impacts.	SP	0.0	Dry
7											
8											
9											
10											
11		S-3	Macro core		55"	Brown / Orange		Loose to medium dense, fine to coarse SAND, little very coarse sand, trace fine gravel.	SP	0.0	Dry
12											
13											
14											
15											
16		S-4	Macro core		50"	Orange / Brown		Loose, fine to very coarse SAND, little fine gravel. No impacts.	SP	0.0	Dry
17											
18											
19											
20											

Comments:

PROJECT NO.	11175065
BORING NO.	DGP-111

URS Corporation										TEST BORING LOG		
										BORING NO:	DGP-111	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 2	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Area E	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
21		S-5	Macro core			42"	Orange / Brown		Loose, fine to very coarse SAND, little fine gravel. No impact.	SP	0.0	Dry
26		S-6	Macro core			43"	Brown / Orange		Loose, fine to very coarse SAND, little fine gravel, with little light brown sand at 28'. Wet at 29'.	SP	0.0	Dry
30												Wet
									End of boring: 30' bgs			
COMMENTS:										PROJECT NO.	DGP-111	
										BORING NO.	11175065	

URS Corporation

TEST BORING LOG

BORING NO:	DGP-112
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER: ~29' bgs	**TOTAL DEPTH:** 30' bgs
DATE STARTED:	01/25/08
DATE FINISHED:	01/25/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Dk. Brown		0' to 1', Loamy topsoil	SP	0.0	Dry
1							Dk Brown		1' to 5', Loose, fine to medium SAND and some fine gravel.	SP	0.0	Dry
5		S-2	Macro core			16"	Dk. Brown / Brown		Loose, fine to medium SAND, trace to little fine gravel.	SP	0.0	Dry
10		S-3	Macro core			32"	Dk. Brown / Brown becoming Orange / Brown		Loose, fine to medium SAND, trace to little fine gravel.	SP	0.0	Dry
15		S-4	Macro core			46"	Brown / Orange		Loose, fine to very coarse SAND, little fine gravel.	SP	0.0	Dry
20												

Comments: 0' to 5' interval excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	DGP-112

URS Corporation										TEST BORING LOG		
										BORING NO:	DGP-112	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 2	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Area E	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
21		S-5	Macro core			48"	Brown / Orange		Loose, fine to very coarse SAND, little fine gravel.	SP	0.0	Dry
26		S-6	Macro core			42"	Brown / Orange		Loose, fine to very coarse SAND, little fine gravel, with little light brown fine to medium sand at 29'. Wet at 29'.	SP	0.0	Dry
30												Wet
31									End of boring: 30' bgs			
40												

COMMENTS:	PROJECT NO.	DGP-112
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	DGP-113
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER: ~29' bgs	**TOTAL DEPTH:** 30' bgs
DATE STARTED:	01/25/08
DATE FINISHED:	01/25/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			40"	Brown		0' to 1', Loose, gravelly SAND, with little clay and black clinker in 0' to 1' interval.	Fill	0.0	Dry
1										SP/GP	0.0	Dry
2									Cobble at 2'.			
3												
4												
5												
6		S-2	Macro core			33"	Red / Orange		Loose, fine to coarse SAND, trace fine gravel. No impact.	SP	0.0	Dry
7												
8												
9												
10												
11		S-3	Macro core			49"	Red / Orange		Loose, fine to coarse SAND, trace sudangular to subround, medium to coarse gravel. No impact.	SP	0.0	Dry
12												
13												
14												
15												
16		S-4	Macro core			45"	Dk. Brown		15' to 17', Loose, fine to coarse SAND, with subangular to subround, medium to coarse gravel.	SP	0.0	Dry
17												
18							Red / Orange		17' to 20', Loose, fine to coarse SAND and GRAVEL.	SP/GP	0.0	Dry
19												
20												

Comments:

PROJECT NO.	11175065
BORING NO.	DGP-113

URS Corporation										TEST BORING LOG		
										BORING NO:	DGP-113	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 2	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Area E	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core			52"	Red / Orange		Loose, fine to coarse SAND and GRAVEL.	SP/GP	0.0	Dry
21												
22												
23												
24												
25												
		S-6	Macro core			38"	Red / Orange		Loose, fine to coarse SAND and GRAVEL. Wet at ~29'	SP/GP	0.0	Dry
26												
27												
28												
29												
30												Wet
									End of boring: 30' bgs			
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

COMMENTS:	PROJECT NO.	DGP-113
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	DGP-114		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	9' bgs
DATE STARTED:	02/05/08		
DATE FINISHED:	02/05/08		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			28"	Dk. Brown		0' to 2', Loamy topsoil, with some fine gravel.	SP	0.0	Dry
1												
2									2' to 5', Loose, fine to coarse SAND, trace fine to coarse gravel.	SP	0.0	Dry
3												
4												
5												
		S-2	Macro core			20"	Dk. Brown		5' to 6', Loose, fine to coarse SAND with some fine gravel.	SP	0.0	Dry
6												
7							Black / Brown		6' to 9', MGP impact. Black, wet, sheen, "muddy", some brown fine to coarse SAND and fine gravel. MGP odor. Refusal at 9'	SP	33.0	Wet
8												
9												
									End of boring: 9' bgs			
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Refusal at 9' believed to be foundation/floor of return sump structure.

PROJECT NO.	11175065
BORING NO.	DGP-114

URS Corporation

TEST BORING LOG

BORING NO:	DGP-115		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:	**CAS.** / **SAMPLER** / **CORE** / **TUBE**	**TOTAL DEPTH:**	3' bgs
DATE / **TIME** / **LEVEL** / **TYPE**	**TYPE** — / Macrocore / — / —	**DATE STARTED:**	02/05/08
	DIA. — / — / — / —	**DATE FINISHED:**	02/05/08
	WT. — / — / — / —	**DRILLER:**	M. Meade
	FALL — / — / — / —	**GEOLOGIST:**	J. Harshman
	*** POCKET PENETROMETER READING**	**REVIEWED BY:**	K. Connare

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Macro core		21"	Dk. Brown		0' to 2', Loamy topsoil with fine gravel.	SP	0.0	Dry
1											
2						Brown		2' to 3', Loose, fine to coarse SAND, with some fine gravel. Refusal at 3'.	SP		Dry
3											
								End of boring: 3' bgs			
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments:

PROJECT NO.	11175065
BORING NO.	DGP-115

URS Corporation

TEST BORING LOG

BORING NO:	DGP-116
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER: ~29' bgs	
TOTAL DEPTH:	30' bgs
DATE STARTED:	02/05/08
DATE FINISHED:	02/05/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Macro core			32"	Dk. Brown		0' to 2', Loamy topsoil, with some fine gravel.	SP	0.0	Dry
1												
2									2' to 5', Loose fine to coarse SAND, some fine to coarse gravel, trace cobble.	SP	0.0	Dry
3												
4												
5												
6		S-2	Macro core			40"			5' to 6', Fill type material: concrete fragments, coal, sand and gravel.	Fill	7.0	Dry
7							Red / Brown		6' to 7', Very fine SAND.	Fill	0.0	Moist to Wet
8									7' to 8', MGP impact black stained and coated very fine to fine SAND with wood strands.	Fill	13.0	Wet
9							Orange / Brown		8' to 10', Loose, fine to medium SAND.	SP	0.0	Dry
10												
11		S-3	Macro core			34"	Orange / Yellow / Brown		Loose, fine to coarse SAND, trace fine gravel. No impact.	SP	0.0	Dry
12												
13												
14												
15												
16		S-4	Macro core			44"	Orange / Yellow / Brown		Loose, fine to coarse SAND, some fine gravel. No impact.	SP	0.0	Dry
17												
18												
19												
20												

Comments: 5' to 10' Fill/SP used in HCN:1

PROJECT NO.	11175065
BORING NO.	DGP-116

URS Corporation										TEST BORING LOG		
										BORING NO:	DGP-116	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 2	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Area E	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
21		S-5	Macro core			42"	Orange / Yellow / Brown		Loose, fine to coarse SAND, some fine gravel. No impact.	SP	0.0	Dry
26		S-6	Macro core			38"	Lt. Brown / Tan		Loose, fine to coarse SAND, trace fine gravel. Wet at 29'. No impact.	SP	0.0	Dry
30												Wet
31									End of boring: 30' bgs			
40												

COMMENTS:	PROJECT NO.	DGP-116
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	DGP-117		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/08/08		
DATE FINISHED:	02/08/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			50"	Black		0' to 2', MGP material. ALM, SAND and GRAVEL.	Fill	0.0	Dry
1												
2												
							Black		2' to 4', MGP, impacted. Stained and coated, sheen, slightly tarry, SAND and GRAVEL, purifier odor.	Fill	50.0	Wet
3												
4												
							Dk. Brown		4' to 5', Stiff, SILT.	ML		Dry to Moist
5												
		S-2	Macro core			42"	Dk. Brown to Brown		5' to 9', Stiff, SILT.	ML	0.0	Moist
6												
7												
8												
9												
							Orange		9' to 10', Loose, fine to very coarse SAND, some fine gravel. No impact.	SP		Dry
10												
									End of boring: 10'			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at ~3'.

PROJECT NO.	11175065
BORING NO.	DGP-117

URS Corporation

TEST BORING LOG

BORING NO:	DGP-118
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Area E
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	10' bgs
DATE STARTED:	02/11/08
DATE FINISHED:	02/11/08
DRILLER:	Brain
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

CAS.	SAMPLER	CORE	TUBE
TYPE	Macrocore		
DIA.			
WT.			
FALL			

DATE	TIME	LEVEL	TYPE

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0								Gravel at surface.			
		S-1	Macro core		48"	Brown		0' to 2', MGP material. ALM, coal fragments, fine to medium SAND and GRAVEL.	Fill	0.0	Dry
1											
2								2' to 3', Medium dense, fine to coarse SAND, trace wood, little fine gravel. Slight sheen, faint MGP odor.			
						Brown			SP	0.0	Moist
3											
						Black		3' to 4', Stained MGP impacted material. Sheen, faint MGP odor.		3.0	Wet
4											
						Dk. Brown		4' to 5', Stiff SILT. No impact.	ML	0.0	Dry
5											
		S-2	Macro core		50"	Dk. Brown		5' to 6', Stiff, SILT. No impact.	ML	0.0	Dry
6											
						Brown		6' to 10', Loose, fine to coarse SAND and GRAVEL. No impact.	GP/SP	0.0	Dry
7											
8											
9											
10											
								End of boring: 10'			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Perched water at ~3'.

PROJECT NO.	11175065
BORING NO.	DGP-118

URS Corporation

TEST BORING LOG

BORING NO:	DGP-119		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/11/08		
DATE FINISHED:	02/11/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0								Gravel at surface.			
		S-1	Macro core		54"			0' to 2', MGP material and fill. ALM, SAND and GRAVEL, red brick, moist at 2'.	Fill	0.0	
1											
											Moist
2						Brown		2' to 3', Stiff SILT, some sand and gravel. Slight sheen.	Fill	0.0	Moist to Wet
3						Black		3' to 4', Stained MGP impacted SAND and GRAVEL. Sheen, MGP (purifier?) odor.	SP	45.0	Wet
4						Dk. Brown		4' to 5', Stiff SILT. No impact.	ML	0.0	Dry to Moist
5		S-2	Macro core		50"	Dk. Brown		5' to 6', Stiff SILT.	ML	0.0	Dry
6						Orange / Brown		6' to 10', Loose, fine to vey coarse SAND and fine to coarse GRAVEL. No impact.	SP		Dry
7											
8											
9											
10											
								End of boring: 10'			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Perched water at ~3'.

PROJECT NO.	11175065
BORING NO.	DGP-119

URS Corporation

TEST BORING LOG

BORING NO:	DGP-120		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:	**CAS.** / **SAMPLER** / **CORE** / **TUBE**	**TOTAL DEPTH:**	10' bgs
DATE / **TIME** / **LEVEL** / **TYPE**	**TYPE** — / Macrocore / — / —	**DATE STARTED:**	02/11/08
	DIA. — / — / — / —	**DATE FINISHED:**	02/11/08
	WT. — / — / — / —	**DRILLER:**	Brain
	FALL — / — / — / —	**GEOLOGIST:**	J. Harshman
	*** POCKET PENETROMETER READING**	**REVIEWED BY:**	K. Connare

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0								Gravel at surface			
		S-1	Macro core		52"	Brown		0' to 2', MGP material. ALM, coal fragments, SAND, fine to coarse gravel.	Fill	0.0	Dry
1											
2						Brown		2' to 3', Fine to coarse sandy SILT and some fine gravel.	Fill	0.0	Moist
3						Black		3' to 4', Stained MGP impacted. SAND and GRAVEL, ALM clinker, slag. Faint MGP odor, sheen	Fill	10.0	Wet
4						Dk. Brown		4' to 5', Stiff SILT.	ML	0.0	Moist to Dry
5		S-2	Macro core		54"	Dk. Brown to Brown		5' to 7', Medium stiff, SILT.	ML	0.0	Dry
6											
7						Orange / Tan		7' to 10', Loose, Fine to coarse SAND and fine to coarse GRAVEL. No impact.	SP	0.0	Dry
8											
9											
10											
								End of boring: 10'			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Perched water at ~3'. 3' to 4' HCN:1

PROJECT NO.	11175065
BORING NO.	DGP-120

URS Corporation

TEST BORING LOG

BORING NO:	DGP-121		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/11/08		
DATE FINISHED:	02/11/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH	SAMPLE			BLOWS	REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"	RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Macro core		56"	Black		0' to 1', MGP material. ALM, wood, SAND and GRAVEL.	Fill	0.0	Dry
1						Brown		1' to 3', Loose, silty SAND with some fine gravel.	Fill	0.0	Moist
2											
3						Black		3' to 4', Stained MGP impacted fine to medium SAND and GRAVEL. ALM, sheen, faint odor.	Fill	10.0	Wet
4						Dk. Brown		4' to 5', Stiff SILT. No impact.	ML	0.0	Dry
5											
6		S-2	Macro core		52"	Dk. Brown Brown		4' to 5', Stiff SILT. No impact.	ML	0.0	Dry
7						Brown / Orange / Tan		6' to 10', Loose, fine to very coarse SAND, some fine gravel. No impact.	SP	0.0	Dry
8											
9											
10											
11								End of boring: 10'			
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Perched water at ~3'. 3' to 4' HCN: 2

PROJECT NO.	11175065
BORING NO.	DGP-121

URS Corporation

TEST BORING LOG

BORING NO:	DGP-122		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/11/08		
DATE FINISHED:	02/11/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH	SAMPLE					DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Macro core		52"	Black Brown		0' to 2', MGP material. ALM, some fine to medium SAND, fine GRAVEL, red brick.	Fill	0.0	Dry
1											
2						Brown		2' to 3', Silty SAND with gravel.	Fill	0.0	Moist to Wet
3						Black		3' to 4', Stained MGP impacted SAND and GRAVEL, wood. Sheen MGP odor.	Fill	85.0	Wet
4						Dk. Brown		4' to 5', Stiff, SILT.	ML	0.0	Dry
5											
6		S-2	Macro core		56"	Dk. Brown to Brown		5' to 6', Stiff SILT.	ML	0.0	Dry
7						Orange		6' to 10', Loose, fine to coarse SAND, some fine to coarse gravel. No impact.	SP	0.0	Dry
8											
9											
10											
11								End of boring: 10'			
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Perched water at ~3'. 3' to 4', HCN:1

PROJECT NO.	11175065
BORING NO.	DGP-122

URS Corporation

TEST BORING LOG

BORING NO:	DGP-123		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:	**CAS.** / **SAMPLER** / **CORE** / **TUBE**	**TOTAL DEPTH:**	10' bgs
DATE / **TIME** / **LEVEL** / **TYPE**	**TYPE** — Macrocore	**DATE STARTED:**	02/11/08
	DIA.	**DATE FINISHED:**	02/11/08
	WT.	**DRILLER:**	Brain
	FALL	**GEOLOGIST:**	J. Harshman
	*** POCKET PENETROMETER READING**	**REVIEWED BY:**	K. Connare

DEPTH	SAMPLE					DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Macro core		57"	Brown		0' to 2', MGP material. ALM, SAND and GRAVEL.	Fill	0.0	Dry
1											
2											Wet
						Brown		2' to 3', Medium dense, fine to medium SAND with fine gravel.	Fill	0.0	Moist to Wet
3											
						Black		3' to 4', Stained MGP impacted SAND and GRAVEL. Sheen, MGP odor.	Fill	40.0	Wet
4											
						Dk. Brown		4' to 5', Stiff SILT.	ML		Moist
5											
		S-2	Macro core		52"	Dk. Brown		5' to 6', Stiff SILT. No impact.	ML	0.0	Dry
6											
						Lt. Brown / Tan		6' to 10', Loose, fine to very coarse SAND and fine to coarse GRAVEL. No impact.	GP/SP	0.0	Dry
7											
8											
9											
10											
								End of boring: 10'			
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Perched water at ~3'. 3' to 4' HCN:1

PROJECT NO.	11175065
BORING NO.	DGP-123

URS Corporation

TEST BORING LOG

BORING NO:	DGP-124		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/11/08		
DATE FINISHED:	02/11/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			50"	Brown		0' to 2', MGP material. ALM, fine to medium SAND, fine to coarse gravel.	Fill	0.0	Moist
1												
2												
							Brown		2' to 3', Silty SAND, some fine gravel.	Fill	120.0	Moist to Wet
3												
4							Black Stained		3' to 4', MGP impacted SAND and GRAVEL. Sheen, moderate MGP (purifier?) odor.	Fill	75.0	Wet
5							Dk. Brown to Brown		4' to 5', Stiff, SILT.	ML	0.0	Dry
6		S-2	Macro core			48"	Brown		5' to 6', Stiff, SILT.	ML	0.0	Dry
7							Lt. Brown / Tan		6' to 10', Loose, fine to coarse SAND, some fine gravel. No impact.	SP	0.0	Dry
8												
9												
10												
11									End of boring: 10'			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at ~3'.

PROJECT NO.	11175065
BORING NO.	DGP-124

URS Corporation

TEST BORING LOG

BORING NO:	DGP-125		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/11/08		
DATE FINISHED:	02/11/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			50"	Black		0' to 2', MGP material. ALM, concrete fragments, SAND and GRAVEL.	Fill	0.0	Dry
1												
2									2' to 4', MGP impacted SAND, GRAVEL, wood. Sheen, moderate MGP odor.	Fill	0.0	Wet
3											100.0	
4												
5							Brown		4' to 5', Stiff, SILT	ML	0.0	Dry to Moist
6		S-2	Macro core			48"	Brown		5' to 6', Stiff, SILT.	ML	0.0	
7							Lt. Brown Orange		6' to 10', Loose, fine to coarse SAND with some fine gravel. No MGP impact.	SP	0.0	Dry
8												
9												
10												
11									End of boring: 10'			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at ~3'. 3.5' HCN:1

PROJECT NO.	11175065
BORING NO.	DGP-125

URS Corporation

TEST BORING LOG

BORING NO:	DGP-126		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/11/08		
DATE FINISHED:	02/11/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			52"	Black		0' to 2', MGP material. ALM, SAND and GRAVEL.	Fill	0.0	Dry
1												
2												
							Brown		2' to 3', Compressed wood fragments/chips. Strong odor, sheen.	Fill	100.0	Moist
3												
							Black Stained		3' to 4', MGP impacted SAND and GRAVEL. Sheen, odor.	Fill	30.0	Wet
4												
							Dk. Brown		4' to 5', Stiff, SILT.	ML	0.0	Dry
5												
		S-2	Macro core			54"	Lt. Brown / Orange		Loose, fine to coarse SAND, some fine gravel. No impact.	SP	0.0	Dry
6												
7												
8												
9												
10												
									End of boring: 10'			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at ~3'.

PROJECT NO.	11175065
BORING NO.	DGP-126

URS Corporation

TEST BORING LOG

BORING NO:	DGP-127		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/11/08		
DATE FINISHED:	02/11/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			54"	Black		0' to 2', MGP material. ALM, coal fragments, SAND and GRAVEL.	Fill	0.0	Dry
1												
2												Wet
3							Dk. Brown		2' to 3', Clayey SILT.	ML	0.0	Dry
4							Lt. Brown / Orange		3' to 5', Loose, fine to coarse SAND, some fine gravel. No impact.	SP	0.0	Dry
5												
6		S-2	Macro core			50"	Lt. Brown / Orange / Tan		Loose, fine to coarse SAND,some fine gravel. No impact.	SP	0.0	Dry
7												
8												
9												
10												
11									End of boring: 10'			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at ~3'.

PROJECT NO.	11175065
BORING NO.	DGP-127

URS Corporation

TEST BORING LOG

BORING NO:	DGP-128		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/12/08		
DATE FINISHED:	02/12/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Macro core			52"	Brown		0' to 3', MGP fill material. Black ALM, coal fragments, SAND and fine GRAVEL, trace red brick.	Fill		Moist to Dry
1												
2												
3									3' to 4', MGP impacted material. Compressed wood chips, strong odor, trace black staining and sheen.		77	
4							Brown					
5							Dk. Brown to Brown		4' to 7', Stiff SILT	ML	5.0	Dry
6		S-2	Macro core			54"	Dk. Brown to Brown				0.0	Moist to Dry
7												
8							Orange		7' to 10', Loose, fine to very coarse SAND and some fine gravel. No impact.	GP/SP	0.0	Dry
9												
10												
11									End of boring: 10'			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at ~3'. Fill 3' to 4' HCN:2.

PROJECT NO.	11175065
BORING NO.	DGP-128

URS Corporation

TEST BORING LOG

BORING NO:	DGP-129		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/12/08		
DATE FINISHED:	02/12/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			56"	Brown		0' to 3', MGP fill material. ALM coal fragments, clinker, SAND and GRAVEL. Faint MGP odor. Moist to wet at 3', sheen.	Fill	0.0	Moist to Wet
1											0.0	
2											0.0	
3											50.0	
4							Dk. Brown Brown		3' to 4', SILT	ML	0.0	Moist to Dry
5							Orange		4' to 5', Loose, fine to coarse SAND, with some fine gravel.	SP	0.0	Dry
6		S-2	Macro core				Orange / Tan		Loose, fine to coarse SAND, some fine gravel. No impact.	SP	0.0	Dry
7												
8												
9												
10												
11									End of boring: 10'			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Preched water at 3'

PROJECT NO.	11175065
BORING NO.	DGP-129

URS Corporation

TEST BORING LOG

BORING NO:	DGP-130		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/12/08		
DATE FINISHED:	02/12/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			52"	Black		0' to 3', MGP fill material. ALM, coal fragments, SAND and fine GRAVEL, clinker slag, trace compressed wood, trace black staining at 3'. Jar shake test revealed a heavy sheen.	Fill	0.0	Dry
1												
2											20.0	
3												
							Dk. Brown		3' to 4', Stiff SILT.	ML	0.0	Dry
4												
							Orange		4' to 5', Loose, fine to coarse SAND and fine gravel.	SP	0.0	Dry
5												
		S-2	Macro core			58"	Lt. Brown Orange		Loose, fine to very coarse SAND and fine to coarse GRAVEL. No impact.	GP/SP	0.0	Dry
6												
7												
8												
9												
10												
									End of boring: 10'			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: No perched water. At 2' HCN:1

PROJECT NO.	11175065
BORING NO.	DGP-130

URS Corporation

TEST BORING LOG

BORING NO:	DGP-131		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	5' bgs
DATE STARTED:	02/12/08		
DATE FINISHED:	02/12/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			48"	Black		0' to 3', MGP fill material. ALM, coal fragments, clinker, slag, SAND and GRAVEL. Wet at 3'. Jar shake test revealed no sheen.	Fill	0.0	
1												
2												
3											0.0	Wet
							Dk. Brown		3' to 4', Stiff SILT.	ML	0.0	Dry
4												
							Orange / Brown		4' to 5', Loose, fine to coarse SAND, some fine to coarse gravel.	SP	0.0	Dry
5												
									End of boring: 5'			
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at 3'.

PROJECT NO.	11175065
BORING NO.	DGP-131

URS Corporation

TEST BORING LOG

BORING NO:	DGP-132		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	5' bgs
DATE STARTED:	02/12/08	**DATE FINISHED:**	02/12/08
DRILLER:	Brain	**GEOLOGIST:**	J. Harshman
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH	SAMPLE			BLOWS	REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"	RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Macro core		52"	Black		0' to 3', MGP fill material. Black ALM, coal, SAND and GRAVEL. Jar shake test revealed a sheen.	Fill	7.7	Dry
4						Dk. Brown		3' to 4', Stiff SILT.	ML	0.0	Dry
5						Orange		4' to 5', Loose, fine to coarse SAND, some fine gravel.	SP	0.0	Dry
								End of boring: 5'			

Comments: No perched water. Jar shake test equaled sheen.

PROJECT NO.	11175065
BORING NO.	DGP-132

URS Corporation

TEST BORING LOG

BORING NO:	DGP-133		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/12/08		
DATE FINISHED:	02/12/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			48"	Black		0' to 4.5', MGP fill material. ALM, slag, coal, SAND and GRAVEL. Wet at 3', sheen, faint odor.	Fill	0.0	
1												
2											0.0	
3											10.0	wet
4												
5							Blk/Brown		4.5' to 5', SILT	ML	10.0	Moist
		S-2	Macro core			54"	Olive		5' to 7', Medium stiff to soft, SILT. Faint MGP odor.	ML	7.0	Moist
6												
7											3.0	
							Red / Orange / Brown		7' to 10', Loose, fine to coarse SAND, some fine to coarse gravel. No impact.	SP	0.0	Moist to Dry
8												
9												
10												
									End of boring: 10'			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at 3'. Jar shake test equaled sheen. At 3' HCN:2

PROJECT NO.	11175065
BORING NO.	DGP-133

URS Corporation

TEST BORING LOG

BORING NO:	DGP-134		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	5' bgs
DATE STARTED:	02/12/08		
DATE FINISHED:	02/12/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH	SAMPLE			BLOWS	REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"	RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Macro core			Black		0' to 2', MGP fill material. Black ALM, coal. Jar shake test revealed no sheen.	Fill	0.0	Dry
1											
2											
3						Dk. Brown Brown		2' to 4', SILT	ML	0.0	Moist to Dry
4											
5						Orange		4' to 5', Loose, fine to coarse SAND, some fine to coarse gravel.	SP	0.0	Dry
6								End of boring: 5'			
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: No perched water. Jar shake test equaled no sheen.

PROJECT NO.	11175065
BORING NO.	DGP-134

URS Corporation

TEST BORING LOG

BORING NO:	DGP-135		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/12/08	**DATE FINISHED:**	02/12/08
DRILLER:	Brain	**GEOLOGIST:**	J. Harshman
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			50"	Black		0' to 2', MGP fill material. Black ALM, coal. Jar shake test revealed no sheen.	Fill	0.0	Dry
1												
2												
							Dk. Brown to Brown		2' to 4', SILT.	ML	0.0	Dry
3												
4												
5									4' to 5', Loose, fine to coarse SAND, some fine to coarse gravel.	SP	0.0	Dry
		S-2	Macro core			48"	Orange / Tan		Loose, fine to coarse SAND, some fine gravel. No impact.	SP	0.0	Dry
6												
7												
8												
9												
10												
									End of boring: 10'			
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: No perched water. Jar shake test equaled no sheen.

PROJECT NO.	11175065
BORING NO.	DGP-135

URS Corporation

TEST BORING LOG

BORING NO:	DGP-136		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	5' bgs
DATE STARTED:	02/12/08		
DATE FINISHED:	02/12/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			48"	Black		0' to 3', MGP fill material. Black ALM, coal, sand, gravel. Jar shake test revealed sheen.	Fill	0.0	
1												
2												
3												
4							Dk. Brown to Brown		3' to 5', SILT.	ML	0.0	Dry
5												
6									End of boring: 5'			
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Perched water at 3'. Jar shake test equaled sheen.

PROJECT NO.	11175065
BORING NO.	DGP-136

URS Corporation

TEST BORING LOG

BORING NO:	DGP-137		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	10' bgs
DATE STARTED:	02/12/08		
DATE FINISHED:	02/12/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			50"	Black		0' to 3', MGP fill material. Black ALM and coal, SAND and GRAVEL. Jar shake test revealed no sheen.	Fill	0.0	Dry to Moist
1												
2												
3												
4							Dk. Brown		3' to 4', SILT	ML	0.0	Dry
5							Orange		4' to 5', Loose, fine to coarse SAND, fine gravel.	SP	0.0	Dry
6		S-2	Macro core				Orange / Brown		Loose, fine to coarse SAND, some fine gravel. No impact.	SP	0.0	Dry
7												
8												
9												
10												
11									End of boring: 10'			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: No perched water. Jar shake test equaled no sheen.

PROJECT NO.	11175065
BORING NO.	DGP-137

URS Corporation

TEST BORING LOG

BORING NO:	DGP-138		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Area E
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	5' bgs
DATE STARTED:	02/12/08		
DATE FINISHED:	02/12/08		
DRILLER:	Brain		
GEOLOGIST:	J. Harshman		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH	SAMPLE			BLOWS	REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"	RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Macro core		50"	Black		0' to 3', MGP fill material. Black ALM and coal. Jar shake test revealed no sheen.	Fill	0.0	Dry
1											
2											
3											
4						Brown		3' to 4' Stiff SILT.	ML	0.0	Dry
5						Orange		4' to 5', Loose fine to coarse SAND, some fine gravel.	SP	0.0	Dry
6								End of boring: 5'			
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: No perched water. Jar shake test equaled no sheen.

PROJECT NO.	11175065
BORING NO.	DGP-138

URS Corporation

TEST BORING LOG

BORING NO:	HISB-80		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Intersection Street
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	15' bgs
DATE STARTED:	01/18/08		
DATE FINISHED:	01/18/08		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:			

	CAS.	SAMPLER	CORE	TUBE
TYPE		Macrocore		
DIA.				
WT.				
FALL				

DATE	TIME	LEVEL	TYPE

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Dk. Brown		0' to 1', Loamy SAND.	SP	0.0	
1											
2						Orange / Brown		1' to 5', Fine to medium SAND.	SP	0.0	Dry
3											
4											
5											
6		S-2	Macro core		46"	Lt. Brown		5' to 8', Loose, fine to coarse SAND, some fine gravel, Perched water.	SP	0.0	Wet
7											
8											
9						Lt. Brown		8' to 10', Loose, fine to medium SAND, trace fine gravel. No impacts.	SP	0.0	Dry
10											
11		S-3	Macro core		42"	Lt. Brown / Yellow / Orange		Loose, fine to very coarse SAND, some fine to coarse gravel. No impacts.	SP	0.0	Dry
12											
13											
14											
15											
16								End of boring: 15' bgs			
17											
18											
19											
20											

Comments: 0' to 5' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	HISB-80

URS Corporation

TEST BORING LOG

BORING NO:	HISB-81		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Intersection Street
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	15' bgs
DATE STARTED:	01/18/08		
DATE FINISHED:	01/18/08		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:			

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Dk. Brown		0' to 2' Loamy topsoil	SP	0.0	
1												
2							Lt. Brown		2' to 5', Loose, fine to coarse SAND, some fine gravel.	SP	0.0	Dry
3												
4												
5												
		S-2	Macro			52"	Lt. Brown /		Loose, fine to coarse SAND, trace very coarse	SP	0.0	Dry
6			core				Yellowish		sand trace fine gravel. No visiable impacts.			
7												
8												
9												
10												
		S-3	Macro			53"	Lt. Brown		Loose, fine to coarse SAND, trace very coarse	SP	0.0	Dry
11			core				/ Brown /		sand, little well graded fine gravel. No visible			
12							Dk. Brown		impacts.			
13												
14												
15												
									End of boring: 15' bgs			
16												
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	HISB-81

URS Corporation

TEST BORING LOG

BORING NO:	HISB-82		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Intersection Street
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	15' bgs
DATE STARTED:	01/07/08		
DATE FINISHED:	01/07/08		
DRILLER:	Charlie		
GEOLOGIST:	J. Harshman		
REVIEWED BY:			

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Dk. Brown		0' to 2', Loamy topsoil.	SP	0.0	
1												
2							Lt. Brown		2' to 5', Fine to coarse SAND, some fine gravel.	SP	0.0	Dry
3												
4												
5												
		S-2	Macro			52"	Lt. Brown		Loose, fine to coarse SAND, trace very coarse	SP	0.0	Dry
6			core				/ Orange		sand, little well graded fine to coarse gravel.			
7							/ Yellow					
8												
9												
10												
		S-3	Macro			56"	Lt. Brown		Loose, fine to coarse SAND, trace very coarse	SP	0.0	Dry
11			Core				/ Orange		sand, little well graded fine to coarse gravel. No			
12							/ Yellow		visible impacts.			
13												
14												
15												
									End of boring: 15' bgs			
16												
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	HISB-82

URS Corporation

TEST BORING LOG

BORING NO:	HISB-83		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Intersection Street
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	15' bgs
DATE STARTED:	01/16/08		
DATE FINISHED:	01/16/08		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:			

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Dk. Brown		0' to 2', Loamy topsoil.	SP		
1											
2						Lt. Brown		2' to 5', Fine to coarse SAND, some fine gravel. Undetermined odor.	SP	3.0	Moist
3											
4											
5											
		S-2	Macro		48"	Lt. Brown		Loose, fine to coarse SAND, little well graded fine gravel. Moderat to strong hydrocarbon (degraded gasoliline-type) odor. Jar shake test: No sheen.	SP	75.0	Dry
6			core								
7											
8											
9											
10											
		S-3	Macro		50"	Brown /		Loose, fine to very coarse SAND, little well graded fine gravel. Strong petroleum-type odor, no visible staining. Jar shake test: No sheen.	SP	250.0	Dry
11			core			Lt. Brown					
12						/ Grey					
13											
14											
15											
								End of boring: 15' bgs			
16											
17											
18											
19											
20											

Comments: 0' to 5' excavated by hand tools. SP 5' to 10', Sample submitted to lab. SP 10' to 15' sample submitted to lab.

PROJECT NO.	11175065
BORING NO.	HISB-83

URS Corporation

TEST BORING LOG

BORING NO:	IPR-1
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	45'
DATE STARTED:	01/07/08
DATE FINISHED:	01/07/08
DRILLER:	C. Guzzardo
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.	3"	2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH	SAMPLE					REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	BLOWS PER 6"		RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Grab			N/A	Dk. Brown		0' to 3', Fine to medium SAND and some fine to coarse gravel.	SP	0.0	Dry
1												
2												
3												
4							Lt. Brown		3' to 5', Fine to coarse SAND, little to some fine to coarse gravel.	SP		Dry
5												
6		S-2	Macro core			56"	Lt. Brown / Yellow		5' to 7', Loose, fine to very coarse SAND, little fine to coarse gravel.	GP	0.0	Dry
7												
8							Brown /Dk. Brown /Tan		7' to 10', Loose to medium dense, intervals brown/dark brown/tan fine to coarse SAND, some fine gravel.	SP	0.0	Dry
9												
10												
11		S-3	Macro core			46"	Yellow / Orange		Losse, fine to medium SAND, trace to little fine gravel.	SP	0.0	Dry
12												
13												
14												
15												
16		S-4	Macro core			42"	Tan/ Yellow / Orange		Loose to medium dense, fine to coarse SAND, trace very coarse sand, some fine to coarse gravel. No visible impacts.	SP/GP	0.0	Dry
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools. Boring advanced to 45 ft, then installed temporary 3-in casing and completed boring with 1-inch PVC well.

PROJECT NO.	11175065
BORING NO.	IPR-1

URS Corporation

TEST BORING LOG

BORING NO:	IPR-1
PROJECT:	KeySpan Hempstead MGP
SHEET:	2 of 3
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
BORING LOCATION:	KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
21		S_5	Macro core			38"	Yellow/ Orange/ Tan		Loose, fine to very coarse SAND, little fine gravel. No impacts.	SW	0.0	Dry
26		S-6	Macro core			36"	Yellow/ Orange/ Tan		25' to27', Loose, fine to verycoarse SAND, little fine gravel. No impacts.	SW	0.0	Dry
28							Brown Stained		27' to 30', Brown stained and coated (MGP) imapcted fine to coarse SAND, trace to little fine gravel (SP). Possible trace of DNAPL, Moderate MGP odor. Water table at about 28' bgs.	SP	50.0	Wet
31		S-7	Macro core			32"			30' to 32', Medium dense, fine to medium SAND. Partially saturated with DNAPL. Stained and coated, intervals of very thin seams of DNAPL imapct moderate to strong MGP odor, water saturated.	SW	280.0	
34							Lt. Brown		32' to 35', Fine to medium SAND, trace fine gravel, no visible impact.			Wet
36		S-8	Macro core			32"	Lt. Brown / Tan / Orange		Medium dense, fine to caorse SAND, some fine to coarse gravel. No visible impact.	SW	0.0	Wet

COMMENTS: 32' HCN:3.

PROJECT NO.	IPR-1
BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR- 1	
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
41		S-9	Macro core			40"	Lt. Brown / Yellow / Orange		40' to 45', Loose to medium dense, fine to medium SAND, trace coarse sand, trace to little gravel. No visible impacts.	SP	0.0	Wet
46									End of boring: 45' bgs			

COMMENTS:	PROJECT NO.	IPR- 1
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 2
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe/HSA
GROUNDWATER:	~ 27 bgs
TOTAL DEPTH:	90'
DATE STARTED:	01/07/08
DATE FINISHED:	01/09/08
DRILLER:	C. Guzzardo
GEOLOGIST:	J. Harshman
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE	Temp.	Macrocore		
				DIA.	3"	2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab			N/A	Dk. Brown		Fine to medium SAND, some fine to coarse gravel, trace ALM, slag, coal. No MGP odors.	Fill/SP	0.0	Dry
1												
2												
3												
4												
5												
6		S-2	Macro core			30"	Dk. Brown		5' to 6', Fine to medium SAND, trace fine gravel.	SP	0.0	Dry
7							Lt. Brown / Yellow		6' to 10', Fine to medium SAND, trace coarse sand, trace coarse gravel. No visible impacts.	SP		Dry
8												
9												
10												
11		S-3	Macro core			48"	Lt. Brown / Yellow		Fine to coarse SAND, some fine to coarse gravel. No impact.	SW	0.0	Dry
12												
13												
14												
15												
16		S-4	Macro core				Lt. Brown / Yellow		Fine to coarse SAND, some fine to coarse gravel. No impact.	SW	0.0	Dry
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools. Advanced boring to 90 ft, then installed temporary 3-in casing to 70 ft (refusal) and installed temporary 1-in PVC well. Later removed temporary well and installed 6-in PVC well to 70 ft.

PROJECT NO.	11175065
BORING NO.	IPR- 2

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 2
PROJECT: KeySpan Hempstead MGP	**SHEET:** 2 of 5
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** KeySpan Property

DEPTH FEET	STRATA SYMBOL	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
21		S-5	Macro core			30"	Orange / Lt. Brown		20' to 23', Fine to very coarse SAND, trace to little fine gravel.	SW	0.0	Dry
22												
23												
24							Lt. Brown		23' to 25', Fine to coarse SAND, trace fine gravel. No impacts.	SP	0.0	Dry
25												
26		S-6	Macro core			42"	Grey / Lt. Brown		Some MGP staining at 28', fine to medium SAND, trace coarse sand. 28' to 29' interval is coated by DNAPL, slight MGP odor, trace to little DNAPL. (water saturated) at 27' to 30'. Water table at about 27' bgs.	SP	45.0	Wet
27												
28												
29												
30												
31		S-7	Macro core			35"			30' to 32', DNAPL saturated fine to medium SAND, stained and coated black to brown. Moderate to strong MGP odor, sheen.	SP	450.0	Wet
32												
33							Lt. Brown		32' to 33', Fine to medium SAND. Faint MGP odor.			Wet
34									33' to 33.5', Fine to medium SAND, with one large cobble, DNAPL pooling around thin seams of DNAPL present.			
35							Lt. Brown		33.5' to 35', Fine to medium SAND, trace fine gravel. No visible impact. Faint MGP odor			Wet
36		S-8	Marco core			30"				SP/GP	400.0	Wet
37									Medium dense, fine to very coarse SAND and fine to coarse GRAVEL, intervals of 2" to 3" seams of DNAPL saturation, with strong MGP odor, stained black/brown and coated, DNAPL pooling around coarse gravel (water saturated)			
38												
39												
40												

COMMENTS: 27' HCN:1, 32' HCN = 8, 32.5' H_2S = 2, 42' HCN = 0,42' H_2S = 1. After 30' driller changes to M. Meade for rest of core.

PROJECT NO.	IPR- 2
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-2
PROJECT:	KeySpan Hempstead MGP
SHEET:	3 of 5
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
BORING LOCATION:	KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
41		S-9	Macro core		34"	Lt. Brown		40' to 43', Loose to medium dense, fine to medium SAND, trace fine gravel.	SP	0.0	Wet
43								43' to 44', 2" DNAPL saturated seam, stained and coated. Moderate MGP odor.	SP	30.0	Wet
45								44' to 45', Fine to medium SAND. Faint MGP odor.	SP	0.0	Wet
46		S-10	Macro core		20"	Lt. Brown		45' to 49', Fine to very coarse SAND, trace fine to coarse gravel. Sheen, faint MGP odor.	SP	6.0	Wet
50								49' to 50', DNAPL saturated fine to medium SAND, stained and coated black. MGP odor, trace fine gravel sheen.	SP	90.0	Wet
51		S-11	Macro core		24"	Lt. Brown / Grey		Very loose, very fine to medium SAND, trace coarse sand, very thin seam (1") of DNAPL saturation at 53', slight/faint MGP odor.	SP	10.0	Wet
55											
56		S-12	Macro core		26"	Lt. Brown and trace Orange		55' to 59', Medium dense, very fine to medium SAND, intervals of trace coarse sand, interval at 58' with fine to coarse gravel.	SP		Wet
59								59' to 60', Fine to medium SAND with very thin seams (1") of DNAPL saturation, trace fine gravel, faint to moderate. MGP odor.	SP	43.0	Wet
60											

COMMENTS: 52.5' HCN: 2.

PROJECT NO.	IPR-2
BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR- 2	
PROJECT:	KeySpan Hempstead MGP									SHEET:	4 of 5	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property	

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-13	Macro core			30"	Lt. Grey / White		Loose, very fine to medium "beach" SAND, little dark grey very fine to fine sand, trace intervals of tan sand. No visible impact, very faint MGP odor.	SP	0.0	Wet
61											2.0	
62												
63												
64												
65												
		S-14	Macro core			32"	White / Lt. Grey / Orange brown		Medium dense, very fine to fine SAND, trace to little medium sand. No visible impact.	SP	0.0	Wet
66												
67												
68												
69												
70												
		S-15	Macro core			36"	Tan / Yellow / Lt. Brown		Very fine to medium SAND, trace clay varves (white clay), very thin. No visible impacts.	SP	0.0	Wet
71												
72												
73												
74												
75												
		S-16	Macro core			32"	Lt. Brown / Orange		Very fine to medium SAND, trace clay varves (very thin). No visible impact.	SP	0.0	Wet
76												
77												
78												
79												
80												

COMMENTS:	PROJECT NO.	IPR- 2
	BORING NO.	11175065

URS Corporation										TEST BORING LOG	
										BORING NO:	IPR- 2
PROJECT:	KeySpan Hempstead MGP									SHEET:	5 of 5
CLIENT:	KeySpan									JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-17	Macro core			34"	Lt. Brown and Orange		Medium dense, very fine to fine SAND, trace medium sand. No visible impact.	SP	0.0	Wet
81												
82												
83												
84												
85												
		S-18	Macro core			32"	Lt. Brown and Orange		Medium dense, very fine to fine SAND, trace medium sand. No visible impact.	SP	0.0	Wet
86												
87												
88												
89												
90												
91									End of boring: 90' bgs			
92												
93												
94												
95												
96												
97												
98												
99												
100												

COMMENTS:	PROJECT NO.	IPR- 2
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-4		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	KeySpan Property
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:	~25'	**TOTAL DEPTH:**	65'
DATE STARTED:	01/22/08		
DATE FINISHED:	01/22/08		
DRILLER:	M. Meade		
GEOLOGIST:	J. Harshman		
REVIEWED BY:			

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			38"	Dk. Brown		FILL: Fine to medium sand, fine to coarse gravel, red bricks, wood.	Fill	0.0	Dry
1												
2												
3												
4												
5												
		S-2	Macro core			25"			FILL: Red bricks, gravel, apparent gypsum drywall material, some black stained gravel, petroleum type odor.	Fill	2 to 3	Dry
6												
7												
8												
9												
10												
		S-3	Macro core			48"			Loose, black stained and coated, heavy petroleum type impact. Moist at 10' to 11'. Fine to coarse SAND, some poorly graded fine to coarse gravel. Very strong petroleum odor.	SP	200.0	Moist
11											HCN:	
12											11.0	
13												
14											150.0	
15												
		S-4	Macro core			36"	Brown		Loose and medium dense. Some black staining at 23' to 25', heavy petroleum impact. Fine to coarse SAND, some poorly graded fine gravel, strong petroleum type odor.	SP	250.0	Moist
16												
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools. Advanced boring to 90 ft, then installed temporary 3-in casing to 70 ft (refusal) and installed temporary 1-in PVC well. Later removed temporary well and installed 6-in PVC well to 70 ft.

PROJECT NO.	11175065
BORING NO.	IPR-4

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 4
PROJECT:	KeySpan Hempstead MGP
SHEET:	2 of 4
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
BORING LOCATION:	KeySpan Property

DEPTH FEET	STRATA SYMBOL	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	DESCRIPTION CONSIST HARD	DESCRIPTION MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core		40"			20' to 23', Loose, intervals of black staining. Fine to very coarse SAND at 20' to 23' with black staining. Strong petroleum odor.	SP	200.0	Moist
21											
22											
23								23' to 25', Fine to coarse SAND, little fine gravel. No staining, moderate odor.	SP	440.0	Dry
24											
25											
		S-6	Macro core		44"	Grey		25' to 27', Loose, Fine to coarse SAND, with some black staining. At about 25' water table and strong petroleum type odor (360 ppm).	SP	360.0	Wet
26											
27											
						Black		27' to 28', Loose, stained and coated fine to coarse SAND. Strong petroleum odor.	SP	200.0	Wet
28											
						Lt. Brown / Orange		28' to 30', Loose, fine to medium SAND, MGP odor, with little brown staining. Liner stained.	SP		Wet
29											
30											
		S-7	Macro core		38"			30' to 32', MGP impacted. Stained brwon with very thin seams of DNAPL saturation (75 to 100%). Trace DNAPL product inside liner. Fine to Medium SAND. Strong MGP odor.	SP	260.0	WET
31											
32											
								32' to 35', Loose, fine to medium SAND, trace coarse sand. No staining.	SP	10.0	Wet
33											
34											
35											
		S-8	Macro core		38"	Lt. Brown / Tan / Yellow		35' to 37', Loose, fine to medium SAND, trace coarse sand and fine gravel. Very thin seam (2") of DNAPL saturation with strong MGP odor.	SP	500.0	Wet
36											
37											
								37' to 40', Loose, fine to very coarse SAND with fine to coarse gravel. No staining, slight MGP odor.	GP/SP	50.0	Wet
38											
39											
40											

COMMENTS: 26.5', HCN: 2

PROJECT NO.	IPR- 4
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 4
PROJECT: KeySpan Hempstead MGP	**SHEET:** 3 of 4
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
41		S-9	Macro core			38 "	Lt. Brown / Orange		Loose to medium dense, fine to coarse SAND, trace coarse sand little well graded fine to coarse gravel. No Staining no odors.	SP	0.0	Wet
46		S-10	Macro core			32"	Orange / Yellow / Brown		45' to 47', Loose to medium dense, fine to coarse SAND, trace very coarse sand and fine gravel. No impacts.	SP	0.0	Wet
48							Lt. Brown		47' to 50', Loose, fine to medium SAND. No impacts.	SP	0.0	Wet
51		S-11	Macro core			37"	Lt. Brown / Orange		Loose, fine to medium SAND, trace coarse sand and fine gravel. No Impact.	SP	0.0	Wet
56		S-12	Macro core			22"	Lt. Brown / Orange		Loose, fine to coarse SAND, trace fine gravel. DNAPL saturation (75 to 100%) at 60'. Black, MGP odor and DNAPL product present.	SP	0.0	Wet
60											10.0	

COMMENTS:

PROJECT NO.	IPR- 4
BORING NO.	11175065

URS Corporation

TEST BORING LOG

PROJECT:	KeySpan Hempstead MGP	**BORING NO:**	IPR-4
CLIENT:	KeySpan	**SHEET:**	4 of 4
BORING CONTRACTOR:	Fenley and Nicol	**JOB NO.:**	11175065
		BORING LOCATION:	KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-13	Macro core			33"	Grey Lt. Brown / Yellow		Loose, intervals of grey and light brown/yellow very fine to medium SAND. No staining, no impact.	SP	0.0	Wet
61												
62												
63												
64												
65												
									End of boring: 65' bgs			
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

COMMENTS:

PROJECT NO.	IPR-4
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-5
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~27' bgs
TOTAL DEPTH:	55'
DATE STARTED:	01/10/08
DATE FINISHED:	01/10/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0									Asphalt pavement at surface.			
		S-1	Grab						0' to 2', Black stained SAND and GRAVEL, with some MGP material (ALM, coal). NO odor.	SP	0.0	Moist
1												
2												
							Lt. Brown		2' to 5', Fine to coarse SAND and some fine to coarse gravel.	SP	0.0	Dry
3												
4												
5												
		S-2	Macro core			54"	Lt. Brown / Yellow		Loose,fine to very coarse SAND with some well graded fine to coarse gravel. No visible impacts.	SP	0.0	Dry
6												
7												
8												
9												
10												
		S-3	Macro core			53"	Lt. Brown / Yellow / Orange		Loose, fine to very coarse SAND, with some well graded fine to coarse gravel. No visible impacts.	SP	0.0	Dry
11												
12												
13												
14												
15												
		S-4	Macro core			42"	Lt. Brown / Yellow / Orange		Fine to very coarse SAND, with some well graded fine to coarse gravel. Very faint odor at 20'. No visible impact.	SP	3.0	Dry
16												
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	IPR-5

URS Corporation

TEST BORING LOG

BORING NO:	IPR-5
PROJECT: KeySpan Hempstead MGP	**SHEET:** 2 of 3
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core			32"	Lt. Brown / Yellow / Orange		20' to 24" Fine to very coarse SAND, with some well graded fine to coarse gravel. Faint to moderate MGP odor.	SP	10 to 40.0	Dry
21												
22												
23												
24									24' to 25', Black and brown MGP staining, fine to coarse SAND, little to fine coarse gravel. Little coating faint to moderate MGP odor.	SP	60.0	Dry
25												
		S-6	Macro core			32"	Brown / Tan / Brown		Medium dense fine to medium SAND, trace coarse sand, well graded fine to coarse gravel. Some staining and coating (MGP impact) at 29' to 30', possibly trace of DNAPL at 29" to 30'. Water table at about 27'	SP	80.0	Moist to Wet
26												
27												
28												
29												
30												
		S-7	Macro core			24"			Loose to medium dense, fine to medium SAND, trace coarse sand, trace well graded fine gravel, little to some brown staining and coating. Faint to moderate MGP odor, sheen, (water saturated), possibly a trace of DNAPL (liner stained).	SP	0.0	Wet
31												
32												
33												
34												
35												
		S-8	Macro core			40"	Yellow / Orange		35' to 38' Fine to very coarse SAND and fine to coarse poorly graded GRAVEL. No visible impacts.	GP/SP	0.0	Wet
36												
37												
38												
							Lt. Brown / Tan / Orange		38' to 40', Fine to medium SAND, little coarse sand, trace fine to coarse gravel. No visible impact.	GP/SP		Wet
39												
40												

COMMENTS:

PROJECT NO.	IPR-5
BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR- 5	
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property	

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
41		S-9	Macro core			34"	Yellow / Lt. Brown		40' to 42', Fine to very coarse SAND and pootly graded fine to coarse GRAVEL. No visible impacts.	GP/SP	0.0	Wet
42												
43							Yellow / Lt. Brown		42' to 45', Fine to medium SAND, trace coarse sand, trace well graded fine gravel. No visible impacts.	SP	0.0	Wet
44												
45												
46		S-10	Macro core			38"	Yellow / Lt. Brown		Intervals of fine to coarse SAND and poorly graded GRAVEL and fine to medium SAND. No visible impacts.	GP/SP	0.0	Wet
47												
48												
49												
50												
51		S-11	Macro core			29"	Lt. Brown		Loose to medium dense. Little yellow/orange banding. Fine to medium SAND, trace coarse sand, trace well graded fine gravel. No visible impacts.	SP	0.0	Wet
52												
53												
54												
55												
56									End of boring: 55' bgs			
57												
58												
59												
60												

COMMENTS:	PROJECT NO.	IPR- 5
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 6
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~27' bgs
TOTAL DEPTH:	65'
DATE STARTED:	01/15/08
DATE FINISHED:	01/15/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Brown		0' to 3', Fill Material. Bricks, concrete, fine to medium sand and gravel, ALM.	Fill	0.0	Dry
1												
2												
3												
4							Dk. Brown		3' to 5', Fine to medium SAND, some fine to coarse gravel.	SP	0.0	Dry
5												
6		S-2	Macro core			42"	Dk. Brown / Lt. Brown / Tan		Loose, fine to coarse SAND, some poorly graded fine gravel, trace coarse gravel. Very faint odor (possibly MGP odor).	SP	0.4	Dry
7												
8												
9												
10												
11		S-3	Macro core			54"	Dk. Brown / Lt. Brown / Tan		10' to 13', Loose, fine to coarse SAND, some poorly graded fine gravel, trace coarse gravel. Very faint odor (possibly MGP odor).	SP	0.0	Dry
12												
13												
14									13' to 14', Black stained, fine to medium SAND, trace fine gravel. Slight odor	SP		Dry
15							Lt. Brown		14' to 15', Loose, fine to medium SAND, trace fine gravel, slight odor.	SP	80.0	Dry
16		S-4	Macro core			45"			Loose, black stained with some coating, fine to coarse SAND with some poorly graded fine gravel, trace coarse gravel. Moderate MGP odor.	SP	80.0	Dry
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools. 17', HCN = 1.

PROJECT NO.	11175065
BORING NO.	IPR- 6

URS Corporation

TEST BORING LOG

BORING NO:	IPR-6		
PROJECT:	KeySpan Hempstead MGP	**SHEET:**	2 of 4
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**BORING LOCATION:**	KeySpan Property

DEPTH FEET	STRATA SYMBOL	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
21		S-5	Macro core			42"	Black Stained		Loose, black stained and coated (MGP impact), fine to medium SAND, trace coarse sand, little fine gavel, trace fight brown sand (not stained) at 25'. Moderate to strong MGP odor.	SP	260.0	Dry
26		S-6	Macro core			42"	Lt. Brown		Loose, light brown with thin intervals of black staining. Fine to medium SAND with little coarse sand at 29' to 30', trace well graded fine gravel wet at ~27' to 28'. Strong MGP odor, sheen, trace DNAPL coating.	SP	300.0	Wet
31		S-7	Macro core			40"			Loose to medium dense, brown and black stained and coated (MGP impact), fine to medium SAND. Sheens, intervals of partial DNAPL saturation. Strong MGP odor, liner stained.	SP	315.0	Wet
36		S-8	Macro core			42"	Lt. Brown		35' to 39.5', Loose fine to medium SAND, trace coarse sand, faint MGP odor (30 ppm).	SP	30.0 to 250.0	Wet
39									39.5' to 40', DNAPL saturated (100%) fine to medium SAND. Black DNAPL liquid present, strong MGP odor, sheen, liner stained , trace to little fine gravel at 39.5' to 40'.	SP		Wet

COMMENTS: 22', HCN = 1. 27' HCN = 2. 33', HCN = 3.

PROJECT NO.	IPR-6
BORING NO.	11175065

URS Corporation										TEST BORING LOG	
										BORING NO:	IPR- 6
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 4
CLIENT:	KeySpan									JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-9	Macro core			30"	Lt. Brown / Orange / Yellow		Loose to medium dense, fine to coarse SAND and well gradedfine to coarse gravel. Pocket of DNAPL saturated (100%) sand at 43' with strong MGP odor, sheen.	SP	10.0 to 150.0	Wet
41												
42												
43												
44												
45												
		S-10	Marco core			35"	Lt. Brown / Yellow		Loose to medium dense, fine to very coarse SAND, little well graded fine gravel. Pocket of DNAPL saturated (100%) sand at 45' with DNAPL pooling around cobble.	SP	60.0	Wet
46												
47												
48												
49												
50												
		S-11	Macro core			30"	Lt. Brown / Yellow		Fine to coarse SAND, trace to little very coarse sand at 53', trace well graded fine gravel. No visible impacts.	SP	0.7	Wet
51												
52												
53												
54												
55												
		S-12	Macro core				Lt. Brown Tan with Bands of Orange		Loose to medium dense, fine to coarse SAND, little very coarse sand at 59' to 60', little fine to coarse gravel. No wet visible impacts.	SP	0.0	Wet
56												
57												
58												
59												
60												

COMMENTS:	PROJECT NO.	IPR- 6
	BORING NO.	11175065

URS Corporation										TEST BORING LOG	
										BORING NO:	IPR- 6
PROJECT:	KeySpan Hempstead MGP									SHEET:	4 of 4
CLIENT:	KeySpan									JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-13	Macro core			30"	Lt. Brown		Loose, fine to coarse SAND, trace fine to coarse gravel. No visible impacts.	SP	0.0	Wet
61												
62												
63												
64												
65												
									End of boring: 65'bgs			
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

COMMENTS:	PROJECT NO.	IPR- 6
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 7
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~ 29' bgs
TOTAL DEPTH:	45'
DATE STARTED:	01/03/08
DATE FINISHED:	01/04/08
DRILLER:	C. Guzzardo
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH	SAMPLE					REC	DESCRIPTION				REMARKS	
				BLOWS PER 6"					MATERIAL			
FEET	STRATA	NO.	TYPE			RQD	COLOR	CONSIST HARD	DESCRIPTION	USCS	PID	Moist
0		S-1	Grab				Dk. Brown		0' to 1', Loamy topsoil.	SP	0.0	Dry
1									1' to 5', Fine to medium SAND, trace coal, trace to little fine gravel.	SP	0.0	Dry
2												
3												
4												
5												
		S-2	Macro			32"	Lt. Brown		5' to 7', Loose, fine to coarse SAND, little fine gravel.	SP		Dry
6			core				/ Brown					
7									7' to 10', Black/brown stained and coated (MGP impacted), fine to medium SAND, trace coarse sand, trace to little fine gravel. Modrate MGP odor.	SP	125.0	Dry
8												
9												
10												
		S-3	Macro			49"			Black/brown stained and coated (MGP impacted), fine to medium SAND, trace coarse sand, trace to little fine gravel. Moderate MGP odor.	SP	88.0	Moist
11			core									
12												
13												
14												
15												
		S-4	Macro			N/A			Black/brown stained and coated (MGP impacted), fine to medium SAND, trace coarse sand, trace to little fine gravel. Moderate MGP odor.	SP	60.0	Dry
16			core									
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	IPR- 7

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 7
PROJECT: KeySpan Hempstead MGP	**SHEET:** 2 of 3
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro			24"	Brown		20' to 22', Mud-like, very fine sand. Impacted by possible NAPL, sheens. MGP odor.	SP/GP	100.0	
21			core									
22												
									22' to 24', Brown stained fine to coarse SAND, fine to coarse gravel with MGP impact. Moderate MGP odor.	SP/GP		Moist
23												
24												
									24' to 25', Fine to coarse SAND, some fine to coarse gravel. No impact.	SP/GP		Dry
25												
		S-6	Marco			42"	Lt. Brown		25' to 29', Medium dense, fine to coarse SAND, trace very coarse sand, with trace fine gravel, black 2" seam at 26' (80 ppm). MGP odor and impact seam.	SP	80.0	Moist
26			core									
27												
28												
29									29' to 30', Very fine to fine SAND, stained and coated by possible DNAPL. Moderate MGP odor. Water table at ~29' bgs.		360.0	Wet
30												
		S-7	Macro			30"			30' to 30.5', Very fine to fine brown stained (MGP impacted) SAND, with very thin seams of black and brown staining (possible DNAPL). Moderate MGP odor.	SP/GP	440.0	Wet
31			core									
32												
							Lt. Brown		30.5' to 35', Fine to medium SAND, trace coarse sand, trace fine gravel. No visible impact.	SP/GP	60.0	Wet
33												
34												
35												
		S-8	Macro			32"	Lt. Brown		35' to 37', Medium dense, fine to medium SAND, trace fine gravel. Faint MGP odor. No visible impact.	SP/GP	8.0	Moist to Wet
36			core									
37												
							Lt. Brown		37' to 40', Medium dense fine to coarse SAND,	SP/GP		Moist
38							/ Orange		some fine to coarse gravel, small cobble. Very faint MGP odor.			to Wet
39												
40												

COMMENTS:

PROJECT NO.	IPR- 7
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 7
PROJECT:	KeySpan Hempstead MGP
SHEET:	3 of 3
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
BORING LOCATION:	KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-9	Macro			28"	Lt. Brown		40' to 43', Medium dense, SAND and GRAVEL,	SP/GP	0.0	Wet
41			core				/ Orange		fine to very coarse sand with fine to coarse gravel. No visible impact.			
42												
43												
							Lt. Brown		43' to 45', Fine to medium SAND, trace coarse	SP/GP		Wet
44							/ Orange		sand, trace fine gravel. No impact.			
45												
									End of boring: 45' bgs			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS:

PROJECT NO.	IPR- 7
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-8
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~28' bgs
TOTAL DEPTH:	45'
DATE STARTED:	01/09/08
DATE FINISHED:	01/10/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0								Asphalt at surface.			
		S-1	Grab			Dk. Brown		FILL: Loose, fine to medium SAND, some fill material consisting of coal fragmenmts, slag, some gravel.	SP/Fill	0.0	Dry
1											
2											
3											
4											
5											
		S-2	Macro core		34"	Dk. Brown		5' to 9', Fine to very coarse SAND, some fine to coarse gravel.	SP	0.0	Dry
6											
7											
8											
								9' to 10', FILL: Black stained and coated fine to coarse SAND and fine gravel, trace concrete at 9.5' to 10' (possible foundation). Faint MGP odor.	SP/GP	76.0	Moist to Wet
9											
10											
		S-3	Macro core		38"			Loose to medium dense, brown/black stained (MGP impacted), fine to coarse SAND. Stained and coated partial DNAPL saturation, trace to little fine gravel, moderate to strong MGP odor.	SP	137.0	Moist to Dry
11											
12											
13											
14											
15											
		S-4	Macro core		36"	Black Stained		15' to 18', Black stained (MGP impact) and coated with partial DNAPL saturation, fine to coarse SAND and little fine gravel. Strong MGP odor.	SP	324.0	Dry to Moist
16											
17											
18											
						Brown/ Black Stained		18' to 20', Brown/Black stained and coated (MGP impact), fine to coarse SAND, little fine gravel, partial DNAPL saturation.	SP		Moist
19											
20											

Comments: 0' to 5' excavated by hand tools. 12.5' HCN: 1. 16.5' HCN: 3.

PROJECT NO.	11175065
BORING NO.	IPR-8

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 8		
PROJECT:	KeySpan Hempstead MGP	**SHEET:**	2 of 3
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**BORING LOCATION:**	KeySpan Property

DEPTH FEET	STRATA SYMBOL	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core			36"	Brown and Black Stained		Brown and black stained and coated (MGP impact), fine to coarse SAND, partial DNAPL saturation possible, little fine gravel, strong MGP odor.	SP	400.0	Moist
21												
22												
23												
24												
25												
		S-6	Marco core			36"	Brown Stained		25' to 28', Loose brown stained (MGP impacted), stained and coated fine to coarse SAND, trace fine gravel wet at 28' bgs. Strong MGP odor.	SP	400.0	
26												
27											120.0	
28												
							Lt. Brown		28' to 30', Fine to medium SAND (no staining). Faint to moderate MGP odor.	SP	50.0	Wet
29												
30												
		S-7	Macro core			42"	Lt. Brown / Tan		Loose to medium dense, fine to medium SAND, trace fine gravel. No staining, no visible impact, faint MGP odor (dissolved).	SP	35.0	Wet
31												
32												
33												
34												
35												
		S-8	Macro core			39"	Lt. Brown / Yellow		Medium dense, fine to medium SAND, trace fine gravel, little coarse sand and fine to coarse gravel at 39.5' to 40'. No visible impact.	SP	0.0	Wet
36												
37												
38												
39												
40												

COMMENTS: 42' HCN: 5.

PROJECT NO.	IPR- 8
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 8
PROJECT: KeySpan Hempstead MGP	**SHEET:** 3 of 3
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-9	Macro core			33"	Lt. Brown / Orange / Yellow		Medium dense, fine to very coarse SAND and fine to coarse GRAVEL. No visible impacts or odors.	GP/SP	0.0	Wet
41												
42												
43												
44												
45												
									End of boring: 45' bgs			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS:

PROJECT NO.	IPR- 8
BORING NO.	11175065

URS Corporation

TEST BORING LOG

PROJECT:	KeySpan Hempstead MGP							**BORING NO:**	IPR-9
CLIENT:	KeySpan							**LOCATION:**	KeySpan Property
BORING CONTRACTOR:	Fenley and Nicol							**JOB NO.:**	11175065
GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**DRILLING METHOD:**	Geoprobe
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore		**TOTAL DEPTH:**	8' bgs
				DIA.		2"		**DATE STARTED:**	04/09/08
				WT.				**DATE FINISHED:**	04/09/08
				FALL				**DRILLER:**	K. Kegel
				*** POCKET PENETROMETER READING**				**GEOLOGIST:**	J. Harshman
								REVIEWED BY:	

DEPTH	SAMPLE					DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Grab			Dk. Brown		FILL: Loose, fine to medium SAND, with some fine to coarse gravel.	Fill SP	0.0	
1											
2											
3											
4											
5											
		S-2	Macro core		32"			MGP- impacted fill material: Sand, gravel, cobbles. Black staining, MGP odor, concrete fragments at 8'.	Fill	633.0	Moist
6											
7											
8											
								End of boring: refusal 8' bgs			
9								Refusal on possible former tank holder bottom/pad.			
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments: Location of IPR-9 pilot hole likely with in former large storage holder. Fill 5' to 8' HCN:5

PROJECT NO.	11175065
BORING NO.	IPR-9

URS Corporation

TEST BORING LOG

BORING NO:	IPR-9A
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	10' bgs
DATE STARTED:	04/09/02
DATE FINISHED:	04/10/02
DRILLER:	K.Keagel
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH	SAMPLE					REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	BLOWS PER 6"		RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Grab				Dk. Brown / yellow brown		Loose, fine to medium SAND, trace red brick, cobble fragments.	Fill/SP	0.0	Dry to Moist
1												
2												
3												
4												
5												
		S-2	Marco core			48"	Brown		5' to 8', MGP impacted material with perched water. Brown sand, gravel. Sheens 75-100% DNAPL and tar saturated, black stained and coated, strong MGP odor, cohesive and gooey.		300.0	Wet
6												
7												
8									8' to 8.5', Concrete (possibly floor /pad of former storage holder).		600.0	
9									8.5' to 10', Loose, fine to medium SAND, trace coarse sand and fine gravel, slight odor.	SP	100.0	Dry
10												
11									End of boring: 10' bgs			
12												
13												
14												
15												
16												
17												
18												
19												
20												

Comments: Location believed to be within large former storage holder.

PROJECT NO.	11175065
BORING NO.	IPR-9A

URS Corporation

TEST BORING LOG

BORING NO:	IPR-9 B
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	60' bgs
DATE STARTED:	04/11/08
DATE FINISHED:	04/11/08
DRILLER:	K. Kegel
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Macro core			43"	Dk. Brown and Black		FILL: Loose, fine to medium SAND, little coarse sand, some fine to coarse gravel, trace coal. No impact.	Fill/SP	0.0	Moist
1												
2												
3												
4												
5												
		S-2	Macro core			44"	Dk. Brown and Black		FILL: Loose, fine to medium SAND, little coarse sand, some fine to coarse gravel, trace coal, brick and mortar. Little yellow/brown fine to coarse sand at 9.5' to 10'. No impact.	Fill/SP	0.0	Moist
6												
7												
8												
9												
10												
		S-3	Macro core			58"	Orange / Brown		Loose, fine to coarse SAND, some fine to medium gravel at 14' to 15'. MGP impact at 14' to 15', with trace DNAPL, oily, coated, moderate MGP odor.	SP	13.0	Dry / Moist
11												
12											50.0	
13												
14											105.0	
15												
		S-4	Macro core			37"	Lt. Brown / Tan		Loose to medium dense, fine to coarse SAND, with some fine to medium gravel through out. Oily at 18' to 20' with coating strong MGP odor.	SP	200.0	Moist to Dry
16												
17												
18											500.0	
19												
20												

Comments:

PROJECT NO.	11175065
BORING NO.	IPR-9 B

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR-9 B	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property	

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core			34"	Orange / Brown / Yellow		20' to 23', Loose, fine to coarse SAND, with some fine to medium gravel. Moderate MGP odor, slightly coated and oily.	SP	500.0	Moist
21												
22												
23												
							Brown Staining		23' to 25', Loose, fine to coarse SAND, some fine to medium gravel. Perched water, 50 to 75% DNAPL saturated and coated, strong MGP odor.	SP	750.0	Wet
24												
25												
		S-6	Macro core			33"			MGP-impacted troughout: Light to moderate brown staining, fine to coarse SAND with some fine to coarse gravel, oily, coated, moderate to strong MGP odor. Wet at 30', liner stained.	SP	500.0	
26												
27												
28												
29												
30												
		S-7	Macro core			34"			30' to 33', Heavy MCG impact: Numerous thin seams of black 100% DNAPL saturation, fine to medium SAND. Strong MGP odor.	SP	400.0	Wet
31												
32												
33												
							Tan / Lt. Brown		33' to 35', Loose, fine SAND. No staining, little orange sand at 35'. No impact.	SP	3.0	Wet
34												
35												
		S-8	Macro core			34"	Lt Brown / Tan		35' to 39', Loose, fine to medium SAND, trace fine gravel. No impact.	SP	0.0	Wet
36												
37												
38												
39									39' to 40', Dense to very dense, fine to coarse SAND and fine to medium GRAVEL, trace silt. No Impact.	GP/SP		Wet
							Dr. Brown					
40												

COMMENTS:	PROJECT NO.	IPR-9 B
	BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR-9B	
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property	
	SAMPLE						DESCRIPTION					
DEPTH	STRATA			BLOWS		REC		CONSIST	MATERIAL		Remarks	
FEET	SYMBOL	NO.	TYPE	PER 6"		RQD	COLOR	HARD	DESCRIPTION	USCS	PID	MOIST
		S-9	Macro core			34"	Orange Brown		Loose, fine to medium SAND, trace fine to coarse gravel. No impact.	SP	0.0	Wet
41												
42												
43												
44												
45												
		S-10	Macro core			30"	Lt. Brown / Orange		Loose to medium dense, fine to coarse SAND, with little fine to coarse gravel. No impact.	SP	0.0	Wet
46												
47												
48												
49												
50												
		S-11	Macro core			6"	Lt. Brown / Tan		Fine to medium SAND, poor recovery cobble stuck in tip of Macro core. No impact.	SP	0.0	Wet
51												
52												
53												
54												
55												
		S-12	Macro core			36"	Lt. Brown / Tan		Loose, fine to medium SAND, trace fine gravel, trace orange sand seam. No impact.	SP	0.0	Wet
56												
57												
58												
59												
60												
									End of boring: 60' bgs			

COMMENTS:	PROJECT NO.	IPR-9B
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-10
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	40' bgs
DATE STARTED:	04/10/08
DATE FINISHED:	04/10/08
DRILLER:	K. Kegel
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				RQD		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Brown / Yellow		0' to 1', Loose, SAND, some poorly sorted medium to coarse gravel.	SP		
1							Black		1' to 5' Loose, SAND, some poorly sorted medium to coarse gravel, some organics. Strong hydrocarbon-type odor. MGP staining.	SP	3.7	
2												
3												
4												
5												
		S-2	Macro core			51"	Black		Loose, SAND, some fine to coarse gravel. Strong hydrocarbon-type odor with possible solvent-type odor, heavily stained. No saturation but sticky (tar-like).	SP	57.0	Moist
6												
7												
8												
9												
10												
		S-3	Macro core			25"	Black		Loose, SAND, some fine to coarse gravel. Strong hydrocarbon-type odor with possible solvent-type odor, heavily stained. No saturation but sticky (tar-like).	SP	237.0	Moist
11												
12												
13												
14												
15												
		S-4	Macro core			24"	Black		Loose to medium dense, SAND, some fine to coarse gravel. Strong hydrocarbon-type odor. Heavily stained.	SP	104.0	Moist
16												
17												
18												
19												
20												

Comments: SP, 15' to 20' HCN:4

PROJECT NO.	11175065
BORING NO.	IPR-10

URS Corporation

TEST BORING LOG

BORING NO:	IPR-10
PROJECT: KeySpan Hempstead MGP	**SHEET:** 2 of 2
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
21		S-5	Macro core			28"	Black		Loose, fine to coarse SAND, some poorly sorted gravel. Hydrocarbon-type, strong gasoline/hydrocarbon-type odor.	SP	78.0	
26		S-6	Macro core			31"	Black / Grey		25' to 26', Loose, fine to coarse SAND. Strong MGP odor, MGP staining.	SP	112.0	Moist
									26' to 30', Loose, fine to coarse SAND, some poorly sorted gravel, strong MGP odor, 25% DNAPL saturation.	SP		
31		S-7	Macro core			35"	Brown / Yellow		Medium dense, fine to medium SAND. Bands/seams of black DNAPL (slightly saturated) at 30' to 32'. Strong MGP odor and staining.	SP	213.0	Moist
36		S-8	Macro core			18"	Brown / Tan		Loose, fine to medium SAND. No visible impact.	SP	1.7	Wet
									End of boring: 40' bgs			

COMMENTS: SP, 20' to 25', 25' to 30' and 30' to 35', HCN:3.

PROJECT NO.	IPR-10
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-11
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	40' bgs
DATE STARTED:	04/09/08
DATE FINISHED:	04/09/08
DRILLER:	K. Kegel
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH	SAMPLE			BLOWS		REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"		RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Grab				Dk. Brown		Fill: Large tan bricks/morter, sand, fine to coarse gravel. Perched water.	Fill	0.0	Wet
1												
2												
3												
4												
5												
		S-2	Macro			48"			5' to 6', FILL: gravel and grey concrete fragments.	FILL	0.0	Wet
6			core									
							Orange /		6' to 10', Loose, fine to coarse SAND, trace to	SP		Dry
7							Brown /		little fine gravel.			
							Dk. Brown					
8												
9												
10												
		S-3	Macro			40"	Reddish		Loose, fine to coarse SAND, little fine gravel. No	SP	0.0	Moist
11			core				Brown /		imapct.			to Dry
12							Lt. Brown					
13												
14												
15												
		S-4	Macro			0"			No sample recovered, macrocore point lost during			
16			core						advancement. Sample not representative.			
17												
18												
19												
20												

Comments:

PROJECT NO.	11175065
BORING NO.	IPR-11

URS Corporation

TEST BORING LOG

BORING NO:	IPR-11
PROJECT: KeySpan Hempstead MGP	**SHEET:** 2 of 2
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro core			28"	Lt. Brown / Yellow		20' to 22', Loose, fine to coarse SAND, with poorly sorted subangular to subrounded coarse gravel. Oily, MGP odor.	SP	107.0	Moist
21												
22												
									22' to 25', Loose, fine to coarse SAND, some fine to coarse, poorly sorted gravel. Oily, MGP odor.	SP		Wet / Moist
23												
24												
25												
		S-6	Macro core			24"	Lt. Grey		Loose, fine to medium SAND, with band of medium to coarse gravel at 27' to 27.5'. Moderate MGP odor, oily, black staining in gravel.	SP	990.0	Moist
26												
27												
28												
29												
30												
		S-7	Macro core			19"			30' to 33', Medium dense to dense, black stained fine to medium SAND and coarse gravel. 60 to 70% DNAPL saturated, with MGP staining and odor.	SP	2890.0	Moist
31												
32												
33												
							Grey / Yellow		33' to 35', Loose, fine to medium SAND. No staining slight odor.	SP	140.0	
34												
35												
		S-8	Macro core			16"			Dense, fine to medium SAND, with coarse gravel. No staining, No DNAPL, moderate odor.	SP	63.0	
36												
37												
38												
39												
40												
									End of boring: 40' bgs			

COMMENTS: SP 25' to 30', HCN:6. SP 30' to 35', HCN:21.

PROJECT NO.	IPR-11
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-12A		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	KeySpan Property
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER:		**TOTAL DEPTH:**	45' bgs
DATE STARTED:	04/08/08		
DATE FINISHED:	04/08/08		
DRILLER:	K. Kegel		
GEOLOGIST:	J. Harshman		
REVIEWED BY:			

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Dk. Brown		FILL: Loose, fine to medium SAND and Fill Material: Ash like material, red brick, slag, gravel.	Fill / GP/SP	0.4	
1											
2											
3											
4											
5											
		S-2	Macro core		28"	Brown		FILL: Loose to medium dense, fine to medium SAND, trace coarse sand, some fine to coarse gravel. Little concrete, trace wood and red brick. Faint MGP odor.	Fill	0.2	Moist
6											
7											
8											
9											
10											
		S-3	Macro core		38"	Dk. Brown		10' to 11', Loose, fine to medium SAND, trace to little fine to coarse gravel. Little black staining and coating, perched water.	SP	10 to 15.0	Wet
11											
12						Yellow / Brown		11' to 15', Loose, fine to medium SAND, little coarse sand, little fine gravel. Faint to moderate petroleum-type odor.			Dry to Moist
13											
14											
15											
		S-4	Macro core		36"	Lt. Brown / Brown / Yellow		Loose, fine to coarse SAND and fine to medium gravel. Moderate MGP or petroleum-type odor, slightly coated (oily)	SP	104.0	Dry
16											
17											
18											
19											
20											

Comments: Temp well installed (1" sch. 40 PVC).

PROJECT NO.	11175065
BORING NO.	IPR-12A

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR-12A	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core			32"	Lt. Brown / Yellow		20' to 22', Loose, fine to coarse SAND, some fine gravel. Lightly coated (oily) moderate MGP-type odor.	SP	260	Moist
21												
22												
									22' to 25', Loose, fine to medium SAND, trace fine gravel. Lightly coated (oily), moderate MGP odor.	SP		Dry
23												
24												
25												
		S-6	Macro core			29"	Lt. Brown		Loose, fine to medium SAND, trace to little fine gravel. Moderate to strong MGP odor, lightly coated (oliy), 25% DNAPL saturated at 29' to 30', liner stained.	SP	608	Moist to Wet
26												
27												
28												
29												
30												
		S-7	Macro core			32"	Lt. Brown / Orange / Tan		Loose to medium dense, fine to medium SAND, trace fine gravel. Very faint MGP odor, no staining, no DNAPL.	SP	10	Wet
31												
32												
33												
34												
35												
		S-8	Macro core						Interval not sampled (mistake made by driller, interval was missed). Auger cuttings show sand and gravel mix.			
36												
37												
38												
39												
40												

COMMENTS:	PROJECT NO.	IPR-12A
	BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR-12A	
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-9	Macro core			32"	Orange / Brown		Loose, fine to medium SAND, trace coarse sand, trace to little fine to coarse gravel. No staining, no DNAPL, no visible impact.	SP	0	Wet
41												
42												
43												
44												
45												
									End of boring: 45' bgs			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS:	PROJECT NO.	IPR-12A
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-12B
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	40' bgs
DATE STARTED:	04/08/08
DATE FINISHED:	04/08/08
DRILLER:	K. Kegel
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Dk. Brown		Loose, fine to medium loamy SAND, trace coarse sand, trace fine gravel. No visible impact.	SP	0.0	Dry to Moist
1												
2												
3												
4												
5												
		S-2	Macro core			42"	Brown / Orange		Loose, fine to medium SAND, little to some coarse sand, trace fine gravel. No impact.	SP	0.0	Dry
6												
7												
8												
9												
10												
		S-3	Macro core			45"	Brown / Orange		Loose to medium dense, fine to coarse SAND, trace to little fine gravel. No impact.			
11												
12												
13												
14												
15												
		S-4	Macro core			46"	Orange / Lt. Brown / Grey		Loose to medium dense, fine to medium SAND, some coarse sand, trace to little well graded gravel. Lightly coated (oily), moderate petroleum/gasoline-type odor.	SP	200.0	Moist
16												
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	IPR-12B

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR-12B	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 2	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property	

	SAMPLE						DESCRIPTION					
DEPTH	STRATA			BLOWS	REC		CONSIST	MATERIAL		Remarks	
FEET	SYMBOL	NO.	TYPE	PER 6"	RQD	COLOR	HARD	DESCRIPTION	USCS	PID	MOIST
		S-5	Macro core		38"	Brown / Grey		Loose, fine to coarse SAND, little fine to coarse gravel. Lightly coated (oily), possibly coated with brown DNAPL, moderate odor, 25% DNAPL saturation.	SP	240.0	
21											
22										350.0	
23											
24											
25											
		S-6	Macro core		36"	Brown / Yellow		Loose, fine to coarse SAND, trace fine gravel. Oily, some brown MGP staining, 25% to 50% (DNAPL) saturation, moderate to strong MGP odor, liner stained.	SP	500.0	Moist
26											
27										1000.0	
28											
29											
30											
		S-7	Macro core		39"	Black and Brown stained		30' to 33', Heavy MGP impact: Fine to medium SAND. 100% DNAPL saturation at 32.5' to 33', other thin seams of near 100% DNAPL saturation, moderate to strong MGP odor, liner stained.	SP	320.0	Wet
31											
32											
33											
						Tan		33' to 35', Loose, very fine to fine SAND. No staining, no DNAPL, slight MGP odor.	SP	100.0	Wet
34											
35											
		S-8	Macro core		36"	Lt. Brown / Tan		Loose to medium dense, fine to medium SAND, trace coarse sand and fine gravel. No visible impact.	SP	4.5	Wet
36											
37										0.0	
38											
39											
40											
								End of boring: 40' bgs			

COMMENTS: SP, 25' to 30', HCN:2. SP 30' to 35', HCN:1

PROJECT NO.	IPR-12B
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-13
PROJECT:	KeySpan Hempstead MGP
LOCATION:	KeySpan Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	
TOTAL DEPTH:	45' bgs
DATE STARTED:	04/10/08
DATE FINISHED:	04/10/08
DRILLER:	K. Kegel
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0								Gravel at surface.			
		S-1	Grab			Dk. Brown		FILL: Loose, fine to medium SAND, little fill material: red brick, wood, ash-like material.	Fill	0.0	Dry
1											
2											
3											
4											
5											
		S-2	Macro core		40"	Yellow Brown		Loose, fine to coarse SAND, little to some fine gravel. No impact.	SP	0.0	Moist to Dry
6											
7											
8											
9											
10											
		S-3	Macro core		35"	Yellow Brown		Loose, fine to coarse SAND, little to some fine gravel, trace medium gravel. No impact.	SP	0.0	Moist to Dry
11											
12											
13											
14											
15											
		S-4	Macro core		36"	Yellow Brown		15' to 16' Loose, fine to coarse SAND, little to some fine gravel, trace medium gravel. No impact.	SP	4.0	Moist to Dry
16						Dk. Brown		16' to 20', Loose to medium dense, fine to medium SAND, trace to little coarse sand, little to some fine gravel. Some black staining, moderate petroleum-type odor.			Moist
17											
										15.0	
18											
19										30.0	
20											

Comments: 0' to 5' precleared by hand tools.

PROJECT NO.	11175065
BORING NO.	IPR-13

URS Corporation

TEST BORING LOG

BORING NO:	IPR-13
PROJECT: KeySpan Hempstead MGP	**SHEET:** 3 of 3
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro core			36"	Brown		Loose, fine to medium SAND, trace coarse sand, little to some fine to medium gravel. Some black staining and coating, moderate petroleum-type odor.	SP	60	Moist
21												
22												
23												
24												
25												
		S-6	Macro core			28"			25' to 27', Petroleum/oily impact: Fine to medium SAND, little fine to coarse gravel. Black stained and coated.	SP	55	Moist
26												
27												
28							Brown / Grey		27' to 30', MGP impacted: Fine to medium SAND. 10% DNAPL, some brown and black MGP staining, coated, moderate odor.		85	Moist to Wet
29												
30												
		S-7	Macro core			28"			30' to 34', MGP impact: Medium dense, fine to medium SAND. Brown MGP staining, thin seams of DNAPL (near 100% saturation), moderate to strong MGP odor.	SP	155	Wet
31												
32												
33												
34												
35							Brown / Tan		34' to 35', Medium dense fine to medium SAND, little fine to medium gravel. No staining faint odor.	SP	26	Wet
		S-8	Macro core			26"	Lt. Brown / Yellow / Tan		35' to 37', Medium dense, fine to very coarse SAND, with some fine to coarse GRAVEL. No staining.	GP/SP		
36												
37												
38									37' to 38', MGP impacted SAND and GRAVEL with 50% DNAPL saturation, moderate MGP odor.		155	
39							Lt. Brown / Yellow		38' to 40', Loose, fine to medium SAND. No staining.		4	Wet
40												

COMMENTS:

PROJECT NO.	IPR-13
BORING NO.	11175065

URS Corporation

TEST BORING LOG

PROJECT:	KeySpan Hempstead MGP	**BORING NO:**	IPR-13
CLIENT:	KeySpan	**SHEET:**	3 of 3
BORING CONTRACTOR:	Fenley and Nicol	**JOB NO.:**	11175065
		BORING LOCATION:	KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-9	Macro core			36"	Orange Brown		Loose, fine to medium SAND, trace fine gravel. No impact.	SP	0	Wet
41												
42												
43												
44												
45												
46									End of boring: 45' bgs			
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS:

PROJECT NO.	IPR-13
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 14
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~24' bgs
TOTAL DEPTH:	45'
DATE STARTED:	01/18/08
DATE FINISHED:	01/18/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Dk. Brown		0' to 3', Loamy topsoil.	SP	0.0	
1												
2												
3												
4							Dk. Brown		3' to 5', Fine to coarse SAND, little fine gravel.	SP		Dry
5												
6		S-2	Macro core			49"	Lt. Brown / Yellowish		Loose, fine to coarse SAND, trace very coarse sand, trace well graded fine gravel. No visible impacts.	SP	0.0	Dry
7												
8												
9												
10												
11		S-3	Macro core			56"	Lt. Brown / Yellowish		10' to 12', Loose, fine to medium SAND, trace fine gravel.	SP	0.0	Dry
12												
13							Brown / Lt. Brown		12' to 15', Loose, fine to very coarse SAND, with some poorly graded fine gravel.	SP		Dry
14												
15												
16		S-4	Macro core			40"	Brown		Loose, fine to very coarse SAND and fine to coarse GRAVEL. No visible impacts.	GP/SP	0.0	Dry
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	IPR- 14

URS Corporation

TEST BORING LOG

PROJECT:	KeySpan Hempstead MGP	**BORING NO:**	IPR- 14
CLIENT:	KeySpan	**SHEET:**	2 of 3
BORING CONTRACTOR:	Fenley and Nicol	**JOB NO.:**	11175065
		BORING LOCATION:	Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro core			40"	Brown		20' to 23', Loose to medium dense, fine to coarse SAND, trace very coarse sand, little fine gravel. Slight MGP odor.	SP	30.0	Dry
21												
22												
23												
							Brown Stained		23' to 25', Loose, MGP impacted, brown stained and coated, fine to coarse SAND, trace to little fine gravel. Moderate MGP odor. Water table at ~24' bgs	SP	175.0	Moist to Wet
24												
25												
		S-6	Macro core			44"	Brown Black Stained		Loose, MGP impacted, stained and coated brown black, fine to coarse SAND, black seams of DNAPL saturation (75 to 100%). Very strong MGP odor. Trace silt and liner stained.	SP	800.0	Wet
26												
27												
28												
											1600.0	
29												
30												
		S-7	Macro core			40"	Black and Brown Staining		30' to 31', Loose, MGP impacted, black and brown staining and coated fine to medium SAND with seams of DNAPL saturation (350 ppm). Strong MGP odor	SP	350.0	Wet
31										SP	75.0	Wet
									31' to 35', Loose, fine to medium SAND, no staining, no DNAPL. Moderate MGP odor.			
32												
33												
34												
35												
		S-8	Macro core			36"	Lt. Brown		35' to 37', Loose, fine to medium SAND, no staining. Moderate MGP odor.	SP	161.0	Wet
36												
37												
							Lt. Brown / Yellow / Orange		37' to 40', Loose, fine to very coarse SAND and fine to coarse GRAVEL. Faint MGP odor.	GP	20.0	Wet
38												
39											30.0	
40												

COMMENTS:

PROJECT NO.	IPR- 14
BORING NO.	11175065

URS Corporation										TEST BORING LOG	
										BORING NO:	IPR- 14
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 3
CLIENT:	KeySpan									JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Medical Center Lot

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro			33"	Brown		Loose, fine to coarse SAND, trace to little fine	SP	2.0	Wet
41			core						gravel. No staining.			
42											1.0	
43												
44											0.0	
45												
									End of boring: 45' bgs			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS:	PROJECT NO.	IPR- 14
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 15
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~25' bgs
TOTAL DEPTH:	45'
DATE STARTED:	01/17/08
DATE FINISHED:	01/17/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Dk. Brown		0' to 2', Loamy topsoil.	SP	0.0	
1												
2												
3							Lt. Brown		2' to 5', Fine to coarse SAND, little fine gravel.	SP		Dry
4												
5												
6		S-2	Macro core			52"	Dk. Brown / Brown		Loose, fine to coarse SAND, intervals of very coarse sand little well graded fine gravel.	SP	0.0	Dry
7												
8												
9												
10												
11		S-3	Macro core			58"	Dk. Brown / Brown		Loose, fine to coarse SAND, intervals of very coarse sand little well graded fine gravel.	SP	0.0	Dry
12												
13												
14												
15												
16		S-4	Macro core			39"	Dk. Brown / Brown		Loose, fine to very coarse SAND, little well graded fine gravel. Petroleum type odor (like degraded gasoline) at 19' to 20'. No staining, slightly coated.	SP	5.0	Dry
17												
18												
19											60.0	
20												

Comments: 0' to 5' interval cleared by hand tools.

PROJECT NO.	11175065
BORING NO.	IPR- 15

URS Corporation										TEST BORING LOG	
										BORING NO:	IPR- 15
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 3
CLIENT:	KeySpan									JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Medical Center Lot

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro core			40"	Brown		Loose, fine to coarse SAND, little to some fine to coarse gravel. Several intervals of black staining at 23' and 24' with fine to medium sand at 24.5' to 25', with strong MGP odor and slight staining. Water table at ~25' bgs.	SP	300.0	
21												
22												
23												
24											600.0	
25												Wet
		S-6	Macro core			45"	Lt. Brown / Grey		25' to 27', Loose fine to very coarse SAND, some poorly graded fine gravel. Very strong MGP hydrocarbon odor.	SP	1800.0	Wet
26												
27									27' to 30', MGP impacted, stained brown with some coating fine to medium SAND, trace coarse sand, 50 to 75% DNAPL saturation at 29' to 30', with strong MGP odor.	SP	1000.0	Wet
28												
29												
30												
		S-7	Macro core			42"	Black and Brown Staining		30' to 33', Black and brown MGP stained, almost 100% DNAPL saturated fine to medium SAND.with trace unstained thin intervals of sandy silt. Very strong MGP odor. Black banding and intervals of 3" thick 100% DNAPL sand.	SP	2500.0	Wet
31												
32												
33												
34							Lt. Brown / Tan		33' to 35', Loose, fine to medium SAND. No staining, moderate MGP odor.	SP	200.0	Wet
35												
		S-8	Macro core			42"	Lt. Brown / Tan		35' to 37', Loose, fine to medium SAND, trace coarse sand, trace fine gravel. Faint MGP odor.	SP	135.0	Wet
36												
37												
38							Brown		37' to 38', Stiff sandy SILT. Faint MGP odor.	ML	20.0	Wet
39							Lt. Brown		38' to 40', Loose, fine to very coarse SAND and fine to coarse GRAVEL. Faint MGP odor.	SP/GP	8.5	Wet
40												

COMMENTS:	22' HCN: 3.	PROJECT NO.	IPR- 15
		BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 15
PROJECT: KeySpan Hempstead MGP	**SHEET:** 3 of 3
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro			38"	Lt. Brown		Loose, fine to coarse SAND, little fine to coarse gravel. No staining or visible impact.	SP	0.0	Wet
41			core									
42												
43												
44												
45												
									End of boring: 45'			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS:

PROJECT NO.	IPR- 15
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 16
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~28' bgs
TOTAL DEPTH:	65'
DATE STARTED:	01/16/08
DATE FINISHED:	01/17/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Dk. Brown		0' to 2', Loamy topsoil.	SP	0.0	
1											
2						Brown		2' to 5', Fine to coarse SAND, with some fine to coarse gravel.	SP	0.0	Dry
3											
4											
5											
		S-2	Macro core		44"	Dk. Brown		Loose, fine to very coarse SAND, trace well graded fine gravel. Very faint odor (undetermined).	SP	2.0	Dry
6						Brown					
7											
8											
9											
10											
		S-3	Macro core		52"	Lt. Brown		Loose, fine to very coarse SAND, little poorly graded fine gravel. No visible impacts.	SP	0.0	Dry
11											
12											
13											
14											
15											
		S-4	Macro core		42"	Brown		15' to 19.5', Loose fine to coarse SAND, little well graded fine gravel.Faint odor.	SP	3.0	Dry
16											
17											
18											
19								19.5' to 20', Black stained and coated fine to coarse SAND, some fine gravel. Slight MGP odor.			
20						Black			SP	15.0	

Comments: 0' to 5' excavated by hand tools. Note: location is 20' east of orginal stake.

PROJECT NO.	11175065
BORING NO.	IPR- 16

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 16
PROJECT:	KeySpan Hempstead MGP
SHEET:	2 of 3
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
BORING LOCATION:	Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
21		S-5	Macro core			39"	Stained Black and Brown		Loose, Stained and coated (MGP impact), fine to coarse SAND, with little well graded fine gravel. Slight to moderate MGP odor.	SP	75.0	Moist to Dry
26		S-6	Macro core			44"	Brown		Loose, fine to medium SAND, trace coarse sand, trace fine gravel, several intervals of black staining and MGP coating. Moderate MGP odor.	SP	150.0	Wet at ~28'bgs
31		S-7	Macro core			40"	Stained Brown		30' to 31', DNAPL saturated (75 to 100%), fine to medium SAND, stained and coated, strong MGP odor heavy sheen, liner stained.	SP	467.0	Wet
33							Lt. Brown / Tan		31' to 35', Loose , fine to medium SAND, trace coarse gravel at 34.5'. Sheen, no staining, no DNAPL, slight MGP odor,	SP	30.0	Wet
36		S-8	Macro core			42"	Lt. Brown		35' to 37', Loose, medium to very coarse SAND and fine to coarse GRAVEL. No staining, slight MGP odor.	SP/GP	15.0	Wet
38							Lt. Brown / Orange		37' to 40', Loose, fine to medium SAND, trace coarse sand and fine gravel. Faint MGP odor.	SP	10.0	

COMMENTS: 30.5', H_2S:4.

PROJECT NO.	IPR- 16
BORING NO.	11175065

URS Corporation										TEST BORING LOG	
										BORING NO:	IPR-16
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 4
CLIENT:	KeySpan									JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Medical Center Lot

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-9	Macro core			37"	Lt. Brown / Tan		Loose, fine to coarse SAND, trace very coarse sand, trace fine gravel, trace medium to very coarse sand at 43'. No staining, faint MGP odor.	SP	5.0	Wet
41												
42												
43											10.0	
44												
45												
		S-10	Macro core			38"	Lt. Brown / Tan		Loose, fine to medium SAND, trace coarse sand, trace well graded fine gravel. No staining no odors.	SP	0.0	Wet
46												
47												
48												
49												
50												
		S-11	Macro core			37"	Lt. Brown / Tan		Loose, fine to medium SAND, trace to little coarse sand, trace very coarse sand, trace fine gravel (well graded). No visible impacts.	SP	1 to 2	Wet
51												
52												
53												
54												
55												
		S-12	Macro core			33"	Lt. Brown / Yellow		Loose, fine to very coarse SAND, with little fine to coarse gravel. No visible impacts.	SP	0.0	Wet
56												
57												
58												
59												
60												

COMMENTS:	PROJECT NO.	IPR-16
	BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR-16	
PROJECT:	KeySpan Hempstead MGP									SHEET:	4 of 4	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Medical Center Lot	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-13	Macro			38"	Lt. Brown		60' to 63', Loose, fine to very coarse SAND, with	SP	0.0	Wet
61			core				/ Yellow		little fine to coarse gravel. No visible impacts.			
62												
63												
							Brown		63' to 63.5', Stiff sandy SILT.	ML		Wet
64							Yellowish		63.5' to 65', Loose, fine to very coarse SAND,			Wet
							Orange		trace to little fine gravel. No visible impacts.			
65												
									End of boring: 65'			
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												

COMMENTS:	PROJECT NO.	IPR-16
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 17
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~30' bgs
TOTAL DEPTH:	50'
DATE STARTED:	01/16/08
DATE FINISHED:	01/16/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab				Dk. Brown		0' to 2', Loamy topsoil.	SP	0.0	
1												
2									2' to 5', Fine to coarse SAND, with some fine to coarse gravel.	SP		Dry
3												
4												
5												
6		S-2	Macro core			48"	Brown / Lt. Brown / Tan		Loose, fine to very coarse SAND, with trace to little fine to coarse gravel (well graded). Faint undetermined odor.	SP	2.0	Moist
7												
8												
9												
10												
11		S-3	Macro core			42"	Brown / Lt. Brown / Tan		Loose, fine to very coarse SAND, with trace to little fine to coarse gravel (well graded). Faint undetermined odor.	SP	2.0	Moist
12												
13												
14												
15												
16		S-4	Macro core			42"	Dk. Brown / Dk. Grey		Loose, fine to coarse SAND, little brown staining and coating, little to some fine to coarse poorly graded gravel. Slight odor (hydrocarbon?).	SP	40.0	Moist
17												
18												
19												
20												

Comments: 0' to 5' excavated by hand tools.

PROJECT NO.	11175065
BORING NO.	IPR- 17

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR-17	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Medical Center Lot	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core			40"	Brown and Black Staining		Loose, staining with little coating, fine to coarse SAND, with little to some fine gravel. Slight to moderate MGP/hydrocarbon odor.	SP	90.0	Dry to Moist
21												
22												
23												
24												
25												
		S-6	Macro core			42"	Black Stained		Loose, stained and coated (possible hydrocarbon impact), fine to coarse SAND, trace well graded fine gravel. Moderate odor (hydrocarbon or MGP).	SP	150.0	Moist
26												
27												
28												
29												Moist to Wet 30' bgs
30												
		S-7	Macro core			40"	Brown and Black Stained		Loose to medium dense, stained fine to medium SAND, pocket of 75% DNAPL saturated sand at 33' to 34'. MGP odor, trace silt at 34'. Trace to little fine gravel at 34.5'. Water table at 30"	SP	250.0	Wet
31												
32												
33												
34												
35												
		S-8	Macro core			36"	Black Stained		35' to 37', DNAPL saturated (100%) SAND and GRAVEL. Completely stained and coated black with DNAPL product. Moderate to strong MGP odor.	SP/GP	250.0	Wet
36												
37												
							Lt. Brown		37' to 39', Fine to medium SAND, trace coarse sand. No DNAPL, no staining.	SP/GP	6.0	Wet
38												
39												
							Black		39' to 40' DNAPL staurated fine to medium sand, trace fine gravel.	SP/GP	50.0	
40												

COMMENTS:	PROJECT NO.	IPR-17
	BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR-17	
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Medical Center Lot	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-9	Macro			30"	Lt. Brown		40' to 44.5', Loose, fine to medium SAND, trace	SP	2.0	Wet
41			core				/ Orange		coarse sand. Several thin seams of DNAPL.			
42											50.0	
43												
44									44.5' to 45', DNAPL saturated fine to medium			
									SAND. Moderate MGP odor, stained and coated.			
45							Black Stained			SP	50.0	
		S-10	Macro			36"	Lt. Brown		Loose, fine to coarse SAND, trace very coarse	SP	0.0	Wet
46			core				/ Yellow		sand, little poorly graded fine to coarse gravel.			
									No visible impacts.			
47												
48												
49												
50												
									End of boring: 50' bgs			
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS:	PROJECT NO.	IPR-17
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-18
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~24' bgs
TOTAL DEPTH:	45'
DATE STARTED:	01/31/08
DATE FINISHED:	01/31/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			44"	Tan		0' to 3', Medium dense to stiff, clayey fine to medium SAND, trace fine gravel.	SP	0.0	Dry to Moist
1												
2												
3												
4							DK. Brown		3' to 5', Loose to medium dense, loamy/peat-like, very fine to fine SAND, trace fine gravel. Little fine to coarse light brown/ orange sand at 5'.	Peat?		Dry
5												
6		S-2	Macro core			54"	Lt. Brown / Yellow / Orange		Loose, fine to coarse SAND, little very coarse sand, little to some fine gravel. No impact.	SP	0.0	Dry
7												
8												
9												
10							Lt. Brown		Fine to medium sand at 10'.			
11		S-3	Macro core			50"	Lt. Brown / Yellow / Orange		Loose, fine to coarse SAND, little very coarse sand, little to some fine gravel. No impact.	SP	0.0	Dry
12												
13												
14												
15												
16		S-4	Macro core				Lt. Brown / Yellow / Orange		Loose, fine to corse SAND, little very coarse sand, little to some fine gravel, becoming more gravelly sand. No impact.	SP	0.0	Dry
17												
18												
19												
20											0.7	

Comments: 19', HCN:1.

PROJECT NO.	11175065
BORING NO.	IPR-18

URS Corporation

TEST BORING LOG

BORING NO:	IPR-18
PROJECT: KeySpan Hempstead MGP	**SHEET:** 2 of 3
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro core			46"	Stained Brown		20' to 24', MGP impacted. Loose lightly stained fine to medium SAND, trace to little coarse sand, trace fine to coarse gravel. Faint MGP odor.	SP	30.0	
21												
22												
											100.0	
23												
												Wet at
24									24' to 25', Heavy MGP impact, 50% DNAPL saturated, strong MGP odor, fine to medium SAND.			24' bgs
							Brown			SP	200.0	Wet
25							Stained					
		S-6	Macro core			42"	Black/ Brown		Heavy MGP impact. 75% to 100% DNAPL saturated intervals of black/brown stained fine to coarse SAND. Very fine to medium sand at 28' to 30'. 100% DNAPL saturation at 28' to 29', very strong MGP odor.	SP	400.0	Wet
26												
							Stained					
27											750.0	
28												
29											1250.0	
30												
		S-7	Macro core			44"	Black/ Brown		30' to 31', Heavy MGP impact. Near 100% saturation. Black/brown stained, very fine to medium SAND. Heavy sheen, very strong MGP odor.	SP	1350.0	Wet
31												
32												
33									31' to 35', Loose, very fine to fine SAND, trace medium sand, trace fine gravel. No DNAPL, no staining, faint to moderate MGP odor.	SP	100.0	Wet
34												
35												
		S-8	Macro core			16"	Lt. Brown / Tan		Loose, fine to coarse SAND, and some fine gravel, grading to fine to medium sand. No staining, no DNAPL, faint to moderate MGP odor.	SP	70.0	Wet
36												
37												
38												
39												
40												

COMMENTS: 37', HCN:1.

PROJECT NO.	IPR-18
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-18
PROJECT:	KeySpan Hempstead MGP
SHEET:	3 of 3
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
BORING LOCATION:	Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-9	Macro core			34"	Lt. Brown / Orange / Tan		Loose, fine to medium SAND, little to some coarse sand, trace fine to coarse gravel at 43'. No staining, no visible impact, very faint MGP odor.	SP	100.0	Wet
41												
42												
43												
44											40.0	
45												
									End of boring: 45'			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS: 41.5', HCN:5.

PROJECT NO.	IPR-18
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR- 19
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe/HSA
GROUNDWATER:	
TOTAL DEPTH:	91'
DATE STARTED:	01/21/08
DATE FINISHED:	03/29/08
DRILLER:	Gazzaro/Meade
GEOLOGIST:	Harshman/Casey
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE	Macro core	Split spoon		
				DIA.	2"	2"		
				WT.		30"		
				FALL		140		
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Grab				Dk. Brown / Lt. Brown		SAND and Gravel. Fine to medium SAND, with some fine to coarse GRAVEL.	GP/SP	0.0	Dry
1												
2												
3												
4												
5		S-2	Macro core			40"	Lt. Brown / Yellow / Orange		Loose, fine to coarse SAND, little very coarse sand, little poorly graded fine gravel.	SP	0.0	Dry
6												
7												
8												
9		S-3	Macro core			41"	Lt. Brown / Yellow / Orange		Loose, fine to coarse SAND, little very coarse sand, little poorly graded fine gravel.	SP	0.0	Dry
10												
11												
12												
13		S-4	Macro core			36"	Lt. Brown / Yellow / Orange		Loose, fine to very coarse SAND, some poorly graded fine to coarse gravel. No impacts.	SP	0.0	Dry
14												
15												
16												
17		S-5	Macro core			36"	Lt. Brown		Loose, fine to coarse SAND, little well graded fine gravel, trace black staining at 17'. MGP odor.	SP	50.0	Dry
18												
19											180.0	
20												

Comments: 0' to 4' excavated by hand tools. Direct-push drilling to refusal at 60 ft. HSA and split spoon to 91 ft. Installed 6-in well screened 65 to 85 ft and adjacent shallow well screened 10 to 40 ft.

PROJECT NO.	11175065
BORING NO.	IPR- 19

URS Corporation

TEST BORING LOG

BORING NO:	IPR-19
PROJECT:	KeySpan Hempstead MGP
SHEET:	2 of 3
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
BORING LOCATION:	Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
21		S-6	Macro core		N/A	Lt. Brown		Loose, fine to coarse SAND, with little to some fine gravel. MGP odor.	SP	180.0	Dry
25		S-7	Macro core		38"	Lt. Brown		24' to 28', Loose, fine to very coarse SAND, trace to little fine to coarse gravel. Strong MGP odor. Water table at ~24' to 25' bgs.	SP	1800.0	Wet
29						Brown to Black Staining		28' to 30', Heavy MGP impact. Staining and coating, intervals of DNAPL saturation (75 to 100%), some DNAPL product, very strong MGP odor, liner stained.	SP	2200.0	Wet
31		S-8	Macro core		44"	Brown to Black Staining		30' to 33', Heavy MGP impact. Stained, DNAPL product present (75 to 100% saturation). Very strong MGP odor, fine to medium SAND. Liner stained.	SP	2400.0	Wet
34						Lt. Brown / Tan		33' to 35', Loose, fine to medium SAND. No staining, no DNAPL, MGP odor.	SP	160.0	Wet
36		S-9	Macro core		42"	Lt. Brown / Tan		35' to 37', Loose, fine to medium SAND. No staining, slight MGP odor.	SP	85.0	Wet
38								37' to 38', Loose, SAND and GRAVEL, medium dense, trace silt.	GP		Wet
39						Lt. Brown		38' to 40', Loose, fine to coarse SAND. Faint MGP odor, no staining.	SP	7.0	Wet

COMMENTS:

PROJECT NO.	IPR-19
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-19
PROJECT:	KeySpan Hempstead MGP
SHEET:	3 of 3
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
BORING LOCATION:	Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
41		S-10	Macro core			43"	Lt. Brown / Tan		Loose, fine to coarse SAND, trace well graded fine gravel. No visible impacts.	SP	0.0	Wet
46		S-11	Macro core			22"	Lt. Brown / Tan		Loose, fine to coarse SAND, trace well graded fine gravel. No visible impacts.	SP	0.0	Wet
51		S-12	Macro core			Poor rec.	Lt. Brown		Loose, fine to medium SAND, trace coarse sand. Faint MGP odor.	SP	35.0	Wet
56		S-13	Macro core			Poor rec.	Lt. Brown		Loose, fine to medium SAND, trace coarse sand. Faint MGP odor.	SP	105.0	Wet

COMMENTS:

PROJECT NO.	IPR-19
BORING NO.	11175065

URS Corporation

TEST BORING LOG

PROJECT:	KeySpan Hempstead MGP	**BORING NO:**	IPR-19D
CLIENT:	KeySpan	**SHEET:**	4 of 5
BORING CONTRACTOR:	Fenley and Nicol	**JOB NO.:**	11175065
		BORING LOCATION:	KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-14			12"	Yellow / Orange		Medium dense, fine to medium SAND, some coarse sand. Faint MGP odor, no staining or saturation.	SP	5.0	Wet
61											
62								62' to 63', Medium dense, fine to medium SAND, some coarse sand. Faint MGP odor, no staining or saturation.	SP	1.6	Wet
		S-15			9"	Yellow / Orange					
63											
						Yellow / Lt. Brown		63' to 65', Medium dense to dense, fine to coarse SAND some coarse gravel. Slight MGP odor, no staining.	SP		
64											
		S-16			21"	Yellow / Lt. Brown				1.6	Wet
65											
						Pale grey		65' to 66', Medium dense, medium to coarse SAND. No MGP impact.	SP		
66											
		S-17			2"				SP	0.0	
67											
68											
		S-18			12"	Lt. Brown		68' to 69', Medium dense fine to coarse SAND., trace silt.	SP	0.0	Wet
69											
								69' to 70', Some thin (<1 mm) black bands of stained sand,, trace medium to coarse gravel	SP		
70											
		S-19			12"	Yellow / Red / Lt. Brown		70' to 72', Medium dense to dense, fine to coarse SAND, some silt, Thin bands of black stained sand.	SP	0.0	Wet
71											
72											
		S-20			18"	Yellow / Red / Lt. Brown		72' to 74', Medium dense to dense, fine to coarse SAND, some silt silt. Thin bands of black stained sand.	SP	0.0	Wet
73											
74											
		S-21			23"	Lt. Brown / Yellow		74' to 76', Loose to medium dense, fine to coarse SAND, rare coarse gravel. Rare bands of black stained sand. Slight MGP odor.	SP	0.0	Wet
75											
76											
		S-22			23"	Lt. Brown / Yellow		76' to 78', Medium dense, fine to coarse SAND, some coarse gravel. No MGP impact.	SP	0.0	Wet
77											
78											
		S-23			12"	Lt. Brown / Yellow		78' to 80', Loose to medium dense, fine to coarse SAND. No MGP impact.	SP	0.0	Wet
79											
80											

COMMENTS:

PROJECT NO.	IPR-19D
BORING NO.	11175065

URS Corporation

TEST BORING LOG

PROJECT:	KeySpan Hempstead MGP	**BORING NO:**	IPR-19D
CLIENT:	KeySpan	**SHEET:**	5 of 5
BORING CONTRACTOR:	Fenley and Nicol	**JOB NO.:**	11175065
		BORING LOCATION:	KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
81		S-24			22"	Orange / Lt. Brown		80' to 82', Loose, fine to medium SAND. At 80' to 81' Thin bands of black stained sand, no odors. Thin band 0.5" of clayey sand.	SP	0.0	
83		S-25			20"	Lt. Brown / Orange		82' to 84', Loose, fine to coarse SAND, rare coarse gravel. No odors, very thin localized bands of black stained sand.	SP	0.0	
85		S-26			24"	Lt. Brown / Orange		84' to 85', Loose, fine to coarse SAND, rare coarse gravel.	SP	0.0	
86								85' to 86', Loose to medium dense SAND. Bands of light grey and black stained sands.	SP	0.0	
87		S-27			2"	Lt. Brown / Orange		86' to 88', Loose to medium dense SAND. Bands of light grey and black stained sands.	SP	0.0	
89		S-28			16"	Yellow / Lt. Brown		88' to 90', Loose to medium dense, fine to coarse SAND, some clay. Some black stained bands.	SP	0.0	
91								End of boring: 90' bgs			

COMMENTS:

PROJECT NO.	IPR-19D
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-20
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~24' bgs
TOTAL DEPTH:	45'
DATE STARTED:	01/31/08
DATE FINISHED:	01/31/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Macro core			44"	Tan		0' to 3', Medium dense to stiff, clayey fine to medium SAND, trace fine gravel.	SP	0.0	Dry to Moist
1												
2												
3												
4							Dk. Brown		3' to 5', Loose, medium to dense, loamy/peat-like, with some organic matter, very fine to fine SAND, trace fine gravel.	Peat?		Dry
5												
6		S-2	Macro core			56"	Lt. Brown / Tan		Loose, fine to coarse SAND, little fine gravel. No visible impact.	SP	12.0	Dry
7												
8												
9											5.0	
10												
11		S-3	Macro core			50"	Brown / Orange		Loose to medium dense, fine to coarse SAND and fine to coarse GRAVEL.	GP/SP	0.0	Dry
12												
13												
14												
15												
16		S-4	Macro core			48"	Orange / Brown		15' to 18', Fine to coarse SAND with some fine gravel.	SP	0.0	Dry
17												
18							Brown Stained		18' to 20', MGP impacted. Stained and coated brown, fine to coarse SAND, some fine gravel. Strong MGP odor.	SP	400.0	Moist
19												
20											750.0	

Comments:

PROJECT NO.	11175065
BORING NO.	IPR-20

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR-20	
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Medical Center Lot	

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro core			48"	Lt. Brown / Tan		20' to 24' Slight MGP impact. Loose fine to medium SAND, trace to little coarse sand and fine to coarse gravel, lightly stained and coated brown by MGP impact. Moderate MGP odor.	SP	700.0	
21												
22											800.0	
23												
									24' to 25', Heavy MGP impact. Loose fine to coarse SAND, little fine gravel, 25 to 50% DNAPL saturated, stained and coated. Water table at ~24' bgs.	SP	750.0	Wet at ~24'
24												
25												
		S-6	Macro core			43"	Lt. Brown and some Brown Staining		25' to 27', Moderate MGP impact. Loose, some brown stained fine to coarse SAND. Very strong MGP odor.	SP	1200.0	Wet
26												
27												
							Black and Brown Staining		27' to 30', Heavy Mgo impact. Intervals of black and brown MGP staining and DNAPL saturation (75 to 100%), very fine to fine sand. Very strong MGP odor. Liner stained.	SP	1400.0	Wet
28												
29												
											1600.0	
30												
		S-7	Macro core			50"	Lt. Brown / Orange		Loose, fine to medium SAND, trace MGP impact and staining at 30'. Then no staining, no DNAPL, moderate MGP odor.	SP	130.0	Wet
31												
32												
33												
34											220.0	
35												
		S-8	Macro core			38"	Brown Stained Lt. Brown / Tan		Loose to medium dense, trace MGP impact at 35' with stained brown fine to medium SAND. Than light brown/tan gravelly fine to coarse SAND and some fine gravel.	SP	420.0	Wet
36												
37												
38												
39												
							Lt. Brown		39' to 40', Fine to medium SAND. No staining.	SP	75.0	
40												

COMMENTS: 22', H_2S:2. 27', HCN:4. 28', H_2S:2. 41.5', HCN:2.

PROJECT NO.	IPR-20
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-20
PROJECT: KeySpan Hempstead MGP	**SHEET:** 3 of 3
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-9	Macro			42"	Lt. Brown		Loose, fine to coarse SAND, trace fine gravel.	SP	49.0	Wet
41			core				/ Tan		No visible impact, no staining, very faint MGP odor.			
42											6.0	
43												
44											4.0	
45												
									End of boring: 45' bgs			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS: 41', HCN:1.

PROJECT NO.	IPR-20
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-21
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~24' to 25' bgs
TOTAL DEPTH:	45'
DATE STARTED:	01/24/08
DATE FINISHED:	01/24/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

	CAS.	SAMPLER	CORE	TUBE
TYPE		Macrocore		
DIA.		2"		
WT.				
FALL				

DATE	TIME	LEVEL	TYPE

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			37"	Dk. Brown Lt. Brown / Yellow		Loose, fine to very coarse SAND and fine to coarse GRAVEL. No impacts.	GP/SP	0.0	Dry
1												
2												
3												
4												
5												
		S-2	Macro core			52"	Dk. Brown Lt. Brown / Yellow		5' to 8' , Loose, fine to very coarse SAND and fine to coarse GRAVEL. No impacts.	GP/SP	0.0	Dry
6												
7												
8												
							Brown / Orange		8' to 10', Loose, fine to medium SAND, little coarse sand, trace fine gravel. No impacts.	SP	0.0	Dry
9												
10												
		S-3	Macro core			10"	Brown / Orange		Loose, fine to medium SAND, little coarse sand, trace fine gravel. No impacts.	SP	0.0	Dry
11												
12												
13												
14												
15												
		S-4	Macro core			42"	Brown to Lt. Brown		Loose, fine to very coarse SAND, some fine to coarse gravel, slightly coated and MGP impacted. Moderate to strong MGP odor.	SP	450.0	Dry to Moist
16												
17												
18												
19												
20												

Comments:

PROJECT NO.	11175065
BORING NO.	IPR-21

URS Corporation

TEST BORING LOG

BORING NO:	IPR-21
PROJECT: KeySpan Hempstead MGP	**SHEET:** 2 of 3
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro			38"	Brown to		20' to 24', Loose, fine to very coarse SAND, some	SP	500.0	Dry to
21			core				Lt. Brown		fine to coarse gravel, slightly coated and MGP			Moist
									impacted. Moderate to strong MGP odor.			
22												
23												
24												
									24' to 25', MGP impacted with some (75%) DNAPL	SP		Wet
25									saturation (2" seam). Strong MGP odor			
		S-6	Macro			39"	Black and		25' to 27', Loose, Moderate MGP impact with	SP	2600.0	Wet
26			core				Brown		brown and black staining, fine to coarse SAND,			
							Staining		some fine to coarse gravel, coated. Strong MGP			
27									odor.			
									27' to 30', Heavy MGP impact:Fine to medium			
28									sand. Intervals of DNAPL saturation (75% to			
									100%), heavily stained brown, very strong MGP			
29									odor, liner stained.			
30												
		S-7	Macro			45"	Black and		30' to 32', Heavy MGP impact. 3" seam of 100%	SP	1200.0	Wet
31			core				Brown		DNAPL saturated brown and black, several thin			
							Stained		seams of DNAPL heavy sheen, very strong MGP			
32									odor. Very fine to medium SAND.			
							Lt. Brown		32' to 35', Loose, very fine to medium SAND. No	SP	200.0	Wet
33									staining, slight MGP odor.			
34												
											10.0	
35												
		S-8	Macro			40"	Brown		35' to 37', Loose, fine to coarse SAND and fine to	GP	90.0	Wet
36			core				Staining		coarse GRAVEL. Slight to moderate MGP impact			
									with little brown staining and sheen with moderate			
37									MGP odor.			
							Lt. Brown		37' to 40', Loose, fine to coarse SAND, trace fine	SP	50.0	
38									gravel. No staining.			
39												
											0.0	
40												

COMMENTS: 24.5', HCN:1. 32.5', HCN:1

PROJECT NO.	IPR-21
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-21
PROJECT: KeySpan Hempstead MGP	**SHEET:** 3 of 3
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-9	Macro core				Lt. Brown		Loose, fine to coarse SAND, trace fine gravel. No staining, no impact.	SP	0.0	Wet
41												
42												
43												
44												
45												
46									End of boring: 45' bgs			
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS: Liner stuck in macrocore.

PROJECT NO.	IPR-21
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-22
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~24' bgs
TOTAL DEPTH:	85'
DATE STARTED:	02/01/08
DATE FINISHED:	02/06/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH	SAMPLE			BLOWS		REC	DESCRIPTION				REMARKS	
FEET	STRATA	NO.	TYPE	PER 6"		RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	PID	Moist
0		S-1	Macro core			48"	Orange / Brown		0' to 4', Medium dense, silty fine to coarse SAND, some fine gravel.	SP	0.0	Dry
1												
2												
3												
4												
5							Dk. Brown		4' to 5', Loamy peat-like fine SAND, trace organic and fine gravel.	SP		Dry
6		S-2	Macro core			52"	Dk. Brown / Brown		5' to 8', Loose, fine to coarse SAND, some fine to coarse gravel, little dark brown peat.	SP	0.0	Dry
7												
8												
9							Orange / Yellow		8' to 10', Loose, fine to coarse SAND, trace to little very coarse sand, with little fine gravel.	SP		Dry
10												
11		S-3	Macro core			49"	Orange / Yellow		Loose, fine to coarse SAND, trace to little very coarse sand, little to some fine gravel. No impact.	SP		Dry
12												
13												
14												
15												
16		S-4	Macro core			48"	Orange / Brown		Loose, fine to very coarse SAND, little to some fine gravel, slight MGP impact at 19.5' to 20', with slight to moderate MGP odor.	SP	0.0	Dry
17												
18											60.0	
19												
20											75.0	

Comments:

PROJECT NO.	11175065
BORING NO.	IPR-22

URS Corporation

TEST BORING LOG

BORING NO:	IPR-22
PROJECT: KeySpan Hempstead MGP	**SHEET:** 2 of 5
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core			48'	Slightly Brown Stained		MGP impacted. Loose, fine to coarse SAND, little to fine gravel. Lightly stained brown (MGP) and coated. Several very thin seams of black stained sand at 23' to 24'. Moderate to strong MGP odor. Liner stained.	SP	290.0	
21												
22												
23												
24												Wet at
											400.0	~24'bgs
25												
		S-6	Macro core			48"			MGP impacted. Loose to medium dense, very fine to medium SAND, intervals of heavy MGP impact with 75 to 100% DNAPL saturation at 27' to 29'. Strong MGP odor. Liner stained.	SP	400.0	Wet
26												
27												
28												
											687.0	
29												
30												
		S-7	Macro core			52"	Lt. Brown / Tan		Loose, very fine to fine SAND, trace medium sand, trace fine to coarse sand and fine gravel at 35'. Faint MGP odor, no staining.	SP	75.0	Wet
31												
32												
33												
34												
35												
		S-8	Macro core			40"	Brown / Lt. Brown		Loose, fine to medium SAND, trace coarse sand. No staining, faint MGP odor.	SP	60.0	Wet
36												
37												
38												
39												
40												

COMMENTS: 22.5', H_2S =2.

PROJECT NO.	IPR-22
BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR-22	
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 5	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Medical Center Lot	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-9	Macro core			42"	Lt. Brown / Tan / Orange		Loose, fine to medium SAND, trace to little coarse sand, trace fine gravel. No impact.	SP	0.0	Wet
41												
42												
43												
44												
45												
		S-10	Macro core			35"	Lt. Brown / Yellow / Tan		Loose, fine to coarse SAND, trace fine gravel. No impact.	SP	0.0	Wet
46												
47												
48												
49												
50												
		S-11	Macro core			46"	Lt. Brown / Yellow / Tan		Loose, fine to coarse SAND, trace fine gravel, with trace cobble. No impact.	SP	0.0	Wet
51												
52												
53												
54												
55												
		S-12	Macro core			29"	Lt. Brown / Yellow / Tan		Loose, fine to coarse SAND, trace fine gravel, with trace cobble. No impact.	SP	0.0	Wet
56												
57												
58												
59												
60												

COMMENTS:	PROJECT NO.	IPR-22
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

PROJECT:	KeySpan Hempstead MGP	**BORING NO:**	IPR-22
CLIENT:	KeySpan	**SHEET:**	4 of 5
BORING CONTRACTOR:	Fenley and Nicol	**JOB NO.:**	11175065
		BORING LOCATION:	Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
61		S-13	Macro core			no rec.			No recovery, Macro core drive point did not retract during advancement.			
62												
63												
64												
65												
66		S-14	Macro core			30"	Lt. Brown / Orange / Tan		Medium dense, very fine to medium SAND, intervals of color change, no gravel. No impact.	SP	0.0	Wet
67												
68												
69												
70												
71		S-15	Macro core			Liner Stuck	Lt. Brown / Orange / Tan		Medium dense, very fine to medium SAND, intervals of color change, no gravel. No impact.	SP	0.0	Wet
72												
73												
74												
75												
76		S-16	Macro core						No recovery of sample, Macro core drive point did not retract upon advancement.			
77												
78												
79												
80												

COMMENTS:

PROJECT NO.	IPR-22
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-22
PROJECT: KeySpan Hempstead MGP	**SHEET:** 5 of 5
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-17	Macro			16"	Lt. Brown		Loose, very fine to fine SAND. No impact.	SP	0.0	Wet
81			core				/ Tan					
82												
83												
84												
85												
									End of boring: 85'			
86												
87												
88												
89												
90												
91												
92												
93												
94												
95												
96												
97												
98												
99												
100												

COMMENTS:

PROJECT NO.	IPR-22
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-23
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~24' bgs
TOTAL DEPTH:	45'
DATE STARTED:	01/30/08
DATE FINISHED:	01/30/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core			41"	Dk. Brown / Brown		Medium dense, very fine to medium silty SAND, trace coarse sand and coarse gravel. No impact	SP	0.0	Moist
1												
2												
3												
4												
5												
		S-2	Macro core			52"	Lt. Brown / Yellow / Orange		Loose, fine to coarse SAND, trace well graded fine gravel. No impact.	SP	0.0	Dry
6												
7												
8												
9												
10												
		S-3	Macro core			52"	Lt. Brown / Yellow / Orange		10' to 12', Loose, fine to coarse SAND, trace well graded fine gravel. No impact.	SP	0.0	Dry
11												
12												
							Orange / Brown		12' to 15', Loose, gravelly fine to coarse SAND, some fine gravel.	SP	0.0	Dry
13												
14												
15												
		S-4	Macro core			49"	Orange / Brown		15' to 18', Loose, gravelly fine to coarse SAND, some fine gravel.	SP	0.0	Dry
16												
17												
18												
									18' to 20', MGP impacted. Loose, sligthly stained brown, fine to coarse SAND, some fine gravel. MGP odor (100 ppm).	SP	100.0	Dry to Moist
19												
20												

Comments: 23.5', HCN:1.

PROJECT NO.	11175065
BORING NO.	IPR-23

URS Corporation

TEST BORING LOG

BORING NO:	IPR-23		
PROJECT:	KeySpan Hempstead MGP	**SHEET:**	2 of 3
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**BORING LOCATION:**	Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro core			46"	Lt. Brown		20' to 24', Loose, fine to coarse slightly stained with MGP impact, some fine gravel. MGP odor.	SP	260.0	Dry to Moist
21												
22												
23												
									24' to 25', MGP impacted. 3" interval of black stained fine to medium SAND, with brown MGP stained fine to coarse sand and some fine gravel.			
24												
							Black		MGP odor.	SP	70.0	Moist
25							Stained					to Wet
		S-6	Macro core			46"	Lt. Brown		25' to 27.5', Loose, fine to medium SAND, trace coarse sand and fine gravel. MGP odor, sheen, no DNAPL.	SP	270.0	Wet
26												
27												
28							Black and		27.5' to30', Heavy MGP impact. Intervals of DNAPL saturation (75%), black and brown stained. Strong MGP odor. Fine to medium SAND, trace fine gravel. Liner stained.	SP		Wet
							Brown					
29							Stained					
30												
		S-7	Macro core			48"	Lt. Brown		Loose, fine to medium SAND, thin 1" seam of DNAPL saturation (100%) at 30.5' with black and brown staining and strong MGP odor.	SP	170.0	Wet
31							/ Tan					
							trace					
32							Orange					
											70.0	
33												
34												
											50.0	
35												
		S-8	Macro core			46"			35' to 36', Medium dense to dense, silty fine SAND, with some fine gravel. Faint MGP odor.	SP	138.0	Wet
36												
									36' to 40', Loose, fine to coarse SAND, trace fine gravel. Faint MGP odor, no staining, no DNAPL.	SP		Wet
37												
38												
39												
40												

COMMENTS:

PROJECT NO.	IPR-23
BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	IPR- 23	
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	Medical Center Lot	
	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-9	Macro			43"	Lt. Brown		Loose, fine to medium SAND, trace to little	SP	0.0	Wet
41			core				/ Tan		coarse sand, trace fine gravel. No impact.			
42												
43												
44												
45												
									End of boring 45' bgs			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS:	PROJECT NO.	IPR- 23
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-24
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Medical Center Lot
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER:	~24' bgs
TOTAL DEPTH:	45'
DATE STARTED:	01/30/08
DATE FINISHED:	01/30/08
DRILLER:	M. Meade
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
0		S-1	Macro core		42"	Dk. Brown		0' to 4', Medium dense, fine to coarse SAND with little silt, some fine gravel.	SP	0.0	Dry
1											
2											
3											
4											
5						Lt. Brown		4' to 5', Loose, fine to medium SAND, trace coarse sand, little fine gravel. No impact.	SP		Dry
6		S-2	Macro core		58"	Lt. Brown / Yellow / Orange		Loose, fine to coarse SAND, little to some fine gravel. No impact.	SP	0.0	Dry
7											
8											
9											
10											
11		S-3	Macro core		56"	Lt. Brown / Yellow / Orange		Loose, fine to coarse SAND, little to some fine gravel. No impact.	SP	0.0	Dry
12											
13											
14											
15											
16		S-4	Macro core		46"	Lt. Brown / Yellow / Orange		15' to 19', Loose, fine to coarse SAND, little to some fine gravel. No impact.	SP	0.0	Dry
17											
18											
19											
20						Brown		19' to 20', Loose, fine to coarse SAND, some fine gravel. No impact.	SP		Dry

Comments:

PROJECT NO.	11175065
BORING NO.	IPR-24

URS Corporation

TEST BORING LOG

PROJECT:	KeySpan Hempstead MGP	**BORING NO:**	IPR-24
CLIENT:	KeySpan	**SHEET:**	2 of 3
BORING CONTRACTOR:	Fenley and Nicol	**JOB NO.:**	11175065
		BORING LOCATION:	Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-5	Macro core			48"	Lt. Brown / Brown		20' to 23', Loose to medium dense, fine to coarse SAND, little fine gravel.	SP	0.0	Dry
21												
22												
23												
							Brown		23' to 25', MGP impacted. Loose, brown MGP	SP	0.0	Wet
24							Stained		stained fine to medium SAND, trace DNAPL (25% saturation). Moderate MGP odor, liner			
									stained. Water table about ~23' to 24' bgs.		60.0	
25												
		S-6	Macro core			44"	Black Stained		Heavy MGP impacted. Loose, fine to medium SAND, intervals of black stained DNAPL seams (near 100% saturation), several thin intervals of unstained sand, little very fine silty sand at 29' to 30'. Strong MGP odor, liner stained.	SP	50.0	Wet
26												
27												
											10.0	
28												
29												
											80.0	
30												
		S-7	Macro core			42"	Brown Stained		30' to 30.2', MGP impacted, fine to medium SAND, stained brown with MGP impact (400 ppm). Strong MGP odor.	SP	400.0	Wet
31												
32							Lt. Brown / Tan		30.2' to 35', Loose, fine to medium SAND, trace cobbles and fine to coarse gravel at 35'. Slight to no impact.	SP	10.0	Wet
33							thin intervals					
							of Orange					
34												
35												
		S-8	Macro core			38"	Lt. Brown / Tan		Loose, fine to coarse SAND, trace fine to coarse gravel. No visible impact, no DNAPL or staining, faint MGP odor.	SP	33.0	Wet
36												
37												
38												
											74.0	
39												
40												

COMMENTS: 27', HCN: 6. 32.5', HCN:1. 37' HCN:1 to 12.

PROJECT NO.	IPR-24
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	IPR-24
PROJECT: KeySpan Hempstead MGP	**SHEET:** 3 of 3
CLIENT: KeySpan	**JOB NO.:** 11175065
BORING CONTRACTOR: Fenley and Nicol	**BORING LOCATION:** Medical Center Lot

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-9	Macro			Liner			Loose, fine to coarse SAND, trace fine to coarse	SP	43.0	Wet
41			core			Stuck			gravel. No visible impact, no DNAPL or staining, very faint MGP odor.			
42												
43												
44												
45												
									End of boring: 45'			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS: 42.5', HCN: 1.

PROJECT NO.	IPR-24
BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	OSMW-2
PROJECT:	KeySpan Hempstead MGP
LOCATION:	Oswego Property
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
DRILLING METHOD:	Geoprobe
GROUNDWATER: ~25'	**TOTAL DEPTH:** 45' bgs
DATE STARTED:	02/07/08
DATE FINISHED:	02/07/08
DRILLER:	Brian
GEOLOGIST:	J. Harshman
REVIEWED BY:	

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.				
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black		Stiff, very fine sandy SILT. No visible impact.	ML	0.0	Moist
1											
2											
3											
4											
5											
6		S-2	Macro core		50"	Black - Brown		5' to 7', Stiff, very fine sandy SILT.	ML	0.0	Moist to Dry
7											
8						Lt. Brown / Yellow		7' to 10', Loose, fine to coarse SAND, little very coarse sand, some fine to coarse gravel, faint petroleum-type odor at 8' to 10'.	SP	0.0	Dry
9										25.0	
10											
11		S-3	Macro core		48"	Lt. Brown / Yellow / Orange		Loose, fine to very coarse SAND, little fine to coarse gravel, faint petroleum-type odor. No visible impact, no staining.	SP	25.0	Dry
12											
13										50.0	
14											
15											
16		S-4	Macro core		38"	Lt. Brown / Grey		15' to 17', Loose, fine to coarse SAND, trace fine gravel.	SP	1.0	Dry
17											
18						Black Staining		17' to 18' ,Loose, fine to medium SAND, trace fine gravel. Little staining and odor.	SP	25.0	Moist
19						Brown trace Black Staining		18' to 20', Loose fine to very coarse SAND, trace to little fine gravel. Trace staining, faint odor.	SP	50.0	Moist
20											

Comments: 0' to 5' excavated with hand tools. SP 10' to 15' HCN:2.

PROJECT NO.	11175065
BORING NO.	OSMW-2

URS Corporation										TEST BORING LOG			
										BORING NO:	OSMW-2		
PROJECT:	KeySpan Hempstead MGP									SHEET:	2 of 3		
CLIENT:	KeySpan									JOB NO.:	11175065		
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property		

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"	REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core		46"	Brown		Loose fine to coarse SAND, little fine to coarse gravel. Little staining and coating, moderate petroleum-type odor.	SP	50	Moist
21						little					
						Black					
22						Staining					
										60	
23											
24											
										100	
25											Wet
		S-6	Macro core		39"	Brown		25' to 28', Loose, fine to coarse SAND, little to some fine gravel. Petroleum-type impact, some staining, moderate odor.	SP	150	Wet
26						some					
						Black					
27						Staining					
28											
						Brown		28' to 30', Heavy MGP impact: Fine to coarse SAND some fine gravel. MGP staining and coating, DNAPL present, 50% to 70% DNAPL saturation, moderate odor. Liner stained with DNAPL.	SP	200	Wet
29											
30											
		S-7	Macro core		39"	Brown		Heavy MGP impact: Fine to very coarse SAND some fine to coarse gravel. MGP staining, several thin seams of 100% DNAPL saturation, 25% to 50% DNAPL saturation through out. Stained and coated, moderate to strong MGP odor, liner stained.	SP	160	Wet
31											
32											
33											
34											
35											
		S-8	Macro core		38"	Lt. Brown		35' to 37', MGP impacted: fine to coarse SAND, some fine to coarse gravel. Little brown MGP staining, 100% DNAPL saturation at 36' to 36.5', liner stained.	SP	160	Wet
36											
										170	
37											
						Orange / Brown		37' to 40', Loose, fine to coarse SAND, trace fine gravel, faint odor, no staining.	SP	3	Wet
38											
39											
40											

COMMENTS: SP 20' to 25' HCN:1. SP 25' to 30' HCN:3. SP 30' to 35', HCN:6 and H_2S:1. SP 35' to 40' HCN:3.

PROJECT NO.	OSMW-2
BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	OSMW-2	
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property	

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	MOIST
		S-9	Macro			45"	Lt. Brown		Loose, fine to medium SAND, little coarse sand,	SP	0.6	Wet
41			core				/ Orange		trace fine gravel. No odors or impact.			
42												
43												
44												
45												
									End of boring: 45' bgs			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS:	PROJECT NO.	OSMW-2
	BORING NO.	11175065

URS Corporation

TEST BORING LOG

BORING NO:	OSMW-3		
PROJECT:	KeySpan Hempstead MGP	**LOCATION:**	Oswego Property
CLIENT:	KeySpan	**JOB NO.:**	11175065
BORING CONTRACTOR:	Fenley and Nicol	**DRILLING METHOD:**	Geoprobe
GROUNDWATER: ~25' bgs		**TOTAL DEPTH:**	45' bgs
DATE STARTED:	02/07/08		
DATE FINISHED:	02/07/08		
DRILLER:	Brian		
GEOLOGIST:	J. Harshman		
REVIEWED BY:			

	CAS.	SAMPLER	CORE	TUBE
TYPE		Macrocore		
DIA.				
WT.				
FALL				

DATE	TIME	LEVEL	TYPE

* POCKET PENETROMETER READING

DEPTH FEET	SAMPLE STRATA	NO.	TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
0		S-1	Grab			Black		Stiff, very fine sandy SILT. Some fine to coarse orange sand at 4'.	ML	0.0	Moist to Dry
1											
2											
3											
4											
5											
6		S-2	Macro core		40"	Brown and Lt. Brown to Orange		Loose, fine to very coarse SAND, little to some fine to coarse gravel. No impact.	SP	0.0	Dry
7											
8											
9											
10											
11		S-3	Macro core		42"	Lt. Brown / Orange		Loose, fine to coarse SAND, little very coarse sand, trace to little fine gravel. No impact.	SP	0.0	Dry
12											
13											
14											
15											
16		S-4	Macro core		37"	Lt. Brown / Orange		15' to 17', Loose, fine to coarse SAND, little very coarse sand, trace to little fine gravel. No impact.	SP	0.0	Dry
17											
18						Black and Brown Staining		17' to 20', Petroleum-type impact: loose fine to medium SAND, trace coarse sand. Staining, petroleum-type odor.	SP	28.0	Dry
19											
20											

Comments: 0' to 5' interval excavated by hand tools. SP 17' to 20' HCN:1

PROJECT NO.	11175065
BORING NO.	OSMW-3

URS Corporation

TEST BORING LOG

BORING NO:	OSMW-3
PROJECT:	KeySpan Hempstead MGP
SHEET:	2 of 3
CLIENT:	KeySpan
JOB NO.:	11175065
BORING CONTRACTOR:	Fenley and Nicol
BORING LOCATION:	KeySpan Property

DEPTH FEET	SAMPLE STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"	REC RQD	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-5	Macro core		36"	Lt. Brown / Orange / Tan Black Staining		Petroleum-type impact: Loose, fine to medium SAND, little fine to coarse gravel at 24' to 25'. Staining at 20' to 21'. Slight petroleum-type odor.	SP	46	Dry
21											
22											
23											
24											
25											
		S-6	Macro core		39"	Brown little Black Staining		25' to 29', Petroleum-type impact: Loose fine to very coarse SAND, trace fine gravel. Staining, moderate petroleum-type odor.	SP	50	Wet
26											
27										135	
28											
29											
30						Brown Staining		29' to 30', MGP impact: loose fine to medium SAND, trace fine gravel. MGP staining, trace to little DNAPL, 25% saturation, moderate odor, liner stained.	SP	160	Wet
		S-7	Macro core		32"	Black and Brown Staining		MGP Impacted: Loose fine to coarse SAND and fine GRAVEL, with cobbles. Stained and coated, strong MGP odor. 30' to 32' 50% DNAPL saturation. 32' to 35' 10% DNAPL saturation.	GP/SP	150	WET
31											
32										260	
33											
34											
35											
		S-8	Macro core		34"	Brown Staining		35' to 36', Loose fine to medium SAND. Stained 75% DNAPL saturated, strong odor.	SP	280	Wet
36						Brown / Orange		36' to 39', Loose, fine to medium SAND, trace coarse sand, trace fine gravel. No staining.	SP	3	Wet
37											
38											
39											
40								39' to 40', Fine SAND, trace gravel. Thin seam of 100% DNAPL saturated.	SP	100	Wet

COMMENTS: SP 20' to 25', HCN:2. SP 25' to 30', HCN:2. GP/SP 30' to 35', HCN:2. SP 35' to 40' HCN:1.

PROJECT NO.	OSMW-3
BORING NO.	11175065

URS Corporation										TEST BORING LOG		
										BORING NO:	OSMW-3	
PROJECT:	KeySpan Hempstead MGP									SHEET:	3 of 3	
CLIENT:	KeySpan									JOB NO.:	11175065	
BORING CONTRACTOR:	Fenley and Nicol									BORING LOCATION:	KeySpan Property	

	SAMPLE						DESCRIPTION					
DEPTH FEET	STRATA SYMBOL	NO.	TYPE	BLOWS PER 6"		REC RQD	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	Remarks PID	Remarks MOIST
		S-9	Macro core			35"	Lt. Brown / Orange		Loose, fine to medium SAND, trace coarse sand, trace fine gravel, trace black sand (native) at 43'. No odors or impact.	SP	0	Wet
41												
42												
43												
44												
45												
									End of boring: 45' bgs			
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

COMMENTS:	PROJECT NO.	OSMW-3
	BORING NO.	11175065

Appendix C

ENTACT Health and Safety Plan

(Provided in Electronic Format Only)

NATIONAL GRID HEMPSTEAD
INTERSECTION STREET
FORMER MGP SITE

Hempstead, NY

HEALTH AND SAFETY PLAN

PREPARED FOR

National Grid

PREPARED BY
ENTACT
3129 Bass Pro Dr.
Grapevine, TX 76051
(972) 580-1323

May 9, 2008
Rev. 2.

TABLE OF CONTENTS

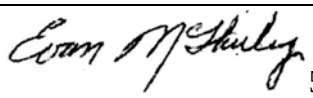
SECTION **PAGE**

ATTACHMENTS THAT ARE REFERENCED WITHIN THIS DOCUMENT ARE CONSIDERED PART OF THIS HEALTH AND SAFETY PLAN AND ARE COMPILED AND MAINTAINED UNDER SEPARATE COVER

HEALTH AND SAFETY PLAN

ACKNOWLEDGEMENT AND ACCEPTANCE

Acknowledgement

Role	Name	Signature and Date
ENTACT Field Project Manager (Site Superintendent)	Dan Duncan	
ENTACT Project Health and Safety Coordinator	Evan McShirley	 5/12/08
ENTACT Health and Safety Officer (Onsite Safety Officer)	Kurt Sutliff	

Acceptance

Role	Name	Signature and Date
National Grid Project Manager	Patrick Van Rossem	
URS Project Manager	Jim Stachowski	

PERMIT TO WORK

This HASP is prepared to meet the requirements for general and high risk permit activities. Listed below are the conditions as well as the sections in the HASP that meet General PTW requirements. Permits that are required for high risk tasks such as excavation, hot work, confined space, elevated work and lockout/ tag out will be completed by the Health and Safety Officer and Field Project Manager. A copy of all permits will be retained on site as part of the project file.

ENTACT shall fill out necessary permit forms and submit them for approval in accordance with ENTACT and client permit program requirements. General work permits require signatures by the ENTACT HSO and by at least one client representative.

General PTW Requirements	Reference
The HASP is tailored to the specific scope of work being performed	Sections 2.3
The scope of work is defined	Section 2.3
The HASP requires daily tailgate meetings wherein the planned activities are reviewed in detail with the work crews and all conditions necessary to perform the work safely for that day are considered	Sections 3.7, 4.1, 4.2, and 5.4
The HASP requires project work teams to conduct daily review of foreseeable hazards and consequences and that both are avoided by taking steps to implement appropriate control measures – HASP updated as necessary	Section 1.3 and 5.0
The HASP identifies all parties that have project health and safety responsibilities and those parties are communicated to as appropriate	Section 3.0

EMERGENCY CONTACTS

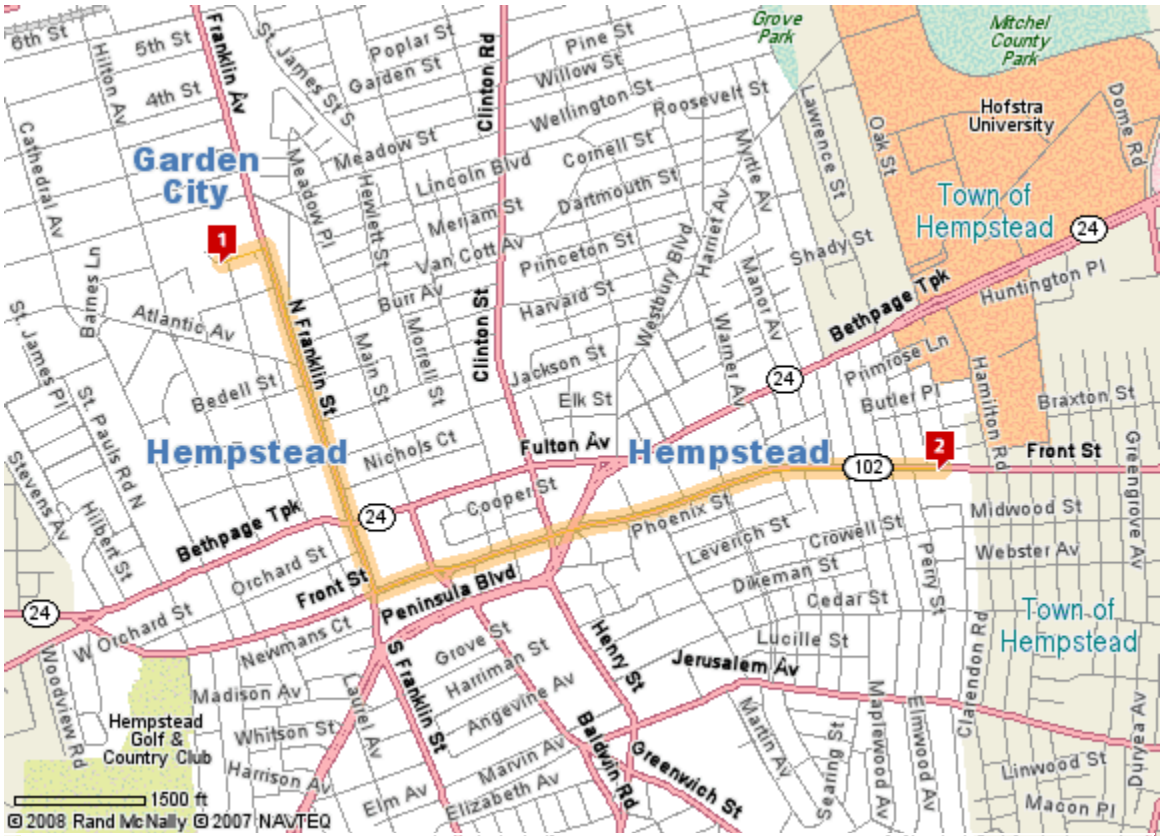
It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. This table should be posted in the worksite trailer.

EMERGENCY CONTACTS	
Emergency Response Agencies	
Fire Department	911 – Emergency
Police Department	911 – Emergency
Hempstead General Hospital 800 Front Street Hempstead, NY. 11550	(516) 564-4827
Island Occupational 4 Dorothy Gate Massapequa, NY 11758	(516) 564-4827
Alternate Gas Emergency Phone Number(General National Grid Gas Emergency)	1- (800) 930 5003
National Response Center	(800) 424-8802
Center for Disease Control	(404) 488-4100
Chemtrec	(800) 424-9300
National Capital Poison Center	(800) 222-1222
Project Personnel	
U.S. Coast Guard National Response	(800) 424-8802
Project Personnel	
Adam Ewert ENTACT Project Coordinator	Office: (630) 986-2900 Cell: (630) 675-9788
Don Self ENTACT Corporate Health and Safety Director	Office: (972) 580-1323 Cell: (603) 669-4259
Dan Duncan ENTACT Field Project Manager	Office: (630) 986-2900 Cell: (630) 461-7128
Evan McShirley ENTACT Project Health and Safety Coordinator	Office: (972) 580-1323 Cell: (630) 675-9975

EMERGENCY CONTACTS	
Emergency Response Agencies	
Kurt Sutliff ENTACT Health and Safety Officer	Office: (630) 986-2900 Cell: (630) 461-5563
Patrick J. Van Rossem Project Manager	Office:(516) 545-2578 Fax: (516) 545-2582 Cell: (917) 572-4075
Jim Stachowski URS Corporation- NY	Office: (716) 856-5636 Cell: (716) 923-1153
Kirk White URS Corporation	Cell: (923) 277-2206
Casey Brockhoff Senior Supervisor Roslyn Gas Field Operations	Cell: (516) 523 7173 **Emergency Line 1- (800) 930 5003**
Alternate Gas Emergency Phone Number(General National Grid Gas Emergency)	**1- (800) 930 5003**

NEAREST EMERGENCY ROOM

Hempstead General Hospital
800 Front Street
Hempstead, NY. 11550
(516) 564-4827

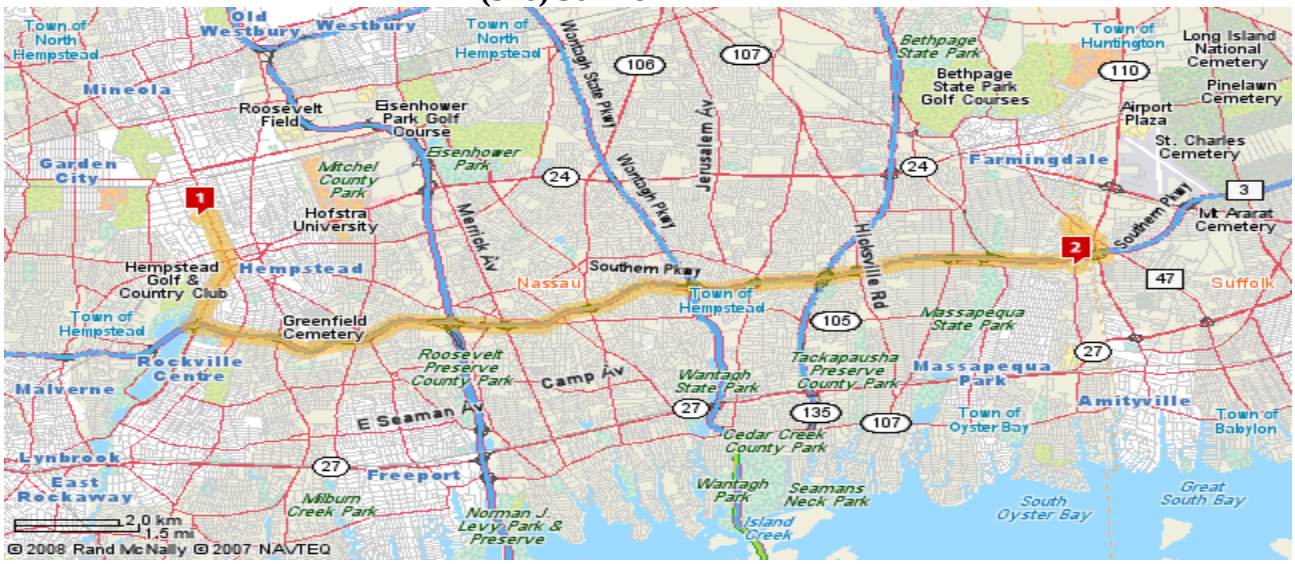


1	You are at 45 Intersection St, Hempstead, NY 11550-1305	
2	Go East on Intersection St Show Map	< 0.1 miles
3	Turn R onto N Franklin St Show Map	
4	Turn L onto Front St 1.3 miles Show Map	
5	You are at 800 Front St, Hempstead, NY 11550-4600	

STEPS: 5 **EST. DRIVE TIME:** 8 minutes **EST. DISTANCE:** 2.1 miles

OCCUPATIONAL CLINIC

Island Occupational
4 Dorothy Gate
Massapequa, New York 11758
(516) 564-4827



Directions:

STEP	DIRECTIONS	DISTANCE
1	You are at 45 Intersection St, Hempstead, NY 11550-1305	
2	Go East on Intersection St Show Map	< 0.1 miles
3	Turn R onto N Franklin St Show Map	0.9 miles
4	Bear R onto Peninsula Blvd Show Map	1.2 miles
5	Continue onto Southern Pkwy E (Southern State Pkwy) Show Map	11.4 miles
6	Take Exit 32N (RT-110 N, Huntington) on R Show Map	0.2 miles
7	Bear R onto RT-110 N (Broadway) Show Map	0.3 miles
8	Bear L onto Main St (CR-47) Show Map	0.2 miles
9	Continue onto Main St Show Map	0.2 miles
10	Turn L onto Carmans Rd Show Map	0.8 miles
11	Turn L onto Dorothy Gate Show Map	< 0.1 miles
12	You are at 4 Dorothy Gate, Massapequa, NY 11758-3521	

HASP-AT-A-GLANCE – MOBILIZATION/SITE PREPARATION /UTILITY LOCATION AND MARKING

ACKNOWLEDGEMENTS

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Key Span Hempstead Project. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

Site preparation includes establishment of an on-site trailer, mobilizing equipment to the work area, locating utilities, setting up a fuel delivery cell, and reviewing soil conditions. Most activities will be performed in clearing designated for ENTACT's trailer. Equipment will be mobilized on an as needed basis. The table below outlines the type and quantity of major equipment to be utilized throughout the project. The equipment list and quantities are subject to change based on actual field conditions.

Equipment Type	Quantity	Equipment Use
D5 Dozer (or equivalent)	1	Backfill placement and structure moves
4-CY Wheel Loader w/Forks	1	General material handling and loading
CAT 330 Excavator (or equivalent)	1	General excavation and structure moves
CAT 325 Excavator (or equivalent) w/Mounted Hammer Attachment	1	Break up and remove MGP features
66-inch Vibratory Compactor	1	Backfill compaction
Water Truck	1	Dust and odor suppression
Rusmar Foamer	1	Dust and odor suppression
320 Kilowatt Generator	1	Power air handling system

Utility Location

Utility location will be performed per Specification Section 02110 prior to beginning land disturbing activities. ENTACT will contact the New York City- Long Island One Call center and/or the new 811 Utility Dig to locate and mark out utilities that may enter or exit the perimeter of the IRM excavation areas. National Grid will locate and mark out underground utilities and piping within the IRM excavation areas limits. In the event utilities are observed entering the excavation areas, National Grid will be notified and proper procedures will be implemented. At a minimum, outlined utilities will be marked and protected against vibration, settlement, undermining, and other hazards. Clearance and protection of the existing 16 inch gas main is discussed below in Section 4.0. The Utility Protection Plan in the final COP will elaborate on execution and methods, and will be in accordance with Specification Sections 01330, 02110 and 02300.

Constituents of Concern

The following constituent of concern (COC) is present at the site:

- Particulates not otherwise classified

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Site preparation activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Pinch points/sharp objects
- Noise
- Vehicle traffic
- Slip, trips, falls
- Heavy lifting
- Fires
- Weather, including heat or cold stress
- Hurricane
- Underground and overhead utilities
- Uneven terrain
- Hand injuries

Site preparation activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level D personal protective equipment (PPE) is anticipated for this task and is defined below.

Level D PPE	
Protective Gear	**Type**
Respiratory protection	None
Chemical protective clothing [1]	None
Hand protection: inner gloves	None
Hand protection: outer gloves	Cotton or leather work gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Splash protection[2]	Standard face shield
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25
[1] Associates may wear Tyvek or similar coveralls as protection from ticks and insects. [2] Splash protection will be worn during high-pressure cleaning.	

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing

in at the on-site trailer.

Fire extinguishers must be available in the trailer and each vehicle or piece of equipment.

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Air monitoring of personnel and the work area is not required for this job task. Dust suppression methods will be used to control particulate not otherwise classified with the goal of dust suppression being the avoidance of any visible dust. Section 8 provides additional information on air monitoring.

HASP-AT-A-GLANCE – ESTABLISHING SITE SECURITY

Acknowledgements

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES – ESTABLISHING SITE SECURITY

ENTACT will control site access during normal working hours in accordance with an approved security plan. All visitors, workers and subcontractors will be required to sign a daily log maintained by ENTACT personnel. The log will include date, name of visitor, company, address and time on and off site. The presence of unauthorized personnel will be immediately communicated to National Grid and appropriate actions will be taken as directed. The site will be secured at day's end and gates will be locked during non-working hours. (See site security checklist).

ENTACT will provide an area designated for security operations. This area that may be part of the Contractor's offices, or a separate enclosure and will contain, as a minimum, the following equipment. The existing chain link fence may be used as part of the security fence with approval by National Grid and/or URS. ENTACT may use additional security fencing for localized security measures with approval by National Grid and/or URS.

- One independent telephone line and telephone

- A minimum of two portable two-way radios for ENTACT, two portable two-way radios for National Grid and/or URS and one base radio station. All sets will be capable of transmitting to and receiving from any other set, at any point within the project boundary. All portable units will be rechargeable, and will be capable of operating continuously without recharge for eight hours.

- Control of all persons, equipment, and vehicles entering and leaving the Site will

be provided by ENTACT in coordination with National Grid's requirements.

- ENTACT will require each person to display proper photo identification.
- ENTACT will maintain a list of persons authorized for Site entry and submit a copy of the list to National Grid and/or URS.
- ENTACT will require all personnel and visitors having access to the Site to sign in and sign out, and will keep a record of all site access. A log of all visitors will be maintained in coordination with National Grid's existing security requirements.
- Site visitors will not be permitted to enter active work areas unless authorized by National Grid and/or URS.
- Vehicular access will be restricted to authorized vehicles only. National Grid and/or the Engineer reserve the right to search all contractor vehicles.
- Personal vehicles will not be authorized to enter the active hazardous areas on site.

Minimum Protective Clothing and Equipment Requirements

Level D personal protective equipment (PPE) is anticipated for this task and is defined below.

Level D PPE	
Protective Gear	**Type**
Respiratory protection	Not required
Chemical protective clothing	Not Required
Hand protection: inner gloves	Not required
Hand protection: outer gloves	Cotton or leather work gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Splash protection	Standard face shield

Level D PPE	
Protective Gear	**Type**
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25
[1] Associates may wear Tyvek or similar coveralls as protection from ticks and insects.	

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer or field office.

Fire extinguishers must be available in the trailer or field office and each vehicle or piece of equipment. Fire extinguishers of proper size, type, and placement for the protection of the incipient phase of fire will be utilized.

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Air monitoring of personnel and the work area is not anticipated for this job task. Dust suppression methods will be used to control particulate not otherwise classified with the goal of dust suppression being the avoidance of any visible dust. Section 8 provides additional information on project air monitoring.

HASP-AT –A –GLANCE – ESTABLISHING WORK ZONES

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES – ESTABLISHING WORK ZONES

The following work zones will be established, clearly delineated with orange construction fencing and identified with signs to control access by unauthorized personnel.

Support Zone

The support zone (SZ) will be located in an approved area and will contain areas for field personnel and visitors to conduct activities and to park vehicles outside the work areas. ENTACT will mobilize an adequate amount of trailers to accommodate ENTACT field personnel, National Grid, URS and NYSDEC Site representative. Temporary services will be provided in accordance with Section 01500 of the Technical Specifications.

Exclusion Zone

The exclusion zones (EZs) will encompass areas where workers may be exposed to contaminants of concern or dangers associated with the use of heavy equipment. The EZs will be clearly marked and protected from unauthorized entry. No one will enter the EZs without appropriate personal protective equipment (PPE), proper safety training, and familiarity with the HASP. The size and locations of the EZs may be adjusted as work in an area progresses and as dictated by field monitoring.

Contamination Reduction Zone

The contamination reduction zone (CRZ) will serve as a buffer between the EZ and the SZ and will house the personnel decontamination area. The personnel decontamination area will provide facilities to don and doff PPE as workers enter and exit the EZ. The personnel decontamination area will be equipped with water, soap, boot wash, and

containers for spent PPE. Rinse waters generated in the personnel decontamination area will be captured, containerized and appropriately managed.

Equipment Decontamination Area

Equipment and transport vehicles will be cleaned and decontaminated in the decontamination area by mechanical means as well as with the use of high pressure, low volume hot water. The decontamination pads will consist of smoothly graded areas large enough to accommodate the largest anticipated piece of construction equipment. The foot print of the decontamination pad will be cleared of large rocks, stones and other obstructions to prevent damage to the overlying decontamination pad containment system. Job Safety Procedures

A work plan or procedure will be written for high pressure water cleaning that includes, but are not limited to, the following:

- Manufacturer's recommendations and requirements for each specific piece of equipment to be used.
- Personal protective equipment (PPE).
- Detailed procedures on the use of each specific piece of equipment.
- Equipment maintenance, servicing, and repair.
- Tools.

- The cutting action of a high-pressure water stream and the potential hazard it poses to the human body shall be demonstrated.

- The need and limitations of personal protective equipment shall be explained. Instruction shall be given as to when and how specific clothing and protective devices must be worn.

- Operation of the high-pressure system and auxiliaries shall be explained. Training shall include start-up and shutdown procedures, potential equipment problems, and appropriate corrective actions.

- Operation, identification, and purpose of all safety devices shall be explained. The importance of not tampering with any safety device, as well as the importance and requirements of keeping them functional, shall be stressed.

- The identification of high-pressure fittings, hoses and accessories, and how to distinguish between them shall be demonstrated.

- The proper method of connecting hoses (lying out without kinks), protecting from excessive wear, and using the proper tools for hook-ups shall be explained and demonstrated.

- The proper stance for sound footing and how to identify and use the various devices. The trainee, under close supervision, shall use the various devices while the unit is slowly pressurized.

Associate(s) shall demonstrate knowledge and skill in the proper application of equipment through practical application.

Berms will be installed along both sides of the decontamination pad to prevent stormwater run on. The floors and berms will be covered with 40 mil high-density polyethylene (HDPE) geomembrane. The geomembrane laid on the floor will be underlain and overlain with a 10 ounce geotextile as protective cushion layers. A minimum 8 inch layer of stone will be placed on top of the geomembrane and geotextile. Wood timbers may be used as a travel surface in lieu of stone to protect the liner system. Side shields will be installed on both sides to prevent overspray or splashing outside of the decontamination pad.

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified
- Petroleum Hydrocarbons (TPH)

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Mobilization/Site preparation activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Pinch points/sharp objects
- Noise
- Vehicle traffic
- Slip, trips, falls
- Heavy lifting
- Fires
- Weather, including cold stress while mobilizing
- Heat stress and lightning during later stage of project
- Underground and overhead utilities
- Uneven terrain

Mobilization/Site preparation activities could be affected by the following biological hazards:

- Insect bites and stings (ticks) Lyme disease
- Poisonous plants

- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level D personal protective equipment (PPE) is anticipated for this task and is defined below.

Level D PPE	
Protective Gear	**Type**
Respiratory protection	None
Chemical protective clothing	None[1]
Hand protection: inner gloves	None
Hand/arm protection: outer gloves	Cotton or leather work gloves/long sleeve shirt
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Splash protection	Standard face shield
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25
[1] Associates may wear Tyvek or similar coveralls as protection from ticks and insects.	

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer or field office.

Fire extinguishers must be available in the trailer or field office and each vehicle or piece of equipment. Fire extinguishers of proper size, type, and placement for the protection of the incipient phase of fire will be utilized.

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Air monitoring of personnel and the work area is not anticipated for this job task. Dust suppression methods will be used to control particulate not otherwise classified with the goal of dust suppression being the avoidance of any visible dust. Section 8 provides additional information on project air monitoring.

HASP-AT-A-GLANCE – SITE CLEARING, PREPARATION AND HAUL ROAD CONSTRUCTION

Acknowledgements

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES: SITE CLEARING AND PREPARATION

Vegetation and debris will be removed from the work zones and other areas where remedial activities may occur. Debris, stumps, roots and other vegetation that is generated during clearing operations will be stockpiled, characterized and disposed of off site at an appropriate disposal facility and accordance with applicable regulations and pending approval by National Grid.

An equipment decontamination pad will be constructed to decontaminate trucks and equipment that have entered the EZ. The decontamination pads will consist of smoothly graded areas large enough to accommodate the largest anticipated piece of construction equipment. The foot print of the decontamination pad will be cleared of large rocks, stones and other obstructions to prevent damage to the overlying decontamination pad containment system. Berms will be installed along both sides of the decontamination pad to prevent stormwater run on. The floors and berms will be covered with 40 mil high-density polyethylene (HDPE) geomembrane. The geomembrane laid on the floor will be underlain and overlain with a 10 ounce geotextile as protective cushion layers. A minimum 8 inch layer of stone will be placed on top of the geomembrane and geotextile. Wood timbers may be used as a travel surface in lieu of stone to protect the liner system. Side shields will be installed on both sides to prevent overspray or splashing outside of the decontamination pad.

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified (particulates not otherwise regulated)
- PAH
- BTEX
- Hydrogen Cyanide
- Hydrogen Sulfide

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task, however, area and personal samples will be collected to evaluate potential exposures.

Hazard Analysis

Site clearing activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Exposure to heavy equipment
- Tree kick back
- Pinch points/sharp objects
- Noise
- Vehicle traffic
- Slip, trips, falls
- Falling objects
- Fires
- Weather, including heat or cold stress
- Underground and overhead utilities
- Uneven terrain

Site clearing activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level D personal protective equipment (PPE) is anticipated for this task and is defined below.

Level D PPE	
Protective Gear	**Type**
Respiratory protection	Not required
Chemical protective clothing	Not Required
Hand protection: inner gloves	Not required
Hand protection/arm protection: outer gloves	Cotton or leather work gloves/long sleeve shirt
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available in the trailer or field office and each vehicle or piece of equipment. Fire extinguishers of proper size, type, and placement for the protection of the incipient phase of fire will be utilized.

Dust control measures will be implemented to minimize the potential for dust generation during soil excavation and handling, and placement of fill. The main dust control device will include water trucks. Heavily traveled truck routes and adjacent off site roads will be wet down with the water truck to minimize dust emissions. Truck routes on and off site will be continuously monitored for excessive dirt or dust

Air Monitoring

Air monitoring will be performed in accordance with the Community Air Monitoring Program to evaluate the effectiveness of dust control measures. In general, real time air monitoring equipment will be utilized to monitor dust real-time and VOC levels in the work zone and at the perimeters. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action measures will be implemented. Corrective action measures may include increasing water coverage, ceasing select activities during high wind, and reducing speed of equipment that may reduce dust generation. See section 8 for additional detail

HASP-AT-GLANCE - INSTALLING SOIL EROSION, SEDIMENT, DUST AND ODOR CONTROLS

Acknowledgements

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

Soil erosion and sediment control measures will be implemented in accordance with the latest edition of the New York State Standards for Soil Erosion and Sediment Control. A SESCP will be prepared by ENTACT per Specification Section 02120 and incorporated into the Final COP. ENTACT will utilize Best Management Practices (BMPs) including silt fence installed as mandated and in strategic locations based on visual observance of flow patterns and topography of work areas to control sediment entrained storm water from exiting and entering work areas. Soil erosion and sediment controls will be installed and functional prior to initiating land disturbing activities. Controls will be continuously monitored and inspected to ensure they are functioning properly and positioned adequately to be effective. Maintenance inspections will be performed weekly and within 24 hours of a rain event. Deficiencies will be corrected as soon as noted and observations will be recorded.

Dust and Odor Controls

The majority of impacted soil excavation and load out will be performed within a temporary structure equipped with a vapor management system (VMS). Working under cover of the structure will control dust and odor emissions during impacted soil excavation and load out. Air monitoring will be performed by others in accordance with the Community Air Monitoring Program (CAMP), to evaluate the effectiveness of dust and odor control measures. Real time continuous air monitoring equipment will be utilized to monitor respirable particulate matter and total volatile organic compound (VOC) levels in the work zones and at the site perimeters. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action

measures will be implemented. Odor will be monitored during excavation and handling of impacted soils from excavation areas. In the event odor emissions exceed an acceptable intensity, controls will be implemented. Odor controls will include foam and foaming devices (Rusmar foamer) or tarps to cover open excavations.

ENTACT's experience points out that there are a number of factors that affect just how challenging and important the control of emissions at a given MGP site will be:

- The proximity of the site to homes, schools or other population centers.
- The concentrations of coal tars and other wastes encountered at the site. This can vary widely depending upon the sector of the site undergoing remediation. For example, surface soil vs. the interior of a gas holder.
- The size of the excavation area.
- The size of any staged contaminated soil or debris piles.
- Ambient air temperatures, wind speed and direction.

Non-hardening, aqueous foam is one of the most commonly prescribed technologies for preventing the release of VOCs, odors and dust during MGP remediation. The performance advantages of foam are its application flexibility, instantaneous results.. Aqueous foams are completely biodegradable, do not interfere with any standard soil treatment processes and do not materially contribute to waste stream volume.

Dusty conditions outside excavation areas will also be closely monitored. Truck routes on and off site will be continuously monitored for excessive dirt or dust. Proper cleaning of trucks exiting the site will aid in minimizing dusty conditions on roadways. A water truck will be on site to wet down on and off site travel routes. A stabilized construction entrance/exit consisting of smooth graded areas large enough to accommodate truck traffic will be constructed at the exit point to clean truck tires prior to exiting the site. The floors of construction entrance/exit will be covered with non-woven geotextile and coarse aggregate and will be maintained and redressed while in use. Truck tire inspection stations will be constructed near site exits to ensure contamination is not migrating onto off site roadways via truck tires. A decontamination pad will be constructed in accordance with Specification Section 01066 to clean trucks and equipment that have entered the EZ by mechanical means as well as with the use of high pressure, low volume hot water as needed. The decontamination pads will consist of smoothly graded areas large enough to accommodate the largest anticipated piece of construction equipment. The foot print of the decontamination pad will be cleared of large rocks, stones and other obstructions to prevent damage to the overlying decontamination pad containment system. Berms will be installed along both sides of the decontamination pad to prevent

stormwater run on. The floors and berms will be covered with 40 mil high-density polyethylene (HDPE) geomembrane. The geomembrane laid on the floor will be underlain and overlain with a 10 ounce geotextile as protective cushion layers. A minimum 8 inch layer of stone will be placed on top of the geomembrane and geotextile. Wood timbers may be used as a travel surface in lieu of stone to protect the liner system. Side shields will be installed on both sides to prevent overspray or splashing outside of the decontamination pad.

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified (particulates not otherwise regulated)
- PAH
- BTEX
- Hydrogen Cyanide
- Hydrogen Sulfide

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Soil erosion and sediment control activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Pinch points/sharp objects
- Trencher utilization
- Underground obstructions
- Muscle strain while shoveling
- Noise
- Vehicle traffic
- Slip, trips, falls
- Falling objects
- Fires
- Weather, including heat or cold stress
- Underground and overhead utilities
- Uneven terrain

Soil erosion and sediment control activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level D personal protective equipment (PPE) is anticipated for this task and is defined below.

Level D or D+ PPE	
Protective Gear	**Type**
Respiratory protection	Not required
Chemical protective clothing[1]	Not required or coveralls
Hand protection: inner gloves	Not required
Hand protection/arm protection: outer gloves	Cotton or leather work gloves/long sleeve shirt
Foot protection: inner boots	Steel-toe, leather work boots

Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25
[1] Optional use of coveralls for insect and poisonous plant protection	

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available within 25 feet of work location. Five pound type ABC, Dry chemical extinguisher will be utilized

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Air monitoring will be performed in accordance with the Community Air Monitoring Program to evaluate the effectiveness of dust control measures. In general, real time air monitoring equipment will be utilized to monitor dust real-time and VOC levels in the work zone and at the perimeters. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action measures will be implemented. Corrective action measures may include increasing water coverage, ceasing select activities during high wind, and reducing speed of equipment that may reduce dust generation.

HASP-AT-A-GLANCE – INSTALLATION OF TEMPORARY FABRIC STRUCTURE WITH VAPOR MANAGEMENT SYSTEM (VMS)

Acknowledgements

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

Excavation and load out activities will be conducted under a temporary fabric structure. The structure, meeting the design criteria requirements in Specification Section 13120 will be delivered and assembled during the preparation phase. Details of the structure signed by a New York State licensed Professional Engineer (PE) will be submitted during the final design phase. ENTACT proposes using a crane to lift, 96 feet wide by 115 feet long PVC coated membrane structure with cargo doors on each gable end. A skid system will be mounted to the structure to aid in movement and repositioning of the structure. The structure will be equipped with a VMS designed to provide a minimum of six (6) air exchanges per hour and to process recovered air from within the structure. To achieve 6 air exchanges per hour the VMS will require two units with each unit consisting of a 20,000 cubic feet per minute (cfm) blower and damper, adsorber with 16,000 lbs of reactivated vapor phase carbon, particulate filter and breakthrough indicator. For ease of movement, the VMS components will be stationed on flatbed trucks and connected to the structure components with flexible ducts. A 320 kilowatt generator will be used to power the VMS components. When the structure is ready to be moved the VMS components and generator will be disconnected and moved via truck to the next location where the structure will be repositioned and the components reconnected. Placement of the VMS will be closely coordinated with excavation sequencing and structure movement to ensure there is sufficient room for the flatbed trucks and generator to park outside the structure. Emissions from the VMS will be continuously monitored using a photoionization detector (PID) and detector tubes, if needed, to ensure emissions for benzene, toluene, ethyl benzene and xylene (BTEX) are achieved. In general once assembled, the structure will be moved by either pulling with a dozer and/or excavator or picking the structure up

with a crane. The placement of the structure will be planned in a manner that minimizes the amount of relocation required. Configurations and relocations may change based on actual field conditions. The mode of movement will depend on where the structure is positioned and where it will be positioned next. Once in position, the structure will be ballasted in place with concrete blocks placed over steel plates at each structure rib.

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified (particulates not otherwise regulated)
- PAH
- BTEX
- Hydrogen Cyanide
- Hydrogen Sulfide

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Demobilization activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Exposure to heavy equipment
- Pinch points/sharp objects
- Noise
- Vehicle traffic
- Slip, trips, falls
- Falling objects
- Fires
- Weather, including heat or cold stress
- Underground and overhead utilities
- Uneven terrain

Demobilization activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level D personal protective equipment (PPE) is anticipated for this task and is defined below.

Level D PPE	
Protective Gear	**Type**
Respiratory protection	Not required
Chemical protective clothing	Not required
Hand protection: inner gloves	Not required
Hand protection: outer gloves	Cotton or leather work gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available for each piece of equipment. Minimum 5 lb. class ABC (Dry Chemical).

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Air monitoring will be performed in accordance with the Community Air Monitoring Program to evaluate the effectiveness of dust control measures. In general, real time air monitoring equipment will be utilized to monitor dust real-time and VOC levels in the work zone and at the perimeters. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action measures will be implemented. Corrective action measures may include increasing water coverage, ceasing select activities during high wind, and reducing speed of equipment that may reduce dust generation.

HASP-AT-A-GLANCE – EXISTING GAS MAIN CLEARANCE AND EXCAVATION

Acknowledgements

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

ENTACT will coordinate with National Grid to deactivate the 16 inch gas line transecting the site prior to excavation activities. The gas line currently runs to the south of Area A and to the north of Area B. ENTACT will hand excavate several test pits to uncover the gas line at multiple points within the work area to accurately determine and record the exact location and depth of the gas line.

Because the current anticipated proximity of the gas line is within the Area A bench down zone and in order to avoid placing the temporary structure on or over the gas line, it will be necessary to excavate and backfill a 15 ft wide area along the south end of Area A as a clean zone for structure placement. An excavator will be positioned in Area A and will excavate by pulling soils away from the gas line in a south to north motion. Positioning the excavator in this manner will avoid placing excessive weight and vibration directly over the gas line. Due to the shallow proposed excavation depth and assuming a typical installation depth of at least 3 feet for the gas line, the area will be excavated with a vertical cut along the south edge to minimize excavation activity directly over the gas line. A vertical cut of 3 feet is within OSHA standards and will minimize excavation risk near the gas line. Extreme care will be taken with any excavation in close proximity to the gas line. Excavation directly over or next to the gas line will be done by hand as necessary.

To minimize the extent of gas line potentially exposed at any one time as well as to control odors and dust emissions, the excavation will be performed in small sections with foam applied as necessary to control odors and dust. Backfill material will be available

on site to concurrently backfill the excavation to minimize the amount of area open at any one time. Backfill placed in the vicinity of the gas line will be compacted with hand operated compaction equipment to further minimize risk of damage to the gas line.

If during the gas line clearance excavation visible source material is identified near or under the gas line, further excavation may be necessary. An evaluation of the potential extent of the source material will be made by means of a visual examination of the excavation area and/or additional test pit excavation. If it is determined the excavation can proceed without exposing more than 15 ft of gas line at any one time, excavation will be performed using conventional excavation means supported by hand excavation of soil directly against the gas line. If more than 15 ft of gas line may be exposed to remove the source material, additional gas line support will be needed. Gas line support will consist of two 25 ft long H-piles installed approximately 3-4 feet off either side of the gas line, with a cross beam and support saddles. Supports will be installed every 15 ft to support the exposed gas line while impacted soils are removed from under and around the line. Once a segment has been successfully excavated, on site backfill material and/or imported clean fill will be used to backfill around and over the exposed pipe. Backfill soils will be placed and compacted with care using hand operated compaction equipment to ensure proper backfilling around the pipe haunches and to provide proper support for the gas line once the temporary support saddles are removed.

While work is performed around the gas line, monitoring of vibration and settlement will be conducted as directed by National Grid in accordance with Technical Specification Section 01056 and the New York State Department of Environmental Conservation (NYSDEC). If vibration exceeds specified tolerance levels, means and methods for completing the work will be evaluated and modified to ensure vibrations are maintained below the action levels. If any settlement of the gas line is identified the work activities will be terminated and the cause evaluated and corrected. If necessary temporary pipe supports can be installed to ensure proper support is maintained until backfilling can be completed and the pipe secured.

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified (particulates not otherwise regulated)
- PAH
- BTEX
- Hydrogen Cyanide
- Hydrogen Sulfide

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements,

respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Demobilization activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Exposure to heavy equipment
- Pinch points/sharp objects
- Noise
- Vehicle traffic
- Slip, trips, falls
- Falling objects
- Fires
- Weather, including heat or cold stress
- Underground and overhead utilities
- Uneven terrain

Demobilization activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level C personal protective equipment (PPE) is anticipated for this task and is defined below.

Level C PPE	
Protective Gear	**Type**
Respiratory protection	½ FACE with OV/P100 for operators with closed cab. Full face with OV/P10O Filters for ground personnel
Chemical protective clothing	TyvekDupont Tyvek® suits with elasticized wrists and ankles, or attached hoods. Lightweight construction is breathable
Hand protection: inner gloves	Nitrile
Hand protection: outer gloves	leather work gloves

Level C PPE	
Protective Gear	**Type**
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available for each piece of equipment. Minimum 5 lb. class ABC (Dry Chemical).

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

The work zone will be monitored using a 4 Gas Meter plus Photo- Ionization Detector (PID) unit to observe levels of hydrogen sulfide (H2S), lower explosive limit (LEL), carbon monoxide (CO) and oxygen (O2). The work zone will be foamed as needed to mitigate potential odor or dust emissions. Monitoring of vibration, noise and settlement will be conducted as directed by National Grid in accordance with Specification Section 01056 and the New York State Department of Environmental Conservation (NYSDEC).

HASP-AT-A-GLANCE – EXCAVATION OF IMPACTED SOILS

Acknowledgements

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

Excavation activities within the delineated areas will proceed once all site preparation is complete and the temporary structure and VMS are operable. Where possible, all impacted soils will be removed and loaded directly into transport vehicles within the temporary structure for off site disposal. Transport trucks will back the bed of the truck into the structure while the cabs remain outside of the structure. Truck drivers will be instructed to remain in the truck cabs while on site. If direct loading is not feasible, excavated source materials may be temporarily stockpiled within the structures in accordance with Technical Specifications Section 02300.

Groundwater is expected to be present on site at 25 ft bgs and therefore is not anticipated to be encountered during shallow excavations. However if wet soils are encountered, they will be allowed to gravity drain back into the excavation. Drier soils and/or a drying agent may be used to mix with the wet soils until soils are adequately dried for loading into transport vehicles. An adequate supply of drying agent will be maintained on site throughout excavation activities. When utilizing the drying agent (Calciment Oxide) associates must handle with care. Under dusty conditions it can cause excessive drying of skin and skin irritation. Eyes and open cuts are particlularly vulnerable. Keep product dry and avoid dusting under any circumstance. If applying in ENTACT will require level C full face respirator with OV-P-100 Filters. See first aid procedures and additional information in Attachment AA.

In some Areas, (Area A and parts of Area E) the uppermost 2 ft of overburden soil will be removed during excavation activities and stockpiled under the structure for potential re-use as backfill pending approval by NYSDEC, National Grid or the Engineer.

Overburden stockpiles will be placed on top of polyethylene sheeting pending approval. The overburden will be used as backfill as soon as approval is granted. In the event approval is not granted prior to repositioning the structure over the next excavation area, the overburden will be covered with polyethylene sheeting in preparation for stockpiling outside of the structure. The polyethylene cover will be secured in place with sand bags or other weighted material.

If NAPL is observed during excavation in soils or on the surface of stormwater runoff within an excavation, booms or absorbent pads will be used to isolate the NAPL. Once isolated and if present in a volume better managed by pumping, a drum vacuum will be used to pump the NAPL into a 55 gallon drum for storage prior to off site disposal. If the NAPL is not pumpable, it may be absorbed with pads and the pads will be placed in drums or disposed of with the impacted soil. In the event large quantities are discovered, a vacuum truck will be brought on site to remove the NAPL and dispose of it properly. The NAPL will be disposed of at a National Grid approved disposal facility.

Should underground storage tanks (USTs) and/or former MGP piping be encountered during excavation activities, approved procedures described within the UST Closure Plan which has been prepared under separate cover (Submittal Reference 02111/1.3) implemented in accordance with Technical Specification Section 02111.

Once excavation depths are achieved and the excavation is determined by the Engineer to be visually clean, post excavation samples will be collected by ENTACT from the final excavation bottom at a minimum of one sample per 900 square feet of excavation bottom. The sample will be provided to National Grid or the Engineer for analytical testing in accordance with NYSDEC DER-10 for the specified parameters. Following sampling and as directed by National Grid the area will be immediately backfilled with either imported clean fill or stockpiled clean overburden soils.

The temporary structure will be positioned first over excavation Areas B and C, followed by Area A, and lastly Area E. The progression of excavation has been carefully thought out and sequenced to maximize time utilization and minimize the number of structure relocations. Specific activities relating to the excavation of Areas A, B, C and E will be completed by December 22, 2008 and are described in the following sections.

Excavation of Areas B and C

Areas B and C include 16 ft and 18 ft excavations respectively, both underlain by a concrete slab. Excavations will proceed once the structure is placed in Position 1 encompassing both areas, as shown on Figure 2. The VMS air intakes will be placed on the east side of the structure with the blowers on the west side as shown on Figure 6. This positioning will keep the VMS off of the gas line and air intakes away from any potential release of natural gas from the gas line. This positioning will be rotated 180

degrees when the structure is relocated for excavation in Area A.

Areas B and C will be safely excavated by initially creating a bench down zone utilizing a perimeter side slope of 1.25:1 to remove the initial 8 to 10 ft of soil along the north side of Area B. Bench down soils will be segregated from source material and stockpiled on polyethylene sheeting for potential reuse following completion of the excavation activities. A 24 ft x 10 ft x 8 ft deep ICON trench box will then be installed to serve as structural support for the final 8 ft cut as shown in Figures 3 and 4. Once the excavation is completed within the trench box, clean reuse or imported soils will be placed and compacted within the trench box as the box is carefully removed in small lifts to maintain the integrity of the excavation side walls. Backfill soils will be placed and spread with the excavator bucket and compacted within the trench box with hand operated compaction equipment or a small remote control operated roller. The trench box will be used in two positions (East and West) as shown in Figure 3 to allow full excavation along the north side of Area B while minimizing the bench back zone in relation to the edge of the temporary structure and gas line. This will also provide a clean zone that can then be benched into to allow the remainder of the Areas B and C excavation to be open cut with side walls benched back. Excavations will cease once the underlying concrete slab is exposed.

Impacted soil will be removed with a standard excavator and placed directly into transport vehicles within the temporary structure. Once the depths are achieved, the area will be backfilled and compacted. Vibratory monitoring will be performed during excavation and backfilling activities within close proximity to the gas line.

Area A Excavation

The structure will be placed over Area A in Position 2 as shown on Figure 2. Placement of the structure will require the removal of the existing inner and outer fence within the footprint of Position 2. Trees and vegetation will be cleared as necessary to accommodate stable footing for the structure. Temporary fence will be installed around the structure and tied into both ends of the standing outer fence to keep the site secure. As discussed, previous activities will include the clearance of the existing 16 inch gas line and excavation of the 15 ft horizontal section within Area A to accommodate the structure foot print. The VMS air intakes will be placed on the west side of the structure with the blowers on the east side and ducts running over the gas line foot print while in position over Area A as shown on Figure 6. This positioning should not affect the existing gas line since the VMS will not be directly over it and will eliminate the possibility of drawing any leaking natural gas (if present) into the building through the air intake louvers.

Area A consists of a shallow excavation down to 3 feet bgs and removal of the

underlying concrete slab. The excavation will be safely benched back with a perimeter side slope of 1¼:1. The uppermost 2 feet will be removed and stockpiled under the temporary structure for potential re-use as general fill, resulting in removal and disposal of approximately 150 CY of total source material from the area. The concrete slab will be broken up with a hammer attachment and removed with the excavator for off site disposal.

Upon completion of remediation at Area A, the temporary fence will be removed and the previous fence alignment will be replaced with in-kind materials.

Area E Excavation

Area E contains approximately 1,700 cubic yards of source material to be removed down to varying depths of 3 to 5 feet bgs. The temporary structure will be placed in the first position at the northern point of Excavation E along the inactive Long Island Rail Road (LIRR). The structure will not encroach upon the LIRR Right of Way (ROW) which may eliminate the need for LIRR access agreements as well as minimize the dangers of working in close proximity to the overhead electric lines. This structure placement outside the limits of the ROW will however limit the area of excavation along the existing fence line that can be completed under the structure. To allow excavation up to the fence line an open air excavation method outside of the structure will be performed in small controllable segments. This will allow excavation from the toe of the existing fence line with minimal slope to a depth of 3 feet and out to the limits achieved while under the structure. The open excavation will be foamed to control odors and dust and backfilled with clean fill concurrently to limit the square foot area open and exposed at any one time. This will allow for successful removal of a relatively small volume of soil along the fence line while preventing odor emissions and community complaints. All excavations will be completely backfilled at the end of each day with the edge of the excavation demarcated so it can be easily identified when excavation resumes the next day.

Limits of excavation scheduled for Future Site-Wide Remediation will be differentiated from IRM excavations prior to backfilling using a geotextile demarcation barrier meeting the minimum required properties provided on IRM Drawing 7. The Area E western perimeter will be cutback at a 1¼:1 side slope to the specified excavation depth. The north corner may require excavation prior to placement of the structure at Position 1. Sequenced structure positions are described below and shown on Figure 5.

ENTACT will exercise extreme caution when the structure and equipment are in the vicinity of the aboveground Long Island Power Authority electrical transmission lines and utility poles located on the LIRR property. Proper signage will be posted to meet the requirements of the High Voltage Proximity Act. At a minimum, the protective radii will be maintained near the utility poles (10 foot radial offset) and overhead wires (11 foot radial offset). Since the structure will be constructed near Area B and C, it will be

initially crane lifted and positioned in Area E then subsequently dragged from north to south, reducing the hazard of interfering with radial offset.

Position 1: The structure will initially be placed over Area E at Position 1. Subsequent moves along the excavation (north to south) will be performed by hooking a dozer and excavator to the gable side of the structure and pulling it into the next position. Position 1 will facilitate the removal of a 4 ft cut within the northern most excavation limits of Area E, post-excavation sampling and analysis, backfill and compaction activities.

Position 2: Activities to be carried out during Position 2 include continuation of the 4 ft excavation of Area E; removing and stockpiling the uppermost 2 foot of overburden for potential re-use; excavation to minimum depths of 3 and 5 feet bgs; post-excavation sampling and analysis; backfill and compaction activities.

Position 3: Activities to be carried out during Position 3 include removal of source material to depths of 3, 4 and 5 feet; post-excavation sampling and analysis; backfill and compaction activities

Position 4: Activities to be carried out during Position 4 include completion of the 3 ft excavation; post-excavation sampling and analysis; backfill and compaction activities. The Boiler Blowdown Sump located in the southern portion of Area E will be broken up with the hammer attachment and removed during the 3 ft excavation

Following completion of remedial efforts at Area E, the structure will be disassembled and demobilized from the site.

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified (particulates not otherwise regulated)
- PAH
- BTEX
- Hydrogen Cyanide
- Hydrogen Sulfide
- Nitrogen dioxide from combustion of diesel fuel inside tent structure
- Carbon monoxide from combustion of diesel fuel inside tent structure and trucks utilized for loadout.

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Exposure to heavy equipment
- Pinch points/sharp objects
- Noise
- Vehicle traffic
- Slip, trips, falls
- Falling objects
- Fires
- Weather, including heat or cold stress
- Underground and overhead utilities
- Uneven terrain

Activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level C personal protective equipment (PPE) is anticipated for this task and is defined below.

Level C PPE	
Protective Gear	**Type**
Respiratory protection	(APF = 50) Any air-purifying, full-face piece respirator (gas mask) with a chin-style, with OV/P-100 filters
Chemical protective clothing	Tyvek/Saranex
Hand protection: inner gloves	Nitrile
Hand protection: outer gloves	leather work gloves or Nitrile 13” flock
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	Rubber boot covers
Head protection	Standard hard hat

Eye protection	Standard safety glasses with side shield or goggles
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25
[1] To be determined by air monitoring. If air monitoring reaches the action level, full-face is required.	

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available for each piece of equipment. Minimum 5 lb. class ABC (Dry Chemical).

Dust suppression will be accomplished using water trucks to keep dust levels low.

Trucks waiting to be loaded at fabric structure will be required to shut down engine to control exhaust fumes

Air Monitoring

Air monitoring will be performed in accordance with the Community Air Monitoring Program to evaluate the effectiveness of dust control measures. In general, real time air monitoring equipment will be utilized to monitor dust real-time and VOC levels in the work zone and at the perimeters. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action measures will be implemented. Corrective action measures may include increasing water coverage, ceasing select activities during high wind, and reducing speed of equipment that may reduce dust generation. In addition air monitoring will be conducted to measure O2, CO, Nitrogen dioxide, LEL, H2S, and Hydrogen cyanide. See Section 8 for more detail on action limits for individual contaminants

HASP-AT-A-GLANCE - RELOCATING TEMPORARY FABRIC STRUCTURE WITH CRANE

Acknowledgements

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

In general once assembled, the structure will be moved by either pulling with a dozer and/or excavator or picking the structure up with a crane. The placement of the structure has been planned to minimize the number of relocations required. Configurations and relocations may be adjusted based on actual field conditions.

The mode of movement will depend on where the structure is positioned and where it will be positioned next. Once in position, the structure will be ballasted in place with concrete blocks placed over steel plates or secured with chain and cable binders at each structure rib. Specific discussion of structure relocation is included in the following sections.

ENTACT will exercise extreme caution with the structure and equipment while in the vicinity of the aboveground Long Island Power Authority electrical transmission lines and utility poles located on the LIRR property. Proper signage will be posted to meet the requirements of the Specifications and the High Voltage Proximity Act. At a minimum, the protective radii will be maintained near the utility poles (10 foot radial offset) and overhead wires (11 foot radial offset). Since the structure will be constructed near Area E, it will be initially positioned then subsequently shifted from north to south, reducing the hazard of interfering with radial offset. See Critical Lift Permit in Attachment F.
A pre-lift meeting will be held on site prior to execution of any critical lift. Mandatory attendees for this meeting include; crane operator, ENTACT field project manager, site health and safety officer, rigging foreman (if applicable) and employees to be lifted (if applicable). The meeting shall be documented in the daily safety log. See Attachment F

for critical lift procedure.
Pre-Lift Evaluation (completed by ENTACT):

☐ Current annual crane certification (attach a copy to the permit)

☐ Manufacturer's load chart accessible to the operator

☐ Operator's manual available in cab of crane

☐ Critical Lift Hazards identified

☐ Operator's license/certification reviewed (attach copy to the permit)

☐ Pre-lift meeting completed and documented

☐ Overhead obstructions and power lines identified and mitigated

☐ Wind speed and weather conditions have been considered two hours prior and after scheduled lift

- Crane operator will implement specifically engineered lift plans for critical-lift hoisting operations. Such plans should be designed by registered professional engineers having specialized knowledge of critical lift operations and should be based on the following: (1) the rated capacity and operational limitations specified by the crane's load chart; (2) measured, as opposed to calculated, weights for the materials to be hoisted; (3) thorough studies of wind speed and its effect on the crane and hoisted load; and (4) consideration of the effects of ground conditions and dynamic forces on the crane's stability.
- ensure that cranes and work areas are equipped with strategically located instruments to monitor wind velocity (speed and direction) at or near the elevation of hoisted loads The load chart for the heavy-lift crane lists rated capacities when steady wind speeds are 20 mph or less.
- ensure that suspended personnel platforms are not used during weather conditions which could endanger the hoisted workers
- consider alternative methods of observation when landing locations are not readily visible to ground-level observers during hoisting operations
- ensure that only personnel necessary to safely complete the lift are assigned as hoisted observers

- ensure that cranes are equipped with correctly calibrated instruments to accurately monitor all parameters affecting safe crane operation

ENTACT PERMIT FOR WORKING NEAR OVERHEAD LINES

Today's Date _____ Job Number _____

ENTACT			
Job Address			
Telephone Number		**Fax Number**	

Emergency Contact Number	

Survey

Before beginning any project, you must first survey your work area to find power lines at the job site. (See job site sketch.

Identify

After finding all of the power lines at your site, identify the activities you'll be doing that may put you or your workers at risk. Mark one or more of the following:

❑Cranes (mobile or truck mounted)
❑Drilling rigs
❑Backhoes/Excavators
❑Long-handed tools
❑Other tools/high-reaching equipment
❑Concrete pump
❑Aerial lifts
❑Dump trucks
❑Ladders
❑Material Handling & Storage
❑Scaffolding
❑Other_____

Eliminate or Control

Before beginning any project, you must first survey your work area to find power lines at the job site. (See job site sketch. Utility company must be identified and contacted prior to initiating any work within the line location. Voltage of line must be determined by utility company to ensure proper distance is maintained during the operation. Job Safety Analysis must be developed prior to beginning any high hazard work.

- After identifying the power line and high-risk activities on our job site, we must determine how to eliminate or control the risk of electrocution (a successful determination is often reached only after consultation with the utility). Mark one or more of the following: Locate and identify all overhead power lines. Determine voltage before construction begins.
- Have lines moved, insulated, or de-energized. In urban areas, insulating or "rubberizing" power lines is often most practical. Contact the local utility.
- Use a signaler whenever a backhoe, crane, or similar device is closer than one boom length to a live power line of 750 volts or more.
- The signaler from established safe distance must warn the operator when any part of the machine or its load approaches the minimum distances allowed in the construction regulation.
- **Jump clear**. If an emergency such as fire forces you to leave the equipment, jump clear. If part of your body contacts the ground while another part touches the machine, current will travel through you. In cases of high-voltage contact, jump clear and shuffle away in small steps. With voltage differential across the ground, one foot may be in a higher voltage area than the other. The difference could kill you.

❑Move the activity
❑Change the activity
❑Have the utility de-energize the power line
❑Have the utility move the power line

❑Use barrier protection (insulated sleeves)
❑Use an observer
❑Use warning lines with flags
❑Use non-conductive tools
❑Use a protective technology
- ❑Insulated link
- ❑Boom cage guard
- ❑Proximity device

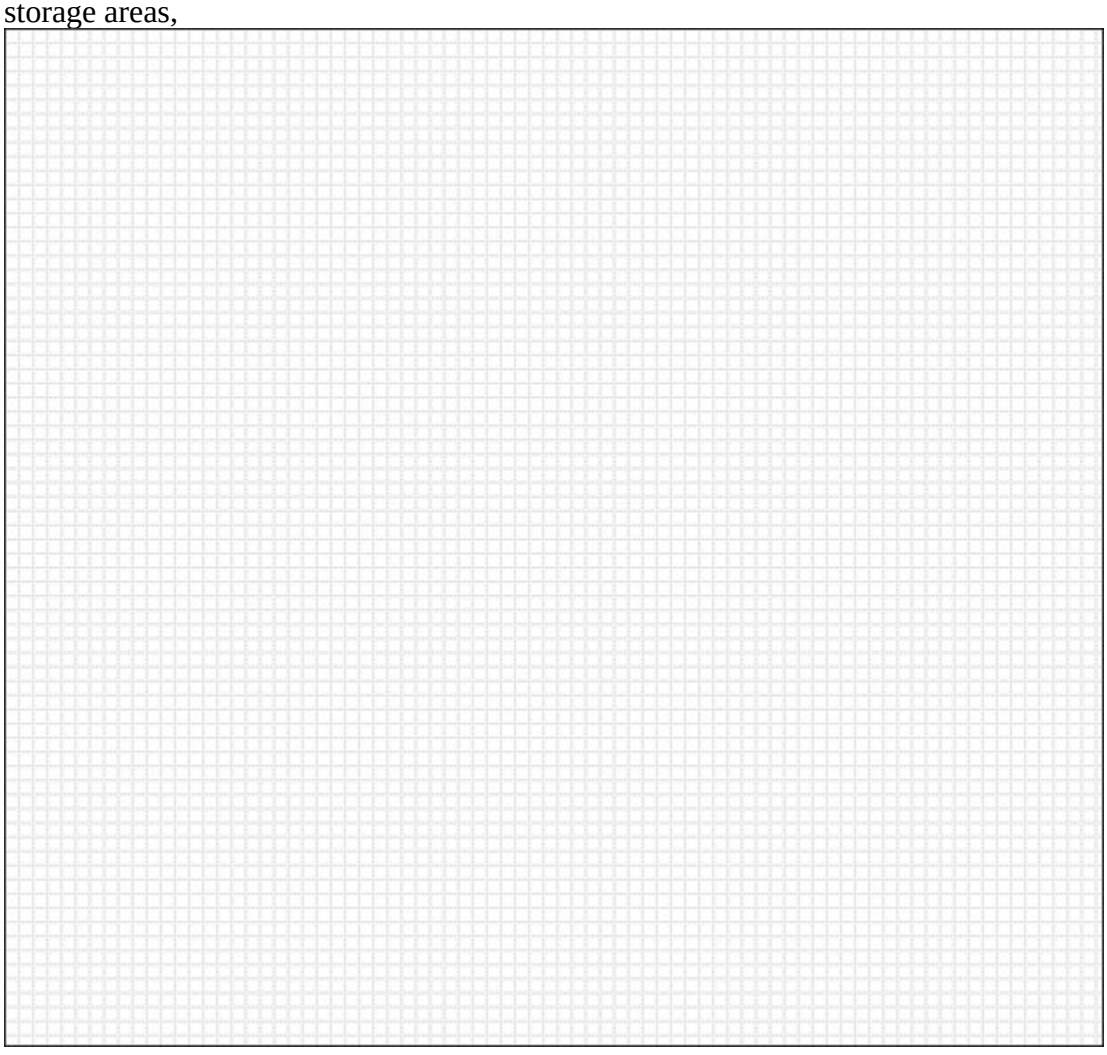
Always maintain your minimum safe clearance distance from the power line, except when the utility has de-energized and visibly grounded the power line.

Voltages	Distance from Power Line
Less than 50 kV	10 feet
More than 50 kV	10'+(0.4")(# of kV over 50 kV)

WARNING!
It is unlawful to operate any piece of equipment within 10' of energized lines

Jobsite sketch

(draw in location of power lines and their proximity to construction site, include such things as; proposed excavations, location of heavy equipment, scaffolding, material storage areas,



Completed by_____ **Date**_____

Approved by_____ **Date**_____

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified (particulates not otherwise regulated)
- PAH
- BTEX
- Hydrogen Cyanide
- Hydrogen Sulfide

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Demobilization activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Exposure to heavy equipment
- Fall from elevated man lift
- Electrical hazards
- Pinch points/sharp objects
- Noise
- Vehicle traffic
- Slip, trips, falls
- Falling objects
- Fires
- Windy conditions sustained above 20 mph
- Weather, including heat or cold stress
- Overhead utilities
- Uneven terrain

Demobilization activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level D personal protective equipment (PPE) is anticipated for this task and is defined below.

Level D PPE	
Protective Gear	**Type**
Respiratory protection	Not required
Chemical protective clothing	Not required
Hand protection: inner gloves	Not required/long sleeve shirt
Hand protection: outer gloves	Cotton or leather work gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25
Safety Harness/shock absorbing lanyard for elevated work/ man lift	DBI/SALA-Miller/MSA

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available for each piece of equipment. Minimum 5 lb. class ABC (Dry Chemical).

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Air monitoring will be performed in accordance with the Community Air Monitoring Program to evaluate the effectiveness of dust control measures. In general, real time air monitoring equipment will be utilized to monitor dust real-time and VOC levels in the work zone and at the perimeters. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action measures will be implemented. Corrective action measures may include increasing water coverage, ceasing select activities during high wind, and reducing speed of equipment that may reduce dust generation.

HASP-AT-A-GLANCE – DEMOLITION AND REMOVAL OF FORMER MGP FEATURES

Acknowledgements

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

Existing features encountered such as footings, beams, piers and other support structures will be removed to the extent practical or as directed by NYSDEC in accordance with Specification Section 02300. In general, an excavator with a hammer attachment will be used to remove and crush concrete slabs and asphalt that is encountered. The debris will be broken up with a hammer, removed with an excavator and staged adjacent to the excavation area. During the hammer operation pressure washer from safe distance will apply mist to reduce dust generation. Work will be conducted in Level C. If clean the crushed debris will be loaded into transport vehicles for off site disposal/recycling. If the debris is impacted they will be loaded for disposal with the impacted soil. Underground piping to be removed will be cleaned of residue prior to removal and disposed of as source material. Any fluids will be removed and disposed of properly. For purposes of this Product Spill Control Plan, a reportable spill is defined as a volume spilled that is greater than one gallon. The use of conventional construction equipment during pipeline activities (backhoes, loaders, generators, air compressors, welding machines, etc.) presents the potential for specific spill scenarios. These include the leakage of fuel, motor oil, or hydraulic fluid during operation, refueling, and equipment maintenance. To prevent equipment leakage during operation, the following measures will be implemented during construction activities:

- Spill control and clean-up materials are staged on-site and will be available for use in the event of a spill.
- All leaks or spills, regardless of size, will be cleaned up immediately.

- ENTACT will require that all equipment used at the site be in good working condition and be inspected daily for leaks. Any equipment observed to be leaking when arriving on-site will be denied entry. Any equipment observed to be leaking while onsite will immediately be relocated to a designated equipment staging and refueling area for repair.

All absorbent material used to clean up leaks and spills shall be disposed of in accordance with applicable hazardous materials regulations. Piping that extends to the perimeter will be flushed clean, cut and capped at the perimeter of the excavation.

Onsite Response Equipment

ENTACT will have access to an appropriate quantity of sorbent pads, sorbent boom, and other materials which will be maintained onsite during project activities. In the event of a spill, construction activities will immediately cease in order to deploy spill containment devices.

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified (particulates not otherwise regulated)
- Silica dust from concrete demolition activities
- PAH
- BTEX
- Hydrogen Cyanide
- Hydrogen Sulfide

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Demobilization activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Exposure to heavy equipment
- Pinch points/sharp objects
- Noise
- Vehicle traffic

- Slip, trips, falls
- Falling objects
- Fires
- Weather, including heat or cold stress
- Underground and overhead utilities
- Uneven terrain

Demobilization activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level C personal protective equipment (PPE) is anticipated for this task and is defined below.

Level C PPE	
Protective Gear	**Type**
Respiratory protection	(APF = 50) Any air-purifying, full-face piece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister OV-P100 Filters
Chemical protective clothing	Tyvek/Saranex
Hand protection: inner gloves	Nitrile
Hand protection: outer gloves	leather work gloves or 13” Nitrile flock
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available for each piece of equipment. Minimum 5 lb. class ABC (Dry Chemical).

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Air monitoring will be performed in accordance with the Community Air Monitoring Program to evaluate the effectiveness of dust control measures. In general, real time air monitoring equipment will be utilized to monitor dust real-time and VOC levels in the work zone and at the perimeters. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action measures will be implemented. Corrective action measures may include increasing water coverage, ceasing select activities during high wind, and reducing speed of equipment that may reduce dust generation.

HASP-AT-A-GLANCE - WASTE TRANSPORTATION& DISPOSAL COORDINATION

Acknowledgements

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

Remedial derived waste (RDW) generated during remedial activities will include excavated impacted soils, demolition debris including concrete and asphalt, containerized or absorbed NAPL, rinse-waters from decontamination procedures, spent PPE and miscellaneous refuse. ENTACT will submit a list of proposed transport and disposal facilities to National Grid for approval prior to transport of waste streams off site. Waste streams will be properly characterized by ENTACT in accordance with the disposal facility requirements. ENTACT will coordinate with the transport and disposal facilities to schedule an appropriate amount of transport trucks and to schedule slots with the disposal facilities. Coordination with the disposal and transport facilities will be critical to accommodate direct loading of soil.

All transport vehicles will be prepared and inspected prior to leaving the site. A Waste Tracking Log will be developed and maintained to track each shipment of waste transported off site. The log will identify the waste type being transported, the date and time the material left the site, the disposal facility, the truck identification number, the manifest number accompanying the load and the weight or estimated weight of each loaded truck. A bill of lading/manifest form will accompany each load and will be signed by an approved agent for National Grid before the material leaves the site; by the truck driver before leaving the site; and by a representative of disposal facility when the load is received. A copy of the signed bill of lading/manifest will be filed in the ENTACT administrative trailer. Upon arrival at the disposal facility the bill of lading/manifest will be signed and a copy returned to ENTACT, complete with all applicable signatures as proof of delivery. The returned bill of lading/manifests will be cross checked and matched with the original copy of the manifest already on file. The Waste Tracking Log

will be used to track the receipt of completed and signed bill of lading/manifests. On a weekly basis and at project completion a summary report as well as bill of ladings/manifests, weight tickets and certificates of destruction will be provided to National Grid and the Engineer.

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified (particulates not otherwise regulated)
- PAH
- BTEX
- Hydrogen Cyanide
- Hydrogen Sulfide

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Demobilization activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Exposure to heavy equipment
- Pinch points/sharp objects
- Noise
- Vehicle traffic
- Slip, trips, falls
- Falling objects
- Fires
- Weather, including heat or cold stress
- Underground and overhead utilities
- Uneven terrain

Demobilization activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level D personal protective equipment (PPE) is anticipated for this task and is defined below.

Level D PPE	
Protective Gear	**Type**
Respiratory protection	Not required
Chemical protective clothing	Not required
Hand protection: inner gloves	Not required
Hand protection: outer gloves	Cotton or leather work gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available for each piece of equipment. Minimum 5 lb. class ABC (Dry Chemical).

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Air monitoring will be performed in accordance with the Community Air Monitoring Program to evaluate the effectiveness of dust control measures. In general, real time air monitoring equipment will be utilized to monitor dust real-time and VOC levels in the work zone and at the perimeters. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action measures will be implemented. Corrective action measures may include increasing water coverage, ceasing select activities during high wind, and reducing speed of equipment that may reduce dust generation.

HASP-AT-A-GLANCE – BACKFILL AND SITE RESTORATION

Acknowledgements

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

Partial backfilling will be done concurrently with excavation activities when possible to minimize the amount of time an excavated area remains open and to maintain level surfaces for movement of the temporary enclosure. Imported material will consist of New York State Department of Transportation (NYSDOT) Type 1 coarse aggregate (select stone fill and stone cover) and clean fill (general fill) or approved equivalent(s). Imported materials will be from a NYSDOT approved certified clean source and will meet the gradation requirements in Specification Section 02300. The information of the selected source(s) will be provided to National Grid for approval prior to delivery of material to the
site. Samples will be obtained for each fill type per source at the specified frequency and analyzed at a New York State Department of Health (NYSDOH) certified Environmental Laboratory Accreditation Program (ELAP) approved laboratory for the total polycyclic aromatic hydrocarbons (PAHs), total volatile organic compounds (VOCs) and metals in accordance with the listing in 6 NYCRR Part 375 Table 375-6.8 (b) for residential use. Ten percent of the samples will also be analyzed for polychlorinated biphenyls (PCBs) parameters listed in the table. Clean overburden materials free of source material will be stockpiled under the temporary structure in accordance with OSHA regulations and re-used on site as backfill within the general fill zone. Select stone fill may be placed within open excavations at depths of 8 feet bgs or greater below ground surface in loose lifts and tamped in place with the excavator bucket. General fill material will be placed with the dozer in approximately 12 inch lifts and compacted to a minimum 95% of the maximum dry density per ASTM D698. In-place quality control compaction testing will be performed on off site general fill by an independent geotechnical testing firm to ensure

specified compaction has been achieved. Each lift will be tested at a frequency of one test per 2,500 square feet, with a minimum of 2 tests per backfill lift per each backfill area. Following geotechnical testing, a surface cover will be placed in a non-compacted single 6 inch lift over the general fill layer and spread with the dozer. The surface cover will consist of a stone layer, unless directed by National Grid to substitute a topsoil layer. If required, topsoil, seed, mulch and fertilizer will meet the requirements of NY Standards for Soil Erosion and Sediment Control for Permanent Critical Area Plantings. ENTACT will restore any areas that may have been disturbed during remediation.

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified (particulates not otherwise regulated)

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Demobilization activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Exposure to heavy equipment
- Pinch points/sharp objects
- Noise
- Vehicle traffic
- Slip, trips, falls
- Falling objects
- Fires
- Weather, including heat or cold stress
- Underground and overhead utilities
- Uneven terrain

Demobilization activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements
Level D personal protective equipment (PPE) is anticipated for this task and is defined below.

Level D PPE	
Protective Gear	**Type**
Respiratory protection	Not Required
Chemical protective clothing	Not Required
Hand protection: inner gloves	Not Required
Hand protection: outer gloves	Cotton or leather work gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available for each piece of equipment. Minimum 5 lb. class ABC (Dry Chemical).

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Air monitoring will be performed in accordance with the Community Air Monitoring Program to evaluate the effectiveness of dust control measures. In general, real time air monitoring equipment will be utilized to monitor dust real-time and VOC levels in the work zone and at the perimeters. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action measures will be implemented. Corrective action measures may include increasing water coverage, ceasing select activities during high wind, and reducing speed of equipment that may reduce dust generation.

HASP-AT-A-GLANCE – DECONTAMINATION OF EQUIPMENT

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

Final Cleaning: The final cleaning will include the following:

- Transport of all containerized soil waste removed under this contract to the approved disposal facility;
- Cleaning and removal of all of ENTACTS construction equipment and materials; and
- Collection and management of all ENTACTS generated material including decontamination water and equipment on the Site for which cleaning is inappropriate.

Equipment Cleaning: Equipment cleaning will consist of degreasing (if required) followed by high-pressure water and/or steam cleaning supplemented by detergents or solvents as appropriate

Tools Cleaning: Tools and items for which cleaning is difficult or impossible to verify will remain on Site, until completion of the work, for subsequent sampling and analytical testing, packing and disposal by ENTACT at an approved disposal facility. (Examples of such items are wire, rope, lumber, personal protective equipment and apparel.)

Temporary Facilities: Cleaning of the temporary facilities located within the Support Zone will be limited to cleaning in accordance with Section 01066 - Equipment and Material Decontamination.

Final Inspection: Prior to removal from site, all cleaned equipment and material will be inspected and accepted by the Site Safety Officer and National Grid and/or the Engineer.

Equipment needed for Heavy Equipment Large/heavy Equipment (i.e., Drill rigs, backhoes, trackhoes, front end loaders etc.

- High-pressure with steam-spray unit. The steam cleaner utilized by the shall be a high-pressure low volume unit from an industry-recognized manufacturer
- Miscellaneous tools such as shovels and brushes shall be available.
- Cleaning agents such as non-phosphate detergents shall also be available for use as necessary.

Small/sampling Equipment (i.e., Split spoons, bailers, bowls, and pumps):

- Soap
- Polyethylene sheeting
- Stiff-bristle brushes.
- Wash bottles or manual pump sprayer.
- 10% methanol solution (optional)
- Distilled water
- Tap water

Procedure. The following steps will be followed when decontaminating large/heavy equipment:

Cleaning procedures developed by ENTACT shall include the removal of contaminated soil, debris and other miscellaneous materials from all construction equipment and tools utilized within the Exclusion Zone and recyclable remnant structure and piping encountered from the Site using a high-pressure low volume steam cleaner. Physical/mechanical agitation (scraping with hand tools) of soil can be utilized to minimize wastewater generation.

1. ENTACT or responsible contractor on site will construct a decontamination area at a designated area on site of 6-mil polyethylene, large enough to capture decontamination fluids. Decontamination of drilling equipment will be performed over the decontamination pad. Depending on site contaminants, drilling equipment may be decontaminated at each drilling location and decon water allowed to infiltrate into site soils.

2. Drill rigs and tools will be cleaned between each location and prior to the initiation of any sampling. Steam-cleaning/pressure washing water will be allowed to soak back into the ground.

3. Spray areas (rear of rig or backhoe) exposed to contaminated soils using steam

high-pressure sprayer. Be sure to spray down all surfaces, including the undercarriage.

4. All wash and rinse water generated during the decontamination procedures shall be collected daily by ENTACT and stored in closed top USDOT specification 55-gallon drums or in frac tanks. The Contractor shall supply empty 55-gallon drums and frac tanks as required. Decontamination pad(s) shall be covered when not in use so as to minimize the accumulation of precipitation

5. All equipment and material decontamination procedures shall be carried out on the decontamination pad(s).

6. Sections of the decontamination pad(s) that have encountered contaminants during site operations shall be cut up and placed in appropriate containers. Sections that have not encountered contaminants may be disposed of as non-hazardous waste if approved.

7. The collection sump shall be purged at the end of each work day and as required, and/or following a rainfall event.

8. Document that decontamination was performed in the appropriate daily logbook.

Procedure. The following steps will be followed when decontaminating sampling equipment including split-spoons, spatulas, and hand tools that directly contact samples.

1. Set up a decontamination line. The decontamination line should progress from .dirty. to .clean. with an area for drying decontaminated equipment. The decontamination line should be set up on polyethylene sheeting.

2. Wash the item thoroughly in a bucket of soapy water (tap water). Use a stiff-bristle brush to dislodge any clinging dirt. Disassemble any items that might trap contaminants internally before washing. Do not reassemble until decontamination is complete.

3. Rinse the item in a bucket containing clear tap water. Rinse water should be replaced as needed.

4. Document that decontamination was performed in the appropriate logbook.

5. Disposable items will be bagged for disposal as general refuse.

Procedure. The following steps will be followed when decontaminating pumps.

1. Pumps should be set-up in the same configuration as for sampling. Flush the pump with potable water.

2. Submerge pump intake (or pump if submersible) and all down hole wetted parts (tubing, piping, foot valve) in soapy water. Pump a minimum of three pump assembly volumes of soapy water through the entire assembly. Note: If dedicated tubing is used for monitoring wells, the tubing will not need to be decontaminated.

3. Replace soapy water with potable water. All down whole wetted parts must be immersed in the potable water rinse. Pump a minimum of three pump assembly volumes of clean water through the entire assembly.

4. Document that decontamination was performed in the groundwater sampling log book.

QA/QC

The HSO or designated alternate will oversee decontamination procedures to ensure that they have been completed according to the procedures outlined above.

Constituents of Concern

The following constituents of concern (COC) are present at the site:

- Particulate not otherwise classified (particulates not otherwise regulated)
- PAH
- BTEX
- Hydrogen Cyanide
- Hydrogen Sulfide
- All cleaning materials will be approved prior to Utilization and MSDS will be provided.

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Demobilization activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Exposure to heavy equipment
- Pinch points/sharp objects
- Noise
- Vehicle traffic
- Slip, trips, falls
- Falling objects
- Fires
- Weather, including heat or cold stress
- Underground and overhead utilities
- Uneven terrain

Demobilization activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements
Level C personal protective equipment (PPE) is anticipated for this task and is defined below.

Level C PPE	
Protective Gear	**Type**
Respiratory protection	Full Face with OV/P100 Filters
Chemical protective clothing	Tyvek/Saranex
Hand protection: inner gloves	Nitrile
Hand protection: outer gloves	13mm Nitrile Gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	Rubber /Metatarsal Protection
Head protection	Standard hard hat
Eye protection	Full face shield
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available for each piece of equipment. Minimum 5 lb. class ABC (Dry Chemical).

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Air monitoring will be performed in accordance with the Community Air Monitoring Program to evaluate the effectiveness of dust control measures. In general, real time air monitoring equipment will be utilized to monitor dust real-time and VOC levels in the work zone and at the perimeters. If visible dust is generated or work zone and/or perimeter air monitoring results show exceedences, corrective action measures will be implemented. Corrective action measures may include increasing water coverage, ceasing select activities during high wind, and reducing speed of equipment that may reduce dust generation.

HASP-AT-A-GLANCE – DEMOBILIZATION AND CLOSEOUT

See table of emergency contacts for telephone numbers.

Responsibility:	Signature:	Date:
ENTACT Health and Safety Officer		
ENTACT Field Project Manager		

This summary sheet is provided for a quick reference for field activities at the Hempstead Former Manufactured Gas Plant Site. The remainder of this HASP provides general health and safety procedures that must be adhered to while conducting work at the project site. Procedures for updating or amending this HASP are outlined in Section 1.4.

PROJECT ACTIVITIES

Tools Cleaning: Tools and items for which cleaning is difficult or impossible to verify will remain on Site, until completion of the work, for subsequent sampling and analytical testing, packing and disposal by ENTACT at an approved disposal facility. (Examples of such items are wire, rope, lumber, personal protective equipment and apparel.) If tools are contaminated work will be conducted in level C.

Temporary Facilities: Cleaning of the temporary facilities located within the Support Zone will be limited to cleaning in accordance with Section 01066 - Equipment and Material Decontamination.

Final Inspection: Prior to removal from site, all cleaned equipment and material will be inspected and accepted by the Site Safety Officer and National Grid and/or the Engineer.

Constituents of Concern

The following constituent of concern (COC) is present at the site:

- Particulate not otherwise classified
- Residual Contamination (Coal tar pitch)

Sections 5.0 and 8.0 describe the health hazards and air monitoring requirements, respectively, of the COC at the site. Exposure to the COC is limited during this task.

Hazard Analysis

Site preparation activities could be affected by the following physical hazards:

- Exposure to particulate not otherwise classified
- Pinch points/sharp objects
- Exposure to crane radius
- Noise
- Vehicle traffic
- Slip, trips, falls
- Heavy lifting
- Fires
- Weather, including heat or cold stress
- Uneven terrain

Site preparation activities could be affected by the following biological hazards:

- Insect bites and stings
- Poisonous plants
- Reptiles, such as snakes

Minimum Protective Clothing and Equipment Requirements

Level D personal protective equipment (PPE) is anticipated for this task and is defined below.

Level D PPE	
Protective Gear	**Type**
Respiratory protection	Not required
Chemical protective clothing	Not required[1]
Hand protection: inner gloves	Not required
Hand protection: outer gloves	Cotton or leather work gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Splash protection[1]	Standard face shield
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest

Hearing protection	Ear plugs or muffs with NRR of at least 25
[1] Associates may wear Tyvek or similar coveralls as protection from ticks and insects.	

Minimum Protective Clothing and Equipment Requirements

Level C personal protective equipment (PPE) will be utilized for cleaning of material that is contaminated below.

Level C PPE	
Protective Gear	**Type**
Respiratory protection	Full Face with OV/P100 Filters
Chemical protective clothing	Tyvek/Saranex
Hand protection: inner gloves	Nitrile
Hand protection: outer gloves	13mm Nitrile Gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	Rubber /Metatarsal Protection
Head protection	Standard hard hat
Eye protection	Full face shield
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest
Hearing protection	Ear plugs or muffs with NRR of at least 25

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Additional information on PPE and respiratory protection is provided in Sections 7.0 and Attachment L.

Engineering and Administrative Controls

All activities will be conducted in accordance with provisions outlined in Section 5.0. All field personnel will notify the site ENTACT Health and Safety Officer (HSO) and ENTACT Field Project Manager (FPM) when reporting for and leaving work by signing in at the on-site trailer.

Fire extinguishers must be available in the trailer and each vehicle or piece of equipment.

Dust suppression will be accomplished using water trucks to keep dust levels low.

Air Monitoring

Perimeter air monitoring for odors and dust will be performed by others and will comply with the Community Air Monitoring Plan provisions of the 95% RDR.

COMPREHENSIVE HEALTH AND SAFETY PLAN

1.0 PURPOSE AND POLICY

1.1 INTRODUCTION

This document describes the health and safety guidelines developed for soil remediation at the National Grid Hempstead Former MGP Site to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes. It is ENTACT's policy to provide a safe and healthy workplace for all employees.

The purpose for this site-specific health and safety plan (HASP) is to set forth, in an orderly and logical fashion, appropriate safety procedures to be followed during on-site activities at the site by ENTACT. This HASP cannot include all of the policies and procedures set forth in the ENTACT Behavior Based Safety System; therefore, they are incorporated by reference and available at: http://connected.entact.com/index.php.

All attachments that are referenced in this Health and Safety Plan are compiled and maintained under separate cover.

ENTACT's mission is to provide cost effective and timely environmental solutions, but to do so while maintaining the industry benchmark for health and safety. With this as our goal, this HASP will be implemented at the project site.

ENTACT will provide a thorough site orientation, maintain an on-going Behavior Based Safety System (BBS) and will continually instruct, promote and prepare all associates for their responsibilities. BBS will be used to prevent or reduce losses and safety incidents using behavior-based tools and management techniques to achieve a safe work environment with the ultimate goal of zero incidents. BBS tools and management techniques include:

- Job Safety Analysis (JSA)
- Job Task Review (JTR)
- Job Task Observation (JTO)
- Near-Loss Investigation (NLI) and Loss Investigation (LI)
- Stewardship

"Safety is a state of mind" that must be nurtured and reinforced every day. The procedures presented herein are intended to serve as guidelines. They are not a substitute for the sound judgment of on-site personnel.

1.2 REGULATORY FRAMEWORK

All work practices and procedures implemented on site will be designed to minimize associate contact with hazardous materials and to reduce the possibility of physical injury. All work will be performed in accordance with the following:

- Occupational Safety and Health Administration (OSHA) regulations found in Part 29 of the *Code of Federal Regulations* (CFR) 1910 and 1926
- National Institute for Occupational Safety and Health (NIOSH) Publications 85-115
- American Conference of Governmental Industrial Hygienists (ACGIH) Publication *Threshold Limit Values and Biological Exposure Indices*
- US Environmental Protection Agency (EPA) Publication No. PB9285.1-03
- American National Standards Institute (ANSI) guidelines (various)

1.3 APPLICATION OF BBS

ENTACT's education and training of associates provides insight to safety protocol and an understanding that the attitude and behavior of all associates is key. As part of our behavior based safety culture, and for continuous reinforcement, ENTACT requires that each project begins with an orientation for site specific instruction and awareness. Also, safety meetings are held at the start of each work day and a second discussion at mid-day to highlight and review daily progress which will ensure that all personnel understand site conditions, receive operating procedures, use PPE correctly, and to address health and safety concerns. BBS is implemented on site as follows (see Attachments N and P):

- JSA – developed for all major work tasks and process, reviewed before the task is done (daily, if applicable,) and updated or revised frequently to address changes in the workplace
- JTR – performed by all associates to briefly assess the risk of each work task prior to work beginning. In addition, associates will perform a self-assessment to determine if they are fit for duty to perform their tasks. If an associate feels he/she is not fit for duty, their supervisor must be notified immediately before work begins.

  I = Illness
  M = Medication
  S = Stress
  A = Attitude

F = Fatigue
E = Emotion

- JTO – conducted on a planned and regular basis
- NLI/LI – performed as needed to determine root causes and contributing factors of near loss and loss incidents

1.4 MODIFICATIONS TO THE HASP

The procedures and guidelines contained herein were based upon the best available information at the time of the plan's preparation. Specific requirements will be revised when new information is received or conditions change. Any amendments to this plan will be documented on the form in Attachment A, Site Safety Plan Amendment, and will be approved by the Field Project Manager, Project Health and Safety Coordinator, and Health and Safety Officer. A hasp amendment log will also be maintained in Attachment A.

1.5 STOP WORK AUTHORITY

All on-site personnel are empowered, are expected, and have the responsibility to stop their own work and the work of co-workers, client employees, or other contractors if any person's safety or the environment are at risk. NO repercussions will result from this action.

Site or project conditions that are possible reasons to stop work and to consider modifications to the HASP include:

- Recognition of new or unidentified hazards
- Site temperatures outside the range predicted in this HASP (possibly resulting in greater risk of heat or cold stress)
- PPE breakthrough or unexpected degradation
- Unusual odors that can't be identified
- Unexplained, elevated readings on an organic vapor monitor
- Unexpected changes in soil coloration or texture that might indicate undisclosed contamination.

This list is not comprehensive and should be used only as guidance (also refer to Section 6.0, for emergency response procedures).

Generally, whenever "Stop Work Authority" is exercised, a significant occurrence should be documented as a near loss incident using the NLI report form.

If anyone is discouraged from exercising the "Stop Work Authority" or if there are penalties for doing so, then affect individuals should report this action to the ENTACT Health and Safety Director at (972) 580-1323.

1.6 SUBCONTRACTOR COORDINATION

ENTACT recognizes that safety begins with a commitment. Supporting the ENTACT Behavior Based Health and Safety System is as important a responsibility as are all other project concerns. ENTACT places the same emphasis on subcontractors.

Certain activities performed at the site may require the use of subcontractors. ENTACT's Health and Safety Plan will be made available to all subcontractors, which they must adopt and comply with at a minimum. This plan is applicable to the subcontractors insofar as ENTACT will be directing the work. If subcontractor performs work not addressed in ENTACT's Heath and Safety Plan, the subcontractor will provide ENTACT with a copy of their Health and Safety Plan and JSAs applicable to the job tasks being performed. All subcontractors will participate in ENTACT site safety meetings and will comply with ENTACT's Subcontractor Letter of Acceptance.

Subcontractor personnel working on site will be enrolled in their company's medical monitoring program per OSHA regulations. Subcontractors will supply their own PPE and other safety equipment.

Subcontractors are responsible for the safety and well being of their personnel and the condition and maintenance of their equipment, vehicles and tools.

Subcontractor personnel working on site will be enrolled in their company's medical monitoring program. Subcontractor personnel will have a medical monitoring exam within the previous 12 months.

Subcontractors

Anchor Security
One Fulton Ave. #14
Hempstead, NY 11550
Ph: 516-481-6800
Fax: 516-481-6802

Residential Fence Corporation
1775 Route 25
P.O. Box 430

Ridge, NY 11961
Ph: 631-924-0644
Fax: 631-924-3275

Maser Consulting
One River Centre - Bldg. Two
331 Newman Springs Road
Red Bank, NJ 07701
Ph: 732-383-1950
Fax: 732-383-1970

Atlantic Subsurface Imaging, Inc.
396 N. Pemberton Road
P.O. Box 98
Mt. Holly, NJ 08060
Locate Company

2.0 SITE DESCRIPTION AND SCOPE OF WORK

This section provides a site description and information about previous site investigations and the scope of work.

2.1 SITE DESCRIPTION

The Hempstead Intersection Street Former MGP Site is located in the Villages of Hempstead and Garden City, Nassau County, New York.. The majority of the approximately 7.5-acre MGP Site is located within the Village of Garden City and is known as the current National Grid property. A 0.8-acre parcel of the MGP Site adjacent to, and south of, the current National Grid property, is within the Village of Hempstead. This parcel is currently used to store vehicles, and is known as the "Sold Property." The Sold Property was previously sold by the Long Island Lighting Company (LILCO – a National Grid predecessor company) in the early 1980's to an automobile dealer who is the current property owner. The areas outside the MGP Site boundaries that contain source material are considered "off-site" properties. The Medical Office Building parking lot and areas south of the Sold Property generally comprise this latter "off-site" area. The MGP Site is bordered to the north by Second Street and along the east by an inactive Long Island Railroad right-of-way (LIRR ROW). Property to the west of the MGP Site is owned by the Village of Garden City and contains a public parking lot, two public water supply wells and a recharge basin related to the two wells. The property to the southeast of the MGP Site is owned by Oswego Oil Service Corporation and is an active fuel oil storage and loading facility. The property to the south of the MGP Site is the parking lot for a Medical Office Building.

An active natural gas regulator station is located on the western portion of the National Grid property. A second automobile dealership currently leases property in the upper northeastern corner of the National Grid property. The MGP Site and surrounding area generally flat, sloping gently to the west and southwest. A perimeter fence secures the National Grid and Sold Properties. National Grid property access from the south is through the Sold Property and from the north through a gated fence. The northern two-thirds of the MGP Site, as well as the eastern portion, is unpaved ground covered with either vegetation or crushed stone. The southern third of the MGP Site is paved with asphalt. Limited grass, shrubs and trees serve as a buffer extending across the northern portion of the National Grid property along Second Street. The MGP property has multiple zoning classifications ranging from residential to commercial depending on the area and municipality. Properties immediately to the north of the MGP Site across Second Street are zoned for multi-family residential apartment housing. Properties immediately to the east of the MGP Site are zoned as general commercial. The property to the west of the MGP Site is designated parkland. Property to the south of the MGP Site is zoned business "C." The site map is shown as Figure 2.1.

2.2 SITE HISTORY

MGP operations began in the early 1900's in the southern portion of the Site and expanded north as the demand for gas increased. LILCO acquired the Site in the early 1930's. Following the availability of natural gas in the early 1950's, the Hempstead former MGP served as a peak/emergency facility to ensure gas supply until operations ceased in the mid 1950's. The on-site plant was subsequently demolished by LILCO. In 1998, LILCO merged with Brooklyn Union Gas forming National Grid Corporation. Following this merger, all but the previously sold automobile dealer property (the Sold Property) became National Grid property. A "cut and plug" IRM Program was undertaken at the Site during the winter of 1999. The objective of that IRM was to locate underground piping associated with historic MGP operations so that each pipe could be cut, drained of any fluids and plugged in order to limit the potential for on-going release of MGP residuals from historic structures.

2.3 SCOPE OF WORK

An overview of the scope of work, as provided in the Construction Operation Plan

- Project Preparation
- Mobilization & Site Preparation
- Establish site security
- Site clearance
- Installation of soil erosion and odor controls
- Clearance of the Existing 16 Inch Gas Main
- Installation of Temporary Fabric Structure and vapor management control
- Excavation of impacted soils
- Waste transportation and disposal coordination
- Removal of Former MGP Features
- Backfill & Site Restoration
- Decontamination of equipment
- Demobilization and closeout

The tasks listed above are grouped by hazard and may not strictly follow the objectives or chronology of events detailed in the ENTACT work plan. Field activities are scheduled to be completed by December 2008.

2.4 PHOTOGRAPHS AND VIDEO

Pictures and video are not allowed under any circumstances unless written permission has

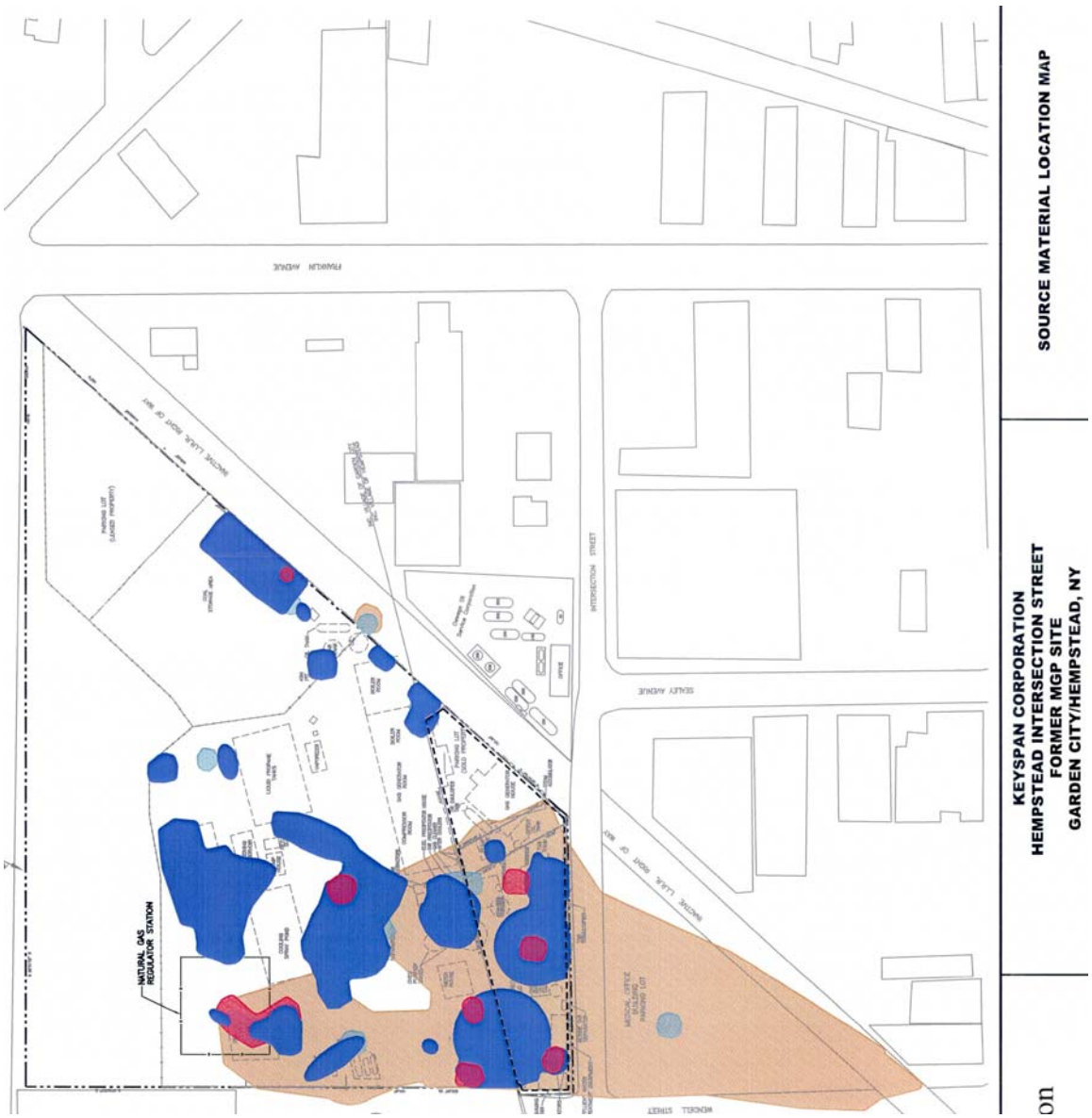
been obtained by the client representative.

2.5 WASTE MANAGEMENT

ENTACT will perform supplemental waste characterization sampling and analysis to meet the approval requirements (both frequency and method) for all proposed Low Temperature Thermal Desorption (LTTD) Facilities (reference the Waste Disposal Matrix in Appendix B). An assessment was performed by ENTACT to evaluate the current waste characterization data in comparison to requirements of the Clean Earth facilities. It has been concluded that CENC would not require additional data, while CESPA and CEP would require nominal supplementary sampling. Additional sampling and analysis will be performed as necessary to allow for waste characterization and approval of soils in advance of excavation activities. This approach will provide uninterrupted direct loading of excavated soils.

FIGURE 2.1

SITE MAP



3.0 PROJECT TEAM ORGANIZATION AND RESPONSIBILITIES

Responsibilities for ENTACT associates are described below using titles familiar to ENTACT staff. The names of key personnel on this project are listed in Table 3.1 and ENTACT's health and safety organization chart is in Figure 3.1.

3.1 ENTACT PROJECT COORDINATOR

The Project Coordinator will report directly to the client and ensure all project members strive for zero incidents. The responsibilities of the Project Coordinator will be the successful completion of the project, but the number one goal will be a safe and healthy work site with zero incidents.

3.2 ENTACT PROJECT HEALTH AND SAFETY COORDINATOR

The Project Health and Safety Coordinator (PHSC) is responsible for writing, reviewing, and approving the site-specific HASP and implementing ENTACT's Health and Safety Program. The PHSC will serve as the primary contact to review health and safety matters and provide direction to the ENTACT Field Project Manager and On-site Health and Safety Officer(s) as necessary on issues related to health and safety. The PHSC will be responsible for conducting the health and safety orientation meeting prior to the start of field activities, reviewing weekly project safety reports, and conducting health and safety inspections and audits at the site project. The PHSC will also review all BBS reports generated by the project.

3.3 ENTACT PROJECT MANAGER

The ENTACT Project Manager will have the overall responsibility for the project and will ensure compliance with the approved work plan and applicable Federal, state, and local regulations. The Project Manager will ensure all operations at the site are performed in the safest manner possible following the site-specific HASP and promoting ENTACT's safety culture. Specific responsibilities will be to observe, promote, and facilitate a safe environment that will achieve zero incidents.

The ENTACT Project Manager or a designated representative shall be responsible for informing all individuals entering the exclusion zone or decontamination zone of the contents of this plan and ensuring that each person understands the hazards of the site and signs the Safety Plan Acknowledgment Form in Attachment B.

3.4 ENTACT FIELD PROJECT MANAGER

The ENTACT Field Project Manager (FPM) will be responsible for directing all site personnel, equipment, subcontractors, and activities to ensure a safe and successful implementation of the on-site activities. The FPM will have overall responsibility for the health and safety of site personnel. The FPM will ensure adequate resources are provided to carry out established health and safety responsibilities and will enforce the site-specific HASP. He will ensure proper communications is established for emergency response. The FPM will coordinate with the on-site Health and Safety Officer in the planning and implementation of all site activities and ensure site personnel are knowledgeable of site hazards and assists with the development of JSA.

3.5 ENTACT HEALTH AND SAFETY OFFICER

The ENTACT Health and Safety Officer (HSO) will be assigned to the site on a full-time basis with functional responsibility for implementing the site-specific HASP. The ENTACT HSO will conduct site audits. Specific duties include, but are not limited to:

- Assume responsibility for health and safety of ENTACT personnel and promote ENTACT's safety culture
- Document safety concerns reported by the field crew and subcontractors
- Supervise decontamination of personnel and equipment
- Ensure air monitoring equipment is calibrated and operational
- Conduct personal air monitoring on all ENTACT personnel as outlined in 29 CFR 1910.120 (h) (4) and this plan
- Perform respiratory fit tests
- Inventory and inspect PPE prior to personnel entering work area
- Prepare summary letter of personal air sampling results
- Select levels of personal protective equipment (PPE) based upon the site-specific HASP, chemical properties, and air sample results
- Prepare and maintain OSHA Log within 3 days of incident and post within 5 days
- Ensure that all on-site ENTACT personnel have had medical exam and are fit for duty
- Inspect first aid kits and fire extinguishers
- Assist with the preparation and review of JSA
- Ensure that all associates have required health and safety training
- Utilize "Stop Work Authority" if required
- Report and investigate all near losses and loss incidents
- Conduct JTOs
- Coordinate safety orientation as well as daily safety meetings
- Work with the FPM daily regarding work activities

- Complete Weekly Project Safety Report and forward it to ENTACT's Project Health and Safety Coordinator
- Ensure all site personnel (ENTACT field crew and subcontractors) have taken the written test to document understanding of site-specific risks
- Complete weekly safety audit

The HSO and the FPM will work together to promote a safety goal of zero incidents and zero incidents. The alternate HSO will be the Field Project Manager.

3.6 ENTACT FIELD CREW

Each ENTACT associate (field crew member) is responsible for asking questions and understanding the site-specific HASP as well as the following:

- Report any unsafe or potentially hazardous conditions to the FPM or the HSO
- Comply with rules, regulations, and procedures as set forth in this HASP
- Express safety ideas or concerns in the daily safety meetings
- Perform all tasks safely
- Perform an JTR before performing any task
- Perform JTO under the direction of the HSO
- Utilize "Stop Work Authority" if required
- Take a written test to document understanding of site-specific risks

By signing the Safety Plan Acknowledgment Form (Attachment B,) individuals are recognizing the potential hazards present on-site and the policies and procedures required to minimize exposure and/or adverse effects of these hazards.

3.7 SUBCONTRACTORS

ENTACT will provide basic BSS training and include subcontractors in the site orientation and daily tailgate safety meetings. Subcontractors must take a written test to document understanding of site-specific risks.

3.8 OTHER PERSONNEL

Examples of other personnel that may be on site include representatives of the Federal, State, and county agencies, and ENTACT's client. Any person who observes safety problems should immediately report observations or concerns to appropriate key personnel. Although other personnel typically only make on-site observations, they will be expected to read, abide by, and sign the HASP and receive a documented site

orientation. Should agency personnel refuse to abide by site safety requirements, work will be stopped while these personnel are on site. Every ENTACT associate has the authority and obligation to stop work in order to prevent incidents and injuries.

Table 3.1
Key ENTACT Personnel

ENTACT Title	Name	Telephone Number
Principle Contractor	ENTACT 3129 Bass Pro Drive Grapevine, TX 76051	(972) 580-1323
Project Coordinator	Adam Ewert	Cell: (630) 675-9788
Project Health and Safety Coordinator	Evan McShirley	Office: (972) 580-1323 Cell: (630) 675-9975
Field Project Manager	Dan Duncan	Cell: (630) 461-7128
Health and Safety Officer	Kurt Sutliff	Cell: (630) 461-5563
QA/QC	Stacy Chervincky	Cell: (630) 743-3364
Administrative Project Manager	Jordan Wipf	Cell: (630) 669-3802

Figure 3.1
ENTACT Health and Safety Organization Chart

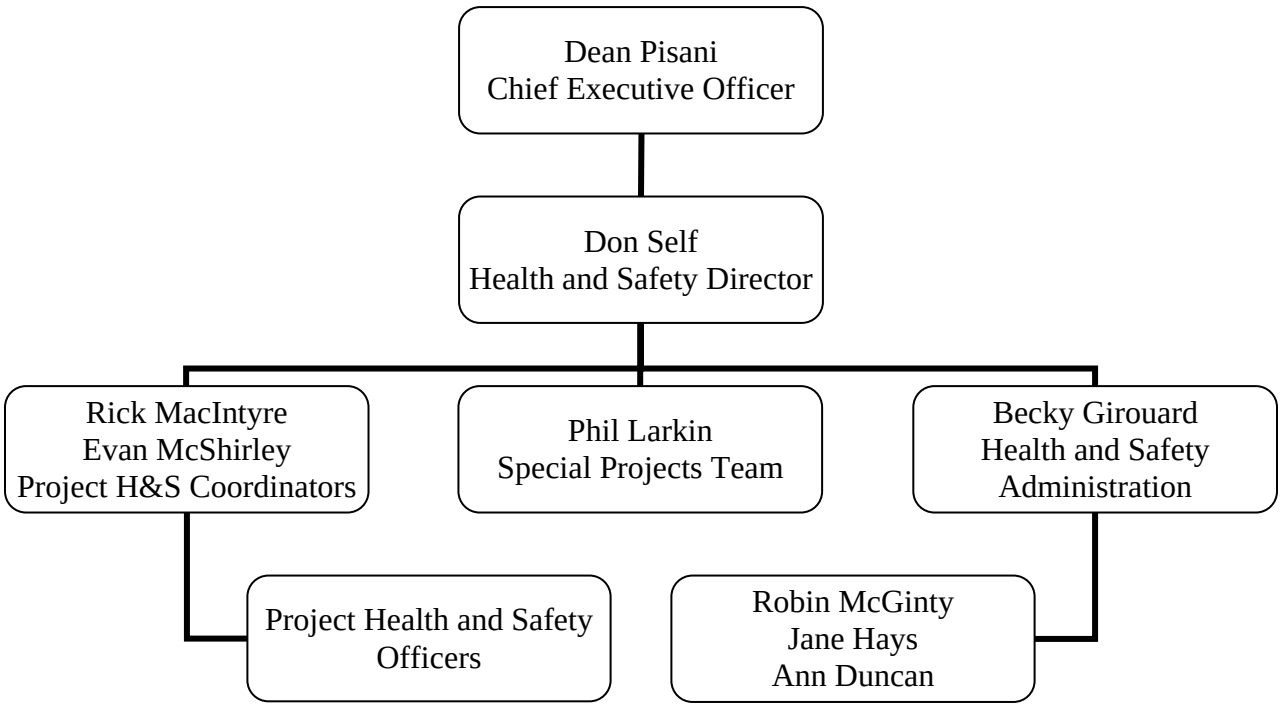
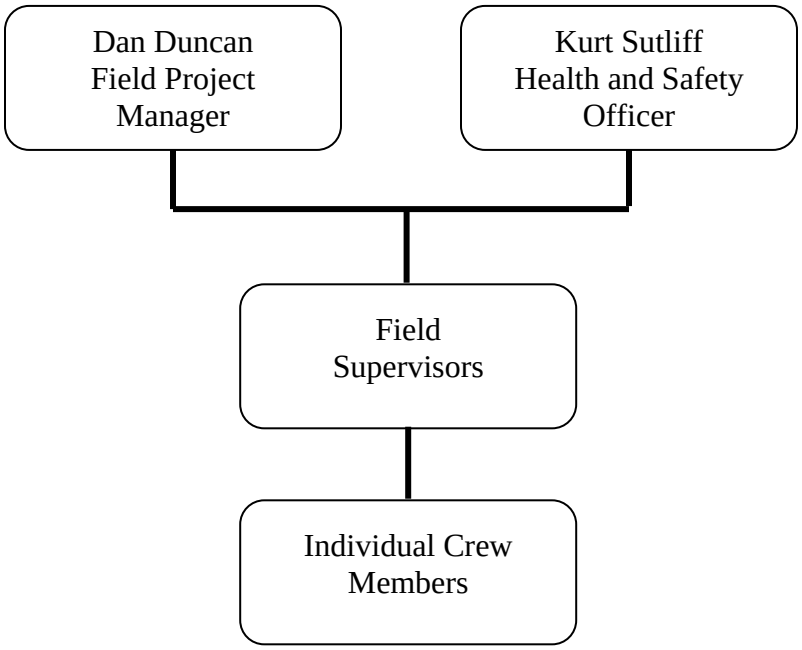


Figure 3.2
Site Specific Health and Safety Organization Chart



4.0 TRAINING AND MEDICAL MONITORING REQUIREMENTS

This section describes the general and site-specific training requirements as well as medical monitoring requirements.

4.1 GENERAL TRAINING

All ENTACT associates are required to attend 40 hours of classroom training in accordance with 29 CFR 1910.120. All field personnel receive 8 hours of refresher training on an annual basis covering the initial 40 classroom topics beginning within the 12 months of the individual's initial 40-hour class. FPMs are required to have 8 hours of training on safe management of hazardous waste sites, also in compliance with 29 CFR 1910.120. ENTACT personnel receive first aid/CPR training. Site personnel will have completed BBS training prior to beginning work. In addition, the following criteria shall be met:

- All assigned personnel will receive site-specific training on routes of exposure and adverse health effects associated with the chemicals listed on the table of hazards in Section 5.
- At least one member of each work crew shall have training in the use of portable fire extinguishers in accordance with 29CFR 1910.157 (g).
- Personnel newly assigned to hazardous waste work will receive 3 days of on the job training by a FPM.
- Each person entering the site shall sign a statement attesting to the fact that they have read and understand this site-specific HASP. Refer to Attachment B for sign in sheet.
- All subcontractors entering the decontamination zone and exclusion zone will have adequate training satisfying 29 CFR 1910.120 and other training necessary to their particular task.
- Daily health and safety tailgate meetings will be held each morning and after lunch prior to work beginning. Specific safety topics will be discussed including prior days' activities. All site discussions will be documented.
- JTR will receive positive support and feedback.
- All associates will follow the General Site Safety Rules (see Attachment C).
- All ENTACT associates are expected to abide by the terms of the Drug and Alcohol Policy (see Attachment D).
- Hazard Communication (Right-to-Know).
- Traffic routes and hazards as identified in JMPs.
- Excavation competent person (usually FPM or his/her designee).

4.2 SITE-SPECIFIC TRAINING

All field team members and subcontractors are required to attend the pre-mobilization safety briefing held before field work begins. The safety briefing will cover the contents of this HASP including roles and responsibilities, a review of job hazard analysis, and safe work practices. The site's emergency response and evacuation practices will be reviewed in detail. A tour of the site and work area will also be included in the pre-mobilization briefing.

Specifically, the pre-mobilization safety briefing will include information on the following:

- Equipment checklist.
- An overview of the requirements contained in the Hazardous Communication (HazCom) Standard.
- Hazardous chemicals present at the site.
- The location and availability of the written HazCom Program.
- Physical and health effects of the hazardous chemicals on-site.
- Methods of preventing or eliminating exposure.
- Emergency procedures to follow if exposed.
- How to read labels and review material safety data sheets (MSDS) to obtain information.
- Location of MSDS file and location of chemical list.
- Equipment being used.
- Site layout.
- All required PPE including hand protection.
- Respirator fit test.
- Locations of fire extinguishers, eye wash stations, and first aid locations.
- Requirements for driving company vehicles, documented weekly inspections, and their upkeep.
- Task analysis.
- Air monitoring protocol and location of results.
- Reporting of all incidents including vehicle or equipment damage.
- Daily safety meetings.
- Contractor orientation.

Attendance at tailgate safety meetings, which are held each morning and afternoon, is also required. Topics of the tailgate safety meetings will include a discussion of that day's activities and the potential hazards which may be encountered. The ENTACT HSO or designee will lead the meetings and record the topic(s) discussed. All field team members are required to sign-in to document their attendance. Meeting topics will include ENTACT's behavior-based safety system and other pertinent safety information.

4.3 MEDICAL MONITORING

Pursuant to 29 CFR 1910.120, all ENTACT field personnel are required to have a pre-employment medical examination and annual update physicals. All associates must pass a pre-established physical including heavy metals blood work before being assigned to the work site. A copy of the medical pass or fail sheet will be kept on file at the site. In addition, a copy of the certificates for training, refreshers, first aid, CPR, respirator fit tests, medical fitness, and other pertinent information will be filed and available on site.

ENTACT field personnel are routinely monitored for blood lead, cadmium, and arsenic levels. Although exposure to these metals is not anticipated at the site, following any incidental or suspected exposure personnel will be scheduled for a special physical examination. The physical examination will focus on the specific contaminants and the associated target organs as well as test for blood lead, cadmium, and arsenic levels for comparison to previously established baselines.

5.0 SITE HAZARD ANALYSIS

Physical, chemical, and biological hazards exist at the work site. While all potential site hazards cannot be identified during HASP development, many can be anticipated. This section discusses the anticipated hazards and offers controls to minimize risk. Task safety assessments are provided at the end of this section.

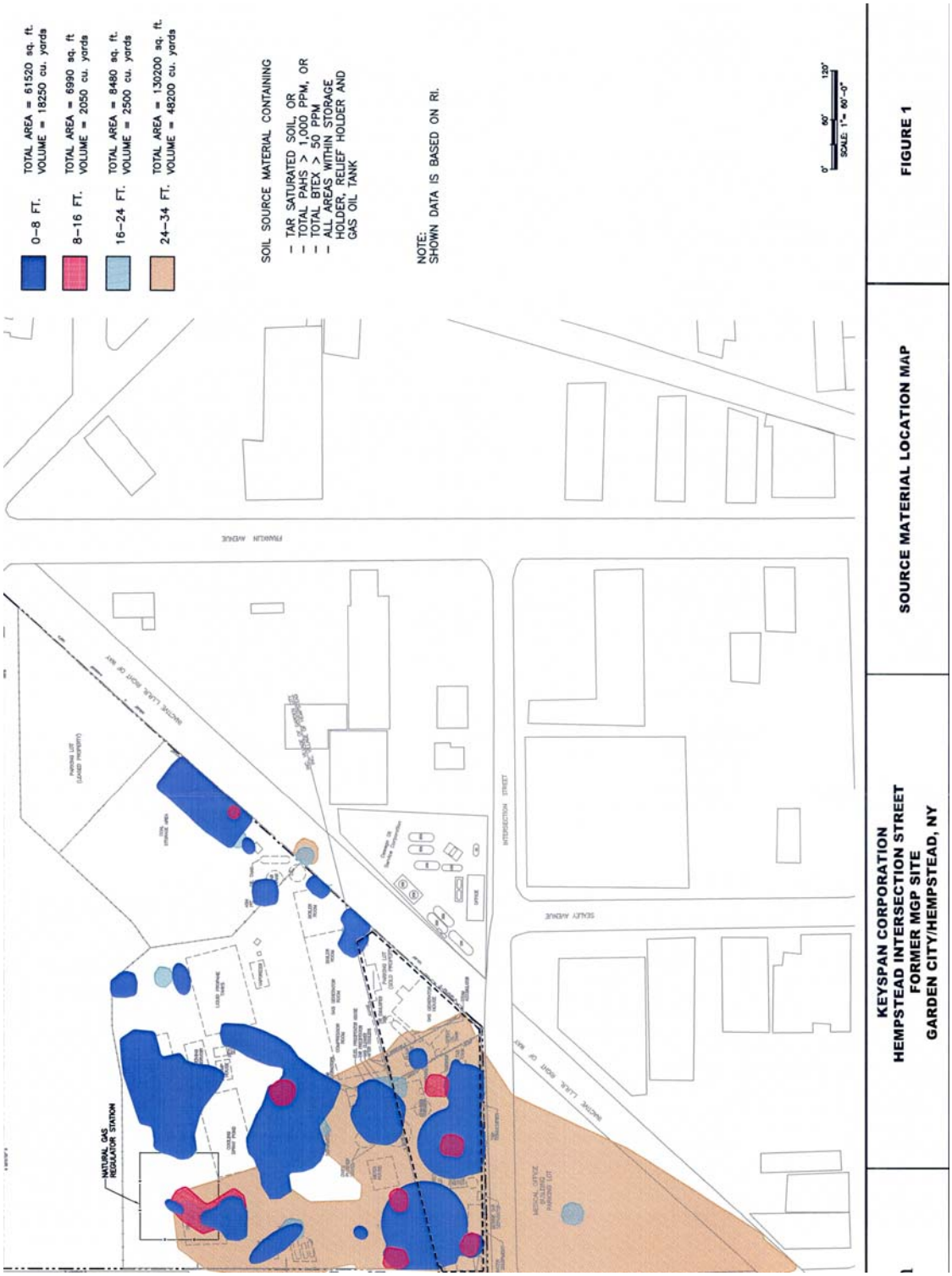
5.1 CHEMICAL HAZARDS

Contaminated media identified at the Site include soils, groundwater, and soil gas. Waste that will be encountered during this IRM will include MGP residuals such as coal tar, ash, and slag mixed with fill and/or native soils. Areas of soil contamination were described in the Final Remedial Investigation (RI) Report based on field observations, and analytical results for total polycyclic aromatic hydrocarbons (PAHs), and total benzene, toluene, ethyl benzene, and xylene (BTEX) concentrations. Areas of dense NAPL (DNAPL) have been identified at the Site and down gradient Several areas have been identified that contain elevated levels of contamination (i.e., "source material"), which were selected for removal (i.e., excavation) as part of an IRM prior to implementation of a site-wide remedial plan. "Based on the results from the Remedial Investigation, the potential limits of "source material" were previously defined and the presence of tar-saturated soils were determined through RI field observations, and/or through analysis of soil where total PAHs was greater than 1,000 parts per million (ppm), and/or total BTEX was greater than 50 ppm. This material was defined as "source material" and is indicative of MGP-impacted soils with the greatest potential for affecting groundwater, soil vapor, and for potential direct contact pathways for a construction worker-exposure scenario.

Maximum concentrations for previously detected contaminants of concern

	Chemical Hazard	Contaminated Media	Concentration	Location
1	DNAPL	Soil, Groundwater & Soil Gas	Presence of	Southwest Corner of Site & Off Site
2	BTEX	Soil, Groundwater & Soil Gas	>50 ppm	Throughout the Site, Specifically at Excavation Areas A, B, C & E
3	PAHs	Soil, Groundwater & Soil Gas	>1,000 ppm	Throughout the Site, Specifically at Excavation Areas A, B, C & E

Note: Entact does not anticipate encountering groundwater for this phase, which addresses relatively shallow excavations.


0–8 FT. TOTAL AREA = 61520 sq. ft. VOLUME = 18250 cu. yards
8–16 FT. TOTAL AREA = 6990 sq. ft VOLUME = 2050 cu. yards
16–24 FT. TOTAL AREA = 8480 sq. ft. VOLUME = 2500 cu. yards
24–34 FT. TOTAL AREA = 130200 sq. ft. VOLUME = 48200 cu. yards
SOIL SOURCE MATERIAL CONTAINING
– TAR SATURATED SOIL, OR
– TOTAL PAHS > 1,000 PPM, OR
– TOTAL BTEX > 50 PPM
– ALL AREAS WITHIN STORAGE HOLDER, RELIEF HOLDER AND GAS OIL TANK
NOTE:
SHOWN DATA IS BASED ON RI.
0' 60' 120'
SCALE 1" = 60'-0"
NATURAL GAS REGULATOR STATION
KEYSPAN CORPORATION
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
GARDEN CITY/HEMPSTEAD, NY
SOURCE MATERIAL LOCATION MAP
FIGURE 1

The exposure limits for chemical hazards of concern and particulate not otherwise classified are/is listed in Table 5.1.

The exposure limits for chemical hazards of concern and particulate not otherwise classified is listed in Table 5.1.

TABLE 5.1
CHEMICAL HAZARDS

Compound	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
Benzene	0.5 ppm (skin)	1 ppm TWA 5 ppm STEL	Inhalation Skin Absorption Ingestion Skin Contact	Irrit eyes, skin, nose, resp system, nausea; Known carcinogen	Eyes, skin, CNS, bone marrow, blood	FP: 12oF IP: 9.24 eV LEL: 1.2% UEL: 7.8% VP: 75 mm
Ethylbenzene	100 ppm	100 ppm	Inhalation Ingestion Skin Contact	Eye, skin, mucous membrane irritation; headache; dermatitis, narcosis; coma	Eyes, skin, respiratory system, CNS	FP: 55oF IP: 8.76 eV LEL: 0.8% UEL: 6.7% VP: 7 mm
Toluene	50 ppm	200 ppm	Inhalation Skin Absorption Ingestion Skin Contact	Eye, nose irritation; fatigue, weakness, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation; nervousness, muscle fatigue, insomnia, tingling in limbs; dermatitis	Eyes, skin, resp system, CNS, liver, kidneys	FP: 40o F IP: 8.82 eV LEL: 1.1% UEL: 7.1% VP: 21 mm
Xylene	100 ppm	100 ppm	Inhalation Skin	Eye, skin, nose, throat irritation;	Eyes, skin, resp system	FP: 90o F IP:

TABLE 5.1
CHEMICAL HAZARDS

Compound	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
			Absorption Ingestion Skin Contact	dizziness, excitement, drowsiness; incoordination, staggering gait; corneal damage; appetite loss, nausea, vomiting, abdominal pain; dermatitis		8.56 eV LEL: 0.9% UEL: 6.7% VP: 9 mm
PAH's as Coal tar pitch Volatiles (CTPV)	0.2 mg/m3	0.2 mg/m3	Inhalation Skin contact Ingestion	Irritant to eyes, swelling, acne contact dermatitis, chronic bronchitis	Respiratory system, CNS, liver, kidneys, skin, bladder, carc NIOSH therefore recommends that CPTV be considered occupational carcinogens in conformance with the OSHA carcinogen policy.	Black or dark brown amorpho us residue.
Hydrogen cyanide	4.7 ppm (5 mg/m3) STEL [skin]	10 ppm (11 mg/m3) [skin]	Inhalation Ingestion Absorption Skin/Eye Contact	Asphyxia; weakness, headache, confusion; nausea, vomiting; increased rate and depth of respiration or respiration slow and gasping; thyroid, blood	CNS, CVS, thyroid, blood	Colorless or pale-blue liquid or gas (above 78°F) with a bitter, almond-like odor. VP: 630 mmHg

TABLE 5.1
CHEMICAL HAZARDS

Compound	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
				changes		IP: 13.60 eV
Hydrogen sulfide	10 ppm TWA, 15 ppm STEL	20 ppm C, 50 ppm [10-min. Maximum peak]	Inhalation Skin/Eye Contact	Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, fatigue, irritability, insomnia; gastrointestinal disturbance; liquid: frostbite	Eyes, respiratory system, CNS	Colorless gas with a strong odor of rotten eggs. VP: 17.6 atm IP: 10.46 eV
Nitrogen dioxide	NIOSH REL: ST 1 ppm (1.8 mg/m^3)	OSHA PEL†: C 5 ppm (9 mg/m^3) IDLH 20 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; cough, mucoid frothy sputum, decreased pulmonary function, chronic bronchitis, dyspnea (breathing difficulty); chest pain;	Eyes, respiratory system, cardiovascular system	Yellowish-brown liquid or reddish-brown gas (above 70°F) with a pungent, acrid odor. [Note: In solid form (below

TABLE 5.1
CHEMICAL HAZARDS

Compound	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
				pulmonary edema, cyanosis, tachypnea, tachycardia		15°F) it is found structurally as N_2O_4.]
Silica as respirable dust	REL: TWA 0.05 mg/m^3 IDLH Ca [25 mg/m^3 (cristobalite, tridymite 50 mg/m^3 (quartz, tripoli)		inhalation, skin and/or eye contact	Cough, dyspnea (breathing difficulty), wheezing; decreased pulmonary function, progressive respiratory symptoms (silicosis); irritation eyes; [potential occupational carcinogen]	Eyes, respiratory system	Colorless odorless solid. [Note: A component of many mineral dusts.]
Carbon monoxide	NIOSH REL: TWA 35 ppm (40 mg/m^3)	OSHA PEL**:** TWA 50 ppm (55 mg/m^3)	inhalation, skin and/or eye contact (liquid)	Headache, tachypnea, nausea, lassitude (weakness, exhaustion), dizziness, confusion, hallucinations; cyanosis; depressed S-T segment of electrocardiogram, angina, syncope	cardiovascular system, lungs, blood, central nervous system	Colorless odorless gas.
Calciment oxide	TLV 5mg/M^3		Under dusty conditions it can cause excessive			

TABLE 5.1
CHEMICAL HAZARDS

Compound	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
			drying of skin and skin irritation. Eys and open cuts are particlularly vulnerable.			
Particulates not otherwise classified	PEL:15 total/5 resp mg/m^3 REL: NE TLV: 10 total/3 resp	Varies	Inh. Con.	Irritates eyes, skin, throat, upper respiratory system		

Key of Abbreviations			
Carc.	Carcinogen	LEL	Lower Explosive Limit
Con.	Contact	PEL	Permissible Exposure Limit
IDLH	Immediately Dangerous to Life and Health	SA	Skin Absorption
F.Pt.	Flash Point	TLV	Threshold Limit Value
Inh.	Inhalation	UEL	Upper Explosive Limit
Ing.	Ingestion	VP	Vapor Pressure
IP	Ionization Potential	f/cc	Fiber per cubic centimeter

5.1.1 MSDS and Right–To-Know

ENTACT will communicate the hazards of chemicals to all associates through the Hazard Communication Program as outlined by Title 29 Code of Federal Regulations 1910.1200. The use of chemicals is anticipated to be minimal at the site. A brief list is included below of certain chemicals that may be necessary. Any additional chemicals used will be added to the list and the MSDS will be added to the MSDS folder located at the ENTACT project trailer or administrative offices.

- Gasoline
- Diesel
- Hydraulic Oil
- Motor Oil
- Calcium oxide

MSDS will be discussed prior to the project beginning at the initial site safety orientation. Site personnel will comply with OSHA Hazard Communication Standards (Right-To-Know) and ENTACT's Hazard Communication Policy. All containers received on site will be inspected by the FPM/HSO who will use the HMIS label according to ENTACT's Haz Comm program. This will ensure that the containers are properly labeled with hazard warnings in compliance with OSHA Hazard Communication regulations.

OSHA and the EPA have established a chemical safety data bank for quick reference to over 800 chemicals. While this does not replace the need for MSDS it is a quick reference for chemical safety and PEL information.

http://www.osha.gov/web/dep/chemicaldata/#target

5.2 NON-CHEMICAL HAZARDS

Physical hazards, such as those associated with excavation, heavy equipment, debris removal, and other construction activities, will likely pose the greatest potential for injury at the site because chemical exposure shouldn't exist. Physical hazards can be caused by the following:

- Underground and overhead utilities
- Heavy equipment
- Crane operation
- Trenching and excavation
- Noise

- Weather
- Slip, trip, and fall
- Fall Protection (Man Lift)
- Fire protection
- Debris removal
- Traffic
- High-pressure cleaning
- Water hazards
- Lockout tagout (for hazardous energy sources)
- Hand injury hazards
- Hot work
- Working inside fabric structure

Injuries that may result from these physical hazards can range from simple slip-trip-fall types of incidents to casualties, including fatalities due to moving or rotating equipment, electrocution, engulfment, or other activities related to construction. Injuries resulting from physical hazards can be avoided through the adoption of safe work practices and associate involvement.

Each of the above mentioned physical hazards are discussed below:

5.2.1 Underground and Overhead Utilities

Before heavy equipment is used, all utilities (electricity, natural gas lines, water lines, sewer lines, etc.) must be identified. The New York Underground Utilities Protective Organization (1-800-962-7962) and National Grid will be contacted prior to beginning intrusive and pre-trenching activities. Identified underground utilities will be clearly marked and color coded. ENTACT will coordinate with the appropriate utilities to remove or reroute utilities as necessary. Caution and awareness of underground and overhead utilities and other identified obstructions that remain in place will be emphasized in daily health and safety meetings. Deviation from planned activities must be discussed and approved by the FPM and the HSO. Additional training that addresses working around high voltage overhead electrical lines will be completed in the site orientation

Table 5.2 Requirements for Equipment Operation Near Power Lines (29 CFR 1926.550)		
ACTIVITY	LINE RATING	MINIMUM CLEARANCE
Equipment Operation	< 50 kV	10 feet
	> 50 kV	10 feet + 0.4 inches per each kV over 50 kV, or 2 times the length of the line insulator (minimum of 10 feet)
In transit with no load and boom lowered	< 50 kV	4 feet
	> 50 kV to 345 kV	10 feet
	345 kV to 750 kV	16 feet

Note: kV = kilovolts

Note: Abandoned utilities slated for removal must be verified as de-energized or out of service prior to attempted removal. See Attachment E – Equipment Safety for working near overhead and underground utilities.

5.2.2 Heavy Equipment

On-site activities that ENTACT will perform require use of heavy equipment. Heavy equipment and its operation can represent a significant safety hazard if proper experience is not combined with site-required procedures. Trained and experienced personnel will perform operation of heavy equipment. Personal protective equipment (PPE) such as steel-toed shoes, safety glasses or goggles, hearing protection, hard hats, and high visibility vests must be worn whenever such equipment is present. Equipment will have a fire extinguisher on board and a backup alarm. See Attachment E, Equipment Safety, for additional requirements for heavy equipment.

5.2.3 Trenching and Excavation

Excavation activities will occur. Excavation activities will proceed once all site preparation is complete and the temporary structure and VMS are operable. Limits of excavation will be surveyed and clearly staked by a qualified professional land surveyor. Where possible, all impacted soils will be removed and loaded directly into transport vehicles within the temporary structure for off site disposal. If direct loading is not feasible, excavated source materials will be temporarily stockpiled in accordance with

Specifications Section 02300. Groundwater is expected to be present on site at 25 feet below ground surface (bgs); therefore it is not anticipated to be encountered during shallow excavations. However if wet soils are encountered, they will be allowed to gravity drain back into the excavation. Drier soils and/or calcium oxide may be used to mix with the wet soils until soils are adequately dried for loading into transport vehicles. An adequate supply of calcium oxide will be maintained on site throughout excavation activities. All excavation and trenching activities shall comply with OSHA 29 CFR 1926.650 Subpart P. See Attachment W for sloping, benching, and competent person checklist.

5.2.4 Noise

Heavy equipment and other construction activities may produce noise levels above acceptable standards. High noise levels (85 dBA or higher) can contribute to hearing loss as well as interfere with communication between associates. Exposure to noise can be expected when working around equipment and machines such as heavy equipment, shears, generators, compressors, jackhammers, and the like. All personnel shall wear hearing-protective devices with a minimum noise reduction rating (NRR) of at least 25 (either earplugs or muffs) if they are within 25 feet of such operating equipment or when noise levels interfere with normal speech. Hand signals will be established by on-site personnel as appropriate to facilitate communications while involved in high-noise activities.

5.2.5 Weather

Adverse weather conditions will be important considerations when planning and conducting site operations. Hot and cold weather may be encountered as well as thunderstorms and lightning. A break trailer equipped with air conditioning and heating will be part of the site setup. Attachment G, Basic Emergency Medical and First Aid address precautions and treatment of heat and cold stress.

Thunderstorms and Lightning

Thunderstorms and lightning pose a threat to safety for personnel working outdoors. ENTACT follows the 30 – 30 Rule for lightning safety; at any time when there is less than 30 seconds between a lightning flash and the following thunder work will be suspended and personnel will seek shelter. Work will not resume until 30 minutes after the last lightning strike with an interval less than 30 seconds.

Tornado Related Weather

A tornado watch defines an area where tornadoes and other kinds of severe weather are possible in the next several hours. It does not mean tornadoes are imminent -- just that you need to be alert, and to be prepared to go to safe shelter if tornadoes do happen or a warning is issued. This is the time to:

- turn on NOAA radio
- verify location of fellow workers and subcontractors
- watch the sky
- make sure you have ready access to safe shelter
- contact your Project Manager so they are aware of the weather conditions

A tornado warning means that a tornado has been spotted, or that Doppler radar indicates a thunderstorm circulation which can spawn a tornado. When a tornado warning is issued for your area take immediate cover.

Weather Average For Hempstead, New York

Month	Avg. High	Avg. Low	Avg. Precip	Rec. High	Rec. Low
January	36.0° F	23.0° F	3.69 in	70.0° F (01/26/1950)	-4.0° F (01/20/1994)
February	40.0° F	24.0° F	2.94 in	72.0° F (02/28/1997)	-3.0° F (02/17/1979)
March	48.0° F	32.0° F	4.08 in	80.0° F (03/29/1985)	5.0° F (03/18/1981)
April	58.0° F	42.0° F	4.06 in	87.0° F (04/12/1977)	18.0° F (04/07/1982)
May	68.0° F	53.0° F	4.48 in	97.0° F (05/29/1969)	34.0° F (05/10/1966)
June	77.0° F	63.0° F	3.45 in	100.0° F (06/26/1952)	44.0° F (06/09/1980)
July	83.0° F	68.0° F	4.17 in	102.0° F (07/03/1966)	49.0° F (07/06/1979)
August	81.0° F	66.0° F	4.05 in	100.0° F (08/02/1955)	47.0° F (08/28/1982)
September	74.0° F	58.0° F	4.05 in	99.0° F (09/02/1953)	38.0° F (09/27/1980)
October	63.0° F	47.0° F	3.50 in	85.0° F (10/13/1954)	27.0° F (10/23/1988)
November	52.0° F	38.0° F	4.00 in	81.0° F (11/01/1974)	14.0° F (11/29/1955)
December	42.0° F	28.0° F	3.86 in	70.0° F (12/04/1982)	0.0° F (12/23/1989)

5.2.6 Slip, Trip, and Fall Hazards

Slip, trip, and fall hazards will exist throughout the site. Protection from slip, trip and fall hazards will be provided through standard safety procedures including good housekeeping. Properly locating equipment and removing debris and taking general precautions during site operations will be standard operating procedures. Associates will be apprized of any potential trip hazards through regularly scheduled health and safety meetings. Whenever possible, trip and fall hazards will be eliminated or clearly identified with yellow "caution" tape. Impalement hazards to associates will be neutralized as soon as they are identified. ENTACT and any subcontractors will be responsible for the use of safety harnesses, lifelines, lanyards, safety nets, etc., for safeguarding their employees when performing elevated work in compliance with 29 CFR 1926.500 Subpart M. Refer to the ENTACT's Behavior Based Health and Safety System for Fall Protection information.

5.2.7 Fire Prevention

Fire extinguishers shall be provided in fuel areas, storage areas, portable buildings and equipment. All extinguishers will be inspected, serviced, and maintained. No burning of materials will take place at the project site. All flammable liquids will be marked and stored in a manner to conform to NFPA and OSHA requirements. A hot work permit will be used when welding or cutting work is performed. Refer to the ENTACT Comprehensive Health and Safety Manual for Portable Fire Extinguishers.

5.2.8 Debris Removal

Debris removal will be accomplished with equipment and manual labor. Proper PPE, daily work requirements, and good housekeeping must be discussed and maintained. Debris removal will be an ongoing process that has many slip, trip, and fall hazards that must be addressed. Nails, metal panels, sharp edges, heavy loads, and biological hazards are some of the hazards associated with this job. Daily work activities will be discussed each day.

5.2.9 Traffic

Site personnel will maintain reasonable dust-free traffic and dust suppression will occur. All traffic will follow typical construction safety practices. Specific on-site and off-site traffic routes will be established to accommodate construction activities as well as work crews commuting from their local lodging to the work site. Necessary demarcation of routes, speed limits, and hazards will be made as appropriate. A journey management

plan (JMP) will be completed by FPM and HSO before work begins and will be updated or revised as necessary for on-going work activities. A blank JMP is included in Attachment H. Vehicles will be inspected weekly using ENTACT's Company Vehicle Weekly Inspection form.

ENTACT associates must comply with the ENTACT Driver Safety and Cell Phone Policy which states that associates may not talk on cell phones while the vehicle is in motion, driver and passengers must wear seat belts, no one is allowed to ride in the back of pickup trucks, all cargo must be secured (in cab, on trailer, bed, etc. Additionally, this applies to the use of 2-way radios and other electronic equipment that may cause distraction.

5.2.10 High-Pressure Cleaning

Decontamination activities will mostly involve pressure washing of truck tires. Decontamination using high-pressure water cleaning above 1,000 PSI requires specific procedures and training that must be followed. Pressure below 1,000 PSI does not mean that it cannot cause injury or requires any less attention to basic procedures. Adequate precautions are required at all pressures. The use of high-pressure water can cause severe injuries and extreme caution and strict compliance with operating procedures must be followed.

- Only trained personnel will be allowed to use the equipment.
- No portion of the body shall ever be placed in front of the water jet. The jets of water can easily puncture and tear the skin or penetrate deeper causing infection or serious internal damage.
- A job review will be made prior to high-pressure water being used.
- Manufacturer's recommendations and requirements will be followed.
- PPE will follow guidelines outlined in Section 7, Level D+ requirements.
- PPE will include full face piece and metatarsal protection
- High-pressure cleaning may require partial body or total entry into tanks with a corresponding increase in PPE and other requirements
- Only essential personnel will be allowed in the work area.

Training will include:

- The cutting action of high-pressure water.
- The need and limitations of PPE.
- Operations of system start-up, shutdown, and potential problems.
- The purpose of all safety devices.
- Proper method of connecting hoses (laying out without kinks) using the proper

tools for hook-ups.
- The proper stance for sound footing.
- Associate shall show knowledge and skill in the proper application of the equipment.

Refer to the ENTACT Comprehensive Health and Safety Manual for High-Pressure Water procedures.

5.2.11 Water Hazards

Where practicable, diverting and/or removing water from the work area prior to performing other construction activities is generally preferable to having to perform work in a sustained basis on, in, or near water. However, implementing water diversion/removal may itself temporarily expose workers or others to activities that represent a potential danger. Therefore, the relative hazards represented by implementing and maintaining water diversion/removal needs to be assessed and compared to the hazards of completing the planned work without water diversion/removal before a final decision is made. If the decision is to proceed with water diversion/removal activities that themselves may represent a potential danger of drowning, then the applicable regulatory, design, health and safety, construction, operations and maintenance, and emergency response procedures will be implemented.

Any work within 5 feet of a water body will follow appropriate safety precautions. Personnel flotation devices (PFD) are required and must meet U.S. Coast Guard requirements. The buddy system will be enforced at all times. No one will work alone. In addition to PFDs, life rings with suitable lengths of rope will be made available when working near swiftly moving water or that of depths greater than 3 feet. Work near water is primarily defined as that work which involves a potential danger of drowning. Evaluation as to whether work could represent a danger of drowning and hence the requirements of this guidance are applicable, will be done on a site-specific basis, as deemed appropriate, by the Basic Work Team (BWT) as part of Health and Safety Plan development.

5.2.11.1 Throwing Rings

Type IV Personal Flotation Devices (PFDs) are U.S. Coast Guard approved "ring life buoys" typically referred to as "life rings" or “throwing rings.”

- These devices are required for work near water.
- The interval between rings shall not exceed 200 feet and/or throwing rings must be within 100 feet of work.
- Maintain 90 feet of retrieval line attached to throwing rings.

- These devices or equivalent length rescue throwing bags shall also be used where there are potential entrapment hazards such as bogs, lagoons, quick sands, or deep mud's.

5.2.11.2 PFD Vests

- Wear Coast Guard approved work vests and inspect work vests before each use.
- Do not use recreational boating PFDs such as ski jackets for work applications.
- PFDs used as work vests may be Type I, II, III, or V PFDs. A Type V PFD, including Type V Hybrid PFDs, is acceptable only if it is U.S. Coast Guard approved and marked for use as a work vest, for commercial use, or for use on commercial vessels.

If the work is defined as work in, on or near water which involves the risk of drowning (as determined using the methodology identified in Section 1b of the GP) then the following emergency response considerations apply:

- All personnel working in, on or near water should have appropriate training and be familiar with emergency response procedures and contacts. Continuous oversight and/or the buddy system need to be used when personnel are working in, on or near water.
- When working in, on or near water, the applicable emergency gear identified in Section 7 (i.e., throw rings, PFDs, skiffs) needs to be available on-site at all times.
- Deep water, fast flowing water, cold water and/or presence of thin ice can present additional constraints to emergency response. Divers, or other specialized responders, may need to be alerted and their availability verified prior to proceeding with work in, on or near water under these conditions.

Management During Construction Options Evaluation

Construction Activity Type	Advantages	Disadvantages
Divert/Remove Water	Limits work activities around water primarily to the initial activities required to divert/remove water and the final activities associated with returning site hydrology to original conditions. Remaining work is isolated from water allowing it to be completed more efficiently and safely and reducing the potential for water quality impacts due to disturbance, spills, etc.	Diverting/removing water may increase overall costs, extend the schedule, cause additional environmental impacts that may be difficult to mitigate, and require significant operation and maintenance to ensure performance. Flood events larger than the design capacity of the diversion/removal system may still result in the need to stop work in the construction area.
Work in Saturated Conditions	Saves the costs and environmental impacts associated with removing/diverting water during field activities.	Working in saturated conditions negatively impacts productivity and safety. Operations are more exposed to changes in conditions from flooding, etc. that could negatively impact costs, schedules, and the environment with little ability to control or mitigate these impacts.

5.2.12 Hand Injuries

The hand is used in every job performed in the field and associates are exposed to the potential for hand injuries while performing various job tasks as described in Section 5. To control this potential loss, ENTACT will educate associates on the site specific hazards that can cause hand injuries (HASP and JSAs) and the hand protection provided, will utilize BBS tools, associates will participate in the development of JSAs, and will perform JTRs. Hand injuries may be encountered in various ways at this job site:

- Absorption of harmful substances;
- Severe cuts or lacerations

- Severe abrasions
- Punctures
- Pinch points
- Repetitive stress
- Crushing
- During Controlling of hazardous energy (Lockout tagout) for all electrical and other forms of energy
- Chemical burns
- Thermal burns
- Harmful temperature extremes

Hand hazards and protection specific to the job task will be discussed in the daily tailgate meetings, identified in JSAs, and JTRs will be performed prior to beginning every job task in order to prevent hand injuries.

Associates will know and understand the hazards that exist while performing their job task. Hazards will be mitigated by:

- Applying the correct level of hand protection as described in Section 7 – Personal Protective Equipment.
- Reviewing the hasp and signing the Acknowledgement Form in Attachment B acknowledging they understand the scope of work and hazards involved.
- Inspecting hand protection PPE prior to use and are responsible for immediate replacement of damaged or worn PPE.
- Perform a JTR before the hand is to be used.
- Following the "Rules for Safe Use of Hand Tools."
- Performing "Work Commentary" – Associates verbally communicate with each other what is going on and what your co-worker(s) will be doing next.
- Performing "Stop and Lock" – Associates will stop all moving parts before placing hands on them, let the energy out of moving parts, make sure hands are away from potentially moving parts before adding energy. Follow Lock-out/Tag-out Policy in Section 5.2.13.
- Use Stop Work Authority should any unsafe condition exist.
- Fixed open blade knives are prohibited to be used as a tool. Exceptions can be made, but must be approved by the Field Project Manager and ENTACT HSO, and complete the Fixed Open Blade Knife (FOBK) Exception Permit located in ENTACT's Hand Protection Policy.
- Hand stickers will be placed on equipment to remind everyone of pinch points.
- Depending on the job task, brightly colored gloves may be utilized. The HSO, FPM and Client representative will make this determination.

All associates will comply with ENTACT's Hand Protection Policy.

GLOVE SELECTION	
DUTY/HAZARD	**TYPE OF GLOVE MATERIAL**
Light Duty Abrasions/loss of grip/adsorption	Cotton, Leather, Rubber Coated or Kevlar separately or in combination with nylon / Nitrile / Teflon®
Medium Duty Laceration/adsorption	Leather or Kevlar separately or in combination with nylon / Nitrile / Teflon®
Heavy Duty Laceration/puncture	Kevlar (exposure to sharp or jagged metal, glass, box cutters, etc), stainless core (stainless steel woven into material), HexArmorTM
High Temperature	Kevlar / Nomex / Fibreglass
Low Temperature	Insulating Gloves
Puncture	Aramid, HexArmorTM

5.2.13 Hazardous Energy Sources (Lock-out/Tag-out)

Site specific lock-out tag-out requirements will be implemented to prevent incidents and injury associated with inspection, maintenance, and/or set-up of equipment, machines, or processes where unintentional start-up, or release of stored energy would be expected to cause harm to persons involved in such work, bystanders or property.

ENTACT will utilize Lock-out/Tag-out tags attached to the ignition source of vehicles and equipment during inspection, maintenance, and/or set-up. The responsible person for each vehicle will retain the operating key in their pocket or in the field office during the lock-out/tag-out process. This person is responsible for ensuring lock-out/tag-out procedures are implemented and followed.

Associates will stop all moving parts before placing hands on them, let the energy out of moving parts, and make sure hands are away from potentially moving parts before adding energy. During operations conducted to control forms of hazardous energy (Lockout tagout) a site specific permit will be generated by the HSO assigned to the project. All heavy equipment, vapor management unit, and all other equipment will conduct lockout tagout procedure's. Generators and the vapor exchange unit will be required to be locked out prior to maintenance and movement

5.2.14 Hot Work

Before beginning hot work, contact the HSO or FPM to have a Hot Work Permit issued.

Permits are issued for the specific job being done, and for a specific time period. The time period is usually for the working shift, but may never exceed twenty-four hours.

HSO has the responsibility to verify that all necessary precautions have been taken at the worksite.

Approved Hot Work Areas

- Welding and Cutting Shops; and
- Detached outdoor areas that are free of flammable and combustible materials (i.e., dry brush, grass, leaves) and is suitably separated from adjacent areas.

Prohibited Hot Work Areas

- Where processes involving flammable liquids, gases and dusts cannot be shut down and made safe;
- Where lint conditions are severe beyond correction;
- On partitions, walls, ceilings, or roofs with combustible coverings (e.g., expanded plastic insulation);
- On pipe or other metals that can conduct enough heat to ignite nearby combustibles;
- In the presence of explosive atmospheres (e.g., mixtures of flammable gases, vapors, liquids, or dusts with air);
- In sprinkle red buildings while such protection is impaired;
- In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulfur, rolled paper, or cotton; and
- In areas not authorized by management.

Fire Watch

A fire watch job is to monitor the area and watch for fires from the hot work operation and to make sure that persons not involved in the hot work operation do not come into or move combustible or flammable materials in to the work zone during the hot work operation.

Fire watch shall be required by the individual responsible for authorizing the hot work wherever hot work is performed in locations that a minor fire might develop, or where:

- Appreciable combustible materials in building construction or contents are closer than 35 ft. (11 m) to the point of operation;
- Appreciable combustibles are more than 35 ft. (11 m) away but are easily ignited by sparks;
- Wall or floor openings within a 35 ft. (11 m) radius expose combustible material in adjacent areas, including concealed spaces in walls or floors;
- Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by heat conduction or radiation.

Fire watch shall have a fully charged and operable fire extinguisher or other extinguishing method available. In either case, the fire watcher will be trained to use the fire extinguishing equipment.

Fire watch shall be familiar with facilities and procedures for sounding an alarm in the event of a fire.

Fire watch shall watch for fires in all exposed areas, and try to extinguish them first only when obviously within the capacity of the equipment available, or otherwise sound the alarm immediately.

A fire watch shall be maintained for at least 30 minutes after completion of cutting, welding and other hot work operations to detect and extinguish smoldering fires.

If the individual conducting the fire watch must leave the area momentarily (to use the restroom, retrieve parts or tools from a service vehicle, etc.), they must arrange to have someone else take over the fire watch responsibility during the time they are away.

Precautions

Precautions required include but are not limited to:

- Valves, regulators, hoses, and torches shall be checked regularly;
- Welding or cutting on vessels that contain combustible or flammable material is prohibited unless completely purged and residue removed;
- Gas cutting and welding equipment shall be secured to avoid damage and disturbance;
- Welding curtains should be used to prevent hot slag from scattering and to protect the vision of persons in close proximity to the hot work.
- Personnel performing hot work shall ensure that the atmosphere is free of flammable or combustible vapors. Should doubt arise, consult the Health and Safety Department to determine if the work should continue;
- Ensure adequate ventilation is provided;
- Segregate combustible material at least 35 feet from work area;
- Provide guarding in the form of shielding and covering if combustibles cannot remove or segregated;
- Remove combustibles from common surfaces when welding on metal walls, partitions, or ceilings is to be completed;
- Special attention to welding or cutting pipes in contact with walls made with combustible materials; and
- Post a fire watch in areas where combustibles cannot be safely segregated from work, where sparks may impact lower levels in cases of elevated work, or where a fire alarm has been partly or completely disable in order to perform the work.

PPE

The PPE required when performing this operation must provide protection from:

- Hot metal,
- Metal fumes and welding gases,
- Noise from high oxygen-burners
- Infrared Radiation

PPE must be used if adequate engineering and administrative controls are not feasible to control the hazards. Each welding or cutting operation, depending on the materials welded on and the type of welding method has specific safety and health hazards from which workers must be protected. A Hazard Assessment is required to be conducted to protect workers from the hazards associated with these operations.

5.2.15 Hauling Trailers

First, determine how much weight you'll need to tow and compare with the vehicle's tow rating. Overloading a vehicle reduces braking capability, places undue stress on components and can lead to shortened service life or failure.

For optimum handling, your trailer must be properly loaded and balanced. Keep the center-of-gravity low for best handling. Approximately 60% of the cargo weight should be in the front half of the trailer and 40% in the rear.

When towing a trailer, drive at approximately half the speed that you would normally be going. When you are braking, allow for much more time to stop. When you change lanes or turn, go slower and allow for greater room. Always be sure to check tire pressure.

Trailer wiring harness
A 7-pin harness is standard Inspect all connections check each signal, brake, and emergency connections

Hitch
Very trailers (35+ feet) use what are called fifth-wheel or gooseneck hitches that mount right in the bed of a pickup truck. Trucks are most likely need to be fitted with a frame-mounted hitch, the most common hitch smaller trailers.

Brakes
Most states require brakes on trailers weighing over 1,500 pounds when loaded. Most manufactures urge that a separate functional brake system be used on any towed vehicle, including those dolly-towed or tow bar-towed.

Trailer lamps
Make sure the trailer is equipped with lights that conform to all applicable government regulations.

Safety chains
Must-haves for towing safely, safety chains retain the connection between a towing and a towed vehicle in case the trailer coupling or ball separates

5.2.16 Confined Space

Not Anticipated if conditions change HSO will address the area and implement confined space procedures after notifying Health and Safety Coordinator.

5.2.17 Excavation Inside Tent Structure

Excavation will conducted inside a tent with engineering controls. Chemical agent filtration systems and air monitoring to protect the workers and the public are to be used as well, with the design of the system altered to handle a larger tent.
Workers will complete rigorous operational training that included thorough safety training in preparation for the September start date.
Safety measures: The safety of the community and the workers is the primary concern. All previous safety precautions remain in place: closed site; work inside a pressurized engineering structure; stringent training; Level C protective suits;

5.3 BIOLOGICAL HAZARDS

Personnel will be cautioned not to disturb insects or animals. Personnel with particular allergies to bee or wasp stings will not work in areas where contact is possible unless they notify the HSO of the allergy and carry appropriate anti-venom kits as necessary. First aid kits should include remedies for possible encounters, including equipment for poisonous snakebites. Insect repellents will be available on the site at all times. Personnel with particular allergies to such compounds will be cautioned prior to their application of the chemical makeup.

The following biological hazards may be present at the site. The FPM will instruct the field crew of the applicable biological hazards during the site orientation and periodically throughout the project.

5.3.1 Insect Bites and Stings

Insects could be present at this site making the chance of bites possible. Although they can be painful, they rarely cause death. However, some people have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. The following is a list of preventive measures:

- Apply insect repellant prior to fieldwork and/or as often as needed throughout the work shift.
- Wear proper protective clothing (work boots, socks, and light colored pants).
- Field personnel that may have insect allergies should provide this information to the HSO or FPM prior to commencing work.

Bee, Wasp, Hornet, and Yellow Jacket Stings

- A bee will leave behind a stinger attached to a venom sac. Try to remove it as quickly as possible. One way is to gently scrape it out with a blunt-edged object, such as a credit card or a dull knife.
- Wash the area carefully with soap and water. Do this two to three times a day until the skin is healed.
- Apply a cold pack, an ice pack wrapped in a cloth, or a cold, wet washcloth for a few minutes.
- Give acetaminophen for pain.
- For pain and itching, give an over-the-counter oral antihistamine. You could also apply a corticosteroid cream or calamine lotion to the sting area.
- A sting anywhere in the mouth warrants immediate medical attention. That's because stings in the mucous membranes of the mouth can quickly cause severe swelling that may block airways. You should seek medical care if you note a large skin rash, a large area of swelling around the sting site, or if swelling or pain persists for more than 72 hours. You should seek immediate medical care if you notice any of the following signs, which may indicate a serious or even potentially life-threatening allergic reaction:

    - wheezing or difficulty breathing
    - tightness in throat or chest
    - swelling of the lips
    - dizziness or fainting
    - nausea or vomiting

Spider Bites

Most spiders found in the United States are harmless, with the exception of the black widow and the brown recluse (or violin) spider. Both of these are found in warm climates.

- Wash the area carefully with soap and water. Do this two to three times a day until skin is healed.
- Apply cool compresses.
- Give acetaminophen for pain.

- To protect against infection, apply an antibiotic ointment and keep hands washed.
- If you have any reason to suspect a bite from a black widow or brown recluse spider, apply ice to the bite site and head for the emergency room. Symptoms include:
    - a deep blue or purple area around the bite, surrounded by a whitish ring and a large outer red ring
    - body rash
    - muscle spasms, tightness, and stiffness
    - abdominal pain
    - headache or fever
    - general feeling of sickness
    - lack of appetite
    - joint pain
    - nausea or vomiting

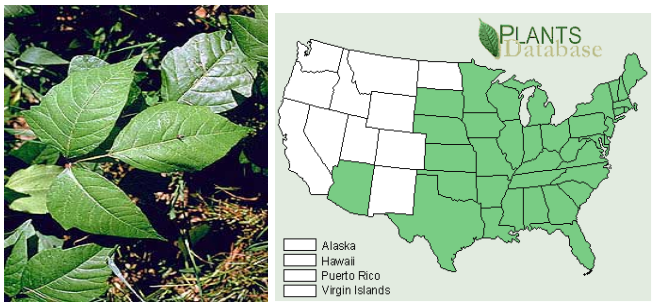
Tick Bites

Check for ticks carefully after you've been in or around a wooded area. Common types of ticks include dog ticks and deer ticks (deer ticks may be carriers of Lyme disease). If you find a tick:

- Call a physician. The doctor may want you to save the tick after removal (you can put it in a jar of alcohol to kill it).
- Use tweezers to grasp the tick firmly at its head or mouth, next to the skin.
- Pull firmly and steadily on the tick until it let’s go, then swab the bite site with alcohol.
- **Don't** use petroleum jelly or a lit match to kill and remove a tick.

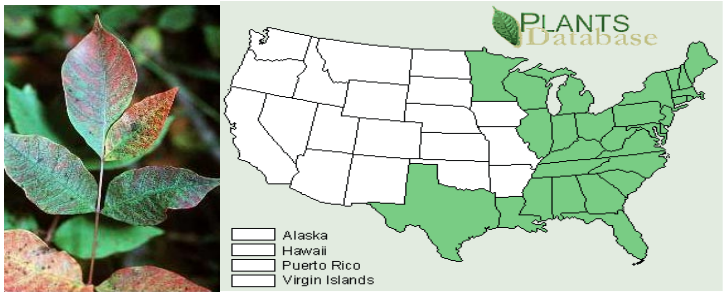
5.3.2 Plants

The potential for contact with poisonous plants exists when performing fieldwork at the site. Poison ivy, sumac, and oak may be present on site. Poison ivy can be found as vines on tree trunks or as upright bushes (poison oak is another name for the bush form of poison ivy). Poison ivy consists of three leaflets with notched edges. Two leaflets form a pair on opposite sides of the stalk, and the third leaflet stands by itself at the tip. Poison ivy is red in the early spring and turns shiny green later in the spring.



Poison Ivy Distribution By State

Poison sumac can be present in the form of flat-topped shrub or tree. It has fern-like leaves that are velvety dark green on top and pale underneath. The branches of immature trees have a velvety "down." Poison sumac is white and has "hairy" berry clusters.



Poison Sumac Distribution By State

Contact with poison ivy, sumac or oak may lead to a skin rash, characterized by reddened, itchy, blistering skin that needs first aid treatment. If you believe you have contacted one of these plants, immediately wash skin thoroughly with soap and water, taking care not to touch your face or other body parts.

The following is a list of preventive measures:

- Know what the plants look like and avoid them.
- Use OTC poison ivy blocker.
- Wear appropriate protective clothing (long sleeves, pants, gloves, etc.)

If you are exposed, according to the FDA, you should quickly (within 10 minutes):

- First, cleanse exposed areas with rubbing alcohol.
- Next, wash the exposed areas with water only (no soap yet, since soap can move the urushiol, which is the oil from the poison ivy that triggers the rash, around your body and actually make the reaction worse).
- Now, take a shower with soap and warm water.
- Lastly, put gloves on and wipe everything you had with you, including shoes, tools, and your clothes, with rubbing alcohol and water.

5.3.3 Snake Bites

Although there are no poisonous snakes native to the area. If bitten by a snake, remain calm, keep the affected area below the level of the heart and walk, do not run, to the nearest aid station for assistance. The FPM will immediately transport the victim to the closest medical facility for treatment or send for appropriate medical assistance, whichever is faster. The following precautions should be used when working in areas with snakes:

- Wear appropriate protection equipment (work boots).
- Be alert and aware of surroundings.
- Avoid walking in wooded areas and through bushes, tall grass or brush as much as possible.

The following is a list of preventive measures:

- Be familiar with your surroundings.
- If you see a snake, back away slowly and do not touch it.
- Leave snakes alone. Many people are bitten because they try to kill a snake or get a closer look at it.
- Stay out of tall grass unless you wear thick leather boots or chaps.
- Keep hands and feet out of areas you can't see.
- Be cautious and alert when working around brush and debris.

The American Red Cross recommends the following first aid treatment:

- Wash the bite with soap and water.
- Immobilize the bitten area and keep it lower than the heart.
- Get medical help.

5.4 HAZARD ANALYSIS AND MITIGATIONS BY TASK

This section assesses the risks of each major project task, as listed in Table 5.3. A Task Safety Assessment has been prepared and is designed to develop awareness of chemical and physical hazards specific to each task. Information in this section should be discussed in prior to the scheduled start of each new task to be performed and during daily tailgate safety meetings. It is the responsibility of each associate to assess their task and analyze potential risk reduction procedures before performing their job by conducting a JTR.

It would be impractical to repeat in complete detail each control measure for each job task. Sources and hazards will be addressed for job tasks with reference made to applicable control measures in the following tables and site-specific plans. Tables 5.4 to 5.17should be posted at the command post. When the Task Safety Assessment is discussed, additional hazards may need to be addressed. In addition to reviewing the Task Safety Assessments associates and the ENTACT HSO will prepare a JSA for each significant work process.

Table 5.3
OVERVIEW OF JOB TASKS

Table	Job Task	Hazard Rating	PPE Level
5.4	Mobilization and Site Preparation including Utility Locates	Low	D
5.5	Establish Security	Low	D
5.6	Establish Work Zones	Low	D
5.7	Site Clearing	Low to Med	D+
5.8	Installing soil erosion and odor control protection	Low to med	D
5.9	Installing temporary fabric structure with vapor management system	Med	D
5.10	Existing gas main clearance and Excavation	Med to High	C
5.11	Excavation and load out of impacted soils	Med to High	C
5.12	Relocation of fabric structure with crane	High	D
5.13	Demolition and removal of former MGP features	Med	C
5.14	Waste transportation and disposal coordination	Med	D
5.15	Backfill and site restoration	Low	D
5.16	Decontamination of equipment	Med	C
5.17	Demobilize and closeout	Low	D

Table 5.4 MOBILIZATION AND SITE PREPARATION		
PPE: Level D		Hazard Rating: Low
Hazard	Sources	Control Measures
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Slip/Trip/Falls	Various Sources	Housekeeping rules shall be established and followed. Pre-existing slip, trip, and fall hazards will be marked, barricaded, or eliminated. Areas will be discussed in safety orientation. Refer to the ENTACT Comprehensive Health and Safety Manual for Fall Protection and Housekeeping.
Electrocution	Electrical utilities	Only qualified electrician will be allowed to hook-up circuits. Extension cords will be inspected. GFCI will be used. Verification that electrical services have been disconnected from the exclusion zone or properly marked and identified.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G
Incidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Explosion/Gas/-Asphyxiation	Utilities	Utilities will be disconnected by utility company and tagged. All utilities will be marked and noted on a facility map. Underground utilities must be verified as de-energized/de-pressured prior to work beginning.
Hand Injuries	Pinch points and hand traps	Utilize proper glove for the task. Think before placing hands into hazard zone. Utilize chemical resistant gloves in wet locations.

Table 5.5 **ESTABLISHING SITE SECURITY**		
PPE: Level D	Hazard Rating:	Low
Hazard	Sources	Control Measures
Hazardous Atmosphere	Particulate not otherwise classified, Petroleum Hydrocarbons	Dust suppression.
Slips/Trips/Falls	Various Locations	Identifiable areas will be either eliminated or marked. Discuss in safety meetings. Refer to ENTACT's Comprehensive Health and Safety Manual for Fall Protection and Housekeeping.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Biological Hazards	Insects Snakes	See Section 5.3.
Noise	Machinery	Hearing protection with a NRR of 25 will be utilized.
Physical Labor	Moving heavy objects and routine tasks	Use moving equipment to transport pumps and hoses. A minimum of two people will be used to move supplies on uneven surfaces.
Heavy Equipment Injury	Machinery	Qualified operators, daily inspection of equipment. A fire extinguisher must be located on all heavy equipment. Utilize 3-point mount and dismount procedures at all times.

Table 5.6 **ESTABLISHING WORK ZONES**		
PPE: Level D	Hazard Rating:	Low
Hazard	Sources	Control Measures
Hazardous Atmosphere	Particulate not otherwise classified, PAH	Dust suppression. Monitoring with PID and PDR
Misuse Of Tools	Hand Tools	Tools will be maintained in safe working conditions. All tools will be secured.
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Back Strain	Lifting heavy objects	Use proper lifting technique when handling liner.
Noise	Machinery	Hearing protection with a NRR of 25 will be utilized.
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavation	Operators must know and work within limitations of equipment.

TABLE 5.7 SITE CLEARING, PREPARATION AND HAUL ROAD CONSTRUCTION		
PPE: Level D Mod		Hazard Rating: Low to Med
Hazard	Sources	Control Measures
Toxic Exposure	Particulate not otherwise classified	Minimize generation of dust and contact with contaminated material.
Misuse Of Tools	Hand Tools	Tools will be maintained in safe working conditions. All tools will be secured.
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Back Strain	Lifting heavy objects	Use proper lifting technique. Use buddy system or mechanical assistance.
Noise	Machinery	Hearing protection with a NRR of 25 will be utilized.
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Bull dozer tree flex	Large trees and the inappropriate use of equipment	Small Trees, 6 Inches or Less in Diameter, and Brush. In clearing small trees and brush, operate the bulldozer with the blade straight and digging slightly. It may be necessary to back up occasionally to clear the blade
Bull dozer tree flex		*Medium Trees, 6 to 12 Inches in Diameter.* To push over trees that range from 6 to 12 inches in diameter, set the blade of the bulldozer as high as possible to gain added leverage. As the tree falls, the bulldozer is backed up quickly to clear the roots. With the blade lowered, the dozer travels forward again and digs the roots free by lifting the blade. The felled tree is then ready for removal to the spoil areas
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.
Hand injuries	Pinch points	Correct gloves for task/proper hand

TABLE 5.7 SITE CLEARING, PREPARATION AND HAUL ROAD CONSTRUCTION		
PPE: Level D Mod	Hazard Rating:	Low to Med
Hazard	Sources	Control Measures
	/laceration small tools	placement/avoid pinch points

Table 5.8 INSTALLING SOIL EROSION, SEDIMENT, DUST AND ODOR CONTROLS		
PPE: Level D	Hazard Rating:	Low
Hazard	Sources	Control Measures
Hazardous Atmosphere	Particulate not otherwise classified	Dust suppression.
Misuse Of Tools	Hand Tools	Tools will be maintained in safe working conditions. All tools will be secured.
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Back Strain	Lifting heavy objects	Use proper lifting technique. Use buddy system or mechanical assistance.
Noise	Machinery Trencher	Hearing protection with a NRR of 25 will be utilized.
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Trencher	Rotating blade	Maintain safe distance and utilize correct procedures
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.

TABLE 5.9 INSTALLATION OF TEMPORARY FABRIC STRUCTURE WITH VAPOR MANAGEMENT SYSTEM		
PPE: Level D	Hazard Rating:	Low to Med
Hazard	Sources	Control Measures
Hazardous Atmosphere	Particulate not otherwise classified PAH, Lead, Hydrogen cyanide,H2S, Nitrogen dioxide	Dust suppression. Air monitoring
Heavy equipment	Working within the radius of equipment	Use forms of communication such as hand signals, radios, maintain eye contact
Contact with energized lines	Overhead lines	Where it is difficult for the crane operator to maintain clearance by visual means, a person shall be designated to observe the clearance between the energized power lines and the crane and its load [29 CFR 1926.550(a)(15)(iv)]. The use of cage-type boom guards, insulating links, or proximity warning devices shall not alter the need to follow required precautions [29 CFR 1926.550 (a)(15)(v)]. These devices are not a substitute for de-energizing and grounding lines or maintaining safe line clearances. Employers shall ensure that overhead power lines are de-energized or separated from the crane and its load by implementing one or more of the following procedures'-energize and visibly ground electrical distribution and transmission lines [29 CFR 1910.333(c)(3); 29 CFR 1926.550(a)(15)] Use independent insulated barriers to prevent physical contact with the power lines [29 CFR 1910.333(c)(3); 29 CFR 1926. 550(a)(15)] Maintain minimum clearance between energized power lines and the crane and its load [29 CFR 1910.333(c)(3)(iii); 29 CFR To protect against electrical shock injury in the event of contact between a crane and an energized line, the CSA recommends the

		following: o The crane operator should remain inside the cab. o All other personnel should keep away from the crane, ropes, and load, since the ground around the machine might be energized. o The crane operator should try to remove the crane from contact by moving it in the reverse direction from that which caused the contact. o If the crane cannot be moved away from contact, the operator should remain inside cab until the lines have been de-energized.
Crane tip over	Crane for structure relocation	• Always use the crane manufacturer's load chart provided for each crane. • Be sure you know or can calculate the weight of each load. • Never use visual signs of tipping as an indicator of lift capacity. • Before beginning a lift, o follow the manufacturer's procedures for proper outrigger deployment to ensure that cranes are properly set up and level, and o make sure outrigger pads are supported on firm, stable surfaces before beginning a lift. • When multiple lifts are made from one location, such as during duty cycle operations, check the condition of the ground and blocking materials regularly and as often as possible to ensure the crane remains on

		firm, stable ground. • Always check for overhead power lines and other obstructions. Comply with OSHA regulations for safe working distances around power lines: 29 CFR* 1910.333(c)(3)(iii) and 29 CFR 1926.550(a)(15)(i), (ii), and (iii). • Avoid hoisting or moving suspended loads over workers and others within the crane's swing radius. • Barricade the swing radius to keep unauthorized persons from entering areas of pinch points. • Follow a written engineered lift plan for all critical lifts
Crane hoisting	Crane utilized to relocate fabric structure	The design of all commercial cranes and hoists shall comply with the requirements of ASME/ANSI B30 standards and Crane Manufacturer's Association of America standards (CMAA-70 and CMAA-74). [COMPANY]-fabricated lifting equipment shall comply with the requirements in Chapter 2.2 (Lifting Equipment) of Mechanical Engineering *Design Safety Standards* (latest edition). • All crane and hoist hooks shall have safety latches. • Hooks shall not be painted (or re-painted) if the paint previously applied by the manufacturer is worn. • Crane pendants shall have an electrical disconnect switch or button to open the main-line control circuit. • Cranes and hoists shall have a main electrical disconnect switch. This switch shall be in a separate box that is labeled with lockout capability. Periodically verifying monthly test and inspection reports.

		• Interpreting crane and hoist safety rules and standards
Misuse Of Tools	Hand Tools	Tools will be maintained in safe working conditions. All tools will be secured.
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Back Strain	Lifting heavy objects	Use proper lifting technique. Use buddy system or mechanical assistance.
Noise	Machinery	Hearing protection with a NRR of 25 will be utilized.
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Trip hazards	Ventilation hose/ power cords/	Vapor management system/ plan steps develop JSA/ Provide barriers
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.

Table 5.10 EXISTING GAS LINE CLEARENCE AND EXCAVATION		
PPE: Level D or D Mod		Hazard Rating: Med. To High
Hazard	Sources	Control Measures
Hazardous Atmosphere	Particulate not otherwise classified PAH/BTEX	Dust suppression. Evaluate Benzene, Hydrogen Cyanide, hydrogen sulfide with air monitoring equipment/ Level C protection
Hazardous Atmosphere	Gas Line /LEL	Have utility shut down/ Bleed off residual/ protect line during excavation/ utilize gas meter to identify LEL of 10%/ No spark producing tools
Heavy equipment operations	Heavy equipment utilized to construct slack drying area	Use forms of communication such as hand signals, radios, maintain eye contact Operators shall:be familiar with the operator's manual and operate the machine within its capabilities and limits; Be familiar with the work site - above ground (eg. Weather conditions and obstructions), at ground level (eg. Presence of obstacles) and below ground (eg. Underground utilities); Conduct a walk around inspection of the machine to check for: (1) coolant, fuel and hydraulic line leaks, (2) debris left in the engine compartment, (3) the condition of attachments (cutting edges and teeth), (4) damaged components both inside and outside of the operator's cab, (5) clear visibility (windows, mirrors and running lights), and (6) Personnel in the machine's immediate area. use seatbelts; obey hand signals and ground guide; check for warning tags (servicing and non-serviceable) on the steering wheel or starter switch indicating that the machine should not be used or even moved; test all controls for proper operation prior to moving the machine;

Table 5.10 EXISTING GAS LINE CLEARENCE AND EXCAVATION		
PPE: Level D or D Mod		Hazard Rating: Med. To High
Hazard	Sources	Control Measures
		ensure that unattended equipment is shut off and all attachments lowered to the ground; park equipment (utilizing the parking brake) on level ground when possible, otherwise at right angles to any slope with wheels blocked; never allow riders on the outside of the machine or personnel to stand in the pivot area of an articulated machine while the engine is running; shut off the machine during refueling; never move a load over personnel or vehicles; carry the attachments low for good stability and visibility while traveling; allow clearance for overhead dangers, such as overhanging trees and banks and overhead wire, especially high voltage lines; keep the equipment back from the edges of banks and excavations, or if it cannot be avoided, face the machine towards the bank's edge while operating; on haul roads, give loaded vehicles the right-of-way; and t. when loading and unloading a machine for transport: (1) load and unload only on level ground; (2) block the transport vehicle's wheels; (3) use ramps with sufficient strength, height and angle; (4) ensure the trailer bed is free of all slippery substances, such as clay, oil, or snow; (5) know the manufacturer's recommended procedure for loading and unloading the machine; (6) only load and unload a machine with the assistance of a ground guide. (7) ensure the machine is properly secured before moving the trailer. **Danger:** If your machine comes in contact with a charged line, stay in the cab. Do not allow anyone close to the machine until the power has been cut off or until contact with the line has

Table 5.10 EXISTING GAS LINE CLEARENCE AND EXCAVATION		
PPE: Level D or D Mod		Hazard Rating: Med. To High
Hazard	Sources	Control Measures
		been broken.
Encountering unplanned utilities	Unknown utilities	Public, private locate, radar penetration, vacuum excavation
Excavation cave in	Excavation for soil removal	Proper sloping/shoring/ shielding/ complete excavation inspections daily after weather events and as needed. Complete permit. Keep spoils 3 feet away from edge of excavation. No surcharge load more than 20,000 lbs
Misuse Of Tools	Hand Tools	Tools will be maintained in safe working conditions. All tools will be secured.
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Back Strain	Lifting heavy objects such as pumps, sections of hose	Use proper lifting technique. Use buddy system or mechanical assistance.
Noise	Machinery Trencher	Hearing protection with a NRR of 25 will be utilized.
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.

Table 5.11 EXCAVATION OF IMPACTED SOILS		
PPE: Level C Hazard Rating: Med. to High		
Hazard	Sources	Control Measures
Hazardous Atmosphere for employees	Particulate not otherwise classified PAH, H2S Hydrogen cyanide, benzene toluene, ethylbenzene, xylene, LEL,CO, Nitrogen dioxide Calciment as drying agent	Dust suppression. Air monitoring Properly selected PPE Properly selected Respiratory protection Set up of decontamination area, utilize correct decontamination methods for conditions/ Proper air exchange rate for vapor control system. Prevent possibility of sparks in LEL conditions Utilize Level C with full face respirator OV-P100 filters. Nitrile glove 13mm, Tyvek boot covers. Contact Lens will not be allowed to be worn.
Hazardous Atmosphere for community	Particulate not otherwise classified PAH, H2S Hydrogen cyanide, benzene toluene, ethylbenzene, xylene, LEL,CO, Nitrogen dioxide	Excavation to be completed inside temporary fabric structure. Perimeter air monitoring conducted any accidence will be addressed follow procedures for stop work when required
Heavy equipment operations	Heavy equipment utilized to construct slack drying area	Use forms of communication such as hand signals, radios, maintain eye contact Operators shall:be familiar with the operator's manual and operate the machine within its capabilities and limits; Be familiar with the work site - above ground (eg. Weather conditions and obstructions), at ground level (eg. Presence of obstacles) and below ground (eg. Underground utilities);

Table 5.11 EXCAVATION OF IMPACTED SOILS		
PPE: Level C Hazard Rating: Med. to High		
Hazard	Sources	Control Measures
		Conduct a walk around inspection of the machine to check for: (1) coolant, fuel and hydraulic line leaks, (2) debris left in the engine compartment, (3) the condition of attachments (cutting edges and teeth), (4) damaged components both inside and outside of the operator's cab, (5) clear visibility (windows, mirrors and running lights), and (6) Personnel in the machine's immediate area. use seatbelts; obey hand signals and ground guide; check for warning tags (servicing and non-serviceable) on the steering wheel or starter switch indicating that the machine should not be used or even moved; test all controls for proper operation prior to moving the machine; ensure that unattended equipment is shut off and all attachments lowered to the ground; park equipment (utilizing the parking brake) on level ground when possible, otherwise at right angles to any slope with wheels blocked; never allow riders on the outside of the machine or personnel to stand in the pivot area of an articulated machine while the engine is running; shut off the machine during refueling; never move a load over personnel or vehicles; carry the attachments low for good stability and visibility while traveling; allow clearance for overhead dangers, such as overhanging trees and banks and overhead wire, especially high voltage lines; keep the equipment back from the edges of banks and excavations, or if it cannot be avoided, face the machine towards the bank's edge while operating; on haul roads, give loaded vehicles the right-of-

Table 5.11 EXCAVATION OF IMPACTED SOILS		
PPE: Level C Hazard Rating: Med. to High		
Hazard	Sources	Control Measures
		way; and t. when loading and unloading a machine for transport: (1) load and unload only on level ground; (2) block the transport vehicle's wheels; (3) use ramps with sufficient strength, height and angle; (4) ensure the trailer bed is free of all slippery substances, such as clay, oil, or snow; (5) know the manufacturer's recommended procedure for loading and unloading the machine; (6) only load and unload a machine with the assistance of a ground guide. (7) ensure the machine is properly secured before moving the trailer. **Danger:** If your machine comes in contact with a charged line, stay in the cab. Do not allow anyone close to the machine until the power has been cut off or until contact with the line has been broken.
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Falls	excavations	Fall protection when working near excavations
Falls from equipment	Excavators dozers	Utilize 3 point stance, clean steps and platforms of mud and grease
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.
Noise	Machinery	Hearing protection with a NRR of 25 will be

Table 5.11 EXCAVATION OF IMPACTED SOILS		
PPE: Level C Hazard Rating: Med. to High		
Hazard	Sources	Control Measures
	Trencher	utilized.
Odor of VOC's	VOC's encountered during excavation	Application of Rusmar foam and tarps

Table 5.12 RELOCATION OF TEMPORARY FABRIC STRUCTURE		
PPE: Level D Hazard Rating: High		
Hazard	Sources	Control Measures
Contact with energized lines	Overhead lines	Where it is difficult for the crane operator to maintain clearance by visual means, a person shall be designated to observe the clearance between the energized power lines and the crane and its load [29 CFR 1926.550(a)(15)(iv)]. The use of cage-type boom guards, insulating links, or proximity warning devices shall not alter the need to follow required precautions [29 CFR 1926.550 (a)(15)(v)]. These devices are not a substitute for de-energizing and grounding lines or maintaining safe line clearances. Employers shall ensure that overhead power lines are de-energized or separated from the crane and its load by implementing one or more of the following procedures'-energize and visibly ground electrical distribution and transmission lines [29 CFR 1910.333(c)(3); 29 CFR 1926.550(a)(15)] Use independent insulated barriers to prevent physical contact with the power lines [29 CFR 1910.333(c)(3); 29 CFR 1926. 550(a)(15)] Maintain minimum clearance between energized power lines and the crane and its load [29 CFR 1910.333(c)(3)(iii); 29 CFR To protect against electrical shock injury in the event of contact between a crane and an energized line, the CSA recommends the following: o The crane operator should remain inside the cab. o All other personnel should keep away from the crane, ropes, and load, since the ground around the machine might be energized. o The crane operator should try to remove the crane from contact by moving it in

Table 5.12 RELOCATION OF TEMPORARY FABRIC STRUCTURE		
PPE: Level D Hazard Rating: High		
Hazard	Sources	Control Measures
		the reverse direction from that which caused the contact. o If the crane cannot be moved away from contact, the operator should remain inside cab until the lines have been de-energized.
Crane tip over	Crane for structure relocation	• Always use the crane manufacturer's load chart provided for each crane. • Be sure you know or can calculate the weight of each load. • Never use visual signs of tipping as an indicator of lift capacity. • Before beginning a lift, • Chock wheels o follow the manufacturer's procedures for proper outrigger deployment to ensure that cranes are properly set up and level, and o make sure outrigger pads are supported on firm, stable surfaces before beginning a lift. • When multiple lifts are made from one location, such as during duty cycle operations, check the condition of the ground and blocking materials regularly and as often as possible to ensure the crane remains on firm, stable ground. • Always check for overhead power lines and other obstructions. Comply with OSHA regulations for safe working

Table 5.12 RELOCATION OF TEMPORARY FABRIC STRUCTURE		
PPE: Level D Hazard Rating: High		
Hazard	Sources	Control Measures
		distances around power lines: 29 CFR* 1910.333(c)(3)(iii) and 29 CFR 1926.550(a)(15)(i), (ii), and (iii). • Avoid hoisting or moving suspended loads over workers and others within the crane's swing radius. • Barricade the swing radius to keep unauthorized persons from entering areas of pinch points. • Follow a written engineered lift plan for all critical lifts
Crane hoisting	Crane utilized to relocate fabric structure	The design of all commercial cranes and hoists shall comply with the requirements of ASME/ANSI B30 standards and Crane Manufacturer's Association of America standards (CMAA-70 and CMAA-74). [COMPANY]-fabricated lifting equipment shall comply with the requirements in Chapter 2.2 (Lifting Equipment) of Mechanical Engineering *Design Safety Standards* (latest edition). • All crane and hoist hooks shall have safety latches. • Hooks shall not be painted (or re-painted) if the paint previously applied by the manufacturer is worn. • Crane pendants shall have an electrical disconnect switch or button to open the main-line control circuit. • Cranes and hoists shall have a main electrical disconnect switch. This switch shall be in a separate box that is labeled with lockout capability. Periodically verifying monthly test and inspection reports.

Table 5.12 RELOCATION OF TEMPORARY FABRIC STRUCTURE		
PPE: Level D Hazard Rating: High		
Hazard	Sources	Control Measures
		• Interpreting crane and hoist safety rules and standards
Heavy equipment	Working within the radius of excavator	Use forms of communication such as hand signals, maintain eye contact
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Falls	Man lift operation	Utilize fall protection when working in man lift/ inspect manlift and safety harness assembly prior to each use. Attachment point must be rated for 5000 lbs. Develop post fall protection plan.
Falls from equipment	Excavators dozers	Utilize 3 point stance, clean steps and platforms of mud and grease
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.
Noise	Machinery Trencher	Hearing protection with a NRR of 25 will be utilized.
Hand Injuries	Pinch points/lacerations crushing	Correct gloves correct hand position

TABLE 5.13 SELECTIVE DEMOLITION OF SURFACE-SUBSURFACE FORMER MGP FEATURES		
PPE: Level C Hazard Rating: Med.		
Hazard	Sources	Control Measures
Hazardous Atmosphere	Particulate not otherwise classified PAH, Hydrogen cyanide,,Silica dust produced from concrete demolition	Dust suppression. Air monitoring Correct PPE/ with OV-P100 filters
Heavy equipment	Working within the radius of excavator	Use forms of communication such as hand signals, radios, maintain eye contact
Flying demolition debris	Concrete/rebar	Inspect area prior to demolition activities/Utilize windshield cage.
Noise	Machinery Hammer	Hearing protection with a NRR of 25 will be utilized.
Contact with utilities	Overhead power lines underground	Utilize spotter for correct positioning of equipment complete utility locate and document
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Falls from equipment	Excavators dozers/Hammers	Utilize 3 point stance, clean steps and platforms of mud and grease
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.

Table 5.14 WASTE TRANSPORTATION AND DISPOSAL COORDINATION		
PPE: Level D Hazard Rating: Med.		
Hazard	Sources	Control Measures
Hazardous Atmosphere	Particulate not otherwise classified PAH, Hydrogen cyanide,	Dust suppression. Air monitoring. Drivers will remain in cabs All beds will be tarped
Heavy equipment operations	Heavy equipment utilized to construct slack drying area	Use forms of communication such as hand signals, radios, maintain eye contact Operators shall:be familiar with the operator's manual and operate the machine within its capabilities and limits; Be familiar with the work site - above ground (eg. Weather conditions and obstructions), at ground level (eg. Presence of obstacles) and below ground (eg. Underground utilities); Conduct a walk around inspection of the machine to check for: (1) coolant, fuel and hydraulic line leaks, (2) debris left in the engine compartment, (3) the condition of attachments (cutting edges and teeth), (4) damaged components both inside and outside of the operator's cab, (5) clear visibility (windows, mirrors and running lights), and (6) Personnel in the machine's immediate area. use seatbelts; obey hand signals and ground guide; check for warning tags (servicing and non-serviceable) on the steering wheel or starter switch indicating that the machine should not be used or even moved; test all controls for proper operation prior to moving the machine; ensure that unattended equipment is shut off and

		all attachments lowered to the ground; park equipment (utilizing the parking brake) on level ground when possible, otherwise at right angles to any slope with wheels blocked; never allow riders on the outside of the machine or personnel to stand in the pivot area of an articulated machine while the engine is running; shut off the machine during refueling; never move a load over personnel or vehicles; carry the attachments low for good stability and visibility while traveling; allow clearance for overhead dangers, such as overhanging trees and banks and overhead wire, especially high voltage lines; keep the equipment back from the edges of banks and excavations, or if it cannot be avoided, face the machine towards the bank's edge while operating; on haul roads, give loaded vehicles the right-of-way; and t. when loading and unloading a machine for transport: (1) load and unload only on level ground; (2) block the transport vehicle's wheels; (3) use ramps with sufficient strength, height and angle; (4) ensure the trailer bed is free of all slippery substances, such as clay, oil, or snow; (5) know the manufacturer's recommended procedure for loading and unloading the machine; (6) only load and unload a machine with the assistance of a ground guide. (7) ensure the machine is properly secured before moving the trailer. **Danger:** If your machine comes in contact with a charged line, stay in the cab. Do not allow anyone close to the machine until the power has been cut off or until contact with the line has been broken.
Truck tip over	Uneven terrain, soft spots,	Utilize spotter for correct positioning of trucks Inspect areas for loading, grade location when necessary. Operator must lower bed prior to

		pulling forward. Distribute load evenly. Keeping the dump area graded level from side-to-side, and free of soft spots, will help prevent trucks from tipping over as the bed is raised. This is particularly a concern in cases where material sticks in the truck bed.
Vehicle accidents	Transporting of impacted material	Design correct haul route on National Grid property, Instruct drivers of hazards of community, school zones, dangerous intersections, select safest route to disposal facility
Contact with utilities	Overhead power lines	Utilize spotter for correct positioning of trucks
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Falls	Excavations	Fall protection when working near excavations
Falls from equipment	Excavators dozers	Utilize 3 point stance, clean steps and platforms of mud and grease
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.

Table 5.15 BACKFILL AND RESTORATION		
PPE: Level D		Hazard Rating: Low
Hazard	Sources	Control Measures
Hazardous Atmosphere	Particulate not otherwise classified	Dust suppression. Air monitoring
Heavy equipment	Dozers, loaders, rollers	Use forms of communication such as hand signals, radios, maintain eye contact
Flying debris	Mud, debris	Inspect area prior to decontamination activities Utilize face shield
Trucks turn over	Raising beds uneven loads Uneven terrain	Utilize spotter at a safe distance in case of tip over. Lower bed while stopped
Contact with utilities	Overhead power lines underground	Utilize spotter for correct positioning of equipment complete utility locate and document
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Truck tip over	Uneven terrain, soft spots	Utilize spotter inspect areas for dumping material prior to activity.
Roller turnover	Roller for compaction	Correct position of equipment
Falls from equipment	Excavators dozers rollers	Utilize 3 point stance, clean steps and platforms of mud and grease
Manual Labor	Materials Equipment Moving pressure washing equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Noise	Machinery	Hearing protection with a NRR of 25 will be utilized.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.
Hand injuries	Pinch points/lacerations	Correct gloves, hand position

Table 5.16 DECONTAMINATION OF EQUIPMENT AND WASTE MANAGEMENT		
PPE: Level C Hazard Rating: Med		
Hazard	Sources	Control Measures
Hazardous Atmosphere	Particulate not otherwise classified PAH, Hydrogen cyanide, BTEX	Dust suppression.
Heavy equipment	Working within the radius of excavator	Use forms of communication such as hand signals, radios, maintain eye contact
Flying debris	Mud, debris	Inspect area prior to decontamination activities Utilize face shield
High pressure spray	Pressure washer	Proper PPE including metatarsal protection and full face shield
Contact with utilities	Overhead power lines underground	Utilize spotter for correct positioning of equipment complete utility locate and document
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Falls from equipment	Excavators dozers/Hammers	Utilize 3 point stance, clean steps and platforms of mud and grease
Manual Labor	Materials Equipment Moving pressure washing equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.
Noise	Machinery	Hearing protection with a NRR of 25 will be utilized.
Hand injuries	Pinch points /lacerations	Correct gloves hand position

Table 5.17 DEMOBILIZE AND CLOSEOUT		
PPE: Level D	Hazard Rating: Low	
Hazard	Sources	Control Measures
Hazardous Atmosphere		Dust suppression.
Heavy equipment	Dozers,	Use forms of communication such as hand signals, radios, maintain eye contact
Heavy equipment	Loading equipment onto trailers	Spot vendors for correct placement of trailers when loading equipment
Contact with utilities	Overhead power lines underground	Utilize spotter for correct positioning of equipment complete utility locate and document
Biological Hazards	Insects, Snakes, Ticks, Plants	See Section 5.3.
Truck tip over	Uneven terrain, soft spots	Utilize spotter inspect areas for dumping material prior to activity.
Falls from equipment	Excavators dozers rollers	Utilize 3 point stance, clean steps and platforms of mud and grease
Manual Labor	Materials Equipment	Stretching and proper lifting techniques and possible use of mechanical equipment or hand trucks. Working in minimum groups of two.
Hot/Cold Temperatures	Weather Conditions	See Section 5.2.5 and Attachment G.
Accidental Injury	Mis-communications; General work activities	Site orientation and training. Positive attitude and behavior will show active participation of self-safety analysis by all associates of tasks to be performed.
Uneven terrain	Slope/grade of excavated hillside	Operators must know and work within limitations of equipment.

6.0 EMERGENCY RESPONSE PLAN

The location of the emergency/evacuation meeting point will be determined at the time of mobilization Air horns, eye wash stations and fire extinguishers will be available at pre determined locations. Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and information on the chemical(s) they may have been exposed to. Any vehicle used to transport contaminated personnel will be cleaned or decontaminated as necessary.

The FPM and HSO are responsible for discussing site-specific emergency response requirements with on-site safety representatives and then informing ENTACT associates of unique procedures. The procedures listed below will be followed in addition to facility-specific requirements.

6.1 HOSPITAL AND CLINIC

ENTACT will use Island Occupational as needed for hazmat physicals, heavy metals blood testing, drug screens, treatment of minor injuries, and so on that may become necessary on the site. A map to the clinic is located at the front of this health and safety plan.

The Hempstead General Hospital will be used for all medical emergencies. A map to the hospital is located at the front of this HASP. Copies of this map should be posted in the decon area, command post, and break area. The use of an ambulance service to the hospital is available for an emergency by dialing 911. The hospital shall be notified of ENTACT's activities and to supply insurance information at the start of job site activities to expedite admission into the trauma center in the event of an emergency situation.

The route to these medical facilities will be driven and verified by the FPM or HSO prior to work beginning. Modifications will be made as needed to the directions to these facilities prior to work beginning.

6.2 COMMUNICATION

A mobile phone stays with the FPM and HSO at all times. In addition, the FPM may be reached by two-way radios that are assigned to field personnel. A private telephone will be available at the command post. Emergency signals will be conveyed through an air horn. Three (3) short blasts signal an emergency.

6.3 FIRST AID KITS

First aid kits are located on site and in work vehicles. Posters will indicate the locations of each first aid kit not in a vehicle. An eye wash station will be located near the decontamination area but no more than 100 feet from the exclusion zone. Basic first aid procedures are provided in Attachment G. First aid kits will be inventoried on a monthly basis and materials found to be missing will be replaced. The First Aid Kit Monthly Inventory form should be used to track needed materials

6.4 INCIDENT REPORTING

All incidents, injuries, and near misses must be reported immediately to the associate's supervisor. Subcontractors will promptly report any incident to the ENTACT Field Project Manager. Work will stop until the situation is addressed and work can safety resume. Incident information will be forwarded to the Project Health and Safety Coordinator and Corporate Health and Safety Director within 24-hours. The client or owner representative will be notified according to their requirements.

A thorough investigation will commence to determine the facts of the incident, root causes, solutions, and verification and validation of solutions. A completed Loss Investigation / Near Loss Investigation report and supplemental information (first report of injury, witness statements, supervisor statement, police report, damaged equipment report, monitoring reports, etc.) must be provided to Corporate Health and Safety within 5 working days of all incidents. If applicable, a Why Tree Incident Investigation will commence following established protocol and final report submitted to the Health and Safety Director within two weeks of the incident. ENTACT's Post Accident Drug and Alcohol testing procedures will be followed.

6.5 FIRE PREVENTION

During site mobilization, the fire department will be notified and briefed about the potential hazards at the site. The ENTACT HSO will be responsible for this notification. In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the ENTACT FPM will advise the fire commander of the location, nature, and identification of the hazardous materials on site and that ENTACT has a Spill Control program (see Attachment K).

ENTACT shall provide fire protection in the form of portable fire extinguishers. This protection shall meet or exceed the requirements of NFPA-10-1984. Fire extinguishers must be tested annually and inspected monthly. The Fire Extinguisher Monthly Inspection form should be used to document inspections.

In the event of a fire that cannot be controlled with available equipment, the local fire department will be summoned immediately by the FPM or his designee. The FPM shall inform the fire department of the situation and any site hazards upon their arrival. If firefighters have to enter the Exclusion Zone, decontamination will be required upon leaving.

In the event of fire or explosion, or if vapor concentrations of explosive vapors or gasses approach or exceed 10 percent of the LEL as indicated by an explosion meter, personnel will evacuate the area immediately.

6.6 EVACUATION

Evacuation routes will be established by work zones and all outside work areas will be provided with designated exit points. Evacuation should be conducted immediately, without regard to equipment under conditions of extreme emergency. Emergency evacuation routes are being discussed and will be presented during site orientation.

- Evacuation notification will be three (3) blasts on an air horn, or by verbal communication on radios.
- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation is not via the decontamination corridor, site personnel should remove contaminated clothing once they are in a location of safety and leave it near the exclusion zone.
- The ENTACT FPM will conduct a head count to ensure all personnel have been evacuated safely.
- In the event of an emergency site evacuation, all personnel should escape from emergency situation, decontaminate to the maximum extent practical, and meet at the pre-determined off-site location.

6.7 EVACUATION RESPONSIBILITIES

The ENTACT FPM has primary responsibility for responding to and correcting emergency situations. ENTACT's representative will:

- Ensure that an evacuation drill is performed at the start of the project and every 6 months thereafter
- Take appropriate measures to protect personnel including:
  - Withdrawal from the exclusion zone
  - Total evacuation and securing of the site

  - Upgrading or downgrading the level of protective clothing and respiratory protection
- Take appropriate measures to protect the public and the environment including:
  - Isolating and securing the site
  - Preventing run-off to surface waters
  - Ending or controlling the emergency to the extent possible
- Ensure that appropriate federal, state, and local agencies are informed, and emergency response plans are coordinated. In the event of a fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted.
- Ensure that appropriate decon treatment or testing for exposed or injured personnel is obtained.
- Determine the cause of the incident and make recommendations to prevent the recurrence.
- Ensure that all reports have been prepared.

The FPM must immediately report emergency situations and take appropriate measures to protect site personnel.

6.8 EMERGENCY DECONTAMINATION

Any person who becomes ill or injured as a result of chemical exposure must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed if possible and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed. First aid should be administered while awaiting an ambulance. General hygiene activities will be followed if associates are wearing Level D PPE. All injuries and illnesses should be reported to the ENTACT FPM and designated HSO.

6.9 OFF-SITE EMERGENCIES

Site management will comply with local municipal or State Emergency Management procedures in the event of disasters including fire, flood, earthquake, telecommunications failure, wildfire, winter or other natural or technological incidents.

6.10 EMERGENCY DRILLS

Emergency drills will be performed periodically to ensure associates understand what is expected during an emergency, ensure that the nearest exits are known, places of refuge or storm shelters are known, all exit routes and storm shelter areas are accessible, and to ensure associates understand their emergency assignments. The FPM and HSO will coordinate and plan site emergency drills. All site associate will participate. Drills will be documented.

6.11 SPILL RESPONSE

Spill response requirements apply to generated waste from soil and groundwater remediation and facility decommissioning activities which include:

- Hazardous wastes
- Oil to water discharges
- Releases

See Attachment K, Spill Control. See the site specific SPCC Plan under separate cover.

6.11.1 Reporting Releases

ENTACT requires the reporting of any spill or release of liquid to the FPM. The PHSC and HSD will be notified and an Incident Investigation will commence. The client representative will be notified and provided a copy of the investigation. See Emergency Contacts at the front of this document.

In the event of a spill potentially affecting wetlands, waterway, or the immediate site ENTACT will implement the Oil Spill Contingency Plan, which includes a discussion of potential spill scenarios, agency notification, spill response methods, and clean-up measures.

For purposes of this HASP, a reportable spill is defined as a volume spilled that is greater than one gallon. The use of conventional construction equipment during remediation activities (backhoes, loaders, generators, air compressors, welding machines, etc.) presents the potential for specific spill scenarios. These include the leakage of fuel, motor oil, or hydraulic fluid during operation, refueling, and equipment maintenance. To prevent equipment leakage during operation, the following measures will be implemented during construction activities:

- Spill control and clean-up materials are staged on-site and will be available for use in the event of a spill.

- Small spill control kits will be included on each piece of equipment for the incipient phase of the spill.
- All leaks or spills, regardless of size, will be cleaned up immediately.
- ENTACT will require that all equipment used at the site be in good working condition and be inspected daily for leaks. Any equipment observed to be leaking when arriving on-site will be denied entry. Any equipment observed to be leaking while onsite will immediately be relocated to a designated equipment staging and refueling area for repair.
- All absorbent material used to clean up leaks and spills shall be disposed of in accordance with applicable hazardous materials regulations.

All spills of 1 gallon or larger shall be reported to the ENTACT project manager. Spills of 5 gallons or more or impacting or potentially impacting surface water bodies (including sheen or discoloration to water body or shoreline, or is not cleaned up within the 2 hour of discovery will be reported to State Office of Emergency Services and other appropriate agencies

ENTACT will utilize only HAZWOPER trained personnel on the project to handle minor spills during project construction activities. ENTACT is responsible for reporting, containment, and clean-up of any small spills using onsite equipment and procedures.

7.0 LEVELS OF PERSONAL PROTECTION FOR SITE ACTIVITIES

The materials of concern present at this site have been identified by previous site sampling. Currently, particulate not otherwise classified, DNAPL, BTEX, PAH, Hydrogen Cyanide, Hydrogen sulfide are the materials of concern. Based on the information available, most tasks will be conducted in Level D and C. Certain tasks (dewatering, direct contact with soils, etc.) will be conducted in Level D+. This level of protection is used when additional dermal protection is required but respiratory protection is not necessary. In addition, some tasks involving potential hydrocarbon exposure will be conducted in level C during the sampling and evaluation of exposure potential.

Tables 7.1 to 7.3 list the components of Level D, D+, and C PPE required for site activities to be conducted by ENTACT personnel and subcontractors. Subcontractors are required to submit a Job Safety Analysis with task specific PPE required for their activities that are not identified in Tables 7.1 to 7.3.

The ENTACT HASP will be the controlling HASP for this project. The ENTACT HSO has authority over all site workers, subcontractors, visitors and other personnel entering the site. Additional information regarding PPE is provided in Attachment L and ENTACT's Respiratory Protection Program which is available under separate cover.

Table 7.1 Level D PPE	
Protective Gear	**Type**
Respiratory protection	None
Chemical protective clothing [1]	None
Hand protection: inner gloves	None
Hand protection: outer gloves	Cotton or leather work gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	None
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Splash protection[2]	Standard face shield
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest. Personal floatation device (PFD) required for all work within 5 feet of creek or ponds.
Hearing protection	Ear plugs or muffs with NRR of at least 25
[1] Associates may wear Tyvek or similar coveralls as protection from ticks and insects. [2] Splash protection is required when there is a potential for contact with groundwater, process water or power washing.	

Table 7.2 Level D+ PPE	
Protective Gear	**Type**
Respiratory protection	None
Chemical protective clothing	Disposable coated Tyvek, Saranex, or equivalent
Hand protection: inner gloves	Nitrile, surgical fit
Hand protection: outer gloves	Cotton or leather work gloves
Foot protection: inner boots	Steel-toe, leather work boots
Foot protection: outer boots	Rubber boot covers
Head protection	Standard hard hat
Eye protection	Standard safety glasses with side shield or goggles
Splash protection[1]	Standard face shield
Other protective clothing	High visibility, reflective vest, such as an orange traffic type vest. Personal floatation device (PFD) required for ant work within 5 feet of creek or ponds.
Hearing protection	Ear plugs or muffs with NRR of 29
[1] Splash protection including face shield and metatarsal guards will be worn during high-pressure cleaning.	

Table 7.3 Level C PPE	
Protective Gear	**Specific Type**
Respiratory protection	Full-Face Air Purifying Respirator (APR) with combination cartridges for organic vapors (OV) and particulates (P-100)
Chemical protective clothing	Disposable coated Tyvek, Saranex, or equivalent/. Ordinary Tyvek provides protection from particles and splash protection from many chemicals but it is not impervious to chemicals. Tyvek however, provides only limited and should be used with caution. If air monitoring indicates acceptable level HSO may utilize Ordinary tyvek
Hand protection: Inner gloves	Nitrile, surgical fit
Hand protection: Outer gloves	Cotton/Latex dipped
Foot protection: Inner boots	Steel-toe leather work boots
Foot protection: Outer boot	Rubber boot covers
Head protection	Standard hard hat
Eye protections	Standard safety glasses with side shields or goggles
Splash protection[1]	Standard face shield
Other protective clothing	High visibility, reflective safety vest, such as orange traffic type vests
Hearing Protection	Ear plugs or muffs with NRR of 29
[1] Splash protection including face shield and metatarsal guards will be worn during high-pressure cleaning.	

PPE will be upgraded:

- If new hazards are found with unknown toxic or physical hazards.
- If hazards exhibit higher toxic or physical hazards that require upgrading of PPE. Air monitoring will be closely monitored.

- If associate requests an upgrade.

If work site conditions dictate the need to upgrade PPE, the FPM or HSO will issue a stop work order and will contact the Project Health and Safety Coordinator to revise or amend this HASP.

7.1 PERSONAL USE FACTORS AND EQUIPMENT LIMITATIONS

Certain personal features of workers may jeopardize safety during equipment use. Protective or
precautionary measures will be taken as necessary for the following personal features:

- Facial hair and long hair that passes between the face and the sealing surface of the respirator is prohibited because it interferes with respirator fit and wearer vision, whereby excessive contaminant penetration may occur. Long hair must be effectively contained within protective hair coverings.
- Eyeglasses with conventional temple pieces will interfere with the respirator-to-face seal of a full face-piece. A spectacle kit should be installed in the facemasks of workers requiring vision correction, providing a tight seal. Prescription eyeglasses worn on-site must meet ANSI Standard Z87.1. Contact lenses may trap contaminants and/or particulate between the lens and the eye, causing irritation. Wearing contact lenses with a respirator in a contaminated atmosphere is prohibited.
- Gum and chewing tobacco are prohibited during respirator use because they may cause the ingestion of contaminants and may compromise the respirator fit.

During equipment use, workers will be encouraged to report any perceived problems or difficulties to their supervisor(s). These malfunctions include, but are not limited to the following:

- Degradation of the protective ensemble;
- Perception of odors;
- Skin irritation;
- Unusual residues on PPE;
- Discomfort;
- Resistance to breathing;
- Fatigue due to respirator use;
- Interference with vision or communication;
- Restriction of movement; and
- Personal responses such as rapid pulse, nausea and chest pain.

If a supplied air respirator is being used, all hazards that might endanger the integrity of the airline should be removed from the working area prior to use. During use, other workers and vehicles should be excluded from the area.

7.2 WORK DURATION

In selecting PPE, the anticipated duration of the Work will be considered. Several factors may limit the Work length, including air supply, equipment effectiveness and temperature. The HSO will make all decisions regarding selection of PPE and Work duration.

7.2.1 Suit/Ensemble Permeation, Degradation, And Penetration

The possibility of chemical permeation, degradation, or penetration of protective ensembles during the Work may limit Work duration. No single clothing material is an effective barrier to all chemicals or all combinations of chemicals, and no material is an effective barrier to prolonged chemical exposure.

7.2.2 Ambient Temperature

The ambient temperature may have a major influence on Work duration as it affects both the worker and the protective integrity of the ensemble. Heat stress, which can occur even in relatively moderate temperatures, presents the greatest immediate danger to an ensemble encapsulated worker. Hot and cold ambient temperatures also can affect:

- Valve operation on suits and/or respirators;
- The durability and flexibility of suit material;
- The integrity of suit fasteners;
- The breakthrough time and penetration rates of chemicals; and
- The concentration of airborne contaminants.

All of these factors may decrease the duration of protection provided by a given piece of clothing or respiratory equipment.

7.3 PPE STORAGE AND MAINTENANCE

Clothing and respirators will be stored properly to prevent damage or malfunction due to exposure to dust, moisture, sunlight, damaging chemicals, extreme temperatures, and impact. Many equipment failures can be directly attributed to improper storage.

Different types and materials of clothing and gloves will be stored separately to prevent issuing the wrong material by mistake. Protective clothing will be folded or hung in accordance with manufacturer's recommendations. Contaminated clothing for reuse will remain in the contamination reduction zone (CRZ).

Self-contained breathing apparatus (SCBA), supplied air respirators, and air-purifying respirators, if required, will be dismantled, washed and disinfected after each use. SCBAs will be stored in storage chests supplied by the manufacturer. Air-purifying respirators should be stored individually in their original cartons or carrying cases, or in heat-sealed or re-sealable plastic bags.

The technical aspects of PPE maintenance procedures vary by manufacturer and type of equipment. Manufacturers frequently restrict the sale of certain PPE parts only to individuals or groups who are specially trained, equipped and authorized by the manufacturer to purchase them.

7.4 PPE TRAINING AND PROPER FITTING

This section provides details regarding personal protective equipment training and procedures for proper fitting for respirators.

7.4.1 Personal Protective Equipment Training

Employees must be trained in the proper use of protective equipment prior to using any equipment at the Site. The purpose of the training will be to: (1) become familiar with the equipment in a non-hazardous situation; (2) instill confidence and awareness in the user of the limitations and capabilities of the equipment; (3) increase the operating and protective efficiency of PPE use; and (4) reduce maintenance expenses.

7.4.2 Respirator Fit Testing

The “fit” of the face piece-to-face seal of a respirator will be tested on each potential wearer to verify a tight seal. Every face piece does not necessarily fit every wearer. Certain features, such as scars, very prominent cheekbones, deep skin creases, dentures or missing teeth and the chewing of gum and tobacco may interfere with the respirator-to-face seal. Under conditions where these features may impede a good seal, a respirator must not be worn. Personnel who may wear a respirator will be qualitatively fit-tested with irritant smoke, isoamyl acetate, or equivalent methods according to 29 CFR 1910.134, Appendix A at least annually.

7.5 PPE DONNING AND DOFFING PROCEDURES

The PPE program includes clearly defined donning and doffing procedures as indicated in the following sections.

7.5.1 Personal Protective Equipment Donning

A routine has been established for donning and evaluating all levels of protective clothing and equipment. If the clothing is too small, the likelihood of tearing the suit material and accelerating worker fatigue will increase. If the clothing is too large, the possibility of snagging the material and compromising the dexterity and coordination of the worker is increased. In either case, better fitting clothing will be provided.

7.5.2 Personal Protective Equipment Doffing

Exact procedures for removing PPE have been established and will be followed to prevent contaminant migration from the work area and transfer of contaminants to the wearer's body, the doffing assistant, and others. These procedures will be performed only after decontamination of the suited worker.

7.6 PERSONAL PROTECTIVE EQUIPMENT INSPECTION PROCEDURES

An effective PPE inspection program features four different inspections:

- Inspection and operational testing of equipment received from the factory or distributor;
- Inspection of equipment as it is issued;
- Inspection before and after use or training and prior to maintenance; and
- Periodic inspection of stored equipment.

7.7 PERSONAL PROTECTIVE EQUIPMENT PROGRAM EVALUATION

At a minimum, the PPE program is reviewed annually to evaluate the effectiveness of the following factors:

- The number of personnel-hours that are spent in various PPE ensembles;
- The degree to which the Site complies with the Hazardous Waste Operation Emergency

- Response (HAZWOPER) standards on PPE use, inspection, maintenance, and record keeping;
- Accident, injury, and illness statistics as well as recorded levels of exposure;
- The adequacy of operating procedures to guide the selection of PPE;
- The degree of coordination with comprehensive and Site-specific health and safety programs; and
- Recommendations for and results of program improvement and modification.

8.0 FREQUENCY AND TYPES OF AIR MONITORING

Personal and work area air monitoring will be required at this job site. Also, ENTACT is not responsible for any community air monitoring program at the National Grid Hempstead Project.

The following monitoring instruments will be available for use during field operation.

- (1) Photoionization Detector (PID), Mini Rae with 10.6 eV lamp or equivalent;
- (2) PDR – MIE 1000 Miniram model MIE 1000
- (2) 420-IQ Stationary gas meters to interface with 3 way alarm system (LEL) or (2)AreaRAE Model 5020 (with RF modem)
- (1) ENMET MX 2100 or Multi Rae Combustible Gas Indicator (CGI)/Oxygen (O2) / H2S / LEL/CO inside of vapor management structure.
- (1) T-82 Industrial Scientific for Hydrogen Cyanide
- Drager tubes for Benzene, nitrogen dioxide for diesel combustion inside tent
- Vapor monitors (OVMs) Benzene, tolulene, ethylbenzene,will be measured as needed.Vapor monitors will require laboratory analysis to establish respiratory protection requirements.

Dust suppression methods will be used to control particulate not otherwise classified with the goal of dust suppression being the avoidance of any visible dust. If work site conditions indicate that other chemical hazards are present, the FPM or HSO will issue a stop work order and will contact the Project Health and Safety Coordinator to revise or amend this HASP.

Personal and work area air monitoring will be required at this job site and during performance of certain tasks. A combination of real-time direct reading instrumentation (Multi-RAE 4 gas + PID, PDR) and personal monitoring for specific hydrocarbons, will be accomplished during excavation, excavation within fabric structure and other activities with a high potential for exposure.

TABLE 8-1

REAL TIME AIR MONITORING ACTION LEVELS

Air Monitoring Instrument	Monitoring Location	Action Level	Site Action	Reason
PID	Breathing Zone	0.5 ppm	Use detector tube for benzene	1/2 of PEL for benzene
PID	Breathing Zone	0 - 10 ppm	No respiratory protection is required	
		10 - 250 ppm	Level C	
		> 250 ppm	Stop work, withdraw from work area; notify CESM	
Oxygen meter	Breathing Zone	< 19.5%	Stop work; withdraw from work area; notify CESM.	Low oxygen
		> 23.5%	Stop work; withdraw from work area; notify CESM.	Oxygen enriched atmosphere; explosion hazard
H2S meter	Breathing Zone	<5 ppm	No respiratory protection is required	
		>5 ppm	Stop work, cover excavation, notify CESM	
HCN meter	Breathing Zone	<2.5 ppm	No respiratory protection is required	
		>2.5 ppm	Stop work, cover excavation, notify CESM	
CGI	Excavation	< 10 % LEL	Investigate possible causes, allow excavation to ventilate; use caution during procedures.	Increasing potential for ignition of vapors
		> 10% LEL	Stop work; allow excavation, borehole to ventilate to < 10% LEL; if ventilation does not result in a decrease to < 10% LEL, withdraw from work area; notify CESM.	Potential for ignition of vapors
Detector Tube	Benzene Exposure	< 0.5 ppm	Level D	
		0.5 – 10 ppm	Level C half-face APR required.	
		10 – 50 ppm	Level C full-face APR required	
		> 50 ppm	Stop work until elevated reading subside. Contact PHSC for possible upgrade to Level B.	

8.1 RESPIRABLE DUST MONITORING

Real time monitoring for respirable dust will be performed using a field-portable monitor that displays airborne dust concentrations immediately and continuously on a digital LCD screen in units of milligrams per cubic meter of air (mg/m3) with a data logging feature. These units use optical light scattering and has a built-in power source. These units are sometimes referred to as real-time aerosol monitors (RAM) or personal DataRam (PDR.) Calibration of the RAM will be in accordance with the manufacturer's instructions. Monitoring will be performed as needed, such as for newly detected particulates which were not previously detected or anticipated. Readings above 0.5 mg/m^3 will require additional dust suppression. Note that the standard site work practice is for dust suppression to begin whenever dust is visible.

Table 8.2

Contaminant of Concern	Instrument and Location	Frequency of Monitoring	Action Level & Response
Particulate not otherwise classified	Personal Data RAM (Real-Time Aerosol Monitor) located within work area	Alarms set to activate during exceedences.	1 mg/m^3 for minute, notify HSO, modify work activities.
Particulate not otherwise classified	Personal Data RAM (Real-Time Aerosol Monitor) worn by worker	Daily: 15 minute intervals to provide STEL, instrument monitored every 60 minutes by operator.	5 mg/m^3 for 15 minute STEL HSO notified, work activities temporarily stop, evaluate modifications to work plan
Particulate not otherwise classified	Personal Data RAM (Real-Time Aerosol Monitor) located at perimeter to site or work area	Daily: 15 minute intervals to provide STEL, instrument monitored every 60 minutes by operator.	0.150 mg/m^3 averaged over a 24-hour averaging time or visible dust

The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

- Applying water on haul roads
- Wetting equipment and excavation faces
- Spraying water on buckets during excavation and dumping
- Hauling materials in properly tarped or watertight containers
- Restricting vehicle speeds to 10 mph
- Covering excavated areas and material after excavation activity ceases

8.2 VOLITILE ORGANIC CHEMICALS

A Multi-RAE or ENMET MX 2100 with a 10.6 eV lamp will be utilized within the work area to monitor VOCs and flammable gasses/vapors. The Multi-RAE is a rugged, weather-resistant, portable monitor capable of detecting a wide range of volatile organic chemicals, including petroleum hydrocarbons and benzene. In addition, this unit is equipped with sensors to detect oxygen content, lower explosive limit, hydrogen sulfide and carbon monoxide.

Benzene and other aromatic hydrocarbons (BTEX) will be monitored using direct reading colorimetric indicator tubes. In addition, initial and periodic collection of personal samples using passive organic vapor monitors (OVMs) and laboratory analysis will be conducted. Results from OVM sampling will be used to validate proper levels of protection are being utilized.

For tasks outside the hot spot area, whenever the PID indicates a sustained reading greater than 1.0 ppm within the breathing zone of the worker, a colorimetric indicator tube will be used to determine if the reading is caused by the presence of benzene. If benzene is present at concentrations greater than the action level listed below, work will be stopped until the levels subside or an appropriate upgrade in PPE will be made.

For tasks within the hot spot area, respiratory protection is required. Whenever the PID indicates a sustained reading greater than 10 ppm within the breathing zone of the worker, a colorimetric indicator tube will be used to determine if the reading is caused by the presence of benzene. If benzene is present at concentrations greater than the action level listed below, work will be stopped until the levels subside or an appropriate upgrade in PPE will be made.

8.3 UTILIZATION OF STATIONARY LEL TRANSMITTERS IN ADDITION TO HANDHELD GAS METERS + PID

Utilization of Stationary LEL Transmitters in Addition to Handheld Gas Meters + PID: The work zone (excavation inside fabric structure) Gas Meter plus Photo-Ionization Detector (PID) unit (ENMET MX 2100 or Multi Rae) to observe levels of hydrogen sulfide (H2S), lower explosive limit (LEL), carbon monoxide (CO) and oxygen (O2). In addition to the portable gas meter either two (2) 420-IQ Stationary gas meters or (2) AreaRae units will be utilized to monitor LEL. It is anticipated that one meter would be temporarily mounted outside of the enclosure in close proximity to the gas line, with the other inside the enclosure temporarily mounted in close proximity to air intake ducts of the VMS. The Model 4-20IQ is a completely self-contained, intelligent transmitter module, housed in a Class 1, Division 1, Group B, C & D explosion proof housing. Interfacing with the 4-20IQ for Span and Zero adjustment is done via magnetic sensors

located on the 4-20IQ's front panel that are activated using a magnetic-tipped wand. It does not require the removal of the housing cover for calibration and other functions needed for the transmitter to operate properly. This is especially important in hazardous or explosive locations where exposure of the sensor's electronics to the ambient environment is not acceptable. This transmitter can operate as a" stand alone" unit, or can be used in conjunction with a variety of controllers. Used in conjunction with the model 9928-beacon horn, an alert will be provided in three ways:

a. Audible air horn
b. LED readout
c. Vibrating horn

The AreaRae may be used to replace the 420- IQ with an integral RF modem and the ability to communicate and transmit information on a real-time basis to a remote base, the AreaRAE is ideal for hazmat monitoring programs. The AreaRAE detectors can be used to establish an emergency perimeter by setting out multiple monitors at strategic locations. The AreaRAE is also an excellent gas detection property., In its simplest form, the AreaRAE is a rugged, weatherproof, five-sensor portable monitor that operates for more than 24 hours on either the rechargeable lithium-ion battery or with alkaline disposables. (Battery life may be reduced if the alarm is tripped.) The AreaRAE model 5020 contains the built-in RF modem

Key Features

- LEL,02,CO,H2S, plus a PID.
- Wireless communication range as far as two miles.
- Works with any personal computer as the base station.

Technical Specifications

Title	Value
Approvals	Wireless: UL (in US) classified for Class 1, Division II, Groups A,B,C, D Non-wireless: UL classified for Class 1, Division I, Groups, A,B,C,D; Class 2 Groups E, F, G hazardous locations, Temp Code T3C
Alarm	100 dB buzzer and flashing red LED cluster indicate exceeded preset limits, low battery or sensor failure. Separate alarm limit settings for TWA, STEL, low and high
Oxygen	Range: 0 to 30% Resolution: 0.1% Response Time: 15 sec
Combustible Gas	Range: 0 to 100% LEL Resolution: 1% Response Time: 15 sec
Carbon Monoxide	Range: 0 to 500 ppm Resolution: 1 ppm Response Time: 20 sec
Hydrogen Sulfide	Range: 0 to 100 ppm Resolution: 1 ppm Response Time: 15 sec
PID with 10.6 eV lamp	Range: 0 to 200 ppm 200 to 2000 ppm Resolution: 1 ppm Response Time: 10 sec

8.4 SINGLE GAS MONITOR FOR HCN

OSHA : PEL10 ppm (skin)
OSHA Action level 5ppm
NIOSH: STEL 4.7 ppm
ACGIH: C 10 ppm (skin)
(1 ppm = 1.105 mg/m3 @ NTP)

Hydrogen Cyanide HCN	4.7 ppm	10.0 ppm	4.7ppm	10ppm	0-30 ppm
Nitrogen Dioxide NO2	2.0 ppm	5.0 ppm	2 ppm	5 ppm	0-99 ppm

8.5 AIR MONITORING LOG AND POSTING OF RESULTS

The Field Project Manager will ensure that all air monitoring data is logged including instruments, data, work process, location, calibration, and analyte concentration.
All personal air monitoring results will be posted in the site break area within two days of receiving the results. Area and perimeter air sampling results will be made available upon request.

8.6 GAS DETECTION LIMITS FOR OXYGEN, LEL, H2S, CO

Continuous monitoring for oxygen, LEL, carbon monoxide and hydrogen sulfide will be performed during all activities inside vapor management unit. Monitoring results will be compared to action level criteria for upgrading PPE or implementing additional

engineering controls or procedures in the Work Areas.

Gas Detected	All Combustible Gases (Methane as standard)	% Volume Methane	Oxygen (O2)	Hydrogen Sulfide (H2S)	Carbon Monoxide (CO)
Detection Principle	Catalytic combustion	Thermal conductivity	Galvanic cell	Electrochemical cell	
Detection Range	0~100% LEL	0~100% Vol.	0~40.0% Vol.	0~100 ppm	0~500 ppm
Sampling Method	Internal sample pump, flow rate nominal 0.5 LPM, includes hydrophobic filter				
Preset Alarms (User Adj)	1st alarm 10% LEL 2nd alarm 50% LEL Over alarm 100% LEL	N/A	Low alarm 19.5% High alarm 23.5% Over alarm 40.0%	1st alarm 10 ppm 2nd alarm 30 ppm TWA alarm 10 ppm STEL alarm 15 ppm Over alarm 100 ppm	1st alarm 25 ppm 2nd alarm 50 ppm TWA 25 ppm STEL alarm 200 ppm Over alarm 500 ppm

8.7 CALIBRATION OF AIR MONITORING INSTRUMENTS

All air monitoring equipment will be calibrated and maintained in accordance with manufacturer's requirements and the Monitoring Instruments: Use, Care, and Calibration program included in Appendix G.

Organic vapor concentrations will be measured using the PID during excavating and other intrusive activities. During intrusive operations, organic vapor concentrations will be measured continuously; during other activities, readings will be taken at least once every hour. Organic vapor concentrations will be measured upwind of the work site(s) to determine background concentrations at least twice a day, (once in the morning and once in the afternoon).

9.0 SITE CONTROL MEASURES

The following section describes how workers will be allowed onto the site and what the various work zones are.

9.1 SITE ACCESS

Access to the site is restricted to authorized personnel only. All employees, subcontractors, vendors and visitors must report to the ENTACT trailer to sign-in and receive a site orientation.

9.1.1 Cameras and Electronic Equipment

Cameras or other electronic equipment may not be used without prior approval from the Field Project Manager.

9.2 WORK ZONES

At this time, site control (such as required by 29 CFR 1910.120) is required for the project. However, if work tasks, work areas, or site conditions change, this HASP must be amended. In the event of a HASP amendment, the following sections will apply.

The purpose of site control is to minimize potential contamination of associates, protect the public from the site activities, and prevent vandalism. To prevent exposure to unprotected personnel and migration of contamination due to tracking by personnel or equipment, work areas along with PPE requirements will be clearly identified. The areas of designation will be:

- Support zone (clean)
- Decontamination zone (transitional)
- Exclusion Zone (contaminated)

The FPM and the team will properly identify, mark, and enforce all zones of operation.

9.2.1 Support Zone

The support zone will be designated by signs and caution tape. It shall be secured against active or passive contamination from the work site. The support zone will consist of those areas adjacent to the exclusion zone where the administrative offices, decontamination trailer, and equipment are staged. Eating and drinking will only be allowed in this area.

The uncontaminated support zone will be the area outside the exclusion and decontamination zones and within the geographic perimeters of the site. This area is used for staging of materials, parking of vehicles, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the exclusion zone. All personnel arriving in the support zone will upon arrival, report to the command post and sign the site entry/exit log. There will be one controlled entry/exit point from the clean zone to the decontamination zone.

9.2.2 Decontamination Zone

The decontamination (decon) zone will provide a location for removal of contaminated personal protective equipment when personnel leave the exclusion zone during the day and the final decontamination at the end of the day. Coveralls will not be worn more than one work shift without being washed or discarded. ENTACT personnel will decontaminate by properly disposing of contaminated clothing and washing the face, forearms and hands as they exit the decon area and before leaving the site.

An on-site decontamination facility (boot wash and portable decon sink) shall be provided by ENTACT. ENTACT shall be responsible for providing the appropriate decontamination tools, equipment, solutions, liquids, containers, and supplies along with a concrete pad or other suitable base on which to perform decontamination activities.

All personnel shall be decontaminated before leaving the site (leaving the exclusion zone and entering the contamination reduction zone). Decontamination shall be required prior to breaks, when picking up tools, equipment, or materials in the support zone, or any other activities where the potential exists for contaminant transfer.

Equipment shall be cleaned and decontaminated prior to use on-site and prior to leaving the site. Wheels on any equipment in contact with potentially contaminated soil shall be cleaned prior to leaving any work area. Care shall be taken to avoid the possibility of contaminating formerly uncontaminated material or areas through the use of contaminated equipment.

Decontamination facilities shall be designed to meet all requirements of the approved work plan and all local, state, and federal requirements.

Decontamination facilities shall be designed to:

- Isolate contamination;
- Prevent cross-contamination;
- Be substantially watertight;
- Prevent contamination from leaving the site;
- Be large enough to contain run-off and spray water; and
- Have provisions for the collection and removal of accumulated water.

All decontamination liquids shall be collected and characterized to determine an appropriate disposal method. The decontamination facilities shall have a sump, pump, and piping system or other acceptable means to evacuate decontamination water in a timely manner.

Decontamination solids, PPE, and debris shall be handled with demolition materials.

The decontamination facility shall be resistant to chemical attack by the materials that will be contained in the facility.

The decontamination stations may be temporary and transportable; side panels shall be used as needed to control fugitive emissions from the decontamination stations.

All equipment shall be free of visual contamination prior to leaving the site. All tires and tracks shall be free of soil, grease, oil, slag, or other contaminants.

Decontamination facilities shall be capable of providing decontamination of the undercarriage and exterior of a vehicle to remove particulate matter using high-pressure spraying from the sides and bottom.

9.2.3 Exclusion Zone

The exclusion zone will be the areas outside the support zone and decontamination zone. The exclusion zone and the decontamination zone will continually change as work progresses. Entry to and exit from this zone will be made through the decontamination zone. Appropriate warning signs to identify the exclusion zone will be posted (such as. DANGER - AUTHORIZED PERSONNEL ONLY). Upon exiting the exclusion zone personnel and equipment must be decontaminated.

The exclusion zone will be identified with a yellow caution banner guard and/or signs.

While in the exclusion zone, personnel will wear Level C PPE and refrain from horseplay, use of tobacco products, eating, drinking, and generating open flames.

9.3 SECURITY OF PERSONNEL AND ASSETS

Site security is vital for protecting not only equipment and other valuable assets, but protects on-site personnel as well.

The Field Project Manager and Health & Safety Officer share responsibility for site security. They are responsible for ensuring that tools, vehicles, equipment, computers and facilities are secured at the end of the workday. Thefts and vandalism are crimes of opportunity that can often be prevented by removing the keys from vehicles and equipment, locking office doors, securing supplies and equipment and providing exterior lighting. Under certain circumstances and when authorized by the client, private security patrols may be provided. ENTACT's Site Security Checklist will be utilized to ensure security measures are in place.

ENTACT will control site access during normal working hours in accordance with an approved security program and Specification Section 01540. All workers, subcontractors and visitors will be required to sign a daily log maintained by ENTACT personnel. The log will include date, name of visitor, company, address and time on and off site. The presence of unauthorized personnel will be immediately communicated to National Grid and appropriate actions will be taken as directed. The site will be secured at day's end and gates will be locked during non-working

10.0 DECONTAMINATION PROCEDURES

In general, items entering the exclusion zone on the site must either be decontaminated or properly discarded upon exit from the exclusion zone. All personnel, including Federal, State, and local officials, must enter and exit the exclusion zone through the decon area. All personnel must be documented on the exclusion zone entry/exit log. Prior to demobilization, contaminated equipment will be decontaminated and inspected by the ENTACT FPM or designate before it is moved into the support zone. Any material that is generated by decontaminated procedures will be stored in a designated area in the exclusion zone until disposal arrangements are made.

10.1 PERSONNEL DECONTAMINATION

Once remediation procedures have been implemented the ENTACT FPM shall be responsible for ensuring that the PPE items and associates have been sufficiently decontaminated through proper training and procedures. Each associate and the FPM are ultimately responsible.

Station 1 Equipment Drop

Deposit equipment used on-site on plastic drop cloths. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

Station 2 Outer Boot and Outer Glove Wash and Rinse

Scrub outer boots, outer gloves, and/or splash suit with decontamination solution or detergent water. Rinse off using water.

Station 3 Outer Boot and Glove Removal

Remove outer boots and gloves. If disposable, deposit in a container with plastic liner. If non-disposable, place in a clean dry place.

Station 4 Respiratory Protection Removal (for Level C work)

Remove hard hat and respirator face-piece and place on a clean surface. APR cartridges will be discarded as appropriate. Wash and rinse respirator at least daily. Wipe off and store respirator in a clean dry location. Example: plastic sealable bag.

Station 5 Inner Glove Removal

Remove inner gloves. Deposit in container for disposal.

Station 6 Protective Clothing Removal

Disposable Tyvek or polycoated coveralls will be deposited in a container with a plastic liner that is properly marked as waste.

Station 7 Field Wash

Thoroughly wash hands, forearms and face with biodegradable soap and water and pat dry with disposable towel.

Cleaning and Disinfecting of respirators

Respirators are cleaned and disinfected using the procedures specified of the standard.

- Prepare 2 buckets (2 gal/7.5 L) of fresh warm water; follow sequence of use as described below.
- Do not use boiling or hot water. Water Temperature should be less than 110 F.
- Disassemble respirator, removing cartridges and/or filters and any external accessories such as communications, hoods, head harness (if possible) and eye lens outserts. Do not remove the valves because they are easy to lose.
- Bucket 1. Clean respirator and associated parts (excluding cartridges and/or filters) with alcohol free wipes, or by immersing in a warm water cleaning solution, scrubbing with a soft brush or sponge. Do not brush eye lenses. Use a neutral detergent cleaning solution that does not contain lanolin or oils.
- Bucket 2. Rinse in fresh, warm water. Running water is better than immersion if available. Thorough rinsing is important to keep detergents or disinfectants from drying on the respirator. [See OSHA 29CFR1910.134, Appendix B-2, running water for rinsing (if available) is preferred over immersion.]
- Replace cleaning solution and rinse water after approximately 20 respirators have been cleaned, or as needed.
- Allow the respirator to air dry in a non-contaminated environment. Do not dry with heaters or in sunlight. Respirators can be reassembled before or after drying.
- Prior to re-use, conduct checks as recommended by the manufacturer's manual to assure that the system is ready to be placed in operation. It is very important to check that the inhalation and exhalation valves are in place prior to use.

Eating, drinking or any practice that increases the probability of hand to mouth transfer and/or ingestion of materials is prohibited in any area where the possibility of contamination exists and is permitted only in the designated break area. Personnel will not wear or bring dirty/decontaminated clothing into the clean support area.

Eating, drinking or any practice that increases the probability of hand to mouth transfer and/or ingestion of materials is prohibited in any area where the possibility of contamination exists and is permitted only in the designated break area. Personnel will not wear or bring dirty/decontaminated clothing into the clean support area.

10.2 EQUIPMENT DECONTAMINATION

Equipment, vehicles, or tools that have entered the exclusive zone will be decontaminated prior to removal. Some equipment decontamination may require pressurized water. In this case face shields will be utilized. Equipment will be decontaminated to meet visual standards.

10.3 DISPOSITION OF DECONTAMINATION WASTES

All equipment used for decontamination shall be decontaminated or disposed of with the established waste streams. Established waste streams are those specified in the work plan. Discarded clothing (PPE) will be disposed of along with the waste streams.

10.4 DECONTAMINATION FACILITIES

Decontamination facilities for personnel, PPE and equipment will be provided by ENTACT. ENTACT personnel will decontaminate prior to leaving the site and taking breaks (washing hands, forearms, and face with soap and water prior to breaks and leaving site). ENTACT personnel will leave the ENTACT operations site in clean street clothing. Contaminated equipment will be placed into assigned containers for disposal or further decontamination. Equipment will be visually inspected and decontaminated with a high-pressure water spray or other suitable means until no visible contamination remains on the equipment.

A decontamination area will be constructed for equipment, personnel, PPE, and the storage of PPE utilized by site personnel. All personnel and equipment will be decontaminated prior to leaving the exclusion zone.

The decontamination of heavy equipment will be carried out by high-pressure water or

steam on a designated decontamination pad. When pressure washers are used with heated water, the lowest temperature that allows for decontamination should be used.

All personnel must use the decontamination zone to enter and exit the exclusion zone.

10.5 SIMPLIFIED DECONTAMINATION

For work in areas not subject to the exclusion zone decontamination requirements a simplified decontamination process for personnel has been established:

Station 1 Equipment Drop

Deposit equipment used on-site on plastic drop cloths. These items must be decontaminated (dry decon or wet wipe) prior to removal from the exclusion zone.

Station 2 Outer Boot and Outer Glove Decon

Scrub outer boots with detergent water and rinse off using water. If disposable boot covers are utilized, remove and discard the covers into waste container. Remove and discard outer gloves.

Station 3 Inner Glove Removal

Remove inner gloves. Deposit in waste container for disposal.

Station 4 Field Wash

Thoroughly wash hands, forearms and face with biodegradable soap and water.

ATTACHMENTS

ATTACHMENT A SITE SAFETY PLAN AMENDMENT

National Grid Hempstead Project
Health and Safety Plan Amendment Number: ###
Date of Work Activities:
Reason for Amendment:
Alternate Safeguard Procedures:
Air Monitoring:

Required Changes in PPE:	
Signatures:	
ENTACT FIELD PROJECT MANAGER	Date
ENTACT PROJECT HEALTH & SAFETY COORDINATOR	Date
ENTACT HEALTH & SAFETY OFFICER	Date

ENTACT
Health and Safety Plan Revision (Amendment) Log

Project Name and Number:

Amendment Date	**Amendment Number**	**Brief Description**	**Approval Complete? (FPM, HSO, Client Rep)**
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No

ATTACHMENT B SAFETY PLAN ACKNOWLEDGMENT FORM

I have been informed and understand and will abide by the procedures set forth in the Health and Safety Plan and Amendments for the site.

Printed Name	Signature	Company	Date

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ATTACHMENT C GENERAL SITE SAFETY RULES

The following guidelines have been implemented and are constantly monitored and reviewed, so as to fully comply with ENTACT's objective of keeping a safe and healthy work environment for all our associates and customers. An "associate" as used in this HASP, is any ENTACT employee.

1. Horseplay, running, or jumping of any obstacles is prohibited.

2. Associates, visitors, and/or subcontractors will observe and comply with all posted signs indicating danger, warning, caution, or unauthorized areas.

3. There will be no unauthorized use or operation of ENTACT or customers equipment.

4. Other unsafe acts, such as jumping from a vehicle or structure or running or throwing objects, are unacceptable.

5. Use or possession of narcotics, intoxicating substances, or guns and ammunition is prohibited.

6. Reporting for work under the influence of narcotics or intoxicating substances is prohibited. NOTE: If on prescription drugs with a "stated" warning, let supervisor know.

7. All associates are authorized to stop any work that they may consider hazardous to Company personnel or equipment or subcontractor personnel.

8. Associates have a responsibility to report for work on time and in condition to work in a safe and efficient manner.

9. The safety and security regulations of our customers must be strictly adhered to. This also applies to government standards and regulations.

10. Associates are required to verbally report any injury or incident to their supervisor, no matter how small it may seem. Failure to do so before leaving work for the day may result in a delay or denial of benefits that the associate may otherwise is entitled to. A written report should follow as soon as possible.

11. Before setting up operations, take a few moments to locate the nearest phone, eye wash, emergency shower (if available,) and fire alarm.

12. Tampering with or by-passing any safety device will not be tolerated.

13. Before setting up your operations, check the surrounding area for potential hazards and conflicts; overhead cranes, plant traffic, including railroads, associates in area, electrical wires, etc.

14. You should inform your supervisor of any incident or problem which may have occurred during that shift immediately. This would include, but not be limited to, injuries, near misses, faulty or defective equipment, use of fire extinguisher, customer requests or concerns, damage to equipment, vehicular incident, etc.

15. Smoking and the use of open flames are strictly prohibited in areas where flammable liquids, gases, or highly combustible materials are stored, handled, or processed, and also in the decontamination or exclusion zones. Obey "NO SMOKING" signs. Smoke only in designated areas.

16. All posted warning, safety, and security signs and barriers shall be observed. Additionally, ENTACT shall provide warning signs, barriers, barricades, etc., wherever such protection is needed. Where signs and barricades do not provide adequate protection, particularly along a road way, flagman will be used.

17. ENTACT personnel will not be permitted to use hoists and powered apparatus belonging to customers unless approval is obtained in each instance from the customer and ENTACT representative.

18. ENTACT personnel will not be permitted to carry cameras or take pictures without prior approval from the customer. If progress or finished construction photographs are desired, request for same should be made through the ENTACT representative and/or the customer representative and security.

19. Prior to beginning work, associates will be instructed on emergency procedures to be followed. The supervisor is responsible for notifying the associates of emergency situations and the evacuation. In the event of an evacuation, do not go home or leave the work site until released by your supervisor.

20. Areas sealed with polyethylene may become slick especially when disposable booties are worn - extra caution should be taken to secure footing and maintain proper balance during these situations.

21. Working from elevated platforms, scaffolding, and ladders can pose a great danger. Do not overreach, move ladder, scaffold or platform. Avoid shortcuts on scaffolding, ladders, and platforms. All provision of 29 CFR 1926 Subpart L must be complied with when working in or around platform, scaffolding, and ladders.

22. Good housekeeping procedures will be maintained during all project operations. Tools, materials, and equipment are more easily located and placed into service when good

housekeeping procedures are followed.

23. Associates are prohibited from the unauthorized removal of any property or Company materials without the special authorization. Associates involved with theft of company property without authorization are subject to immediate termination. Associates involved in theft activities are also liable to the company for full restitution of monies and/or properties taken from ENTACT, and are subject to criminal prosecution by the Company. Theft of Company property, client's property, or personal property belonging to associates will not be tolerated, and violators will be prosecuted.

24. Associates are cautioned that the Company will not be responsible for loss of personal property due to theft. Associates are advised to leave jewelry items, valuables, and personal items in a locked and secured area away from the job site.

25. Associates will wear all required personal safety protective equipment as required by ENTACT, while inside or outside the containment areas or exclusion zones.

26. Associates, visitors, and subcontractors are required to be dressed in the proper work uniforms at all times as per the requirements of the job.

27. Associates will obtain proper authorization prior to leaving the job site.

28. Safety guards, safety plugs, and/or any other electrical safety device shall not be bypassed, removed, or compromised in any way.

29. Step ladders, scaffolding, and/or platforms are to be used as designed and instructed by the supervisor. Step ladders are to be used in the fully extended position only.

30. Respiratory equipment will be worn properly in accordance with EPA and OSHA rules.

31. Respiratory equipment will be kept clean and sanitary for reuse. Respirators not in use will be cleaned and stored in sealed protective bags.

32. Respirator cartridges new or used will be kept clean at all times. Cartridges that are spent should be properly discarded to prevent incidental re-use.

33. Optical eye-wear other than industrial safety eye-wear is prohibited from use on the job site.

34. Safety body harness and lanyards are to be worn properly when required.

35. Specific maintenance and service to equipment and/or tools is to be conducted only by skilled maintenance personnel. Equipment used at the site will be inspected daily by a competent person.

36. Intentional violations of associate rights concerning health and physical well being will be cause for termination. Willfully causing an incident and/or injury to ones self or to a fellow associate will be cause for immediate termination.

37. Hand tools are to be used for the specific purpose of their design. Hand tools, electrical tools, and mechanically operated tools are to be free obstructions.

38. Trash bags marked for asbestos containing materials shall not be used for disposal of non-asbestos trash.

39. Waste identification labels will not be applied to any material that does not correspond with label (i.e. hazardous waste labels).

40. All safety equipment and tools are to be inspected for defects routinely by each associate prior to use. Damaged tools or equipment must be reported immediately to a supervisor and taken out of service.

41. All job site personnel must be aware of and know where to locate all fire extinguisher and emergency evacuation routes.

42. Hand tools are not to be left on the floor, scaffolding, ledges, and/or ladders.

43. Extension type ladders should be used with a 1 to 4 ratio - one foot out for every four feet of elevation.

44. Ladder users will face the ladder while ascending and descending. The top and second to top steps are not to be used for standing. Only one person at a time on a ladder. Bracing on the back of the ladder should not be used for climbing. Ladders should be secured to a fixed object when possible.

45. Guardrails and toe boards should always be installed on scaffolding. Associates should be careful to keep all debris bagged and obstacles off the floor. All components such as cross braces, railing, pin connectors, planking, toe boards, or scaffold grade lumber should be available before the unit is assembled.

46. Mobile scaffolding base dimensions should be at least one-half of the height. Scaffolding ten feet high or higher must have rigid guardrails.

47. All electrical equipment used on the job site will have electrical grounding devices with ground fault circuit interrupters. An extension cord without a ground wire plug is never to be used. Damaged electrical cords will be discarded or turned into the office for repair. All electrical cords and boxes are to be considered live until tested otherwise. Never spray water on or near open panels or electrical boxes. All 110v, 15-20 amp circuits must be protected with ground fault circuitry, or an assured grounding program. Electrical tools should be

unplugged prior to servicing.

48. ENTACT requires that an electrical lock out program be in effect at all job sites.

49. While preparing to do work around energized equipment such as transformers and/or electrical panel boxes, all aspects of 29 CR 1926 Subpart K must be complied with. Equipment that cannot be de-energized during the abatement will be covered and sealed on three sides only. There must be adequate ventilation to the panels and or boxes, or else there is the possibility and danger of explosion.

MOTOR VEHICLES

1. Any person operating a company vehicle must have a current, valid and appropriate driver's license. In addition, all applicants considered for positions that include driving a company vehicle, will be subject to a Motor Vehicle Record search and evaluation.

2. All company vehicles must be equipped with a first aid kit at all times.

3. All company vehicles must be equipped with a fire extinguisher and flares or reflectors.

4. All company vehicles must be maintained in good mechanical condition. A pre-trip inspection shall be performed, and any defects or malfunctions must be reported to the supervisor before the vehicle leaves the yard.

5. The number of persons inside the vehicle shall be limited by the number of seat belts available for use.

6. The driver is responsible to see that he/she and each authorized passenger is properly wearing a seat belt while riding in a company vehicle.

7. All rules of the road and all customer regulations concerning vehicles must be obeyed.

8. Use extreme caution when backing a vehicle. If at all possible, use a spotter to guide you or back into the parking space to be able to pull forward when leaving.

9. All vehicles will be maintained in a clean and orderly manner to prevent injuries and fire hazards. This includes the cab as well as the inside and outside of the truck.

10. When your job assignment requires you to drive a company vehicle, you are considered to be a professional driver. Failure to drive courteously and to obey the rules of the road may result in the loss of this privilege and termination of your employment.

11. The use of company vehicles shall be restricted to the specific job to which you are assigned. Any unauthorized use will be cause for disciplinary action up to and including discharge.

12. All vehicles must be parked in authorized areas only.

ATTACHMENT D DRUG AND ALCOHOL POLICY

INTRODUCTION

It is the purpose of ENTACT to provide a drug and alcohol free work environment and to maintain the highest safety and health standards for our clients and our associates. This policy was designed to eliminate incidents that may result from associate use of controlled substances (defined below) and alcohol. The use of controlled substances and alcohol increase the risk of incidents, jeopardize the safe work environment, and causes harm to an individual's health and personal life. With a goal of "Zero Incidents" we are establishing this policy for all ENTACT associates.

Subcontractors working on client's properties that require controlled substance and alcohol testing and/or random testing will follow and adhere to ENTACT's Drug and Alcohol Policy.

POLICY

ENTACT explicitly prohibits:

- The use, manufacture, purchase, transfer, possession, solicitation for, or sale of controlled substances and/or alcohol (including the use of over-the-counter and prescription medication in a manner inconsistent with their normal and intended use) at any time during working hours, on ENTACT's or customer's premises, while operating ENTACT vehicles or equipment, or otherwise while performing ENTACT business.

- Being under the influence of controlled substances and/or alcohol at anytime during working hours, on ENTACT's or customer's premises, while operating ENTACT vehicles or equipment, or otherwise while performing ENTACT business.

- Being under the influence of over-the-counter and/or prescription medications at any time during working hours, on ENTACT's or customer's premises, while operating ENTACT vehicles or equipment, or otherwise while performing ENTACT business where such use is inconsistent with the proper and intended use of such substances and/or impair the associate's ability to safely perform his or her job duties.

- Testing positive on a required or requested controlled substance or alcohol test.

- Any violation of ENTACT's Drug and Alcohol Policy.

"Controlled substances" specifically include, but are not limited to, narcotics; depressants; stimulants; intoxicants; inhalants; opiates, including heroin; hallucinogens, including marijuana, mescaline, and peyote; cocaine; phenecyclidine (PCP); and prescription drugs, including amphetamines and barbiturates, and any other illegal controlled substances as defined by applicable federal and state law which are not obtained and used in a manner consistent with their normal and intended use under a prescription lawfully issued to the associate possessing them.

"Premises" is used in the broadest sense and includes, but is not limited to, all land, property, buildings,

structures, installations, vehicles, or equipment.

TYPES OF TESTING

Controlled substance or alcohol "test" means any test using blood, urine, breath or other samples to determine the presence of controlled substances or alcohol in the body. ENTACT will require controlled substance and/or alcohol testing under any of the following circumstances:

- NEW HIRE: After offer of employment, but prior to the applicant starting work.

- RANDOM TESTING: All ENTACT associates will be placed in the random controlled substance and alcohol testing pool. Fifty percent of associates that are established in the random controlled substance and alcohol testing pool will be tested within a 12-month period. ENTACT will use an independent third party that will select individuals for random testing. The identities of the individuals selected will be kept strictly confidential until prior to them being asked to be tested.

- FOR CAUSE TESTING: ENTACT may ask an associate to submit to a controlled substance and alcohol test at any time it has a reasonable suspicion that the associate may be under the influence of controlled substances or alcohol, including, but not limited to, the following circumstances: evidence of controlled substances or alcohol on or about the associate's person or in the associate's vicinity; unusual conduct on the associate's part that suggests he or she is under the influence of controlled substances or alcohol (e.g., the appearance, behavior, speech, attitude, mood, and/or breath of an associate); Near Loss and Loss Investigations; and equipment or property damage.

- POST-INCIDENT TESTING: Any associate may be asked to submit to a controlled substance and/or alcohol test if he/she is involved in an on-the-job incident, near-miss or incident in which safety precautions are violated or careless acts are performed, and reasonable suspicion exists that suggest possible use or influence of controlled substances or alcohol. "Involved" means not only the associate who was injured, but also any associate who potentially contributed to the incident or event in any way. Controlled substance and alcohol testing is required for the following circumstances when preliminary evaluation indicates appropriate procedures, precautions, work set-up, or judgment were not employed:

    1. Serious incident causing injury to self and/or other person,
    2. Motor vehicle incident, **whether or not there was significant damage to personal or private property,**
    3. Significant release, which fouls the environment (air, land, water),
    4. Any serious near-miss incident that could have caused injury to persons or the environment.

- REHABILITATION: After an associate has participated in a rehabilitation program.

- LEGAL REQUIREMENT: When testing is required by federal or state law or regulation.

Consent to take or to release information to ENTACT regarding such tests constitutes a condition of

continued employment.

CONSEQUENCES

Positive Results

Any ENTACT associate who tests positive will be given an opportunity to discuss the results with a Medical Review Officer (MRO). If the MRO confirms the positive test, the associate will be suspended pending discharge. If associate is discharged they may request to be rehired after a six month period.

Negative Results with Diluted Specimen

Any ENTACT associate with a negative drug screen result that has a *Diluted specimen* noted by the MRO (Medical Review Officer) will be retested immediately with observation.

Negative Results with Fit for Duty Evaluation

Any ENTACT associate with a negative drug screen result that has a recommendation from the MRO for a fit for duty evaluation due to a valid prescription will be asked to provide a statement from the prescribing physician that they have the ability to safely perform their assigned duties while taking the medication as prescribed. This is to be provided prior to starting and continuing in assigned job task.

Outside Employment

If an associate is tested for controlled substances or alcohol outside of the employment context and the results indicate a violation of this policy, the associate may be subject to appropriate disciplinary action, up to and including termination.

Refusal

Refusal to sign this consent form or submit to testing is a violation of this policy. Any associate refusing to submit to testing or the disclosure of test results to ENTACT will face appropriate disciplinary action, up to and including termination of employment. The following behaviors constitute a refusal:

- Refusal to appear for testing.
- Failure to remain at the testing site until the testing process is complete.
- Failure to provide a urine, blood, breath, or other appropriate specimen.
- Failure to allow observation or monitoring if required.
- Refusal to sign the testing form.
- Failure to cooperate in the testing process (i.e., any action which prevents the completion of the test).
- Verified adulterated or substituted test reported by the MRO.
- Failure to provide sufficient quantities of specimen to be tested without a valid medical explanation.
- Failure to undergo a medical examination or evaluation when directed.

- Tampering with, attempting to adulterate, adulteration or substitution of the specimen, or interference with the collection procedure.
- Failure to report to the collection site in the time allotted.
- Leaving the scene of an incident without a valid reason before the tests have been conducted.

Report to Law Enforcement

ENTACT reserves the right to bring a matter involving the use, manufacture, purchase, transfer, possession, solicitation for, or sale of controlled substances to the attention of appropriate law enforcement authorities. Any conviction for criminal conduct involving controlled substances, whether on or off duty, may lead to disciplinary action, up to and including immediate termination.

SEARCHES AND INSPECTIONS

Unless prohibited by law, ENTACT reserves the right at all times on its premises or various project site locations to conduct unannounced searches and inspections of associates, subcontractors, vendors, and other persons, including their effects, lockers, baggage, desks, tool boxes, clothing and vehicles. The sole purpose of such searches and inspections is to ensure compliance with this policy. Any controlled substance or items prohibited by this policy, or any materials that are illegal to posses, will be retained by ENTACT and may be destroyed or turned over to the appropriate law enforcement agency.

FOLLOW-UP AND RETURN TO WORK

Any associate who has been required to or voluntarily undergoes rehabilitation for substance abuse must submit to a controlled substance and/or alcohol test and receive a confirmed negative test result before returning to work. In addition, the associate will be subject to follow-up testing (including participation in the random controlled substance and alcohol testing pool) not to exceed 24 months following the associate's return to work.

PRESCRIPTION MEDICATIONS

The associates will, when controlled substances are prescribed by a licensed health care provider, inquire of the health care provider whether the controlled substance prescribed has any side effects, which may impair the associate’s ability to safely perform the associate’s job duties. If the answer from the health care provider is yes, the associate shall obtain a statement from his or her health care provider indicating any work restrictions and their duration. The associate shall present that statement to his or her supervisor prior to going on duty. Failure to communicate this information is a violation of this policy.

EMPLOYEE ASSISTANCE PROGRAM

Associates should contact their Human Resources representative to discuss available EA services.

SUBCONTRACTORS

Subcontractors working on client’s properties that require controlled substance and alcohol testing and/or random testing will follow and adhere to ENTACT’s Drug and Alcohol Policy.

ATTACHMENT E EQUIPMENT SAFETY

The following equipment safety standards are applicable for equipment and vehicles owned or leased by ENTACT and their subcontractors. Safety standards are divided into two categories, heavy equipment and vehicles. Heavy equipment includes rubber-tired and crawler type excavation materials handling equipment, haul trucks, and cranes. Vehicles include pick-ups, passenger vans, and cars.

Heavy equipment and vehicles that will be used on site include the following:

- Excavator
- Dozers
- Haul trucks
- Water trucks
- Front end loader
- Grader
- Crane
- Pick up trucks

HEAVY EQUIPMENT

Parking: All equipment left unattended at night, adjacent to a roadway in normal use, or adjacent to active construction areas shall have appropriate lights or reflectors, or barricades with appropriate lights or reflectors, to identify the location of the equipment.

Bulldozer blades, end-loader buckets, dump bodies, and similar equipment: These shall either be fully lowered or blocked when being serviced or not in use. All controls shall be in a neutral position, with the motors stopped and the brakes set.

Audible Alarms: All equipment shall be equipped with a reverse signal alarm. The alarm shall be distinguishable from the surrounding noise level, and shall be maintained in an operable condition.

Vehicle Cabs: All equipment with operator cabs shall be equipped with windshields and power wipers. All cab glass shall be safety glass, or equivalent, that does not introduce visible distortion affecting operation. Cracked and broken glass shall be replaced.

Seat Belts: Seat belts shall be provided in all equipment. Operators will be required to wear seat belts while the equipment is in operation. Seat belts are not required for equipment that is designed for stand-up operation.

Riders: Only equipment operators will be allowed on the equipment when it is in operation.

Associates will not be allowed to ride on the equipment.

Working Under Power Lines

Except where electrical distribution and transmission lines have been de-energized and visibly grounded at the point of work or where insulating barriers have been erected to prevent physical contact with the lines, equipment shall be operated in accordance with the following:

- Lines rated 50 kV or less - minimum clearance between the lines and any part of the equipment shall be 10 feet;

- Lines over 50 kV - minimum clearance between the lines and any part of the equipment shall be 10 feet plus 0.4 inch for each 1 kV over 50 kV;

- A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means.

- Electrical lines will be marked-off with caution tape to help visually locate the lines.

Roll-Over Protection Structures (ROPS)

All rubber-tired and crawler type equipment owned or leased by ENTACT and any subcontractors shall be equipped with roll-over protective structures which meet the minimum performance standards, as prescribed in 29 CFR1926.1001 and 1926.1002.

VEHICLES

Driver Policy: Only authorized ENTACT drivers will be allowed to drive company vehicles.

Brakes: All vehicles shall have a service brake system, an emergency brake system and a parking brake system. These systems may use common components and shall be maintained in working order.

Lighting: All vehicles shall be equipped with two headlights and two taillights, and shall be maintained in working order. All vehicles or combination of vehicles shall have brake lights in operable condition.

Seat Belts: Seat Belts meeting DOT regulations shall be maintained in all vehicles. ENTACT associates will be required to wear their seat belts when operating or as passengers in company vehicles.

Riders: ENTACT associates will not ride in the back of pickups or on tailgates or fenders. No

riders are allowed in the bed of a pickup.

Loads: Materials and tools will be firmly secured to prevent movement when transported in the same compartment with ENTACT Associates.

Audible Alarms: No associate shall use any vehicle having an obstructed view of the rear unless:

- The vehicle has a reverse signal alarm audible above the surrounding noise level

OR

- The vehicle is backed up only when an observer signals that it is safe to do so

COMMERCIAL TRUCKS

All commercial drivers will receive an orientation from the ENTACT HSO on their responsibilities and safety requirements.

Once trucks are loaded, drivers will proceed to the truck decontamination area. After the truck is decontaminated, drivers will cover their loads prior to leaving the site. ENTACT associates will wear an orange vest directing traffic to allow trucks to safely exit the property.

WORKING NEAR UNDERGROUND AND OVERHEAD UTILITIES

ENTACT Project Number and Name:		Date:	
Project Address:			
Phone Number:		Fax Number:	
Emergency Contact: Name:		Phone Number:	

SURVEY

Before beginning any project, you must first survey your work area to find power lines at the job site. (See job site sketch below.)

IDENTIFY

After finding all of the power lines at your site, identify the activities you'll be doing that may put you or your workers at risk. Mark one or more of the following:

- ☐ Cranes (mobile or truck mounted)
- ☐ Drilling rigs
- ☐ Backhoes/Excavators
- ☐ Long-handed tools
- ☐ Other tools/high-reaching equipment
- ☐ Concrete pumper
- ☐ Aerial lifts
- ☐ Dump trucks
- ☐ Ladders
- ☐ Material Handling & Storage
- ☐ Scaffolding
- ☐ Other (specify): _____

ELIMINATE OR CONTROL

Before beginning any project, you must first survey your work area to find power lines at the job site. (See job site sketch. Utility company must be identified and contacted prior to initiating any work within the line location. Voltage of line must be determined by utility company to ensure proper distance is maintained during the operation. Job Safety Analysis must be developed prior to beginning any high hazard work.

After identifying the power line and high-risk activities on our job site, we must determine how to eliminate or control the risk of electrocution (a successful determination is often reached only after consultation with the utility). Mark one or more of the following:

1. Locate and identify all overhead power lines. Determine voltage before construction begins.

2. Have lines moved, insulated, or de-energized. In urban areas, insulating or "rubberizing" power lines is often most practical. Contact the local utility.

3. Use a signaler whenever a backhoe, crane, or similar device is closer than one boom length to a live power line of 750 volts or more.

4. The signaler from established safe distance must warn the operator when any part of the machine or its load approaches the minimum distances allowed in the construction regulation.

5. Jump clear. If an emergency such as fire forces you to leave the equipment, jump clear. If part of your body contacts the ground while another part touches the machine, current will travel through you. In cases of high-voltage contact, jump clear and shuffle away in small steps. With voltage differential across the ground, one foot may be in a higher voltage area than the other. The difference could kill you.

- ☐ Move the activity
- ☐ Change the activity
- ☐ Have the utility de-energize the power line
- ☐ Have the utility move the power line
- ☐ Use a protective technology
- ☐ Boom cage guard
- ☐ Use barrier protection (insulated sleeves)
- ☐ Use an observer
- ☐ Use warning lines with flags
- ☐ Use non-conductive tools
- ☐ Insulated link
- ☐ Proximity device

Always maintain your minimum safe clearance distance from the power line, except when the utility has de-energized and visibly grounded the power line.

Voltages	Distance from Power Line
Less than 50 kV	10 feet
More than 50 kV	10'+(0.4") (# of kV over 50 kV)

WARNING!
It is unlawful to operate any piece of equipment within 10' of energized lines

Jobsite Sketch

(Draw in location of power lines and their proximity to construction site, include such things as proposed excavations, location of heavy equipment, scaffolding, material storage areas, etc.)

Completed by:		Date:	
Approved by:		Date:	

ATTACHMENT F CRITICAL LIFT PROCEDURE

Scope and Application: The document is applicable to jobsites where ENTACT has responsibility for lifting and hoisting activities. Nothing in this document is intended to relieve the Crane Provider from the responsibility to work safely, follow the requirements of OSHA regulation and exercise the sound judgment of a qualified operator.

Introduction: A critical lift is the use of a crane and rigging system in any of the following situations:

- Making a lift where the load is below the ground level or significantly below the level at which the crane is located
- Blind lifts, where the load is not visible to the crane operator
- A lift that exceeds 75% of the cranes capacity in its current configuration
- Tandem and Tailing crane lifts
- Lifts made in close proximity to the required clearance for energized power lines
- Hoisting of occupied suspended work platforms
- Lifts involving specialized, unique or complex rigging
- Static tower crane erection and dismantling

A critical lift plan & permit is required for every critical identified above. The critical lift plan shall include a copy of the critical lift hazard analysis, crane specifications, specifics of the intended load, crane operator's license/certification and a diagram of the area showing the intended load and crane location.

A pre-lift meeting will be held on site prior to execution of any critical lift. Mandatory attendees for this meeting include; crane operator, ENTACT field project manager, site health and safety officer, rigging foreman (if applicable) and employees to be lifted (if applicable). The meeting shall be documented in the daily safety log.

Pre-Lift Evaluation (completed by ENTACT):

- ☐ Current annual crane certification (attach a copy to the permit)
- ☐ Manufacturer's load chart accessible to the operator
- ☐ Operator's manual available in cab of crane
- ☐ Critical Lift Hazards identified
- ☐ Operator's license/certification reviewed (attach copy to the permit)
- ☐ Pre-lift meeting completed and documented
- ☐ Overhead obstructions and power lines identified and mitigated
- ☐ Wind speed and weather conditions have been considered
- ☐ Exclusion area established and non-essential personnel removed

_____ _____
Signature (ENTACT) Date

Rigging and Set Up (completed by Crane Provider)

Below the hook lifting devices: ☐ N/A

☐ Manufacture's name permanently marked on lifting beam/bar

☐ Serial number marked on lifting beam/bar

☐ Rated load capacity marked on beam/bar

Alloy Steel Slings: ☐ N/A

☐ Sling is permanently marked with size, grade, capacity and reach

☐ Hooks, rings, oblong links, welded or mechanical coupling links have rated capacity equal to the chain

☐ Slings inspections are documented and conducted by a competent person

Wire Rope Slings: ☐ N/A

☐ Sling is permanently marked with size and capacity

☐ Welded end attachments are "proof tested" at 2X rated capacity

☐ Slings inspections are documented and conducted by a competent person

Metal Mesh Slings: ☐ N/A

☐ Sling is permanently marked with rated capacity for vertical basket and chocker hitch loading

☐ Handles are rated a capacity equal to metal fabric

☐ Slings inspections are documented and conducted by a competent person

Synthetic Web Slings: ☐ N/A

☐ Slings are permanently marked with manufacturer, rated capacity and type of material

☐ Slings inspections are documented and conducted by a competent person

Crane Set Up:

☐ Crane is level

☐ Ground is compacted and stable

☐ Mats or cribbing under outrigger pads

☐ Outriggers fully extended ☐ N/A

☐ Area of travel is level, clear & stable ☐ N/A

Crane Safety and Structural Integrity (Completed by Crane Provider)

☐ Load moment indicator is functioning and accurate

☐ Boom angle indicator is functioning and accurate

☐ Anti two-block device operational

☐ Boom sections free of visible defects

☐ Jib assembly free of visible defects ☐ N/A

☐ Outriggers free of visible defects ☐ N/A

Lifting Information: (Completed by Crane Provider)

What will be lifted, hoisted or moved? _____

What is the heaviest lift to be completed under this permit? _____Lbs.

Lift will be at what radius? _____Ft.

What is the maximum radius this crane will be lifting? _____Ft.

Weight of maximum radius lift? _____Lbs.

Weight determined by: ☐ Marked on load ☐ Calculation ☐ Estimated ☐ Weighed

Will any lift exceed 80% of the rated capacity? ☐ No ☐ Yes (Explain below)

_____

_____

_____

Describe the load, how it will be attached and how it will be moved:

_____

_____

_____

Signature (Crane Provider)	Date	Company Name

Rigging Sketch and Equipment Layout

In the space provided below or by attachment provide a rigging sketch and equipment layout for the lift. Indicate on the sketch each sling, attachment point and lift point. Footnote or indicate the force on each piece of the rigging gear and the rated capacity or working load limit for that item. Indicate the total calculated static load for this lift.

_____ _____

Signature (Crane Provider) Date

Approval to Proceed:

I have reviewed the ENTACT conducted Pre-Lift Evaluation and the information provided by the Crane Provider in this permit and hereby issue approval to conduct this lift in a safe and controlled manner.

_____ _____

Signature (ENTACT) Date

ATTACHMENT G BASIC EMERGENCY MEDICAL AND FIRST AID

In the event of personal injury, a site associate trained in first aid will administer treatment to the injured associate after taking precautions to protect him or herself. If necessary, the injured associate will be transported to the nearest hospital. For all areas, emergency arrangements will be made prior to the commencement of work at the project. An ambulance will be provided if necessary. The Field Project Manager is responsible for the completion of an Incident Report Form.

OSHA Subpart K, Medical Services and First Aid, states that an employer shall ensure that medical personnel are readily available for consultation if professional assistance is not in near proximity to the workplace, persons will be adequately trained to render first aid. ENTACT requests that at least one person for every ten associates working is trained in first aid procedures and cardiopulmonary resuscitation (CPR).

ENTACT advises the following procedures in case of an incident; however these recommendations are not a substitution for First Aid Training:

1. Evaluate the situation and take immediate appropriate action. If necessary, remove the victim from a hazardous environment.

2. Rescuers and associates providing medical attention must protect themselves from blood borne pathogens by applying universal precautions learned in CPR and first aid training. Rescuers must avoid direct contact with blood and body fluids by wearing gloves, safety glasses, and masks or face shields. Breathing barriers must be used when performing CPR. If these protective devices are not available, it is better to wait for professional care.

3. Make certain emergency medical support has been notified.

4. Ascertain that the victim is breathing. If not, begin rescue breathing. Make sure the airway is not blocked.

5. Stop bleeding. Follow proper decontamination procedures prior to removing a victim contaminated with hazardous substances. If the victim is not decontaminated, other people and areas could be contaminated.

6. Confirm that help is on the way.

7. Communicate accurate information concerning details of the incident to medical personnel. It is very important that the medical personnel understand what type of chemicals that the victim has been exposed to. The ENTACT office is equipped with specific chemical

information and first aid guidelines to assist you and the medical personnel. This information can be accessed and relayed to the hospital or medical personnel within minutes.

Order of Obtaining First Aid

1. If possible, designate another person to go for assistance while you stay with the victim.

2. Notify a physician, make him/her aware of the emergency and follow his/her advice regarding further first aid and transportation of the victim.

3. If it is apparent that the services of an ambulance are necessary, tell the telephone operator it is an emergency and ask him/her to connect you with the local ambulance service. If there is no ambulance service, telephone the nearest city, county, or state police.

4. In the telephone request to the doctor, police, or ambulance, be prepared to give:

   - Phone number calling from
   - Address and directions to the site
   - Describe the incident, number of victims and condition
   - Give your name
   - Do not hang up until emergency personnel end the conversation

5. Stay at the site until the doctor or ambulance arrives.

Condition, Symptoms and Treatment

Breathing Stopped - Breathing stopped completely

1. Check that breathing passages are not blocked.
2. Apply mouth to mouth method of artificial respiration at once.

Shock - Pale skin, body clammy and cold, pulse rapid and weak

1. Keep victim lying down.
2. Maintain normal body heat, but do not allow victim to become overheated.
3. If victim's face is pale, elevate feet slightly.

Bleeding - Blood flowing

1. Apply direct pressure over wound with cloth compress (sterile if possible).
2. If bleeding continues apply pressure at nearest pressure point above the bleeding.

Electrical Shock - Unconsciousness, burns may be present, may convulse

1. Survey the situation carefully. Make certain you are not the second victim.
2. If possible, turn power off.
3. If unable to turn power off move person from contact by moving live wire with a rope or dry board. If the victim remains in contact with the source of the electricity and must be moved use only your feet. By using your hands an electrical current is sent through your entire body including your heart and is far more serious than current through the legs. An electrical current through the lower extremities is rarely fatal.
4. Check breathing. Check pulse. If necessary, begin CPR. Do not stop life saving measures until medical personnel arrive.

Burns

- 1st degree - skin reddened - cover lightly with sterile dressing
- 2nd degree - skin blistered - cover lightly with sterile dressing
- 3rd degree - deep destruction of tissue usually with charring - cover lightly with sterile dressing and consult physician at once. Do not place grease or oil on any burn.

Fractures

- Simple - pain and swelling, and/or deformed part.
- Compound - broken bone plus break in skin and bleeding.

    1. Immobilize fractured part.
    2. Stop bleeding and dress wound.
    3. Splint securely if patient has to be moved.

Spinal Injuries

Injury to the spinal cord should be suspected in any incident involving a fall or injury to the neck or back or when there is loss of sensation or movement. Move the victim only if necessary. Attempt to keep the body aligned and the back and neck straight. Preferably, the victim should not be moved until an ambulance arrives with a special stretcher and trained personnel.

Choking

An air way obstruction should be suspected if there is violent choking, alarmed expression, attempts at inhalation, discoloration in the face, neck, and hands, unconsciousness

1. If the victim can cough, speak or breathe - DO NOT interfere by pounding on the victim's back.
2. If the victim can not respond or speak, approach the victim from behind and place fisted hands below the rib cage and apply firm pressure in quick, sharp, upward blows to force air from the lungs.

3. If unconscious, turn victim's head to one side, apply same pressure outlined in Step 3.
4. Artificial respiration may be necessary for the unconscious victim after the object has been removed from the throat.

Sudden Illness

- Heart Attack - Chest pain, shortness of breath, pale or bluish skin, shock.
- Stroke - Loss of sensation and/or movement on one side of the body, pupils unequal, inability to talk, unconsciousness.
- Convulsion - Rigidity of body muscles lasting from a few seconds to half a minute, bluish discoloration of face and lips.
- Fainting - Unconsciousness

1. Check breathing. Check pulse. Begin CPR, if necessary.
2. Loosen tight clothing.
3. Keep normal body temperature.
4. In the case of convulsions - protect the victim from injury, but do not attempt to place objects in the victim's mouth.
5. Do not attempt to give liquids to an unconscious victim.

Prevention of Heat Stress

1. Proper clothing - Loose fitting, light weight, light colored, and properly ventilated.
2. Hat - To prevent radiant heat exposure to the head and to shield the face from ultraviolet light.
3. Acclimatization - Heat disorders are more likely to occur at times when associates are not acclimated to working in the heat. Most people require one week to adapt to a hot humid environment.
4. Work loads - During hot temperatures, work loads should be adjusted to each associate's acclimatization rate.
5. Body weight - Monitor your daily weight. A pint of water weighs one pound. If you have lost several pounds in one day, try to replace the amount of weight lost.
6. Heart rate and body temperature - While working in the heat your heart rate and body temperature are good measures of body stress.
7. Fluid intake - The most important measure of prevention adequate fluid intake during the work period.

Exposure to Hazardous Chemicals

The environmental industry is faced with the problem of handling mixtures of unknown substances. Speed is of prime importance in the prevention of injury from chemical exposure. It may not be possible to take the time to determine what particular chemical or combination of chemicals are responsible for the exposure. Even once a chemical is known it may require

valuable time to refer to specific chemical exposure guidelines. If "worst case" exposure guidelines are followed then valuable time can be saved. In general, there are four ways that chemicals enter the body: inhalation, skin exposure, eye exposure, and ingestion.

Inhalation

1. Remove from hazardous area to fresh air.
2. If not breathing begin mouth to mouth respiration.
3. Give oxygen.
4. Call emergency services.
5. Identify chemicals.
6. Observation by physician for a 24-hour period depending on specific chemical.

Skin exposure

1. Remove contaminated clothing.
2. Wash under running water for 15 minutes.
3. Call emergency services.
4. Identify chemical
5. Observation by a physician if necessary.

Eye exposure

1. Wash eye for 15 minutes (remove contact lenses first).
2. Call emergency services.
3. Identify chemicals.
4. Evaluation and treatment by physician.

Ingestion

1. Identify chemical ingested.
2. Call poison control center or CHEMTREK 1-800-424-9300.
3. Follow actions given by center.
4. Seek follow-up medical attention if recommended by the center.

Hot Weather

1. Orientation for all associates on heat stress and its related symptoms.
2. Regular break periods with water and Gatorade.
3. Methods to monitor heat stress:
4. Body water loss (BWL) due to sweating should be measured by weighing the associate in the morning and the evening. The clothing worn should be similar at both weighings. BWL should not exceed 1.5% of total body weight. If it does the associate should be instructed to increase his or her daily intake of fluids; or

5. The heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats per minute. If the HR is higher the next work period should be shortened by 10 minutes while the length of the rest period remains the same.
6. There will be established break periods and breaks on an as needed basis.

If symptoms of heat stress are noted for an associate the associate will be evaluated by measuring the heart rate for 30 seconds.

Signs and Symptoms of Heat Stress

Heat rash may result from continuous exposure to heat or humid air.
Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include;

- Muscle spasms
- Pain in the hands, feet and abdomen
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:
- Pale, cool, moist skin
- Heavy sweating
- Dizziness
- Nausea
- Fainting
- Tiredness
- Headache
- Weakness

Heat stroke is the most serious form of heat stress. Temperature regulations fail and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:

- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Nausea
- Dizziness and confusion
- Weak rapid pulse
- Coma or unconsciousness

Cold Weather

- When the air temperature is below 40ºF associates will be reminded of the hazards of cold stress and that proper clothing is required.

- When air temperature is below 36ºF, any time clothing becomes wet it must be replaced immediately.
- Temperatures below 30ºF will require special insulated clothing and fluid replacement with warm, sweet, non-caffeine containing drinks.
- Specific Controls:
  - An area that is heated for breaks and lunch.
  - Areas minimizing air movement to shield wind.
  - Reducing conductive heat transfer.
  - Providing adequate clothing protection.
  - Special cold weather discussions will be held in daily safety meetings when temperatures are expected to be below 36ºF.

See the ENTACT Comprehensive Health and Safety Manual for wind chill chart.

Caring for Poisonous Snake Bites

The following is a summary of current (as of 2005) recognized first aid treatment protocols for bites that occur at field locations where advance medical treatment is not immediately available.

- Try to safely and quickly identify the species of snake if practical. Move victim to safety. Have one person take firm command of the situation. Document the victim's condition and location of the bite and time. Write it down!
- Remove any jewelry or tight fitting clothing. Quickly tie a light restricting band (not a tourniquet) both above and below the bite area a few inches away from the puncture/bite marks.
- Without cutting, apply strong suction, preferably within seconds of the bite directly on the main or deepest puncture/bite marks. This can be accomplished with the mouth or a commercial bite kit suction device. Time is critical here as any venom present will become destructive very quickly!
- Rapidly apply antiseptic cleanser to the entire area and place cold compress (or chemical ice pack) as closely as possible without interfering with suction process.
- Continue strong suction and alternate the location of compress to avoid injury from severe cold.
- Check constriction bands periodically as swelling may occur and loosen as appropriate. A constriction band should not stop the pulse below the band.
- Monitor for symptoms of shock and be prepared to administer appropriate treatment. At any signs of major stress or unusual/unexplained discomfort, check for need to apply other first aid techniques - elevate legs from lying down position, keep warm, immobilize, etc. Do not administer alcohol or cause additional stress to victim. Avoid food or liquid intake.
- Keep victim warm, but do not over heat, and as immobile as practical. Movement to proper treatment facility is more crucial than maintaining immobile status.
- Transport safely at the earliest possible time to competent medical facility. Ideally, all of the above steps can be administered concurrently with transport phase. Keep victim as

comfortable as possible and reassure that survival is not in question. Rapid response reduces damage levels.

- If the snake has been killed, take it along for any identification or testing needs. The primary purpose of this first aid is to slow down or reduce the invasion of the venom, to protect the victim from further side effect trauma and generally to get the victim to advanced treatment as quickly and safely as practical.
- Documenting activities, times and treatment will be useful for the advanced medical providers. Remember to write it down.
- Be confident in what you do and remember, early treatment is the best treatment when a bite occurs!

ATTACHMENT H JOURNEY MANAGEMENT PLANNING

Background:
The first step of journey management planning is to "question the need for every trip." The journey management planning process is a simple risk assessment of the relative value of any proposed trip versus the inherent risk that making it presents. This planning process will ensure that all identified hazards are understood and managed and that unnecessary trips or those presenting an unreasonable or uncertain risk are not taken. Depending on the nature of company travel, this assessment may be something as simple as a driver asking themselves what route and time they will travel to a destination to a formal documented project journey management plan (JMP.)

Purpose:
This document provides guidance and outlines requirements regarding journey management planning. Its purpose is to minimize the risk associated with motor vehicle use and transport. This document includes forms which should be used to prepare a JMP.

Scope:
Journey management planning applies to ENTACT Associates and contractor/sub-contractors when on Company property or when using motor vehicles for company related business, including:

- Company-owned or leased vehicles
- Rental vehicles used on Company-authorized business
- Personal vehicles while being used for Company business

Journey management planning excludes multiple transport mode journeys where associated motor vehicle travel is less than 100 miles. Multiple transport mode journeys are those that include the use of, for example, a combination of personal vehicle, airplane, and rental car.

Definitions:
All employees should categorize their business travel into one of the following categories:

Routine journeys: routine and repetitive driving tasks associated with short journeys (those less than 100 miles one way), familiar regions and terrain, and normal driving conditions (such as familiar roads, good weather, and owner's vehicle.) For example, travel to a local site for a weekly project meeting is a routine journey.

Non-routine journeys: driving tasks associated with extended travel distances (greater than 100 miles one way) or duration, unfamiliar regions or terrain, and unusual conditions (such as unfamiliar roads, bad weather, and use of a rental vehicle.) For example, mobilizing to a new project or area that is not familiar to the driver, either because of unfamiliar roads, wildlife, night

driving, and bad weather is a non-routine journey. Such journeys may also require specific security and emergency response considerations as well as additional planning and controls.

Basic Operating Standards:
All journeys, whether routine or non-routine, must comply with ENTACT's basic motor vehicle operating standards as follows:

- All vehicle occupants must wear safety belts (seatbelts and shoulder harness if provided)
- No vehicle shall be operated by a driver under the influence of drugs or alcohol
- Keep speed appropriate to conditions and follow all local laws and regulations
- Cellular telephone and 2-way radio use, in either the hand-held or hands free mode, by the driver of a motor vehicle is strictly prohibited while the vehicle is in motion
- Never operate a motor vehicle if you will exceed the "16 Hour Rule"
- Where practical, vehicles will be parked such that the first movement after inspecting and starting the vehicle is in the forward direction

16 Hour Rule:
To minimize risk caused by fatigue, employees will not engage in driving if the journey requires them to exceed 16 hours of continuous duty in one day. For example, a 5 hour road trip at the end of 12 hour work shift can raise the risk of a crash due to fatigue to an unacceptable level. The driver should have adequate rest prior to the start of the trip.

Additional Requirements for Routine Journeys:
Employees on routine journeys should "question the need for every trip" by asking themselves the following:

- Is there an alternative way of achieving this trip's objective, such as using a courier or having a teleconference or net meeting? If the answer to this question is yes, the trip may not be necessary.
- Do I know the route to the destination well? Drivers should have a clear understanding of the best route to the destination in advance. If this is not the case, a better alternative may be to take a taxi or car service.
- Have I considered all environmentally related hazards for the route of travel? Weather conditions, road conditions, and traffic conditions present at the planned time of departure must be considered. Fog, rain, ice, or road construction present hazards that need to be accounted for by selecting an alternative route or delaying or rescheduling the trip.
- Must this journey be made at night? Driving at night increases risk substantially. Consequently, extra caution is required. For night travel on routine journeys, consider what steps must be taken to minimize the risk. Actions such as decreasing speed, altering the route to well lighted streets, or delaying or rescheduling to arrive in daylight hours are possibilities.

Additional Requirements for Non Routine Journeys:
All non-routine journeys require a formal journey management plan (JMP.) The JMP should address security concerns (if applicable) and emergency response issues. At a minimum, all drivers will inquire about the safest route of travel and notify their business contact and/or supervisor of travel plans and expected arrival time. Copies of completed JMPs should be included with the employee's or contractor's travel itinerary. Completed JMPs should be electronically sent to the destination location. Safe arrival should be confirmed within 4 hours of the estimated arrival time with personnel at the same destination location. Personnel at the destination location should notify the traveler's supervisor if the traveler fails to confirm safe arrival. Additional considerations are as follows:

- Security concerns that may be present on the planned route need to be addressed. For example, planned demonstrations, high risk crime areas, car jacking, and kidnapping are security concerns. If security is an issue for the journey, the JMP should address how that risk will be minimized. Carrying of weapons while on Company business is not permitted.
- Emergency response (ER) services, especially in remote locations may not be available. Arrangements for communication and support, such as cell phone, local 911 service, two way radio must be made. The local emergency response service is an appropriate answer in many cases, however, on some journeys; drivers need to be aware of the limitations and even existence of ER services. The best way to minimize this risk is by ensuring personnel at the destination location know the planned arrival time and what to do in the event the driver does not arrive or make contact.
- Night driving during non-routine journeys should be avoided except in the event of an emergency. The journey should be rescheduled to allow for daylight travel in all other cases.

Related Documents:
Forms (provided on the following pages) have been developed to assist drivers and other affected Associates in complying with this journey management process. The forms include a Journey Assessment Form and Journey Management Plan. Also, a JSA (provided on the following pages) for driving passenger vehicles is applicable and required as part of the overall safety process.

Journey management planning requirements are in addition to other ENTACT requirements that appear in Section 9.0 and 10.0 of the Associate Handbook as well as the Driver Safety and Cell Phone Policies.

JMPs will be prepared in addition to site-specific Health and Safety Plans.

Journey Assessment Form

For use by: ☐ ENTACT Associate ☐ Contractor/Sub-contractor

Assessment developed by: _____ _____ _____

_____ _____ _____

Driving requirement: _____

Is this trip necessary?	☐ Yes	☐ No
Is there an alternative that does not involve driving?	☐ Yes	☐ No

If yes, by what means: _____

Basic Journey Steps

Was a JSA developed or revised for this driving task by employees from the site that will be involved in the task?	☐ Yes	☐ No
Does the JSA break the journey into steps necessary to accomplish the task and describe in "what" not "how" steps?	☐ Yes	☐ No
Are the journey steps numbered for reference?	☐ Yes	☐ No

Potential Crashes or Hazards

Are the hazards associated with each journey step identified by asking "what" driver action, condition, or event can lead to a crash?	☐ Yes	☐ No
Are potential health hazards identified (toxics, heat/cold, fatigue)	☐ Yes	☐ No
Are all potential crashes (struck by, line of fire, pinch points) identified with a corresponding solution or mitigation technique?	☐ Yes	☐ No
Are the potential crashes/hazards numbered for reference?	☐ Yes	☐ No

Safe Procedures and Behaviors

Are safe procedures and behaviors identified for minimizing or eliminating each identified potential crash or hazard?	☐ Yes	☐ No
Are the safe procedures and behaviors specific?	☐ Yes	☐ No
Are vague and general statements avoided?	☐ Yes	☐ No
Are the safe procedures and behaviors numbered for reference?	☐ Yes	☐ No

JSA Process Review

Was the JSA revised because the scope of work changed?	☐ Yes	☐ No

Does the JSA match the task to be performed? ☐ Yes ☐ No

Journey Management Plan

For use by: ☐ ENTACT Associate ☐ Contractor/Sub-contractor

Developed by: _____ _____ _____

_____ _____ _____

Task or Trip description: _____

_____

Is this trip necessary? ☐ Yes ☐ No
Is there an alternative way of achieving the trip objective? ☐ Yes ☐ No
If yes, how: _____

Destination: _____ Contact Phone Number _____

Vehicle	**Driver**	**Passenger**
_____	_____	_____
_____	_____	_____
_____	_____	_____

Departure Time: Estimated Time of Arrival:

Security Escort Required? ☐ **Reason:** _____

Weather ☐ Dry ☐ Windy ☐ Rain ☐ Snow ☐ Fog ☐ Icy ☐ Dust

Road Conditions ☐ Dirt Road ☐ Pot holes ☐ Paved Road ☐ Mixed Conditions

Driver Hours Work hrs _____ + Driving Hrs _____ = Total Hrs _____
(total hours may not exceed 16 hours in any day)

Communications ☐ Cell phone ☐ Two-Way Radio ☐ Other _____

Night Driving ☐ Yes ☐ No Is it essential? ☐ Yes ☐ No
Night driving controls (list) _____

Vehicle condition ☐ **Satisfactory**
Person responsible for the daily inspection of the (these) vehicle(s)? _____

Person responsible for preventive maintenance on the (these) vehicle(s)? _____

Documentation Check	Yes	No

Vehicle registration/license	☐	☐
Proof of insurance	☐	☐
Valid driver's license (or CDL as required)	☐	☐
Valid vehicle inspection (if required)	☐	☐

Journey Hazard Review

Step	Hazard	Mitigation
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____

Comments:

Supervisor Approval _____ Date _____

Job Safety Analysis	
Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, success agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each work day. Job Task Review (JTR) procedures must be used during field activities. Also consider weather conditions (heat, cold, rain, lightning).	
Work Type:	Driving - Passenger Vehicle
Personal Protective Equipment (PPE) needed	
Safety Glasses	
Work Boots - Steel Toe, Leather	

Job Steps	Potential Hazard(s)	Critical Action(s)
Conduct JTR	• NLI/LI	Always conduct an JTR prior to start. • Assess the risk. What is the worst that could happen? • Analyze how to reduce the risk. Ask yourself what you could do to make the task safer. If you are uncertain, then ask someone who would know. • Act to ensure safe operations. Use the ideas and tools that make the task safer.
Perform Vehicle Inspection	• Vehicle failure • Incident or injury	• Check overall condition of vehicle. • Inspect tire condition and pressure. • Check all fluids. • Check head lamps, turn signals, and back up lights. • Clean mirrors and windows. • Inspect the interior of the vehicle; including seat belts and gauges. Remove any clutter or items that may affect your driving or visibility. • Follow appropriate maintenance schedule for your vehicle. Verify insurance card, registration and inspection.
Pre vehicle entry	• Injury or incident. • Vehicle or property damage	• Before entering your vehicle, do a complete walk around. • Be sure that there are no persons or objects behind you or in your path. • Consider ground conditions. Is it wet or muddy? Could the vehicle become stuck or slide? • Consider weather conditions. Is there lightning, flooding or high winds?
Configure seating and controls and	• Visibility • Sitting to far or to close to pedals may effect	• Adjust seating to a comfortable position and so that you can easily reach the pedals and steering wheel. • Adjust all mirrors. • Wear seat belt. • If you haven't operated this

Job Steps	Potential Hazard(s)	Critical Action(s)
lock doors	reaction time in a stop, or have unexpected results during acceleration.	vehicle before, become familiar with all the controls and where every this is located in the vehicle. • Look for blind spots in your viewing area. • Refer to the owner's manual if necessary.
Starting Vehicle	• Unexpected vehicle movement. • Engine damage or failure	• Before starting, ensure that the vehicle is in park and the parking break is applied. • After starting, check all gauges for proper temperatures, pressures, etc.
Pulling away from parked area.	• Collision with other vehicles, objects or persons.	• Check mirrors and over the shoulder before pulling away. • Vehicle should be situated so the first movement is forward, however if backing, either use a spotter or blow horn to warn others. • Proceed Cautiously.
Driving	• Auto incident • Pedestrians • Foreign objects in roadway • Cross traffic • Mechanical failure • Becoming lost or disoriented. • Weather	• Always be alert while driving. • Plan your route, review maps before leaving. Stop in a secure areas if you need to review your map again. • NEVER drive under the influence of drugs or alcohol. If under medical treatment, consult your physician about side effects of medications. Inform H&S if you are taking any medications. • Never operate the vehicle if you are abnormally tired. • Obey all laws of the land as well as site procedures. Follow posted signs. • Be observant of pedestrians and other traffic around you. Be prepared to "expect the unexpected". You never know what someone else (or animals) might do. • Watch your gauges and listen to the sounds that the vehicle makes. If something doesn't seem right, pull over and check it out or call for help. • Continually check mirrors. Follow the 3 second rule for following in normal circumstances. • Leave adequate space between you and other when stopping. • Never use a cell phone or 2-way radio while driving. Save phone calls for when you are stopped. If you must take a call, pull off the road in a safe area away from traffic. • Reduce speed during hazardous circumstances. Pull off the road if necessary during bad weather.

ATTACHMENT I JOB SAFETY ANALYSIS

The following JSAs are provided as guidance and to assist the site Health and Safety Officer and Field Crew (JSA Development Team) with the development of site-specific JSAs. The Development Team will prepare a JSA for work tasks and equipment by applying work experience and skills learned during training.

Job Safety Analysis			
Work Type:	Heavy Equipment Operation: Dozer		
Personal Protective Equipment (PPE) needed			
Body Suit - Coveralls			
Hard Hat			
Hearing Protection - plugs			
Orange Safety Vest			
Protective Gloves - cotton dipped or leather			
Respiratory Protection - OV/P-100			
Safety Glasses			
Work Boots - leather steel toe			
No	**Job Steps**	**Potential Hazard(s)**	**Critical Action(s)**
1	Conduct JTR.	NLI/LI.	Always conduct an JTR prior to start.
2	Conduct inspection using ENTACT daily inspection check list.	Lack of inspection could cause equipment damage or injury to driver.	Lockout/tag out, make sure ignition key is in your pocket, not in the ignition.
3	Clean/defrost windows and mirrors.	Obstructions in windshield and windows/mirrors could cause injury/equipment damage or even death.	Keep paper towels and window cleaner in equipment at all times. Clean only when equipment is off and parking brake is applied.
4	Entering the equipment.	Slips/falls and pinch points may cause injury or death.	Always use 3 point mount/dismount. Stay clear of pinch points. Utilize approved mounting steps, brackets and handrails. Use required PPE.
5	Configure controls and seating.	Ergonomics/unnecessary physical stress. Incapable of reaching controls. Visual blocks.	Upon sitting, adjust seat fully to accommodate reach and comfort zone. Adjust mirrors. Fasten seat belt. Make certain all controls are set in neutral positions.
6	Starting and	Unanticipated rolling or movement, engine	Review operator's manual if new to this

	warming up.	fire, or mechanical/electrical faults.	particular machine. Start engine and check controls to ensure all green lights. Allow minimum of two minutes warm up.
7	Moving equipment work area.	Other equipment, personnel, or objects in work area. Uneven terrain.	Conduct JTR. Know the daily task and other people and equipment in the area.
8	Performing tasks.	Other equipment (collision), slopes, ground conditions possible injuries to personnel and equipment, buried obstacles, underground and overhead utilities, and dust. SPOT TRUCKS WHEN DUMPING MAKE SURE THEY ARE LEVEL HAVE COMMUNICATION WITH DRIVER BE AWARE OF OTHER EQUIPMENT IN YOUR WORK AREA NEVER STAND BETWEEN DOZER AND TRUCK WHEN DUMPING	Perform JTR. Know where utilities are located. Be aware of the scope of work to be performed. Know the paths of other equipment or persons entering and leaving your work area. Communicate with supervisors throughout the day with any questions. Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure, or personal injury or near loss. Make visual contact with all site personnel walking in your area of work.
9	Stopping at end of day.	Slips, trips and falls. Fuel splash/spill. Underground movement of equipment, or hydraulic leak.	Park in designated area. Set brake/control locks. Idle two minutes if engine is hot. Lower blade to ground. Turn equipment off, use 3 point dismount. Be sure that you are in a well ventilated area. Grease moving parts.

Job Safety Analysis

Work Type: Heavy Equipment Operation: Motor Grader

Personal Protective Equipment (PPE) needed

Level D

No	Job Steps	Potential Hazard(s)	Critical Action(s)
1	Conduct JTR	NLI/LI	Always conduct an JTR prior to start.
2	Conduct inspection using ENTACT daily inspection check list	Lack of inspection could cause equipment damage or injury to driver	Lock out/ Tag out, make sure ignition key is in your pocket, not in the ignition. Check all fluids.
3	Clean/Defrost windows and mirrors	Obstructions in windshield and windows/mirrors could cause injury/ equipment damage.	Keep paper towels and window cleaner in equipment at all times. Clean only when equipment is off and parking brake is applied.
4	Entering the Equipment.	Slips/falls and pinch points may cause injury or death	Always use 3-point mount/dismount. Stay clear of Pinch Points. Utilize approved mounting steps, brackets and handrails. Use required PPE.
5	Configure controls and seating	Ergonomics/ unnecessary physical stress. Incapable of reaching controls. Visual blocks.	Upon sitting, adjust seat fully to accommodate reach and comfort zone. Adjust mirrors. Fasten seat belt. Make certain that all controls are set in Neutral positions.
6	Starting and warming up.	Unanticipated rolling or movement, engine fire, or mechanical/electrical faults. Noise	Review operator's manual if new to this particular machine. Start engine and check controls to ensure all green lights. Allow minimum of two minuets warm up. Wear ear plugs or be sure the doors are closed to protect ears from loud noise during startup.
7	Moving equipment to work area.	Other equipment, personnel, or objects in work area. Uneven terrain.	Conduct JTR as the task changes. Know the daily task and other people and equipment in the area.
8	Performing tasks.	Other equipment (collision), slopes, ground conditions possible injuries to personnel, and equipment, buried obstacles, underground and overhead utilities, and Dust.	Know where utilities are located. Be aware of the scope of work to be performed. Know the paths of other equipment or persons entering and leaving your work area. Communicate with Supervisors through out the day with any questions. Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure or

			personal injury or near loss.
9	Stopping at end of day	Slips trips and falls, Fuel splash/spill. Unexpected movement of equipment, or hydraulic leak	Park in designated area. Set brake/control locks. Idle two minutes if engine is hot. Lower blade to ground. Turn equipment off, use three point dismounts. Be sure that you are in a well ventilated area. Grease moving parts.

Job Safety Analysis

Work Type:	Heavy Equipment Operation: Articulating Dump Truck

Personal Protective Equipment (PPE) needed
Hard Hat
Level D
Orange Safety Vest
Other - Two way radio, fire extinguisher
Safety Glasses
Work Boots - Steel toe

No	Job Steps	Potential Hazard(s)	Critical Action(s)
1	Conduct JTR.	Failing to identify hazardous conditions resulting in losses or near losses	Follow JTR card. Assess the risks. Determine the hazards of performing the task and survey the work area. Consider weather conditions such as recent rainfall that could cause soft ground and could compromise integrity of excavations; wind that could increase lateral loads when dumping; rain and fog that could decrease visibility; wet or icy conditions that could cause slippery conditions. Always consider the worst case scenario. Analyze the hazards determined. Decide a plan of action to eliminate or reduce these hazards. Act to reduce the hazards. Follow through with the plan determined when analyzing.
2	Perform daily equipment inspection.	Equipment malfunction or damage; hydraulic fluid, fuel, oil leaks/spills; loss of steering, loss of brakes, etc.-incidents; decreased visibility; failing to lo/to; fire	Ensure key is not in ignition. Follow ENTACT equipment inspection form. Check all fluids. Ensure fluids are not too low or too full. Walk around truck. Look for damage. Look for leaking fluids. Ensure proper tire pressure. Clean mirrors and windows. Remove any trash or other debris from cab. Ensure back-up alarm and horn is operational. Ensure fire extinguisher is on equipment and functioning. Inspect the fire extinguisher monthly.
3	Establish communication and plan a haul route	Personnel and/or equipment damage due to inadequate communication; head on	Establish hand signals and horn signals for communication. Always maintain clear radio communication.

	with operators and other associates involved in the task.	collisions with other truck traffic	NEVER proceed with the task until communication is clearly established. If communications are unclear, stop work until clear communications are reestablished. Ensure that everyone knows the correct haul route. Inform other relevant site personnel of the route you will be using. If route changes through out the day, notify all relevant site personnel.
4	Enter truck and start.	Slips, trips, falls; failing to fasten seatbelt-injuries and death; failing to adjust mirrors and seat; unexpected movement of equipment	Make sure steps are clear of mud, ice and debris. Use 3 point contact for mounting. Make sure seatbelt is securely fastened. Adjust seat and mirrors appropriately. Ensure truck is in neutral and parking brake is engaged. When entering and exiting truck, walk around to ensure that no people or equipment is in blind spot.
5	Drive forward.	Injury/death due to incidents-contact with other equipment or pedestrians; property and/or equipment damage; failing to remain alert and aware of surroundings-repetitive task; complacency	Check all mirrors before moving. Be aware of surroundings and blind spots. Drive at reasonable amount of speed. Never exceed posted speed limit of 10mph. Reduce speed if conditions such as heavy traffic routes, weather, rough terrain, dust, etc. exist. Be familiar with the route to be used. If route changes throughout the day, notify appropriate personnel. Ensure that routes are free of obstacles such as debris and ruts. NEVER use a route that travels against the flow of haul truck traffic unless the route is coordinated, approved and overseen by Field Project Manager. Be aware that other site sub/contractors use these same roads. Be a defensive driver. Be aware of other site personnel not following safe driving procedures. Obey site traffic rules. Drive with lights on and heed all traffic signs.
6	Drive in reverse.	Injury, death or due to incidents-back off edge of excavation, back into equipment, people or other obstacles; truck turn over-backing onto uneven, badly rutted or extremely soft	Always minimize backing up; plan ahead to ensure first move is forward. NEVER back up if unsure of what is behind the truck. NEVER back up without the aid of a spotter. When using a spotter, NEVER back without knowing his location. Use

		material; blind spots; poor visibility	mirrors and turn body to look out windows to cover all blind spots. Exit cab to check area if unsure of conditions such as soft ground, rebar/other debris. Back at a slow rate. Use 6 wheel drive when needed. Never drive close to an edge or back to an edge that could collapse. Never back when vision is obscured by sunlight, darkness, fog, etc. Never back onto an upward slope, badly rutted or extremely soft ground.
7	Receive load.	Injury, death or equipment damage-contact with other equipment, truck tip; miscommunication; falling debris; unexpected equipment movement	Never allow the truck to be loaded with excavator swinging over cab. Never stand next to a truck or allow others to stand next to a truck being loaded. Set parking brake and park a sufficient distance from the equipment loading the truck. Follow instruction from excavator operator on where to park. Maintain radio communication with operator loading truck and others in the area. Ensure the loading area is level, free of ruts and not too soft. Communicate with the operator loading the truck to ensure that the load is centered. Ensure that the truck is not overloaded. If hauling pipe, ensure the pipe is 10 ft or less.
8	Dump load.	Equipment damage, injury or death-truck tip, excavation collapse; overhead utilities; failing to remain alert, complacency	Ensure the truck is on stable, level surface. Have ruts removed. Inspect area for rebar or other debris that could puncture a tire or otherwise cause dumping to be unsafe. Inspect area for overhead power or other lines and mark. Ensure that no people or equipment is in the tip radius of the truck before dumping. Align the cab with the bed. Place truck in neutral, set parking brake, lift up on the lever that starts the bed up. Once the bed is fully up, place the truck in drive. Disengage parking brake and slowly pull forward until bed is empty. STOP MOVING and lower the bed. ALWAYS watch the bed lower in mirrors. Do not continue forward until the bed is more than 50% down. If route from dumping

			area poses hazards such as over head power lines, turns, unleveled ground etc., lower bed completely before moving. Drive straight on solid, level ground until bed is completely down. Always remain alert while operating the truck.
9	Complete task and exit truck.	Unexpected movement of truck; slips, trips, falls	Park truck on level ground in a safe area. Engage parking brake. Turn off and remove key. Dismount using 3 point contact.

Job Safety Analysis

Work Type:	Heavy Equipment Operation: Excavator

Personal Protective Equipment (PPE) needed
Fire Resistant Clothing
Hard Hat
Level D
Orange Safety Vest

No	Job Steps	Potential Hazard(s)	Critical Action(s)
1	Conduct JTR.	Failing to identify hazardous conditions resulting in losses and near losses.	Follow JTR card. Assess the risks. Determine the hazards of performing the task and survey the work area. Consider weather conditions such as recent rainfall that could cause soft ground and could compromise integrity of excavations; rain and fog that could decrease visibility; wet or icy conditions that could cause slippery conditions. Always consider the worst case scenario. Analyze the hazards determined. Decide a plan of action to eliminate or reduce these hazards. Act to reduce the hazards. Follow through with the plan determined.
2	Conduct inspection of equipment using ENTACT inspection check list.	Lack of inspection could cause equipment damage or injury to driver	Lock/out tag out - make sure ignition key is in pocket, not in the ignition. Bucket should always be on the ground. Check hydraulic hoses to be sure they have enough slack when operating boom. Ensure all pins are in place. Grease equipment every 10 hrs of work.
3	Clean/defrost mirrors and windows.	Obstructions in windshield and mirrors could cause injury/equipment damage-reduced visibility	Keep paper towels and window cleaner in equipment. Clean only when equipment is off and parking brake is applied.
4	Enter the equipment.	Slips and falls; pinch points may cause injury or death	Always use 3 point mount/dismount. Stay clear of pinch points. Utilize approved mounting steps, brackets and hand rails. Use required PPE

5	Configure controls and seating.	ergonomics/unnecessary physical stress, incapable of reaching controls, visual blocks	Upon sitting, adjust seat fully to accommodate reach and comfort zone. Adjust mirrors, fasten seat belt. Make certain that all controls are in the neutral position.
6	Start and warm up.	unanticipated rolling or movement, engine fire, mechanical/electrical faults	Review operator's manual if new to machine. Start engine and check controls to ensure all green lights. Allow minimum of two minutes to warm up. Ensure parking brake remains engaged while warming.
7	Move equipment to work area.	other equipment, site traffic, overhead utilities, personnel or objects in work area, uneven terrain	Conduct JTR. Know the daily task and tasks of other people and equipment in the area. Raise the bucket off the ground to situate machine in the work area. If traveling from one work area to another, watch for overhead power lines. Travel with boom low and bucket curled. Survey the travel path for overhead utilities ahead of time.
8	Perform task.	Other equipment (collision), slopes, ground conditions changing, possible injuries to personnel/equipment, buried obstacles, underground and overhead utilities and other overhead hazards; muddy or water filled excavations; uncovering drums or other unknown hazardous material, cave-ins	Perform JTR. Know where utilities are located and have them marked. Know the scope of work to be performed. Know the paths of other equipment or persons entering and leaving the work area. Communicate with supervisors throughout the day with questions. Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment problems or personnel injury or loss. Never enter an excavation that contains water. Survey an excavation that is wet to determine if the soil is to soft to enter. Any questionable excavations should not be entered. Anytime questionable debris, material or drums is uncovered during excavation, the FPM should be notified immediately. Excavation should be stopped until further instruction from the FPM. Never stand or work within 2 ft. of the edge of an excavation. If working

			on top of a spoil pile, never throw material over the side without checking for others working below. Never let other workers stand behind or in front of the excavator while it is being operated. If working at the bottom of a stockpile, remain aware of activity on top of the stockpile. Maintain constant communication with others working in the area.
9	Park, shut down and exit equipment.	Unexpected movement, trespasser starting/moving equipment, unstable ground sloughing	Park equipment on stable ground and lower bucket to ground. Consider weather. Will ground become unstable overnight? Set parking brake and remove keys. Use a 3 pt. dismount.

ATTACHMENT J INCIDENT REPORTING

ENTACT is guided by an established safety policy. This policy is based on a sincere desire to eliminate personal injuries, occupational illnesses, and damage to equipment and property, as well as to protect fellow associates and the general public whenever the public comes in contact with, or is affected by, ENTACT's work.

Managers and supervisors are charged with the responsibility of preventing the occurrence of incidents or conditions that could lead to occupational injuries or illness. While it is management's responsibility to provide a safe environment in which to work, the ultimate success of a safety and health program depends upon the full cooperation of each individual associate.

Safety should never be sacrificed for production. It must be considered an integral part of quality control, cost reduction and job efficiency. Every supervisor will be held accountable for the safety performance demonstrated by the associates under their supervision. Our goal is the total elimination of incidents from our operations. There are three sound reasons for this goal:

1. No endeavor is worthy if it should cause human suffering through disabling injury or loss of life.
2. A good safety record reflects the quality of management, supervisors, and the work force. It also serves to promote business and thereby contributes to the continuing growth and success of ENTACT.
3. Poor incident experience increases costs and results in a loss of profits. Our policy is to accomplish work in the safest possible manner consistent with good work practices. Management at every level is charged with the task of translating this policy into positive actions.

INCIDENT REPORTING PROCEDURES

All incidents, injuries, and significant near misses must be reported immediately to the associate's supervisor. Subcontractors will promptly report any incident to the ENTACT Field Project Manager. Work will stop until the situation is addressed and work can safety resume. Incident information will be forwarded to the Project Health and Safety Coordinator and Corporate Health and Safety Director within 24-hours. The client or owner representative will be notified according to their requirements.

The project management team will use ENTACT's Online Incident Notification System to report losses and significant near losses. This notification system does NOT replace any part of ENTACT's incident notification requirements and investigation process.

http://www.sENTACT.com/ENTACTincidents/

A thorough investigation will commence to determine the facts of the incident, root causes, solutions, and verification and validation of solutions. A completed Loss Investigation / Near Loss Investigation report and supplemental information (first report of injury, witness statements, supervisor statement, police report, damaged equipment report, monitoring reports, photographs, drawings, etc.) must be provided to Corporate Health and Safety within 5 working days of all incidents. If applicable, a Why Tree Incident Investigation will commence following established protocol and final report submitted to the Health and Safety Director within two weeks of the incident. ENTACT's Post Accident Drug and Alcohol testing procedures will be followed. Completed incident documentation shall be maintained on-site and at the Corporate Health and Safety office.

Incident reporting forms are located in the Policies and Procedures section of the ENTACT Behavior Based Safety System or are available on the intranet at: http://connected.ENTACT.com/index.php .

Failure to report an incident immediately after it happens may result in dismissal and/or delay or denial of associates' workers compensation benefits.

ENTACT shall maintain a log of occupational injuries and illnesses as required by federal law in accordance with the OSHA record keeping requirements of 29 CFR 1904.2

MOTOR VEHICLE INCIDENT REPORTING

Associates, supervisors, and subcontractors are responsible for reporting all motor vehicle incidents involving ENTACT (business or personal). This includes any incident involving a company owned, leased or rented motor vehicle. Where appropriate, work will stop until the situation is addressed and work can safety resume. Verbal notification of a motor vehicle incident will be given to the HSD or his designee within 24-hours of the incident. An incident investigation will commence as noted above including loss of load and/or damaged to other property. This documentation will be forwarded to the Project Health and Safety Coordinator and Health and Safety Director within 72-hours of the incident. The client or owner representative will be notified.

ATTACHMENT K SPILL CONTROL

Information for this plan will vary from project to project according to site-specific needs. Site-specific information should be added once site operations have begun. The following are provided as guidelines.

Gasoline/Diesel

- Each tank is self-contained up to 110% of capacity of the tank.
- Barricades are installed around the tanks to prevent incidental damage to the tanks.
- Only skilled operators are allowed to refuel the equipment at specific times during the day.
- Tanks are inspected twice a day - once in the morning and once in the afternoon with a twenty-four hour guard service.
- Safety meetings outline spill prevention control measures.

Identifying Material

- Locations will be marked once they are established.
- Material Safety Data Sheets will be available on site for diesel and gasoline.
- "Flammable" signs will be posted at the locations on the gasoline tank.
- The material name will also be posted on all tanks.

Spill Response

The FPM is the responsible person in charge of spill protection and in the case that a spill does occur:

- The FPM will be notified.
- If a spill does occur one of the most important factors is in limiting the environmental damage through a speedy clean-up.
- The FPM will react immediately, stopping the leak, containing the product with absorbent bags and absorbent material.
- Client representatives will be notified as soon as possible.
- One person will be assigned to stand-by with a fire extinguisher.
- All materials picked up will be placed in a 55-gallon drum for proper disposal.
- All unnecessary personnel will be kept away from the area.
- Waste accumulated must be removed from the containment area within twenty-four hours or at the earliest practicable time.

To What Level Is Clean?

The spill material must be cleaned-up so that the environment is returned to as close to its pre-spill condition as possible. Any residue that remains must pose no risk to public health and must be at levels that are acceptable to regulatory agencies.

Disposal of Cleanup Materials

The material cleaned-up from a gasoline or diesel tank would be classified as hazardous waste and all containers would have to be clearly labeled and properly disposed. Material from the treated wastewater will be tested for proper disposal protocol.

Spill Report

After the clean-up has been completed, a detailed report with all circumstances relating to the leak and how the spill response team reacted to the spill with an Estimated Damages Report must be submitted to ENTACT and client representatives. All spills require completion of a Near Loss Incident/Loss Incident Report.

ATTACHMENT L PERSONAL PROTECTIVE EQUIPMENT

The following is a brief description of the personal protective equipment that may be required during remediation activities. The U.S. EPA terminology for Levels A, B, C, and D personal protective equipment will be used.

Respiratory protective equipment shall be NIOSH-approved and use shall conform to OSHA 29 CFR 1910.134 requirements. ENTACT maintains a written respirator program detailing selection, use, cleaning, maintenance, and storage within the ENTACT Comprehensive Health and Safety Manual. A copy shall be available at each project and at ENTACT's Corporate Office in Grapevine, Texas.

Equipment to protect the body against contact with known or anticipated chemical hazards has been divided into four categories or levels according to the degree of protection required:

LEVEL A
Level A provides the highest level of skin and respiratory protection and is used in the following situations:

- The extremely hazardous substance requires the highest level of protection for skin, eyes, and the respiratory system.
- Substances with a high degree of hazard to the skin are known or suspected.
- Chemical concentrations are known to be above IDLH levels.
- Biological hazards requiring Level A are known or suspected.
- Oxygen deficient or potentially oxygen deficient atmosphere (<19.5%) are possible.

Protective Gear:
Supplied Air respirator- self-contained breathing apparatus (SCBA) or air line with 5-minute egress air pack
Fully encapsulating chemical resistant suit
Inner and outer gloves
Boot covers
Work gloves
Steel-toe leather and rubber over boots
Hard hat
Hearing protection
Communication device

LEVEL B
Level B provides the same level of respiratory protection, but a lesser degree of skin protection than Level A. It is used when:

- Substances have been identified and require a high level of respiratory protection but less skin protection.
- Concentrations of chemicals in the air are IDLH or above the maximum use limit of an APR with full-face mask.
- Oxygen deficient or potentially oxygen deficient atmosphere (<19.5%) are possible.
- Incomplete identification of gases and vapors, but not suspected to be harmful to skin.

Protective Gear
Supplied air respirator – SCBA or air line with 5-minute egress air pack
Chemical resistant suit
Inner and outer chemical resistant gloves
Steel toe leather work boots and over boots
Hard Hat
Hearing Protection
Communication devices

LEVEL C

Level C provides the same level of skin protection as Level B, but a lower level of respiratory protection is required. Level C is used when:

- The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove contaminants.
- The substance has adequate warning properties and all criteria for the use of APR respirators have been met.
- Oxygen concentrations are in the normal range.

Protective Gear
Air purifying respirator with filters and cartridges
Chemical resistant Coveralls
Inner and outer chemical resistant gloves
Steel Toe Leather, safety boots with outer covers
Hard Hat
Safety glasses or goggles
Hearing Protection
Communication device

LEVEL D
Level D is a basic work uniform worn when no skin or respiratory hazards exist. Level D is used when:

- The atmosphere contains no known hazard; and,
- Work functions preclude splashes, immersion or the potential for unexpected inhalation

of, or contact with, hazardous concentrations of harmful chemicals.

Protective Gear
Coveralls
Steel toe, leather work boots
Hard Hat
Safety Glasses or goggles
Hearing Protection

Any personal protective equipment issued to the associate by the company is the personal responsibility of the associate. He/she must ensure that it is kept in a safe and clean condition and in his/her possession at job sites. When in disrepair, it must be returned for repair or replacement.

In certain construction and maintenance operations, personal protective equipment, such as safety glasses, chemical goggles, respirators, hard hats, and protective clothing is required. The type of protective equipment to be worn will be determined by the degree of exposure to the potential hazard. When in doubt about the safety measures to be observed, associates shall contact the supervisor.

Limitations of PPE
While personal protective equipment reduces the potential for contact with harmful substances, ensuring the health and safety of associates requires, in addition, safe work practices, decontamination, site entry protocols, and other safety considerations. Together these protocols establish a combined approach for reducing potential harm to associates.

Personnel must wear protective equipment when response activities involve known or suspected atmospheric contamination, when vapors, gases or particulate may be generated, or when direct contact with skin-affecting substances may occur. Respirators can protect lungs, gastrointestinal tract, and eyes against air toxicant. Chemical-resistant clothing can protect the skin from contact with skin-destructive and absorbable chemicals. Good personal hygiene limits or prevents ingestion of materials.

In addition to risks due to contaminants, some physical hazards or hazardous conditions may be present at the site. These include risk of injury while working around heavy equipment, explosive or combustible gas generation, hearing damage from heavy equipment noise, and heat or cold stress.

Additional Information

Eye Protection
Eye protection is required when engaging in operations such as the following:

- Drilling, chipping, grinding, wire brushing.

- Handling caustics and acids.
- Breaking bricks and concrete.
- Hammering and chiseling.
- At least number 2 shaded eye protection for burning and oxy-gas welding.
- Other situations that create a possible eye hazard, e.g., chemical environments.

The following are different types of eye protection used:

- Industrial type safety glasses must be worn. Mono-goggles will be worn over regular prescription glasses, if the glasses are not industrial rated.
- A full-face shield must be worn while performing any job with high-pressure water. A face shield is not to be substituted for safety glasses or goggles, but used in addition to them.
- Chemical splash-guard goggles are required on all operations where solvents, acid, or caustics are used or in the immediate vicinity.
- Appropriate goggles must be worn at any time a hazard exists such as grinding or chipping operations or welding.
- Sandblasting hoods with plastic face shields and piece protection are required while operating a sandblast gun or nozzle. These must be positive pressure fresh air hoods.

Ear Protection

Ear plugs or muffs are required on projects where the noise level is above 85 dBA on an average of eight hours worked. If noise is a problem, associates must wear hearing protection that has NRR of 30.

Hand and Body Protection

Waterproof gloves, wet suits, and rubber boots will provide some protection. Where conditions warrant, additional protection such as acid suits, chemical gloves, metatarsal guards or shin guards must be worn. Personnel using arc welding equipment will comply with 29 CFR 1926.102 and will wear a long sleeve shirt, gloves, head protection, and using a welding hood with a sufficient shaded lens for the type of welding being performed.

Safety Harness and Lifelines

Whenever any associate is exposed to the hazard of falling six feet or more (10 feet on a scaffold), he must wear a serviceable safety harness and lifeline adequately secured to a fixed support. This will be so arranged that he cannot fall freely from a vertical distance more than three feet. This included any associate working on open steel, swing stages, suspended scaffolds, platforms without proper guarding, etc.

- When working on a swing stage or elevated device, the lifeline must be secured to a structure separate from the stage or elevating device.
- All harnesses, lifelines and lanyards are to be inspected before use for fraying or other

weak spots. Any defective item must be replaced before using.

- Safety body harness must be in good condition and the "D" ring must be placed in the back.
- Bolts, shackles, safety snap hooks, "D" rings and metal links which connect parts of the lifeline system to each other should be properly inspected and maintained at all times.
- Safety body harness and lifelines are required on all work performed in confined spaces where an oxygen deficiency or toxic vapors may exist.

Back Support Harnesses

When any associate is required to move or lift any materials, dollys, forklifts, pallet jacks, back harnesses, and proper lifting techniques should be utilized. Proper lifting techniques are taught to all associates during training sessions and are as follows:

- Put on a back harness support
- Get a good footing on a solid surface
- Place one foot alongside and the other behind the object
- Squat down beside the object keeping your back as straight as possible
- Tilt the object and firmly grasp at the bottom center
- Draw the object close to your body and lift slowly by straightening your legs
- Do not lift more than you can carry. Get help with bulky or heavy loads.

ATTACHMENT M MAN LIFT OPERATION

I. INTRODUCTION

This policy complies with OSHA 29 CFR 1910 Subpart F and provides guidance for the protection of personnel engaged in operating and using aerial lifts or man lifts in the performance of their jobs.

II. RESPONSIBILITIES

An aerial lift operator and associates will comply with the requirements of this policy and site specific requirements that might be designated.

III. REQUIREMENTS

A. Inspection

Inspection of the lift will be made at the time of arrival on site and will be made in accordance with and at intervals specified by the manufacturers recommendations.

B. Operation

1. No associate will be permitted to use or operate lifts unless he/she has been instructed and trained by a competent perform in the use and operation of such equipment. The operator must review the operator's guide prior to operating the equipment.

2. Equipment will not be moved when the boom is elevated in a working position with associates in the basket or on an elevated platform. Manufacturer's specifications and limitations will be observed.

3. Operators must work while standing on the platform, never on the top rail, mid-rail or toe-board, and shall not site or climb on the edge of the basket or use planks, ladders, or other devices for work positions. Associates may not climb out of the platform to an elevated work location unless there is a 100% tie-off protection.

4. Rigging shall not be allowed from the platform or boom.

5. Housekeeping in the basket and around the aerial lift must be maintained.

6. This equipment shall not be operated within 10' of overhead electric lines.

7. The equipment shall have load capacities posted on the basket. The operator shall adhere to these limitations.

8. Associates and their immediate tools shall use the manlift. The manlifts are not intended to be used as material handlers.

9. Associates are required to perform daily inspections of the controls and equipment prior to usage.

10. Cutting torch bottles will not be utilized in the aerial life basket.

11. Associates are required to wear fall protection. This will include a full body harness with a breakaway lanyard attached to the boom or basket while operating the manlift. **Note: Attachment points are provided by the manufacturer on the basket and will be used. It is unacceptable to wrap the lanyard around the rails and attach the lanyard to itself. It is unacceptable to attach the lanyard to an adjacent structure.**

12. A checklist must be completed and retained in the project files. The Competent Person is responsible for the completion of this checklist. The associate shall sign this document confirming his/her training.

IV. TRAINING

Associates shall be trained by a Competent Person in the following:

- Startup
- Forward and reverse
- Speed
- Up and down
- Extending the boom, retracting the boom
- Articulating
- Emergency stop
- Shut down
- Review of operator's guide

ATTACHMENT N BEHAVIOR BASED SAFETY: WRITTEN PLAN

Purpose

ENTACT is committed to operating incident free. ENTACT's most valuable resource is its employees. Protecting the members of our team has been and will always be priority number one. Promoting safety at work and empowering employees to be involved in the process has always been our goal. The key to preventing injuries is to be proactive. A behavior-based safety program is built around observing at-risk behaviors and replacing at-risk behavior with safe behavior and work practices. All employees at a ENTACT site will exercise the right to stop work if an unsafe act is occurring or perceived to be occurring. There is always time to discuss the act and come to a consensus to proceed in a safe manner.

Administrative Duties

The ENTACT Project Safety Coordinator, H&S Officer, and the Field Project Manager, is responsible for developing, amending and maintaining the written behavior-based safety program.

Corporate Performance Goals

The following corporate level goals for our behavior-based safety program are:

- Reduce personal injures.
- Reduce vehicle incidents at work and away from work.
- Complete participation from all employees, regardless of position or level.
- Observe, analyze, and reward safe work practices.
- Ensure that each division establishes and has the training to obtain its goals.
- Allow and encourage groups to discuss and achieve their own safety goals.
- Mandate that all employees actively participate in the program.

Theory and Implementation

There are two basic theories about people that are widely accepted in the psychology field. Theory X assumes that people do not like work and must be directed and or coerced into work. Theory Y assumes that people enjoy work, are committed toward achieving goals, and accept and need responsibility. A behavior-based program embraces the second theory and empowers employees to attain their goals. At ENTACT, we feel that people are motivated and we empower them to make decisions and advance themselves.

The focus of this company and its employees is to safely perform all tasks. Each task must be done safely or not at all. Employees will encounter situations where the "easy way" will save them time, but at ENTACT the "easy way" is unacceptable. Our team believes that injuries are preventable, but prevention takes effort and we are willing and determined to protect our employees.

As part of our program:

- Each employee will set individual, departmental and participate in setting company goals
- ENTACT will provide training and mentoring to all employees

Safe Work Environment

ENTACT tries to provide a work environment free of hazards by:

- Ensuring channels of communication are always open (open door policy)
- Provide employees with communication devices, so that field personnel can up-channel information or questions
- Create an atmosphere where trust is paramount, because trust is essential to open communication

Even with channels of communication open, steps need to be taken to ensure the working environment is free of physical, chemical, and environmental hazards. Employees have the right to work in a hazard free workplace. To keep our workplace safe, we have programs and training in the following:

- Hazard communication (per 29 CFR 1910.1200)
- Hazard identification (per 29 CFR 1910.120)
- HAZWOPER certifications are maintained (per 29 CFR 1910.120)

Observation and Feedback

At the heart of behavior-based safety is observation of tasks. At ENTACT observations are to be conducted by all employees. The observer must be trained in the task in which they are observing. The observation record must illustrate how many listed behaviors were recorded. Every behavior is rated as safe or unsafe. Immediately following the observation appropriate personnel will discuss and provide feedback.

All observations are recorded and forwarded the job site trailer at 2210 W. Pine River Rd, Breckenridge, MI, 48615.

Feedback and guidance is the key to field corrections. Observers are instructed to **STOP WORK IMMEDIATELY** if a behavior could cause an injury. Observers must also provide positive feedback for actions that are done safe. Feedback needs to constructive. Feedback may

be negative or positive. When providing feedback, keep in mind that the goal of this program is to make the site safer for all personnel. Do not become condescending or authoritarian in tone or manner.

Evaluate and Record

ENTACT continually tracks information from the observations. Every month, ENTACT will update tables and do a trend analysis for all at-risk behaviors. The results of our observations will be shared with all personnel working on the project. ENTACT will also do a quarterly analysis to assess the success of our safety program. Quarterly evaluations were being shared with all employees. The sharing of information will be continuous and not restricted to monthly or quarterly. Charts and graphs of at-risk practices will be posted and reviewed by all employees working on ENTACT projects.

Team Building

Teams are the building block of our behavior-based safety program. With a team structure, no single person is obligated to carry the program. Success of the program is based on the team ensuring that they meet there team goals. Each team will develop there goals, but each team is a working unit within the total program.

Roles and Responsibilities

Each employee is expected to be a professional and each professional is responsible for his or her own safety. Employees must accept this responsibility or the safety of everyone is at-risk.

ENTACT accepts the responsibility of implementing a behavior-based safety program and developing a culture that promotes and lives safety. The only way to meet our goals is to ensure that every employee receives and understand our goals. Training will be conducted to ensure that employees are knowledgeable in the plans and procedures of their company. All new employees will go thru a comprehensive orientation program and will be mentored.

New employee training will consist of:

Instruction will involve multiple types of media. Our training program is both classroom and field based. Training will cover the following topics:

- Definition of behavior-based safety
- Safety goals of the company
- Training on goals setting and productivity
- Hazardous communicate and hazard recognition
- A review of Standard Operating Procedures for all appropriate tasks
- Introduction to observation and feedback tactics
- How observations are evaluated
- Stop work authority

- A review of trends and at-risk behaviors
- The team philosophy
- Team training
- Roles and responsibilities within behavior-based safety
- OSHA HAZWOPER (initial or refresher)

Training is done either in-house or by an outside company. Training is lead by a competent person who is knowledgeable in the topic. All personnel are encouraged to conduct training sessions in their area of expertise. Employees are encouraged to be actively involved in their health and safety program.

All employees are mandated to conduct a formal observation of a co-worker once every two weeks for a total of two per month. These observations are the backbone of the behavior-based safety program. The observations will be recorded into a database, which will enable ENTACT to track at-risk behaviors. All data output will be discussed and or posted so that all employees can review the information.

ATTACHMENT O LOCKOUT TAGOUT

LOCKOUT TAGOUT

I. INTRODUCTION

The purpose of this program is to prevent accidents and injury associated with confined space entry, inspection, maintenance, and/or set-up of equipment, machines, or processes where unintentional start-up, or release of stored energy, product, or process material would be expected to cause harm to persons involved in such work, bystanders or property.

II. SCOPE

This program will apply to confined space entry, equipment maintenance, utility maintenance or other work involving energized equipment performed at ENTACT and covers all hazardous energy sources including, electrical, mechanical, pneumatic, hydraulic, steam and other similar sources.

Contractors/subcontractors performing work at ENTACT project sites will be informed of the existence of this program and its requirements. Contractors/subcontractors will comply with the provisions of this program, or provide to ENTACT in writing with an equivalent means of protection to persons/property in situations in which implementation of this program would be necessary prior to work beginning.

III. RESPONSIBILITIES

A. Health and Safety Department

- Develop and implement effective lockout/tagout procedures and training.
- Provide training and support to Project Managers, Field Project Managers, Health and Safety Coordinators, and associates regarding interpretation and implementation of the procedure.
- Conduct audits and inspections of project sites to assure program is being effectively implemented, where necessary. Periodic inspections will be performed by authorized associate that is not involved with procedure being inspected.
- Review program at least annually to assure it remains relevant to the operation of ENTACT project sites. Where lockout is utilized, the periodic inspection with each authorized associate will review their responsibilities under the energy control procedure being inspected. If tagout is used for energy control the inspection will review each authorized associate and the affected associate

responsibilities under the energy control procedure being inspected.. Documentation of the periodic inspection will include the type of equipment the energy control procedure was being utilized, the date of inspection, the associates included in the inspection and the authorized associate performing the inspection. After review is complete, any deviations or inadequacies that are discovered will be corrected by retraining associates involved with the procedure. All documentation will be forwarded to ENTACT Health and Safety Director for review.

B. Project Managers

- Designate a qualified and authorized person (Health and Safety Coordinator) to implement the lockout/tagout program.
- Provide supplies, equipment and site personnel to effectively implement this program.
- Notify contractors/subcontractors of the lockout/tagout program, allowing time for review, and answering questions regarding involvement of contractors/subcontractors in hazardous energy control situations.
- Enforce compliance with the requirements of this program.

C. Health and Safety Officers

- Evaluate work to be performed on equipment, machines and/or processes to determine when control of hazardous energy is required.
- Identify and designate qualified authorized persons to perform the tasks required in this procedure.
- Assure suitable restraining, security, and test equipment is available for control and measurement of hazardous energy.
- Conduct pre-work meetings with affected associates to discuss the work and their involvement.
- Provide training to ensure that the purpose and function of the energy control program are understood by associates authorized to do maintenance and that the knowledge and skills required for the safe application, use, and removal of the energy controls are acquired by the associates, as required by the lockout/tagout program. Authorized associates will be trained annually in the recognition of hazardous energy sources, type and magnitude of energy available in the workplace and the methods necessary to achieve energy isolation and control. Affected associates will be trained on the purpose and use of energy control procedures
- Training will include all associates whose work is or may be in the area of energy control procedure being implemented. Associates will be instructed on recognition of hazardous energy sources, methods and means to control energy, classification of workers and the prohibition relating to attempting to

restart or reenergize machinery or equipment that has been locked out or tagged out.

- Training will provide in the instruction the limitations of tags. Tags are essentially warning devices affixed to energy isolating devices and will not provide the physical restraint of a lock. Tags that are attached as energy isolating are not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored or otherwise defeated. Tags must be legible and understandable by all authorized associates, affected associates, and all other associates whose work is or may be in the area. Tags and their attachments must be made of material which will withstand the environmental conditions of the workplace. Tags must be securely attached to energy isolating devices so they cannot be inadvertently detached during use. Associates will be instructed on the false sense of security offered by tags, if their true meaning is not understood by all involved
- Provide retraining for other authorized and affected associates when there is a change in job assignments, machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.
- Train associates in emergency evacuation and rescue procedures.
- Post warnings about the existence, location and danger of permit-required confined spaces.
- Coordinate energy control procedures among work crews when work is of a duration that energy control procedures must be confined to another shift.
- Coordinate energy control procedures between ENTACT and contractor/subcontractor when it has been determined that joint energy control procedures must be implemented.
- Assure that all persons included in an energy control procedure are present, or positively accounted for prior to restoring energy to a previously controlled energy situation.
- Conduct pre-work inspections to assure hazardous energy has been properly secured.
- Authorize commencement of work in hazardous energy control situations.
- Conduct post-work inspections to assure work in energy control situations has been property completed.
- Authorize removal of lockout hardware and restoration of energy to machine, equipment or process.
- Complete Lockout Permit.

D. Authorized/Qualified Site Personnel

- Perform work as directed by the Health and Safety Coordinator.
- Report unusual conditions as they pertain to control of hazardous energy to the immediate supervisors.

- Maintain hardware provided by ENTACT in a serviceable condition and ready for immediate use.
- Report absences to supervisor when the facility or job site must be left for any reason.
- Apply and remove energy control hardware assigned specifically to them.
- NOT removing lockout hardware assigned to others.

IV. DEFINITIONS

Affected Associate: An associate whose job requires operation/use of equipment, machine, or process, which is being serviced, maintained, or set-up under lockout conditions or whose job requires work to be performed in areas in which such work is being performed.

Authorized/Qualified Site Personnel: An associate who locks or implements a lockout procedure on machines, equipment, or processes to perform servicing, maintenance, or set-up upon that machine, process, or equipment. An authorized associate and an affected associate may be the same person when the affected associates duties also include performing maintenance or service on a machine, equipment, or process which must be locked out. The associate(s) will be able to demonstrate, by experience, training, or both, the ability to recognize potentially hazardous energy and its potential impact upon facility or conditions, and has the knowledge to implement adequate means and methods to control and isolate such energy.

Capable of Being Locked Out: An energy isolating device will be considered to be capable of being locked out, if it is designed with a hasp, other attachment or integral part, to which or through which, a lock can be affixed, or if it has a locking mechanism built in to it. Other energy isolating devices will also be considered to be capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.

Dissipate: For the inclusion within this program the terms dissipate and dissipation will always be related to energy control. It's meaning will be to cause energy to be spread out or reduced to a level tolerable to humans.

Energized: Connected to an energy source or containing residual or store energy.

Energy Isolating Device: A device that physically prevents the transmission or release of energy. Such devices may include, but not be limited to, the following:

- A manually operated electrical circuit breaker.
- A mechanical, electrical, hydraulic, or pneumatic disconnect switch.
- A slide gate.

- A slip blind.
- A line valve.
- Blocks.
- Similar devices used to block or isolate energy.

Energy Source: As used within this program the term energy source will be considered to be any of the following, either singly or in combination:

- Mechanical energy due to motion,
- Potential energy due to pressure, springs, or gravity,
- Electrical energy due to generated electrical current, static electricity, or residual stored electrical energy,
- Thermal energy from high or low temperatures,
- Chemical reaction energy.

Isolated Energy: Energy is considered isolated or blocked when its flow would not be reactivated by a foreseeable unplanned event. The term "isolate" means to set apart from others. The term "block" means an obstacle or obstruction; or, to make unsuitable for passage or progress by obstruction, to prevent normal functioning.

Lockout: The placement of a lockout device on an energy isolating device, in accordance with this procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout Device: A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine, equipment or process.

Residual Energy: Energy such as electrical, chemical, thermal or mechanical which is stored within a port, component, or subsystem of an equipment or process following shutdown of equipment/process. Examples of residual energy would be electricity in capacitors, tension in springs, or the potential energy of an unsupported suspended load.

Tagout Device: A prominent warning device capable of being securely attached to an energy isolating device that identifies the applier or authority who has control of the lockout, and contains information/instructions to prevent operation of an energy isolating device.

V. LOCKOUT/TAGOUT PROCESSES

To prevent the unintentional, unwanted activation of equipment, machines, or processes upon which ENTACT associates work, it is necessary to identify, locate, and control energy sources capable of activating such equipment, machines, or processes. The procedures

contained within this program will meet this objective if applied effectively on a consistent basis.

These procedures are required when work must be performed upon equipment, which if inadvertently operated, could cause injury to persons, damage to property, or both.

The responsibility for effectively implementing the procedure is a joint supervisor /associate undertaking. Management will provide the means and direction to implement the program while affected associates must adhere to the provisions of the program. Only those associates authorized by their immediate supervisors are permitted to perform duties requiring a lockout procedure.

VI. PROCEDURE

A. Lockout Preparation

It is necessary to completely evaluate energized equipment, which must undergo work to assure its energy sources are identified, located, and controlled prior to start-up of work. Preparations must be made to assure appropriate lockout hardware and test equipment is available to isolate energy and evaluate the effectiveness of energy controls. The following will be evaluated and documented on the Lockout/Tagout Permit by the Supervisor.

- Equipment, machine, process requiring work
- Scope of work
- Energy sources (Includes residual)
- Energy isolation devices
- Lockout devices
- Tags
- Test procedures
- Authorized persons

B. Pre-Work Safety Meeting

The supervisor responsible for the completion of the work will convene a pre-work meeting of all affected associates to discuss the job. The supervisor will review the information pertaining to the job as recorded on the Lockout/Tagout Permit. Associates will have the opportunity to ask questions about the work and to have them answered to their satisfaction before the start of work. Associates will sign the lockout worksheet to indicate their understanding of the work being performed, and their specific assignments. The supervisor will discuss the following items at the pre-work safety meeting.

- Equipment, machine, process to be worked

- Scope of work
- Anticipated duration
- Energy source(s). Includes residual
- Energy isolation device(s)
- Lockout devices
- Locks *
- Tags *
- Energy isolation test procedures
- Designation of authorized person(s)

*NOTE: These items will be distributed to associates implementing the lockout of they are not in their possession prior to the start of the pre-work safety meeting.

C. Equipment, Machine, Process Shutdown

The equipment, machine, or process which must undergo work should be shutdown in an orderly manner so as not to create an additional hazard to associates in the work area. Shutdown should be accomplished as follows:

1. Inform affected associate(s) in the vicinity of the need to shutdown equipment, machine, or process.
2. Clear area in vicinity of work area if shutdown will present a known or potential hazard to bystanders.
3. Locate on/off switch.
4. Shutdown equipment, machine, or process.
5. If on/off or activation/deactivation controls <u>are not</u> energy isolation devices, locate these devices and place in an OFF position.
6. Supervisor, or authorized person(s), will then apply lockout device to prevent operation of the energy isolation device and secure the device with a lock. <u>Each</u> associate involved in the work should apply their own individual ENTACT issued lock with their name on it to assure a maximum level of protection is provided to the affected associates.
7. When lockout procedures must involve multiple crews, or groups of associates, application of individual locks may not be possible. When such conditions exist, the supervisor of each crew or group will apply a lock for their group. That lock may then be removed only by that supervisor, or the superior of the supervisor.
8. Tags bearing the legend "DANGER - EQUIPMENT LOCKOUT" will be affixed to the lockout device bearing the name of the person applying the device, the date, and the time.
9. An entry will be made on the Lockout/Tagout Permit indicating the date, time and persons applying, lockout device(s) to equipment, machine, or process energy isolation device(s).

D. Residual Energy

Residual, or stored energy, within a system, component, or part of an equipment, machine or process can present a greater hazard to associates than the primary energy source due to its sometimes "hidden" nature. To assure sources of residual energy have been identified, located, and controlled, the following diagnostic procedure will be followed:

1. Qualified, authorized personnel familiar with the equipment, machine, or process being worked will review instruction manuals, manufacturer's literature, wiring diagrams and other available information to identify and locate sources of residual energy.
2. An appropriate method of controlling any residual energy will be selected and the suitable hardware obtained to implement the control. Residual energy controls may include, but not be limited to, electrical circuit grounding, releasing pneumatic/hydraulic line pressure, allowing a suspended object to come to rest at ground level, relieving spring compression.
3. A lockout device will be applied and secured to the residual energy control. The control must stay in place throughout the duration of the job to prevent re-accumulation of the residual energy or because removal would permit residual energy to be transmitted to equipment, machine, process being worked.
4. A tag will be applied to the residual energy lockout device.
5. Application of the residual energy controls will be recorded on the Lockout/Tagout Permit with the time, date, and name of person(s) applying device(s).

E. Pre-Work Inspection/Energy Isolation Verification

Prior to releasing equipment, machine, process for work following implementation a lockout procedure, it is necessary to verify the effectiveness of the applied controls. This task should be performed by the work crew's supervisor. As an alternative, it may be performed by a qualified, authorized associate who has been designated by the supervisor and granted the authority to release the equipment for work, or to reject the lockout procedure as being unsatisfactory, based upon the outcome of energy isolation verification procedures. When lockout procedures must be implemented which involve multiple crews, the verification task should be performed by the supervisors of each work crew. The inspection/test sequence should be performed as follows:

1. Use Lockout/Tagout Permit to account for all personnel involved in lockout.
2. Clear points of operation of all personnel/material, which could be affected by start-up of equipment, machine, process.

3. Inspect energy isolation devices to assure they are in the off position, secured with locks, and appropriately tagged.
4. Inspect residual energy control devices to assure they are in place, secured with

locks, and appropriately tagged.

5. Conduct any necessary testing of equipment, machine, process systems, components or parts to assure they are free of energy.
6. Attempt to operate energy isolation device, and observe equipment, machine, and process to assure it remains inoperative.
7. Attempt to operate equipment, machine, process controls. Observe to assure it remains inoperative.
8. Return activation controls to off position following testing.
9. If equipment, machine, process remains inoperative and testing indicates residual energy has been controlled, the equipment may be released for work by supervisor or designated qualified authorized person.
10. The date, time, and name of person(s) conducting the inspection(s) and test(s) will be recorded on Lockout/Tagout Permit.
11. Authorization to commence work will then be given to affected associates by designated qualified, authorized associate.
12. If inspection/testing reveal inadequate control of primary/residual energy source(s), the immediate supervisor responsible for completion of the work will be contacted by person(s) performing testing prior to taking any further action. The inadequacy of the controls must be recorded on the Lockout/Tagout Permit with the date, time and name of person making the entry.
13. If it is necessary to safety test the equipment, clear away tools, remove employees from the area, remove the LO/TO device, energize the equipment and test. Next de-energize the equipment and re-apply LO/TO.

F. Release for Work

Upon completion of the necessary inspection and tests, the immediate supervisor responsible for completion of the work will release the equipment, machine, process to the authorized person(s) for completion of the work. The release for work will be performed as follows:

1. Supervisor will assure all required inspections/tests have been performed by checking Lockout/Tagout Permit entries.
2. Supervisor will assure all affected associates are aware of the release for work status of the equipment, machine, and process by verbally informing them and noting the communication on Lockout/Tagout Permit.
3. Supervisor will note on Lockout/Tagout Permit the date and time that the equipment, machine, process was deemed safe and able to be worked upon by authorized person(s).

G. Energy Restoration - Purpose

Upon completion of assigned tasks the authorized person(s) will inform supervisor that job has been completed. It will then be necessary to prepare the de-energized equipment, machine, or process for start-up and to restore energy in a manner which will minimize hazards to persons/property in the area. Energy restoration will be performed as follows:

1. Authorized person performing work will inform supervisor that assigned tasks have been completed.
2. Supervisors will use the Lockout/Tagout Permit to account for all personal involved in lockout procedure and work to be completed. (See H if all associates cannot be accounted for.)
3. Supervisor will instruct affected associates and others in area to remain clear of points of operation of equipment, machine, process.
4. Supervisor will inspect equipment, machine, process to assure points of operation are free of tools, debris, or other material which could be placed into motion if equipment, machine, process were to immediately restart following restoration of energy.
5. Lockout serving residual energy controls will be removed by those who applied them.
6. Residual energy control devices will be removed by those who applied them.
7. Energy isolation lockouts will be removed by those who applied them.
8. Energy isolation controls will be removed by those who applied them.
9. Supervisor will again check area around equipment, machine, process to assure personnel are clear of points of operations.
10. Energy will be restored to equipment, machine, or process through activation of energy isolation device.
11. Proper operation of equipment, machine, or process will be verified by supervisor prior to releasing equipment, machine, process for routine use.
12. Tags will be removed from equipment, machine, or process following verification of proper operation.
13. Completion of work, removal of lockout devices, verification of proper operation, and release for routine use will be recorded on Lockout/Tagout Permit with date, time and name of supervisor or qualified authorized person responsible for completion of work.
14. Lockout/Tagout Permit will be retained in a permanent file available for inspection/audit. Such files may include maintenance job files or Health and Safety files.

H. Absent Associates and Group LO/TO

Accounting for associates involved in lockout procedures is required prior to removal of lockout hardware and re-energization of equipment to assure associates are clear of areas

which could expose them to existing or potential hazards when equipment, machine, process is reenergized and tested prior to releasing it for routine operations. Should there be any associates who cannot be accounted for the supervisors responsible for completion of the lockout related work will initiate the following to attempt to locate the absent associate(s).

1. Lockout/Tagout Permit will be used to account for affected and authorized associate(s).
2. Supervisors will obtain a Lockout Absent Associate Notification Form.
3. Supervisor will record name(s) of absent associate(s).
4. Supervisor will instruct crew members as needed to search work area for absent associate(s) as determined by size and configuration of equipment, machine, process which has undergone lockout related work. Page associate over public address system if one is available.
5. Searchers will pay special attention to locations in which associate presence would result in physical harm through start-up of equipment, which is undergoing lockout.
6. When it has been established through a comprehensive search of the work area that the absent associate is not present and is incapable of being injured by start-up of equipment, machine, process the supervisor will dispatch an associate to contact the house(s) of the absent associate(s) and to search other outlying areas as needed.
7. Upon completion of the searches conducted in G if the associate(s) have still not been located, the supervisor will sign the Absent Associate Notification Form attesting to the conduct of the required searches and inability to account for absent associate(s).
8. The supervisor will appoint associate(s) in numbers dictated by equipment, machines, process which has undergone work to secure all possible points of access to prevent the absent associate(s) from returning to the area.
9. The supervisor will then release the equipment, machine, process for routine use providing all other conditions in paragraphs F and G have been fulfilled.
10. Copies of the Absent Associate Notification Form will be posted conspicuously in the work area.
11. Supervision of the area in which the equipment, machine, process are located will be informed of the absent associate(s) identity and that the associate(s) are to be prevented from entering the work area until they have been informed that the lockout is no longer in effect.

ENTACT associates utilize single owner LO/TO devices however, in the event a group LO/TO device is utilized overall responsibility must be given to a single authorized employee to ensure continuity of protection. Each crew, craft or individual will then affix their personal LO/TO device to the group LO/TO when they begin work. The individual LO/TO device will be removed upon completion of the task.

VII. DISCIPLINE

Effective implementation of this program is dependent on all affected associates complying with its provisions. All affected associates will be informed during training of the contents of this program that failure to abide by any of its provisions will be grounds for discipline which will be progressive up to and including discharge.

VIII. TRAINING

All affected, authorized associates will be trained in the provisions of this procedure prior to engaging in any lockout related work. Verification of an associate's training in the contents of this procedure will be performed before associate may be assigned to lockout created work. Training will be conducted annually for those associates who will be required to perform lockout/tagout procedures. Training will follow OSHA 29cfr1910.147 and will include energy control procedures, documentation, periodic inspection, associate training and retraining on new or modified equipment, associate protection, application of energy control, release from lockout/tagout, testing of equipment, outside personnel, group lockout/tagout requirements.

ENTACT will provide retraining when there is a change in job assignment, machinery, equipment or process that introduce or create a new hazard or if the procedure itself is revised, and whenever inspections reveal inadequacies in the program or ENTACT has reason to believe that deviations from or inadequacies in the associate's knowledge of the program.

The training associates will receive will include:

- Safe application, usage and removal of the energy controls.
- Authorized Associates – recognition of hazardous energy sources, type and magnitude of the energy available in the workplace and the methods necessary to achieve energy isolation and control.
- Affected Associate – Instructed in the purpose and use of the energy control procedure.
- Other Associates whose work is or may be in the area are instructed about the procedure and about the prohibition relating to attempting to restart or reenergize machinery or equipment that has been locked out or tagged out.
- Tags are warning devices and do not provide physical restraint that is provided by a lock.
- Tags are not to be removed without authorization of the authorized person, bypassed, ignored or otherwise defeated.
- Tags must be legible and understandable by all personnel whose work is or may be in the area.

- Means used to attach tags must withstand the environmental conditions of the workplace.
- Tags may evoke a false sense of security and their meaning needs to be understood by all involved.
- Tags must be securely attached so that they cannot be inadvertently or accidentally detached.

IX. REVIEW

This program will be reviewed annually to assure it is relevant to ENTACT operations. It will be amended and redistributed when changes are made.

ENTACT GENERAL LOTO CHECKLIST	
Date:	Associate Performing Inspection:
Associate(s) Observed:	

	Check
Manufacturer/Model/Serial Number of Equipment or System:	☐
The general procedures for the various types of energy sources are as follows:	
Review the manufacturers literature and/or wiring and mechanical schematics to assure that all energy sources have been identified, otherwise, inspect the equipment/machine to identify all energy sources. During this inspection do NOT perform work near exposed energized circuits unless you are a person qualified to work on electrical systems, and do NOT put any part of your body in any area where moving parts may cause injury. If you are unsure of the hazard, STOP WORK and contact your supervisor for guidance.	☐
ELECTRICAL CONTROLS	
Isolate the machine or piece of equipment by using an electrical plug lock or by locking and tagging the disconnect switches. A special adaptor may be needed to LO/TO circuit breakers. Document where the LOTO are applied:	☐
Bleed any stored electrical energy to a "zero energy state". If this type of hazard is present, document here:	☐
Ensure that all power sources are LOTO by using a tester to check that all circuits are de-energized.	☐
PNEUMATIC CONTROL	
Release the pressure to reach a "zero energy state".	☐
Document where the LOTO are applied. LOTO the energy source(s).	☐
HYDRAULIC CONTROL	
Release the pressure to reach a "zero energy state".	☐
Document where the LOTO are applied. LOTO the energy source(s).	☐
FLUIDS AND GASES	
Evaluate all hoses and valves connecting to the system or equipment. Determine what type of fluid or gas may be present and, if necessary, obtain and review the Material Safety Data Sheet (MSDS) for the material. Take precautions as needed to protect you from exposure to any hazardous material that may be contained in the system. Contact your supervisor as needed for guidance.	☐
Close all valves on supply lines, and as necessary, bleed or drain the contents. Contact your supervisor as needed for guidance on proper disposal of the material.	☐

ENTACT GENERAL LOTO CHECKLIST	
If working on a pressurized system where valve leaks may re-pressurize the line, insert a blank or blind in the line.	☐
Use lockout valves, chains, and locks and tags at the isolating source. Document where the LOTO are applied, and document all related hazards:	☐
MECHANICAL CONTROL	
Release or block all stored mechanical energy. Be cautious of springs, tension, elevated mechanical arms or platforms that could lower, and other sources of energy that are not always obvious. If needed, restrain the system by inserting blocks.	☐
Document where the LOTO are applied. LOTO the energy source(s):	☐
Recheck all areas for potential sources of energy.	☐
Review the LOTO procedure with your supervisor if the procedure, the system, or the equipment is new or unfamiliar.	☐
Review the type and magnitude of the energy and the required controls.	☐
Inform all affected associates, and all other associates working in or entering the work area, that LOTO is to be performed. Instruct these associates that they must not attempt to start equipment that has been locked/tagged out, and that locks/tags must not be bypassed or removed.	☐
Shutdown the equipment/process/system.	☐
Locate the necessary energy isolating device(s) for the equipment/process/system and operate them to isolate them from the energy sources. Affix LOTO devices.	☐
Relieve all stored or residual energy and take appropriate measures to ensure the energy will not re-accumulate. Affix lockout/tagout devices as necessary.	☐
Verify that all sources of energy have been isolated and stored energy relieved after ensuring that associates are not exposed and before beginning work. Activate equipment or system controls in a safe manner to ensure that the equipment or system will not operate, and then deactivate the controls.	☐
Perform the servicing or maintenance.	☐
Replace all guards and safety devices. Remove all tools and equipment from the work site. Assure that all personnel are clear of the equipment.	☐
Notify all affected personnel that the system will be reactivated.	☐
Lockout/tagout devices are removed by the authorized associate(s) who installed the devices. Document this authorized entrant:	☐
LOCKOUT/TAGOUT DEVICE REMOVAL BY SUPERVISOR	
If it becomes necessary to remove a LOTO of an associate who is unavailable on site, the removal of this device must be done using the following procedure.	

ENTACT **GENERAL LOTO CHECKLIST**
• The supervisor must ensure that the associate who applied the lock or tag is not available at the workplace; and • The supervisor must make all reasonable efforts to contact the authorized associate to inform him or her that his/her lockout and/or tagout device has been removed; and, • The supervisor ensures that the associate is made aware that his or her lock or tag was removed before he or she resumes work at that worksite.
GROUP LOCKOUT/TAGOUT
When a lockout/tagout job involves numerous lockout/tagout devices and many associates, the group lockout/tagout procedures should be used.
CONTRACTORS
All contractors must comply with ENTACT and OSHA safety requirements.

LOCKOUT TAGOUT SAFETY PERMIT

SAFETY PERMIT	
DATE:	PERMIT ISSUED TO:
TIME ISSUED:	EXPIRATION TIME:
PURPOSE:	
DESCRIPTION OF WORK TO BE DONE:	
CHECKED PRECAUTIONS WILL BE OBSERVED	
☐ TAG & DISCONNECT ELECTRIC EQUIPMENT	☐ FIRE EXTINGUISHER AT SITE
☐ LINES BLINDED	☐ CONTAINS SPARKS
☐ VALVES CLOSED & TAGGED	☐ KEEP AREA FREE OF COMBUSTIBLES
☐ LOCKED OUT	☐ BARRICADE AREA
☐ LINES DISCONNECTED	☐ SHIELD ARC
☐ BLEEDERS OPEN	
PROTECTIVE EQUIPMENT REQUIRED	
☐ WEAR GOGGLES FACE SHIELD	☐ WEAR RUBBER BOOTS
☐ WEAR GLOVES RUBBER THERMAL	☐ WEAR SAFETY BELT & LINE
☐ WEAR HOOD ACID THERMAL	☐ WEAR RESPIRATOR DUST CHEMICAL
☐ WEAR SUIT RUBBER THERMAL	

OTHER PRECAUTIONS

APPROVALS	
ENTACT FIELD PROJECT MANAGER	DATE/TIME
ENTACT ASSOCIATE	DATE/TIME
SUBCONTRACTOR REPRESENTATIVE	DATE/TIME
Work must begin within ninety minutes of issuance of this permit. If the work is interrupted, the foreman, craftsman, or contractor must indicate equipment condition to operations foreman or operator when leaving job for more than two hours or when job is complete.	
❑ JOB COMPLETED	❑ JOB INCOMPLETE
THIS PERMIT IS TO BE KEPT ON THE JOB UNTIL WORK IS COMPLETED, PERMIT EXPIRES OR IS REVOKED	

ATTACHMENT P BBS FORMS

ENTACT
JOB TASK OBSERVATION

Project Name and No.:		**FPM:**	
HSO:		**Field Supervisor:**	
Observer:		**Observation Date:**	
Job Task Observed	**Field Area Work (job task):**		
	Office Area (job task):		
Location on the site where the observation took place:			
Number of Personnel Observed (individual, crew of #, etc.)	**ENTACT**	**Subcontractor: (name)**	**Other: (name)**

Listing	GOALS Ref. #	Safe	Concern	Comments
Personal Protective Equipment				
Hand Protection	1.1			
Eye & Face Protection	1.2			
Head Protection	1.3			
Foot Protection	1.4			
Hearing Protection	1.5			
Monitors (Air)	1.6			
Body Use & Position				
Line Of Fire	2.1			
Lifting/Pulling/Pushing/Carrying	2.2			
Walking – Eyes on Path	2.3			
Eyes On Work	2.4			
Ergonomics – PC Workstation	2.5			
Pinch Points	2.6			
Tools				
Tool Use/Selection	3.1			
Tool Condition	3.2			
Job Planning				
Pre-Job Inspection*****	4.1			
Tailgate Safety Meeting*****	4.2			
Work Permits	4.3			
Working Environment				
Walking/Working Surface	5.1			
Housekeeping	5.2			
Vehicle Operation				
Driving/Seat Belts	6.1			
Parking/Backing	6.2			
Safety Procedures				

Listing	GOALS Ref. #	Safe	Concern	Comments
Familiar w/Emergency Procedures	7.1			
Safety Reporting Requirements	7.2			
Safety Procedures	7.3			
Other				
	8.1			

*Ask questions to confirm.

ENTACT
JOB TASK OBSERVATION

GOALS Ref. #	Feedback Discussion	Solution Implemented

Tenets of Operational Excellence

We believe:

- All incidents are preventable.

Two Key Principles:

- Do it safely or not at all.
- There is always time to do it right.

We ALWAYS:

1. Operate within design or environmental limits.
2. Operate in a safe and controlled condition.
3. Ensure safety devices are in place and functioning.
4. Follow safe work practices and procedures.
5. Meet or exceed customer's requirements.
6. Maintain integrity of dedicated systems.
7. Comply with all applicable rules and regulations.
8. Address abnormal conditions.
9. Follow written procedures for high risk or unusual situations.
10. Involve the right people in decisions that affect procedures and equipment.

ENTACT
JOB TASK OBSERVATION PROCESS

GOALS Action List

Following is the GOALS Action List (GOALS) that was specifically selected and designed to encourage positive and open communication between the observer and observed during the observation process. GOALS are grouped by major categories, sub-categories, and specific examples of safe behavior. In most cases, the sub-categories are the GOALS on the observation worksheet. Periodically, the list is updated to help foster safety communication on special issues.

1.0 PERSONAL PROTECTIVE EQUIPMENT

1.1 Hand Protection
- Proper gloves used to avoid exposures to electrical, cuts, burns, crude oil, and chemicals.

1.2 Eye and Face Protection
- General: Use approved safety glasses with side shields or "wrap-around" protection.
- Outside: Face shield / welding helmet.
- Next to face: Goggles are required. Check the distinction between goggles and safety glasses. Goggles make full skin contact around the eyes.

1.3 Head Protection
- Hard hats will be worn at all times by all personnel working in the field, except when in Office.

1.4 Foot Protection
- Steel-toed leather work boots or steel-toed rubber work boots as conditions warrant.

1.5 Hearing Protection
- Used in posted areas.
- Used by Equipment Operators.

1.6 Monitors
- H_2S meters are to be worn at all times.
- VOC meters, at least once daily and as conditions warrant.
- When air monitor is used, it must be downwind of all crewmembers' work.

2.0 BODY USE AND POSITION

2.1 Line of Fire
- Based on discussion, employees know sources of lines of fire hazards on their work site and know how to work safely with the hazards.
- Body was positioned to avoid being sprayed, struck or contacted by solids, liquids or gas when/if material lets go, moves, gives way, releases or falls.
- When using copy machine, used cover to shield eyes from bright light.

2.2 Lifting/Pulling/Pushing/Carrying

- Positions work close to body using elevation device – ladders, work benches, blocks, etc.
- Stand over the object to be lifted and face the direction intended to move.
- Lift with legs rather than back, maintain natural back curve and chin level, and face forward.
- Load close to the body, lean back to keep center of gravity over feet, and feet apart but not wider than shoulder width.
- Firm hold of object.
- Turn entire body by moving feet rather than twisting body.
- Smooth motions.
- Get other individuals or mechanical lifting devices before attempting to lift anything that can't be handled easily or weighs 50 pounds or more.
- Work as a team when two or more people lift a heavy load.
- Position work below shoulder height.

2.3 Walking - Eyes on path

- Chose working walking path free of defects and hazards.
- Be aware of other activities and people working when carrying a load.
- Maintain clearance from equipment.
- Use caution when going from office to hallway, and in/out of doors.
- Pay attention to walking path and watch next step.
- Proceed with caution around corners and other blind spots.
- Walk with caution on slippery surface such as wet metal walkways, loose or muddy soils.
- Wipe shoes before stepping on hard surface like tile, metal, wood, or cement.
- Look both ways before stepping in vehicle traffic lane, from between trucks or vans, building structures, or other obstacles.
- Utilize pedestrian crossing signal and lane to cross street. Be aware of approaching traffic and vehicles making right and left hand turns across the intersection.
- Make eye contact with driver before crossing in front of vehicle.
- In parking areas, watch for tripping hazards such as curbs, holes, protruding objects from vehicles and landscaping.

2.4 Eyes on work

- Avoid being distracted and look away from the task involved in.
- If swinging or moving large objects (excavator), check all clearances.

2.5 Ergonomics – computer workstation

- Take mini breaks from repetitive tasks or with body in odd positions throughout the day to shrug shoulders, shake arms, stretch legs and back, rotate wrists, close eyes, and get up and walk around. Take break from computer every thirty minutes.
- Move mouse from the shoulder.
- Forearms, wrists, and hands approximately parallel to floor.
- Wrists straight.
- Shoulders relaxed.
- Arms close to the body with elbows close to sides.
- Neck straight, not bent or twisted and back had natural curve.
- Viewing distance between 13 and 28 inches.
- Body to leg angle between 90 and 105 degrees.
- Feet flat on floor or foot rest.

- Have an airspace between back of knee and seat.

2.6 Pinch Points

- Keep hands and fingers in sight, or checked before putting out of sight.
- Based on a discussion, employee knows pinch point hazards for the work site being worked on and how to work safely with the hazard.
- De-energize source of moving parts.
- Open one file cabinet drawer at a time; close after use.
- Use caution when loading stapling machines.
- When using a paper cutter, keep fingers clear of blade, and secured when not in use.
- Use caution when clearing paper jams in copy machines, paper shredders, or fax machines. When unfamiliar with machine, get help.

3.0 TOOLS

3.1 Tool Use /Selection

- Use ladder and step stools to reach overhead.
- Use leverage devices, breaker bar, etc. to avoid over exertion.
- Use vises or other means to secure small objects and equipment firmly.
- Do not carry sharp tools in pockets.
- Never use a wrench as a hammer.
- Never use a screwdriver for a chisel.
- Fixed blade knives are prohibited.

3.2 Tool Condition

- No defective tools in use or in the toolbox.
- Tools cleaned and put in place in the toolbox after use.
- Jaws on wrenches and vices clean and in good condition.

4.0 JOB PLANNING

4.1 Pre Job Inspection (may need to ask questions to confirm)

- Potential hazards identified and noted before starting work.
- Job Task Review performed before beginning each task.
- All affected parties notified of work in progress.

4.2 Tailgate Safety Meeting (may need to ask questions to confirm)

- Work process, potential hazards, and emergency response plan discussed and appropriate level of PPE determined.
- Job Safety Analysis reviewed and signed before beginning task.

4.3 Work Permits

- A work permit prepared based on the following ENTACT safety regulations or work situation:
- ENTACT safety regulations:
    - Waste manifest.
    - Hot work area of combustibles.
    - Opening any vessel. Confined space entry (requires additional permit).

- Entry into excavations over 5 feet.
- Exceptions to writing a permit:
- Hot work permits are not needed if the work is over 50 feet from a source of ignition, facility, or well.

5.0 WORKING ENVIRONMENT

5.1 Walking/working surface

- Proper access and egress routes in use.
- Routes clear of debris / obstructions.

5.2 Housekeeping

- No office clutter that could pose tripping hazards or blocking evacuation routes.
- Telephone and flexible cords positioned so they weren't tripping hazards.
- Work areas are free of hazards including vehicles and equipment.

6.0 VEHICLE OPERATION (COMMENTARY DRIVE CHECKLIST)

6.1 Driving/Seat belt

- Wear seat belts.
- Make full stops.
- Inside of vehicles free of distractions/loose items.
- Cell phones, radios, not used in moving vehicles or equipment.
- Concentration on driving.
- Appropriate speed for conditions, terrain, intersections, etc.
- Comply with posted speed limit; allowed space to stop for pedestrians or other vehicles; reduce speed for adverse driving conditions.
- Establish eye contact, moving eyes every two seconds.
- Special attention around parked vehicles and intersections.
- Work to maintain space cushion from obstacles and other vehicles.
- Full stop.
- In area with limited sight lead-time, keep to right side of road.
- Stopping – Can see tires/pavement contact of vehicle in front.
- Stopping – Pause 3 seconds before moving.
- 4 – 6 seconds following time.
- Stale green light.
- 5 – 8 seconds mirror check.

6.2 Parking/Backing

- First move is forward, turn motor off, and set brake.
- Glance over shoulder before curb pull out.
- Walk around vehicle to check for obstructions.
- Don't park in another vehicle's blind spot; parked where visible.
- In parking lots, only park in marked stalls, and park so the first move is forward.
- In parking lots, drive with caution around blind corners and through intersections. Never assume that the other car will stop. Watch for pedestrians moving from between vehicles. Always ready to stop.

- Back vehicle into parking stall so first move is forward. While backing, use mirrors and look around frequently to ensure a safe distance from other vehicles and objects are maintained. Position vehicle within line striping.

7.0 SAFETY PROCEDURES

7.1 Familiar with Emergency Procedures

- Site evacuation and copy of emergency procedures.
- Building evacuation and copy of emergency procedures posted near door.
- Medical, bomb threat, earthquake (stay away from windows and area's where objects may fall), or other emergency.
- Know emergency contact and reporting procedures. (Notify supervisors of an emergency as soon as practical.)

7.2 Safety reporting requirements

- Frayed or damaged cables or cords-report for repair.
- Report defective or missing paper cutter guard.
- Broken or defective furniture and equipment taken out of service and reported.
- Trash, boxes, storage under stairs, or tripping hazards cleaned up or reported.
- Damage to carpeting or stairs reported.
- Corridors/hallways free of obstructions, boxes, furniture, etc.
- Report body discomfort from operating computer.

7.3 Safe procedures

- No open flames (candles) in office areas.
- All office type electric power devices are approved, power strips for multiple plug outlets, space heaters, fans, and cup warmers.
- Smoking in designated area.
- No heavy objects on high shelves.
- Cabinets and shelves over 5 feet high are braced.

<u>Guidelines for effective observations:</u>
A key to effective observations is to make the safe/at-risk feedback part of the observation very specific, very factual, and timely. It is better to have fewer rather than too many behaviors marked. When someone sees a behavior marked safe and it doesn't fit, then the observation may not be as effective as it could be. In addition, the person may leave thinking their behavior is safe and it may be at risk. When making observations, consider the following: Only record safe/at-risk for a behavior you observed during the specific <u>time period</u> of the observation. For example, you observed someone installing a pipe clamp but didn't observe them driving to the work. Record safe/at-risk for the behaviors that you actually observed -- gloves, parking (first move forward), etc. -- but not for driving to the site.

Another item that you observed, for example "walking - eyes on path," is actually seeing their eyes looking at the walking path. You may observe that the person got from point A to B but, if you didn't see them looking at their walking path, you don't know if their behavior is safe or at risk. In fact, if you mark the behavior "walking - eyes on path" as safe and the person isn't focusing on their path, you may have set them up to get hurt in the future.

Keep discussions to policy that is currently in place. For example, gloves are required to avoid exposure to cuts, chemicals, etc. but are not required at all times.

If you observe a behavior that exceeds ENTACT's policy, be careful to encourage the behavior.

ENTACT
JOB SAFETY ANALYSIS

Date:	Project # and Name:	FPM/HSC:	
Work Type (Task):			
Development Team:		Master ☐ Revision ☐ (maintain hard copies on site for audit)	Rev#:

Equipment / Tools / Materials Required	Personal Protective Equipment	Reason for JSA Revision

Step#	Job Steps	Potential Risks / Hazards	Critical Actions / Mitigation	Responsible Person
	Discuss emergency contingency plan (required)			

☐ Stop Work Authority – All on-site personnel are empowered, expected, and have the responsibility to stop their own work and the work of co-workers, or other contractors if any person's safety or the environment is at risk. NO negative repercussions will result from this action.
☐ Safety Tools – Site personnel are participating in the daily safety tools including JTR, JTO, NLI, and JSA.
☐ JSA Review – This JSA was reviewed after completion of the job. ☐ JSA adequately addressed the task, hazards, and mitigations. ☐ Changes to JSA are noted in Changes or Revisions section.

CONFIRMATION OF JOB SAFETY ANALYSIS REVIEW:

I have reviewed and understand the chemical and/or physical hazards, critical actions, and my responsibility and accountability to actively participate in JSA review and implementation steps.

Printed Name	Signature	Date

APPROVAL OF JOB SAFETY ANALYSIS:

I have reviewed and approve this version of the JSA.

FPM, HSC or Supervisor Printed Name	Signature	Date

CHANGES OR REVISIONS:

Date	Job Steps	Potential Risks / Hazards	Critical Actions / Mitigation	Responsible Person	Development Team Initials Changes

Job Hazard Assessment

Potential Hazards					
☐	Chemical Exposure	☐	Ignition Sources/Static Elec	☐	Fire/Explosion
☐	Hazardous Atmosphere/Dust	☐	Energy Sources/Pressure	☐	Spills/Releases
☐	Confined Spaces	☐	Manual Handling	☐	Slips/Trips/Falls
☐	Excessive Noise (> 85 dB)	☐	Overhead/Underground	☐	Chips/Slivers/Flying
☐	Working/Walking Surfaces	☐	Falling/Dropping Objects	☐	Pinch Points/Crush
☐	Environment/Weather/Biological	☐	Equipment/Machinery/Processes	☐	Workplace Design
☐	Arc/Flash/Hot Surfaces	☐	Temperature Extremes	☐	Simultaneous
☐	Open Hole/Excavation	☐	Working Near or Over Water	☐	Splash
☐	Isolated Work Areas	☐	Visibility	☐	Work Near
☐	Caught In-Between	☐	Contact/Struck By/Strike	☐	Hand Hazards
☐	Work Area	☐	Repetitive Stress/Duration	☐	Swing Radius
☐	Other (specify):				

Hazard Controls					
☐	Eliminate Hazard	☐	Spill Control/Contingency Plan	☐	Rest/Breaks/Stretch
☐	Engineering Controls (Isolation, Design, Change, Substitution)	☐	Ventilation/Redirection	☐	Adjust Work Schedules
☐	Administrative Controls (Reduction, Rotation, Training)	☐	JSA (JLA)s/SOPs/Procedures	☐	Decontamination
☐	PPE (Level D, C, B, or A)	☐	Monitoring	☐	Work Area Inspection
☐	Exposure Time Limits	☐	Buddy System	☐	Manufacturer Guidelines
☐	Physical Barriers	☐	Fire Fighting	☐	Equip/Tool/PPE Inspection
☐	Safety Equipment	☐	Emergency Response Procedure	☐	Competent Person
☐	Ignition Source Controls	☐	Communication Plan	☐	Fit For Duty
☐	Lock-Out/Tag-Out	☐	Eyewash/Safety Shower	☐	Multi-Contractor Meetings
☐	Work Permits	☐	Material Safety Data Sheets	☐	Site Orientation
☐	Other (specify):				

PPE and Safety Equipment Required					
☐	Hard Hats	☐	Reflective Safety Vest	☐	Respiratory Protection
☐	Steel Toe Safety Boots	☐	Overboots	☐	Fire Extinguisher
☐	Safety Glasses	☐	Double Lanyard w/	☐	Fire Retardant
☐	Safety Glasses w Side	☐	Welding Helmet/Gloves	☐	Decontamination Supplies
☐	Face Shield	☐	Life Line	☐	Lock-Out/Tag-Out Devices
☐	Goggles	☐	Safety Cable	☐	Gas Detector
☐	Cotton Gloves	☐	Safety	☐	Hearing Protection
☐	Leather Gloves	☐	Seat Belt	☐	Adsorbent Pads
☐	Rubber/Chemical Gloves	☐	Chemical Resistant	☐	Containment Pans
☐	Full Body Harness	☐	Tyvek/Cotton Coveralls	☐	Heavy Duty Electrical Cords
☐	First Aid Kit/Eye Wash	☐	Metatarsal Guards	☐	2-Way Radio/Phone
☐	Emergency Air Horn	☐	Life Jacket/Life Ring	☐	Chemical Apron
☐	Other (specify):				

5/12/08

ENTACT LOSS / N EAR LOSS INVESTIGATION

Incident Date/Time		**OTIPS # (Chevron only):**	
Loss Type	☐ Near Loss ☐ Equipment/Property Damage ☐ Fire ☐ First Aid ☐ Lost Workday Injury ☐ Notice of Violation ☐ OSHA Recordable ☐ Restricted Duty Injury ☐ Spill / Leak ☐ Third Party Injury / Fatality ☐ Vehicle Accident ☐ To Be Determined		
Work Type Category	(Chevron only)		
Work Type			
EMC Business Unit	(Chevron only)		
Organization	ENTACT Services, LLC		
Chevron Facility	(Chevron only)	**Chevron PM**	(Chevron only)
Flash Report	☐ Yes ☐ No (Chevron only)		
Stop Work Authority Used	☐ Yes ☐ No		

Investigation Date/Time		**Investigation Supervisor**	

Employee Name		**Supervisor**	
Employment Status	☐Regular ☐Part Time	**How long in present job**	

Incident Location	
Incident Reported To	

Description of Incident / Near Loss (Describe what happened and how it happened)

Investigation Team	**Position/Title/Phone**	**Primary Contact**
		☐

"5-Why" Investigation			Verification
A	Why did incident happen?		
B	Why did "A" happen?		
C	Why did "B" happen?		
D	Why did "C" happen?		
E	Why did "D" happen?		

Root Cause and Contributing Factors: (Describe in Detail Why Incident / Near Loss Occurred)	
1	
2	
3	
4	
5	

Explanation of Root Cause(s) Analysis Numbers (RCA No): *(Revised 8/28/07)*			
1	Lack of skill or knowledge (PERSONAL FACTOR)	5	Lack of or inadequate operational procedures (JOB FACTOR)
2	In the past, did not follow procedures or acceptable practices and no incident occurred (injury, product quality incident, equipment damage, regulatory assessment or production delay) (PERSONAL FACTOR)	6	Inadequate communication of expectations regarding procedures or acceptable practices (JOB FACTOR)
3	Doing the job according to procedures or acceptable practices takes more time/effort (PERSONAL FACTOR)	7	Inadequate tools or equipment (available, operable and safely maintained, proper task and workplace design) (JOB FACTOR)
4	Short-cutting procedures or acceptable practices is positively reinforced or tolerated (PERSONAL FACTOR)	8	External factors (make sure you have asked "why" enough to justify using RCA #8)

BE SURE ROOT CAUSE AND SOLUTIONS MATCH			
	PERSONAL FACTORS	**JOB FACTORS**	**EXTERNAL FACTORS**
ROOT CAUSES	RCA1 – always include the word "training." If an employee or contractor doesn't know how to do the job, the recommended solution should be training. RCA2 – Lack of motivation - Include some significant communication between the supervisor and the employee about the personal consequences (not disciplinary action) to the employee physically if the employee continues to do the job contrary to work standards – this is telling the employee that he/she needs to understand the cost to him/herself or to others (such as family members) when his/her actions result in an injury. Maintaining "ten fingers and ten toes" is a key goal of LPS. RCA3 – Lack of motivation – same RCA4 – Lack of motivation – same (Slide#24 of LPS Field Assist.)	RCA5 – The solution should specify which steps the organization needs to take, such as developing or modifying work standards, communicating work expectations regarding standards, and providing proper tools and equipment. RCA6 - same RCA7 – same (Slide #25 of LPS Field Assist)	RCA8 – Even though the root cause may not be controllable, solutions should focus on minimizing loss when the situation occurs again. Make sure you have asked "why" enough to justify using RCA #8.

Item No	RCA No	Solution(s): How to Prevent Incident / Near Loss From Recurring	Person Responsible	Due Date	Date Completed	Verified/ Validated by First Line Supervisor

Results of Solution Verification and Validation

ATTACHMENT Q HEALTH AND SAFETY PLAN TEST

Project Name/Number: Paterson Plank Road Superfund Site	FPM:
Your Name (please print):	Date:
Company:	
Score:	Corrected to 100%:

1. If a person's safety or the environment are at risk all on-site personnel are empowered, expected, and have the responsibility to stop their own work and

   a) the work of co-workers
   b) subcontractor employees
   c) other contractors
   d) all of the above

2. Subcontractors will prepare their own HASP, which must

   a) meet or exceed the requirements of ENTACT's HASP.
   b) be reviewed by the PM and PHSC before work begins.
   c) include ENTACT's scope of work.
   d) a and b

3. All injuries will be reported to

   a) the Health and Safety Officer.
   b) a co-worker.
   c) the police.

4. The chemical hazards on this site are:

5. All ENTACT field associates are required to

   a) have OSHA 40-Hour HAZWOPER training.

b) have BBS 8-Hour training.
c) both a and b.

6. Tailgate meetings are held

a) in the morning.
b) at the end of the day.
c) in the morning and afternoon.

7. The PEL for nuisance dust is

a) PEL:15 total/5 resp mg/m^3
b) PEL:25 total/10 resp mg/m^3
c) PEL:35 total/15 resp mg/m^3

8. Name at least five of the physical hazards (non-chemical) that exist on this site.

9. Three (3) short blasts signal

a) tailgate meeting time.
b) the scheduled time for JTOs.
c) an emergency.

10. An eye wash station will be located near the decontamination area but no more than _____ feet from the exclusion zone.

a) 50
b) 100
c) 150

11. What level of PPE is required at this site?

a) Level D
b) Level D modified
c) Level C
d) Level B
e) Level A

12. Name at least three job tasks that will be performed on this site (other than mobilization and demobilization):

13. Who are ENTACT's project management team for this site?

    a) Field Project Manager:
    b) Health and Safety Coordinator:
    c) Client Representative:

14. Air monitoring is performed to determine associate exposure levels to

    a) physical hazards.
    b) airborne dust/heavy metals/organics.
    c) biological hazards.

15. Name at least three biological hazards may be encountered at this site?

16. What is the name, address and phone number of the hospital for this site?

17. Where is the emergency meeting point(s) for this site?

18. What types of heavy equipment will be used at this site?

19. What types of JSA's are included in this HASP?

20. Journey management planning applies to ENTACT Associates and contractor/sub-contractors when on Company property or when using motor vehicles for company related business, including:

    a) Company-owned or leased vehicles
    b) Rental vehicles used on Company-authorized business
    c) Personal vehicles while being used for Company business
    d) all of the above

ATTACHMENT R DAILY WORK PERMIT

Project:		Project No.:
Date:	Day:	Activity:

PERSONNEL				
Role	Name	Hours	Job Task	PPE Level

HAZARDS ANTICIPATED			ACTION TAKEN
Electrical Lines	☐ Yes	☐ No	
Fall Hazards	☐ Yes	☐ No	
Confined Space	☐ Yes	☐ No	
Trenching and Excavation	☐ Yes	☐ No	
Chemicals 1. 2. 3.	☐ Yes	☐ No	
High Pressure Air Lines	☐ Yes	☐ No	
Gas Lines	☐ Yes	☐ No	
Propane Lines	☐ Yes	☐ No	
Water Lines	☐ Yes	☐ No	
Hot Conditions (Weather)	☐ Yes	☐ No	
Cold Conditions (Weather)	☐ Yes	☐ No	
High Pressure Washing	☐ Yes	☐ No	
Other Hazards Identified 1. 2. 3.	☐ Yes	☐ No	

EXPLAIN ANY SPECIAL CONDITIONS AND WHAT HAS BEEN DONE TO ELMINATE HAZARDS OR RISKS:

FORMS COMPLETED TODAY
❑ Fall Protection
❑ Air Monitoring
❑ Hot Work Permit Completed
❑ Confined Space Permit Completed
❑ Heavy Equipment Inspected
❑ Demolition Form Completed
❑ Incident/Incident Report
❑ Weekly Safety Report

PPE REQUIRED TODAY		
Circle one: Level D	Level C	Level B Level A
Additional check:		
❑ Full Face	❑ Goggles	❑ Tyvek
❑ PAPR	❑ Face Shield	❑ Body Harness
❑ Special Filters	❑ Rubber Rain Gear	❑ Lanyards

OTHER SITE ACTIVITIES DAILY WORK SUMMARY:
LIST ANY INCIDENTS THAT OCCURRED TODAY:

PROBLEMS/DELAYS:

SPECIAL REQUESTS:

PM SIGNATURE	H&S OFFICER SIGNATURE	CREW LEADER

ATTACHMENT S ORIENTATION FORMS

Associate Site Health & Safety Orientation

Project Name & #:	Project Location:
H&S Coordinator:	Field Project Manager:
Associate Name:	Associate's Title:
Date(s) of Orientation:	

Health & Safety Orientation shall consist of a minimum of 4 hours of site-specific safety awareness, hazards identification, safe behavior and attitude, and participation in safe behavior activities.

TASK:	DATE COMPLETED
Associate has completed a negative drug test **prior** to arriving on-site.	
MVR has been completed on this associate and defensive driving requirements have been discussed.	
Site-specific safety checklist is complete and signed-off. Establish clear understanding of site risks and safety requirements.	
Chemical hazards and exposure control methods have been discussed. Chemical hazards on this site include: _____	
Associate training and medical records are on-site and are current.	
Explain required safe behavior activities: JTR (JTR), JTO (JTO), NLIs, JSAs, etc.	
Explain reasons and procedures for reporting all incidents/incidents/near misses.	
Discussion of HASP and hazard analyses and acknowledgement signed by associate.	
Identify hazardous atmospheric conditions and discuss air monitoring lab results.	
Discuss Industrial Hygiene Monitoring (air sampling equipment): Calibration, use, maintenance, sample handling & analysis and interpreting results.	
Discuss Right-To-Know (HazCom) and location of chemicals used at the site MSDS, labeling, storage, routes of entry etc.	
Discuss "Hand-To-Mouth" Contamination Prevention Policy No eating, chewing gum, or use of tobacco products permitted in work zones.	
Discuss Work Zone locations and minimum PPE levels enforced for all areas: Support, Exclusion, and Decontamination (Personnel Trailer & Equipment Pad).	
Review Respiratory Protection Program. Perform and record fit test.	
Record PPE items issued and demonstrate proper procedures for: Donning, Doffing, Disposal, Decontamination and Storage.	
Discuss decon procedures and PM's expectations for equipment and personnel.	
Identify fire extinguisher locations and proper use, first aid and eye wash station.	
Discuss heavy equipment work zones, operations and expectations.	

Discuss emergency signals and procedures. Discuss evacuation relocation procedures.	
Review special hazards/procedures.	

TRUCK DRIVER POLICY AND ORIENTATION

I. INTRODUCTION

Truck drivers operating on ENTACT project sites must observe unique safety precautions to help protect the driver's safety and the safety of others. This policy describes these minimum requirements.

II. REQUIREMENTS

Truck drivers on ENTACT project sites are required to comply with ENTACT's Behavior Based Health and Safety System requirements including the following:

A. Participate in daily safety meetings. Review JSAs.
B. Truck Driver Orientation must be completed prior to entering the site. Be aware of site specific hazards and site operational responsibility.
C. All personnel entering the Exclusion Zone are subject to drug and alcohol testing. Drugs, alcohol, and firearms are not allowed on-site.
D. Obey posted speed limit on-site at all times.
E. Conduct yourself in a professional manner, courteous of those dumping before and after you.
F. Stay in your vehicle while truck is being loaded and/or while you are in the Exclusion Zone.
G. No smoking or use of other tobacco products is allowed on-site.
H. Keep truck windows closed while loading.
I. Obey the spotter's directions at all times. If you do not understand the spotter's direction, clarify what he/she is directing prior to moving.
J. Be totally aware of all ground personnel and obstructions, as well as overhead power lines and electrical wires, and maintain appropriate safe distances.
K. Decontamination and documented inspection of vehicle is required prior to leaving the job site.
L. All loads must be tarped prior to leaving property.
M. The bed of the truck must be completely lowered prior to moving.
N. Cleaning of truck beds is allowed only in designated areas.
O. Watch oncoming traffic when exiting the job site.
P. Proper daily truck documented maintenance is required for safe operation.
Q. Vehicles with obvious unsafe conditions will be refused access.
R. Any truck incidences or incidents are to be reported to the ENTACT Field Project Manager as soon as possible (no later than 24-hours after incident). Follow ENTACT incident reporting procedures.
S. Be sure you have received all required paperwork prior to departure. Also be sure to deliver the previous load's paperwork (with the arriving weight) to the designee signing manifests.

T. Road safety in and out of the facility as well as road safety to and from the landfill is of paramount importance. Negative feedback from flagmen and/or other drivers can be grounds for dismissal from the project.
U. If you must leave your vehicle for any reason (going to office, restroom, etc.) you must shut the truck engine off and set the brake before leaving the vehicle.
V. Cell phones will not be used by the driver if the truck is moving or being loaded.

III. SITE SPECIFIC HAZARDS

Site specific hazards are identified in ENTACT's Health and Safety Plan. Listed below are the hazards associated with truck driving on your particular site.

ENTACT Project Name and Location:	Date:
ENTACT FPM:	Subcontractor:
Chemical and Physical Hazards:	
Site Specific Requirements:	

Truck Driver Name (print)

Company Name

Truck Driver Signature

Date

ENTACT Associate Completing Orientation

ENTACT Contact Numbers:
1.
2.
3.

VISITOR, OCCASIONAL WORKER, SUBCONTRACTOR ORIENTATION

Project Name:	Date:	
FPM:	HSC:	
Signed Visitor Log and received a Visitor badge.		☐
I acknowledge that eating, drinking, smoking and use of tobacco at non-designated areas is prohibited.		☐
I will stay with my assigned escort at all times. My escort is: _____		☐
I have reviewed the Health and Safety Plan and I am aware of the physical, chemical, and biological hazards that may exist at the project site. I will obey all safety signs, comply with all safety requirements as set forth in the HASP, and will report any unsafe condition(s) immediately.		☐
I have reviewed the site air monitoring plan.		☐
I have reviewed this list of site-specific hazards with the FPM and/or HSC and have discussed how I may come into contact with them. SITE HAZARDS AT-A-GLANCE CHEMICAL HAZARDS 1. 2. 3. PHYSICAL HAZARDS 1. 2. 3.		☐
I have reviewed and will comply with the visitor PPE requirements as set forth in the site-specific Health and Safety Plan. I have been provided the following PPE: ☐ Hard Hat ☐ Safety Glasses ☐ Gloves ☐ Hearing Protection ☐ Protective Clothing ☐ Half-Face Respirator w/ P-100 Filters ☐ Half-Face Respirator w/ Combination Filters ☐ Other:		☐
If I require access into the Exclusion Zone and Contamination Reduction Zone I have provided to the FPM/HSC the following certifications: OSHA 40-Hr HAZWOPER and current refresher, behavior based safety certification, current hazmat physical, current respirator certification and fit test.		☐
I will report any unsafe acts, conditions, or Near Losses and Loss Incidents to the FPM.		☐
I have been shown and know the locations of first aid care, emergency phone numbers, MSDSs, first aid stations, eye wash stations (showers), fire extinguishers, restrooms, emergency evacuation procedures, and emergency meeting point.		☐
I have been show and know boundaries of all work zones (support, decon and exclusion zones).		☐
I agree to abide by ENTACT's Health and Safety policies. I understand that any violation of this Orientation and/or Health and Safety Plan requirements may result in my being dismissed from the project site.		
Name (Printed and Signature):	Date:	
Company:		

ATTACHMENT T SITE SECURITY CHECKLIST

ENTACT
Site Security Checklist
(Forward a completed copy to your Project Health and Safety Coordinator)

Project Name: _____ Project Number: _____

Field Project Manager: _____

Health and Safety Officer: _____

Project Start Date: _____ Anticipated Completion Date: _____

Date checklist was completed and forwarded: _____

Yes	No	Activity
		Property, trailers, and equipment are protected with a locked security fence. If "no", explain how you will prevent the public from having access to the site and equipment:
		All ENTACT offices or trailers have secure locks on doors and windows. If "no", please explain:
		All windows in ENTACT offices or trailers have window shades or blinds that can be closed when personnel have left the site.
		All laptop computers and other portable electronic equipment are securely stored each night.
		A security service is provided for the site. Please provide the security company's name, phone number, and hours of service at the site. Who is the ENTACT contact for the security guard? Security Company: _____ Phone Number: _____ Hours of service: _____ ENTACT Contact: _____ Home phone and pager: _____ If a security service is not used please explain the procedures to be used to protect ENTACT property after working hours: _____ _____ _____ _____ _____ _____ _____

		All personnel entering the site or entering offices or trailers after working hours will sign-in noting the time entering and leaving.
		Petty cash is locked up each night. The ENTACT associate responsible for petty cash is:
		Keys for offices or support trailers are signed for and keys are returned if the associate is terminated from the site. Extra keys are not left outside the office or trailer.

Heavy Equipment

Yes	No	Activity
		All heavy equipment is stored in a securely fenced area. If a fenced area is not practicable, please explain how heavy equipment is being protected. Who is responsible to ensure the equipment is properly stored each night? Responsible associate: _____
		Keys to heavy equipment are removed from the equipment each night and kept in a secured area. If not, please explain:
		Equipment was inspected prior to use and pictures were taken to verify condition.
		Equipment is inspected weekly and the findings are documented. (See Driver Safety and Cell Phone Policy, Weekly Inspection for ENTACT Vehicles)
		The type of work performed by ENTACT in most cases allows the use of used equipment instead of new equipment. On this project used equipment was leased.
		Projects are instructed to immediately report any incidents or equipment damage to Don Self (972/580-1323) in Dallas within 48-hours of their occurrences. (See Vehicle and Equipment Damage Report)
		All equipment (owned or leased) valued over $1,000 is listed on the vehicle and equipment sheet.

Leasing Agreements

Acknowledgement	Activity
	Always read leasing agreements and understand what you are signing. Ensure the following is comparatively stated: Equipment lost or stolen will be replaced “like in kind”. Example: Used equipment will not be replaced with new equipment.

	If negligence was ***not*** involved ENTACT will not be responsible for the ***loss of use*** of stolen equipment.

Driving on Company Business

Acknowledgement	**Activity**
	Associates will be required to have an approved Motor Vehicle Record check. Associates must be approved by ENTACT's Health and Safety Department. (See Driver Safety and Cell Phone Policy)
	The Project Manager will be responsible for ensuring that only approved drivers are allowed to drive company vehicles or personal vehicles on company business. (See Driver Safety and Cell Phone Policy)

Extra Security

Yes	**No**	**Activity**
		Motion detection lighting is installed at the site.
		An alarm system is installed on site. If "yes", what does it monitor and is it connected to a central monitoring service? Alarm system will monitor: _____ _____ Central monitoring service and phone: _____ _____
		Other:

Additional Comments

ATTACHMENT U HIGH PRESSURE WATER CLEANING

I. INTRODUCTION

The term high-pressure water cleaning covers all portable and fixed water cleaning, including lancing, line moling, shotgunning, and the use of additives or abrasives at pressures above 1,000 psi. This policy discusses the safety and training requirements of high pressure water cleaning.

Pressure below 1,000 psi does not mean that it cannot cause injury or requires any less attention to the principles outlined in this procedure. Adequate precautions are required at all pressures. Equipment that operates below 1,000 psi shall have a specific written operating procedure identifying proper setup, use and associate training.

II. REQUIREMENTS

A. Safety

High pressure water cleaning is normally performed using jet streams that can have a velocity greater than that of a 45-caliber bullet and do as much damage. Therefore, extreme caution and strict compliance with procedures must be used to prevent the jet stream from striking the operator, other associates, or delicate equipment. No portion of the body shall ever be placed in front of the water jet. These jets of water can easily puncture and tear the skin or penetrate deeper causing infection or serious internal damage.

B. Job Safety Procedures

A work plan or procedure and a job safety analysis (JSA) will be written for high pressure water cleaning that includes, but are not limited to, the following:

- Manufacturers recommendations and requirements for each specific piece of equipment to be used.
- Personal protective equipment (PPE), including use of face shield, metatarsal guards and steel toe rubber boots.
- Detailed procedures on the use of each specific piece of equipment.
- Equipment maintenance, servicing, and repair.
- Tools.

C. Training Course Requirements for High-Pressure Water Cleaning

A training course shall be completed by each associate before his/her first high-pressure water cleaning job. The training course shall include, but not be limited to, the following:

- The cutting action of a high-pressure water stream and the potential hazard it poses to the human body shall be demonstrated.
- The need and limitations of personal protective equipment shall be explained. Instruction shall be given as to when and how specific clothing and protective devices must be worn.
- Operation of the high-pressure system and auxiliaries shall be explained. Training shall include start-up and shutdown procedures, potential equipment problems, and appropriate corrective actions.
- Operation, identification, and purpose of all safety devices shall be explained. The importance of not tampering with any safety device, as well as the importance and requirements of keeping them functional, shall be stressed.
- The identification of high-pressure fittings, hoses and accessories, and how to distinguish between them shall be demonstrated.
- The proper method of connecting hoses (laying out without kinks), protecting from excessive wear, and using the proper tools for hook-ups shall be explained and demonstrated.
- The proper stance for sound footing and how to identify and use the various devices. The trainee, under close supervision, shall use the various devices while the unit is slowly pressurized.
- Associate(s) shall demonstrate knowledge and skill in the proper application of equipment through practical application.

D. Required Personal Protective Equipment

- Hard-hat with face shield
- Safety glasses with side shields
- Slicker suit or liquid resistant disposable coveralls
- Rubber or PVC gloves
- Rubber or PVC steel toe boots
- Metatarsal guards

ATTACHMENT V RESPIRATORY TRAINING AND FIT TEST PROCEDURES

ENTACT has developed a written Respiratory Protection Program in order to ensure that the unique characteristics of each work site are taken into account. The written program allows for thorough assessment and documentation of information pertaining to the respiratory hazards to which its associates may be exposed to both during normal operating conditions and during reasonably foreseeable emergencies. This program is updated and implemented for each of ENTACT's work sites.

ENTACT's written Respiratory Protection Program includes the following elements:

- Selecting appropriate respirators for use in the workplace.
- Fit testing tight fitting respirators.
- Using respirators properly in routine situations as well as in reasonably foreseeable emergencies.
- Cleaning, disinfecting, storing, inspecting, repairing, removing from service or discarding, and otherwise maintaining respirators.
- Ensuring adequate air supply quantity and flow of breathing air for atmosphere supplying respirators.
- Regularly evaluating the effectiveness of the program.
- Provisions for medical evaluations of associates who must use respirators.
- Training associates in the proper use of respirators, limitations on use, and maintenance.

Implementation of the program is administered and overseen by ENTACT's Health and Safety Director. Additionally, the designated Health and Safety Coordinator for each of ENTACT's work site locations is responsible for implementing and overseeing the program. The program is updated as necessary at each work site location to reflect relevant changes in the work place. Any changes in the types of respirators used, respirator cartridges or in any other element of the Respiratory Protection Program will require that appropriate revisions be made in the existing written program.

Program Administrator

ENTACT's overall Respiratory Protection Program is administered by Mr. Don Self, Health and Safety Director. His background and training qualifies him to recognize, evaluate, and control the various hazards that are present at ENTACT's work sites. Additionally, Mr. Self is directly responsible for the appointment of individual Health and Safety Coordinators at each work site.

Employer-Provided Respirators

ENTACT provides respirators, training, and medical evaluations at no cost to each of its associates who are required to wear a respirator for protection from hazards in the work place. This reflects the ENTACT philosophy of not only compliance with federal rules and guidelines, but to provide its associates with the very best personal protective equipment necessary to protect their health and safety.

Training

Associates that require respirator protection will be trained prior to beginning work according to OSHA regulations. Training will be provided at no cost and will be documented.

- Why respiratory protection is needed.
- How to use the respirator effectively.
- How to inspect, clean and maintain the respirator.
- How to recognize medical signs and symptoms that may limit or prevent effective use of the respirator.

Retraining will be administered annually and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete.
- Inadequacies in the associate's knowledge or use of the respirator indicate that the associate has not retained the requisite understanding or skill.
- Any other situation arise in which retraining appears necessary to ensure safe respirator use.

ENTACT
CHECKLIST FOR RESPIRATORY PROTECTION PROGRAMS

- □ A written respiratory protection program that is specific to the workplace and covers the following:
- □ Procedures for selecting respirators.
- □ Medical evaluations of associates required to utilize respirators.
- □ Fit testing procedures.
- □ Routine use procedures and emergency respirator use procedures.
- □ Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and maintaining respirators.
- □ Procedures for ensuring adequate air quality for supplied air respirators.
- □ Training in respiratory hazards.
- □ Training in proper use and maintenance of respirators.
- □ Program evaluation procedures.
- □ Procedures for ensuring that associates who voluntarily wear respirators (excluding filtering facepiece) comply with the medical evaluation, and cleaning, storing and maintenance requirements of the standard.
- □ A designated program administrator who is qualified to administer the program.
- □ Updated the written program as necessary to account for changes in the workplace affecting respirator use.
- □ Provided equipment, training, and medical evaluations at no cost to associates.

Voluntary Respirator Use

ENTACT may allow associates to use a respirator voluntarily if it has been determined that the respirator itself will not present a hazard to the associate due to misuse, other hazards or conditions in the workplace, or the associate's medical condition. In such cases, ENTACT may provide associates with respirators or allow them to use their own respiratory protection. However, should this instant occur, the associate must be provided with:

- either verbal or on written form, basic information on the proper use of respirators;
- procedures for cleaning, disinfecting, storing, inspecting, repairing, removing from service or discarding, and otherwise maintaining respirators;
- provide medical evaluation of associates who use elastomeric respirators. Any ENTACT associate who voluntarily chooses to wear a respirator will be required to adhere to the guidelines set forth in ENTACT's overall and site specific written Respiratory Protection Program.

RESPIRATOR SELECTION

General Guidelines for Selection

Selection of respirators is based on the hazard which ENTACT associates are exposed and how workplace user factors affect respirator performance and reliability. In each instance workplace and user factors such as size and configuration of the work area, ease of associate communication, ease or difficulty of the work rate of activity, and workplace conditions such as temperature and humidity, are given consideration prior to the selection of any necessary respiratory equipment. Additionally, the identification and evaluation of work site hazards are reviewed. Estimates for measurement of associate exposures to various hazards are accomplished either through baseline data monitoring or personal monitoring. However, demonstration through waste stream analysis, process information and reasonable assumptions may be used in respirator determination. In the event that associate exposure cannot be determined, ENTACT will consider the work site atmosphere to be IDLH (Immediately Dangers to Life and Health) and select respirators on that basis.

ENTACT selection of any respirator will be one that has been certified by the National Institute for Occupational Safety and Health (NIOSH) and will only be used in compliance with the conditions of its certification. A sufficient number of respirator models and sizes will be selected so as to be acceptable to and correctly fit each user. If medical evaluations of the associate show that their health may be impaired by using negative pressure respirators ENTACT will provide them with powered air purifying respirators.

Respirators for IDLH Atmospheres

IDLH environments require the highest level of respirator protection and reliability. ENTACT will provide either of the following respirators for use in IDLH environments:

- Full facepiece pressure demand SCBA that are certified by NIOSH for a minimum service life of 30 minutes.
- Combination full facepiece pressure demand supplied air respirators with auxiliary self-contained escape air supply.

Respirators for escape from IDLH atmospheres must be NIOSH certified for escape from the atmosphere in which they will be used. ENTACT considers all oxygen deficient atmospheres to be IDLH, therefore, atmosphere supplying respirators must be used in oxygen deficient atmospheres (where oxygen is less than 19.5%). ENTACT may use any atmosphere supplying respirator if it can be demonstrated that under all reasonably foreseeable conditions oxygen concentration in the work area can be maintained within ranges specified in the following table (Table II of 29 CFR 1910.134). Otherwise, associates must use full facepiece pressure demand SCBA's or a combination full facepiece pressure demand supplied air respirators with auxiliary self-contained air supply.

Table 1	
Altitude	Oxygen deficient atmospheres (% O_2) for which the employer may rely on any atmosphere supplying respirator.
Less than 3001	16.0-19.5
3001-4000	16.4-19.5
4001-5000	17.1-19.5
5001-6000	17.8-19.5
6001-7000	18.5-19.5
7001-8000	17.3-19.5
Above 8000 feet the exception does not apply. Oxygen-enriched breathing air must be supplied above 14,000 feet.	

Table 1 specified, by altitude, the oxygen concentrations in which any type of atmosphere-supplying respirators may be used. For example, if the workplace is located at sea level and the associate can demonstrate that they oxygen content in the oxygen deficient environment will be maintained between 17 and 19%, and then the associate may use any atmosphere-supplying respirator.

Work operations being conducted in well-controlled atmospheres where oxygen levels are deficient (below 19.5 percent) are typically permit-required confined spaces (see OSHA's Permit-Required Confined Space standard, 29 CFR 1910.146).

Respirators for Non-IDLH Atmospheres

ENTACT will provide respirators that are adequate to protect its associate's health and ensure compliance with all other OSHA requirements under routine and reasonably foreseeable emergency situations. Other OSHA regulations include Air Contaminants standard (29 CFR 1910.1000), the substance specific standards, appropriate safety regulations such as the Hazardous Waste Operations and Emergency Response standard (29 CFR 1910.120(g)(2)). Additionally, ENTACT will comply with the General Duty Clause of the Occupational Safety and Health Act which requires that employees be protected from substances which are not regulated by OSHA, but which are known to be hazardous at levels encountered in the workplace. ENTACT will consult the Material Safety Data Sheets (MSDSs) should any questions arise about toxicity of a particular substance.

Respirators selected by ENTACT must be appropriate for the chemical state and physical form of the contaminant which will require the use of different types of filters, cartridges, and canisters depending on whether dust, fumes, mists, vapors, and gases are present in the workplace and depending on the kinds of concentrations of substances present.

Respiratory Protection for Gases and Vapors

For protection against gases and vapors, either atmosphere supplying respirators or air purifying respirators will be selected. In instances that require air purifying respirator use, the respirator must be equipped with an end-of-service life indicate (ESLI) certified by NIOSH for the contaminants. If there is no appropriate ESLI then a change schedule must be implemented for canisters and cartridges based on objective information that will ensure that canisters and cartridges are changed before the end of their service life. Factors for determining change schedules include the following:

- Contaminants the respirator is to protect against.
- Concentrations of contaminants in the work area.
- Frequency of use.
- Temperature, humidity, and air flow through the cartridge or canister.
- Associate work rates.
- The presence of other potentially interfacing chemicals.

ENTACT will assume worst-case conditions to avoid breakthrough earlier than anticipated. All information relied upon and the basis for the change schedules used in the written respirator protection program will be documented on a job-by-job basis.

Respiratory Protection for Particulates

Available options include:

- Atmosphere-supplying respirators.
- Air purifying respirators (including filtering facepieces) with filters certified by NIOSH under 30 CFR Part U, as high efficiency particulate (HEPA) filters or filters certified by NIOSH under 42 CFR Part 84.
- Air purifying respirators with any filter certified for particulates by NIOSH for protection against contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least two micrometers.

Types of Particulate Filters Available for Air-Purifying Respirators

Particulate-removing cartridges contain filters that reduce inhaled concentrations of toxic dusts and fiber, such as lead and asbestos, fumes, mists, and radioactive and biological materials (such as grain dusts). Powered and non-powered APRs require different particulate filters. Only HEPA filters are appropriate for protection against particulates for powered APRs.

The nine types for use with non-powered APRs are based on three levels of filter efficiency and three levels of resistance to degradation by oil. The three levels of filter efficiency are 95, 99, and 99.97 percent. These are referred to as 95, 99, and 100 filters, respectively. The three levels of oil resistance are N (non oil resistant), R (oil resistant), and P (oil proof). The most common commercially available cartridges are the “N95” (not oil resistant and 95 percent efficient) and “P100” (oil proof and 99.97 percent efficient). The P100 is comparable to the HEPA filter that is used with PAPRs.

ENTACT
CHECKLIST FOR RESPIRATOR SELECTION

- □ Respiratory hazards in the workplace have been identified and evaluated.
- □ Associate exposures that have not been, or cannot be, evaluated are considered IDLH.
- □ Respirators are NIOSH certified, and used under the conditions of certification.
- □ Respirators are selected based on the workplace hazards evaluated and workplace and user factors affecting respirator performance and reliability.
- □ A sufficient number of respirator sizes and models are provided to be acceptable and correctly fit the users.
- □ For IDLH atmospheres:
- □ Full facepiece pressure demand SARs with auxiliary escape unit or full facepiece pressure demand SCBAs, with a minimum service life of 30 minutes, are provided.
- □ Respirators used for escape only are NIOSH certified for the atmosphere in which they will be used.
- □ Oxygen deficient atmospheres are considered IDLH.
- □ For Non-IDLH atmospheres:
- □ Respirators selected are appropriate for the chemical state and physical form of the contaminant.
- □ Air-purifying respirators used for protection against gases and vapors are equipped with ESLIs or a change schedule has been implemented.
- □ Air-purifying respirators used for protection against particulates are equipped with NIOSH-certified HEPA filters or other filters certified by NIOSH for particulates under 42 CFR Part 84.

III. MEDICAL EVALUATION

Employer-Provided Medical Evaluation

ENTACT requires that a complete medical evaluation be conducted at no charge for all new associates to determine the associate's ability to use a respirator. If an associate refuses to be medically evaluated for use of a respirator he or she cannot be assigned to perform a job that requires a respirator. The medical evaluation must be provided before the associate is fit tested and uses a respirator in the workplace for the first time. Medical evaluations are required for both positive pressure and negative pressure respirators. No ENTACT associates will be allowed to wear a respirator until they have been deemed medically fit to do so by a licensed physician.

Medical Evaluation Procedures

ENTACT selects and identifies a physician (PLHCP) to perform medical evaluations necessary to determine an associate's ability to wear a respirator. Medical information for each associate is obtained by the licensed physician prior to examinations. A follow-up examination is conducted if the questionnaire or initial medical examination indicates that one is necessary. As part of the follow-up examination, the PLHCP may include any test, consultation, or diagnostic procedures that are needed to make a final determination about an associate's ability to use a respirator.

Procedures for Administering Medical Evaluations

When ENTACT provides a medical evaluation for an associate, the following guidelines are standard procedure:

- Confidentiality of the associate being evaluated.
- Questionnaire or medical examination is given during associate's normal work hours or at a place convenient to the associate.
- Assurance that the associate understands the questions on the medical questionnaire.
- Medical evaluation costs or any expenses relating to the physical examination are incurred by ENTACT.

ENTACT associates are informed that they have access to the physician who conducted the medical examination should they wish to discuss the results of their questionnaire or medical examination. If necessary, an interpreter may be employed to assist any non-English speaking associates.

Supplemental Information for Physician

ENTACT provides the examining physician with specific information to be used to make the determination about an associate's ability to use a respirator. Information supplied includes the following:

- The type and weight of the respirator to be worn by the associate.
- The duration and frequency of respirator use (including use for rescue and escape).
- The level of physical effort that the associate would be expending while wearing a respirator.
- Additional personal protective clothing and equipment that the associate would wear.
- The temperature and humidity extremes that may be encountered in the work environment where respirator use is required.
- A copy of ENTACT's written respiratory protection program.
- A copy of the Respiratory Protection standard.

Medical Determination

A physician's recommendation must be in writing and must include the following information:

- A determination of whether or not the associate is medically able to use a respirator.
- Any limitations on respirator use related to the medical condition of the associate or to the workplace conditions in which the respirator will be used.
- The need, if any, for follow-up medical evaluations.
- A statement that the physician has provided the associate with a copy of the physician's written recommendation.

ENTACT is responsible for making the final determination as to the associate's ability to wear a respirator. The physician's opinion is an important factor that will be considered in making this determination. A copy of the physician's written recommendation is kept in the associates file. If the physician determines that the associate is unable to wear a negative pressure respirator, but would be able to wear a powered air purifying respirator (PAPR), ENTACT would provide the associate with a PAPR.

Additional Medical Evaluations

Associates are provided with additional medical evaluations whenever the following event occurs:

- The associate reports symptoms related to his or her ability to use a respirator.
- The PLHCP, respiratory protection program administrator, or supervisor determines that a medical reevaluation is necessary.
- Information from the respiratory protection program suggests a need for reevaluation.
- Workplace conditions (such as protective clothing, temperature, or level of work effort) have changed so that an increase burden is placed on the associate's health.

All ENTACT associates are provided with annual physicals and checkups.

CHECKLIST FOR MEDICAL EVALUATION

- □ All associates have been evaluated to determine their ability to wear a respirator prior to being fit tested for or wearing a respirator for the first time in the workplace.
- □ A physician or other licensed health care professional (PLHCP) has been identified to perform the medical evaluation.
- □ The medical evaluations obtain the information requested in Sections 1 and 2, Part A of Appendix C of the standard, 29 CFR 1910.134.
- □ Associates are provided follow-up medical exams if they answer positively to any of questions 1 through 8 in Section 2, Part A of Appendix C, or if their initial medical evaluation reveals that a follow-up exam is needed.
- □ Medical evaluations are administered confidentially during normal work hours, and in a manner that is understandable to associates.
- □ Associates are provided the opportunity to discuss the medical evaluation results with the PLHCP.
- □ The following supplemental information is provided to the PLHCP before he or she makes a decision about respirator use:
- □ Type and weight of the respirator.
- □ Duration and frequency of respirator use.
- □ Expected physical work effort.
- □ Additional protective clothing to be worn.
- □ Potential temperature and humidity extremes.
- □ Written copies of the respiratory protection program and the Respiratory Protection standard.
- □ Written recommendations are obtained from the PLHCP regarding each associate's ability to wear a respirator, and that the PLHCP has given the associate a copy of these recommendations.
- □ Associates who are medically unable to wear a negative pressure respirator are provided with a powered air-purifying respirator (PAPR) if they are found by the PLHCP to be medically able to use a PAPR.
- □ Associates are given additional medical evaluations when:
- □ The associate reports symptoms related to his or her ability to use a respirator.
- □ The PLHCP, respiratory protection program administrator, or supervisor determines that a medical reevaluation is necessary.
- □ Information from the respiratory protection program suggests a need for reevaluation.
- □ Workplace conditions have changed in a way that could potentially place an increased burden on the associate's health.

IV. FIT TESTING

In compliance with the Respiratory Protection standard, ENTACT requires that fit testing be conducted on all associates who are required to wear a respirator that includes a tight-fitting facepiece.

There are two types of fit testing: quantitative and qualitative.

Quantitative Fit Testing

Quantitative fit testing is a method of measuring the amount of leakage into a respirator. It is a numeric assessment of how well a respirator fits a particular individual.

To quantitatively fit test a respirator, a sampling probe or other measuring device must be placed on the inside of the respirator facepiece. The respirator wearer then performs the user seal checks followed by the selected QNFT.

- For the generated aerosol QNFT, he or she stands inside a "test chamber" (booth or hood), where a nontoxic aerosol is introduced into the air. Measurements are then taken of the aerosol concentration both inside the test chamber and inside the respirator. An assessment of the quantitative fit is made based on the ratio of the aerosol concentration inside the test chamber to the concentration inside the facepiece.
- For the condensation nuclei counter QNFT, ambient air particles are used as the test aerosol with measurements made of their concentration outside and inside the facepiece, and an assessment is made of the quantitative fit of the facepiece.
- The controlled negative pressure QNFT method uses a fit test instrument to exhaust air from inside the respirator facepiece to maintain a constant negative pressure. The measurement of the exhaust stream required to maintain a constant negative pressure yields a measure of the leakage into the facepiece.

Detailed protocols for quantitative fit testing are provided as part of the standard (see Appendix A of the standard).

Qualitative Fit Testing

Qualitative fit testing is a non-numeric pass/fail test that relies on the respirator wearer's response to a substance ("test agent") used in the test to determine respirator fit.

If the individual can smell the test agent (or is irritated by the smoke), this indicates that the agent leaked into the facepiece and that the respirator has failed the test because a good facepiece-to-face seal has not been achieved. If the associate cannot successfully complete the

qualitative test with a particular respirator, the associate must then be tested with another make, size, or brand of respirator.

Detailed protocols for qualitative fit testing are provided as part of the standard (see Appendix B of the standard).

Tight-Fitting Facepiece

A tight-fitting facepiece is intended to form a complete seal with the respirator wearer's face. This seal must be sufficiently tight to prevent any contaminants in the work environment from leaking around the edges of the facepiece into the user's breathing air.

In contrast, a loose-fitting facepiece is specifically designed to form a partial seal with the user's face. Such a facepiece typically covers at least the head and includes a system through which clean air is distributed into the breathing zone. For example, hoods, suits, and helmets are all loose-fitting face pieces. Such equipment does not rely on a tight facepiece-to-face seal to protect the associate, and is useful for associates with facial hair or other physical characteristics that make it difficult to wear a tight-fitting facepiece.

Positive and Negative Pressure Respirators

Positive pressure respirators maintain positive air pressure inside the facepiece throughout the user's breathing cycle. That is, the air pressure inside the facepiece remains greater than the air pressure outside the facepiece. Thus, any leakage around the facepiece seal should result in air escaping from inside the facepiece to the outside environment rather than worksite contaminants leaking into the facepiece and breathing air.

In contrast, a negative pressure respirator will have a lower air pressure inside the facepiece than outside during inhalation. If the facepiece-to-face seal leaks on these types of respirators, air contaminants will be drawn into the breathing air.

Respirators That Require Fit Testing

ENTACT must ensure that quantitative or qualitative fit testing is conducted for all associates required to use either positive or negative pressure tight-fitting facepiece respirators. This includes both air-purifying and atmosphere-supplying respirators operating in either a positive or negative pressure mode, but does not include any loose-fitting face pieces.

When Fit Testing Must be Conducted: General Requirements

ENTACT will ensure that fit testing is conducted for all associates required to wear tight-fitting

facepiece respirators as follows:

- Prior to initial use.
- Whenever an associate switches to a different tight-fitting facepiece respirator (for example, a different size, make, model, or type).
- At least annually.

When Fit Testing Must Be Conducted: Changes in the Respirator Wearer's Physical Condition

ENTACT will ensure that an additional fit test is conducted if an associate experiences a change in physical condition that could affect the seal on the tight-fitting facepiece respirator. This requirement is triggered by a physical change:

- Reported by the respirator user.
- Observed by an associate, a physician or other licensed health care professional, the supervisor, or the program administrator.

Physical changes in the associate that might affect the facepiece-to-face seal could include, for example, an obvious change in body weight, facial scarring, extensive dental work, or cosmetic surgery.

When Fit Testing Must Be Conducted: Unacceptable Fit as Determined by an Associate After Fit Testing

If, after fit testing, an associate reports that his or her respirator does not fit properly, ENTACT will allow the associate a reasonable opportunity to select a different tight-fitting facepiece respirator. After another respirator is selected, ENTACCT will conduct a new fit test on the associate's replacement equipment.

An associate might determine that the facepiece does not establish an effective facepiece-to-face seal, for example, upon smelling a worksite contaminant while wearing the respirator with new cartridges. Or an associate might hear or feel air leaking around the facepiece-to-face seal. The associate's determination also can be based on factors unrelated to the particular worksite. For example, the associate might find that he or she can't wear the respirator for extended periods without experiencing irritation or pain.

Fit Testing Procedures: General Requirements

ENTACT will ensure that all fit testing conducted for associates required to wear tight-fitting facepiece respirators follows the OSHA approved protocols.

Detailed protocols for qualitative and quantitative fit testing are provided as part of the standard

(see Appendices A and B of the standard). These protocols specify that the assocaite must have on hand during fit testing all types and sizes of respirators that are available for use at the worksite. This allows ENTACT to ensure that each associate is tested with the same type of respirator (make, model, style, and size) that he or she will wear at the worksite.

Limitation on Use of Qualitative Fit Testing

The table at the end of this section summarizes acceptable means of fit testing (QLFT versus QNFT) for different types of respirators.

Qualitative fit testing may be used to fit test all positive pressure respirators (air-supplying and PAPRs), and any negative pressure air-purifying respirators that must achieve a fit factor of 100 or less. Dividing the fit factor of 100 by a standard safety factor of 10 indicates that the negative pressure air-purifying respirators that have successfully completed a qualitative fit test can be relied on to reduce an associate's exposure by a protection factor of 10. The safety factor of 10 is used because protection factors that associates achieve at work sites tend to be much lower than the fit factors achieved during fit testing.

In practice, this means that any negative pressure air-purifying respirator (APR) may be qualitatively fit tested if the APR is to be used in workplace atmospheres where the level of the hazardous contaminant is 10 times or less than the permissible exposure limit (PEL) and lower than the level that is immediately danger to life or health (IDLH). For example, if the PEL for a specific workplace contaminant is 50 ug/m^3, the associate could use a qualitative fit test to fit test a negative pressure APR to be used in the workplace at exposure levels up to 500 ug/m^3, (ten times the PEL or less).

Both half-facepiece APRs and full-facepiece APRs may be qualitatively fit tested if they are to be worn in work areas where the concentration of contaminant is no more than ten times the PEL.

What is a PEL?

OSHA PELs (permissible exposure limits) establish the maximum level of a specific contaminant that an associate can be exposed to, averaged over an 8-hour work day (8-hour time-weighted average, or TWA) or over a specified portion of a work day (for example, a 15 minute short-term exposure limit, or STEL). (PELs are listed in 29 CFR 1910.1000, and 1926.55. Also see the substance-specific standards for general industry and construction.

Use of Quantitative Fit Testing

If quantitative testing is used to fit test a tight-fitting facepiece respirator, respirator fit is not acceptable unless:

- For a half or quarter facepiece: The fit factor achieved in the test is greater than or equal to 100.
- For a full facepiece: The fit factor achieved in the test is greater than or equal to 500.

Fit Testing for Atmosphere-Supplying and Powered Air-Purifying Respirators

ENTACT will ensure that all fit testing conducted for associates issued tight-fitting atmosphere-supplying respirators and powered air-purifying respirators is conducted in the negative pressure mode, even if the respirator is to be worn with positive pressure. This is because it is difficult outside of a laboratory test situation to accurately perform fit testing on positive pressure respirators.

ENTACT can conduct qualitative or quantitative fit testing of tight-fitting atmosphere-supplying respirators and powered air-purifying respirators according to the following requirements:

Qualitative fit testing. To conduct qualitative fit testing on an atmosphere-supplying respirator, ENTACT will do one of the following:

- Temporarily convert the user's actual facepiece into a negative pressure respirator by installing the appropriate filters. ENTACT will consult with the manufacturer or supplier for proper procedure if necessary.
- Use an identical negative pressure facepiece (size, make, model).

ENTACT can conduct qualitative fit testing on a powered air-purifying respirator by simply turning off the blower.

Quantitative fit testing. To conduct quantitative fit testing on an atmosphere-supplying respirator, ENTACT will temporarily or permanently install a sampling probe or adaptor inside the facepiece.

In preparation for testing, ENTACT will contact the respirator manufacturer or supplier for information on whether a sampling adapter can be temporarily installed in the facepiece. Any modifications made to a respirator for testing purposes must be removed before use.

If temporary modifications cannot be made, ENTACT will need to permanently convert the facepiece to allow for testing. If the facepiece is permanently converted – for example, by drilling a hole in the respirator facepiece to insert the probe – the associate cannot repair the hole and put the respirator back in service. Once a hole is drilled in the facepiece, the respirator can only be used for fit testing purposes. It is no longer approved for workplace use.

Acceptable Fit-Testing Methods		
Respirator	**QLFT**	**QNFT**
Half-face, negative pressure, APR (< 100 fit factor)	Yes	Yes
Full-face, negative pressure, APR (<100 fit factor) used in atmospheres up to 10 times the PEL	Yes	Yes
Full-face, negative pressure, APR (> 100 fit factor)	No	Yes
PAPR	Yes	Yes
Supplied-air respirators (SAR), or SCBA used in negative pressure (demand mode) (> 100 fit factor)	No	Yes
Supplied-air respirators (SAR), or SCBA used in positive pressure (pressure demand mode)	Yes	Yes
SCBA – Structural Fire Fighting, positive pressure	Yes	Yes
SCBA/SAR – IDLH, positive pressure	Yes	Yes
Mouth bit Respirators	Fit-testing not required	
Loose-fitting Respirators (e.g., hoods, helmets)		

ENTACT
CHECKLIST FOR FIT TESTING

- □ Associates who are using tight-fitting facepiece respirators have passed an appropriate fit test prior to being required to use a respirator.
- □ Fit testing is conducted with the same make, model, and size that the associate will be expected to use at the worksite.
- □ Fit tests are conducted annually and when different respirator face pieces are to be used.
- □ Provisions are made to conduct additional fit tests in the event of physical changes in the associate that may affect respirator fit.
- □ Associates are given the opportunity to select a different respirator facepiece, and be retested, if their respirator fit is unacceptable to them.
- □ Fit tests are administered using OSHA-accepted QNFT or QLFT protocols.
- □ QLFT is only used to fit test either PAPRs, SCBAs, or negative pressure APRs that must achieve a fit factor of 100 or less.
- □ QNFT is used in all situations where a negative pressure respirator is intended to protect associates from contaminant concentrations greater than 10 times the PEL.
- □ When QNFT is used to fit negative pressure respirators, a minimum fit factor of 100 is achieved for tight-fitting half-face pieces and 500 for full-face pieces.
- □ For tight-fitting atmosphere-supplying respirators and powered air-purifying respirators:
- □ Fit tests are conducted in the negative pressure mode.
- □ QLFT is achieved by temporarily converting the facepiece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure APR.
- □ QNFT is achieved by modifying the facepiece to allow for sampling inside the mask midway between the nose and mouth. The facepiece is restored to its NIOSH approved configuration before being used in the workplace.

V. USE OF RESPIRATORS

As part of the written respirator protection program, ENTACT has established and implemented procedures for the proper use of respirators in both routine jobs and emergencies. Specific use procedures are required to:

- Prevent leaks in the respirator facepiece seal.
- Prevent associates from removing respirators in hazardous environments.
- Ensure that respirators operate effectively throughout the work shift.

- Protect associates entering IDLH atmospheres.

Preventing Leaks in the Facepiece Seal

Facepiece seals and valves are important in tight-fitting respirators. Tight-fitting respirators have a complete seal to the face. If there is a leak in the seal of tight-fitting respirator or valve, then the respirator cannot reduce the wearer's exposures to respiratory hazards. The associate must be sure that nothing interferes with the seal of the respirator to the associate's face or with the valves.

Conditions that can interfere with the seal or valve are specified in the standard and include:

- Facial hair, facial scars;
- Jewelry or headgear that projects under the facepiece seal;
- Missing dentures; and
- Corrective glasses or goggles or other personal protective equipment:
    - Face shields
    - Protective clothing
    - Helmets
    - Eyeglass insert or spectacle kits

Associates may use this equipment with tight-fitting respirators if the associate ensures that the equipment is worn in a way that:

- Does not interfere with the face-to-facepiece seal.
- Does not distort the associate's vision.
- Does not cause physical harm to the associate (e.g., if the eyeglass insert did not fit properly so that the tight fit of the respirator caused the insert to press against his or her forehead, eyes, or temples).

ENTACT will make sure that the respirator does not interfere with the associate's eyewear or force the associate to remove the eyewear altogether. Contact lenses can not be worn with full face respirators.

ENTACT requires that associates perform user seal checks each time they put on a tight-fitting respirator. User seal checks are a quick and easy way for associates to verify that they have put on their respirators correctly and that the respirators are working properly.

To conduct a user seal check, the associate must follow either the procedures for a user seal check that are contained in Appendix B-1 of the respiratory protection standard or equally effective procedures that the respirator manufacturer recommends for conducting a user seal check.

How are user seal checks conducted?
To conduct a user seal check, the associate performs a negative or positive pressure fit check.

- For the negative pressure check, the associate:
    1. Covers the respirator inlets (cartridges, canisters, or seals);
    2. Gently inhales; and
    3. Holds breath for 10 seconds.

  The facepiece should collapse on the associate's face and remain collapsed.
- For the positive pressure check, the associate:
    1. Covers the respirator exhalation valve(s); and
    2. Exhales.

  The facepiece should hold the positive pressure for a few seconds. During this time, the associate should not hear or feel the air leaking out of the face-to-facepiece seal.

Appendix B-1 of the respiratory protection standard provides detailed instructions on how to conduct the user seal check.

The manufacturer's recommended procedures for checking the facepiece may be used if the employer demonstrates that the manufacturer's procedures are as effective as those described in Appendix B-1 of the respiratory protection standard, e.g., these procedures are effective in identifying respirators that fit poorly when put on or adjusted.

How can ENTACT ensure that associates perform user seal checks?

The intent of the standard is that ENTACT make sure that the fit and performance of the respirator is not compromised. ENTACT must take actions that will result in safe work practices. Examples of these actions include:

- Providing training to associates;
- Routinely observing work practices;
- Routinely monitoring site conditions; and
- Consulting associates.

Continuing Respirator Effectiveness

ENTACT must be aware of conditions in work areas where associates are using respirators. ENTACT allows associates to leave the respirator use area to perform any activity that involves removing or adjusting a respirator facepiece, or if there is any indication that a respirator may not be fully effective. If there is any indication that they are not functioning properly, the associate must replace, repair, or discard respirators, before allowing associates to return to an area in

which respirator use is required.

"Appropriate surveillance" means that the associate must routinely look for any changes that may affect the effectiveness of a respirator. The associate must look for changes in the work area, such as changes in work tasks or processes, that can result in changes in the hazard or the time period of exposure, or that put the associate in closer proximity to the hazard. Another change might be the addition of new machinery that would cause an associate to exert more energy and breathe harder.

By "appropriate surveillance" OSHA means that ENTACT must routinely observe associates as they work while wearing respirators. By observing respirator use under actual workplace conditions, ENTACT can determine:

- Whether other protective equipment is interfering with respirator use.
- Whether a change in working conditions may result in exposure to new contaminants.
- Whether associates are experiencing discomfort, such as skin irritation or break-through of contaminants through cartridges and canisters.

If any of these conditions exist, ENTACT must make adjustments – such as providing a more protective respirator or a different size or style of respirator, or altering work practices to reduce the stress on associates – to ensure that associates continue to receive adequate respiratory protection. Additionally, associates need a "safe area" in the workplace where they can safely remove their respirators to wash or conduct the maintenance necessary to ensure the respirator's adequate operation. The "safe area" will be located in a place which is free of respirator hazards or contamination.

ENTACT
CHECKLIST FOR PROPER USE OF RESPIRATORS

- □ Associates using tight-fitting respirators have no conditions, such as facial hair, that would interfere with a face-to-facepiece seal or valve function.
- □ Associates wear corrective glasses, goggles, or other protective equipment in a manner that does not interfere with the face-to-facepiece seal or valve function.
- □ Associates perform user seal checks prior to each use of tight-fitting respirator.
- □ There are procedures for conducting ongoing surveillance of the work area for conditions that affect respirator effectiveness, and that, when such conditions exist, ENTACT take steps to address those situations.
- □ Associates who are permitted to leave their work area to conduct respirator maintenance, such as washing the facepiece, or to replace respirator parts.
- □ Associates do not return to their work area until their respirator has been repaired or replaced in the event of breakthrough, a leak in the facepiece, or a change in breathing resistance.

VI. MAINTENANCE AND CARE OF RESPIRATORS

ENTACT will provide respirator users with equipment that is clean, sanitary, and in good working order. To accomplish this, ENTACT has a system of respirator care and maintenance as a component of its respiratory protection program. Regular care and maintenance is important to ensure that the equipment functions as designed and protects the user from the threat of illness or death.

ENTACT's system of respirator care and maintenance provides for:

- Cleaning and disinfection procedures
- Proper storage
- Regular inspections
- Repair methods

Cleaning and Disinfecting

Respirator equipment must be regularly cleaned and disinfected according to specified procedures (see Appendix B-2 of the standard) or according to manufacturer specifications that are of equivalent effectiveness.

Cleaning and disinfection procedures are divided into the following:

- Disassembly of components
- Cleaning and disinfecting
- Rinsing, drying, and reassembly
- Testing

The frequency of cleaning and disinfecting or sanitizing respirators will depend in part on whether ENTACT associates share the equipment or are issued respirators for their exclusive use. Worksite conditions also will dictate cleaning frequency, e.g., working in a dirty environment will require that the respirator facepiece, in particular, be cleaned more frequently.

At a minimum:

If a respirator is . . .	**Then . . .**
Issued for the exclusive use of an individual associate.	The equipment must be cleaned and disinfected as often as necessary to be maintained in clean and sanitary conditions.
Used by more than one associate.	The equipment must be cleaned and disinfected *before* being used by different individuals.
Maintained for use in emergencies, testing, and training exercises.	The equipment must be cleaned and disinfected *after* each use.

ENTACT will choose the program that best meets the needs of its workplace. For example, ENTACT may use a centralized operation where associates receive respirators that have been cleaned, disinfected and repaired by associates assigned to this task. ENTACT may also require that each respirator wearer be responsible for cleaning and maintaining his or her equipment. In either case, ENTACT must provide appropriate training, on-the-job-time, and the necessary equipment and supplies.

In addition, if individual associates are required to clean their own respirators, ENTACT will allow time during work hours for users to perform this function.

Storage

ENTACT associates will store respirators in a manner that:

- Protects them from contamination, dust, sunlight, extreme temperatures, excessive moisture, damaging chemicals, or other destructive conditions.
- Prevents the facepiece or valves from becoming deformed.
- Follows all storage precautions issued by the respirator manufacturer.

In addition, if a respirator is intended for emergency use, it must be:

- Kept accessible to the work area, but not in an area that may itself become involved in an emergency and become contaminated or inaccessible.
- Stored in a compartment or cover that is clearly identified as containing emergency equipment.

Inspection

The frequency of and procedures for inspections depend on whether the respirator is intended for non-emergency, emergency, or escape-only use.

All respirator inspections must include:

- A check of respirator function, i.e., visual inspection to identify any parts that may be missing, distorted, blocked, loose, deteriorated, or otherwise interfere with proper performance.
- A check of elastomeric (rubber) parts for pliability and deterioration.

In addition, inspect:

- Non-emergency use equipment. *Before* each use and during cleaning and disinfection.
- Self-contained breathing apparatus (SCBA). *Monthly*, making sure the air and oxygen cylinders that are available for immediate use are maintained in a fully charged state (i.e., pressure is not below 90% of manufacturer's recommended level). ENTACT must also activate the regulator and low pressure warning devices to ensure that they function properly.
- Emergency use respirators. *At least monthly*, checking for proper *functioning before and after each use*. When inspecting these types of respirators ENTACT must:
    1. Document the date of inspection, name or signature of inspector, inspection findings, any remedial action required, and serial number or other identification of the respirator.
    2. Retain this information with the respirator, storage compartment, or inspection report until next certification. ENTACT may use tags to document the inspections.
- Emergency escape-only equipment. *Before* being carried into the workplace for use.

Repairs

If a respirator does not pass inspection, ENTACT must remove the respirator from service and discard, repair, or adjust it. Tagging out of service respirators is a good means for ensuring that defective respirators are not inadvertently used.

Respirators may be repaired only by an appropriately trained person, who must use NIOSH-approved parts that are designed for the particular respirator being repaired.

Valves, regulators, and alarms must be adjusted and repaired only by the manufacturer or a technician trained by the manufacturer.

What are some examples of when a respirator should be removed from service?

- A cartridge has become saturated or a contaminant has broken through the cartridge and must be replaced.
- An alarm system is not functioning on an SCBA.
- A respirator strap, buckle, or connection is damaged or missing.
- The mask portion of a respirator is misshapen or degraded and can no longer form a good seal around the user's face.

ENTACT
CHECKLIST FOR RESPIRATOR MAINTENANCE AND CARE

Check to make sure that the facility has met the following requirements:

Cleaning and Disinfecting

- □ Respirators are provided that are clean, sanitary, and in good working order.
- □ Respirators are cleaned and disinfected using the procedures specified in Appendix B-2 of the standard.
- □ Respirators are cleaned and disinfected:
- □ As often as necessary when issued for the exclusive use of one associate.
- □ Before being worn by different individuals.
- □ After each use for emergency use respirators.
- □ After each use for respirators used for fit testing and training.

Storage

- □ Respirators are stored to protect them from damage from the elements, and from becoming deformed.
- □ Emergency respirators are stored:
- □ To be accessible to the work area.
- □ In compartments marked as such.
- □ In accordance with manufacturer's recommendations.

Inspections

- □ Routine-use respirators are inspected before each use and during cleaning.
- □ SCBAs and emergency respirators are inspected monthly and check for proper function before and after each use.
- □ Emergency escape-only respirators are inspected before being carried into the workplace for use.
- □ Inspections include:
- □ Check of respirator function
- □ Tightness of connections
- □ Condition of the facepiece, head straps, valves, and cartridges
- □ Condition of elastomeric parts
- □ For SCBAs, inspection includes checking that cylinders are fully charged, and that regulators and warning devices function properly.
- □ Emergency use respirators are certified by documenting the inspection, and by tagging the information either to the respirator or its compartment, or storing it with inspection reports.

Repairs

- □ Respirators that have failed inspection are taken out of service.
- □ Repairs are made only by trained personnel.
- □ Only NIOSH-approved parts are used.
- □ Reducing and admission valves, regulators and alarms are adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

VII. BREATHING AIR QUALITY AND USE

This section of the respiratory protection program requires ENTACT to provide associates who are wearing atmosphere-supplying respirators with breathing air of high purity. Respirators that supply breathing air are generally used in highly hazardous work environments. It is critical that such respirator system provides breathing air of optimal quality and that the equipment operates reliably.

More broadly, ENTACT will establish or continue a respiratory protection program that follows performance standards for the operation and maintenance of breathing air compressors, methods for ensuring breathing air quality, and requirements for the quality of purchased breathing air.

The requirements detailed in this section are critical for ensuring the integrity of high purity breathing air for use with respirators, whether the air is delivered in tanks by a supplier or produced on site using a compressor. Also, it is ENTACT's responsibility to ensure that practices are in place for protecting the quality of breathing air while stored in containers and when being used by associates. These requirements are essential for protecting respirator-wearing associates from the threat of illness or death.

As detailed below, when using atmosphere-supplying respirators ENTACT must:

- Provide breathing air that meets certain specifications.
- Develop procedures to ensure the proper use of compressed gas cylinders and air compressors.
- Implement certain precautions to avoid improper use of couplings on airline system and confusion about breathing air containers.
- Implement certain precautions to prevent exposure to carbon monoxide when using air compressors.

Atmosphere-Supplying Respirators

Atmosphere-supplying respirators are used to provide breathing air from a source independent of the ambient atmosphere. The two types of such equipment are:

- Self-contained breathing apparatus (SCBA) units, for which air is supplied from a tank (a cylinder of compressed air or oxygen). For this type of respirator, the source of the breathing air is designed to be transported by or with the equipment user.

- Supplied-air respirators (SARs) (also known as airline respirators), which receive air from a connecting hose. The source of air is either a pressurized cylinder or an air compressor. Because the associate does not carry the air on his or her back when using a SAR, breathing air can be provided over a longer time than is the case with SCBA.

Breathing Air

ENTACT will ensure that CGA Grade D breathable air is utilized by associates wearing atmosphere-supplying respirators. Unless ENTACT produces its own breathing air from a compressor, ENTACT can rely on certificates of analysis from air suppliers to ensure that breathing air meets the required specifications.

Compressed air is the most common type of breathing air system used in worksite applications because it is the most convenient and least expensive. Compressed air is provided either through compressed air cylinders or air compressors at relatively high pressures. Regulators are used to ensure that breathing air supplied to respirators is provided at pressures that are safe for associates to breathe.

Specifications

Compressed breathing air. Any compressed breathing air must meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air (G-7.1-1989). This specification requires that:

- Oxygen content in compressed breathing air must be 19.5 to 23.5 percent of the total volume of air.
- Condensed hydrocarbon content in compressed breathing air must be 5 milligrams (mg) per each cubic meter (m^3) of air or less.
- Carbon monoxide content in compressed breathing air must be 10 parts per million (ppm) or less.

- Carbon dioxide content in compressed breathing air must be 1,000 ppm or less.
- There must be a lack of any noticeable odor from the compressed breathing air.

Cylinder Use

ENTACT will ensure that cylinders used with atmosphere-supplying respirators meet the following requirements:

- Cylinders of breathing air must be tested and maintained according to the Department of Transportation (DOT) Shipping Container Specification Regulations (49 CFR Parts 173 and 178), which include provisions for the construction, testing, and maintenance of cylinders. These steps are necessary to prevent explosions that can result from a rupture in a breathing air cylinder under high pressure. (Additional guidance is available in OSHA 29 CFR 1910.101(b), which includes provisions for in-plant handling and storage of compressed gas cylinders.)
- Cylinders of purchased breathing air must be accompanied by a certificate from the supplier indicating that the contents of each cylinder must have been tested and found to meet the criteria for Grade D breathing air. This certification will provide ENTACT with a reasonable assurance that the breathing air supplied to associates is safe.
- Cylinder contents must have a moisture level that does not exceed a dew point of minus 50°F (minus 45.6° C) at 1 atmosphere pressure. (Dew point refers to the temperature at which the air is saturated with moisture.) This requirement is intended to prevent respirator valves from freezing when excess moisture accumulates on the valves, which can cause blockages in the flow of breathing air. ENTACT will verify with the supplier that the breathing air meets this requirement.

Compressor Use

General Requirements

ENTACT will ensure that compressors used with atmosphere-supplying respirators provide breathing air according to the following requirements:

Location of compressor during use. The location of an air compressor during use is very important to maintain the purity of the supplied breathing air. For this reason, an air compressor in use must be located so that the air intake component is not drawing from areas that contain:

- Combustion exhaust from vehicles or the compressor itself.
- Plant process exhaust, which should be exhausted to the outside by the facility's ventilation system.
- Contaminated air from hazardous work areas.

Low moisture content of ambient air. The moisture content of compressed air must be kept to a minimum to prevent freezing of respirator valves at cold temperatures, which can cause blockages in the flow of breathing air. To ensure low moisture content, the dew point at one atmosphere must be 10°F (5.56°C) below the ambient temperature (in plant).

Are there any systems for keeping moisture from getting into a compressor?

Water traps or desiccators can keep moisture out of a compressor. These systems remove the water from the air as it is run through the compressor, ensuring a certain level of dryness when it comes out. Such systems, like all other parts of a compressor, must be maintained in accordance with the manufacturer's instructions to properly remove the moisture.

Inline air purification. Suitable air-purifying beds and filters must be used in the supply lines to ensure delivery of a continuous flow of Grade D breathing air to the respirator user. (A sorbent bed is a filter designed to capture impurities in the air.) ENTACT will maintain, refurbish, or replace inline sorbent beds and filters as specified by the equipment manufacturer.

Tracking of bed and filter changes. ENTACT will ensure that a tag is maintained at/on the compressor with a note indicating when the sorbent beds and filters were last changed. The notation will include the signature of the person authorized to perform the bed and filter maintenance. Only a tag indicating the most recent filter and bed changes will be retained at/on the compressor.

Requirements Regarding Carbon Monoxide

ENTACT will take certain precautions in regard to carbon monoxide when using compressors with atmosphere-supplying respirators. These precautions are required because:

- Exposure to carbon monoxide above certain levels can be fatal.
- Sources of this potentially lethal gas are fairly common in many worksites. (In fact, one source of carbon monoxide is the exhaust from the compressor itself.)
- The associate will not be able to detect the presence of carbon monoxide because it is an odorless gas.

The types of precautions to be taken will depend on the type of compressor ENTACT will use.

Compressors that are not oil lubricated. With this type of compressor, the associate must ensure that carbon monoxide in the breathing air is less than or equal to 10 ppm. This can be achieved by:

- Locating the compressor's air intake component in an area free of contaminants.
- Conducting continuous or frequent monitoring of the breathing air supply.
- Using inline carbon monoxide filters.
- Using high-temperature alarms or shut-off devices.

Compressors that are oil lubricated. With this type of compressor, carbon monoxide can be generated when oil enters the combustion chamber and is partially combusted. Therefore, the associate must ensure that the compressor operates with a carbon monoxide alarm or a high-temperature alarm.

Carbon monoxide alarms provide better protection than high-temperature alarms because the high-temperature alarms only detect carbon monoxide in the combustion chamber, and not carbon monoxide resulting from a poorly located compressor intake. Furthermore, high-temperature alarms are installed more for the purpose of protecting the compressor from damage than guarding associates from exposure to carbon monoxide. Because of this, the alarm component of the system is often located with the alarm sensor, where it may not be heard by the respirator users. Consequently, if the compressor has only a high-temperature alarm, ENTACT must ensure that air quality is frequently monitored to confirm that carbon monoxide levels stay below 10 ppm.

Precautions Regarding Couplings

ENTACT will ensure that couplings used on airlines for atmosphere-supplying respirators are incompatible with outlets for non-breathable worksite air or other gas systems. This precaution must be taken to avoid the chance of inadvertently connecting a respirator to a source other than the breathing air. Such a mistake could result in serious illness or death.

Also, the associate must ensure that at no time is an asphyxiating substance introduced into a respirator's airlines. For example, an inert gas such as nitrogen must not be used to purge or clean breathing airlines.

Labeling of Breathing Gas Containers

ENTACT will ensure that breathing air containers are labeled in keeping with the NIOSH respirator certification standard (42 CFR 84). The NIOSH standard incorporates ANSI's Method of Marking Portable Compressed Gas Containers to Identify Material Contained (Z48.1-1971). Proper labeling of containers will avoid the possibility of confusion when connecting the breathing air source to the respirator.

ENTACT
CHECKLIST FOR BREATHING AIR QUALITY AND USE

General

- □ Compressed breathing air meets the requirements for Grade D breathing air.
- □ Compressed oxygen is not used in respirators that have previously used compressed air.
- □ Oxygen concentrations greater than 23.5 percent are used only in equipment designed for oxygen service or distribution.
- □ Breathing air couplings are incompatible with outlets for other gas systems.
- □ Breathing gas containers are marked with appropriate NIOSH certification.

Breathing Air Cylinders

- □ Cylinders are tested and maintained according to DOT 49 CFR Part 173 and 178.
- □ A certificate of analysis for breathing air has been obtained from the supplier.
- □ Moisture content in the cylinder does not exceed a dew point of -50ºF at 1 atmosphere pressure.

VIII. IDENTIFICATION OF FILTERS, CARTRIDGES, AND CANISTERS

This section of the ENTACT respirator protection program requires that all filters, cartridges, and canisters used at an ENTACT job site are color coded with the NIOSH approved label. This label is never to be removed and must always remain legible.

The NIOSH label serves several purposes. It ensures selection of the appropriate cartridge/canister for the contaminants found in the workplace. Also, it permits the associate using the respirator to check and confirm that the respirator has the appropriate filters before the respirator is used. Further, the color coding scheme allows fellow associates, supervisors, and the respiratory protection administrator to readily determine that the associate is using the appropriate filter.

The label clearly states the class of contaminants for which the filter, cartridge, or canister may be used (e.g., permissible particulate respirator filter for dusts, fumes and mists, including asbestos containing dusts and mists and radionuclides). The NIOSH approval number, and any limitations or precautions are also included on the label.

IX. TRAINING AND INFORMATION

Associate training is a critical part of a successful respiratory protection program and is essential for correct respirator use. ENTACT provides training to its associates who are required to wear respirators.

ENTACT requires that each associate receive training and can demonstrate knowledge of the following topics:

- Why the respirator is necessary and how improper fit, usage, and maintenance can make the respirator ineffective.

  Training must address the identification of hazards, the extent of associate exposure to those hazards, and the potential health effects of exposure. The training that is required under the Hazard Communication standard (29 CFR 1910.1200) can satisfy this requirement for chemical hazards. Associates must understand that proper fit, usage, and maintenance of respirators is critical to ensure that they can perform their protective function.

- What the limitations and capabilities of the selected respirator are.

  Training must cover how the respirator operates. Included must be an explanation of how the respirator provides protection by filter the air, absorbing the gas or vapor, or by supplying a clean source of air. Limitations on the use of the equipment, such as prohibitions against using an air-purifying respirator in an IDLH atmosphere, and why not, must also be explained.

- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.

  Training must address the possibility of respirator malfunction and the development of emergency situations specific to the worksite. Associates must understand what procedures are to be followed in such circumstances, and which procedures require use of a different respirator.

- How to inspect, put on and remove, and check the seals of the respirator.

  ENTACT must train associates how to recognize problems that may decrease the effectiveness of the respirator and what steps to follow if a problem is detected, such as the person to whom problems should be reported and where replacement equipment can e obtained if needed. If specialized personnel conduct inspections, individual respirator wearers only need to be taught about the portions of the inspection process that are their responsibility. ENTACT must also cover how to properly put on and remove the respirator to ensure that respirator fit in the workplace

is as close as possible to the fit obtained during fit testing. Associates must be trained to perform user seal checks (see Appendix B-1 of the standard).

- What the respirator maintenance and storage procedures are.

  The extent of training required may vary according to workplace conditions. If associates are individually responsible for storing and maintaining respirators, detailed training may be necessary. If specialized personnel perform these functions, associates only need to be informed of the maintenance and storage procedures.

- How to recognize medical signs and symptoms that may limit or prevent effective use of the respirator.

  ENTACT instructs associates to recognize medical signs and symptoms, such as shortness of breath or dizziness that may limit or prevent effective use of respirators. Examples of medical conditions and signs and symptoms that may affect an associate's ability to use a respirator are described in Appendix C of the standard.

- The general requirements of the Respiratory Protection standard.

  ENTACT must ensure that associates are aware, in general, of obligations under the standard. This discussion need not focus on the standard's provisions but could, for example, simply inform associates that ENTACT is obligated to develop a written program, properly select respirators, evaluate respirator use, correct deficiencies in respirator use, conduct medical evaluations, provide for the maintenance, storage and cleaning of respirators, and retain and provide access to specific records.

Prior to placing an associate into the workplace, ENTACT ensures that each associate understands the information that they have been provided and they fully understand the proper usage of the respirator. This is accomplished through content review of classroom training either verbally or in written form, and by reviewing the associate's hand-on use of respirators. Comprehension of training is assured by conducting training in a manner that is understandable to the associates. The program is tailored to associate's education level and language background. ENTACT associates receive training on an annual basis or prior to job assignments for new associates.

Information for Voluntary Respirator Users

For associates who choose to wear a respirator but are not required to do so, ENTACT is only required to provide advisory information in Appendix D of the standard. This basic information on the proper use of respirators can be presented to the associated either verbally or in written form. Training is not required for associates who are not required to wear respirators, i.e., for associates who are wearing respirators voluntarily.

ENTACT
CHECKLIST FOR TRAINING AND INFORMATION

- □ Associates can demonstrate knowledge of:
- □ Why the respirator is necessary and the consequences of improper fit, use, or maintenance.
- □ Limitations and capabilities of the respirator.
- □ How to effectively use the respirator in emergency situations.
- □ How to inspect, put on, remove, use, and check the seals of the respirator.
- □ Maintenance and storage procedures.
- □ The general requirements of the respirator standard.
- □ Training is understandable to associates.
- □ Training is provided prior to associate's use of a respirator.

Retraining is provided:

- □ Annually.
- □ Upon changes in workplace conditions that affect respirator use.
- □ Whenever retraining appears necessary to ensure safe respirator use.
- □ Appendix D of the standard is provided to voluntary users.

X. PROGRAM EVALUATION

Conducting Program Evaluations

ENTACT conducts program evaluations in the workplace on an as needed basis in order to ensure that its written respiratory protection program is effective. The frequency which ENTACT evaluates its respiratory protection program depends on the complexity and/or variability of the program and factors such as:

- The type and extent of hazards in the workplace.
- The types of respirators used by ENTACT associates.
- The number of ENTACT associates who use respirators.
- The amount of experience respirator-wearing associates have.

Consulting With Associates

ENTACT regularly consults with its associates that are required to wear respirators in order to assess their views on the effectiveness of its respiratory protection program and to identify any problems they may be encountering with the use of respirators. Any identification problems are resolved immediately. General assessments are standard protocol and include at a minimum:

- Whether proper fit of respirators is being achieved, and whether respirator use is interfering with effective work performance.
- Whether appropriate respirators have been selected.
- Whether respirators are being properly used.
- Whether respirators are being properly maintained.

ENTACT
PROGRAM EVALUATION CHECKLIST

- □ Workplace evaluations are being conducted as necessary to ensure that the written respiratory protection program is being effectively implemented.
- □ Associates required to wear respirators are being regularly consulted to assess the associate's views and to identify problems with respirator fit, selection, use and maintenance.
- □ Any problems identified during assessments are corrected.

XI. RECORDKEEPING

To assist in auditing the adequacy of its respiratory protection program, to facilitate associate involvement, and to provide a record for compliance determination by OSHA, ENTACT retains the following records:

Medical Evaluation Records

Record of medical evaluations required by the standard and described in section (e) of this guide must be retained and made available to the affected associates in accordance with OSHA's Access to Employee Exposure and Medical Records standard (29 CFR 1910.1020).

Respirator Fit Testing Records

ENTACT retains written records of the qualitative and quantitative fit tests administered to its associates. These records include:

- The name or identification of the associate tested.
- The type of fit test performed.
- The make, model, and size of the respirator tested.
- The date of the fit test.
- Pass/fail results if a qualitative fit (QLFT) is used, or the fit factor and strip chart recording or other record of the test results if a quantitative fit test (QNFT) is used.

Fit test records are retained for respirator users until the next fit test is administered. A copy of ENTACT's current written respiratory protection program is on file at its corporate office located in Irving, Texas.

Access To Records

Written materials required to be retained will be made available upon request to the affected associates, their designated representatives, and to OSHA. See 29 CFR 1910.1020 for more information. Upon receipt of written request, copies of these records will be made available for inspection and for duplication.

ENTACT
CHECKLIST FOR RECORDKEEPING

- □ Records of medical evaluations have been retained.
- □ Fit testing records have been retained.
- □ A copy of the current respiratory protection program has been retained.
- □ Access to these records is provided to affected associates.

ATTACHMENT W COMPETENT PERSON EXCAVATION CHECKLIST

EXCAVATION SAFETY

All excavation activities will conform to the excavation requirements prescribed in 29 CFR 1926.650 through 1926.652 (Subpart P.)

- Contact the utility companies or property owners to locate the exact location of any underground installations in the area. If the utility companies or owners do not respond within 24 hours, or if they cannot establish the exact location of the underground installations, the excavation may proceed with caution. In this situation, ENTACT must provide its associates with detection equipment or other safe and acceptable means to locate underground installations. This could include the use of an airknife or other acceptable tool as identified in the JSA. A spotter will be utilized where underground installations may be present, but have not been positively identified. See Attachment E – Equipment Safety, Working Near Underground or Overhead Utilities and Attachment EE – Utility Locate.
- Before heavy equipment is used, all utilities (electricity, natural gas lines, water lines, sewer lines, etc.) must be identified and marked. ENTACT will also contact One Call for locating utilities and pipelines on the property. Each day before work begins, utility locations will be discussed as they relate to planned activities. Deviation from planned activities must be discussed and approved by the FPM and the HSO. Additional training that addresses working around high voltage overhead electrical lines will be completed in the site orientation.
- Abandoned utilities slated for removal must be verified as de-energized or out of service prior to attempted removal.
- Remove or adequately support objects in the excavation area that could create a hazard to ENTACT associates. These may include rubble, debris and stockpiles.
- Classify the type of soil at the site as either stable rock, Type A, Type B or Type C soil. The soil classification, as defined in Appendix A of Subpart P to 1926.652, must be made based on the results of at least one visual and at least one manual analysis conducted by the Competent Person.
- If the excavation is less than 20 feet in total depth, select the maximum allowable side slope from Table A and C. If proper sloping cannot be completed, approved bracing or an approved trench box must be used. If the excavation is less than 20 feet in total depth and is in layered soil, refer to Table B and C for the maximum allowable slope of each material layer. If the total depth of excavation exceeds 20 feet or does not allow for proper sloping, protective systems will be designed and approved by a registered professional engineer.
- All ENTACT personnel and subcontractors will have the authority to shut the operations down if they believe the operations are unsafe. The competent person will review the

situation and make the decision on how to proceed.

Table 5.2 Requirements for Equipment Operation Near Power Lines (29 CFR 1926.550)		
ACTIVITY	LINE RATING	MINIMUM CLEARANCE
Equipment Operation	< 50 kV	10 feet
	> 50 kV	10 feet + 0.4 inches per each kV over 50 kV, or 2 times the length of the line insulator (minimum of 10 feet)
In transit with no load and boom lowered	< 50 kV	4 feet
	> 50 kV to 345 kV	10 feet
	345 kV to 750 kV	16 feet

Note: kV = kilovolts

COMPETENT PERSON

As defined in 29 CFR 1926.650, .651, and .652, the Competent Person is the one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous or dangerous to associates. The Competent Person has the authority to take prompt corrective measures to eliminate such hazards.

The FPM will be the designated Competent Person for the site. The FPM reserves the authority to duly elect trained and knowledgeable associates to act in the capacity as Competent Person in his absence.

The Competent Person shall be responsible for inspecting all open excavations on the site on a daily basis or in the event of changing circumstances such as:

- Water
- Weather
- Traffic or
- Any other site concerns

Inspections shall note the integrity of side slopes and sidewalls and insure that only trained and knowledgeable associates are supporting the excavation operations.

EXCAVATION HAZARDS

Cave-Ins / Slides: A cave in or slide is defined as the separation or loss of soil material from the side of an excavation and its sudden movement into the excavation, either by sliding or falling, in sufficient quantity so that it could entrap, bury or otherwise injure and immobilize a person.

All personnel will be aware of trench safety and will adhere to the following emergency procedures.

- Know exact location of emergency.
- Know number of victims.
- Know trench measurements.
- Know special hazards.
- Keep all life support and de-watering systems operating.
- Clear associates away from excavation.
- Shut down heavy equipment.
- Be prepared to meet and brief rescue personnel.

DO NOT try to dig the victim out with heavy equipment.
DO NOT allow others into the trench.
DO NOT panic.

ENTACT associates in open excavations will be limited to those persons involved in sample retrieval. Only those associates involved in sampling or required to support excavation activities will be allowed into open excavations.

Access and Egress: A stairway, ladder, ramp or other means of safe access and egress shall be located in excavations that are 4 feet or more in depth. Locations of such means shall require no more than 25 feet of lateral travel for associates.

Falling Loads: No associates will be permitted underneath loads handled by lifting or digging equipment. Associates will be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.

Water Accumulation: Associates shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating.

Warning System for Mobile Equipment and Personnel: A barricade of orange expanded fencing will be set up around the excavation site along with yellow caution tape at all times.

Ramps: At least one ramp made of soil will be installed in areas that require mechanical equipment to enter excavation site.

Reflective Clothing: When excavation is adjacent to a public road, reflective vests will be worn

by personnel.

SOIL CLASSIFICATIONS

Each soil and rock deposit at an excavation site must be classified by the Competent Person as stable rock, Type A, Type B, or Type C soil.

Stable Rock: Refers to the natural solid mineral matter which can be excavated with vertical sides and remain in tact while exposed.

Type A Soil: Is cohesive with an unconfined compressive strength of 1.5 tons per square foot (tsf). Type A soils include clay, silty clay, sandy clay, clay loam, caliche, hardpan and sometimes silty clay loam and sandy clay loam. No soil should be classified as Type A soil if it is fissured, subject to vibration from traffic or similar effects, previously disturbed or part of a sloped, layered system where the side slopes are four horizontal to one vertical or greater.

Type B Soil: Is cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf. Type B soils include granular cohesion less soils like angular gravel, silt, silt loam, sandy loam and sometimes silty clay loam and sandy clay loam; previously disturbed samples that are not Type C soils; fissured soils and soils subject to vibration that would otherwise be classified as Type A; dry rock that is not stable; and material that is part of a sloped layered system where the layers dip an a slope less steep than four horizontal to one vertical.

Type C Soil: Is cohesive soil with an unconfined compressive strength of 0.5 tsf or less. Type C soils include granular soils such as gravel, sand and loamy sand; submerged soil; soils from which water is freely seeping; submerged rock; submerged rock that is not stable; or material in a sloped, layered system where the layers dip into the excavation at a slope of four horizontal to one vertical or steeper.

MAXIMUM ALLOWABLE SLOPES

Table A defines the maximum allowable slopes.

Table A

Soil or Rock Type	Maximum Allowable Slopes (H:V) For Excavations Less than 20 Feet Deep
Stable Rock	Vertical (90º)
Type A	3/4 : 1 (53º)
Type B	1:1 (45º)
Type C	1-1/2 : 1 (34º)

SLOPING REQUIREMENTS FOR LAYERED SOILS

Table B defines the sloping requirements for layered soils.

Table B			
Layered Soil Type	Type A Layer	Type B Layer	Type C Layer
B over A	3/4 : 1	1 : 1	
C over A	3/4 : 1		1-1/2 : 1
C over B		1 : 1	1-1/2 : 1
A over B	1 : 1	1 : 1	
A over C	1-1/2 : 1		1-1/2 : 1
B over C		1-1/2 : 1	1-1/2 : 1

SLOPING AND BENCHING

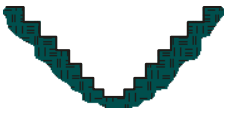
Table C

ENTACT

SLOPING AND BENCHING

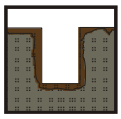
To slope and bench a site means cutting the walls of your excavation back at an angle to its floor. Sloping uses straight cuts. Benching uses a series of one or more steps. Angled cuts for excavations up to 20 feet deep are allowed by OSHA:

Sloping

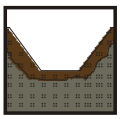


Benching

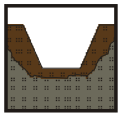
STABLE ROCK
90 degrees



TYPE B
45 degrees



TYPE A
53 degrees



TYPE C
34 degrees

AN EXCEPTION: Excavation is TYPE A SOIL, less than 12 feet in depth and open less than 24 hours, may have a maximum slope or bench of 63 degrees.

DON'T FORGET:

- If the soil condition changes, re-inspect the system. Cut back the angle of slope if needed.
- Evacuate any excavation whose walls show signs of distress.

SOIL STABILITY AS A SAFETY MEASURE

Classifying a soil's stability is an important part of evaluating the site. In general, soil is divided into four classes, from most stable to least stable:

- *Stable Rock*
  Solid mineral matter

- *Type A*
  Cohesive soils, such as clay, silty clay and hardpan.

- *Type B*
  Granular soils, silt, sandy loam, unstable rock, any unstable or fissured Type A soil.

- *Type C*
  Gravel, loamy soil, submerged soil, sandy and any soil that is part of a layered, steeply sloped system.

PROTECTIVE SYSTEMS

The following figures are a graphic summary of the requirements contained in Subpart P for excavations 20 feet or less in depth. Protective systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer in accordance with §1926.652 (b) and (c).

FIGURE 1 – Preliminary Decisions

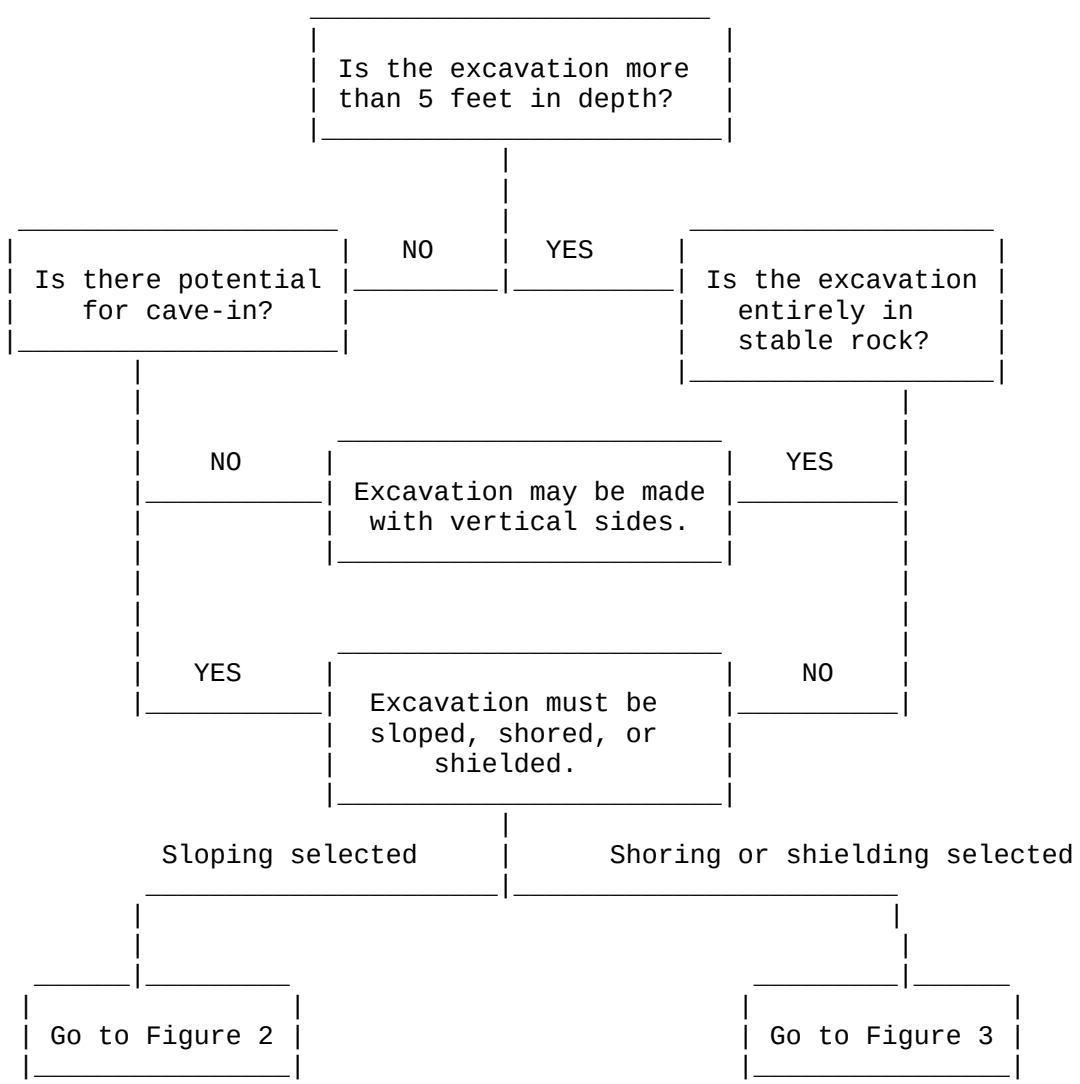


FIGURE 2 – Sloping Options

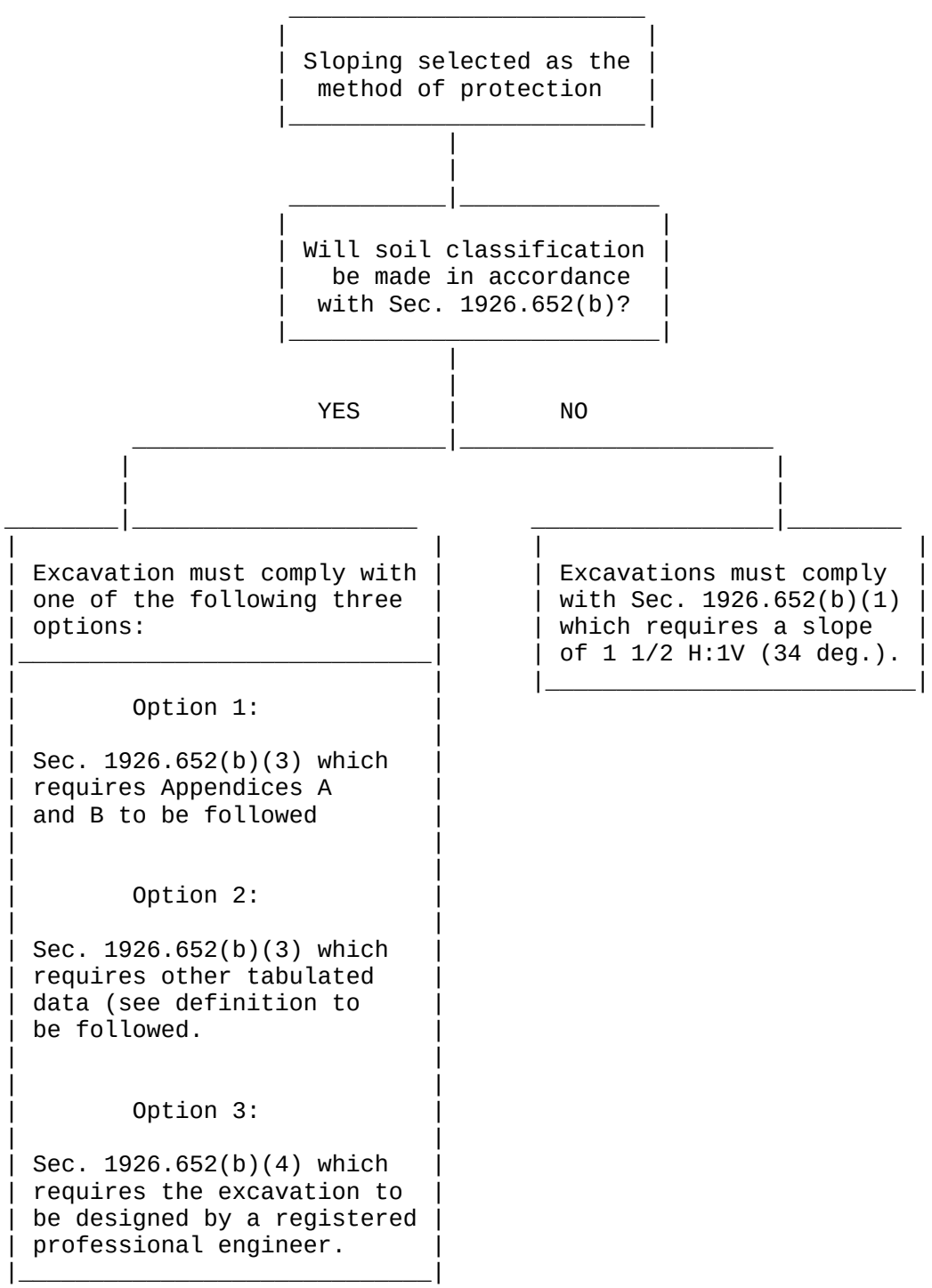
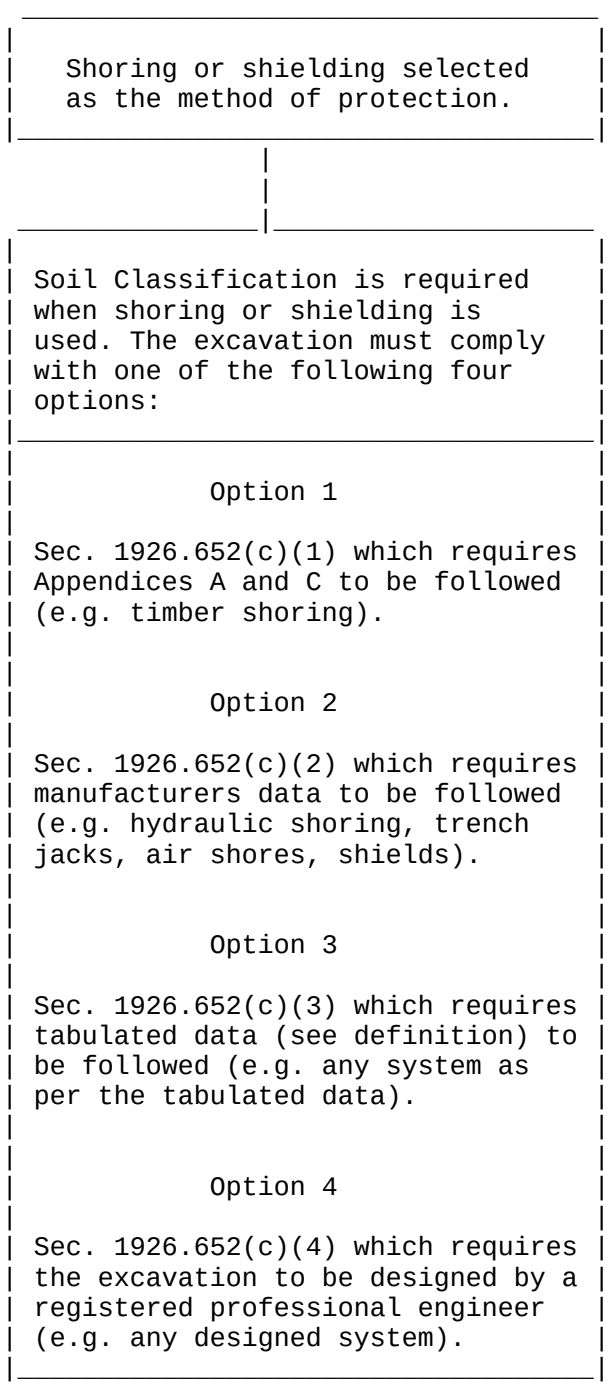


FIGURE 3 – Shoring and Shielding Options



See Tables D-1.1 and D-1.2 for specific spacing requirements for various types of soil

Table D-1.1
Aluminum Hydraulic Shoring
Vertical Shores for **Soil Type A**

Depth of trench (feet)	Hydraulic cylinders				
	Maximum horizontal spacing (feet)	Maximum vertical spacing	Width of trench (feet)		
			Up to 8	Over 8 up to 12	Over 12 up to 15
Over 5 up to 10	8	4	2 inch diameter	2 inch diameter (Note 2)	3 inch diameter
Over 10 up to 15	8				
Over 15 up to 20	7				
Over 20	Note 1				

Table D-1.2
Aluminum Hydraulic Shoring
Vertical Shores for **Soil Type B**

Depth of trench (feet)	Hydraulic cylinders				
	Maximum horizontal spacing (feet)	Maximum vertical spacing	Width of trench (feet)		
			Up to 8	Over 8 up to 12	Over 12 up to 15
Over 5 up to 10	8	4	2 inch diameter	2 inch diameter (Note 2)	3 inch diameter
Over 10 up to 15	6.5				
Over 15 up to 20	5.5				
Over 20	Note 1				

Table D-1.3
Aluminum Hydraulic Shoring
Waler Systems for **Soil Type B**

Depth of trench (feet)	Wales		Hydraulic cylinders						Timber uprights		
			Width of trench (feet)						Max. horiz. spacing (on center)		
			Up to 8		Over 8 up to 12		Over 12 up to 15				
	Vertical Spacing (feet)	Section Modulus (in. ^3)	Horiz. Spacing	Cylinder diameter	Horiz. Spacing	Cylinder diameter	Horiz. Spacing	Cylinder diameter	Solid sheet	2 ft.	3 ft.
Over 5 up to 10	4	3.5	8.0	2 in.	8.0	2 in. Note 2	8.0	3 in.			3 X 12
		7.0	9.0	2 in.	9.0	2 in. Note 2	9.0	3 in.			
		14.0	12.0	3 in.	12.0	3 in.	12.0	3 in.			
Over 10 up to 15	4	3.5	6.0	2 in.	6.0	2 in. Note 2	6.0	3 in.		3 X 12	
		7.0	8.0	3 in.	8.0	3 in.	8.0	3 in.			
		14.0	10.0	3 in.	10.0	3 in.	10.0	3 in.			
Over 15 up to 20	4	3.5	5.5	2 in.	5.5	2 in. Note 2	5.5	3 in.	3 X 12		
		7.0	6.0	3 in.	6.0	3 in.	6.0	3 in.			
		14.0	9.0	3 in.	9.0	3 in.	9.0	3 in.			
Over 20	Note 1										

Table D-1.4
Aluminum Hydraulic Shoring
Waler Systems for **Soil Type C**

Depth of trench (feet)	Wales		Hydraulic cylinders						Timber uprights		
			Width of trench (feet)						Max. horiz. spacing (on center)		
			Up to 8		Over 8 up to 12		Over 12 up to 15				
	Vertical Spacing (feet)	Section Modulus (in. ^3)	Horiz. Spacing	Cylinder diameter	Horiz. Spacing	Cylinder diameter	Horiz. Spacing	Cylinder diameter	Solid sheet	2 ft.	3 ft.
Over 5 up to 10	4	3.5	6.0	2 in.	6.0	2 in. Note 2	6.0	3 in.	3 X 12		
		7.0	6.5	2 in.	6.5	2 in. Note 2	6.5	3 in.			
		14.0	10.0	3 in.	10.0	3 in.	10.0	3 in.			
Over 10 up to 15	4	3.5	4.0	2 in.	4.0	2 in. Note 2	4.0	3 in.	3 X 12		
		7.0	5.5	3 in.	5.5	3 in.	5.5	3 in.			
		14.0	8.0	3 in.	8.0	3 in.	8.0	3 in.			
Over 15 up to 20	4	3.5	3.5	2 in.	3.5	2 in. Note 2	3.5	3 in.	3 X 12		
		7.0	5.0	3 in.	5.0	3 in.	5.0	3 in.			
		14.0	6.0	3 in.	6.0	3 in.	6.0	3 in.			
Over 20	Note 1										

EXCAVATION INSPECTION

Date:		Field Project Manager:	
Job Number and Name:		Competent Person:	

GENERAL INSPECTION OF JOB SITE

Activity	Y	N	NA
1. Excavations, adjacent areas, and protective systems inspected daily by the Competent Person prior to the start of work.	☐	☐	☐
2. Competent Person has the authority to remove workers from the excavation immediately.	☐	☐	☐
3. Surface encumbrances supported or removed.	☐	☐	☐
4. Associates protected from loose rock or soil that could possibly pose a hazard by falling or rolling into the excavation.	☐	☐	☐
5. Hard hats worn by all associates.	☐	☐	☐
6. Spoils, materials, and equipment set back a minimum of 2’ from the edge of the excavation.	☐	☐	☐
7. Barriers provided at all remote excavations, well, pits, shafts, etc.	☐	☐	☐
8. Walkways and bridges, over excavations 4’ or more in depth must be equipped with guardrails.	☐	☐	☐
9. High visibility safety vests are worn by all associates.	☐	☐	☐
10. Associates are required to stand away from vehicles being loaded or unloaded.	☐	☐	☐
11. Associates are prohibited from working or walking under suspended loads.	☐	☐	☐
12. Associates are prohibited from working on the faces of sloped or benched excavations above other associates.	☐	☐	☐
13. Warning system is established and utilized when mobile equipment is operating near the edge of an excavation.	☐	☐	☐

UTILITIES

Activity	Y	N	NA
1. Utility companies contacted and/or utilities located.	☐	☐	☐
2. Exact location of utilities is marked when approaching the utilities.	☐	☐	☐
3. Underground installations are protected, supported, or removed when the excavation is open.	☐	☐	☐
See Equipment Safety – Working Near Overhead or Underground Utilities			

MEANS OF ACCESS AND EGRESS

Activity	Y	N	NA
1. Lateral travel distance to a means of egress does not exceed 25' for excavations 4' or more in depth.	☐	☐	☐
2. Ladders, when used, must extend 3' above the edge of the trench and be secured.	☐	☐	☐
3. Structural ramps used by associates must be designed by a Competent Person.	☐	☐	☐
4. Structural ramps used by equipment must be designed by a Registered Professional Engineer (RPE).	☐	☐	☐
5. Ramps must be constructed of materials of uniform thickness, securely cleated together on the bottom, and have a non-slip surface.	☐	☐	☐
6. Associates protected from cave-ins while entering and exiting the excavation.	☐	☐	☐

WET CONDITIONS

Activity	Y	N	NA
1. Precautions taken to protect associates from accumulation of water.	☐	☐	☐
2. Water removal equipment monitored by a Competent Person.	☐	☐	☐
3. Surface water controlled or diverted.	☐	☐	☐
4. Inspection made after each rainstorm.	☐	☐	☐

HAZARDOUS ATMOSPHERE

Activity	Y	N	NA
1. Atmosphere tested when there is a reasonable possibility of oxygen deficiency or build up of other hazardous gases that may expose an associate to a hazard.	☐	☐	☐
2. Oxygen content is between 19.5% and 21%.	☐	☐	☐
3. Ventilation provided to prevent flammable gas from building up to 20% of the LEL of the gas.	☐	☐	☐
4. Testing conducted to ensure that atmosphere remains safe.	☐	☐	☐
5. Emergency Response Equipment readily available where a hazardous atmosphere could or does not exist.	☐	☐	☐
6. Associates are trained on the use of PPE and Emergency Response Equipment.	☐	☐	☐
7. Safety harness and life line must be individually attended when an associates entering a deep confined excavation or bell bottom pier.	☐	☐	☐

PROTECTIVE SUPPORT SYSTEMS

Activity	Y	N	NA
1. Materials and/or equipment selected on soil analysis, expected loads, and trench parameters.	☐	☐	☐
2. Materials and equipment inspected and in good condition.	☐	☐	☐
3. Materials and equipment not in good condition must be removed from service and not returned until repaired, inspected, and approved by a Registered Professional Engineer.	☐	☐	☐
4. Protective systems installed without exposing associates to hazards of cave-ins, collapses, or from being struck by materials of equipment. Install from the top, down, and from the bottom up.	☐	☐	☐
5. Members of protective support system must be securely fastened.	☐	☐	☐
6. Adjacent structures must be securely supported.	☐	☐	☐
7. Excavations below the footing of base must be approved by a Registered Professional Engineer.	☐	☐	☐
8. The backfill process must progress with the removal of the support system.	☐	☐	☐
9. Material excavated to a level no greater than 2' from the bottom of the protective support system, and only if system is designed to support the calculated loads.	☐	☐	☐
10. Shield system placed to prevent lateral movement.	☐	☐	☐
11. Associate prohibited from remaining in a trench box when being moved vertically.	☐	☐	☐

SOIL ANALYSIS

This checklist must be completed when an analysis is performed to determine the soil(s) type present in the excavation. A separate analysis must be performed for each change in soil conditions, such as layers in the excavation wall, if the trench extends long distances, etc.

Date:	Project :	Competent Person:	
Weather:			
Measurements of Trench:	Depth:	Length:	Width:
Sample:	Location Taken From:		Time:

VISUAL TEST

Particle Type:	☐ Fine Grained (cohesive) ☐ Course Grained (sand or gravel)
Water Conditions:	☐ Wet ☐ Dry ☐ Submerged ☐ Surface Water Present
Previously Disturbed Soil?	☐ Yes ☐ No
Underground Utilities Protected?	☐ Yes ☐ No
Layered Soils?	☐ Yes ☐ No
Layered Soil Dipping into Excavation?	☐ Yes ☐ No
Excavation Exposed to Vibration?	☐ Yes ☐ No
Surface Encumbrances Present?	☐ Yes ☐ No If yes, what type?
Evidence of Cracking or Spalling Observed?	☐ Yes ☐ No
Potentially Hazardous Atmosphere Exists?	☐ Yes ☐ No If yes, identify condition and source. Follow confined space procedures.

Competent Person Printed Name	Competent Person Signature
Site Health and Safety Officer Printed Name	Site Health and Safety Officer Signature

MANUAL TEST

Plasticity:	☐ Cohesive ☐ Non-Cohesive
Dry Strength:	☐ Granular (crumbles easily) ☐ Cohesive (broken w/ difficulty)
NOTE: The following unconfined compressive strength tests should be performed on undisturbed soils.	
THUMB TEST	**Used to estimate unconfined compressive strength of a cohesive soil.**
Test Performed?	☐ Yes ☐ No
Type "A" Soil:	☐ Yes Indented by thumb with very great difficulty.
Type "B" Soil:	☐ Yes Indented by thumb with some difficulty.
Type "C" Soil:	☐ Yes Easily penetrated, or if soil is submerged, seeping, or subject to water, runoff, etc.
PENTROMETER OR SHEARVANE	Used to estimate unconfined compressive strength of saturated soils.
Test Performed?	☐ Yes ☐ No
Type "A" Soil:	☐ Yes Unconfined compressive strength of 1.5 tsf or greater.
Type "B" Soil:	☐ Yes Unconfined compressive strength between 0.5 and 1.5 tsf.
Type "C" Soil:	☐ Yes Unconfined compressive strength of 0.5 tsf or less or if soil is submerged, seeping or subject to water, runoff, etc.
WET SHAKE TEST	Used to determine the percentage of granular and cohesive materials in a soil sample. Compare results to a soil textural classification chart.
% Granular	% Cohesive % Silt
Type "A" Soil:	☐ Yes Clay, silty clay, sandy clay, clay loam, and in some cases silty clay loam, and sand clay loam.
Type "B" Soil:	☐ Yes Angular gravel (similar to crushed rock), silt, silt loam, sandy loam, and in some cases silty clay loam, sandy clay loam.
Type "C" Soil:	☐ Yes Granular soil including gravel sand and loamy sand.
NOTE: Type "A" soil – no soil is a Type "A" if the soil is fissured, subject to vibration, previously disturbed, layered dipping into the excavation on a slope of 4H:1V.	
PROTECTIVE SYSTEMS	For selection of the appropriate protective system, use the flow chart in Appendix F of the Standard.
☐ Sloping or Benching (Appendix B) Specify Angle:	
☐ Timber Shoring (Appendix C)	
☐ Aluminum Hydraulic Shoring (Appendix D)	

Competent Person Printed Name	Competent Person Signature
Site Health and Safety Officer Printed Name	Site Health and Safety Officer Signature

ATTACHMENT X EQUIPMENT DECONTAMINATION

PICK-UP OF EQUIPMENT

1) All equipment will be scheduled for pick-up during normal ENTACT working hours. Equipment must be removed from the jobsite prior to completion of the demobilization process.

2) Upon arrival and prior to loading the equipment, an inspection will be conducted. This inspection shall be documented on an appropriate form and should include digital pictures showing the condition of the equipment. Equipment utilized within the exclusion zone must be decontaminated prior to shipping.

3) During loading of the equipment at least one ENTACT person will be assigned responsibility for safety observation. This observer will work with the personnel picking up the equipment and understands he/she is expected to conduct a JTR/SPSA and utilize stop work authority.

4) Once loaded, the vehicle will be returned to a highway safe condition prior to exiting the jobsite.

5) Any paperwork provided documenting the shipment will be given to the Administrative Project manager (APM) or Field Project manager (FPM).

FIELD EQUIPMENT DECONTAMINATION PROCEDURE

Decontamination of field equipment and heavy equipment is necessary to ensure the quality of samples by preventing cross-contamination. In addition, decontamination reduces health hazards and prevents the spread of contaminants off-site.

Equipment needed for Heavy Equipment Large/heavy Equipment (i.e., Drill rigs, backhoes, trackhoes, front end loaders etc.

- High-pressure with steam-spray unit. The steam cleaner utilized by the shall be a high-pressure low volume unit from an industry-recognized manufacturer
- Miscellaneous tools such as shovels and brushes shall be available.
- Cleaning agents such as non-phosphate detergents shall also be available for use as necessary.

Small/sampling Equipment (i.e., Split spoons, bailers, bowls, and pumps):

- Soap
- Polyethylene sheeting
- Stiff-bristle brushes.
- Wash bottles or manual pump sprayer.
- 10% methanol solution (optional)
- Distilled water
- Tap water

Procedure. The following steps will be followed when decontaminating large/heavy equipment:

Cleaning procedures developed by ENTACT shall include the removal of contaminated soil, debris and other miscellaneous materials from all construction equipment and tools utilized within the Exclusion Zone and recyclable remnant structure and piping encountered from the Site using a high-pressure low volume steam cleaner.
Physical/mechanical agitation (scraping with hand tools) of soil can be utilized to minimize wastewater generation.

1. ENTACT or responsible contractor on site will construct a decontamination area at a designated area on site of 6-mil polyethylene, large enough to capture decontamination fluids. Decontamination of drilling equipment will be performed over the decontamination pad. Depending on site contaminants, drilling equipment may be decontaminated at each drilling location and decon water allowed to infiltrate into site soils.

2. Drill rigs and tools will be cleaned between each location and prior to the initiation of any sampling. Steam-cleaning/pressure washing water will be allowed to soak back into the ground.

3. Spray areas (rear of rig or backhoe) exposed to contaminated soils using steam high-pressure sprayer. Be sure to spray down all surfaces, including the undercarriage.

4. All wash and rinse water generated during the decontamination procedures shall be collected daily by ENTACT and stored in closed top USDOT specification 55-gallon drums or in frac tanks. The Contractor shall supply empty 55-gallon drums and frac tanks as required. Decontamination pad(s) shall be covered when not in use so as to minimize the accumulation of precipitation

5. All equipment and material decontamination procedures shall be carried out on the decontamination pad(s).

6. Sections of the decontamination pad(s) that have encountered contaminants during site

operations shall be cut up and placed in appropriate containers. Sections that have not encountered contaminants may be disposed of as non-hazardous waste if approved.

7. The collection sump shall be purged at the end of each work day and as required, and/or following a rainfall event.

8. Document that decontamination was performed in the appropriate daily logbook.

Procedure. The following steps will be followed when decontaminating sampling equipment including split-spoons, spatulas, and hand tools that directly contact samples.

1. Set up a decontamination line. The decontamination line should progress from .dirty. to .clean. with an area for drying decontaminated equipment. The decontamination line should be set up on polyethylene sheeting.

2. Wash the item thoroughly in a bucket of soapy water (tap water). Use a stiff-bristle brush to dislodge any clinging dirt. Disassemble any items that might trap contaminants internally before washing. Do not reassemble until decontamination is complete.

3. Rinse the item in a bucket containing clear tap water. Rinse water should be replaced as needed.

4. Document that decontamination was performed in the appropriate logbook.

5. Disposable items will be bagged for disposal as general refuse.

Procedure. The following steps will be followed when decontaminating pumps.

1. Pumps should be set-up in the same configuration as for sampling. Flush the pump with potable water.

2. Submerge pump intake (or pump if submersible) and all down hole wetted parts (tubing, piping, foot valve) in soapy water. Pump a minimum of three pump assembly volumes of soapy water through the entire assembly. Note: If dedicated tubing is used for monitoring wells, the tubing will not need to be decontaminated.

3. Replace soapy water with potable water. All down whole wetted parts must be immersed in the potable water rinse. Pump a minimum of three pump assembly volumes of clean water through the entire assembly.

4. Document that decontamination was performed in the groundwater sampling log book.

QA/QC

The HSO or designated alternate will oversee decontamination procedures to ensure that they

have been completed according to the procedures outlined above.

ATTACHMENT Y HIGH PRESSURE WATER

I. HIGH PRESSURE WATER CLEANING

The term high-pressure water cleaning covers all portable and fixed water cleaning, including lancing, line moling, shot gunning, and the use of additives or abrasives at pressures above 1,000 psi. This policy discusses the safety and training requirements of high pressure water cleaning.

Pressure below 1,000 psi does not mean that it cannot cause injury or requires any less attention to the principles outlined in this procedure. Adequate precautions are required at all pressures. Equipment that operates below 1,000 psi shall have a specific written operating procedure identifying proper setup, use and associate training.

II. REQUIREMENTS

A. Safety

High pressure water cleaning is normally performed using jet streams that can have a velocity greater than that of a 45-caliber bullet and do as much damage. Therefore, extreme caution and strict compliance with procedures must be used to prevent the jet stream from striking the operator, other associates, or delicate equipment. No portion of the body shall ever be placed in front of the water jet. These jets of water can easily puncture and tear the skin or penetrate deeper causing infection or serious internal damage.

B. Job Safety Procedures

A work plan or procedure will be written for high pressure water cleaning that includes, but are not limited to, the following:

- Manufacturer's recommendations and requirements for each specific piece of equipment to be used.
- Personal protective equipment (PPE).
- Detailed procedures on the use of each specific piece of equipment.
- Equipment maintenance, servicing, and repair.
- Tools.

C. Training Course Requirements for High-Pressure Water Cleaning

A training course shall be completed by each associate before his/her first high-pressure water cleaning job. The training course shall include, but not be limited to, the following:

- The cutting action of a high-pressure water stream and the potential hazard it poses to the human body shall be demonstrated.

- The need and limitations of personal protective equipment shall be explained. Instruction shall be given as to when and how specific clothing and protective devices must be worn.

- Operation of the high-pressure system and auxiliaries shall be explained. Training shall include start-up and shutdown procedures, potential equipment problems, and appropriate corrective actions.

- Operation, identification, and purpose of all safety devices shall be explained. The importance of not tampering with any safety device, as well as the importance and requirements of keeping them functional, shall be stressed.

- The identification of high-pressure fittings, hoses and accessories, and how to distinguish between them shall be demonstrated.

- The proper method of connecting hoses (lying out without kinks), protecting from excessive wear, and using the proper tools for hook-ups shall be explained and demonstrated.

- The proper stance for sound footing and how to identify and use the various devices. The trainee, under close supervision, shall use the various devices while the unit is slowly pressurized.

Associate(s) shall demonstrate knowledge and skill in the proper application of equipment through practical application.

ATTACHMENT Z ENTACT INSPECTION AND AUDIT PROGRAM

The PHSC will be responsible for conducting the health and safety orientation meeting prior to the start of field activities, reviewing weekly project safety reports, and conducting health and safety inspections and audits at the site project.

ENTACT HEALTH AND SAFETY
PROJECT SITE HEALTH & SAFETY INSPECTION AND END OF JOB EVALUATION FORM

Project Name & Number:	Date of Inspection:	
	Start Date:	Anticipated End Date:
Project Address:	FPM:	
Project Phone:	APM:	
Project Fax:	HSO:	
Project Coordinator:	QAQC:	

Inspection Scoring System (items not corrected by the end of the day of the inspection): • 5 items or less = A • 6 to10 items = B • 11 to 15 items = C • 16 to 20 items = D • More than 20 items = F	Inspection Score =

Positive Comments and Observations

Action Items and Responsible Personnel			
Action Item	Responsible Personnel	Due Date	Completion Date

Conclusion and Comments

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
ORIENTATION	**Orientation completed and documented (site history, site hazards, safety requirements).**				
	A. All site and incidental personnel have received site specific safety orientation prior to that person's exposure to the site.				
	B. All Subcontractors have received site safety orientation and meet safety qualifications (list subcontractors below, must be documented):				
	1.				
	2.				
	3.				
	4.				
	C. All visitors entering the work zone have received visitor orientation and are identified with a Visitor's Badge. Must be documented.				
	D. Truck driver orientation is complete and chemical hazards discussed.				
RECORDS	**All required and up-to-date records for associates and subcontractors are on-site.**				
	A. OSHA 40-Hour HAZWOPER training.				
	B. Behavioral Based (LPS) 8-Hour Initial training.				
	C. OSHA 8-Hour HAZWOPER Update.				
	E. Other specialized training (indicate type:)				
	F. Hazardous materials physical (medical clearance & respirator clearance).				
	G. Drug and alcohol test.				
	H. Motor Vehicle Record verified for all associates (email confirmation).				
	I. First Aid and CPR trained personnel are on site.				
	J. Respiratory Program and fit test completed.				
	K. Defensive driving certifications.				
	L. Medical Data and Emergency Contact sheet is current *(new form at job start up or < 1 year old)*				
SIGNS AND POSTERS LOGS AND JOURNALS	**Posters and appropriate signage have been posted accordingly. Logs and journals obtained.**				
	A. Federal and state required labor posters.				
	B. Safety signs are posted around the project site as required.				
	C. Safe Performance Self Assessment (Job Task Review) poster.				
	D. Root Cause Analysis and Stop Work Authority poster.				
	E. Safety Incentive poster.				
	F. Emergency contacts and hospital route.				

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
	G. Health and Safety Plan, Project Journal, EZ & Visitor/Contractor Sign-In Logs, Daily Safety Meeting Log, Sampling Journal, etc.				
	H. OSHA 29 CFR 1910 and 1926 regulations are onsite.				

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
BBS AND REPORTING	**Weekly safety reports completed and forwarded to PHSC.**				
	A. Monthly Safety Report.				
	B. NLI with Root Cause Analysis process in place. V&Vs complete.				
	C. Incident investigation process established (Why Tree, etc.).				
	D. Process of sharing lessons learned and best practices (tailgate, etc.).				
	E. Project team understands client incident reporting process.				
	F. Job Safety Analysis (on major job tasks at the site, updated regularly).				
	G. JSAs adequately identify job steps, hazards and critical actions.				
	H. JSAs reviewed by associate performing work prior to beginning task				
	I. The Task Observation process utilized				
	J. Observations performed per requirements				
	L. Followup, communication, review Observation trends				
	M. Equipment and vehicle inspections are maintained on-site.				
	N. Monthly LPS/BBS spreadsheet submitted to Becky.				
PROJECT SET-UP	A. FPM/HSO has visited local clinic. Contact names and phone numbers, established minor injury requirements, and special medical services.				
	B. Background air monitoring completed and documented.				
	C. Exclusion, decon, and support zones are established and identified.				
	D. Overhead and underground utilities have been located, marked and discussed with the team, must be documented.				
	E. Hazard Communications area is established and MSDSs are on-site.				
	F. First Aid and CPR trained personnel are on site.				
	G. Respiratory Program and fit test completed.				
	H. Spill prevention plan and spill kit.				
OPERATIONS	A. During operations JSAs are developed and updated as required.				
	B. Documented inspections of heavy equipment and motor vehicles.				
	C. Decon area set-up and is being utilized.				
	D. Two daily tailgate meetings completed and documented each day.				
	E. Stop work authority discussed and encouraged.				
	F. Emergency drills performed.				

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
HOUSEKEEPING	A. Administration and decon trailers are cleaned daily.				
	B. Materials and equipment properly cleaned and stored, in good working order. Unusable items are marked and removed from service.				
	C. Equipment cabs are clean and free of debris and moving material.				
	D. Portable toilets properly sanitized.				
	E. Clear access to all fire extinguishers				
	F. All working platforms are clear of debris.				
	G. Trash containers are marked and appropriately stationed.				
	H. Soap, water and clean towels are available.				
	I. Walk areas are clear of debris or tripping hazards.				
	J. Break areas and eating areas are marked and kept clean.				
	K. Worksite left clean and usable.				
	L. Emergency ingress/egress routes identified, kept clear of obstructions.				

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
SUB CONTRACTORS	A. Subcontractor orientation complete and signed.				
	B. EMR, number of recordable injuries, incident rate, fatalities, and insurance requirements meet ENTACT's requirements and are complete and submitted to Health and Safety.				
	C. Adheres to all requirements in the ENTACT Behavior Based Health and Safety System Manual, the site specific Health and Safety Plan, orientation process, daily safety meetings, and any specific guidelines directed toward subcontractors.				
	D. Participates in daily tailgate meetings.				
PERSONAL PROTECTION EQUIPMENT	A. What level of protection is required on this site? A, B, C, D or combination?				
	B. Do associates understand why the level of protection is required?				
	C. Are associates wearing the required PPE? Requirements are enforced?				
	D. Have the associates been trained on PPE procedures, i.e. wearing, cleaning, replacing, storage.				
	E. Are upgrades to PPE utilized where needed, i.e. face shield when power washing.				
	F. Is contaminated PPE properly disposed of?				
	G. Are the appropriate filters used with respiratory equipment?				
	H. Are eye wash stations and/or emergency showers on-site and appropriately placed with signage?				
	I. Is hearing protection required and enforced around heavy equipment and/or noise levels exceeding 85 dBa?				
	J. PPE is inspected prior to use.				
LOCKOUT / TAGOUT	A. Is all machinery, equipment, or electrical services capable of movement required to be de-energized or disengaged and locked out during clearing, servicing, adjusting or setting up operations? Items are locked out and tagged. LOTO process is documented.				
	B. All stored energy (mechanical, hydraulic, air, etc.) has been released or blocked before equipment is locked out for repairs.				
	C. Are sufficient number of signs or tags and safety padlocks provided?				
	D. Is it required that only the associate exposed to the hazard is the only one to place or remove the safety lock?				
	E. Are associates required to keep personal control of their key while they have safety locks in use?				
	F. Are permits signed and saved?				

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
CONFINED SPACE	A. Was background air monitoring performed according to the appropriate sequence (O2, LEL, toxic materials concentration, and determine if continuous monitoring is needed) and documented?				
	B. Was ENTACT's confined space permit fully completed, posted, and saved, and procedures followed on all permitted confined spaces.				
	C. Was an Emergency Rescue Plan completed and set in place in case of an emergency and was rescue equipment made available?				
	D. Have all associates entering a permitted confined space received confined space training?				
	E. Is adequate illumination provided for the work?				
	F. Have entry supervisor, attendant, entrant(s), and rescue personnel been identified, trained, and understand their responsibilities?				
	G. Is the correct PPE being used including skin protection and respiratory?				
	H. Have confined space rescue team performed emergency drill?				
FALL PROTECTION	A. Slip, trip and fall hazards have been identified and eliminated from the site or are marked.				
	B. Ladders are in good condition.				
	C. Correct type of ladders, heavy duty Type 1, are being utilized.				
	D. Temporary stairs to trailers are on good condition.				
	E. Safety harnesses, connectors and lanyards are in good condition.				
	F. Rebar protection is being utilized.				
	G. Rescue and Post Fall Recovery Plans are available and are current.				
	H. Aerial lifts are being utilized and are in good condition.				
	I. Associates are properly trained in the use of aerial lifts.				
	J. Maintenance and inspections are completed for aerial lifts.				
	K. Tie-off points have a 5000-pound capacity for each associate tying off.				

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
HEAVY EQUIPMENT / TRUCKS	A. Heavy equipment inspected each day by operators and documented?				
	1. Noted deficiencies repaired in a timely manner.				
	2. Fire extinguishers located on equipment.				
	3. No eating, smoking or chewing while in the equipment.				
	B. Operators use 3-point mount and dismount procedures.				
	C. No eating, smoking or chewing while in the equipment.				
	D. Operator stops work if ground crew walks into swing radius of equipment.				
	E. All truck drivers have completed site orientation and Truck Driver Safety Orientation and have signed the orientation sheet. Drivers understand chemical hazards.				
	F. Truck routes and speed limit signs are posted and discussed in daily safety meetings.				
	G. Area for dump trucks to unload is properly marked and is level.				
	H. Use of cell pones is not allowed by the operator of moving equipment or vehicles.				
	I. Equipment is turned off prior to fueling.				
	J. Damage or incidents (requires drug and alcohol test- see Drug and Alcohol Policy):				
	1. Minor damage or incidents reported within 3 days of incident.				
	2. Major damage or incidents reported as soon as possible or not later than 24-hours of occurrence.				
	K. Operators are qualified to operate equipment. Documentation available.				
	L. Equipment is stored in a secure area when not in use.				
	M. Truck routes are maintained in good condition, are level, and are a safe distance from excavation site.				
	N. Weekly fuel tank inspections are complete and documented.				
	O. Inspection forms are sent to Ronnie Greer				

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
FLAMMABLES	A. Containers are labeled and stored according to Haz Com regulations.				
	B. Signs are posted.				
	C. Emergency spill procedures are in place and spill kit is available.				
	D. Portable fire extinguishers are placed appropriately.				
	1. Mounted off the ground.				
	2. 20 to 25 feet from bulk storage.				
	3. Proper size and type of fire extinguishers.				
	4. Map showing location of all fire extinguishers.				
	E. Monthly documented on-site inspection of each fire extinguisher and yearly outside inspection.				

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
EXCAVATIONS	A. Competent Person has classified soil conditions.				
	B. Excavation area is marked with fencing and signage.				
	C. Excavations greater than 4 feet deep, slopes are 1 ½ to 1 or 34%.				
	D. Excavated material set a minimum of two feet from the edge of excavation.				
	E. All overhead and underground utilities are marked.				
	F. Work, haul, and traffic areas are marked and organized for safe operation.				
	G. Spotters are used for trucks dumping material.				
	H. Work is stopped immediately if lightning is observed.				
	I. Equipment that must be removed by other equipment must use the appropriate rated strap (chains are not to be used).				
	J. Keys are removed from equipment at night and weekends or when not in use.				
	K. Operator wearing PPE designated in H&S Plan.				
	L. Excavation area is inspected by the Competent Person each day before work begins. Documented.				
DEMOLITION	A. Utilities are disconnected/de-energized.				
	B. Warning signs and barricades are in place.				
	C. Competent Person has surveyed the project. Documented.				
	D. Thorough communication takes place between all members of the demolition crew.				
	E. Proper engineering controls keep dust to a minimum.				
	F. All personnel are restricted from demolition drop areas.				
	G. Working above 6 feet off the ground appropriate fall protection is provided.				
	H. Open pits and open holes are marked and properly covered.				
	I. Hot work permit is complete and is being utilized.				
COMPRESSED GAS	A. Bottles are properly transported.				
	B. Valve Protection caps are in place.				
	C. Bottle carriers are utilized in trucks.				
	D. Oxygen cylinders are separated from fuel gas cylinders and combustibles by a distance of 20' or 5' high barrier with ½ hour fire rating.				
	E. Cylinders are in good condition.				
	F. Regulators are in good condition.				
	G. Hoses are in good condition.				
	H. Torches are in good condition.				
	I. Gauges are in good condition.				

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
VEHICLES	A. Only authorized personnel drive Company vehicles. MVR complete.				
	B. Vehicles are inspected prior to use and are in good mechanical condition. Documented and maintained on site for audit.				
	C. Vehicle interior/exterior is maintained in good condition. Smoking is now allowed in vehicles.				
	D. All vehicle incidents are reported to the Health and Safety Department in Dallas, Texas the day of occurrence. Reporting documentation is complete and submitted to Health and Safety Department in Dallas.				
	E. Required documentation is with the vehicle:				
	1. Current insurance card.				
	2. Current inspection sticker.				
	3. Current registration sticker.				
SAMPLING DATA AND EQUIPMENT	A. Personal air monitoring program is established and results are posted in the trailer.				
	B. Equipment is calibrated, clean and in good working condition.				
	C. XRF equipment is properly operated following SOP.				
	D. XRF is properly stored in a secure area.				
	F. Documented corrective action taken if readings go over action level.				
	G. Air sampling log is used for setup, operation, and results.				
	H. PID and PDR information downloaded and sent to PHSC.				
	I. All laboratory analyses forwarded to PHSC.				
PORTABLE (POWER OPERATED) TOLS AND EQUIPMENT	A. Are chainsaws, grinders, saws, power washers, water pumps, and similar equipment provided with appropriate safety guards?				
	B. Is power equipment used with the appropriate PPE and trained personnel?				
	C. Are electrical cords rated for use in good condition and ground fault interrupters (GFI) utilized on-site?				
	D. Are pneumatic and hydraulic hoses checked for deterioration or damage?				
	E. Energy source to equipment is disconnected when equipment is not in use?				

	ACTIVITY REQUIRED	Yes	No	Corrected Same Day	Incomplete
HOT WORK PERMIT	A. Permissible areas for hot work operations are being utilized.				
	B. Fire blankets are being utilized.				
	C. Fire extinguishers are available and are the proper rating.				
	D. Ventilation is being utilized.				
	E. A fire watch is being implemented.				
	F. Areas are being checked for combustibles in all directions for 35'.				
	G. Areas are being inspected ½ hours after completion of hot work.				
	H. Hot Work Permits are properly completed and saved.				
WASTE MANAGEMENT	A. Waste minimization procedures utilized.				
	B. Waste shipping papers (manifests, bills of lading) properly prepared and signed by authorized personnel.				
	C. Wastes properly labeled and accumulated while on site.				
	D. Proper shipping records maintained (manifests, bills of lading, weigh tickets, etc.).				
OTHER	A. HASP completed and at least one copy is on site.				
	B. Behavior Based Health and Safety System being utilized by FPM.				
	C. Site is using ENTACT's comprehensive operational policies and procedures for daily activities.				
	D. Where applicable, Short Service Employee and mentorship policy implemented.				
	F. Site emergency drills have been conducted.				

I have reviewed this safety audit and fully understand the recommendations and will make every attempt to correct them immediately.

	Signature	Date
Field Project Manager		
Site Health and Safety Officer		
Health and Safety Auditor		

(Use the space below if any response is indicated in the findings above.)

RESPONSE ACTIONS (& DATE):

	Signature	Date
Field Project Manager		
Site Health and Safety Officer		

ATTACHMENT AA MSDS FOR CALCIMENT OXIDE

Mintek RESOURCES inc

MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT IDENTIFICATION

Date: 01/01/07

Product Name	Distributor	Telephone
Calciment®	Mintek Resources, Inc. PO Box 340187 Beavercreek, OH 45434	937-431-0218 Office 937-431-1305 Fax 800-424-9300 CHEMTREC

Chemical Name	Chemical Family
Calciment Oxide-Pozzolan Mixture	Lime/Cement

SECTION 2. TYPICAL COMPOSITION

Component	Formula	% Wt.	CAS No.	PEL
Calcium Oxide	CaO	>60%	1305-78-8	5mg/m^3
Magnesium Oxide	MgO	1%	1309-48-4	10mg/m^3
Silica	SiO_2	6.15%	7704-34-9	15mg/m^3
Iron Oxide	Fe_2O_3	>3%	1309-37-1	15mg/m^3
Aluminum Oxide	Al_2O_3	2.22%	1344-28-1	10mg/m^3

SECTION 3. HAZARD CLASSIFICATIONS

Irritant: To the eyes, mucous membranes and to the skin (in case of sweating).
Flammability: The product is not flammable or combustible.
Explosive: None.
Reactivity: Reacts when mixed with water, steam or acids and will generate heat sufficient to ignite wood and other materials. Small amounts of lime in a fire do not hinder the use of any standard extinguishing medium. Wear self-contained breathing apparatus approved by NIOSH. Protect eyes from dust.

SECTION 4. FIRST AID SYMPTOMS AND TREATMENTS

Effects:

Inhalation:	Respiratory problems, coughing, sneezing, inflammation of the respiratory passages.
Eyes:	Severe irritation, intense tearing, burns and possible blindness when exposure is prolonged.
Skin:	Removes natural skin oils, blotches, itching and severe burns in case of sweating.
Ingestion:	Sore throat, burning sensation, stomachaches, cramps, diarrhea, vomiting.

P.O. Box 340187
Beavercreek, OH 45434

Dispatch (937) 431-0218
Fax (937) 431-0254

Appendix D

Community Air Monitoring Program

Prepared for:
National Grid
Hicksville, NY

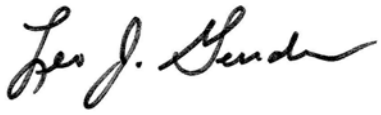
Hempstead Intersection Street Former MGP Site – Villages of Hempstead and Garden City, NY

ENSR Corporation
August 2008
Document No.: 01765-072-101

ENSR | AECOM

Prepared for:
National Grid
Hicksville, NY

Hempstead Intersection Street Former MGP Site – Villages of Hempstead and Garden City, New York



Prepared By: Leo J. Gendron

ENSR Corporation
August 2008
Document No.: 01765-072-101

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Executive Summary

This Community Air Monitoring Program (CAMP) Work Plan has been developed to provide specific procedures for measuring, documenting, and responding to potential airborne contaminants during the remedial action at the Former Hempstead Intersection Manufactured Gas Plant site. The procedures in this CAMP are focused on the monitoring of airborne contaminants at the site perimeter and complement the work zone monitoring conducted to protect site workers as described in the site Health and Safety Plan (HASP). This CAMP Work Plan is based on and builds on the CAMP guidelines established by the New York State Department of Health (NYSDOH) in the New York State Department of Environmental Conservation (NYSDEC) DER-10 Draft Technical Guidance for Site Investigation and Remediation (DER-10) (December 2002). The CAMP is designed to provide monitoring procedures, Alert Limits, Action Limits, and contingency measures if Action Limits are approached. An Alert Limit is a contaminant concentration or odor intensity that triggers contingent measures. An Alert does not suggest the existence of a health hazard, but serves instead as a screening tool to trigger contingent measures if necessary, to assist in minimizing offsite transport of contaminants and odors during remedial activities. An Action Limit is a contaminant concentration or odor intensity that triggers work stoppage.

During times of ground intrusive activities, fenceline perimeter air monitoring will be conducted using a combination of real-time (continuous and almost instantaneous) air monitoring at fixed locations (24 hours a day/7 days a week) and walk-around supplemental monitoring using hand-held instruments on an as-needed basis. Contaminants commonly found at former MGP sites will be monitored, including volatile organic compounds (VOCs) and dust. Relative odor intensity will also be monitored using an American Society for Testing Materials (ASTM) method. The Contingency Plan defines Alert Limits, Action Limits, and specific response activities to be implemented during working hours if an exceedance of an Alert Limit or Action Limit for a measured compound occurs. The response actions, potentially including work stoppage, are intended to prevent or significantly reduce the migration of airborne contaminants from the site. Although hydrogen cyanide has not been detected in the soil or groundwater, there will be a separate contingency plan for monitoring for its presence if cyanide-containing material is encountered during excavation.

The following plan describes the monitoring to be conducted during significant ground intrusive activities. Significant ground intrusive activities are those excavations on the main site where there is reasonable expectation of encountering MGP-impacted materials. Where appropriate, an alternative level of monitoring which is in compliance with NYSDOH CAMP Guidance in DER-10 and equally protective of the community may be employed. Based on specific field activities, a decision will be made as to the appropriate level of monitoring. Pre-trenching and surface clearing activities will be performed in the vicinity of an active 16-inch diameter gas main that is located near IRM excavation areas A and B and limited open excavation will be performed along the LI Railroad right of way in Area E. For these activities, monitoring may be performed using portable Air Monitoring equipment and procedures similar to those used at the site during previous investigation activities as described in Section 4 of this document.

1.0 Introduction

The NYSDOH Generic Community Air Monitoring Program (CAMP), as presented in New York State Department of Environmental Conservation's (NYSDEC) document DER-10 Technical Guidance for Site Investigation and Remediation, requires that real-time monitoring for total volatile organic compound (TVOC) and particulates (i.e., dust) be conducted at the downwind perimeter of each designated work area during ground intrusive activities at contaminated sites. As such, this work plan describes the proposed air monitoring means and methods that will be implemented during the construction activities at the Hempstead Intersection Former Manufactured Gas Plant (MGP) site (Site). A site location map is shown on Figure 1-1.

Air monitoring at the Site will be conducted in accordance with the NYSDOH CAMP. The purpose of the air-monitoring program is to provide early detection in the field of potential short-term emissions. The early detection of potential emissions and associated contingency measures is intended to expedite any necessary mitigation measures, and to reduce the potential for the community and public to be exposed to hazardous constituents at levels above accepted regulatory limits and guidelines provided in the NYSDOH Generic CAMP. During ground intrusive activities at the Site, the CAMP will be conducted using a combination of real-time air monitoring at fixed locations and supplemental walk-around perimeter monitoring using hand-held instruments as appropriate.

The objectives of the CAMP are as follows:

- Provide an early warning system to alert National Grid that concentrations of TVOCs, dust, odor, and HCN in ambient air are approaching Action Limits due to site activities.
- Provide details for a site contingency plan that is designed to reduce the off-site migration of contaminants/odors if established Action Limits are approached or exceeded.
- Determine whether construction controls are effective in reducing ambient air concentrations to below Action Limits and make appropriate and necessary adjustments.
- Develop a permanent record that includes a database of perimeter air monitoring results and meteorological conditions, equipment maintenance, calibration records, and other pertinent information.

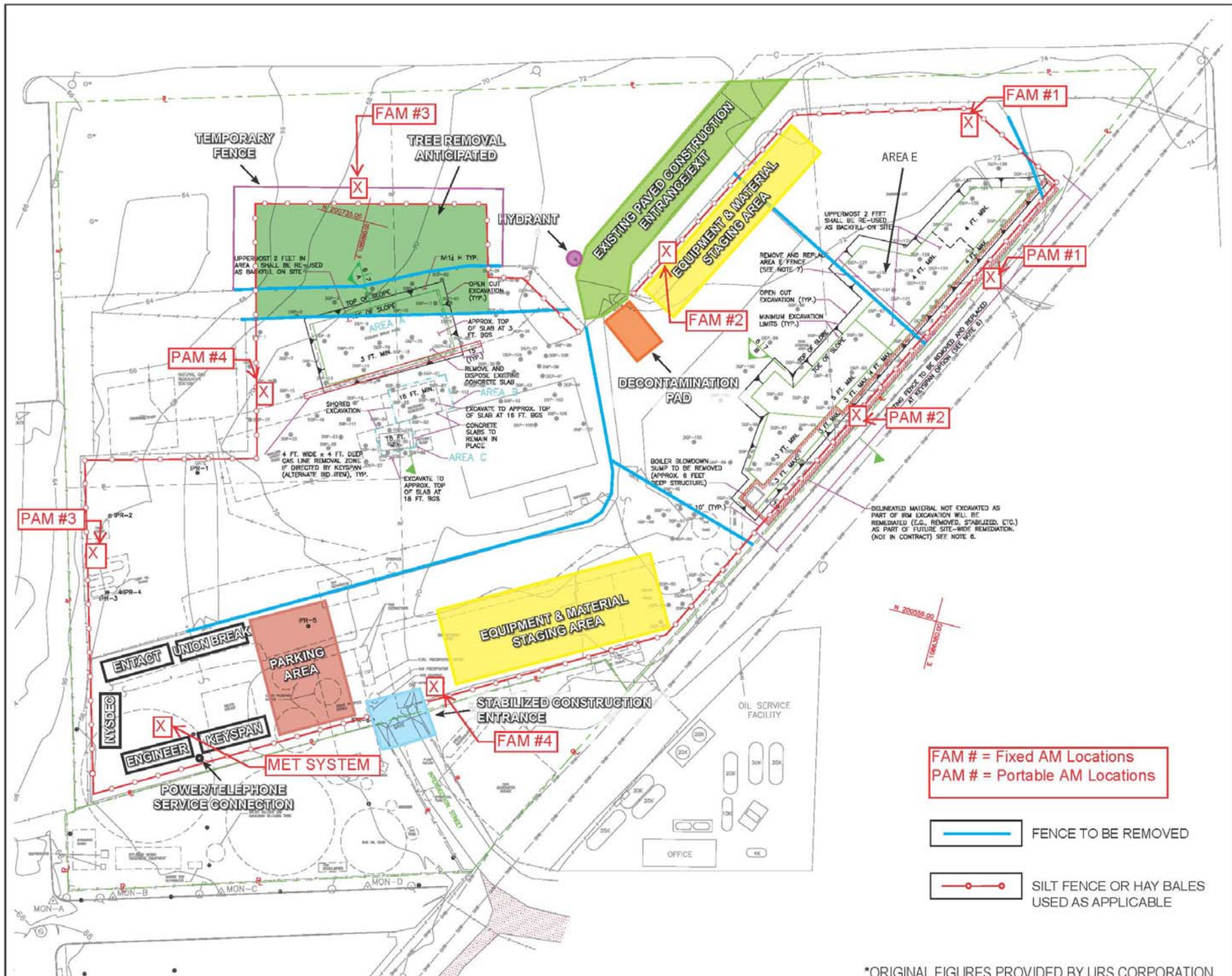
1.1 General Approach

The general approach to meet the objectives of the Plan is two-fold:

1. Utilize a real-time system to monitor target compounds. Real-time monitoring data will be used as an early warning system so that the air monitoring contractor can alert National Grid and the site engineer and contractor, that concentrations of target compounds are approaching Action Limits. Under this scenario, National Grid, the site engineer/contractor, and the air monitoring contractor can then begin to evaluate and implement appropriate site controls to maintain acceptable ambient air concentrations.

2. Develop comprehensive data management and analysis procedures. Data will be generated from a variety of sources, including real-time fixed station analytical monitoring, pre-construction baseline sampling, supplemental hand held equipment, and meteorological monitoring. These data will be reduced, evaluated, verified, and presented to National Grid and the site engineer/contractor in a timely manner to facilitate timely decision-making.

Figure 1-1: Site Location Map



CONSTRUCTION SCHEDULE & SEQUENCING

1. Project preparation including preparation of project plans and obtain applicable project permits
2. Personnel and equipment mobilization and site preparation
3. Establish work zones delineated with orange fencing and signs (support, contaminant reduction and exclusion zones)
4. Install erosion and sediment controls
5. Construct temporary facilities (trailers, utilities, storage areas)
6. Site clearing and grubbing
7. 16 inch gas main clearance excavation
8. Assemble temporary containment structure and VMS and place into first position
9. Excavate and backfill Excavation Areas B and C under the temporary containment structure
10. Reposition the temporary containment structure to Excavation Area A
11. Excavate and backfill Excavation Area A under the temporary containment structure
12. Reposition the temporary containment structure to Excavation Area E1
13. Excavate and backfill Excavation Area E1 under the temporary containment structure
14. Repeat steps 12 and 13 in Excavation Areas E2, E3 and E4
15. Decontaminate and disassemble the temporary containment structure and VMS
16. Removal of SESC features
17. Final site restoration and demobilization
18. Estimated time for project completion and final stabilization – 3 and ½ months

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SITE PLAN

SOIL EROSION SEDIMENT CONTROL PLAN

Project No.	E7370		
Figure No.	1	Date	05/12/2008
		Updated	05/29/2008

2.0 Sampling and Analytical Procedures

This section of the CAMP presents a detailed description of the air monitoring sampling and analytical procedures, including data management that will be used during the Site ground intrusive activities.

In general, real-time sampling methods will be utilized to determine ambient air concentrations during the project. Real-time continuous monitoring for TVOC and respirable particulate matter (RPM_{10}) will occur at four fixed locations. Meteorological conditions including wind speed and direction, temperature, and relative humidity will be monitored in real time. Supplemental walk-around perimeter monitoring for TVOC, RPM_{10}, odor intensity, plus HCN and H_2S will occur along the perimeter of the project site on an as-needed basis.

2.1 Alert Limit and Action Limit

An Alert Limit is a contaminant concentration or odor intensity that when exceeded triggers contingent measures. For example, if odors are detected on site, contingent measures such as the use of odor suppression foam may be required. An Action Limit is a contaminant concentration that when exceeded requires a work stoppage.

The following target compounds and corresponding Alert Limits and Action Limits were developed in accordance with the NYSDOH Generic CAMP.

Target Compounds	Alert Limit
TVOCs (15-minute average concentration)*	3.7 ppm greater than background**
Respirable Particulate Matter (RPM_{10}) (15-min avg.) *	100 µg/m^3 greater than background**

Target Compounds	Action Limit
TVOCs (15-minute average concentration)	5 ppm greater than background**
TVOCs (15 minute average concentration)	25 ppm greater than background**
Benzene (15-minute average concentration)	1.0 ppm (actual measurement)
Respirable Particulate Matter (RPM_{10}) (15-min conc.)	150 µg/m^3 greater than background**
Odor (n-butanol scale) (15-minute sustained)	3 (Verified related to construction)
Odor (nuisance)	Public complaints that are verified to be related to construction
Hydrogen cyanide	0.6 ppmv

ppmv - parts per million volume
µg/m^3 - micrograms per meter cubed
* 15-minute average concentrations updated every 1 minute
** Background is defined as the current upwind 15-minute average concentration.

2.2 Real-Time Fixed Station Monitoring

Real-time air monitoring for TVOCs and suspended particulates will be conducted upwind and downwind of the work area along the site perimeter. The intent of the real-time monitoring program is to provide early detection in the field of short-term emissions and off-site migration of site-related TVOCs and dust. Real-time monitors will operate 24 hours per day during periods of excavation activity. The perimeter air monitoring system consists of four Air Monitoring Stations, one meteorological tower, and one central computer system. The central computer system will be located in the project trailer located on the site.

Real-time monitoring will be conducted at four fixed air-monitoring stations (FAM #1 through FAM #4, Figure 1-1).

Each real-time air monitoring station contains the following:

1. Station enclosure with sample manifold system
2. An organic vapor analyzer or (PID) plus a separate gas chromatograph (GC)
3. A particulate monitor
4. A data logger plus communications device
5. Environmental control devices (heater/AC)

Each monitoring station is housed in a weather-tight NEMA-4 type enclosure. The internal capacity of each AM shelter is illustrated in Figure 2-1.

Each monitoring station will continuously measure and record TVOCs and RPM_{10}.

The PIDs will operate in the TVOC mode to determine the TVOC concentration in ambient air. In TVOC mode, the PIDs will collect and analyze samples at a rate of one sample every 10 seconds, producing one-minute averages which are then used to make 15-minute data averages. If the subsequent 15-minute average TVOC concentration measured at a station reaches an Alert Limit (3.7 parts per million [ppm] or 75 percent of the Action Limit for TVOC), then the PID will continue to measure TVOCs and the GC at that station will begin to continuously sample and measure in the compound-specific mode. In the compound-specific mode, quantitative concentrations of benzene, toluene, ethyl benzene, and xylene in ambient air will be determined.

Each portable particulate meter will also be equipped with a PM_{10} sampler to monitor RPM less than 10 microns (RPM_{10}). Particulate meters analyze samples once every 10 seconds and produces one-minute averages. These one-minute averages will be averaged to make 15-minute data averages.

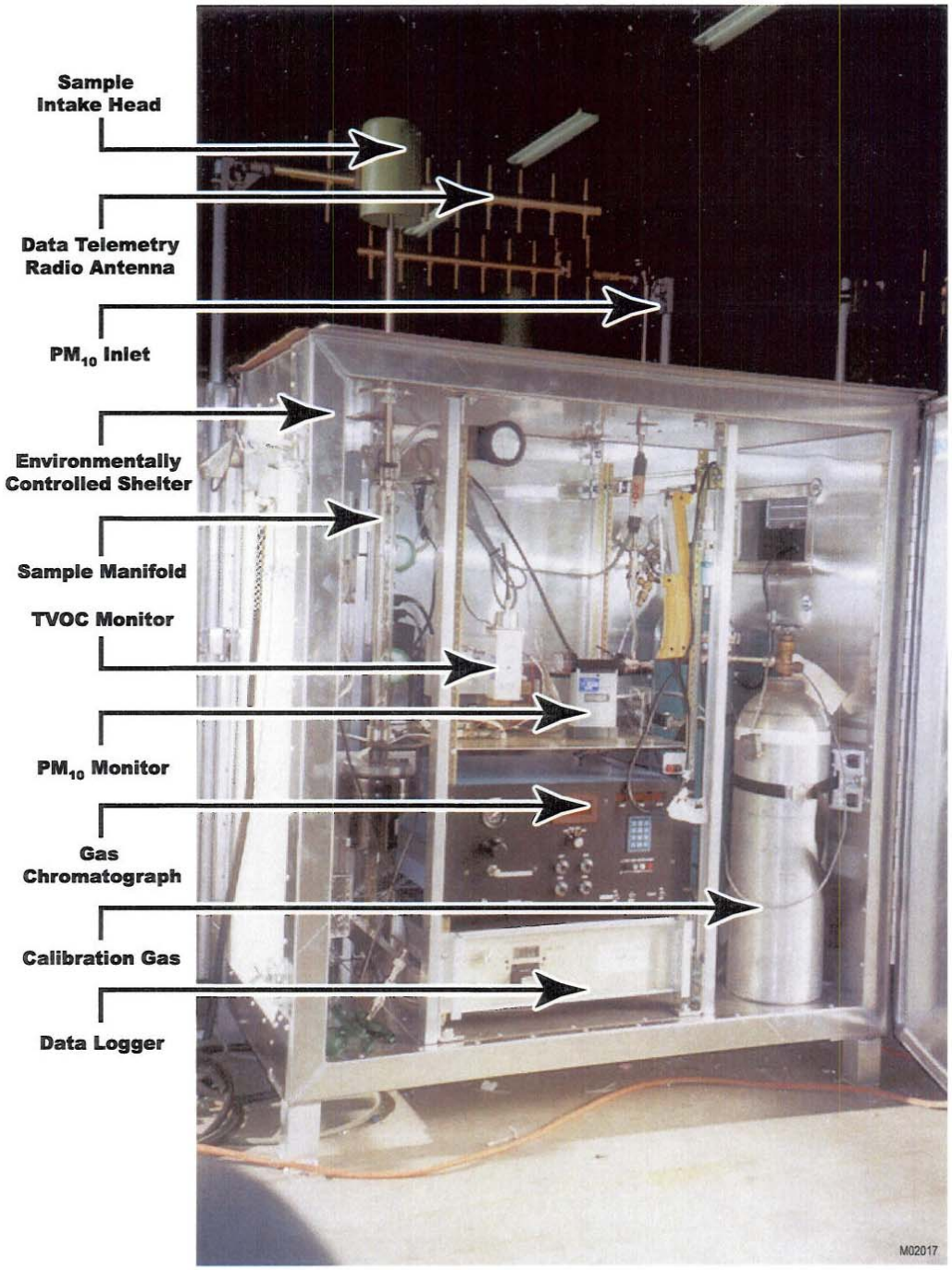
In addition to the four monitoring stations, a Climatronics meteorological monitoring system, or equivalent, will be established on site. The meteorological system will be set at a height of 10 meters (approximately 30 feet) above ground and located at the central AM shelter that is clear of buildings, trees, or other obstructions. The meteorological system will continuously monitor temperature, dew point temperature, wind speed, and wind direction. Fifteen-minute average values for each meteorological parameter will be stored in the meteorological system and downloaded continuously into the on-site central database.

All TVOC, individual VOC constituents (BTEX), RPM_{10}, and meteorological data will be stored in data-loggers located within each monitoring station. Stored analytical data along with system performance data from each station will be sent in real-time, via radio telemetry, to the central computer system located in the project office or trailer for monitoring and analysis.

Equipment calibration will be performed according to manufacturer's instructions. Each PID will be calibrated once daily using a certified standard isobutylene gas for TVOC mode. A certified standard gas mixture for BTEX specific compounds will be used to daily calibrate the onsite GC at each location. Particulate monitors for RPM_{10} will be zeroed daily plus a once-per-week upside check will be performed on each unit. Hand-held portable equipment will be calibrated before each use, and a minimum of once per week when not in use.

In the event of an exceedance of an Alert Limit or Action Limit for TVOC or RPM_{10}, the air-monitoring consultant will be notified via phone paging. The central computer will be equipped with a modem or wireless card that is capable of sending text pages to cell phones. If a TVOC Alert Limit or Action Limit is reached during non-working hours, the system will be checked remotely and an appropriate response action will be determined.

Figure 2-1: Internal Capacity of Each Air Monitoring Shelter



2.3 Supplemental Walk-Around Monitoring

Supplemental perimeter monitoring for TVOC, RPM_{10}, odor, plus HCN and H_2S will occur along the perimeter of the project site on an as-needed basis. Specific site conditions that may trigger walk-around perimeter monitoring include:

- Visible dust
- Odor complaints
- Detection of TVOCs and/or RPM_{10} at an AMS at concentrations exceeding an Alert Limit or Action Limit
- Elevated HCN levels within the exclusion zone from purifier waste or other materials, or if HCN (bitter almond) odors are detected on-site or in the vicinity of the site.
- Direction by National Grid, the site Engineer, or NYSDEC.

Readings will be collected continuously at a number of sites in the downwind direction between the work area and the nearest receptors.

When a triggering condition is observed during ground intrusive activity, the supplemental down wind perimeter monitoring will occur continuously until the conditions that triggered the monitoring have subsided. TVOC concentrations will be monitored and recorded using a Portable Ionization Detector (PID) or equivalent. RPM_{10} will be measured and recorded using a portable real-time aerosol monitor equipped with a PM_{10} impactor. Odors will be noted based on the n-butanol scale, as adapted from ASTM E544-99. At each monitoring point, the data value, sample time, and sample location will be collected and recorded. Additional temporary monitoring points may be established due to changing site or meteorological conditions.

If cyanide materials are encountered during excavation or work area monitoring detects a confirmed measurement of cyanide, or if hydrogen cyanide odors are detected in the vicinity of the site, cyanide will be monitored at the perimeter downwind. To monitor cyanide (as hydrogen cyanide gas), a real-time hand-held meter in conjunction with the Dräger standard tube measuring system will be used. The continuous monitoring equipment that will be used to measure hydrogen cyanide gas will be the Mini-Warn by Dräger Safety Systems. Due to potential interference from sulfur compounds, hydrogen sulfide gas (H_2S), Sulfur Dioxide (SO2) and phosphine will also be monitored for comparison to any hydrogen cyanide gas levels detected. Hydrogen cyanide gas detections will also be confirmed with standard Dräger tubes due to this interference. The Dräger tubes can quantify other gases that could potentially provide false positives for hydrogen cyanide gas (including sulfur dioxide, hydrogen sulfide, phosphine gas, hydrogen chloride, and nitrogen dioxide) detected by the real-time meter.

2.4 Integrated Volatile Organic Compound Measurements

Integrated VOC samples (24 hours) will be collected once per week at two air-monitoring stations (plus one collocated sample per month). The samples are collected to demonstrate that the real-time monitoring stations are effective in measuring the concentration of the VOC target compounds. VOC samples will be collected using 6-liter Summa® canisters (or equivalent vacuum canisters) and analyzed using United States Environmental Protection Agency (EPA) Method TO-15 modified to include naphthalene. An accredited laboratory will perform the analytical testing on the canisters and will provide Category B deliverables as required by the New York Analytical Services Protocol. The data will be validated according to EPA and New York State Requirements.

2.5 Pre-Construction Baseline Sampling

Pre-construction sampling will be completed to establish baseline ambient air concentrations prior to the start of construction activities. Baseline conditions will be developed for TVOCs and RPM_{10} in ambient air using

real-time fixed station sampling methods. In addition, a baseline odor survey plus integrated TO-15 VOC sampling at 2 sites per day, will be completed during background sampling activities. Sample collection and analysis methods will follow those described in subsection 2.2 (Real-Time Fixed Station Monitoring).

Pre-construction real-time sampling will take place at the four fixed air monitoring station locations to determine TVOC and RPM_{10} baseline conditions. TVOC plus RPM_{10} data will be recorded 24 hours per day for a minimum of **three days**.

Pre-construction odors will also be established for 3 days prior to construction activities. On-site and off-site odor surveys will be conducted using the 8-point n-butanol scale. The on-site odor surveys will be conducted along the perimeter of the site. The off-site odor surveys will be conducted throughout adjacent neighborhoods.

2.6 Data Management Procedures

This section of the Plan discusses the data management procedures that will be used during the remedy. Data will be generated from a variety of sources, including real-time fixed station analytical monitoring, supplemental walk-around monitoring, preconstruction sampling, integrated TO-15 sampling, and meteorological monitoring. These data must be reduced, evaluated, verified, and presented to National Grid and the site engineer/contractor in a timely manner to facilitate decision-making. The data management process for each source of data is discussed below.

Analytical data generated at each fixed-station monitoring location are sent to the central computer system via radio telemetry. The fixed station baseline monitoring data will also be downloaded to the project database for data evaluation. The following daily charts or tables will be prepared:

- Averaged (15-minute averages updated every minute) TVOC concentrations compared to the TVOC Action Limits
- Averaged (15-minute averages updated every minute) RPM_{10} concentrations compared to the RPM_{10} Action Limit
- Supplemental Perimeter Walk-Around TVOC concentrations compared to the TVOC Action Limits (if any)
- Supplemental Perimeter Walk-Around RPM_{10} concentrations compared to the Action Limits (if any)

The following weekly data summaries will be prepared and transmitted to National Grid and the site engineer:

- 15-minute average wind speed, wind direction, humidity, and air temperature data
- Maximum 15-minute average concentrations of TVOC, RPM_{10}, and odor intensity
- Upwind and downwind comparison and discussion of Alert and Action Limits reached during the week
- Summary of site activities
- Air monitoring station location maps

In addition to the daily and weekly data reporting, sampling results for TVOCs and particulates will be reported to the construction manager and NYSDEC when Action Levels have been exceeded, to allow prompt evaluation and response to potential emissions. The ENSR air monitoring task manager, together with National Grid and the construction manager, will decide when shut-down and start-up criteria are met.

In addition, if there is a confirmed CAMP Action Limit exceedance during off hours, an email notification will be provided within 24 hours of the incident to the NYSDEC, NYSDOH, and NCDH.

In addition, a monthly data CD will be provided to National Grid, the NYSDEC, and NYSDOH.

A field log book and sensor calibration field forms, along with monthly data listings, will be maintained by ENSR throughout the sampling efforts. Information to be recorded by ENSR will include:

- Description of remediation activities conducted during the elevated data values;
- Daily Site maps showing the locations of all portable AM sites for the day;
- Any corrective actions used due to elevated real-time air monitoring readings such as shut-downs, covering stockpiles, reduced work pace, etc.;
- VOC sample media receipt dates, conditions, and numbers;
- Copies of chain-of-custody forms;
- Sampling equipment installation, operations, and removal dates;
- Sampling equipment calibration dates and results;
- Sampling equipment maintenance dates and results;
- General field weather conditions on sampling days;
- Any unusual situations which may affect samples or sampling'
- Sample dates; and
- Start and stop times.

3.0 Contingency Plan

The contingency plan is to identify potential site control measures that may be implemented in response to elevated levels of target compounds or odor measured during ground intrusive activities. In general, a tiered approach to site conditions with corresponding response actions will be implemented during the air monitoring program.

The three tiers of site conditions are defined as follows.

- **Operational Level**: Normal or ambient air-conditions where all target concentrations are less than the Alert Limits (75 percent of the Action Limits).
- **Alert Level:** Concentration of at least one target is equal to or greater than Alert Limit (75 percent of the Action Limit), but less than the Action Limit.
- **Action Level**: Concentration of at least one target is equal to or greater than the Action Limit.

The contingency plan will rely on real-time data generated from the fixed-station monitoring, odor intensity monitoring, and meteorological monitoring. These data sources will be evaluated together in order to make appropriate decisions concerning site conditions and potential control measures.

An explanation of the notification system, specific conditions, and response actions for VOCs, RPM_{10}, and odor are presented below.

3.1 VOCs

TVOC concentrations in air will be measured and recorded by fixed-station monitors. Figure 3-1 presents the TVOC decision diagram that will be used to determine the appropriate site condition based on contaminant concentrations.

Operational Level site conditions will be in effect when the 15-minute TVOC concentrations from all fixed AM locations is less than the Alert Limit 3.7 ppm (75 percent of the TVOC Action Limit of 5.0 ppm).

Under an **Operational and Alert Level** site condition, each PID located at the fixed monitoring stations will operate in the TVOC mode, and will collect and analyze a TVOC sample at a frequency of one 15-minute average each minute.

An Alert Level site condition will occur if any 15-minute TVOC concentration measured at a fixed station is greater than or equal to the Alert Limit (3.7 ppm), but less than the Action Level (5.0). Under an Alert Level, the GC at the elevated site will begin analyzing for the BTEX compounds. In the compound-specific mode, the 15-minute concentration of each target VOC (benzene, toluene, ethylbenzene, and xylene) will be determined.

At this time, the upwind and downwind TVOC concentrations will be compared to determine if the preliminary Alert Level site condition is due to site activities. If downwind TVOC concentrations are greater than 3.7 ppm above upwind concentrations, then it will be assumed that the preliminary site condition is due to site activities.

If the above condition is true, then an Alert Level site condition will be verified. Under a verified Alert Level site condition, a contingency meeting attended by the air monitoring consultant, National Grid, NYSDEC and/or NYSDOH representatives (when possible), and the site engineer/contractor will be held to determine appropriate response actions. This meeting will be held within 60 minutes of the Alert Level site condition verification. Possible Alert Level response actions are listed in **Table 3-1**. The site will remain in Alert Level as

long as the TVOC concentration is between 3.7 ppm (alert limit) and 5.0 ppm (action limit), based on 15-minute averages.

Table 3-1: Levels and Response Actions

Site Condition	Response Action
Operational Level	• Normal Site Operations – No Response Action Required
Alert Level	• Establish trend of data and determine if evaluation/wait period is warranted • Temporarily stop work • Temporarily relocate work to an area with potentially lower emission levels • Apply water to area of activity or haul roads to minimize dust levels • Reschedule work activities • Cover all or part of the excavation area • Apply VOC emission suppressant foam over open excavation areas • Slow the pace of construction activities • Change construction process or equipment that minimize air emissions
Action Level	• Assess work activity modifications • Cease construction activities • Re-evaluate air monitoring work plan
Notes: The bulleted response actions specified under each site condition can be implemented in any order that is most appropriate under the existing site conditions.	

If average TVOC concentrations increase to greater than the Action Limit of 5.0 ppm or the benzene concentrations exceed 1.0 ppm during the GC speciation mode at any site, then the site will enter into an **Action Level** site condition. An **Action Level** site condition will remain in effect if any of the following conditions is true:

- The 15-minute average benzene concentration is greater than 1.0 ppm (Action Level)
- The 15-minute average TVOC concentration is greater than or equal to 5.0 ppm (Action Limit)
- The 15-minute average TVOC concentrations are greater than 25 ppm (Upper Action Limit)

Under an Action Level site condition, all construction activities will be halted. A meeting attended by the air monitoring consultant, NYSDEC and/or NYSDOH representatives (when possible), National Grid, and the site engineer/contractor will be held within 60 minutes of the Action Level notification to determine appropriate response actions. Possible Action Level corrective measures/actions are listed in **Table 3-1**. After appropriate corrective measures/actions are taken, work activities may resume provided that the TVOC concentration at the site perimeter is no more than 5 ppm above background for the 15-minute average and the benzene concentrations are below 1.0 ppm..

If average TVOC and benzene concentrations fall below the Action Limits, then the site will be returned to an Alert Level site condition, at which time work activities may resume. The Alert Level site condition will remain in effect as long as the following condition is true.

- The 15-minute average concentration for TVOCs is greater than 3.7 ppm (Alert Limit) and less than 5.0 ppm (Action Limit) above background.

The site will return to Operational Level site condition if the following condition is true:

- The 15-minute average concentrations for TVOCs at each of the fixed monitoring stations are less than 3.7 ppm (Alert Limit).

Under Operational Level site condition, the GCs in each of the fixed stations that were in VOC compound-specific (BTEX) sampling mode will be automatically turned off.

Specific TVOC target concentrations for Operational Level, Alert Level, and Action Level site conditions are summarized in **Table 3-2**.

3.2 Respirable Particulate Matter (RPM_{10})

RPM_{10} concentration in air will be measured and recorded by the fixed-station monitors. Figure 3-2 presents the RPM_{10} decision diagram. Operational Level site condition will be in effect when the downwind 15-minute average RPM_{10} concentration is less than 100 µg/m^3 than the current average upwind conditions. An Alert Level site condition will occur if the 15-minute average RPM_{10} concentration at a fixed station is greater than 100 µg/m^3. At this time, the site engineer and National Grid will be notified of elevated measurements and a possible Alert Level site condition. Under an Alert Level site condition, upwind and downwind RPM_{10} concentrations will be compared to determine if the Alert Level site condition is due to site activities. If downwind RPM_{10} concentrations are 100 µg/m^3 greater than upwind concentrations (Alert Limit), then it will be assumed that the Alert Level site condition is due to site activities.

The Alert Level site condition will remain in effect as long as the 15-minute average RPM_{10} concentration is greater than or equal to 100 µg/m^3 above upwind conditions (Alert Limit), and less than or equal to 150 µg/m^3 (Action Limit). Under an Alert Level site condition, dust suppression techniques must be implemented. At this point, routine monitoring continues and 15-minute averages continue to be evaluated. Work may continue with dust suppression techniques provided that downwind RPM_{10} levels do not exceed 150 µg/m^3 above the upwind level (Action Limit) and provided that no visible dust is migrating offsite from the work area. A contingency meeting attended by the air monitoring contractor, National Grid, the NYSDEC or NYSDOH representatives, and the site engineer/contractor will be held within 60 minutes of the Alert Level site condition if the condition is not mitigated by dust suppression techniques.

An Action Level site condition will go into effect if the average 15-minute RPM_{10} concentration exceeds 150 µg/m^3 above the current average upwind concentration (Action Limit). Under an Action Level site condition, work must be stopped and a meeting attended by the air monitoring contractor, National Grid, the NYSDEC or NYSDOH representatives, and the site engineer/contractor will be held within 60 minutes of the Action Level notification to determine appropriate response actions. Work may resume provided that dust suppression measures and other controls are successful in reducing the downwind RPM_{10} concentration to within 150 µg/m3 of the upwind level and in preventing visible dust migration.

Specific RPM_{10} target concentrations for Operational Level, Alert Level, and Action Level site conditions are summarized in **Table 3-2**.

3.3 Visible Dust

In addition to measured RPM_{10} levels, the CAMP requires monitoring of visible dust conditions. If visible airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind RPM_{10} levels do not exceed 150 µg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

3.4 Odor

Odors from MGP sites are generally negligible due to surface soil cover of contaminated materials. However, excavation work may expose these materials and odors may become detectable. Odors may cause concern among the nearby community, visitors to the site, and on-site workers regarding potential health risks. Health risks or the potential for health risks do not rely strictly on detectable odors. A detectable odor does not indicate health risks. However, controlling odor emissions from a site can allay public fears about health risks and provide additional means of controlling nuisance emissions during remediation activities.

For MGP sites, the characteristic odor during remediation has been attributed primarily to naphthalene and indene, although additional compounds may contribute to the overall odor. (Pure naphthalene has the characteristic odor of mothballs). EPA provides a threshold for the initial presentation of naphthalene odors at 440 µg/m^3 (ATSDR, 1995; Amoore and Hautala, 1983). There is no reported odor threshold for indene. Odors emanating from the site will be monitored for general odor intensity, as described below.

Odor intensity levels will be noted and recorded during as needed perimeter walk-around monitoring. Intensity levels will be based on the n-butanol scale as adapted from ASTM E544-99. Figure 3-3 illustrates the odor decision diagram. An Operational Level site condition will remain in effect if the odor intensity, based on the 8-point n-butanol scale, is less than 3 (Action Limit). An Action Level site condition will go into effect when odor intensities are greater than 3, based on the 8-point n-butanol scale, or there are odor complaints from the public.

If an Action Level site condition, due to odor, is verified, then a meeting attended by the air monitoring contractor, National Grid, NYSDEC or NYSDOH representatives, and the site engineer/contractor will be held within 60 minutes of the Action Level to determine appropriate response actions.

3.5 Hydrogen Cyanide

Hydrogen cyanide (HCN) will be monitored on the perimeter of the site if cyanide-containing material (e.g. purifier waste) is encountered during excavation, or if exclusion zone monitoring detects confirmed levels of cyanide or if HCN (bitter almond) odors are detected in the vicinity of the site. Sampling will be performed every fifteen minutes if sulfur odor or suspected purifier material is encountered. Measurements will be made downwind, and will be recorded into the field notebook. In the event that hydrogen cyanide is detected, the following procedures will be implemented:

Hydrogen Cyanide Gas Air Monitoring Plan	
Response Level	**Actions**
> 0.6 ppm for 15-minute average using real-time meter (Action Limit)	• Run Dräger tube • Continue monitoring with real-time meter • Continue work if Dräger tube for hydrogen cyanide reads < 0.6 ppm
>0.6 ppm on Dräger tube	• Stop work and move (with continuous monitoring meter) at least 25 feet upwind from excavation or until continuous monitoring meter registers <0.6 ppm • Run Dräger tube for hydrogen cyanide and re-evaluate activities • Continue monitoring with real-time meter • May resume work if Dräger tube for cyanide reads <0.6 ppm
> 0.6 ppm for 15-minute average using real-	• Run Dräger Tube for HCN and confirm <0.6 ppm concentration

Hydrogen Cyanide Gas Air Monitoring Plan	
Response Level	**Actions**
time meter and < 0.6 ppm on Dräger tube.	• Continue monitoring with real-time meter • Run Dräger tube using sulfur dioxide, hydrogen sulfide and phosphine tubes to evaluate potential interference • Recalibrate the real-time meter and continue to monitor the work zone.

Note: The ACGIH Threshold Limit Value (TLV) for Hydrogen Cyanide is 4.7 ppm.

Table 3-2: Target Concentrations (above Background) for Site Conditions

			Site Condition		
Target	**Alert Limit**	**Action Limit**	**Operational Level**	**Alert Level**	**Action Level**
Total VOC (PID) – ppmv Benzene (GC) - ppm	3.7 N/A	5.0 1.0	[C] <3.7 [C] < 1.0	3.7 ≤ [C_{avg}] ≤ 5.0 N/A	[C_{avg}] > 5.0 [C] > 1.0
RPM_{10} - µg/m^3	100	150	[C] < 100	100 ≤ [C_{avg}] ≤ 150	[C_{avg}] > 150
Odor (n-butanol scale)	NA	3	OI<3 and No Odor Complaints	NA	OI ≥ 3 or Odor Complaints
Odor (naphthalene) - µg/m^3	NA	440	[C] < 440	NA	[C_{avg}] > 440
Hydrogen Cyanide – ppmv	NA	0.6	[C_{avg}] < 0.6	[C_{avg}] >0.6 (meter) and [C] < 0.6 (DT)	[C_{avg}] >0.6 (meter) and [C] ≥ 0.6 (DT)

Notes
VOC = Volatile Organic Compound
PID = Photo-Ionization Detector
RPM_{10} = Respirable Particulate Matter
ppmv = parts per million volume
µg/m^3 = micrograms per cubic meter
[C] = Concentration of target collected from a discrete sample
[C_{avg}] = 15-minute average concentration of target
DT = Dräger Tubes
OI = Odor Intensity based on the n-butanol scale adapted from ASTM E544-99
Odor measurements made over a 15-minute interval.
NA = Not applicable, odor intensity will be either an Operational Level or Action Level; there is no Alert Level for odor.

Figure 3-1: TVOC Decision Diagram

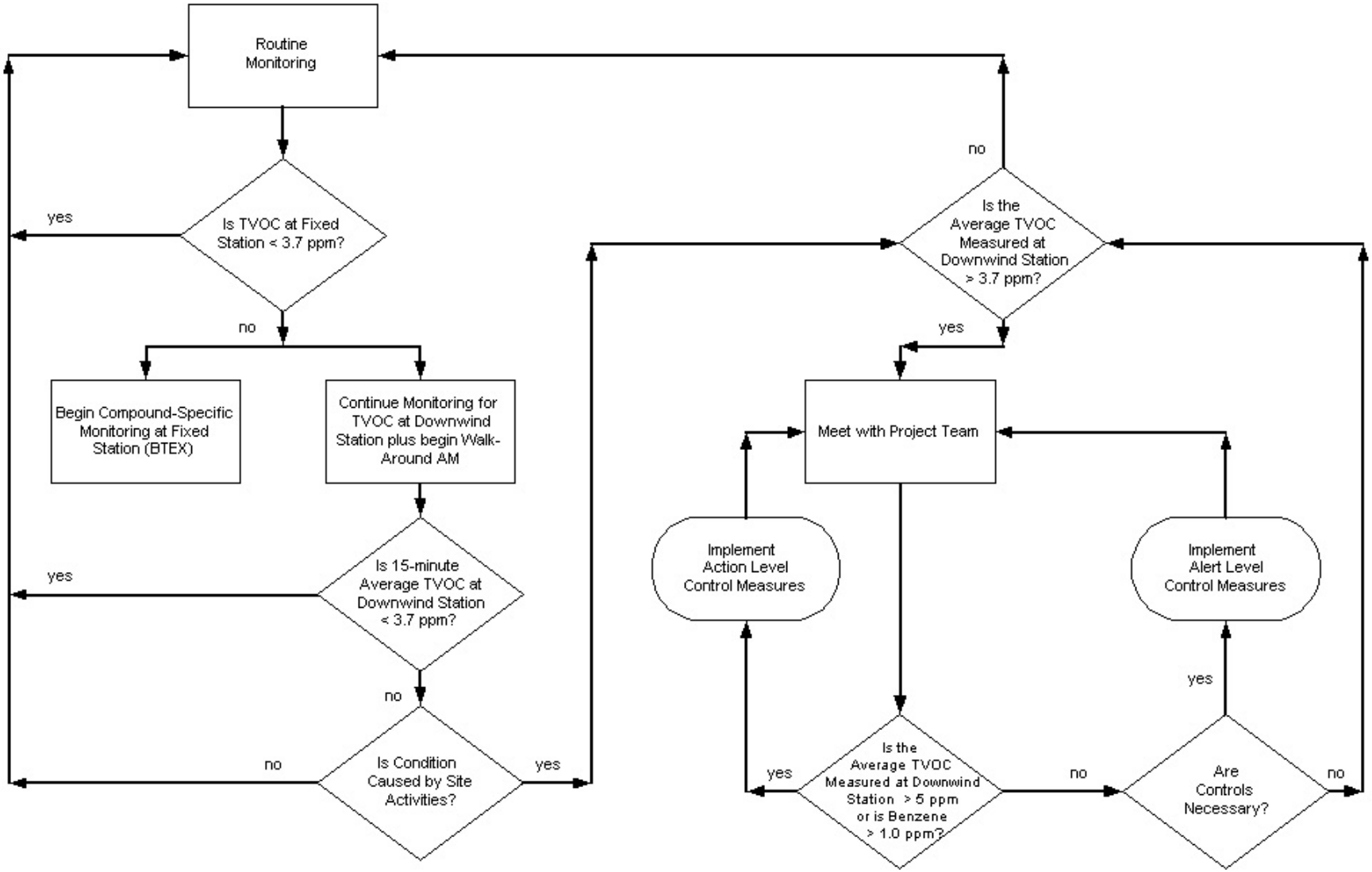


Figure 3-2: Respirable Particulate Matter (RPM_{10}) Decision Diagram

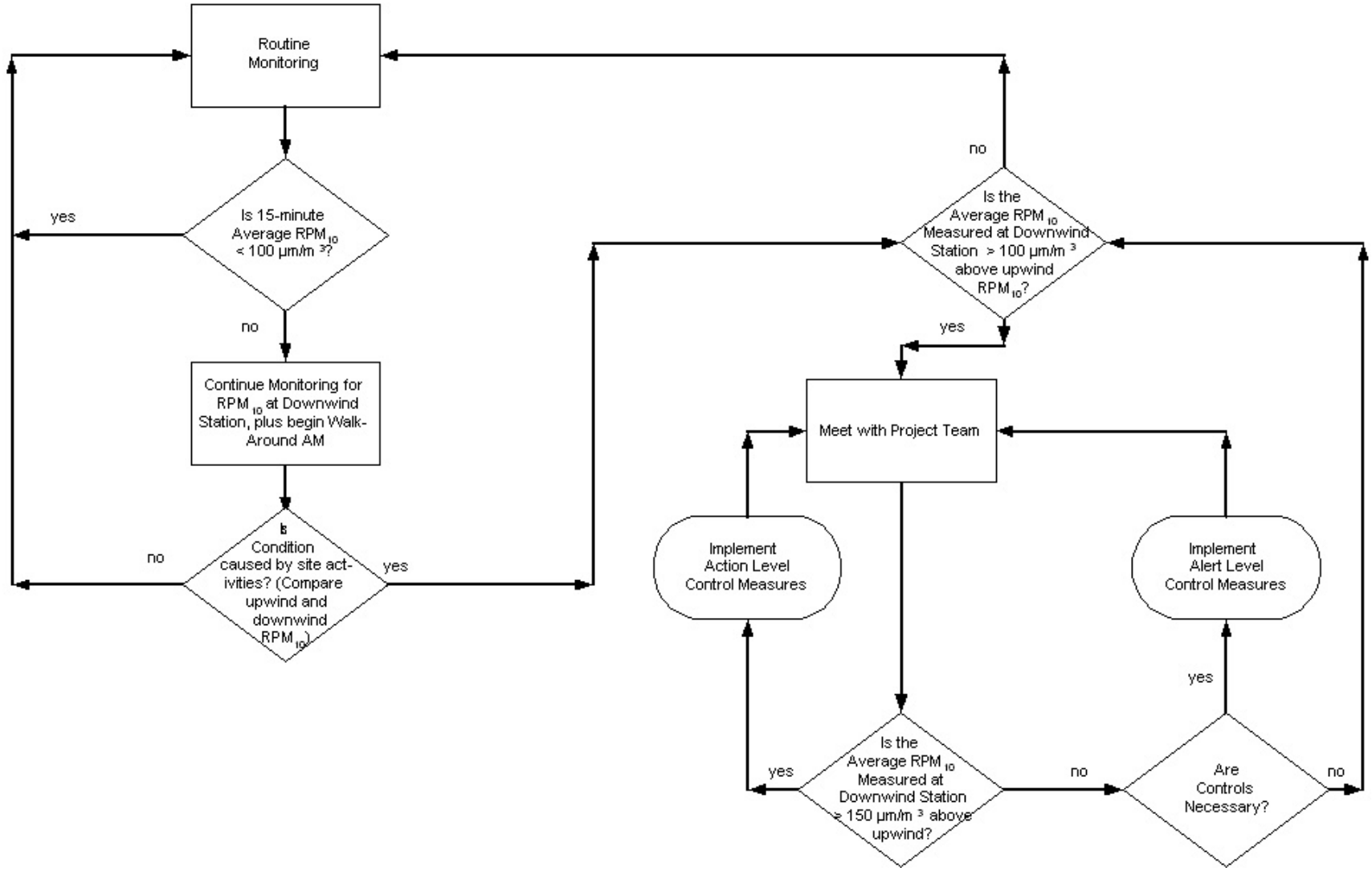
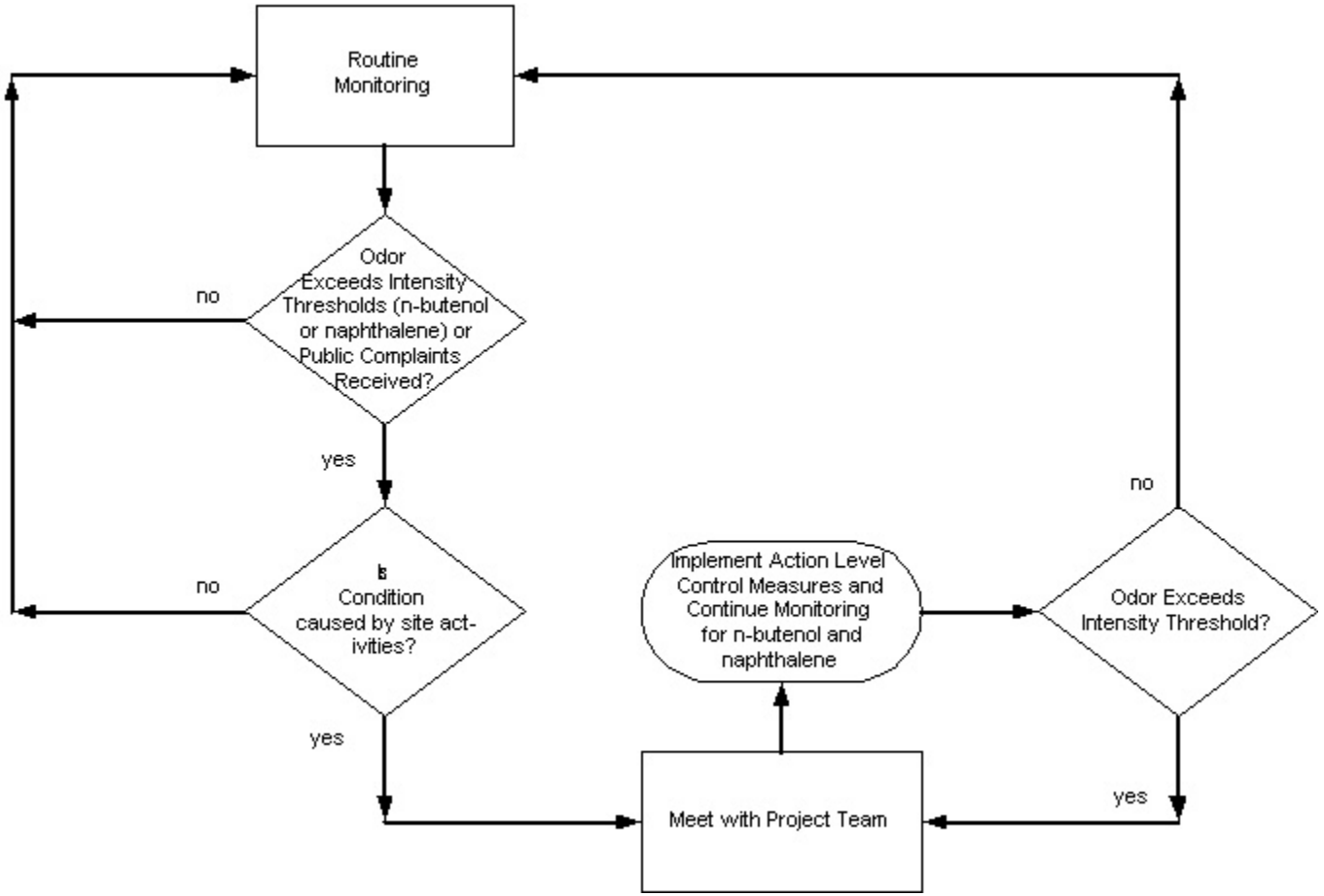


Figure 3-3: Odor Decision Diagram



4.0 Alternate / Portable Monitoring Procedures

The procedures noted above are directed towards the monitoring of perimeter air during the conduct of significant ground intrusive activities. Significant ground intrusive activities are those excavations on the main Hempstead site where there is reasonable expectation of encountering MGP-impacted materials. Where appropriate, an alternative and additional portable level of monitoring which is in compliance with NYSDOH CAMP Guidance in DER-10 and equally protective of the community may be employed. Based on the location of specific field activities, a decision will be made as to the appropriate level of monitoring. Specific activities could include trenching and surface clearing activities or additional geotechnical or environmental borings deemed necessary during the performance of the remedy. For these activities, additional air monitoring may be performed using equipment and procedures similar to those used at the site during previous investigation activities as described below.

Real-time air monitoring for TVOCs and suspended particulates will be conducted upwind and downwind of the work area at the site perimeter. Real-time monitors will operate during periods of excavation/construction activity during working hours only.

Each alternative / portable air monitoring station would include the following (see photo, attached):

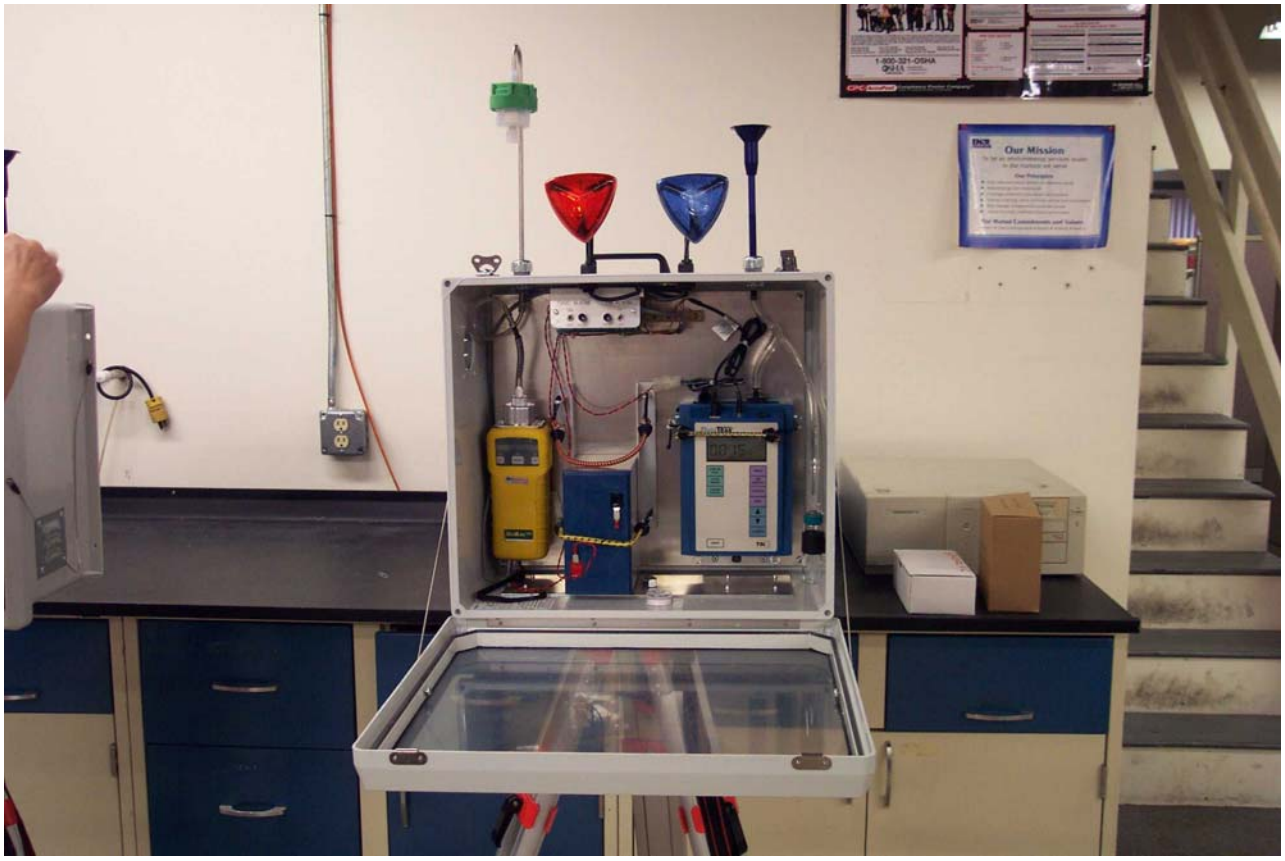
1. Station Tripod
2. Total organic vapor analyzer
3. Particulate monitor
4. Data Logger
5. Radio Telemetry Hardware

Instruments will be positioned to monitor from the breathing zone (See Figure 1-1 for potential portable AM locations PAM #1 – PAM #4).

Each monitoring station will continuously measure and record TVOCs and RPM_{10}. All TVOC and RPM_{10} will be stored in data-loggers located within each monitoring station. Similar to the fixed AM stations, data from each piece of equipment will be telemetered to the central location and stored on a central computer system. The location of each station, the work zone, and the wind direction will be noted daily. At each monitoring station location, the 15-minute data averages (60 concentrations per hour) of TVOC and RPM_{10} will be recorded. In the event of elevated concentrations for TVOC and/or PM_{10}, the 15-minute average value of TVOC and RPM_{10} data from the upwind and downwind stations will be compared and resultant downwind concentration will be calculated and recorded.

All contingency plans for the portable AM units (TVOC and PM_{10}) will remain the same as described in Section 3.0.

Figure 4-1: Portable Air Monitoring Unit



Appendix E

Traffic Assessment

TRAFFIC ASSESSMENT

FOR
TRUCKING OPERATIONS
ASSOCIATED WITH

REMEDIATION OF THE FORMER MANUFACTURED GAS PLANT SITE

AT

INTERSECTION STREET
HEMPSTEAD, NEW YORK

JUNE 2008

N & P JOB NO. 08110

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FIGURES & TABLES

APPENDIX

OVERVIEW

National Grid (formerly KeySpan) is preparing a remedial design to address known soil and groundwater impacts at a former Manufactured Gas Plant (MGP) Site in Hempstead, Nassau County, New York. The remedial activities will include the off-site transport, recycling and/or disposal of impacted soil and debris, as well as on-site delivery of clean backfill materials. The remediation materials will be transported by truck to an off-site disposal location.

The material transporting is expected to occur over a period of approximately 3 months beginning in September 2008. During this period, levels of trucking activity will fluctuate. During peak activity, a fleet of 30-35 trucks per day will be required to haul excavated remediation materials offsite and clean fill materials on-site. The loaded trucks will haul the excavated materials to off-site locations in New Jersey, Delaware or Pennsylvania. Clean fill material will be transported from various off-site locations. The transporting of materials will take place during weekdays between the hours of 9:00 AM and 2:00 PM. These midday hours of operation are intended to avoid periods of peak traffic congestions and are in compliance with the 7AM - 6PM restrictions set forth in the New York City Administrative Code: (24-219 - 24-224) Construction Noise Management for Queens and Kings (Brooklyn) Counties.

SITE LOCATION AND ACCESS

The former MGP site is a parcel of land located west of Franklin Avenue, south of Second Street, east of Hilton Avenue and north of Intersection Street (see Figure 1). The majority of the site is within the Village of Garden City. The extreme southerly end of the site is in the Village of Hempstead. The common boundary of the two Villages is indicated by the dashed line running roughly east-west in Figure 1.

For the remedial activities, trucks will enter the Site at the western terminus of Intersection Street off North Franklin Street and exit the site onto Second Street, approximately 300 feet west of Franklin Avenue. Intersection Street is an east/west roadway with one lane in each direction which intersects North Franklin Street one block south of Second Street. The intersection of North

Franklin Street and Intersection Street is unsignalized. In addition to providing access to the former MGP site, Intersection Street also provides access to the industrial land uses and the rear of the car dealerships which front North Franklin Street.

Second Street is an east/west roadway with one lane in each direction. There is a traffic signal in place at the intersection of Second Street with Franklin Avenue. Franklin Avenue (Garden City) changes to North Franklin Street (Hempstead) just south of Second Street. Franklin Avenue/North Franklin Street is a four lane north/south roadway (two lanes in each direction) with exclusive turn lanes at key intersections.

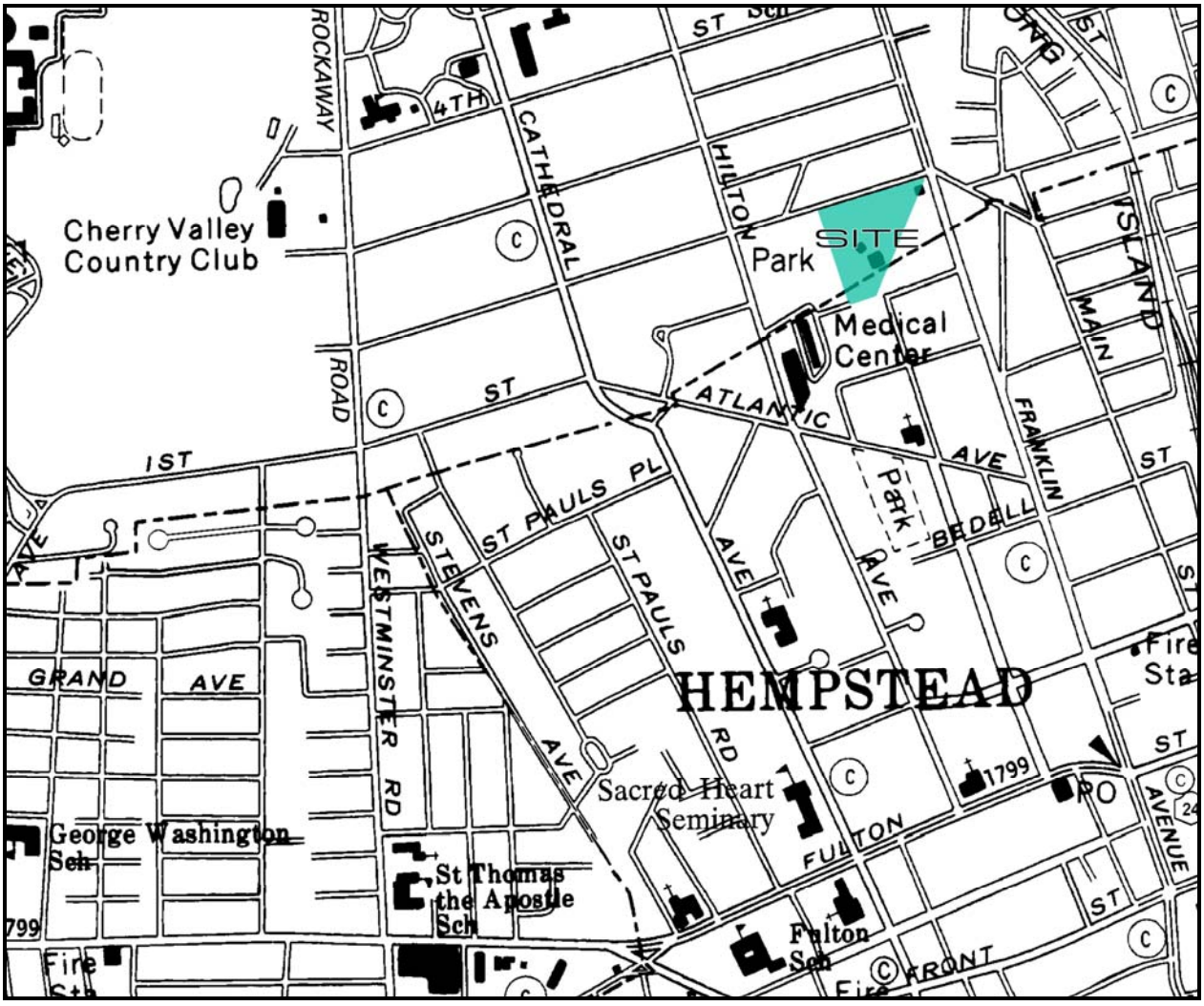


Figure 1: Site Location

Second Street and Intersection Street are low traffic roadways. Field observations do not indicate any factors which would prevent safe access into or out of the site during peak and non-peak periods. There are no restrictions on sight lines for the exit driveway.

TRAFFIC GENERATION

The transporting of materials to and from the site is expected to require approximately 3 months starting in September 2008. During this period, it is estimated that approximately 30-35 trucks will access the site per day (between 9:00 AM-2:30 PM) from an off-site location to either load and depart with remediation materials or to deliver clean fill materials. It is estimated that the on-site loading and unloading processes will require approximately 10 minutes per truck and no more than 6 trucks will be loaded and 6 trucks unloaded in one hour. Typically, the earlier portion of the day will consist primarily of trucks hauling the excavated material offsite while the later portion of the day will consist primarily of truck unloading clean material onsite.

During times when materials are being hauled off-site and on-site simultaneously, a maximum of 12 trucks will enter and exit the site during a one hour period for a total a maximum of 24 truck trips. According to NYC Environmental Review guidelines (CEQR), a heavy truck trip is equivalent to 2.0 vehicle trips. Using the CEQR criterion, the site would therefore generate the equivalent of 48 vehicles trips (PCEs). CEQR guidelines suggest that if a proposed action will generate fewer than 50 peak hour vehicle trips, detailed quantitative analyses are generally not required to determine the project's potential impact on traffic operations.

DEVELOPMENT OF POTENTIAL TRUCK ROUTES

In order to identify the most suitable routes for trucks to travel between the former MGP site in Hempstead and the Verrazano Narrows Bridge, it is necessary to understand the regulatory constraints imposed on truck travel through Nassau County and New York City. In Nassau County, trucks are restricted from driving on certain roadways according to the ordinances of local governing agencies, based on weight limits and land use characteristics of said roadways.

Typically, trucks are restricted from driving on local or residential roadways except for deliveries. Signs posted on the subject roadways specify the applicable truck restrictions.

In New York City (including Queens and Brooklyn), truck traffic is required to use the designated Local and/or Through Truck Routes established by NYCDOT and illustrated on DOT's Truck Route Map. NYCDOT defines "Local Truck Routes" and "Through Truck Routes" as follows:

> *Local Truck Route*: Trucks with an origin or destination for the purpose of delivery, loading or servicing within the respective Borough, shall only operate on designated local routes, except that an operator may operate on a non-designated street for the purpose of arriving at his/her destination. This shall be accomplished by leaving a designated truck route by the most direct route. If the operator has additional destinations in the same general area, he/she may proceed by the most direct route to his/her destination without returning to a designated truck route, provided that the operator's next destination does not require that he/she cross a designated truck route.
>
> *Through Truck Route*: Trucks having neither an origin nor a destination within the respective borough shall restrict the operation of such vehicles to those street segments designated as Through Truck Routes.

The Interim Remediation report prepared for KeySpan by the remediation design consultant identified three potential truck routes. Nelson & Pope has examined the three routes with respect to the regulatory constraints described above and, where necessary, has modified the routes to avoid roadways segments where truck restrictions are in place (e.g., Stewart Avenue, Garden City, 212th Street, Queens Village). The modified Routes have been designated as Truck Routes #1, #2 and #3. In addition, a fourth potential route, Truck Route #4, was developed which traverses through the southerly portions of Queens and Brooklyn. All of the four truck routes comprise roadways which have either have no posted restrictions on trucks (in Nassau County) or, are Through Truck Routes established by NYCDOT. Each Route allows for travel in both directions; and therefore these routes can be utilized for both legs of a round trip.

ASSESSMENT METHODOLOGY

In order to perform a comparative assessment of the four potential truck routes, each of the routes were driven during non-peak hours (9:00 AM-2:00 PM). During these "drive-throughs" the following data were collected and documented :

- Average Travel Time required to traverse each Route between the former MGP site and the Verrazano Narrows Bridge;
- Posted Truck Restrictions along the Route;
- Areas of Traffic Congestion;
- Travel Lane Configurations for each roadway included in the Route;
- Potential Geometric Constraints (intersection geometry, horizontal curves, sight distance limitations, etc);
- Traffic Signal locations;
- Areas of high pedestrian activity;
- General land uses in vicinity of the site and along truck route.

The data collected through this inventory are summarized in Table 1

TABLE 1
INVENTORY OF EXISTING ROADWAYS
INCLUDED IN POTENTIAL TRUCK ROUTES

ROADWAY	FACILITY TYPE	COUNTY	SEGMENT LENGTH (MILES)	TRUCK RESTRICTION	NO. OF THRU TRAVEL LANES	SPEED LIMIT (MPH)	ON-STREET PARKING PERMITTED?	NOTEWORTHY GEOMETRIC FEATURES
INTERSECTION ST.	Local Roadway	Nassau	0.1	None	1 lane each direction	30	No	-
SECOND ST.	Local Roadway	Nassau	0.07	None	1 lane each direction	30	Designated areas only	-
FRANKLIN AVE.	Collector Roadway	Nassau	1.6	None	2 lanes each direction	30	Designated areas only	Narrow lanes between LIRR & Old Country Restrictive Turning radius at SE Corner at Old Country Rd
NO. FRANKLIN ST.	Collector Roadway	Nassau	0.95	None	2 lanes each direction	30	Designated areas only	-
OLD COUNTRY RD.	Urban Arterial	Nassau	0.6 miles *(WB-Rte #2)* 1.2 miles *(EB Rte #3)*	None	2 lanes each direction	30	Designated areas only	Narrow lanes between Franklin and Willis Avenues
HERRICKS RD.	Collector Roadway	Nassau	0.57	None	2 lanes each direction	30	Designated areas only	-
GLEN COVE RD.	Urban Arterial	Nassau	2.9	None	2 lanes each direction	Varies 40 -45	No	-
PENINSULA BLVD.	Urban Arterial	Nassau	4.6	None	2 lanes each direction	Varies 30 - 45	No	-
SUNRISE HIGHWAY (NYS 27)	Urban Arterial	Nassau	2.8	None	3 lanes each direction	40	Designated areas only	-
JERICHO TURNPIKE (NYS 25)	Urban Arterial	Nassau	3.7	None	2 lanes each direction	30	Designated areas only	-

FULTON AVE. / HEMPSTEAD TPKE. (NYS 24)	Urban Arterial	Nassau/ Queens	6.5	None/ Designated thru Truck Route	2 lanes each direction	30 (Fulton) 35 (NYS 24)	Designated areas only	-
NORTH / SOUTH CONDUIT AVENUES	Urban Arterial	Queens	8.1	Designated thru Truck Route	Varies 2 to 4 lanes each direction	40	No	-
BRADDOCK AVE. (NYS 25)	Urban Arterial	Queens	1.2	Designated thru Truck Route	2 lanes each direction	30	Designated areas only	-
JAMAICA AVE.	Urban Arterial	Queens	0.51	Designated thru Truck Route	2 lanes each direction	30	Designated areas only	-
FRANCIS LEWIS BLVD.	Urban Arterial	Queens	0.57	Designated thru Truck Route	2 lanes each direction	30	Designated areas only	-
HILLSIDE AVE. (NYS 25)	Urban Arterial	Queens	1.1	Designated thru Truck Route	3 lanes each direction	30	Designated areas only	-
ATLANTIC AVE.	Urban Arterial	Queens/ Brooklyn	6.6	Designated thru Truck Route	3 lanes each direction	30	Designated areas only	Poor pav't condition. In commercial areas, bottlenecks created by double-parked trucks
COLUMBIA ST.	Collector Roadway	Brooklyn	0.1	Designated thru Truck Route	2 lanes NB 3 lanes SB	30	No	
LONG ISLAND EXPRESSWAY (I-495)	Freeway	Nassau/ Queens	17.1	Designated thru Truck Route	3 lanes (typ.) each direction + HOV lane in Nassau	55 (Nassau) 50 (Queens)	No	-
BKLYN/QUEENS EXPRESSWAY (I-278)	Freeway	Queens/ Brooklyn	14.4	Designated thru Truck Route	3 lanes each direction	50	No	Long term roadway construction several locations

DESCRIPTION AND ASSESSMENT OF POTENTIAL TRUCK ROUTES

The four potential Truck Routes are illustrated in Exhibit A and Exhibit B. The Nassau County portions of each Route are depicted on Exhibit A and the Queens and Brooklyn portions of the Routes are illustrated in Exhibit B. A brief description and assessment of each Route is provided below.

TRUCK ROUTE #1

(through the Village of Hempstead to Hempstead Turnpike)

Truck Route #1 proposes for trucks originating at the MGP site to travel south on North Franklin Street to westbound Fulton Street. The Route continues west on Fulton Street until it becomes Hempstead Turnpike (NYS Route 24) and continues along Jamaica Avenue. At the Intersection of Francis Lewis Blvd and Jamaica Avenue, the Route turns north to reach Hillside Avenue (NYS Route 25) where it continues east a short distance to the Clearview Expressway entrance. The northbound Clearview Expressway leads to the westbound Long Island Expressway (I-495) and then the Brooklyn-Queens Expressway (BQE) to the Verrazano Narrows Bridge. **Route #1 is represented by the green line in Exhibits A & B.**

Truck Route # 1 has an overall length of thirty-one miles and the **total travel time was 1 hour 15 minutes**

This route is well suited for truck traffic. The pavement is in acceptable condition and based on our observations there are no critical points of conflict or congestion. The section of the Route prior to reaching the LIE should provide consistent travel times. Travel times on the LIE and BQE will vary day to day according to time of day and uncontrollable variables (crashes, construction activity, etc).

TRUCK ROUTE #2

(through the Village of Garden City to Jericho Turnpike)

Truck Route # 2 requires trucks originating at the MGP site to travel north on Franklin Avenue to westbound Old Country Road and then to northbound Herricks Road to westbound Jericho

Turnpike (NYS Route 25). In Queens, NYS 25 becomes Braddock Avenue. Truck Route #2 continues west on Braddock Avenue to Hillside Avenue (also NYS Route 25) to the northbound Clearview Expressway (I-295), The northbound Clearview Expressway leads to the westbound Long Island Expressway (I-495) and Brooklyn-Queens Expressway (BQE) which terminates at the Verrazano Narrows Bridge. **Route # 2 is represented by a pink line in Exhibits A & B.**

Truck Route #2 has an overall length of thirty miles and the **total travel time was 60 minutes.**

Truck Route #2 route is well suited for truck traffic. The pavement is in acceptable condition and based on our observations the only area of potential concern is on Franklin Avenue between the Long Island Rail Road (LIRR) train tracks and Old Country Road. This section of roadway has narrow lanes (approximately 10 feet). However, heavy trucks were observed traveling on this section of roadway. There are no other points of conflict or congestion. The section of this travel route prior to reaching the LIE should provide consistent travel times. Travel times on the LIE and BQE will vary day to day according to time of day and uncontrollable variables (crashes, construction activity, etc).

TRUCK ROUTE #3

(through the Village of Garden City to Glen Cove Road)

Truck Route #3 requires trucks originating at the MGP site to travel north on Franklin Avenue to eastbound Old Country Road and then northbound on Glen Cove Road to the Long Island Expressway (I-495). The LIE connects with the Brooklyn-Queens Expressway (BQE) which leads to the Verrazano Narrows Bridge. **Route #3 is represented by a blue line in Exhibits A & B.**

Truck Route # 3 has an overall length of thirty-five miles and the **total travel time was fifty five (55) minutes.**

Truck Route #3 is well-suited for truck traffic, except for the following areas of potential concerns:

- As described above under "Truck Route #2," the section of Franklin Avenue between the Long Island Rail Road (LIRR) tracks and Old Country Road has narrow lanes (approx 10 ft).

- At the southeast corner of Franklin Avenue and Old Country Road the turning radius is small and larger trucks turning right to head east on Old Country Rod are often required to swing wide, encroach into the adjoining travel lane.
- On Old Country Road between Franklin Avenue and Willis Avenue the lane widths are also narrow (approx 10 ft).

The portion of the Route prior to reaching the LIE should provide consistent travel times. Travel times on the LIE and BQE are somewhat unpredictable and will vary day to day based on the time of day and uncontrollable variables (crashes, construction activity, etc).

TRUCK ROUTE #4

(through the Village of Hempstead to Peninsula Blvd & North / South Conduit Avenues)

Truck Route i# 4 is a southerly route which requires trucks to travel south on Franklin Avenue to southbound Peninsula Boulevard to westbound Sunrise Highway (NYS Route 27) which changes to North Conduit Avenue, continuing then to Atlantic Avenue, Columbia Street and the Brooklyn-Queens Expressway (BQE) to reach the Verrazano Narrows Bridge. **Truck Route #4 is represented by an orange line in Exhibits A & B.**

Truck Route # 4 has an overall length of twenty nine miles and a total travel time of **1 hour 15 minutes.**

Although the travel time matches the longest duration recorded for any of the investigated routes, it should be noted that Route #4 may provide the most consistent travel times as the traffic signal systems along much of the route's length (prior to the BQE) are likely to provide the most reliable progression of traffic on a daily basis. As with Truck Route Nos. 1, 2 & 3, travel times on the BQE are somewhat unpredictable and will vary on a daily basis according to time of day and uncontrollable variables (crashes, construction activity, etc).

Truck Route #4 is well-suited for truck traffic. However, the following areas of concern were observed:

- Atlantic Avenue is an important commercial corridor for much of Brooklyn and hence carries a high percentage of local truck traffic. Local trucks often double park to make local deliveries, blocking the right lane and requiring through traffic to make frequent lane changes. These lane changes create substantial friction in the through traffic stream and impede the desired progression of traffic.
- The pavement on Atlantic Avenue is generally in poor condition with many pot-holes and an uneven or undulating pavement. The rough ride provided by these poor pavement conditions is less than ideal for trucks carrying contaminated materials.

Due to the concerns on Atlantic Avenue, **Truck Route No 4 is most suitable as an alternative when known congestion or roadway closures are present on the other three routes**.

CONCLUSIONS

1. The proposed action is anticipated to generate a maximum of 48 passenger car equivalent (PCE) trips per hour during non-commuter peak hours (9AM-2PM). Based on this estimate and the qualitative evaluation of existing traffic conditions along the truck routes, we believ that the proposed operation will not significantly impact traffic operations on the study area.

2. Truck Route #1 (75 minutes) has a longer travel time than Route #2 and Route #3. However, it is debatable whether the additional travel time (15 or-20 minutes) is significant in the context of an overall travel time of three and a half to five hours to reach disposal facilities in Delaware, New Jersey or Pennsylvania. Truck Route #1 is a straightforward routing and does not have any special operational concerns. Route #1 should be considered as one of two preferred routes (along with Route #2).

3. Recognizing that when it comes to trucking operations, “time is money” it is anticipated that truck operators will utilize routes which result in the shortest travel times. Based on this criterion, Truck Route #2 (60 minutes) and Truck Route #3 (55 minutes) would be the most attractive routes.

4. Despite having the shortest travel time (55 minutes) of the four potential routes, Truck Route #3 (Glen Cove Road) has a several concerns related to the existing roadway geometry. These concerns are significant enough to dismiss Route #3 from consideration in favor of either Route #1 or Route #2.

5. Truck Route #4 is the least desirable truck route due to congestion and poor pavement conditions on Atlantic Avenue through Brooklyn. Route #4 should be considered only as an alternative route when there are known problems on the other three truck routes.

POTENTIAL MITIGATION MEASURES

To minimize the potential impact of site-generated truck trips on the traffic operations and the environment within the adjoining Villages of Garden City and Hempstead, the following mitigation measures could be implemented:

- To minimize the impact of site-generated truck traffic on any one community, Truck Routes could be alternated on a daily or weekly basis. For example, during Day 1 (or Week 1) Trucks would be required to use Truck Route #1 and on Day 2 (or Week 2) Trucks would be required to follow Truck Route #2. Given the fact that the difference in travel time between the two Routes (15 minutes) is negligible when compared to the overall 3 three and one-half to 5 hour trip required to reach the disposal facilities, we believe it would be difficult to assert that the slightly longer travel time of Truck Route #1 presents any hardship to the trucking operator. This measure would require some level of enforcement by the Superintendent of Construction.

- Although Second Street traffic volumes are low and sight lines are unimpeded, it is nevertheless recommended that truck traffic exiting the site to Second Street should do so only with the assistance of a flag person. Whenever possible, several trucks should be flagged together as a “platoon”.

- All vehicles exiting the site should be directed to go eastbound on Second Street to the signalized intersection at Franklin Avenue.

- During trucking operations, right turns on red from eastbound Second Street to southbound North Franklin Street should be prohibited to minimize potential safety concerns related to slow-moving trucks entering southbound North Franklin Street.

APPENDIX

IMAGES

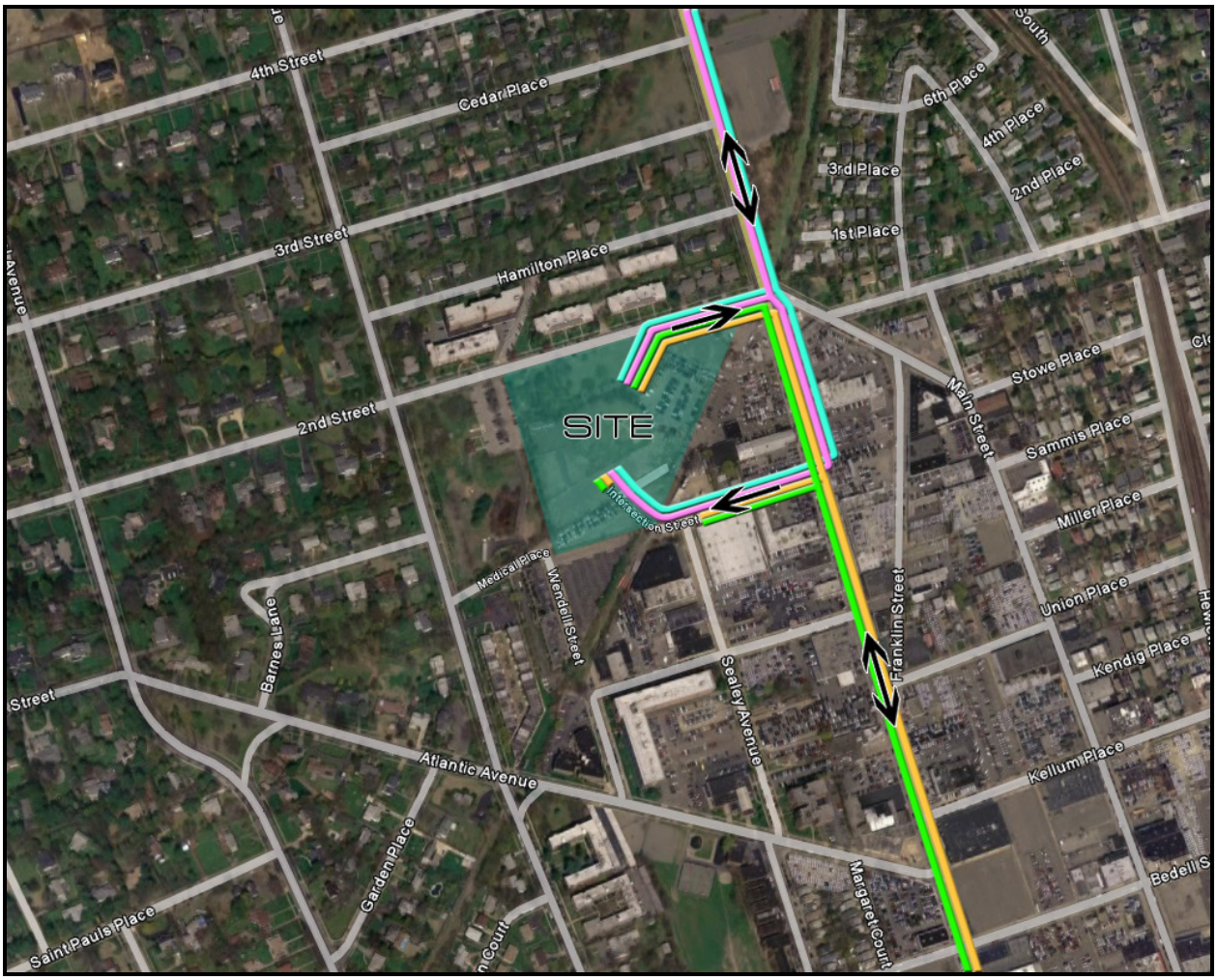


Image 1: Detail of Site Access (Intersection St. & Second Street) &
Franklin Avenue/North Franklin Street

Image 2: Detail of North Franklin Street at Fulton Avenue (NYS Route 24)
& North Franklin Street at Peninsula Boulevard

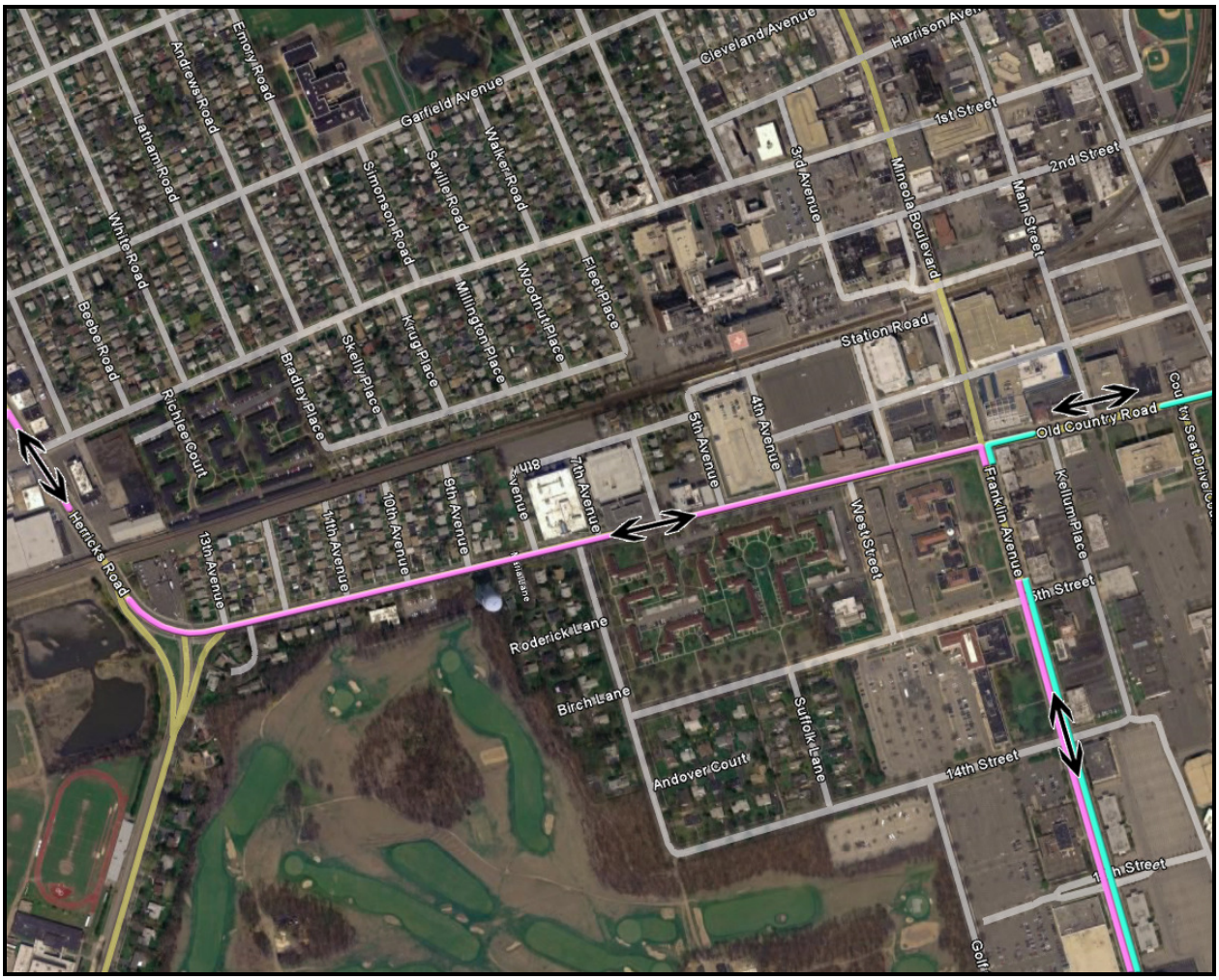


Image 3: Detail of Franklin Avenue at Old Country Road &
Old Country Road at Herricks Road/Rockaway Avenue

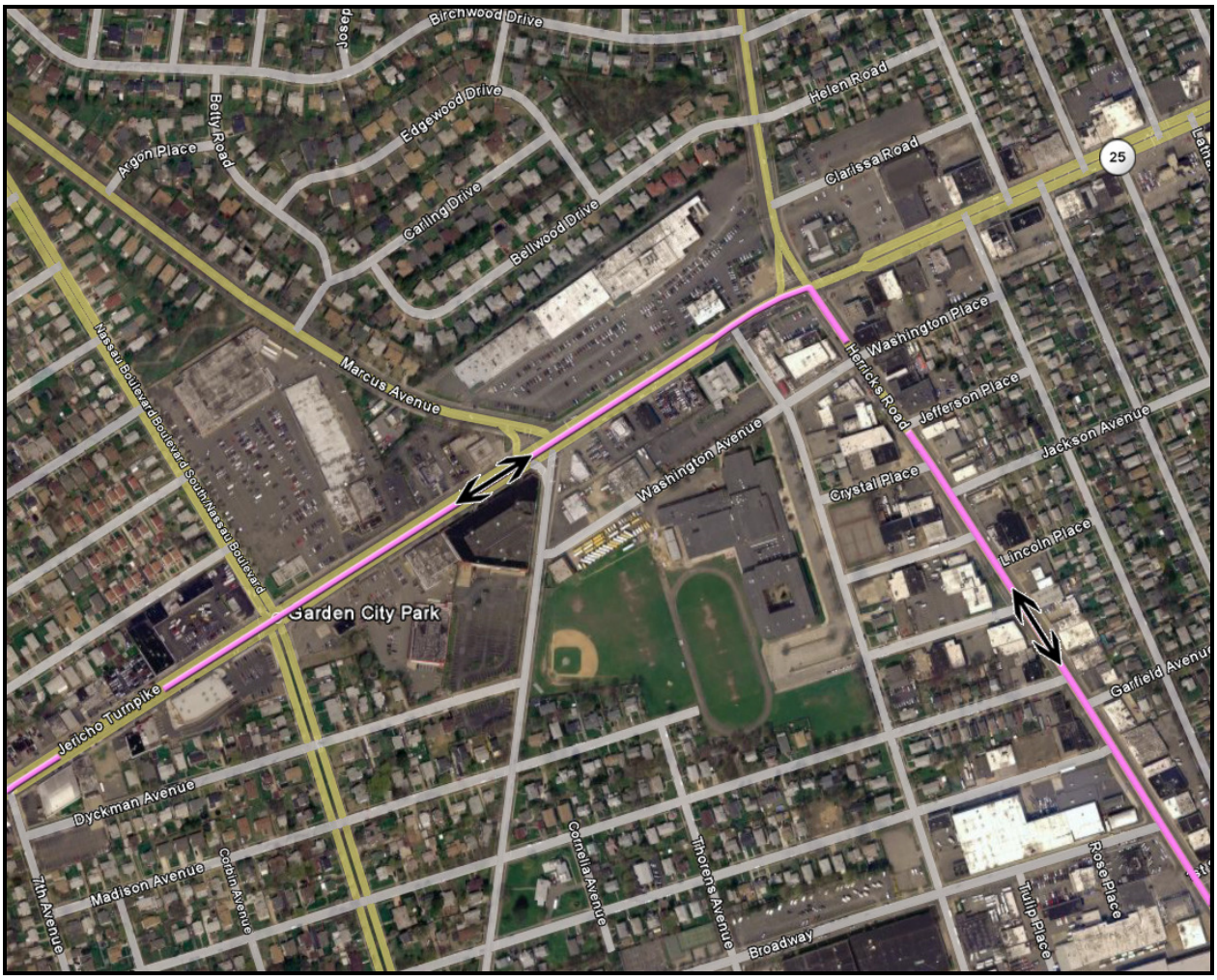


Image 4: Detail of Herricks Road at Jericho Turnpike (NYS Route 25)

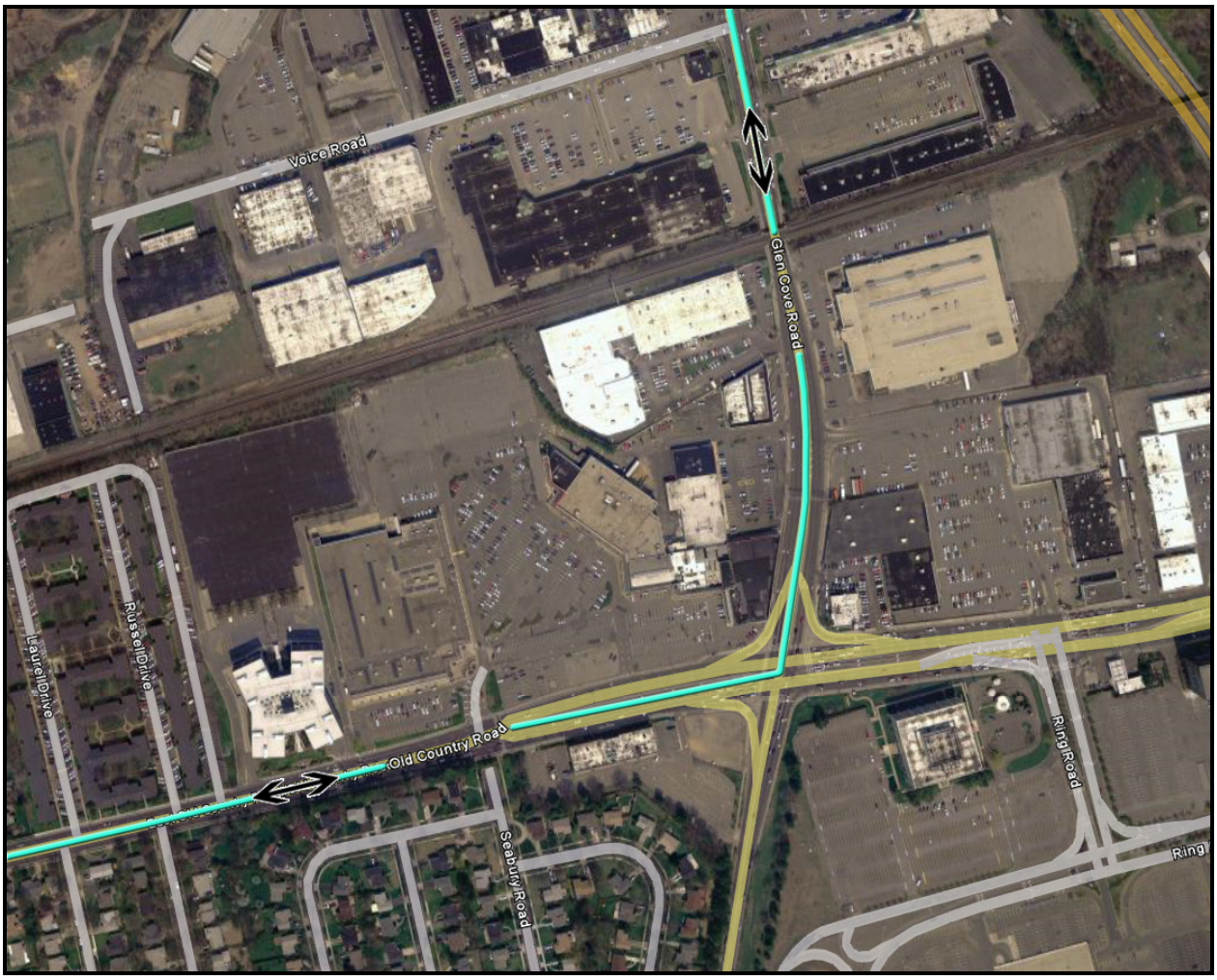


Image 5: Detail of Old Country Road at Glen Cove Road

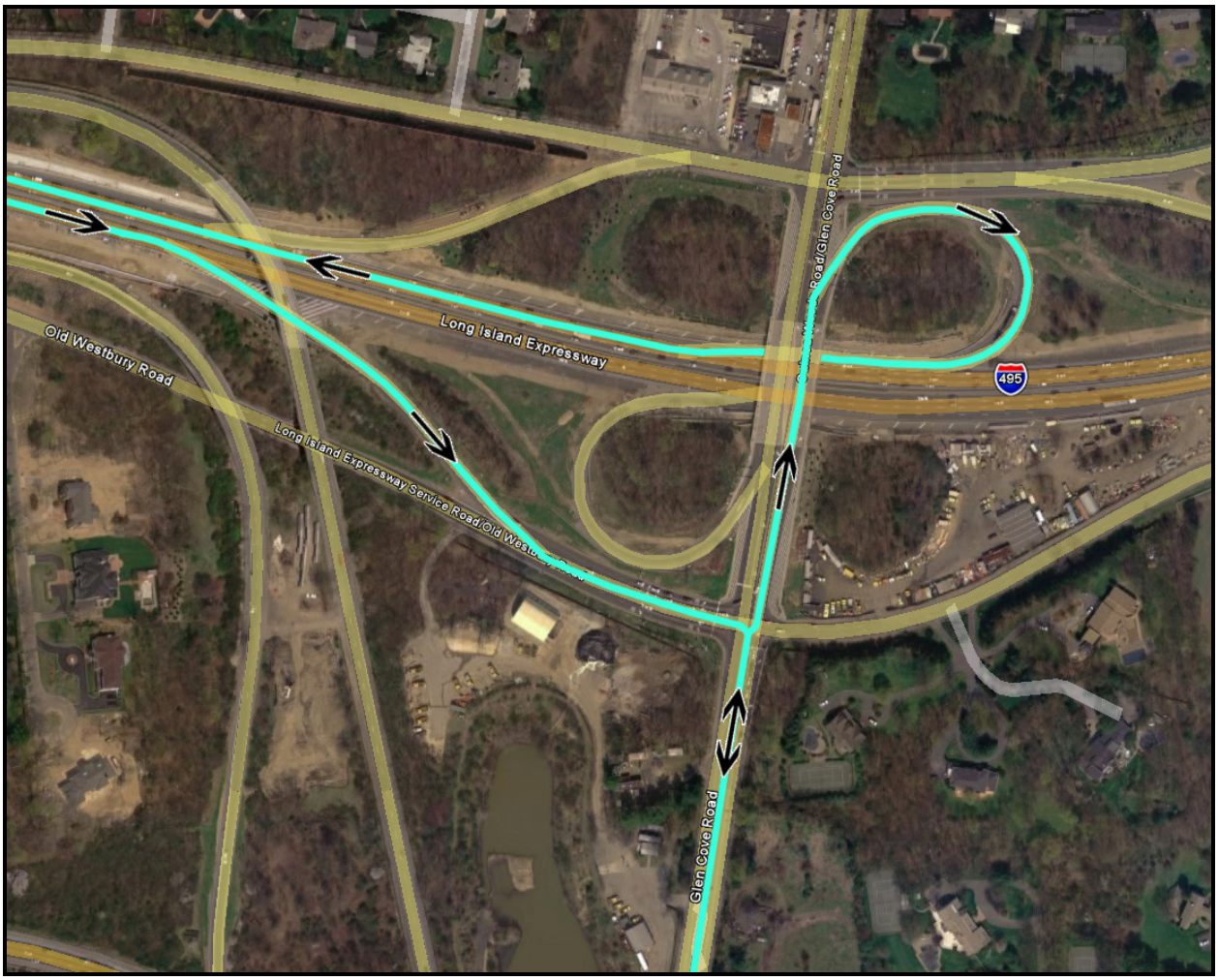


Image 6: Detail of Glen Cove Road at Long Island Expressway (I-495)

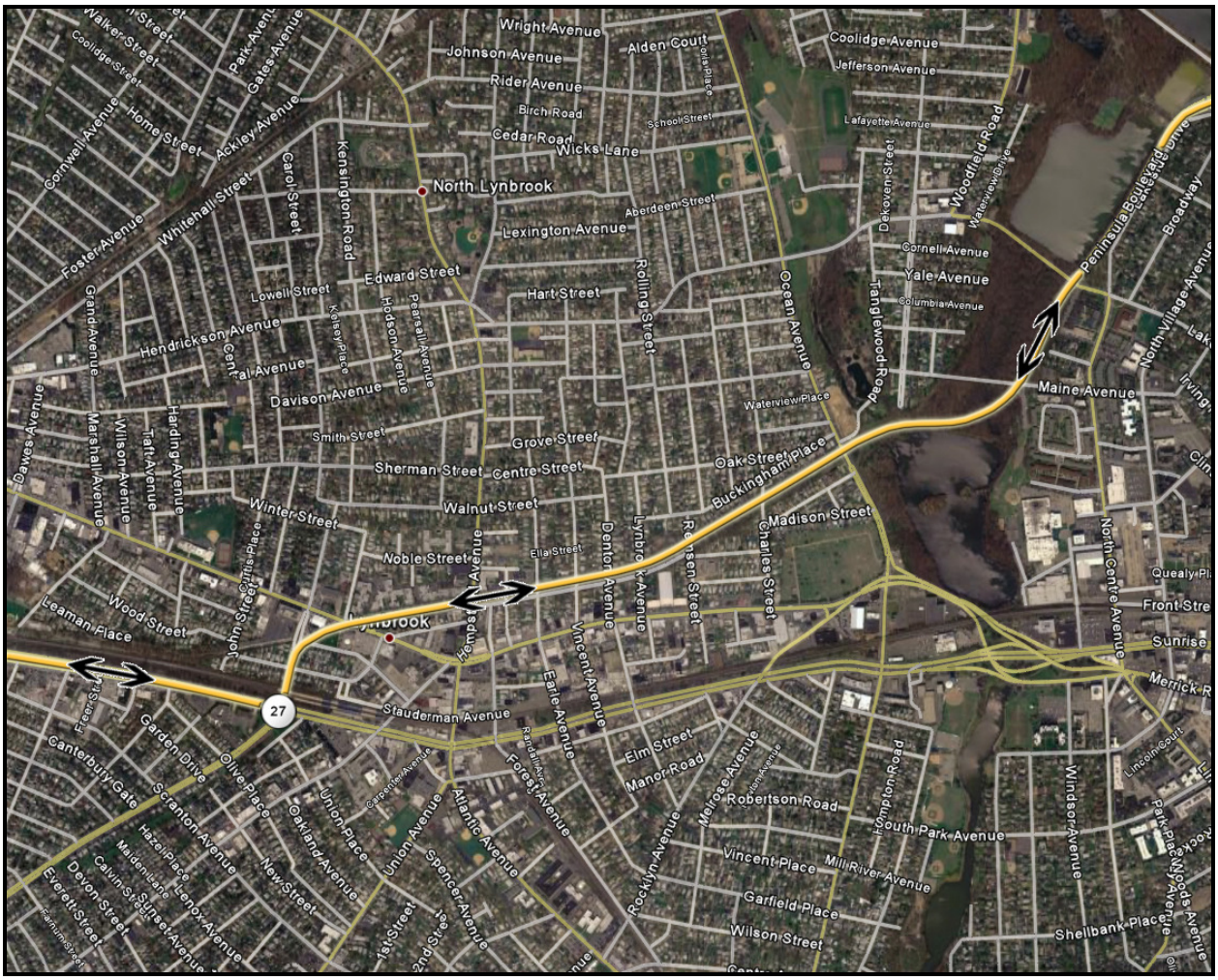


Image 7: Peninsula Boulevard at Sunrise Highway

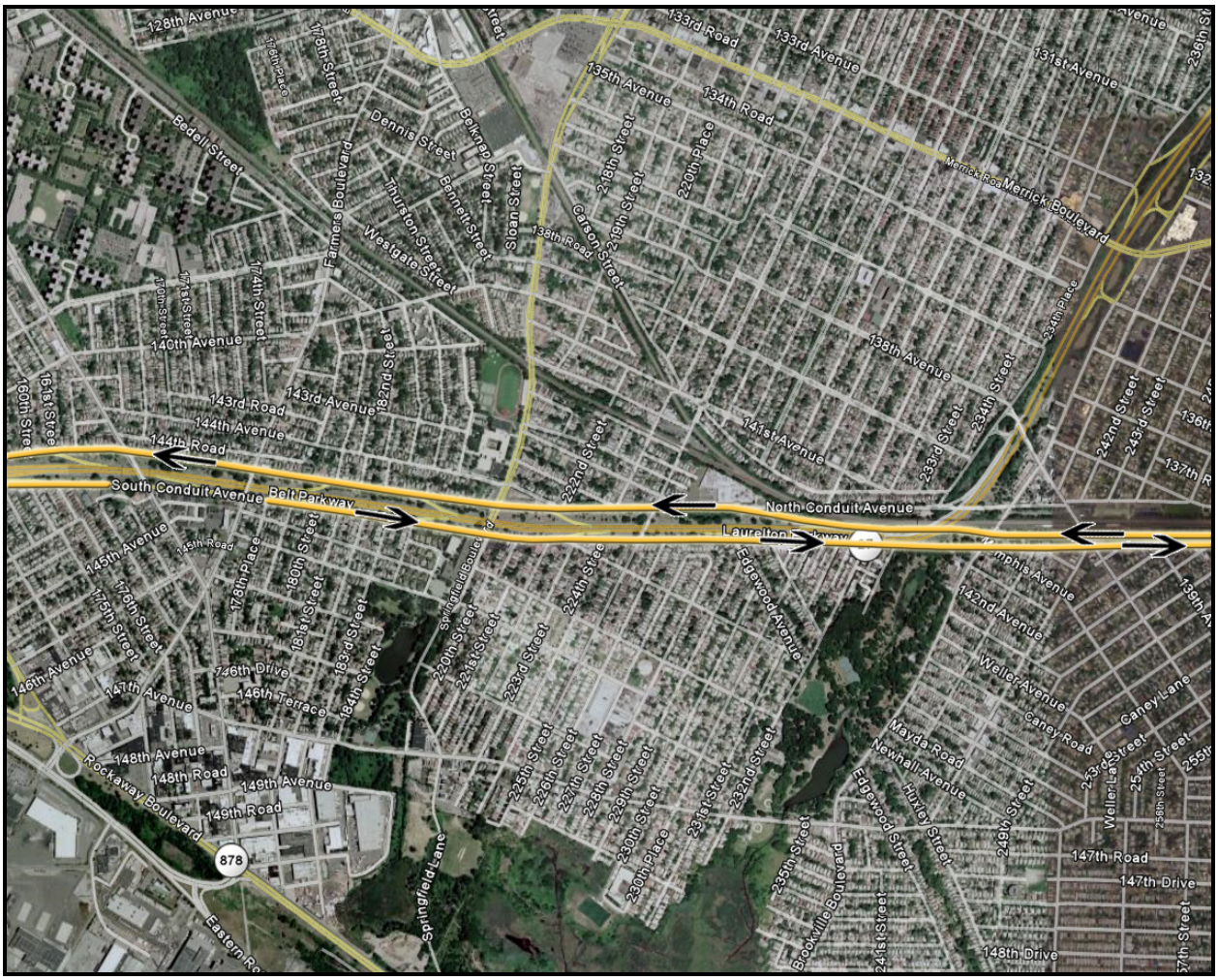


Image 8: Detail of Sunrise Highway at North/South Conduit Avenue

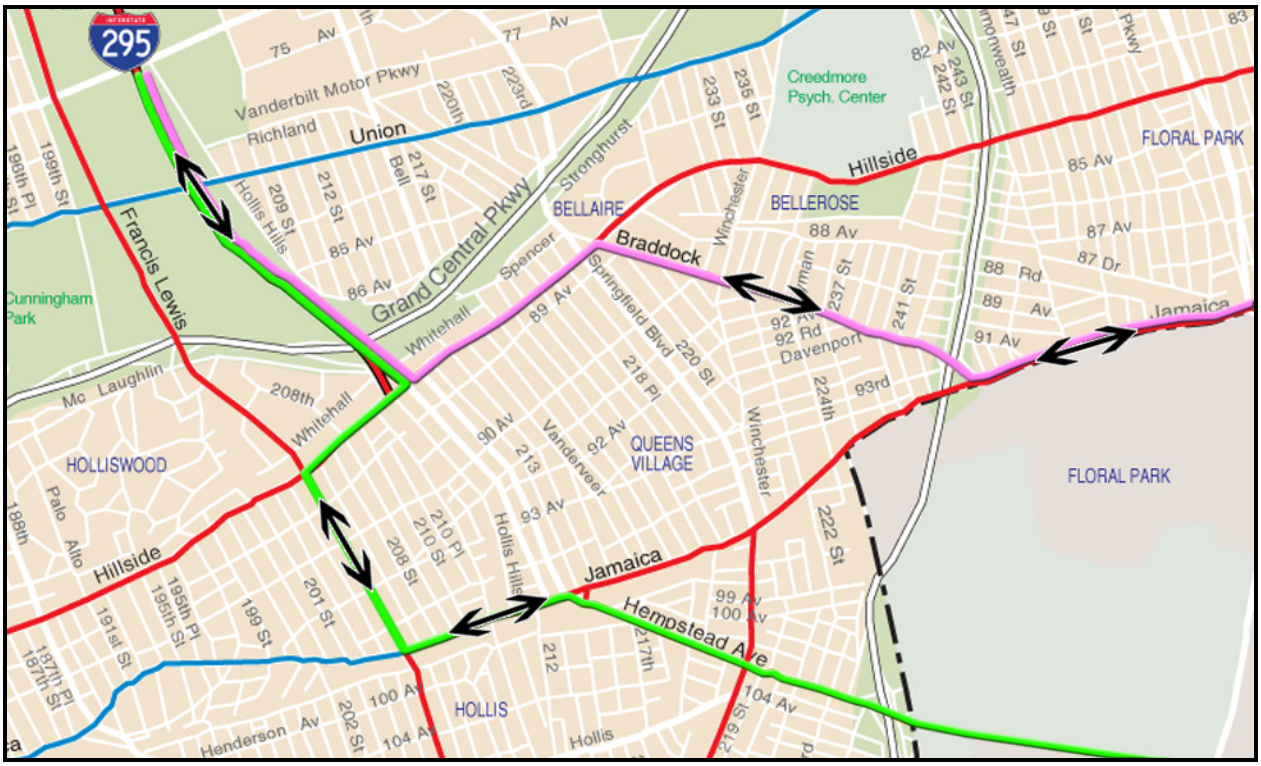


Image 9: Flatbush Detail of Hempstead Avenue at Jamaica Avenue,
Jamaica Avenue at Francis Lewis Boulevard,
Francis Lewis Boulevard at Hillside Avenue (NYS Rt 25)
Jericho Turnpike (NYS Rt 25) at Braddock Avnue (NYS Rt 25)
Braddock Avenue (NYS Rt 25) at Hillside Avenue (NYS Rt 25)
Hillside Avenue (NYS Rt 25) at Clearview Expressway (I-295)

Image 10: Detail of Clearview Expressway (I-295) at Long Island Expressway (I-495)

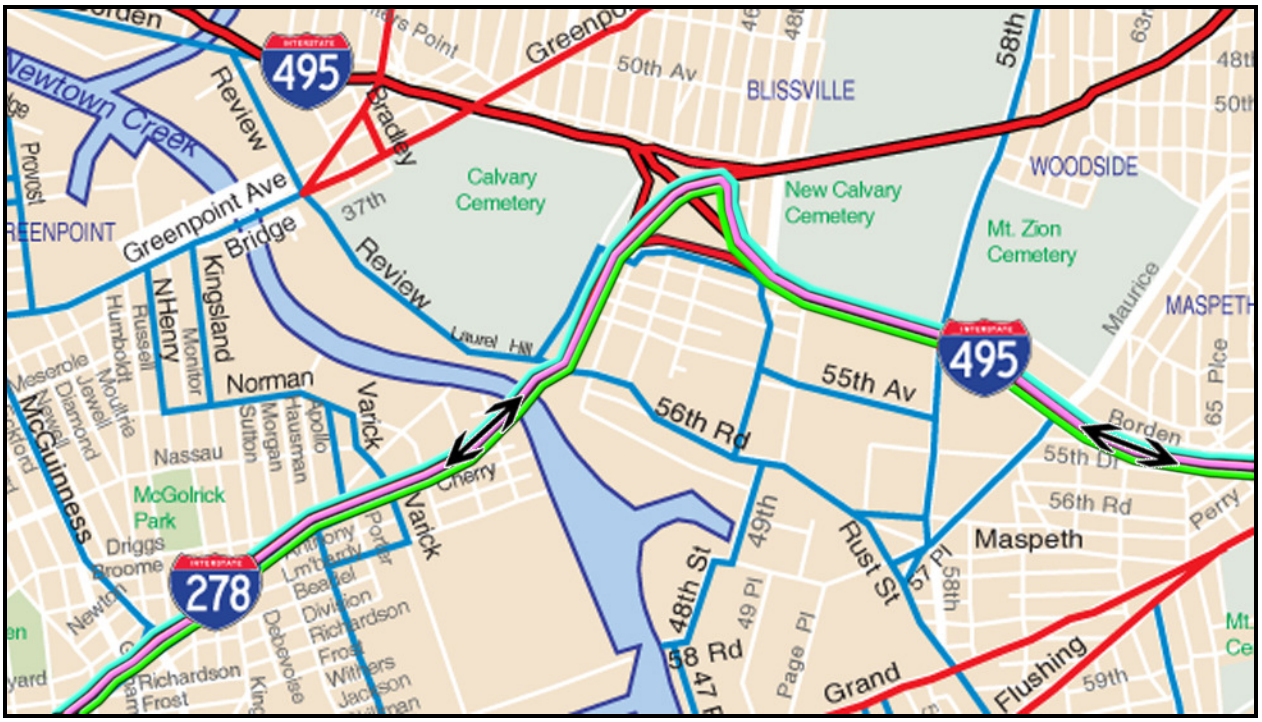


Image 11: Detail of Long Island Expressway (I-495) at Brooklyn-Queens Expressway (I-278)

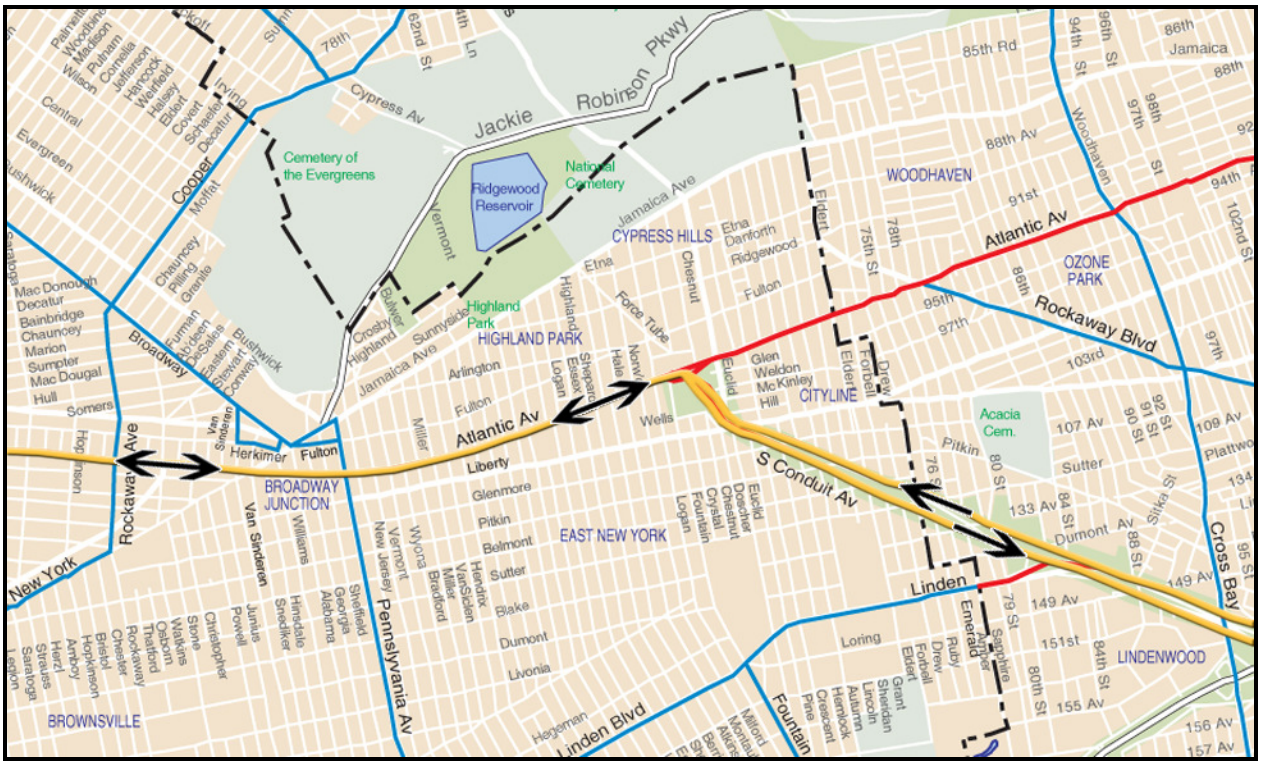


Image 12: Detail of North/South Conduit Avenue at Atlantic Avenue

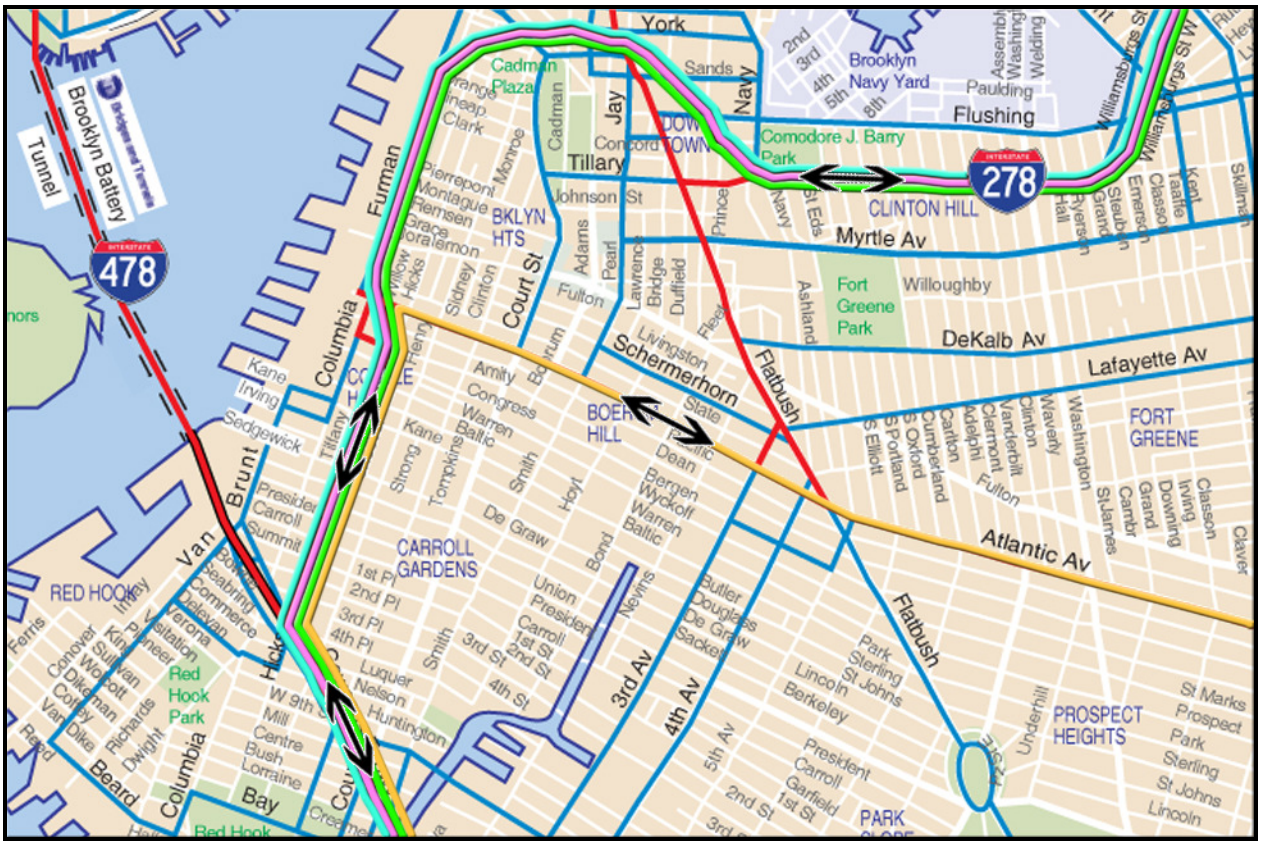


Image 13: Detail of Atlantic Avenue at Columbia Street &
Columbia Street at Brooklyn-Queens Expressway (I-278)

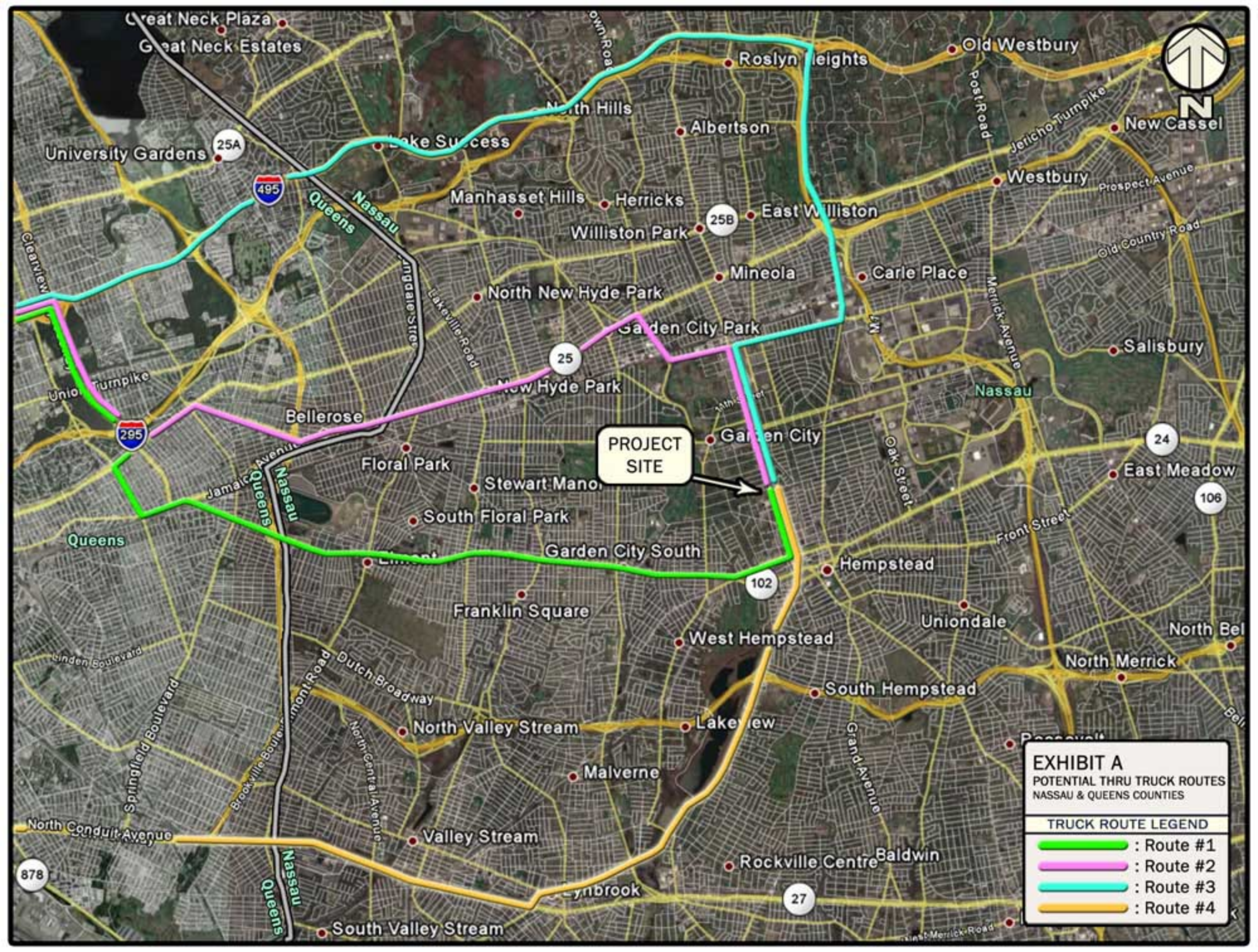
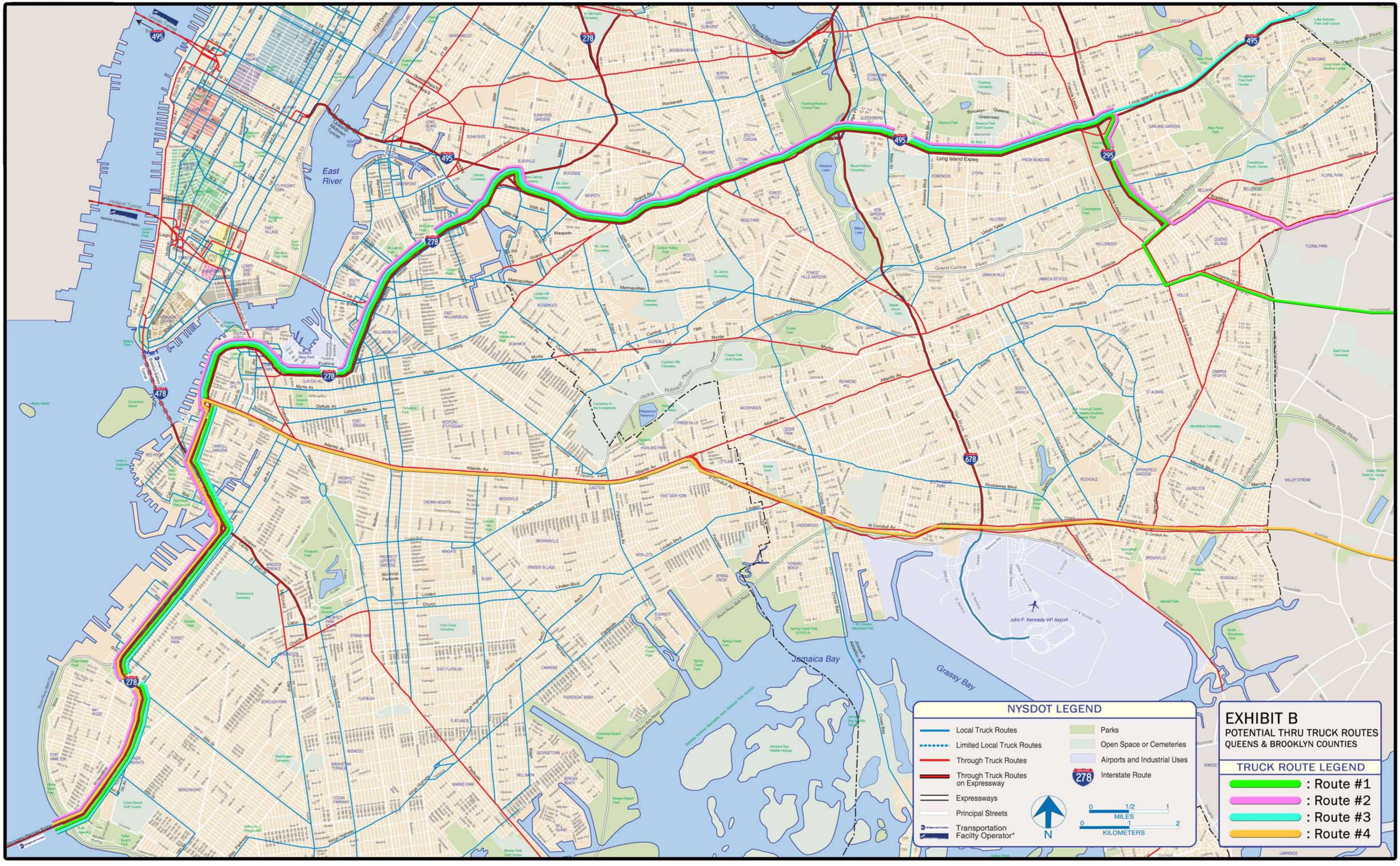


EXHIBIT A
POTENTIAL THRU TRUCK ROUTES
NASSAU & QUEENS COUNTIES
TRUCK ROUTE LEGEND
: Route #1
: Route #2
: Route #3
: Route #4
PROJECT SITE
N
Great Neck Plaza
Great Neck Estates
Roslyn Heights
Old Westbury
North Hills
Albertson
New Cassel
University Gardens
25A
Lake Success
495
Queens
Nassau
Manhasset Hills
Herricks
Westbury
Prospect Avenue
Jericho Turnpike
Post Road
Williston Park
25B
East Williston
Old Country Road
Mineola
Carle Place
North New Hyde Park
Garden City Park
Merrick Avenue
Salisbury
Lakeville Road
25
New Hyde Park
Nassau
Bellerose
295
Floral Park
Garden City
24
East Meadow
Stewart Manor
Oak Street
106
Front Street
South Floral Park
Queens
Garden City South
Hempstead
102
Franklin Square
Uniondale
West Hempstead
North Merrick
South Hempstead
North Valley Stream
Lakeview
Malverne
Grand Avenue
Springfield Boulevard
Dutch Broadway
North Central Avenue
Valley Stream
North Conduit Avenue
878
Rockville Centre
Baldwin
27
South Valley Stream


East River
Jamaica Bay
Grassy Bay
John F. Kennedy Int'l Airport
Long Island Expwy
Queens Blvd
Northern Blvd
Roosevelt
Atlantic Av
Flushing
Metropolitan
Grand
Myrtle
Linden Blvd
Rockaway Blvd
N Conduit Av
Jamaica
Hillside
Union Tpke
Lincoln Tunnel
Holland Tunnel
Verrazano-Narrows Bridge
Brooklyn Queens Greenway
Northern State Pkwy
Southern State Pkwy
Van Wyck Expwy
Belt Pkwy
Grand Central Pkwy
Cross Bay
Rockaway Inlet
Shore Pkwy (Belt Pkwy)
NYSDOT LEGEND
Local Truck Routes
Limited Local Truck Routes
Through Truck Routes
Through Truck Routes on Expressway
Expressways
Principal Streets
Transportation Facilty Operator*
Parks
Open Space or Cemeteries
Airports and Industrial Uses
Interstate Route
N
MILES
KILOMETERS
EXHIBIT B
POTENTIAL THRU TRUCK ROUTES
QUEENS & BROOKLYN COUNTIES
TRUCK ROUTE LEGEND
: Route #1
: Route #2
: Route #3
: Route #4

Appendix F

Construction Quality Control Plan

(Laboratory Certifications Provided in Electronic Format Only)

1.0 INTRODUCTION

ENTACT will be performing interim remedial measures (IRM) at the Hempstead Intersection Street Former Manufactured Gas Plant (MGP) Site located in the Villages of Garden City and Hempstead, Long Island, New York (site). IRM activities will include removal of impacted soil from designated areas across the site to depths ranging from 3 feet (ft) to 18 ft below ground surface (bgs), backfill and restoration of excavated areas. Previous site investigations indicate soils contain polycyclic aromatic hydrocarbons (PAH) and benzene, toluene, ethyl benzene and xylene (BTEX) associated with former MGP operations greater than 1,000 mg/kg and 50 mg/kg respectively. The majority of excavation and backfill activities will be conducted under a temporary containment building equipped with a vapor management system (VMS).

This Construction Quality Control Plan (CQCP) has been prepared in accordance with Technical Specification Section 01400 and contains information relevant to inspections, tests and associated documentation needed to plan, execute and confirm that the project is constructed in accordance with the Construction Documents as defined below. Procedures and requirements discussed in this plan will be specific to the quality of work to be performed by ENTACT personnel and subcontractors under ENTACT's direction.

ENTACT has prepared this CQCP in accordance with and is to be used in conjunction with the following documents which will be referred to collectively as the Construction Documents throughout the remainder of this plan:

- IRM Remedial Action Work Plan (RAWP) for the Hempstead Intersection Street MGP Site and Appendices (URS Corporation);
- Hempstead Intersection Street MGP Site Technical Specifications and Drawings (URS Corporation);
- United States Environmental Protection Agency (USEPA); New York Department of Environmental Conservation (NYSDEC) and local regulations, and;
- Other approved project plans prepared by ENTACT

1.1 Project Description

In general, IRM activities are being performed at this former MGP site to remove MGP related contaminated soils present at relatively shallow depths. Soil will be excavated and loaded into transport vehicles under cover of a temporary containment building. Excavated soils will be transported off site for disposal. Specific activities to be implemented at the Site include the following.

- Mobilization of equipment, personnel, and establishment of temporary support facilities
- Establishment of work zones and decontamination stations
- Establishment and maintenance of temporary environmental controls throughout the duration of the project

- Clearing and grubbing of work zones and other areas as needed
- Utility location and mark out/survey
- Assemble temporary containment building and vapor management system (VMS)
- Excavation of delineated areas to specified depth
- Removal of former MGP structures as encountered
- Backfill and site restoration
- Waste management and off site disposal
- Project closeout and demobilization

1.2 Objectives of Quality Control

This CQCP has been prepared to assist ENTACT, subcontractors and manufacturers with the requirements necessary to ensure products and construction activities are in accordance with the project requirements and to outline procedures for documenting such performance. In the context of this plan, quality assurance and quality control are defined as follows:

Quality assurance (QA) is a planned and systematic pattern of activities designed to assure and document that the quality control of items or products are being performed in accordance with the Construction Documents and that the products will perform satisfactorily in service. The Engineer will perform QA.

Quality control (QC) is defined as actions taken by manufacturers, fabricators, installers and contractors that provide a means to measure performance and demonstrate that the characteristics of an item or service meet the requirements of the Construction Documents and contractual requirements. ENTACT, manufacturers and subcontractors retained by ENTACT will perform QC.

1.3 Scope of the CQCP

The CQCP specifically addresses the following items:

- Roles and responsibilities of involved parties
- Responsibilities of ENTACT personnel
- Lines of communication
- Meetings related to construction QC
- Documentation and reporting procedures related to construction QC
- QC requirements associated with the specific work activities
- Summary of QC testing procedures and frequency

After final acceptance of this CQCP any proposed changes to the plan will be submitted to the Owner and the Engineer prior to making any proposed changes. Changes will be subject to approval.

2.0 ROLES AND RESPONSIBILITIES

There are various parties associated with the implementation, documentation and oversight of the construction QA/QC activities. The following section describes the parties involved and their roles in ensuring QA/QC objectives for the project are met.

2.1 Project Roles and Responsibilities

2.1.1 Project Owner

The Project Owner, National Grid is authorizing the performance of the scope of work. National Grid will review and approve all contract, administrative and payment issues.

2.1.2 Project Engineer

The Project Engineer, URS Corporation (URS) will be responsible for providing site management and coordination activities. As part of this responsibility, URS will perform the following:

- Provide technical support (e.g., design interpretation if needed) as it pertains to the Construction Documents, including Technical Specifications and Drawings
- Review project submittals for compliance with the Construction Documents
- Review proposed changes or substitution to specified materials or procedures

2.1.3 Contractor

The Contractor, ENTACT will be responsible for implementation of IRM activities and the QC function as it pertains to the IRM activities. As a part of this responsibility, ENTACT will perform the following:

- Assure that IRM activities are performed in accordance with the Construction Documents and this plan
- Provide direction to the ENTACT field crew, subcontractors and vendors involved in performing the IRM activities
- Perform material testing as required by the Construction Documents
- Ensure construction work conforms with Construction Documents
- Regularly provide details of field construction activities and documentation to National Grid and URS, and other interested parties as needed

2.2 ENTACT Quality Control Team Roles and Responsibilities

The ENTACT QC team will include the Project Coordinator (PC), Field Project Manager (FPM), On Site Field Engineer, Technical Lead, geotechnical and chemical laboratories and various

subcontractors. All members of the QC team will be familiar with the Construction Documents and this plan as it relates to the overall project and their specific job responsibilities. No changes will be made to the project team without notification and acceptance by National Grid and URS. Specific responsibilities of the team related to the implementation of QC requirements and this plan are described in the following sections.

2.2.1 Project Coordinator (PC)

The PC, Adam Ewert, will be on site periodically and will monitor the work progress with the field team and ensure that appropriate and sufficient resources are available to achieve the QC requirements. The PC will receive daily construction reports from site personnel updating him of the status of planned, ongoing, and completed work, including QC performance. The PC will prepare progress reports for submission to National Grid and URS. The PC will be immediately notified of any potential problems and recommendations for solutions and/or corrective action. The PC will work with the FPM and the Technical Lead to rectify deficiencies reported from the field team.

2.2.2 Technical Lead

The Technical Lead, Caroline Panico, will be on site periodically and will ensure site activities are implemented in accordance with the Construction Documents and this plan. The Technical Lead will aid in the review of data as it is received and conduct periodic surveys during remedial activities to monitor field documentation and data collection procedures. Prior to beginning remedial activities the Technical Lead will review QC procedures with the On Site Field Engineer and staff. The Technical Lead will work with the PC and FPM to rectify deficiencies reported from the field team.

2.2.3 Field Project Manager (FPM)

The FPM, Dan Duncan, will be on site daily and will ensure construction activities performed by the ENTACT project team and subcontractors are in accordance with the Construction Documents and this plan. The FPM will also work directly with the Field Engineer and the Technical Lead to ensure compliance with the Construction Documents and this plan. The FPM will prepare daily construction reports for submission to the PC. The FPM will report deficiencies related to QC objectives to the PC and the Technical Lead.

2.2.4 Field Engineer

The Field Engineer, Stacy Chervincky, will be on site daily and will ensure construction activities performed by the ENTACT project team and subcontractors are in accordance with the Construction Documents and this plan. In addition the Field Engineer will ensure required QC testing is performed at the specified frequency and that all required submittals are prepared and submitted in accordance with this plan and the approved Submittal Register. The subcontractor

QC personnel will report information related to their scope of work to the ENTACT Field Engineer who will be responsible for organizing the data for formal submission to National Grid and URS. The Field Engineer will report deficiencies to the Technical Lead and the FPM.

2.2.5 Subcontractors & Vendors

Subcontractors and vendors will ensure that all required documentation pertaining to their scope of work is properly prepared and submitted in a timely manner to the ENTACT Field Engineer who will review the documents for completeness and accuracy prior to submission to National Grid and URS. The ENTACT FPM and Field Engineer will monitor the subcontractor and vendor's activities to ensure compliance with the Construction Documents.

2.2.6 Independent Laboratories

The following independent laboratories will be retained to conduct geotechnical and chemical analysis throughout the duration of the project. Laboratories proposed for chemical analysis are New York State Department of Health (NYSDOH) certified; Environmental Laboratory Accreditation Program (ELAP) approved laboratories. Current NYSDOH certifications are included as Appendix A.

Geotechnical Analysis	Chemical Analysis
MT Group 145 Sherwood Avenue Farmingdale, NY 11735 Phone: 631-815-1900	Environmental Testing Laboratories, Inc 208 Route 109 Farmingdale, NY Phone: 631-249-1456 NY Lab ID No. 10969 and/or Chemtech Consulting Group 284 Sheffield Street Mountainside, NJ Phone: 908-789-8900 NY Lab ID No. 11376

2.3 Lines of Communication

To help ensure project objectives are met during construction activities clear open channels of communications are essential between all parties. The lines of communication between all parties involved in the project are described in the above sections and are illustrated on Figure 1.

3.0 PROJECT MEETINGS

3.1 Pre-Construction Meeting

A pre-construction meeting will be scheduled by URS prior to beginning work in accordance with Technical Specification Section 01201 to discuss project schedule, project coordination, project procedures, record documentation and other agenda items deemed necessary by URS. National Grid, URS, ENTACT, appropriate subcontractors and other interested parties may be in attendance. URS will prepare the meeting agenda and record the meeting minutes.

3.2 Progress Meetings

Progress meetings will be held weekly throughout the duration of the project in accordance with Technical Specification Section 01202 to discuss work completed during the previous week and work planned for the upcoming week, problems encountered and resolutions, status of submittals, updates to the progress schedule, and other items related to the work and QC issues. National Grid, URS, ENTACT, appropriate subcontractors depending on the specific construction activities being performed at the time of the meeting, and other interested parties may be in attendance. URS will prepare the meeting agenda and record the meeting minutes. ENTACT will prepare an updated Critical Path Method (CPM) schedule.

3.3 Problems/Resolutions Meeting

Problem and resolution meetings may be held as necessary when the immediate nature of a construction problem precludes discussion at the next scheduled weekly progress meeting. At the problem/resolution meeting, the problem will be defined and discussed among the appropriate participants. The implementation of the chosen solution will be discussed, planned and properly documented.

4.0 DOCUMENTATION AND REPORTING

An effective QC program is accomplished and verified by accurate documentation and reporting of activities. Documentation and reports will be submitted to URS in accordance with Technical Specification Section 01330 and an approved Submittal Register prepared by ENTACT. The Submittal Register will track type of submittals required, required date of submittal, actual date of submittal, submittal status and comment section. The Submittal Register has been submitted under separate cover with a copy included as Table 1.

ENTACT will be responsible for documenting that project QC requirements are achieved. Documentation may be in the form of logs, data sheets, photographs, manufacturer certifications, test results, drawings or noted field observations. Sample and backfill tracking logs are included as Appendix B.

ENTACT will also be responsible for preparing and submitting the following reports and documents during construction activities to keep interested parties abreast of site activities.

4.1 Daily Project Summary Report

The ENTACT FPM will prepare a daily project summary report for each day on site. Copies of the reports will be submitted to the ENTACT PC and URS on a weekly basis. The daily project summary report will be prepared in accordance with Technical Specification Section 01320 and shall include the following:

- Personnel and equipment on site (including subcontractors)
- Weather conditions and temperature
- Hours of operation
- Material imported and removed from the site
- Detailed summary of work performed
- Orders and requests of authorities having jurisdiction
- Health and safety information (tail gate topics, activities, incidents)
- Permits received/issued
- Communications
- Air monitoring results (personal, work zones)
- Unusual events

A sample Daily Project Summary Report is included in Appendix B.

4.2 Field Log Books

The ENTACT Field Engineer will maintain a bound, hard cover logbook to record general information and observations or technical data that may not be included for documentation in the daily construction report. Results of inspections and field tests will be logged in the logbook in a format convenient to the reader. At a minimum the information will include date, time, location, activity, observations and pertinent tests or inspection results. Recorded information may be in the form of notes, charts or sketches. Copies of field log books, logs and notes may be provided to URS upon request.

4.3 Record of Design and/or Specification Changes

If design or specification modifications are required during construction, ENTACT will provide a Field Change Request (FCR) in accordance with Technical Specification Section 01050 to National Grid and URS describing the nature and reason for the required changes. Design or specification modifications will only be made after approval of the FCR by National Grid and URS. A log of all approved changes will be maintained by ENTACT throughout the project duration.

4.4 As-Built Drawings

At the completion of work, ENTACT will prepare and submit "As Built" drawings showing the location of all work installed. Drawings will be based on survey data obtained by a land surveyor registered in the State of New York. As-built drawings will be prepared in accordance with Technical Specification Section 01720. A working draft of the "As Built" drawings will be updated in the field as changes occur and maintained on site for review upon request.

4.5 Photographic Documentation

Photographs will be taken to serve as a pictorial record of work progress, construction problems and corrective measures. The photo documentation file will contain color prints (or photo CD) labeled with the project name, date, perspective, subject and location of the photograph. Negatives will be stored and organized in a separate file if necessary.

5.0 GENERAL CONSTRUCTION QC ACTIVITIES

The construction activities presented in the following sections include specific discussion of the QC actions that are to be implemented for that particular task. The procedures and activities will be conducted in accordance with the Construction Documents. The testing for each specific task is summarized on Table 2 – Material Testing Methods and Frequency.

5.1 Erosion and Sediment Controls

Temporary erosion controls will include a stabilized construction exit, decontamination pad, silt fence, hay bales and other necessary controls to be installed as described in Technical Specification Section 02120. QC activities related to erosion and sediment controls will include the following:

- Ensure soil erosion and sediment controls are installed and implemented in accordance with the latest edition of the New York State Standards for Soil and Erosion Control and the approved Soil Erosion and Sediment Control Plan prepared by ENTACT (submittal reference # 02120/1.2).
- Perform weekly maintenance and inspection of all erosion control devices while devices are in use. Inspection to be performed at a minimum of once per week and within 24 hours of a rain event of 0.5 inches or more

5.2 Surveying

A Professional Land Surveyor licensed in the State of New York will be utilized to verify and document work is performed at the specified locations and to elevations. A log documenting the survey control information will be maintained on site for review by National Grid and URS.

Field Engineering and surveying will be done in accordance with Technical Specification Section 01050. The following survey events will be conducted through out project duration:

- Horizontal and vertical limits of excavation prior to backfilling
- Post excavation sample locations
- Location, size, etc, of subsurface structures and utilities encountered and/or removed
- Final grades
- Limits of disturbance
- Location of restored features
- Additional components of the work as directed by National Grid and/or the Engineer

5.3 Temporary Containment Building and VMS

The majority of excavation and load out activities will be conducted under a temporary containment structure meeting the design criteria requirements. The structure will be a crane liftable, 96 ft wide by 115 ft long PVC coated membrane structure with cargo doors on each gable end equipped with a VMS designed to provide a minimum of six (6) air exchanges per hour and to process recovered air from within the structure. To achieve 6 air exchanges per hour the VMS will consist of 2 units, each consisting of a 20,000 cubic feet per minute (cfm) blower and damper, adsorber with 16,000 lbs of reactivated vapor phase carbon, particulate filter and breakthrough indicator. QC activities related to the temporary containment structure and VMS will include the following as described in Technical Specification Section 13120:

- Components of the structure and VMS will be inspected during delivery to verify conformance with the order. Components will be stored and protected in accordance with the manufacturer's recommendations
- Once assembled and after being relocated, the structure and VMS components will be inspected to ensure they are functioning properly prior to beginning excavation within the structure
- During IRM activities, real time air monitoring will be performed within the structure to ensure BTEX, hydrogen cyanide (HCN), carbon monoxide (CO) and particulate matter do not exceed action levels defined in the ENTACT Health and Safety Plan (HASP)
- Emissions from the VMS will be continuously monitored using a photo-ionization detector (PID) and detector tubes, if needed, to monitor BTEX emissions. Particulate filters and media will be replaced as needed based on emissions monitoring

5.4 Excavation and Backfill

Excavation will be performed under the temporary structure from designated areas across the site to depths ranging from 3 to 18 feet bgs. Previous site investigations indicate soils may contain PAH and BTEX associated with former MGP operations greater than 1,000 mg/kg and 50 mg/kg respectively. Backfilling of excavated areas will be performed concurrent with excavation under

the temporary structure. A detailed description of the excavation and backfill procedures and coordination with the movement of the temporary structure and VMS are included in the Excavation and Backfill Plan submitted under separate cover (submittal reference # 02300/1.3.1). QC activities related to excavation and backfill will include the following as described in Technical Specification Section 02300:

- Pre-excavation photographs and videotape showing existing conditions of adjoining structures will be performed prior to beginning excavation
- Excavation side slopes will be inspected to ensure they are Occupational Safety and Health Administration (OSHA) compliant
- Post excavation samples will be collected from the final excavation bottom at a minimum of one sample per 900 square feet of excavation bottom and provided to National Grid or URS for analytical testing in accordance with NYSDEC DER-10 for the specified parameters.
- Information related to the selected backfill source(s) and clean fill certification for each soil type will be provided to URS prior to delivery to the site in accordance with Technical Specification Section 02300 and the approved Submittal Register
- Samples will be obtained for each fill type per source at the specified frequency of one sample for every 5,000 CY imported and analyzed at a NYSDOH certified, ELAP approved laboratory for total PAH, total volatile organic compounds (VOCs) and metals in accordance with the listing in 6 NYCRR Part 375 Table 375-6.8 (b) for residential use. Ten percent of the samples will be analyzed for polychlorinated biphenyl (PCB) parameters listed in the table.
- In-place quality control compaction testing will be performed by an independent geotechnical testing firm to ensure specified compaction has been achieved. Each lift will be tested at a frequency of one test per 2,500 square feet, with a minimum of 2 tests per backfill lift per each backfill area.
- Final grades of placed soil layers will be surveyed for inclusion in the final As-Built drawings

5.6 Waste Characterization

Waste characterization sampling and analysis may be necessary to supplement existing data. In the event it is required, composite samples will be collected at the frequencies dictated by the disposal facilities. An appropriate laboratory turn around time will be used to ensure soil loading and transport to the LTTD facility is not impacted or delayed.

- Visual inspections of stockpiled material will be performed for the presence of debris exceeding the size limitations. Visually observed debris will be removed from the stockpile or crushed as necessary

6.0 NONCONFORMANCE WITH SPECIFICATIONS

In the event test results, data or inspections indicate nonconformance with the Construction

Documents, the information along with corrective action measures will be submitted to National Grid and URS in a timely manner for review and approval prior to implementation. Any required change in the Construction Documents will be documented by ENTACT in a FCR and submitted to National Grid and URS.

In the event National Grid or URS observe nonconformance with the Construction Documents, they will notify ENTACT immediately and corrective measures as noted above will be undertaken.

FIGURE 1 PROJECT ORGANIZATION CHART

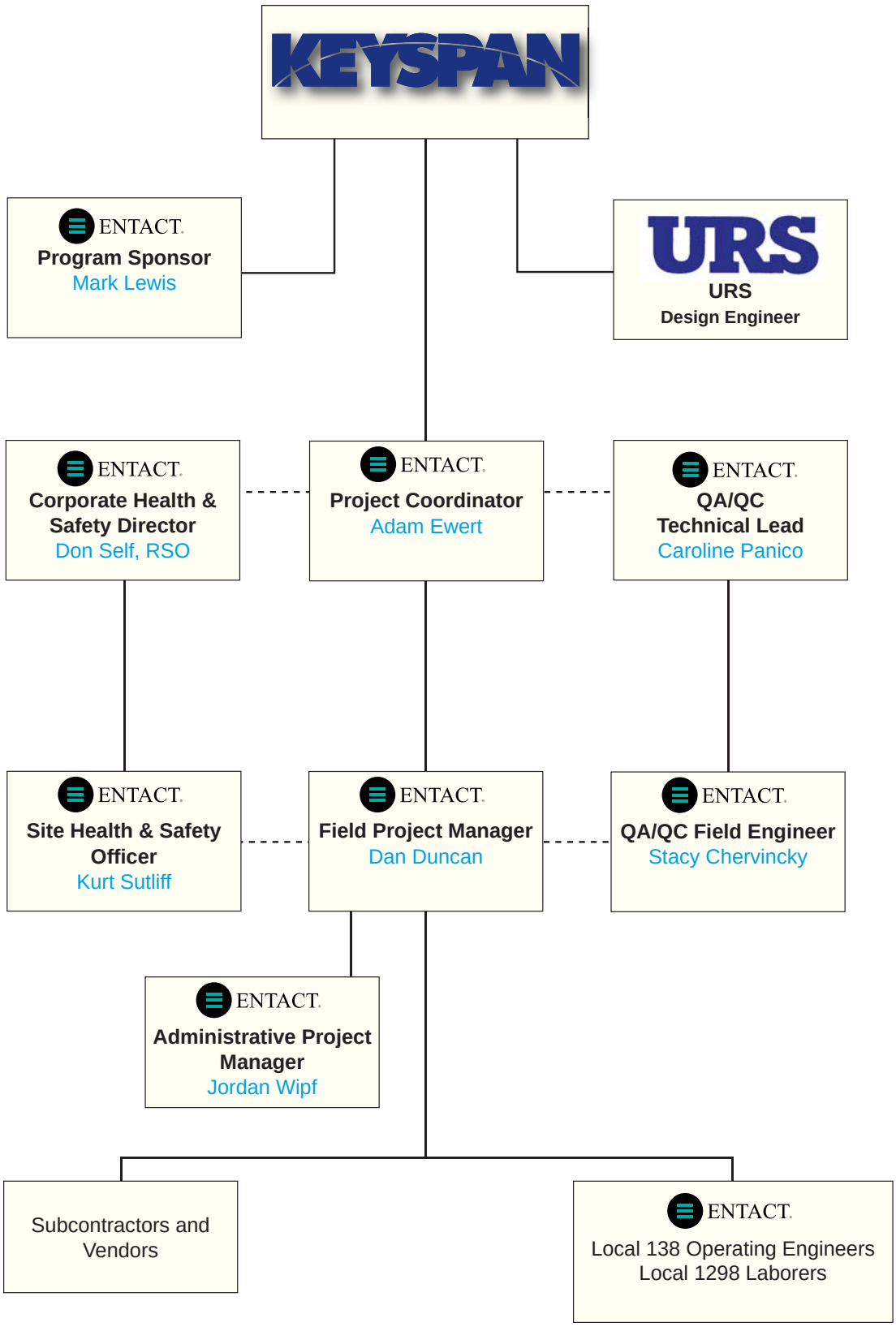


Table 1 - Submittal Register
Hempstead Intersection Street Former Manufactured Gas Plant Site
Interim Remedial Measure
Submittal Register
Project #E7370

Specification Section	Specification Paragraph		Title/Description	Required Submittal Date	Actual Submittal Date	Comment	Approved (A); Approved as Noted (AN); Rejected (R); Revise/Resubmit (RR); Information Only (I)
01025 Measurement and Payment	1.1.3		Hourly Labor Rate Breakdown (trade and management supervision	After Award of Contract			
	1.1.4		Equipment Rate Breakdown (both rented and owned)	After Award of Contract			
	1.2.1		Schedule of Values	Prior to Award of Contract			
	1.2.2		Bid Form Signed by a Company Officer	After Award of Contract			
	1.3.1		Invoices	Monthly			
01026 Schedule of Values	1.4.1		Schedule of Values	Prior to Award of Contract			
	1.4.2		Updated Schedule of Values	Shortly after each Approved Change of the Contract			
01050 Field Engineering	1.3.1		Professional Land Surveyor Contact Information and NY Registration Number	After Award of Contract			
	1.3.2		Certificate signed by the Surveyor, certifying that elevations and locations of constructed features are in conformance with Contract Documents including any approved Field Change Request (FCR)	Upon substantial Completion of Work			
	1.3.4		Field Change Request (FCR) Form Template and Procedure	After Award of Contract			
	1.3.5		Request for Information (RFI) to document requested clarifications to the Contract Document	As needed			
	1.3.7		Field Change Request (FCR)	As needed			
	1.4.2		Record Documents	Upon substantial Completion of Work			
	2.1.2		Calibration Certificates for Instruments (i.e. lasers, transits)	Prior to Construction			
01055 Resident Engineering Services	1.1.2		Resident Engineer Qualifications	With Bid Documents			
	1.6		Submittal transmittal template to be used as basis for all submittals	Prior to Construction			
01056 Protection of the Work and Property	1.2.4		Pre-Construction photos	1-Month Prior to Construction			
	1.3		Any procedures that deviate from the specifications	Prior to Construction			
	1.5.4		Lists of existing damages to property (location, nature, extent)	Prior to Construction			
01065 Health and Safety Requirements	1.2.1		Health and Safety Plan (HASP)	After Award of Contract			
	1.2.3		Copies of HAZWOPER training certificates and record of medical monitoring for site personnel and subcontractors	After Award of Contract			
01066 Equipment and Material Decontamination	3.3.2		Inspection Forms to document equipment decontamination	Maintain on site			
01202 Project Progress Meetings	3.2		Updated CPM project schedule	During Progress Meetings		Part of COP	
01203 Project Coordination	1.2.4		List of Subcontractors and Personnel	After Award of Contract			
01250 Contract Modification Procedures	1.4.3		Quote for cost adjustments to Contract (KeySpan initiated Proposal Requests)	Within 10-days from proposal request			
	1.4.4		List of estimated quantities of products required/eliminated with total amount of purchase/credit (KeySpan initiated Proposal Requests)	Within 10-days from proposal request			
	1.5.1		Detailed Request for change including reason, effect on Contract Sum and Time (Contractor initiated Proposal)	Within 10-days from proposal request			
01290 Payment Procedures	1.2.2		Application for Payment	Monthly throughout construction			
	1.2.4		Initial Application for Payment	1-Month from Mobilization			
	1.2.5		Application for Payment at Completion	Upon substantial Completion of Work			
	1.2.6		Final Payment Application	Upon substantial Completion of Work			
01320 Construction Progress Documentation	1.2.1		Critical Path Method Schedule	After Award of Contract and Throughout Construction			
	1.2.2		Daily Construction Reports	Weekly			
	1.2.3		Field Condition Report	Upon discovery of conflicting project conditions			
01330 Submittal Procedures	1.2		Construction Operations Plan (see Specification for individual section requirements	3 weeks after Award of Contract			
	3.4		Certificates of Compliance	With Submittal Document			
	3.5		Permits (i.e. electric, plumbing, construction related)	After Award of Contract			
01400 Construction Quality Requirements	1.2.1		Construction Quality Assurance Project Plan (CQAPP)	After Award of Contract		Part of the COP	
	3.4.1		Sufficient Records of QA/QC testing	As they Become Available			
01500 Temporary Site Facilities and Controls / Pre Mobilization and Mobilization	1.2.1		Utility Location Plan	After Award of Contract			
	1.2.2		Information pertaining to trailers, electric and water supply, staging areas, decontamination pa	After Award of Contract		Part of COP	
	1.2.2		Site Plan depicting Proposed Facility Locations	After Award of Contract		Part of COP	
01540 Site Security	1.2		Site Security Program	Prior to Mobilization		Part of COP	
Section 01720 Project Record Documents	1.4.1		Final Record Documents and As-Built Surveys	Upon substantial Completion of Work			
01732 Selective Demolition	1.4.1.		Contractor & Resident Engineer Qualifications	After Award of Contract		Part of COP	
	1.4.2		Proposed Dust Control Measures	After Award of Contract		Part of COP	
	1.4.3		Schedule of Selective Demolition Activities	After Award of Contract		Part of COP	
	1.4.4		Inventory of removed or salvaged item	As they Become Available			
	1.4.5		Predemolition Photographs and Videotape	After Award of Contract			
	1.4.6		Disposal Records	As they Become Available			
	3.1.4		Unanticipated Elements	When Conflict arises			
01770 Closeout Procedures	1.2.1	a	Prepare "Punch list"	Upon substantial Completion of Work			

Table 1 - Submittal Register
Hempstead Intersection Street Former Manufactured Gas Plant Site
Interim Remedial Measure
Submittal Register
Project #E7370

Specification Section	Specification Paragraph		Title/Description	Required Submittal Date	Actual Submittal Date	Comment	Approved (A); Approved as Noted (AN); Rejected (R); Revise/Resubmit (RR); Information Only (I)
	1.2.1	b	Insurance Changeover Requirements	Upon substantial Completion of Work			
	1.2.1	c	Warranties/Maintenance Agreements etc.	Upon substantial Completion of Work			
	1.2.1	d	Releases for unrestricted use and access to site and utilities	Upon substantial Completion of Work			
	1.2.1	e	Project Record Documents	Upon substantial Completion of Work			
	1.2.1	j	Notification of Utility changeove	Upon substantial Completion of Work			
	1.2.2		Request for Inspection	Upon substantial Completion of Work			
	1.3.1	a	Final Payment Application	Upon substantial Completion of Work			
	1.3.1	b	KeySpan/Engineer's Substantial Completion Inspection Punch Lis	Upon substantial Completion of Work			
	1.3.1	c	Insurance Coverage	Upon substantial Completion of Work			
	1.3.2		Written Request for Final Inspection	Upon substantial Completion of Work			
	1.4.2		Marked Project Record Drawings	Upon substantial Completion of Work			
	1.4.3		Marked Project Record Specificatior	Upon substantial Completion of Work			
	1.4.4		Marked Project Record Product Data	Upon substantial Completion of Work			
	1.5.1		Warranties	As they Become Available			
01780 Demobilization	1.3		Project Record Documents	Upon substantial Completion of Work			
	3.1.6		Certification of Cleaning	As they Become Available			
	3.3.2	a	Written Certification of Final Acceptance	Upon substantial Completion of Work			
	3.3.2	b	Permit Closeouts	Upon substantial Completion of Work			
	3.3.2	c	Waste Disposal Manifests and T&D Documentation	Upon substantial Completion of Work			
	3.3.2	d	Final As-Built Survey(s)	Upon substantial Completion of Work			
02110 Site Clearing and Preparation	1.3.1		Mobilization and Site Preparation Details including a Truck Routing Plan	After Award of Contract		Part of the COP	
	1.3.2		Demolition Plan	After Award of Contract		Part of the COP	
	1.3.3		Noise Mitigation plan	After Award of Contract		Part of the COP	
	1.3.4		Summary of daily truck activity, tonnage removed, manifests, weight tickets, Certificate of Destruction	After Award of Contract		Part of the COP	
02111 Waste Management and Handling of Contaminated Materials	1.3		UST Closure Plan	After Award of Contract		Part of the COP	
	1.3.2		Off-Site Disposal Facilities	After Award of Contract		Part of the COP	
	3.6		Disposal Summary and Certificate of Destruction	Weekly			
02120 Soil Erosion and Sediment Control	1.2		Soil Erosion and Sediment Control Plan (SESCP)	After Award of Contract		Part of the COP	
02240 Dewatering	1.3		Dewatering Methodology	After Award of Contract		Part of the COP	
02260 Excavation Support and Protection	1.2.1	a	Details on the Method of Excavation Support	After Award of Contract			
	1.3.1		Photographs or Video of Existing Conditions	Prior to Construction			
	1.3.2		Excavation Support Design	Prior to Construction			
	1.3.3		Pre-Trenching and Obstruction Removal Methods	Prior to Construction			
02300 Earthwork and Backfill	1.3.1		Excavation and Backfill Plan	After Award of Contract		Part of the COP	
	1.3.2		Utility Protection Plan	After Award of Contract			
	1.3.3		Documentation that backfill meets specification	Prior to Delivery			
	1.3.4		Material Test Reports	Prior to Delivery			
	1.3.5		Pre-Excavation Photographs/Videotape	Prior to Construction			
	1.3.6		Independent geotechnical testing agency qualifications	After Award of Contract			
	1.3.7		Results of in place density testing of compacted backfil	During Placement			
	1.3.8		Documentation that topsoil and seed meets specification	Prior to Delivery			
02610 Monitoring Well Abandonment	1.3.1		Drilling Contractor Information	Prior to Construction			
	1.3.2		Proposed methods for well abandonmen	After Award of Contract		Part of the COP	
	1.3.3		Well Sealing Records	As they Become Available			
13120 Temporary Containment Building	2.3.1		Sealed Design of Fabric Enclosure	After Award of Contract			
	2.3.2		Sealed Design of Vapor Management System	After Award of Contract			
	2.3.3		Sealed Design of Foundation/Footing System	After Award of Contract			
	2.3.4		Sealed Design of Anchoring System & Calculations	After Award of Contract			
	2.3.5		Building manufacturer's experience and qualifications	After Award of Contract			
Interim Remedial Measures Drawing 8	Note 6c		Details, Procedures and Schedule for survey monitoring of 16 inch gas main line and power poles	Prior to Construction		Part of COP	

Table 2: Material Testing Methods and Frequency Construction Quality Control Plan Hempstead Intersection Street Former MGP Site				
Material to be Tested	**Parameter**	**Test Method**	**Frequency**	**Specification Reference**
Post Excavation Confirmation Samples (collected by ENTACT and provided to URS for analysis)	BTEX PAHs RCRA metals Total cyanide Total Phenols	SW-846 Method 8260B SW-846 Method 8270C SW-846 Method 6010B/7000 series NYSDEC Method 9012A NYSDEC Method 9065	1 sample every 900 square feet of excavation bottom. Sample location to be selected by URS	02300- 3.3.5
Fill Material – during importation	VOCs PAHs RCRA Metals Pesticides	SW-846 Method 8260B SW-846 Method 8270C SW-846 Method 6010B/7000 series SW-846 Method 8081B	1 sample per 5,000 cubic yards (in place) imported soil (10% of samples)	02300-2.1.1
Fill Material – during placement	In Place Density	ASTM D2922	1 test every lift per 2,500 square per lift; no fewer than 2 per lift per area	02300-3.10
Waste Characterization	Paint Filter Test Total Petroleum Hydrocarbons VOCs SVOCs Total RCRA Metals Total PCBs TCLP VOC TCLP SVOC TCLP RCRA Metals TCLP Pesticides Ignitability Reactive Cyanides/Sulfides Corrosivity Total Sulfur	SW846-9095B SW846-8015 modified SW846-8260B SW846-8270C SW846-6010B/7000 series SW846-8082 SW846-1311/8260B SW846-1311/8270C SW846-6010B/7470A SW846-1311/8081B SW-846-1010 Chapter 7 Section 7.3 SW846-9040B ASTM D129	As needed based on disposal facilities testing frequencies and parameters	02300-3.3.6

APPENDIX A

Environmental Testing Laboratories, Inc. - NYSDOH Certification
ChemTech - NYSDOH Certification

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
RICHARD F. DAINES, M.D.

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CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

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ENVIRONMENTAL TESTING LABORATORIES INC
208 ROUTE 109
FARMINGDALE, NY 11735

NY Lab Id No: 10969
EPA Lab Code: NY00061

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Drinking Water Non-Metals

Hydrogen Ion (pH)	EPA 150.1

Serial No.: 32636

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Acrylates	
Acrolein (Propenal)	EPA 624
	EPA 8260B
Acrylonitrile	EPA 624
	EPA 8260B
Amines	
2-Nitroaniline	EPA 8270C
3-Nitroaniline	EPA 8270C
4-Chloroaniline	EPA 8270C
4-Nitroaniline	EPA 8270C
Carbazole	EPA 8270C
Pyridine	EPA 8260B
	EPA 8270C
Benzidines	
3,3' -Dichlorobenzidine	EPA 625
	EPA 8270C
Benzidine	EPA 625
	EPA 8270C
Chlorinated Hydrocarbon Pesticides	
4,4'-DDD	EPA 608
	EPA 8081A
4,4'-DDE	EPA 608

Chlorinated Hydrocarbon Pesticides	
4,4'-DDE	EPA 8081A
4,4'-DDT	EPA 608
	EPA 8081A
Aldrin	EPA 608
	EPA 8081A
alpha-BHC	EPA 608
	EPA 8081A
alpha-Chlordane	EPA 8081A
beta-BHC	EPA 608
	EPA 8081A
Chlordane Total	EPA 608
	EPA 8081A
delta-BHC	EPA 608
	EPA 8081A
Dieldrin	EPA 608
	EPA 8081A
Endosulfan I	EPA 608
	EPA 8081A
Endosulfan II	EPA 608
	EPA 8081A
Endosulfan sulfate	EPA 608
	EPA 8081A
Endrin	EPA 608

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Chlorinated Hydrocarbon Pesticides	
Endrin	EPA 8081A
Endrin aldehyde	EPA 608
	EPA 8081A
gamma-Chlordane	EPA 8081A
Heptachlor	EPA 608
	EPA 8081A
Heptachlor epoxide	EPA 608
	EPA 8081A
Lindane	EPA 608
	EPA 8081A
Methoxychlor	EPA 608
	EPA 8081A
Toxaphene	EPA 608
	EPA 8081A
Chlorinated Hydrocarbons	
1,2,4,5-Tetrachlorobenzene	EPA 8270C
1,2,4-Trichlorobenzene	EPA 625
	EPA 8270C
2-Chloronaphthalene	EPA 625
	EPA 8270C
Hexachlorobenzene	EPA 625
	EPA 8270C

Chlorinated Hydrocarbons	
Hexachlorobutadiene	EPA 625
	EPA 8260B
	EPA 8270C
Hexachlorocyclopentadiene	EPA 625
	EPA 8270C
Hexachloroethane	EPA 625
	EPA 8270C
Hexachloropropene	EPA 8270C
Pentachlorobenzene	EPA 8270C
Chlorophenoxy Acid Pesticides	
2,4,5-T	EPA 8151A
	EPA 8321
2,4,5-TP (Silvex)	EPA 8151A
	EPA 8321
2,4-D	EPA 8151A
	EPA 8321
Dicamba	EPA 8151A
Demand	
Biochemical Oxygen Demand	SM 18-20 5210B
Carbonaceous BOD	SM 18-20 5210B
Chemical Oxygen Demand	HACH 8000

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Fuel Oxygenates	
Ethanol	EPA 8260B
Methyl tert-butyl ether	EPA 8260B
t-Butyl alcohol	EPA 8260B
Haloethers	
4-Bromophenylphenyl ether	EPA 625
	EPA 8270C
4-Chlorophenylphenyl ether	EPA 625
	EPA 8270C
Bis (2-chloroisopropyl) ether	EPA 625
	EPA 8270C
Bis(2-chloroethoxy)methane	EPA 625
	EPA 8270C
Bis(2-chloroethyl)ether	EPA 625
	EPA 8270C
Microextractables	
1,2-Dibromo-3-chloropropane	EPA 8260B
1,2-Dibromoethane	EPA 8260B
Mineral	
Acidity	EPA 305.1
Alkalinity	EPA 310.1
Calcium Hardness	EPA 200.7
Mineral	
Chloride	EPA 325.3
	SM 18-20 4500-Cl B
Fluoride, Total	EPA 340.2
Hardness, Total	EPA 200.7
Sulfate (as SO4)	EPA 375.4
Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 625
	EPA 8270C
2,6-Dinitrotoluene	EPA 625
	EPA 8270C
Isophorone	EPA 625
	EPA 8270C
Nitrobenzene	EPA 625
	EPA 8270C
Nitrosoamines	
N-Nitrosodiethylamine	EPA 8270C
N-Nitrosodimethylamine	EPA 625
	EPA 8270C
N-Nitrosodi-n-butylamine	EPA 8270C
N-Nitrosodi-n-propylamine	EPA 625
	EPA 8270C
N-Nitrosodiphenylamine	EPA 625

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Nitrosoamines	
N-Nitrosodiphenylamine	EPA 8270C
Nutrient	
Ammonia (as N)	EPA 350.2
Kjeldahl Nitrogen, Total	EPA 351.3
Nitrate (as N)	EPA 353.3
	LACHAT 10-107-04-1-C
Nitrite (as N)	EPA 354.1
	SM 18-20 4500-NO2 B
Orthophosphate (as P)	EPA 365.3
Phosphorus, Total	EPA 365.2
Organophosphate Pesticides	
Azinphos methyl	EPA 8141A
Demeton-O	EPA 8141A
Demeton-S	EPA 8141A
Phthalate Esters	
Benzyl butyl phthalate	EPA 625
	EPA 8270C
Bis(2-ethylhexyl) phthalate	EPA 625
	EPA 8270C
Diethyl phthalate	EPA 625
	EPA 8270C
Phthalate Esters	
Dimethyl phthalate	EPA 625
	EPA 8270C
Di-n-butyl phthalate	EPA 625
	EPA 8270C
Di-n-octyl phthalate	EPA 625
	EPA 8270C
Polychlorinated Biphenyls	
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	EPA 8082
2,2',3,3',4,4',5-Heptachlorobiphenyl	EPA 8082
2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	EPA 8082
2,2',3,3',5,5',6,6'-Octachlorobiphenyl	EPA 8082
2,2',3,4,4',5,5'-Heptachlorobiphenyl	EPA 8082
2,2',3,4,4',5',6-Heptachlorobiphenyl	EPA 8082
2,2',3,4,4',5'-Hexachlorobiphenyl	EPA 8082
2,2',3,4',5,5',6-Heptachlorobiphenyl	EPA 8082
2,2',3,4,5,5'-Hexachlorobiphenyl	EPA 8082
2,2',3,4',5,6,6'-Heptachlorobiphenyl	EPA 8082
2,2',3,4,5'-Pentachlorobiphenyl	EPA 8082
2,2',3,5,5',6-Hexachlorobiphenyl	EPA 8082
2,2',3,5'-Tetrachlorobiphenyl	EPA 8082
2,2',4,4',5,5'-Hexachlorobiphenyl	EPA 8082
2,2',4,5,5'-Pentachlorobiphenyl	EPA 8082

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Polychlorinated Biphenyls	
2,2',5,5'-Tetrachlorobiphenyl	EPA 8082
2,2',5-Trichlorobiphenyl	EPA 8082
2,2'-dichlorobiphenyl	EPA 8082
2,3,3',4,4',5-Hexachlorobiphenyl	EPA 8082
2,3',4,4'-Tetrachlorobiphenyl	EPA 8082
2,4',5-Trichlorobiphenyl	EPA 8082
2-Chlorobiphenyl	EPA 8082
PCB-1016	EPA 608
	EPA 8082
PCB-1221	EPA 608
	EPA 8082
PCB-1232	EPA 608
	EPA 8082
PCB-1242	EPA 608
	EPA 8082
PCB-1248	EPA 608
	EPA 8082
PCB-1254	EPA 608
	EPA 8082
PCB-1260	EPA 608
	EPA 8082

Polynuclear Aromatics	
Acenaphthene	EPA 625
	EPA 8270C
Acenaphthylene	EPA 625
	EPA 8270C
Anthracene	EPA 625
	EPA 8270C
Benzo(a)anthracene	EPA 625
	EPA 8270C
Benzo(a)pyrene	EPA 625
	EPA 8270C
Benzo(b)fluoranthene	EPA 625
	EPA 8270C
Benzo(ghi)perylene	EPA 625
	EPA 8270C
Benzo(k)fluoranthene	EPA 625
	EPA 8270C
Chrysene	EPA 625
	EPA 8270C
Dibenzo(a,h)anthracene	EPA 625
	EPA 8270C
Fluoranthene	EPA 625
	EPA 8270C
Fluorene	EPA 625

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Polynuclear Aromatics	
Fluorene	EPA 8270C
Indeno(1,2,3-cd)pyrene	EPA 625
	EPA 8270C
Naphthalene	EPA 625
	EPA 8270C
Phenanthrene	EPA 625
	EPA 8270C
Pyrene	EPA 625
	EPA 8270C
Priority Pollutant Phenols	
2,4,5-Trichlorophenol	EPA 625
	EPA 8270C
2,4,6-Trichlorophenol	EPA 625
	EPA 8270C
2,4-Dichlorophenol	EPA 625
	EPA 8270C
2,4-Dimethylphenol	EPA 625
	EPA 8270C
2,4-Dinitrophenol	EPA 625
	EPA 8270C
2-Chlorophenol	EPA 625
	EPA 8270C

Priority Pollutant Phenols	
2-Methyl-4,6-dinitrophenol	EPA 625
	EPA 8270C
2-Methylphenol	EPA 8270C
2-Nitrophenol	EPA 625
	EPA 8270C
4-Chloro-3-methylphenol	EPA 625
	EPA 8270C
4-Methylphenol	EPA 8270C
4-Nitrophenol	EPA 625
	EPA 8270C
Cresols, Total	EPA 8270C
Pentachlorophenol	EPA 625
	EPA 8270C
Phenol	EPA 625
	EPA 8270C
Purgeable Aromatics	
1,2-Dichlorobenzene	EPA 624
	EPA 625
	EPA 8260B
	EPA 8270C
1,3-Dichlorobenzene	EPA 624
	EPA 625

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Purgeable Aromatics	
1,3-Dichlorobenzene	EPA 8260B
	EPA 8270C
1,4-Dichlorobenzene	EPA 624
	EPA 625
	EPA 8260B
	EPA 8270C
Benzene	EPA 624
	EPA 8260B
Chlorobenzene	EPA 624
	EPA 8260B
Ethyl benzene	EPA 624
	EPA 8260B
Styrene	EPA 8260B
Toluene	EPA 624
	EPA 8260B
Total Xylenes	EPA 624
	EPA 8260B
Purgeable Halocarbons	
1,1,1,2-Tetrachloroethane	EPA 8260B
1,1,1-Trichloroethane	EPA 624
	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 624

Purgeable Halocarbons	
1,1,2,2-Tetrachloroethane	EPA 8260B
1,1,2-Trichloroethane	EPA 624
	EPA 8260B
1,1-Dichloroethane	EPA 624
	EPA 8260B
1,1-Dichloroethene	EPA 624
	EPA 8260B
1,1-Dichloropropene	EPA 8260B
1,2,3-Trichloropropane	EPA 8260B
1,2-Dichloroethane	EPA 624
	EPA 8260B
1,2-Dichloropropane	EPA 624
	EPA 8260B
1,3-Dichloropropane	EPA 8260B
2,2-Dichloropropane	EPA 8260B
2-Chloro-1,3-butadiene (Chloroprene)	EPA 8260B
2-Chloroethylvinyl ether	EPA 624
	EPA 8260B
3-Chloropropene (Allyl chloride)	EPA 8260B
Bromochloromethane	EPA 8260B
Bromodichloromethane	EPA 624
	EPA 8260B
Bromoform	EPA 624

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Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. JUAN R. CUBA
ENVIRONMENTAL TESTING LABORATORIES INC
208 ROUTE 109
FARMINGDALE, NY 11735

NY Lab Id No: 10969
EPA Lab Code: NY00061

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Purgeable Halocarbons	
Bromoform	EPA 8260B
Bromomethane	EPA 624
	EPA 8260B
Carbon tetrachloride	EPA 624
	EPA 8260B
Chloroethane	EPA 624
	EPA 8260B
Chloroform	EPA 624
	EPA 8260B
Chloromethane	EPA 624
	EPA 8260B
cis-1,2-Dichloroethene	EPA 8260B
cis-1,3-Dichloropropene	EPA 624
	EPA 8260B
Dibromochloromethane	EPA 624
	EPA 8260B
Dichlorodifluoromethane	EPA 8260B
Methylene chloride	EPA 624
	EPA 8260B
Tetrachloroethene	EPA 624
	EPA 8260B
trans-1,2-Dichloroethene	EPA 624
	EPA 8260B
Purgeable Halocarbons	
trans-1,3-Dichloropropene	EPA 624
	EPA 8260B
Trichloroethene	EPA 624
	EPA 8260B
Trichlorofluoromethane	EPA 8260B
Vinyl chloride	EPA 624
	EPA 8260B
Purgeable Organics	
2-Butanone (Methylethyl ketone)	EPA 8260B
2-Hexanone	EPA 8260B
4-Methyl-2-Pentanone	EPA 8260B
Acetone	EPA 8260B
Carbon Disulfide	EPA 8260B
Vinyl acetate	EPA 8260B
Residue	
Solids, Total	EPA 160.3
Solids, Total Dissolved	EPA 160.1
Solids, Total Suspended	EPA 160.2
Semi-Volatile Organics	
2-Methylnaphthalene	EPA 8270C
Benzoic Acid	EPA 8270C

Serial No.: 32637

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
RICHARD F. DAINES, M.D.

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All approved analytes are listed below:

Semi-Volatile Organics	
Benzyl alcohol	EPA 8270C
Dibenzofuran	EPA 8270C
Volatile Chlorinated Organics	
Benzyl chloride	EPA 8260B
Wastewater Metals I	
Barium, Total	EPA 200.7
	EPA 6010B
Cadmium, Total	EPA 200.7
	EPA 6010B
Calcium, Total	EPA 200.7
	EPA 6010B
Chromium, Total	EPA 200.7
	EPA 6010B
Copper, Total	EPA 200.7
	EPA 6010B
Iron, Total	EPA 200.7
	EPA 6010B
Lead, Total	EPA 200.7
	EPA 6010B
Magnesium, Total	EPA 200.7
	EPA 6010B
Manganese, Total	EPA 200.7
	EPA 6010B
Nickel, Total	EPA 200.7
	EPA 6010B
Potassium, Total	EPA 200.7
	EPA 6010B
Silver, Total	EPA 200.7
	EPA 6010B
Sodium, Total	EPA 200.7
	EPA 6010B
Strontium, Total	EPA 200.7
	EPA 6010B
Wastewater Metals II	
Aluminum, Total	EPA 200.7
	EPA 6010B
Antimony, Total	EPA 200.7
	EPA 6010B
Arsenic, Total	EPA 200.7
	EPA 6010B
Beryllium, Total	EPA 200.7
	EPA 6010B
Chromium VI	EPA 7196A
	SM 18-19 3500-Cr D

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All approved analytes are listed below:

Wastewater Metals II

Mercury, Total	EPA 245.1
	EPA 7470A
Selenium, Total	EPA 200.7
	EPA 6010B
Vanadium, Total	EPA 200.7
	EPA 6010B
Zinc, Total	EPA 200.7
	EPA 6010B

Wastewater Metals III

Cobalt, Total	EPA 200.7
	EPA 6010B
Molybdenum, Total	EPA 200.7
	EPA 6010B
Thallium, Total	EPA 200.7
	EPA 6010B
Tin, Total	EPA 200.7
	EPA 6010B
Titanium, Total	EPA 200.7
	EPA 6010B

Wastewater Miscellaneous

Boron, Total	EPA 200.7
	EPA 6010B

Wastewater Miscellaneous

Bromide	EPA 320.1
Color	EPA 110.2
Hydrogen Ion (pH)	EPA 150.1
Oil & Grease Total Recoverable	EPA 1664A
	EPA 413.1
Phenols	EPA 420.1
Silica, Dissolved	EPA 6010B
Specific Conductance	EPA 120.1
	SM 18-20 2510B
Sulfide (as S)	SM 18 4500-S E
Surfactant (MBAS)	SM 18-20 5540C
Temperature	EPA 170.1
	SM 18-20 2550B

Sample Preparation Methods

EPA 3010A EPA 3005A EPA 3510C

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Wastewater Miscellaneous

Cyanide, Total	EPA 335.2
	EPA 9014

Sample Preparation Methods

EPA 3010A EPA 3005A EPA 3510C

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EPA Lab Code: NY00061

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All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 8260B
Acrylonitrile	EPA 8260B
Amines	
2-Chloroaniline	EPA 8270C
2-Nitroaniline	EPA 8270C
3-Nitroaniline	EPA 8270C
4-Chloroaniline	EPA 8270C
Carbazole	EPA 8270C
Benzidines	
3,3' -Dichlorobenzidine	EPA 8270C
Benzidine	EPA 8270C
Characteristic Testing	
Corrosivity	EPA 9040B
	EPA 9045C
Ignitability	EPA 1010
	EPA 1020
Reactivity	SW-846 Ch7, Sec. 7.3
Chlorinated Hydrocarbon Pesticides	
4,4'-DDD	EPA 8081A
4,4'-DDE	EPA 8081A

Chlorinated Hydrocarbon Pesticides	
4,4'-DDT	EPA 8081A
Aldrin	EPA 8081A
alpha-BHC	EPA 8081A
alpha-Chlordane	EPA 8081A
beta-BHC	EPA 8081A
Chlordane Total	EPA 8081A
delta-BHC	EPA 8081A
Dieldrin	EPA 8081A
Endosulfan I	EPA 8081A
Endosulfan II	EPA 8081A
Endosulfan sulfate	EPA 8081A
Endrin	EPA 8081A
Endrin aldehyde	EPA 8081A
Endrin Ketone	EPA 8081A
gamma-Chlordane	EPA 8081A
Heptachlor	EPA 8081A
Heptachlor epoxide	EPA 8081A
Lindane	EPA 8081A
Methoxychlor	EPA 8081A
Toxaphene	EPA 8081A
Chlorinated Hydrocarbons	
1,2,4,5-Tetrachlorobenzene	EPA 8270C

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Chlorinated Hydrocarbons	
1,2,4-Trichlorobenzene	EPA 8270C
2-Chloronaphthalene	EPA 8270C
Hexachlorobenzene	EPA 8270C
Hexachlorobutadiene	EPA 8270C
Hexachlorocyclopentadiene	EPA 8270C
Hexachloroethane	EPA 8270C
Pentachlorobenzene	EPA 8270C
Chlorophenoxy Acid Pesticides	
2,4,5-T	EPA 8151A
	EPA 8321
2,4,5-TP (Silvex)	EPA 8151A
	EPA 8321
2,4-D	EPA 8151A
	EPA 8321
Dicamba	EPA 8151A
Haloethers	
4-Bromophenylphenyl ether	EPA 8270C
4-Chlorophenylphenyl ether	EPA 8270C
Bis (2-chloroisopropyl) ether	EPA 8270C
Bis(2-chloroethoxy)methane	EPA 8270C

Metals I	
Barium, Total	EPA 6010B
Cadmium, Total	EPA 6010B
Calcium, Total	EPA 6010B
Chromium, Total	EPA 6010B
Copper, Total	EPA 6010B
Iron, Total	EPA 6010B
Lead, Total	EPA 6010B
Magnesium, Total	EPA 6010B
Manganese, Total	EPA 6010B
Nickel, Total	EPA 6010B
Potassium, Total	EPA 6010B
Silver, Total	EPA 6010B
Sodium, Total	EPA 6010B
Metals II	
Aluminum, Total	EPA 6010B
Antimony, Total	EPA 6010B
Arsenic, Total	EPA 6010B
Beryllium, Total	EPA 6010B
Chromium VI	EPA 7196A
Mercury, Total	EPA 7471A
Selenium, Total	EPA 6010B
Vanadium, Total	EPA 6010B

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Metals II	
Zinc, Total	EPA 6010B
Metals III	
Cobalt, Total	EPA 6010B
Molybdenum, Total	EPA 6010B
Thallium, Total	EPA 6010B
Tin, Total	EPA 6010B
Miscellaneous	
Cyanide, Total	EPA 9012A
Hydrogen Ion (pH)	EPA 9040B
	EPA 9045C
Lead in Dust Wipes	EPA 6010B
Lead in Paint	EPA 6010B
Oil & Grease Total Recoverable	EPA 9070
Sulfide (as S)	EPA 9034
Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 8270C
2,6-Dinitrotoluene	EPA 8270C
Isophorone	EPA 8270C
Nitrobenzene	EPA 8270C
Pyridine	EPA 8270C
Nitrosoamines	
N-Nitrosodimethylamine	EPA 8270C
N-Nitrosodi-n-propylamine	EPA 8270C
Phthalate Esters	
Benzyl butyl phthalate	EPA 8270C
Bis(2-ethylhexyl) phthalate	EPA 8270C
Diethyl phthalate	EPA 8270C
Dimethyl phthalate	EPA 8270C
Di-n-butyl phthalate	EPA 8270C
Di-n-octyl phthalate	EPA 8270C
Polychlorinated Biphenyls	
PCB-1016	EPA 8082
PCB-1221	EPA 8082
PCB-1232	EPA 8082
PCB-1242	EPA 8082
PCB-1248	EPA 8082
PCB-1254	EPA 8082
PCB-1260	EPA 8082
Polynuclear Aromatic Hydrocarbons	
Acenaphthene	EPA 8270C
Acenaphthylene	EPA 8270C
Anthracene	EPA 8270C

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Polynuclear Aromatic Hydrocarbons	
Benzo(a)anthracene	EPA 8270C
Benzo(a)pyrene	EPA 8270C
Benzo(b)fluoranthene	EPA 8270C
Benzo(ghi)perylene	EPA 8270C
Benzo(k)fluoranthene	EPA 8270C
Chrysene	EPA 8270C
Dibenzo(a,e)pyrene	EPA 8270C
Dibenzo(a,h)anthracene	EPA 8270C
Fluoranthene	EPA 8270C
Fluorene	EPA 8270C
Indeno(1,2,3-cd)pyrene	EPA 8270C
Naphthalene	EPA 8260B
	EPA 8270C
Phenanthrene	EPA 8270C
Pyrene	EPA 8270C
Priority Pollutant Phenols	
2,3,4,6 Tetrachlorophenol	EPA 8270C
2,4,5-Trichlorophenol	EPA 8270C
2,4,6-Trichlorophenol	EPA 8270C
2,4-Dichlorophenol	EPA 8270C
2,4-Dimethylphenol	EPA 8270C
2,4-Dinitrophenol	EPA 8270C

Priority Pollutant Phenols	
2,6-Dichlorophenol	EPA 8270C
2-Chlorophenol	EPA 8270C
2-Methyl-4,6-dinitrophenol	EPA 8270C
2-Methylphenol	EPA 8270C
2-Nitrophenol	EPA 8270C
3-Methylphenol	EPA 8270C
4-Chloro-3-methylphenol	EPA 8270C
4-Methylphenol	EPA 8270C
4-Nitrophenol	EPA 8270C
Pentachlorophenol	EPA 8270C
Phenol	EPA 8270C
Purgeable Aromatics	
1,2,4-Trimethylbenzene	EPA 8260B
1,2-Dichlorobenzene	EPA 8260B
	EPA 8270C
1,3,5-Trimethylbenzene	EPA 8260B
1,3-Dichlorobenzene	EPA 8260B
	EPA 8270C
1,4-Dichlorobenzene	EPA 8260B
	EPA 8270C
2-Chlorotoluene	EPA 8260B
4-Chlorotoluene	EPA 8260B

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All approved analytes are listed below:

Purgeable Aromatics

Benzene	EPA 8260B
Bromobenzene	EPA 8260B
Chlorobenzene	EPA 8260B
Ethyl benzene	EPA 8260B
Isopropylbenzene	EPA 8260B
n-Butylbenzene	EPA 8260B
sec-Butylbenzene	EPA 8260B
Styrene	EPA 8260B
tert-Butylbenzene	EPA 8260B
Toluene	EPA 8260B
Total Xylenes	EPA 8260B

Purgeable Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260B
1,1,1-Trichloroethane	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 8260B
1,1,2-Trichloroethane	EPA 8260B
1,1-Dichloroethane	EPA 8260B
1,1-Dichloroethene	EPA 8260B
1,2,3-Trichloropropane	EPA 8260B
1,2-Dibromo-3-chloropropane	EPA 8260B
1,2-Dichloroethane	EPA 8260B
1,2-Dichloropropane	EPA 8260B

Purgeable Halocarbons

1,3-Dichloro-2-propanol	EPA 8260B
1,3-Dichloropropane	EPA 8260B
2,2-Dichloropropane	EPA 8260B
2-Chloro-1,3-butadiene (Chloroprene)	EPA 8260B
2-Chloroethylvinyl ether	EPA 8260B
3-Chloropropene (Allyl chloride)	EPA 8260B
Bromochloromethane	EPA 8260B
Bromodichloromethane	EPA 8260B
Bromoform	EPA 8260B
Bromomethane	EPA 8260B
Carbon tetrachloride	EPA 8260B
Chloroethane	EPA 8260B
Chloroform	EPA 8260B
Chloromethane	EPA 8260B
cis-1,2-Dichloroethene	EPA 8260B
cis-1,3-Dichloropropene	EPA 8260B
cis-1,4-Dichloro-2-butene	EPA 8260B
Dibromochloromethane	EPA 8260B
Dichlorodifluoromethane	EPA 8260B
Methylene chloride	EPA 8260B
Tetrachloroethene	EPA 8260B
trans-1,2-Dichloroethene	EPA 8260B
trans-1,3-Dichloropropene	EPA 8260B

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Purgeable Halocarbons	
trans-1,4-Dichloro-2-butene	EPA 8260B
Trichloroethene	EPA 8260B
Trichlorofluoromethane	EPA 8260B
Vinyl chloride	EPA 8260B
Purgeable Organics	
2-Butanone (Methylethyl ketone)	EPA 8260B
2-Hexanone	EPA 8260B
4-Methyl-2-Pentanone	EPA 8260B
Acetone	EPA 8260B
Carbon Disulfide	EPA 8260B
Vinyl acetate	EPA 8260B
Semi-Volatile Organics	
2-Methylnaphthalene	EPA 8270C
Benzoic Acid	EPA 8270C
Benzyl alcohol	EPA 8270C
Dibenzofuran	EPA 8270C
Volatile Chlorinated Organics	
Benzyl chloride	EPA 8260B

Sample Preparation Methods

EPA 1311	EPA 9030B	EPA 9010B	EPA 3540C
EPA 3550B	EPA 3545		

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ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Amines	
4-Nitroaniline	EPA 8270C
Miscellaneous	
Cyanide, Total	EPA 9014

Sample Preparation Methods

EPA 1311	EPA 9030B	EPA 9010B	EPA 3540C
EPA 3550B	EPA 3545		

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All approved analytes are listed below:

Chlorinated Hydrocarbons	
1,2,4-Trichlorobenzene	NIOSH 2, VOL. 2 S133
Hexachlorobutadiene	NIOSH 2, VOL. 5 307
Metals I	
Lead, Total	EPA 200.7
Purgeable Aromatics	
1,2-Dichlorobenzene	NIOSH 2, VOL.3 S135
1,4-Dichlorobenzene	NIOSH 2, VOL. 3 S281
Benzene	NIOSH 2, VOL. 1 127
Chlorobenzene	NIOSH 2, VOL. 2 S133
Ethyl benzene	NIOSH 2, VOL 2 S29
Toluene	NIOSH 2, VOL. 3 S343
Total Xylenes	NIOSH 2, VOL. 3 S318

Serial No.: 32641

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
RICHARD F. DAINES, M.D.

Expires 12:01 AM April 01, 2008
Issued April 01, 2007
Revised May 07, 2007

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. DIVYAJIT MEHTA
CHEMTECH
284 SHEFFIELD STREET
MOUNTAINSIDE, NJ 07092

NY Lab Id No: 11376
EPA Lab Code:

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 8260B
Acrylonitrile	EPA 8260B
Amines	
2-Nitroaniline	EPA 8270C
3-Nitroaniline	EPA 8270C
4-Chloroaniline	EPA 8270C
4-Nitroaniline	EPA 8270C
Aniline	EPA 8270C
Carbazole	Method Not Specified
Pyridine	EPA 8270C
Bacteriology	
Standard Plate Count	SM 18 9215B
Benzidines	
3,3' -Dichlorobenzidine	EPA 625
	EPA 8270C
Benzidine	EPA 625
	EPA 8270C
Chlorinated Hydrocarbon Pesticides	
4,4'-DDD	EPA 608
	EPA 8081A

Chlorinated Hydrocarbon Pesticides	
4,4'-DDE	EPA 608
	EPA 8081A
4,4'-DDT	EPA 608
	EPA 8081A
Aldrin	EPA 608
	EPA 8081A
alpha-BHC	EPA 608
	EPA 8081A
alpha-Chlordane	Method Not Specified
beta-BHC	EPA 608
	EPA 8081A
Chlordane Total	EPA 608
	EPA 8081A
delta-BHC	EPA 608
	EPA 8081A
Dieldrin	EPA 608
	EPA 8081A
Endosulfan I	EPA 608
	EPA 8081A
Endosulfan II	EPA 608
	EPA 8081A
Endosulfan sulfate	EPA 608
	EPA 8081A

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Chlorinated Hydrocarbon Pesticides	
Endrin	EPA 608
	EPA 8081A
Endrin aldehyde	EPA 608
	EPA 8081A
Endrin Ketone	EPA 8081A
gamma-Chlordane	Method Not Specified
Heptachlor	EPA 608
	EPA 8081A
Heptachlor epoxide	EPA 608
	EPA 8081A
Lindane	EPA 608
	EPA 8081A
Methoxychlor	EPA 608
	EPA 8081A
Toxaphene	EPA 608
	EPA 8081A
Chlorinated Hydrocarbons	
1,2,4-Trichlorobenzene	EPA 625
	EPA 8270C
2-Chloronaphthalene	EPA 625
	EPA 8270C
Hexachlorobenzene	EPA 625

Chlorinated Hydrocarbons	
Hexachlorobenzene	EPA 8270C
Hexachlorobutadiene	EPA 625
	EPA 8270C
Hexachlorocyclopentadiene	EPA 625
	EPA 8270C
Hexachloroethane	EPA 625
	EPA 8270C
Chlorophenoxy Acid Pesticides	
2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A
2,4-D	EPA 8151A
Dicamba	EPA 8151A
Demand	
Biochemical Oxygen Demand	EPA 405.1
	SM 18-20 5210B (01)
Chemical Oxygen Demand	EPA 410.1
	EPA 410.4 Rev. 2.0
	SM 18-20 5220D (97)
Haloethers	
4-Bromophenylphenyl ether	EPA 625
	EPA 8270C

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Haloethers	
4-Chlorophenylphenyl ether	EPA 625
	EPA 8270C
Bis (2-chloroisopropyl) ether	EPA 625
	EPA 8270C
Bis(2-chloroethoxy)methane	EPA 625
	EPA 8270C
Bis(2-chloroethyl)ether	EPA 625
	EPA 8270C
Mineral	
Alkalinity	SM 18-20 2320B (97)
Chloride	EPA 300.0 Rev. 2.1
	EPA 325.3
	SM 18-20 4500-Cl- C
Fluoride, Total	EPA 300.0 Rev. 2.1
	EPA 340.2
	SM 18-20 4500-F C (97)
Hardness, Total	EPA 200.7 Rev. 4.4
Sulfate (as SO4)	EPA 300.0 Rev. 2.1
	EPA 375.4
Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 625
	EPA 8270C

Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 8330
2,6-Dinitrotoluene	EPA 625
	EPA 8270C
	EPA 8330
Isophorone	EPA 625
	EPA 8270C
Nitrobenzene	EPA 625
	EPA 8270C
	EPA 8330
Nitrosoamines	
N-Nitrosodimethylamine	EPA 625
	EPA 8270C
N-Nitrosodi-n-propylamine	EPA 625
	EPA 8270C
N-Nitrosodiphenylamine	EPA 625
	EPA 8270C
Nutrient	
Ammonia (as N)	EPA 350.1 Rev. 2.0
	EPA 350.2
Kjeldahl Nitrogen, Total	EPA 351.1 Rev. 1978
	EPA 351.3
	SM 18 4500-NH3 C

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Nutrient	
Nitrate (as N)	EPA 300.0 Rev. 2.1
	EPA 353.1
	EPA 353.2 Rev. 2.0
	SM 18-20 4500-NO3 E (00)
	SM 18-20 4500-NO3 F (00)
Nitrite (as N)	EPA 300.0 Rev. 2.1
	EPA 354.1
	SM 18-20 4500-NO2 B (00)
Orthophosphate (as P)	EPA 300.0 Rev. 2.1
	EPA 365.2
Phosphorus, Total	EPA 365.2
Phthalate Esters	
Benzyl butyl phthalate	EPA 625
	EPA 8270C
Bis(2-ethylhexyl) phthalate	EPA 625
	EPA 8270C
Diethyl phthalate	EPA 625
	EPA 8270C
Dimethyl phthalate	EPA 625
	EPA 8270C
Di-n-butyl phthalate	EPA 625
	EPA 8270C
Phthalate Esters	
Di-n-octyl phthalate	EPA 625
	EPA 8270C
Polychlorinated Biphenyls	
PCB-1016	EPA 608
	EPA 8082
PCB-1221	EPA 608
	EPA 8082
PCB-1232	EPA 608
	EPA 8082
PCB-1242	EPA 608
	EPA 8082
PCB-1248	EPA 608
	EPA 8082
PCB-1254	EPA 608
	EPA 8082
PCB-1260	EPA 608
	EPA 8082
Polynuclear Aromatics	
Acenaphthene	EPA 625
	EPA 8270C
	EPA 8310
Acenaphthylene	EPA 625

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Polynuclear Aromatics	
Acenaphthylene	EPA 8270C
	EPA 8310
Anthracene	EPA 625
	EPA 8270C
	EPA 8310
Benzo(a)anthracene	EPA 625
	EPA 8270C
	EPA 8310
Benzo(a)pyrene	EPA 625
	EPA 8270C
	EPA 8310
Benzo(b)fluoranthene	EPA 625
	EPA 8270C
	EPA 8310
Benzo(ghi)perylene	EPA 625
	EPA 8270C
	EPA 8310
Benzo(k)fluoranthene	EPA 625
	EPA 8270C
	EPA 8310
Chrysene	EPA 625
	EPA 8270C
	EPA 8310

Polynuclear Aromatics	
Dibenzo(a,h)anthracene	EPA 625
	EPA 8270C
	EPA 8310
Fluoranthene	EPA 625
	EPA 8270C
	EPA 8310
Fluorene	EPA 625
	EPA 8270C
	EPA 8310
Indeno(1,2,3-cd)pyrene	EPA 625
	EPA 8270C
	EPA 8310
Naphthalene	EPA 625
	EPA 8270C
	EPA 8310
Phenanthrene	EPA 625
	EPA 8270C
	EPA 8310
Pyrene	EPA 625
	EPA 8270C
	EPA 8310

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Priority Pollutant Phenols	
2,4,5-Trichlorophenol	EPA 625
	EPA 8270C
2,4,6-Trichlorophenol	EPA 625
	EPA 8270C
2,4-Dichlorophenol	EPA 625
	EPA 8270C
2,4-Dimethylphenol	EPA 625
	EPA 8270C
2,4-Dinitrophenol	EPA 625
	EPA 8270C
2-Chlorophenol	EPA 625
	EPA 8270C
2-Methyl-4,6-dinitrophenol	EPA 625
	EPA 8270C
2-Methylphenol	EPA 8270C
2-Nitrophenol	EPA 625
	EPA 8270C
4-Chloro-3-methylphenol	EPA 625
	EPA 8270C
4-Methylphenol	EPA 8270C
4-Nitrophenol	EPA 625
	EPA 8270C
Cresols, Total	EPA 8270C

Priority Pollutant Phenols	
Pentachlorophenol	EPA 625
	EPA 8270C
Phenol	EPA 625
	EPA 8270C
Purgeable Aromatics	
1,2-Dichlorobenzene	EPA 601
	EPA 602
	EPA 624
	EPA 625
	EPA 8021B
	EPA 8260B
	EPA 8270C
1,3-Dichlorobenzene	EPA 601
	EPA 602
	EPA 624
	EPA 625
	EPA 8021B
	EPA 8260B
1,4-Dichlorobenzene	EPA 601
	EPA 602
	EPA 624
	EPA 625

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Purgeable Aromatics	
1,4-Dichlorobenzene	EPA 8021B
	EPA 8260B
Benzene	EPA 602
	EPA 624
	EPA 8021B
	EPA 8260B
Chlorobenzene	EPA 624
	EPA 8021B
	EPA 8260B
Ethyl benzene	EPA 602
	EPA 624
	EPA 8021B
	EPA 8260B
Styrene	Method Not Specified
Toluene	EPA 624
	EPA 8021B
	EPA 8260B
Total Xylenes	EPA 624
	EPA 8021B
	EPA 8260B
Purgeable Halocarbons	
1,1,1-Trichloroethane	EPA 601

Purgeable Halocarbons	
1,1,1-Trichloroethane	EPA 624
	EPA 8021B
	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
1,1,2-Trichloroethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
1,1-Dichloroethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
1,1-Dichloroethene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
1,2-Dichloroethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B

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Purgeable Halocarbons	
1,2-Dichloropropane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
2-Chloroethylvinyl ether	EPA 601
	EPA 624
	EPA 8260B
	SM 18-19 6230B
Bromodichloromethane	EPA 624
	EPA 8021B
	EPA 8260B
Bromoform	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Bromomethane	EPA 601
	EPA 8021B
	EPA 8260B
Carbon tetrachloride	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Chloroethane	EPA 601

Purgeable Halocarbons	
Chloroethane	EPA 624
	EPA 8021B
	EPA 8260B
Chloroform	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Chloromethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
cis-1,3-Dichloropropene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Dibromochloromethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Dichlorodifluoromethane	EPA 601
	EPA 624
	EPA 8260B
Methylene chloride	EPA 601

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Purgeable Halocarbons	
Methylene chloride	EPA 624
	EPA 8021B
	EPA 8260B
Tetrachloroethene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
trans-1,2-Dichloroethene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
trans-1,3-Dichloropropene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Trichloroethene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Trichlorofluoromethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Purgeable Halocarbons	
Vinyl chloride	EPA 601
	EPA 8021B
Purgeable Organics	
2-Butanone (Methylethyl ketone)	EPA 8015 B
	EPA 8260B
2-Hexanone	EPA 8260B
4-Methyl-2-Pentanone	EPA 8260B
Acetone	EPA 8260B
Carbon Disulfide	EPA 8260B
Vinyl acetate	EPA 8260B
Residue	
Solids, Total	EPA 160.3
	SM 18-20 2540B (97)
Solids, Total Dissolved	EPA 160.1
	SM 18-20 2540C (97)
Solids, Total Suspended	EPA 160.2
	SM 18-20 2540D (97)
Semi-Volatile Organics	
2-Methylnaphthalene	EPA 8270C
Benzoic Acid	EPA 8270C
Benzyl alcohol	EPA 8270C

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Semi-Volatile Organics	
Dibenzofuran	EPA 8270C
Wastewater Metals I	
Barium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Cadmium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-19 3113B (99)
	SM 18-20 3120B (99)
Calcium, Total	EPA 200.7 Rev. 4.4
	EPA 6010B
Chromium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Copper, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Iron, Total	EPA 200.7 Rev. 4.4

Wastewater Metals I	
Iron, Total	EPA 6010B
	SM 18-20 3120B (99)
Lead, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Magnesium, Total	EPA 200.7 Rev. 4.4
	EPA 6010B
Manganese, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Nickel, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Potassium, Total	EPA 200.7 Rev. 4.4
	EPA 6010B
	SM 18-20 3120B (99)
Silver, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)

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Wastewater Metals I	
Sodium, Total	EPA 200.7 Rev. 4.4
	EPA 6010B
	SM 18-20 3120B (99)
Wastewater Metals II	
Aluminum, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Antimony, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Arsenic, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Beryllium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 210.1
	EPA 6010B
	SM 18-20 3120B (99)
Chromium VI	EPA 7196A

Wastewater Metals II	
Mercury, Total	EPA 245.1 Rev. 3.0
	EPA 7470A
	SM 18-19 3112B (99)
Selenium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Vanadium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Zinc, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Wastewater Metals III	
Cobalt, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)
Molybdenum, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
RICHARD F. DAINES, M.D.

Expires 12:01 AM April 01, 2008
Issued April 01, 2007
Revised May 07, 2007

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. DIVYAJIT MEHTA
CHEMTECH
284 SHEFFIELD STREET
MOUNTAINSIDE, NJ 07092

NY Lab Id No: 11376
EPA Lab Code:

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER All approved analytes are listed below:

Wastewater Metals III

Molybdenum, Total	EPA 6010B
	SM 18-20 3120B (99)
Thallium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
	EPA 6010B
	SM 18-20 3120B (99)

Wastewater Miscellaneous

Boron, Total	EPA 200.7 Rev. 4.4
	EPA 6010B
Bromide	EPA 300.0 Rev. 2.1
Color	EPA 110.2
Cyanide, Total	EPA 335.1
	EPA 335.2
	EPA 9012A
	SM 18-20 4500-CN D (99)
	SM 18-20 4500-CN E (99)
Hydrogen Ion (pH)	EPA 150.1
	EPA 9040B
	SM 18-20 4500-H B (00)
Oil & Grease Total Recoverable	EPA 1664A
	EPA 413.1
Organic Carbon, Total	EPA 415.1

Wastewater Miscellaneous

Phenols	EPA 420.1 Rev. 1978
Silica, Dissolved	EPA 200.7 Rev. 4.4
Specific Conductance	EPA 120.1 Rev. 1982
	SM 18-20 2510B (97)
Sulfide (as S)	EPA 376.1
	EPA 9034
Surfactant (MBAS)	EPA 425.1
	SM 18-20 5540C (00)
Temperature	SM 18-20 2550B (00)

Sample Preparation Methods

EPA 9030B	EPA 9010B	EPA 3010A	EPA 3005A
EPA 3510C	EPA 3520C	EPA 5030B	

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Acrylates	
Acrolein (Propenal)	EPA 8260B
Acrylonitrile	EPA 8260B
Amines	
2-Nitroaniline	EPA 8270C
3-Nitroaniline	EPA 8270C
4-Chloroaniline	EPA 8270C
4-Nitroaniline	Method Not Specified
Carbazole	EPA 8270C
Benzidines	
3,3' -Dichlorobenzidine	EPA 8270C
Benzidine	EPA 8270C
Characteristic Testing	
Corrosivity	EPA 1110
	EPA 9040B
Ignitability	EPA 1010
	EPA 1030
Reactivity	SW-846 Ch7, Sec. 7.3
Chlorinated Hydrocarbon Pesticides	
4,4'-DDD	EPA 8081A
4,4'-DDE	EPA 8081A

Chlorinated Hydrocarbon Pesticides	
4,4'-DDT	EPA 8081A
Aldrin	EPA 8081A
alpha-BHC	EPA 8081A
alpha-Chlordane	Method Not Specified
beta-BHC	EPA 8081A
Chlordane Total	EPA 8081A
delta-BHC	EPA 8081A
Dieldrin	EPA 8081A
Endosulfan I	EPA 8081A
Endosulfan II	EPA 8081A
Endosulfan sulfate	EPA 8081A
Endrin	EPA 8081A
Endrin aldehyde	EPA 8081A
Endrin Ketone	EPA 8081A
gamma-Chlordane	Method Not Specified
Heptachlor	EPA 8081A
Heptachlor epoxide	EPA 8081A
Lindane	EPA 8081A
Methoxychlor	EPA 8081A
Toxaphene	EPA 8081A
Chlorinated Hydrocarbons	
1,2,4-Trichlorobenzene	EPA 8270C

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Chlorinated Hydrocarbons	
2-Chloronaphthalene	EPA 8270C
Hexachlorobenzene	EPA 8270C
Hexachlorobutadiene	EPA 8270C
Hexachlorocyclopentadiene	EPA 8270C
Hexachloroethane	EPA 8270C
Chlorophenoxy Acid Pesticides	
2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A
2,4-D	EPA 8151A
Dicamba	EPA 8151A
Haloethers	
4-Bromophenylphenyl ether	EPA 8270C
4-Chlorophenylphenyl ether	EPA 8270C
Bis (2-chloroisopropyl) ether	EPA 8270C
Bis(2-chloroethoxy)methane	EPA 8270C
Bis(2-chloroethyl)ether	EPA 8270C
Metals I	
Barium, Total	EPA 6010B
	EPA 6020
Cadmium, Total	EPA 6010B
	EPA 6020

Metals I	
Calcium, Total	EPA 6010B
Chromium, Total	EPA 6010B
	EPA 6020
Copper, Total	EPA 6010B
	EPA 6020
Iron, Total	EPA 6010B
Lead, Total	EPA 6010B
	EPA 6020
Magnesium, Total	EPA 6010B
Manganese, Total	EPA 6010B
Nickel, Total	EPA 6010B
	EPA 6020
Potassium, Total	EPA 6010B
Silver, Total	EPA 6010B
	EPA 6020
Sodium, Total	EPA 6010B
Metals II	
Aluminum, Total	EPA 6010B
	EPA 6020
Antimony, Total	EPA 6010B
	EPA 6020
Arsenic, Total	EPA 6010B

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Metals II	
Arsenic, Total	EPA 6020
Beryllium, Total	EPA 6010B
Chromium VI	EPA 7196A
Mercury, Total	EPA 7471A
Selenium, Total	EPA 6010B
	EPA 6020
Vanadium, Total	EPA 6010B
Zinc, Total	EPA 6010B
Metals III	
Cobalt, Total	EPA 6010B
Molybdenum, Total	EPA 6010B
Thallium, Total	EPA 6010B
	EPA 6020
Miscellaneous	
Cyanide, Total	EPA 9012A
	EPA 9014
Hydrogen Ion (pH)	EPA 9040B
	EPA 9045C
Sulfide (as S)	EPA 9034
Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 8270C
Nitroaromatics and Isophorone	
2,6-Dinitrotoluene	EPA 8270C
Isophorone	EPA 8270C
	OLM 4.2 BNA
Nitrobenzene	EPA 8270C
Nitrosoamines	
N-Nitrosodi-n-propylamine	EPA 8070A
N-Nitrosodiphenylamine	EPA 8270C
Phthalate Esters	
Benzyl butyl phthalate	EPA 8270C
Bis(2-ethylhexyl) phthalate	EPA 8270C
Diethyl phthalate	EPA 8270C
Dimethyl phthalate	EPA 8270C
Di-n-butyl phthalate	EPA 8270C
Di-n-octyl phthalate	EPA 8270C
Polychlorinated Biphenyls	
PCB-1016	EPA 8082
PCB-1221	EPA 8082
PCB-1232	EPA 8082
PCB-1242	EPA 8082
PCB-1248	EPA 8082
PCB-1254	EPA 8082

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Polychlorinated Biphenyls	
PCB-1260	EPA 8082
Polynuclear Aromatic Hydrocarbons	
Acenaphthene	EPA 8270C
Acenaphthylene	EPA 8270C
Anthracene	EPA 8270C
Benzo(a)anthracene	EPA 8270C
Benzo(a)pyrene	EPA 8270C
Benzo(b)fluoranthene	EPA 8270C
Benzo(ghi)perylene	EPA 8270C
Benzo(k)fluoranthene	Method Not Specified
Chrysene	EPA 8270C
Dibenzo(a,h)anthracene	EPA 8270C
Fluoranthene	EPA 8270C
Fluorene	EPA 8270C
Indeno(1,2,3-cd)pyrene	EPA 8270C
Naphthalene	EPA 8270C
Phenanthrene	EPA 8270C
Pyrene	EPA 8270C
Priority Pollutant Phenols	
2,4,5-Trichlorophenol	EPA 8270C
2,4,6-Trichlorophenol	EPA 8270C
2,4-Dichlorophenol	EPA 8270C

Priority Pollutant Phenols	
2,4-Dimethylphenol	EPA 8270C
2,4-Dinitrophenol	EPA 8270C
2-Chlorophenol	EPA 8270C
2-Methyl-4,6-dinitrophenol	EPA 8270C
2-Methylphenol	EPA 8270C
2-Nitrophenol	EPA 8270C
4-Chloro-3-methylphenol	EPA 8270C
4-Methylphenol	EPA 8270C
4-Nitrophenol	EPA 8270C
Pentachlorophenol	EPA 8270C
Phenol	EPA 8270C
Purgeable Aromatics	
1,2-Dichlorobenzene	EPA 8021B
	EPA 8260B
1,3-Dichlorobenzene	EPA 8021B
	EPA 8260B
1,4-Dichlorobenzene	EPA 8021B
	EPA 8260B
Benzene	EPA 8021B
	EPA 8260B
Chlorobenzene	EPA 8021B
	EPA 8260B

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Purgeable Aromatics	
Ethyl benzene	EPA 8021B
	EPA 8260B
Styrene	EPA 8260B
Toluene	EPA 8021B
	EPA 8260B
Total Xylenes	EPA 8021B
	EPA 8260B
Purgeable Halocarbons	
1,1,1-Trichloroethane	EPA 8021B
	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 8021B
	EPA 8260B
1,1,2-Trichloroethane	EPA 8021B
	EPA 8260B
1,1-Dichloroethane	EPA 8021B
	EPA 8260B
1,1-Dichloroethene	EPA 8021B
	EPA 8260B
1,2-Dichloroethane	EPA 8021B
	EPA 8260B
1,2-Dichloropropane	EPA 8021B
	EPA 8260B

Purgeable Halocarbons	
2-Chloroethylvinyl ether	EPA 8021B
	EPA 8260B
Bromodichloromethane	EPA 8021B
	EPA 8260B
Bromoform	EPA 8021B
	EPA 8260B
Bromomethane	EPA 8021B
	EPA 8260B
Carbon tetrachloride	EPA 8021B
	EPA 8260B
Chloroethane	EPA 8021B
	EPA 8260B
Chloroform	EPA 8021B
	EPA 8260B
Chloromethane	EPA 8021B
	EPA 8260B
cis-1,3-Dichloropropene	EPA 8021B
	EPA 8260B
Dibromochloromethane	EPA 8021B
	EPA 8260B
Dichlorodifluoromethane	EPA 8021B
	EPA 8260B
Methylene chloride	EPA 8021B

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Purgeable Halocarbons

Methylene chloride	EPA 8260B
Tetrachloroethene	EPA 8021B
	EPA 8260B
trans-1,3-Dichloropropene	EPA 8021B
	EPA 8260B
Trichloroethene	EPA 8021B
	EPA 8260B
Trichlorofluoromethane	EPA 8021B
	EPA 8260B
Vinyl chloride	EPA 8021B
	EPA 8260B

Purgeable Organics

2-Butanone (Methylethyl ketone)	EPA 8260B
2-Hexanone	EPA 8260B
4-Methyl-2-Pentanone	EPA 8260B
Acetone	EPA 8260B
Carbon Disulfide	EPA 8260B
Vinyl acetate	EPA 8260B

Semi-Volatile Organics

2-Methylnaphthalene	EPA 8270C
Benzoic Acid	EPA 8270C
Benzyl alcohol	EPA 8270C

Semi-Volatile Organics

Dibenzofuran	EPA 8270C

Sample Preparation Methods

EPA 1311	EPA 9030B	EPA 9010B	EPA 3010A
EPA 3005A	EPA 3050B	EPA 3550B	EPA 5030B
EPA 5035	EPA 3060A	EPA 3541	
EPA 5035	EPA 3060A	EPA 3541	
EPA 3005A	EPA 3050B	EPA 3550B	

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APPENDIX B

Master Sample Log
Backfill Tracking Log
Daily Project Summary Report

Master Sample Log
Hempstead Intersection Street Former MGP Site
Project #E7370

Sample ID	Lab ID	Matrix	Sample Date	Sample Time	Sampler	Date to Lab	TAT	Lab Report Date Prelim	Lab Report Date Final	Parameters																	Notes
										RCRA Metals 6010B/7000 series	VOC 8260B	SVOC 8270	PAHs 8270C	TPH 8015 modified	Pesticides 8082	PCBs 8082	Reactivity Chapter 7	Ignitability 1010	Corrosivity 9040B	Paint Filter 9095B	TCLP RCRA Metals	TCLP VOC 1311/8260B	TCLP SVOC 1311/8270C	TCLP Pesticides 1311/8081B	Total Sulfur D129		

IMPORTED BACKFILL SUMMARY
Hempstead Intersection Street Former MGP Site

Sample ID	Sample Collection Date	Analytical Laboratory	Laboratory Sample ID	Meets 6 NYCRR Part 375 [(a)]	Meets Geotech Specs [(b)]	Organic Content (%)	Borrow Source	Material Placed (tn)	Comments

Notes:
[(a)] Meets 6 NYCRR Part 375, Table 375-6.8(b) residential use, as indicated by laboratory analytical results.
[(b)] Meets geotechnical specs as stated in the Technical Specification 02300 2.1.2
[(c)] "cy" indicates cubic yards.

Project Site Information

ENTACT
www.entact.com

Daily Project Summary Report

ENTACT Project No.:
Date of Activity:
Weather Conditions:
Hours of Operation:

A. ENTACT Personnel

Name	Role

B. Subcontractors

Company	QTY	Role

C. Craft Labor

Type	QTY	Role

D. Equipment

E. Material Removed From Site

Material Type	QTY	Units

F. Material Imported to Site

Material Type	QTY	Units

G. Detailed Summary Of Work Performed

H. Instruction from Engineer Outside of Scope

I. Health & Safety Specifics

Main Tailgate Topic	Activities/Observations

J. Health & Safety Incidents

Description	Injuries	First Aid Performed	Recordable

K. Permits and Communications

Permits Issued	Additional Topics/Concerns

L. Contact Made with Local Community

M. Air Monitoring Performed By ENTACT

Personal Air Monitors

Associate	Activity	PAM ID

Personal Data RAM

Location of Reading	Time	Reading

PID/Multi Rae

Location of Reading	Time	Reading

Specialty Sampling

Location of Reading	Time	Reading

Appendix G

Temporary Containment Structure

(Provided in Electronic Format Only)

Universal Fabric Structures
2200 Kumry Road
Quakertown, PA 18951
(215) 529-9921

TFS/R 29.2M x 35M

KeySpan Hempstead Intersection Street Former MGP

Structural calculation of a TFS/R 29.2m structure
according to the New York Building Code

STRUCTURAL ONLY

CHANDER P. NANGIA P.E.
7423 HOLLOW RIDGE DR.
HOUSTON, TX 77095

STATE OF NEW YORK
CHANDER P. NANGIA
PROFESSIONAL ENGINEER

JUN 04 2008

The professional engineer seal on this cover page refers to the calculation sheets contained within this document and to any Appendix or Table sheets that support this document. Any other drawings and documents may require a separate seal for coverage not provided here.

UNIVERSAL
FABRIC STRUCTURES

Universal Fabric Structures
2200 Kumry Road
Quakertown, PA 18951
(215) 529-9921

Table of Contents

Revision Log

Rev	Rev. Date	Sections Affected	Description
0	28 May 08	-	Original Issue
A			

UNIVERSAL
FABRIC STRUCTURES

Universal Fabric Structures
2200 Kumry Road
Quakertown, PA 18951
(215) 529-9921

1. Introduction

This document describes the structural design calculations for a TFS/R style Tension Fabric Structure. The length of the structure can reach any value as long as it's a multiple of the bay distance.

Distance between two arches : $L_{bay} = 5\ m$

For a length of 40 m or less, two bays with bracing cables are needed. If the length is higher than 40 m, an additional bay with steel bracing cables is needed. The maximum distance between two bays with bracing cables is 30 m. There should always be a bay with bracing cables at both ends of the structure.

Height of the peak : $z = 12.3\ m$

The external loadings on the fabric like wind, rain and snow are transmitted directly to the main arch.
The function of the purlin is to keep the distance between the arches and to ensure the longitudinal stability in combination with the cable bracing system.

The calculation is based on the finite element method and uses nodes which are connected by beams.
The connections of the arches with the base plates are considered as hinges. The connections of the cables as well as the connection of the purlins to the arches are considered as hinges.

The profile is calculated as being continuous. The splices are checked with the results from the general arch calculation.

The hinged connection of the arch and base plate is situated at 160 mm above the ground level.

The computational analysis is performed by the VisualAnalysis 5.0 computer program. The presentation calculations are done with the MathCAD computer program.

The design is governed by the following codes and guides:

- ASCE 7-02 (American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures, by reference)
- Aluminum Design Manual, Specifications & Guidelines for Aluminum Structures (The Aluminum Association, 2000)
- AISC ASD 9th edition (American Institute of Steel Construction, Manual of Steel Design, 1989)

UNIVERSAL
FABRIC STRUCTURES

Universal Fabric Structures
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(215) 529-9921

2. Project Parameters

Building Geometry

Building length:	$L_{length} = 114.83\ ft$	Peak height:	$z = 40.22\ ft$	
Building width:	$L_{width} = 95.93\ ft$	Eave height:	$h_e = 17.86\ ft$	
Bay spacing:	$L_{bay} = 16.4\ ft$	Mean roof height:	$h := 0.5 \cdot (z + h_e)$	$h = 29.04\ ft$
Purlin spacing:	$L_{purlin} = 6.67\ ft$	Roof slope:	$\theta_t := \operatorname{atan}\left[\frac{2 \cdot (z - h_e)}{L_{width}}\right]$	$\theta_t = 25\ deg$

Basic wind speed:	$V = 110\ mph$	*[Section 6.5.4]*
Category:	$Cat = "II"$	*[Table 1-1]*
Importance factor (wind):	$I_W = 1$	*[Table 6-1]*
Exposure:	$Exposure = "C"$	*[Sections 6.5.6.2 & 6.5.6.3]*
Expected life of structure (years):	$Life = 10$	

Extrusion Profile: **380**

Weight of the main profile : $Weight_{ALU380} := 11.91 \frac{kg}{m}$

Weight of the fabric : $Weight_{fabric} := UnitWeight_{fabric} \cdot L_{bay}$ $Weight_{fabric} = 4.07 \frac{kg}{m}$ $Weight_{fabric} = 0.23 \frac{lb}{in}$

Weight of the Inside Liner : $Weight_{liner} := UnitWeight_{liner} \cdot L_{bay}$ $Weight_{liner} = 2.71 \frac{kg}{m}$ $Weight_{liner} = 0.15 \frac{lb}{in}$

Weight of the purlins : $Weight_{ALU97} := 2.03 \cdot \frac{kg}{m}$ $Weight_{ALU97} = 0.11 \frac{lb}{in}$

$Weight_{ALU129} := 2.56 \cdot \frac{kg}{m}$ $Weight_{ALU129} = 0.14 \frac{lb}{in}$

$Weight_{ALU133} := 4.35 \cdot \frac{kg}{m}$ $Weight_{ALU133} = 0.24 \frac{lb}{in}$

Total Length of arch : $Length_{arch} = 40.71\ m$

Weight of Peak Splice : $Weight_{peak\_splice} = 70\ kg$

Weight of Straight Splice: $Weight_{connection\_splice} = 45\ kg$

Weight of Light Assy: $Weight_{light\_assy} = 40\ lb$ (based on $Desc_{light\_assy} = "400W\ Direct\ w/\ lens\ \&\ guard"$)

UNIVERSAL
FABRIC STRUCTURES

Universal Fabric Structures
2200 Kumry Road
Quakertown, PA 18951
(215) 529-9921

3. Determination of Loads

Dead Load :

The uniform loading on the arch consists of the weight of the :
- main profile
- purlins
- fabric

There are 10 heavy purlins (ALU 129/89), 6 light purlins (ALU 97/77) and 1 peak purlin (ALU 133/70) per bay.

$$Weight_{purlins} := L_{bay} \cdot (10 \cdot Weight_{ALU129} + 6 \cdot Weight_{ALU97} + 1 \cdot Weight_{ALU133})$$

$Weight_{purlins} = 210.65\,kg$ $Weight_{purlins} = 464.4\,lb$

This weight is divided by the total length of the arch. $Length_{arch} = 40.71\,m$ $Length_{arch} = 1603\,in$

Total Uniform weight : $$Weight_{uniform} := Weight_{ALU380} + Weight_{fabric} + Weight_{liner} + \frac{Weight_{purlins}}{Length_{arch}}$$

$Weight_{uniform} = 23.9 \frac{kg}{m}$ $Weight_{uniform} = 1.336 \frac{lb}{in}$

Local loadings are the weight of the peak splice, connection splices, and lighting assemblies.

$Weight_{peak\_splice} = 70\,kg$ $Weight_{peak\_splice} = 154.3\,lb$

$Weight_{connection\_splice} = 45\,kg$ $Weight_{connection\_splice} = 99\,lb$

A general lighting system is assumed. This consists of metal halide, high bay warehouse style light fixtures that weigh approximately 45 lbs each. The light fixtures will be evenly distributed throughout the structure and will be hung from the aluminum structure frame such that no more than two fixtures are attached to any single arch.

$Weight_{light\_assy} = 18.14\,kg$ $Weight_{light\_assy} = 40\,lb$

Other incidental loads due to electrical conduit or emergency lighting are negligible so do not impact these calculations.

Collateral Loads :

The structure is designed to support the loads shown in this calculations. It may, or may not, be capable of supporting additional collateral loads. The owner of the structure shall not hand, or otherwise affix, additional loads to this structure without a review by an engineer qualified to make said review. Additionally, prior to adding load to this structure, the owner shall get a written confirmation by the qualified engieer as to the magnitude and location of the load, or loads, being applied.

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Snow Load :
(Modified for UFS Building Applications & Applied as projection on horizontal distance)

From The Glossary of Meteorology, "snow density is the specific gravity of the snow sample". Also, "freshly fallen snow usually has a snow density of 0.07 to 0.15. Values as low as 0.004 have been measured".

A study was documented in the abstract Snow Density and it Underlying Variables; Atmospheric and Oceanic Sciences, University of Wisconsin-Madison by Andrew S. Thut. In that study, various snow falls were measured, and the snow densities ranged from a minimum of 0.030 to a maximum of 0.141. The mean value was 0.063.

For this analysis, we will use a slightly higher than average snow density of 0.125. We will also add a safety factor to cover any uncertainty that higher loads may occur.

1) Balanced snow based on 3 times the maximum observed.
2) Unbalanced snow based on 3 times the maximum observed with the windward side free of snow.

Based on UFS Building performance in snow storms of significant accumulation, the maximum snow observed was 3 - 4" (max based on a storm that dropped 1.5 feet of snow on an unheated structure).

Water density (pure):	$\gamma_{water} = 62.43\ pcf$	
Snow Density (assumed) :	$\gamma_{snow} := \gamma_{water} \cdot 12.5\%$	$\gamma_{snow} = 7.8\ pcf$
Additional Safety Factor:	$Factor = 3$	
Observed depth:	$d := 3.5 \cdot in \cdot Factor$	$d = 10.5\ in$
Design load:	$ps := \gamma_{snow} \cdot d$	$ps = 6.83\ psf$
	$ps := ps \cdot L_{bay}$	$ps = 112\ plf$
		$ps = 9.33\ pli$

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Roof Live Load :
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Based on UFS Building performances, only short duration of the Roof Live Load is expected on the Fabric Roof Structure. It's rare to have the presence of workers and materials on the roof of the structure. If repairs are needed, usually one worker with a light equipment would suffice.

Assume a maximum concentrated load 500 lbf to be used as a Roof Live Load.

Roof Live Load : $L_r := \frac{500 \cdot lbf}{Length_{arch}}$ $L_r = 3.74\,plf$ (reference)

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Wind Loads.

MathCAD Reference Files

UFS Std. MathCADFiles
Tables
Functions

Building Geometry

Building length:	$L_{length} = 114.83\,ft$	Peak height:	$z = 40.22\,ft$	
Building width:	$L_{width} = 95.93\,ft$	Eave height:	$h_e = 17.86\,ft$	
Bay spacing:	$L_{bay} = 16.4\,ft$	Mean roof height:	$h := 0.5\cdot(z + h_e)$	$h = 29.04\,ft$
Purlin spacing:	$L_{purlin} = 6.67\,ft$	Roof slope:	$\theta_t := \operatorname{atan}\left[\frac{2\cdot(z - h_e)}{L_{width}}\right]$	$\theta_t = 25\,deg$

Load Design Criteria - ASCE 7-98

Method 2, Analytical Procedure, from Section 6.5 is used in these calculations. In addition, the low-rise provisions of buildings, given in Section 6.5.12.2 and Figure 6-10, will be used.

Basic wind speed:	$V = 110\,mph$		*[Section 6.5.4]*
Exposure:	$Exposure = "C"$		*[Section 6.5.6]*
Category:	$Cat = "II"$		*[Table 1-1]*
Importance factor:	$I_W = 1$		*[Table 6-1]*
Index for calculations:	$idxE := Exposure\_Index\_For(Exposure)$		
Expected life of structure (years):	$Life = 10$		
Reduction factor for 'other' MRI:	$R_n := RecurFactor(Life)$	$R_n = 0.84$	*[Table C6-3]*
Effective wind speed:	$V_r := V\cdot R_n$	$V_r = 92.4\,mph$	

Velocity Pressure Exposure Coefficients

$\alpha := Table_{6.4_{idxE,0}}$	$\alpha = 9.5$	*[Table 6-2]*
$z_g := Table_{6.4_{idxE,1}}\cdot ft$	$z_g = 900\,ft$	*[Table 6-2]*

$$K_z := 2.01\cdot\left(\frac{\max(15\cdot ft, if(Exposure = "B", \max(30\cdot ft, h), h))}{z_g}\right)^{\frac{2}{\alpha}} \qquad K_z = 0.98$$ *[Table 6-3]*

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Wind Directionality

$K_d = 0.85$ *[Table 6-4]*

Topographic Factor

$K_{zt} = 1$ *[Section 6.5.7]*

Gust Factor

$l := \text{Table}_{6.4_{idxE,7}} \cdot ft$ $l = 500\ ft$ *[Section 6.5.8.1] [Table 6-2]*

$\varepsilon_{bar} := \text{Table}_{6.4_{idxE,8}}$ $\varepsilon_{bar} = 0.2$

$c := \text{Table}_{6.4_{idxE,6}}$ $c = 0.2$

$z_{bar} := 0.6 \cdot h$ $z_{bar} = 17.43\ ft$

$L_{z.bar} := l \cdot \left(\frac{z_{bar}}{33 \cdot ft} \right)^{\varepsilon_{bar}}$ $L_{z.bar} = 440.05\ ft$ *[Equation 6-7]*

$Q := \sqrt{\frac{1}{1 + 0.63 \cdot \left(\frac{L_{width} + h}{L_{z.bar}} \right)^{0.63}}}$ $Q = 0.88$ *[Equation 6-6]*

$I_{z.bar} := c \cdot \left(\frac{33 \cdot ft}{z_{bar}} \right)^{\frac{1}{6}}$ $I_{z.bar} = 0.22$ *[Equation 6-5]*

$g_Q := 3.4$ $g_v := 3.4$

$G := 0.925 \cdot \left(\frac{1 + 1.7 \cdot g_Q \cdot I_{z.bar} \cdot Q}{1 + 1.7 \cdot g_v \cdot I_{z.bar}} \right)$ $G = 0.86$ *[Equation 6-4]*

Velocity Pressure

$q_h := 0.00256 \cdot \frac{psf}{mph^2} \cdot K_z \cdot K_{zt} \cdot K_d \cdot V_r^2 \cdot I_W$ $q_h = 18.12\ psf$ *[Equation 6-15]*

Internal Pressure Coefficients (GCpi)

Openings are considered to be equally distributed around the building. The building qualifies as an enclosed building (see Section 6.2). The value can be both positive (overpressure), and negative (underpressure).

$GC_{pi} = 0.18$ *[Section 6.5.11.1] [Figure 6-5]*

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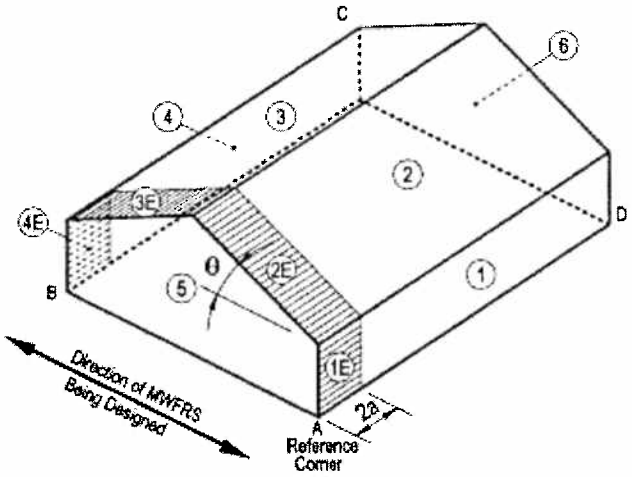

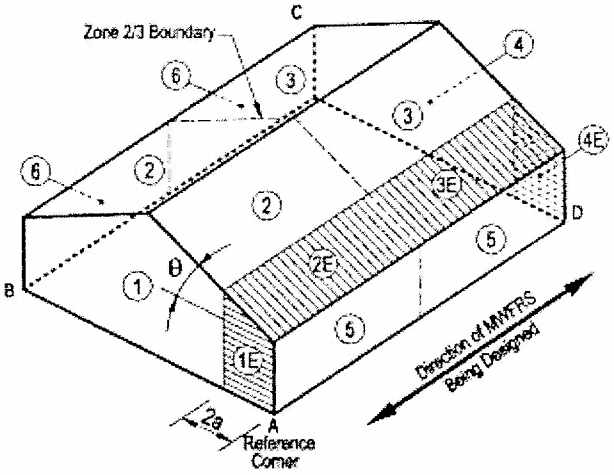

External Pressure Coefficients (C_p)

Transverse Direction

GC_{pf} =

"1"	"2"	"3"	"4"	"5"	"6"	"1E"	"2E"	"3E"	"4E"
0.54	-0.24	-0.46	-0.4	-0.45	-0.45	0.75	-0.4	-0.61	-0.56

by linear interpolation of Figure 6.4 for $\theta_t = 25\,\text{deg}$

Longitudinal Direction

GC_{pf} =

"1"	"2"	"3"	"4"	"5"	"6"	"1E"	"2E"	"3E"	"4E"
0.4	-0.69	-0.37	-0.29	-0.45	-0.45	0.61	-1.07	-0.53	-0.43

by linear interpolation of Figure 6.4 for $\theta = 0 \cdot \text{deg}$

Design Wind Pressures

$P = qGC_p \pm q_h(GC_{pi})$ *[Equation 6-17]*

Transverse Direction

P =

"1"	"2"	"3"	"4"	"5"	"6"	"1E"	"2E"	"3E"	"4E"
6.62	-7.62	-11.51	-10.51	-11.42	-11.42	10.24	-10.52	-14.32	-13.41
13.14	-1.09	-4.98	-3.99	-4.89	-4.89	16.77	-4	-7.79	-6.89

psf

top line = overpressure, bottom line = underpressure

Longitudinal Direction

P =

"1"	"2"	"3"	"4"	"5"	"6"	"1E"	"2E"	"3E"	"4E"
3.99	-15.77	-9.97	-8.52	-11.42	-11.42	7.79	-22.66	-12.87	-11.06
10.51	-9.24	-3.44	-1.99	-4.89	-4.89	14.32	-16.13	-6.34	-4.53

psf

top line = overpressure, bottom line = underpressure

Wind Pressure Coefficient Zone

$a := \max\left(\min\left(0.4 \cdot h, \min\left(L_{length}, L_{width}\right) \cdot 10\%\right), \min\left(L_{length}, L_{width}\right) \cdot 4\%, 3 \cdot \text{ft}\right)$ *[Figure 6-10, Note 9]*

$a = 9.59\,\text{ft}$ $a = 2.92\,\text{m}$

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Design Wind Loads

The wind pressure on one bay must be supported by one arch. The total wind load per arch equals :

$$WL := P \cdot L_{bay}$$

Transverse Direction

WL =

"1"	"2"	"3"	"4"	"5"	"6"	"1E"	"2E"	"3E"	"4E"
9.04	-10.42	-15.73	-14.37	-15.61	-15.61	14	-14.39	-19.57	-18.34
17.96	-1.5	-6.81	-5.45	-6.69	-6.69	22.92	-5.47	-10.66	-9.42

pli

top line = overpressure, bottom line = underpressure

Longitudinal Direction

WL =

"1"	"2"	"3"	"4"	"5"	"6"	"1E"	"2E"	"3E"	"4E"
5.45	-21.56	-13.63	-11.64	-15.61	-15.61	10.65	-30.97	-17.59	-15.11
14.37	-12.64	-4.71	-2.73	-6.69	-6.69	19.57	-22.05	-8.67	-6.19

pli

top line = overpressure, bottom line = underpressure

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4. Load Combinations : ASCE 7-02

1. D

3. $D + L_r$
   $D + S_{bal}$
   $D + S_{unb}$

5. D + W1
   D + W2
   D + W3

6. $D + 0.75\ W1 + 0.75\ L_r$
   $D + 0.75\ W2 + 0.75\ L_r$
   $D + 0.75\ W3 + 0.75\ L_r$

   $D + 0.75\ W1 + 0.75\ S_{bal}$
   $D + 0.75\ W2 + 0.75\ S_{bal}$
   $D + 0.75\ W3 + 0.75\ S_{bal}$

   $D + 0.75\ W1 + 0.75\ S_{unb}$
   $D + 0.75\ W2 + 0.75\ S_{unb}$
   $D + 0.75\ W3 + 0.75\ S_{unb}$

7. 0.6 D + W1
   0.6 D + W2
   0.6 D + W3

D = dead load;
L_r = roof live load;
S_{bal} = balanced snow
S_{unb} = unbalanced snow
W1 = lateral wind overpressure
W2 = lateral wind underpressure
W3 = longitudinal wind overpressure

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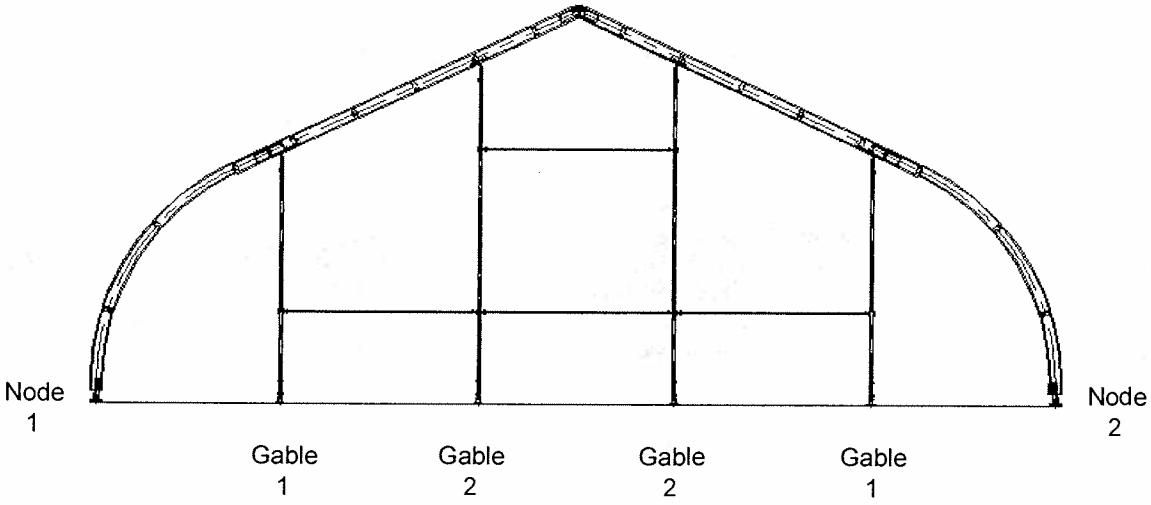
5. Support Reactions

Unfactored Support Reactions



+FX = Horiz. to Right, +FY = Vert. up, -FY = Indicates Uplift, FZ = toward or away from viewer

Nodal Reactions

Node	Result Case Name	FX lb	FY lb	FZ lb
1	D (Dead load)	772	1478	-NA-
"	Lr Roof Live Load	2411	3110	-NA-
"	Snow Balanced	2672	3447	-NA-
"	Snow Unbalanced	1336	1170	-NA-
"	Wind 1 (Lateral +)	-6719	-6300	-NA-
"	Wind 2 (Lateral -)	-5323	-1165	-NA-
"	Wind 3 (Longitudinal +)	-4216	-11987	5700*
2	D (Dead load)	-772	1478	-NA-
"	Lr Roof Live Load	-2411	3110	-NA-
"	Snow Balanced	-2672	3447	-NA-
"	Snow Unbalanced	-1336	2276	-NA-
"	Wind 1 (Lateral +)	318	-7272	-NA-
"	Wind 2 (Lateral -)	-1078	-2138	-NA-
"	Wind 3 (Longitudinal +)	4216	-11987	5700*

* : 5700 lbs; in the longitudinal direction of the building; applicable only on the supports in the 3 braced bays. In typical bays apply the value of 0 lbs. Also, an additional ±5700 lbs must be added to the FY in each arch adjacent to the wind braced bay (uplift in tension cable side).

There are no allowances for collateral loads applied to this structure.

The reactions shown are for interior arches. The gable uprights are shown for locational reference to the chart on the next page. The reactions in this chart can be conservatively used for the end arches.

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Since the arch substantially supports the gable structure, foundation loads for the gables are primarily due to wind loads alone. Shear loads are applied perpendicular to the gable wall, either inward, or outward.

Gable Reactions

Node	Result Case Name	FX lb	FY lb	FZ lb
Gable 1	D (Dead load)	0	170	-NA-
"	Wind 1 (Lateral +)	0	0	2660
"	Wind 2 (Lateral -)	0	0	1140
"	Wind 3 (Longitudinal +)	0	0	-930 / 1985
"	Wind 4 (Longitudinal -)	0	0	-2450 / 465
Gable 2	D (Dead load)	0	370	-NA-
"	Wind 1 (Lateral +)	0	0	3780
"	Wind 2 (Lateral -)	0	0	1620
"	Wind 3 (Longitudinal +)	0	0	-1320 / 2820
"	Wind 4 (Longitudinal -)	0	0	-3480 / 660

+FY = Vert. up, -FZ = toward building interior.

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06 - Fabric Stresses

General

Sp = 6.67 ft	Purlin Spacing
PrStr = 10 pli	Prestress in the fabric
Li = 16.4 ft	Span of Fabric (mean length Beam to Beam). Initial Length before Prestress.
E = 20000 plf	Modulus of Elasticity of Fabric (Ferrari 702
DL = 22.1 oz_per_sq_yd	Weight of fabric
WL = 15.77 psf	Wind Pressure (V = 110 mph, Exposure = "C")
Lr = 6.83 psf	Roof load due to snow
Lo := 0.0·in	1/2" Initial overlength

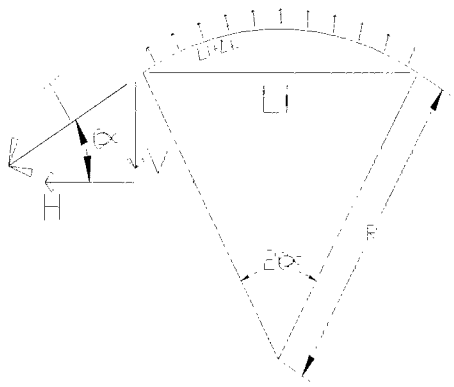
Solution for Wind Loading:

Final radius of fabric deformed into a cylindrical shape: R = 24.65 ft

Starting Fabric Tension: $T := WL \cdot R$ T = 388.71 plf T = 32.39 pli

Angle of cylindrical deformed shape: $\alpha := \operatorname{asin}\left(\frac{Li}{2R}\right)$ $\alpha = 19.43\ \text{deg}$

Geometrical Elongation: $\Delta l := \left(\pi \cdot R \cdot \frac{\alpha}{90 \cdot \text{deg}}\right) - Li$ $\Delta l = 0.32\ \text{ft}$



New Fabric Tension: $Tn := \frac{E \cdot (\Delta l + Lo)}{Li}$ Tn = 388.706 plf

Fabric deflection @ midpoint:

$$\Delta := R - \frac{\sqrt{4 \cdot R^2 - Li^2}}{2} \qquad \Delta = 16.85\ \text{in}$$

Determination of Anchoring load:

Multiply tension, T, with distance between supports: $AL := T \cdot Sp$ AL = 2591.4 lbf

Vertical Component: $Vc := AL \cdot \sin(\alpha)$ Vc = 862 lbf

Horizontal Component: $Hc := AL \cdot \cos(\alpha)$ Hc = 2444 lbf

Therefore the fabric will pull the bay arches towards each other with a force of Hc to be resisted by the purlin.

Determination of Fabric capability (wind loading):

Fabric Strip Tensile Strength: STS = (243 241) pli

Safety Factor: SF := 4 (4=wind, 5=snow, 8=prestress+dead)

Allowable Stress: $Allowed := \frac{0.75 \cdot STS}{SF}$ Allowed = (45.56 45.19) pli

Compare allowable to actual: IsOK(T, Allowed) = ("yes" "yes")

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Solution for Dead Load plus Fabric prestress:

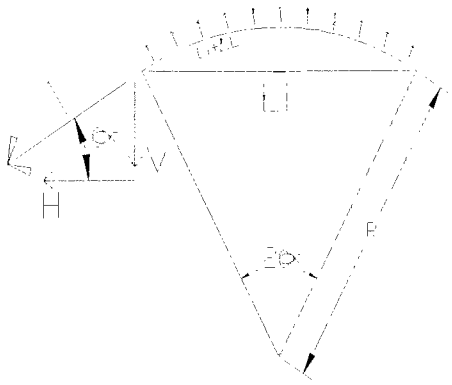
Final radius of fabric deformed into a cylindrical shape: $R = 113.56\,ft$

Starting Fabric Tension: $T := DL \cdot R$ $T = 17.43\,plf$ $T = 1.45\,pli$

Angle of cylindrical deformed shape: $\alpha := asin\left(\frac{Li}{2R}\right)$ $\alpha = 4.14\,deg$

Geometrical Elongation: $\Delta l := \left(\pi \cdot R \cdot \frac{\alpha}{90 \cdot deg}\right) - Li$ $\Delta l = 0.01\,ft$

New Fabric Tension: $Tn := \frac{E \cdot (\Delta l + Lo)}{Li}$ $Tn = 17.429\,plf$



Fabric deflection @ midpoint:

$$\Delta := R - \frac{\sqrt{4 \cdot R^2 - Li^2}}{2} \qquad \Delta = 3.56\,in$$

Determination of Anchoring load:

Multiply tension, T, with distance between supports: $AL := T \cdot Sp$ $AL = 116.2\,lbf$

Vertical Component: $Vc := AL \cdot \sin(\alpha)$ $Vc = 8\,lbf$

Horizontal Component: $Hc := AL \cdot \cos(\alpha)$ $Hc = 116\,lbf$

Therefore the fabric will pull the bay arches towards each other with a force of Hc to be resisted by the purlin.

Determination of Fabric capability (wind loading):

Fabric Strip Tensile Strength: $STS = (243 \quad 241)\,pli$

Safety Factor: $SF := 8$ (4=wind, 5=snow, 8=prestress+dead)

Allowable Stress: $Allowed := \frac{0.75 \cdot STS}{SF}$ $Allowed = (22.78 \quad 22.59)\,pli$

Compare allowable to actual: $IsOK(T, Allowed) = (\text{"yes"} \quad \text{"yes"})$

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Solution for Dead Load, Roof Live load, plus Fabric prestress:

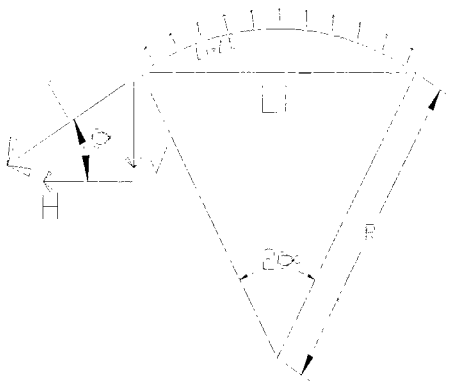
Final radius of fabric deformed into a cylindrical shape: $R = 32.11\ ft$

Starting Fabric Tension: $T := (DL + Lr)\cdot R$ $T = 224.16\ plf$ $T = 18.68\ pli$

Angle of cylindrical deformed shape: $\alpha := \operatorname{asin}\left(\frac{Li}{2R}\right)$ $\alpha = 14.8\ deg$

Geometrical Elongation: $\Delta l := \left(\pi\cdot R\cdot\frac{\alpha}{90\cdot deg}\right) - Li$ $\Delta l = 0.18\ ft$

New Fabric Tension: $Tn := \frac{E\cdot(\Delta l + Lo)}{Li}$ $Tn = 224.165\ plf$



Fabric deflection @ midpoint:

$$\Delta := R - \frac{\sqrt{4\cdot R^2 - Li^2}}{2} \qquad \Delta = 12.78\ in$$

Determination of Anchoring load:

Multiply tension, T, with distance between supports: $AL := T\cdot Sp$ $AL = 1494.4\ lbf$

Vertical Component: $Vc := AL\cdot\sin(\alpha)$ $Vc = 382\ lbf$

Horizontal Component: $Hc := AL\cdot\cos(\alpha)$ $Hc = 1445\ lbf$

Therefore the fabric will pull the bay arches towards each other with a force of Hc to be resisted by the purlin.

Determination of Fabric capability (wind loading):

Fabric Strip Tensile Strength: $STS = (243\ \ 241)\ pli$

Safety Factor: $SF := 5$ (4=wind, 5=snow, 8=prestress+dead)

NOTE: Typically the snow safety factor is used for roof live load.

Allowable Stress: $Allowed := \frac{0.75\cdot STS}{SF}$ $Allowed = (36.45\ \ 36.15)\ pli$

Compare allowable to actual: $IsOK(T, Allowed) = (\text{"yes"}\ \ \text{"yes"})$

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7. Main Profile (380) Design

The following allowable stresses are based on table 2-21 from the "2000 Aluminum Design Manual" For Alloy: 6061-T6

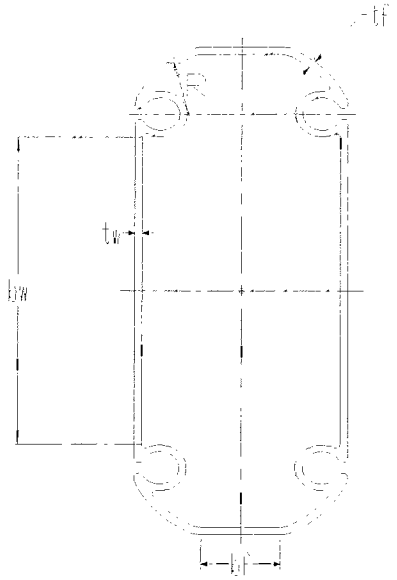
Section Properties :

$Area := 11.307 \cdot in^2$

$I_x := 308.8 \cdot in^4$ Moment of inertia about strong axis

$E := 10100 \cdot ksi$ Table 3.3-1

$n_u := 1.95$ Table 3.4-1



Extrusion : 380

$b_w := 9.7 \cdot in$ Web length of Shape

$t_w := 0.236 \cdot in$ Web thickness $\frac{b_w}{t_w} = 41.1$

$b_f := 4.173 \cdot in$ Flat flange

$R := 1.00 \cdot in$ Mid-thickness radius of the Curved Flange

$t_f := 0.256 \cdot in$ Flange thickness $\frac{R}{t_f} = 3.9$ $\frac{b_f}{t_f} = 16.3$

$Ly := L_{purlin}$ Length for weak axis buckling

$K := 0.5$ For weak axis buckling

$ry := 2.68 \cdot in$ Radius of Gyration abt weak axis $\frac{K \cdot Ly}{ry} = 14.9$

$L = 425\ in$ Length between Inflection Points for strong axis buckling from computer model

$Kx := 1.0$ For strong axis buckling

$rx := 5.22 \cdot in$ Radius of Gyration abt stong axis $\frac{Kx \cdot L}{rx} = 81.4$

$L_b := Ly$ Length between Bracing Points (compression flange restrained from twisting or moving laterally)

$S_x := 41.22 \cdot in^3$ Section Modulus about strong axis

$S_y := 24.86 \cdot in^3$ Section Modulus about weak axis

$I_y := 81.23 \cdot in^4$ Moment of inertia about weak axis

$J := 197.5 \cdot in^4$ Torsional constant $\frac{L_b \cdot S_x}{0.5\sqrt{I_y \cdot J}} = 52.1$

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Allowable Axial Stress:

Specification 3.4.1: $F_{aT} := 19 \cdot ksi$

Specification 3.4.7: $F_{a8} := if\left[\frac{K \cdot Ly}{ry} \le 66, \left[20.2 - 0.126 \cdot \left(\frac{K \cdot Ly}{ry}\right)\right] \cdot ksi, \frac{51000 \cdot ksi}{\left(\frac{K \cdot Ly}{ry}\right)^2}\right]$ $F_{a8} = 18.32\,ksi$

$F_{aIP} := if\left[\frac{Kx \cdot L}{rx} \le 66, \left[20.2 - 0.126 \cdot \left(\frac{Kx \cdot L}{rx}\right)\right] \cdot ksi, \frac{51000 \cdot ksi}{\left(\frac{Kx \cdot L}{rx}\right)^2}\right]$ $F_{aIP} = 7.69\,ksi$

Specification 3.4.9: $F_{acw} := if\left[\frac{b_w}{t_w} \le 8.4, 21 \cdot ksi, \left[23.1 - 0.25 \cdot \left(\frac{b_w}{t_w}\right)\right] \cdot ksi\right]$

$F_{acw} := if\left(\frac{b_w}{t_w} > 33, \frac{490 \cdot ksi}{\frac{b_w}{t_w}}, F_{acw}\right)$ $F_{acw} = 11.92\,ksi$

Specification 3.4.10: $F_{acc} := if\left[\frac{R}{t_f} \le 2.2, 21 \cdot ksi, \left[22.2 - 0.80 \cdot \left(\sqrt{\frac{R}{t_f}}\right)\right] \cdot ksi\right]$

$F_{acc} := if\left[\frac{R}{t_f} > 141, \frac{3200 \cdot ksi}{\frac{R}{t_f}\left(1 + \frac{\sqrt{\frac{R}{t_f}}}{35}\right)^2}, F_{acc}\right]$ $F_{acc} = 20.62\,ksi$

$F_a := \min(F_{acw}, F_{acc}, F_{aIP}, F_{a8})$ $F_a = 7.69\,ksi$ Use in Eq. 4.1.1-1

$F_{ao} := \min(F_{acw}, F_{acc})$ $F_{ao} = 11.92\,ksi$ Use in Eq. 4.1.1-2

$F_{ex} := \frac{\pi^2 \cdot E}{n_u \cdot \left(\frac{Kx \cdot L}{rx}\right)^2}$ $F_{ex} = 7.7\,ksi$

$F_{ey} := \frac{\pi^2 \cdot E}{n_u \cdot \left(\frac{K \cdot Ly}{ry}\right)^2}$ $F_{ey} = 229.5\,ksi$

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Allowable Bending Stress:

Specification 3.4.2: $F_{bT} := 19 \cdot ksi$

Specification 3.4.14:

$$F_{bc1} := if\left[\frac{L_b \cdot S_x}{0.5 \cdot \sqrt{I_y \cdot J}} \le 146,21 \cdot ksi, \left(23.9 - 0.24 \cdot \sqrt{\frac{L_b \cdot S_x}{0.5 \cdot \sqrt{I_y \cdot J}}}\right) \cdot ksi\right]$$

$$F_{bc1} := if\left(\frac{L_b \cdot S_x}{0.5\sqrt{I_y \cdot J}} > 1700, \frac{24000 \cdot ksi}{\frac{L_b \cdot S_x}{0.5\sqrt{I_y \cdot J}}}, F_{bc1}\right)$$

$F_{bc1} = 21\,ksi$

Specification 3.4.16:

$$F_{bc2} := if\left[\frac{b_f}{t_f} \le 22,21 \cdot ksi, \left[27.3 - 0.29 \cdot \left(\frac{b_f}{t_f}\right)\right] \cdot ksi\right]$$

$$F_{bc2} := if\left(\frac{b_f}{t_f} > 33, \frac{580 \cdot ksi}{\frac{b_f}{t_f}}, F_{bc2}\right)$$

$F_{bc2} = 21\,ksi$

Specification 3.4.16.1:

$$F_{bc3} := if\left[\frac{R}{t_f} \le 1.6,25 \cdot ksi, \left[26.2 - 0.94 \cdot \left(\sqrt{\frac{R}{t_f}}\right)\right] \cdot ksi\right]$$

$$F_{bc3} := if\left[\frac{R}{t_f} > 141, \frac{3800 \cdot ksi}{\frac{R}{t_f}\left(1 + \frac{\sqrt{\frac{R}{t_f}}}{35}\right)^2}, F_{bc3}\right]$$

$F_{bc3} = 24.34\,ksi$

Specification 3.4.18:

$$F_{bc4} := if\left[\frac{b_w}{t_w} \le 46,28 \cdot ksi, \left[40.5 - 0.27 \cdot \left(\frac{b_w}{t_w}\right)\right] \cdot ksi\right]$$

$$F_{bc4} := if\left(\frac{b_w}{t_w} > 75, \frac{1520ksi}{\frac{b_w}{t_w}}, F_{bc4}\right)$$

$F_{bc4} = 28\,ksi$

$Fbx := \min(F_{bc1}, F_{bc2}, F_{bc3}, F_{bc4})$ $Fbx = 21\,ksi$ Use in Eq. 4.1.1-1 & Eq. 4.1.1-2

$Fby := Fbx$

Allowable Shear Stress:

Specification 3.4.20:

$$F_V := if\left[\frac{b_w}{t_w} \le 36,12 \cdot ksi, \left[15.6 - 0.099 \cdot \left(\frac{b_w}{t_w}\right)\right] \cdot ksi\right]$$

$$F_V := if\left[\frac{b_w}{t_w} > 65, \frac{39000 \cdot ksi}{\left(\frac{b_w}{t_w}\right)^2}, F_V\right]$$

$F_V = 11.53\,ksi$

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Allowable Bending Stress:

Specification 3.4.2: $F_{bT} := 19 \cdot ksi$

Specification 3.4.14:

$$F_{bc1} := if\left[\frac{L_b \cdot S_x}{0.5 \cdot \sqrt{I_y \cdot J}} \le 146,21 \cdot ksi, \left(23.9 - 0.24 \cdot \sqrt{\frac{L_b \cdot S_x}{0.5 \cdot \sqrt{I_y \cdot J}}}\right) \cdot ksi\right]$$

$$F_{bc1} := if\left(\frac{L_b \cdot S_x}{0.5\sqrt{I_y \cdot J}} > 1700, \frac{24000 \cdot ksi}{\frac{L_b \cdot S_x}{0.5\sqrt{I_y \cdot J}}}, F_{bc1}\right) \qquad F_{bc1} = 21\,ksi$$

Specification 3.4.16:

$$F_{bc2} := if\left[\frac{b_f}{t_f} \le 22,21 \cdot ksi, \left[27.3 - 0.29 \cdot \left(\frac{b_f}{t_f}\right)\right] \cdot ksi\right]$$

$$F_{bc2} := if\left(\frac{b_f}{t_f} > 33, \frac{580 \cdot ksi}{\frac{b_f}{t_f}}, F_{bc2}\right) \qquad F_{bc2} = 21\,ksi$$

Specification 3.4.16.1:

$$F_{bc3} := if\left[\frac{R}{t_f} \le 1.6,25 \cdot ksi, \left[26.2 - 0.94 \cdot \left(\sqrt{\frac{R}{t_f}}\right)\right] \cdot ksi\right]$$

$$F_{bc3} := if\left[\frac{R}{t_f} > 141, \frac{3800 \cdot ksi}{\frac{R}{t_f}\left(1 + \frac{\sqrt{\frac{R}{t_f}}}{35}\right)^2}, F_{bc3}\right] \qquad F_{bc3} = 24.34\,ksi$$

Specification 3.4.18:

$$F_{bc4} := if\left[\frac{b_w}{t_w} \le 46,28 \cdot ksi, \left[40.5 - 0.27 \cdot \left(\frac{b_w}{t_w}\right)\right] \cdot ksi\right]$$

$$F_{bc4} := if\left(\frac{b_w}{t_w} > 75, \frac{1520ksi}{\frac{b_w}{t_w}}, F_{bc4}\right) \qquad F_{bc4} = 28\,ksi$$

$Fbx := \min(F_{bc1}, F_{bc2}, F_{bc3}, F_{bc4})$ $\quad Fbx = 21\,ksi$ Use in Eq. 4.1.1-1 & Eq. 4.1.1-2

$Fby := Fbx$

Allowable Shear Stress:

Specification 3.4.20:

$$F_V := if\left[\frac{b_w}{t_w} \le 36,12 \cdot ksi, \left[15.6 - 0.099 \cdot \left(\frac{b_w}{t_w}\right)\right] \cdot ksi\right]$$

$$F_V := if\left[\frac{b_w}{t_w} > 65, \frac{39000 \cdot ksi}{\left(\frac{b_w}{t_w}\right)^2}, F_V\right] \qquad F_V = 11.53\,ksi$$

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Ld 22 : 0.6D + W1 **Member 14 :** $Mx := 501.842 \cdot kip \cdot in$ $My := 0.0 \cdot kip \cdot in$ $C := 5.523 \cdot kip$

$Cmx := 0.85$

$Cmy := 0.85$

$f_{bx} := \frac{Mx}{S_x}$ $f_{by} := \frac{My}{S_y}$ $f_{ac} := \frac{C}{Area}$

$f_{bx} = 12.2\,ksi$ $f_{by} = 0\,ksi$ $f_{ac} = 0.5\,ksi$

Eq. 4.1.1-1 : $Eq1 := \frac{f_{ac}}{F_a} + \frac{Cmx \cdot f_{bx}}{\left(1 - \frac{f_{ac}}{F_{ex}}\right) \cdot Fbx} + \frac{Cmy \cdot f_{by}}{\left(1 - \frac{f_{ac}}{F_{ey}}\right) \cdot Fby}$ $Eq1 = 0.9$ **<= 1.0 O.K.**

Eq. 4.1.1-2 : $Eq2 := \frac{f_{ac}}{F_{ao}} + \frac{f_{bx}}{Fbx} + \frac{f_{by}}{Fby}$ $Eq2 = 0.62$ **<= 1.0 O.K.**

Ld 22 : 0.6D + W1 **Member 7 :** $Mx := 715.562 \cdot kip \cdot in$ $My := 0.0 \cdot kip \cdot in$ $T := 7.269 \cdot kip$

$f_{bx} := \frac{Mx}{S_x}$ $f_{by} := \frac{My}{S_y}$ $f_{at} := \frac{T}{Area}$

$f_{bx} = 17.4\,ksi$ $f_{by} = 0\,ksi$ $f_{at} = 0.6\,ksi$

Eq. 4.1.2-1 : $Eq3 := \frac{f_{at}}{F_{aT}} + \frac{f_{bx}}{Fbx} + \frac{f_{by}}{Fby}$ $Eq3 = 0.86$ **<= 1.0 O.K.**

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8. Splice Design

Steel Profile:

The splice is reinforced over half of the length.
The splice is connected to the main profiles by 8 bolts of M27.

Material : Steel AE355 Profile : 250 x 150 x 6 mm

Reinforcing plates :
Plate : 90 x 10 x 420 mm

$Fy_{AE355} := 355 \cdot \frac{N}{mm^2}$ $Fy_{AE355} = 51.5\,ksi$

$Fut_{AE355} := 490 \cdot \frac{N}{mm^2}$ $Fut_{AE355} = 71.1\,ksi$

$E_{AE355} := 210000 \cdot \frac{N}{mm^2}$ $E_{AE355} = 30458\,ksi$

Unreinforced Profile :

$A_{splice} := 4656 \cdot mm^2$ $A_{splice} = 7.2\,in^2$

$I_{xsplice} := 40277872 \cdot mm^4$ $I_{xsplice} = 96.8\,in^4$

$y_{x\_splice} := 125 \cdot mm$ $y_{x\_splice} = 4.9\,in$

$S_{x\_splice} := 322223 \cdot mm^3$ $S_{x\_splice} = 19.7\,in^3$

Reinforced Profile :

$A_{splice\_Re} := 5556 \cdot mm^2$ $A_{splice\_Re} = 8.6\,in^2$

$I_{xsplice\_Re} := 70712872 \cdot mm^4$ $I_{xsplice\_Re} = 169.9\,in^4$

$y_{x\_splice\_Re} := 135 \cdot mm$ $y_{x\_splice\_Re} = 5.3\,in$

$S_{x\_splice\_Re} := 523799 \cdot mm^3$ $S_{x\_splice\_Re} = 32\,in^3$

Allowable Stress on Splice :

$\sigma_{allowable} := (0.6) \cdot Fy_{AE355}$ $\sigma_{allowable} = 213 \frac{N}{mm^2}$ $\sigma_{allowable} = 30.89\,ksi$

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The moment in the connection splice increases gradually from the first row of bolts until the second row of bolts. Between the two middle rows of bolts, the whole moment is supported by the reinforced connecting splice.

0.6 D + W1 **Member 9 :** $Mx := 378.2 \cdot kip \cdot in$ $V := 2.33 \cdot kip$ $T := 6.88 \cdot kip$

Stress at the unreinforced section of the connection splice :

$$\sigma := \frac{T}{A_{splice}} + \frac{0.5(Mx)}{S_{x\_splice}}$$

$\sigma = 10.6\,ksi$

σ is less than or equal to $\sigma_{allowable}$ = "OK"

Stress at the reinforced section of the connection splice :

$$\sigma := \frac{T}{A_{splice\_Re}} + \frac{Mx}{S_{x\_splice\_Re}}$$

$\sigma = 12.6\,ksi$

σ is less than or equal to $\sigma_{allowable}$ = "OK"

D + S balanced **Member 9 :** $Mx := 109.7 \cdot kip \cdot in$ $V := 2.44 \cdot kip$ $C := 4.94 \cdot kip$

Stress at the unreinforced section of the connection splice :

$$\sigma := \frac{C}{A_{splice}} + \frac{0.5(Mx)}{S_{x\_splice}}$$

$\sigma = 3.5\,ksi$

σ is less than or equal to $\sigma_{allowable}$ = "OK"

Stress at the reinforced section of the connection splice :

$$\sigma := \frac{C}{A_{splice\_Re}} + \frac{Mx}{S_{x\_splice\_Re}}$$

$\sigma = 4\,ksi$

σ is less than or equal to $\sigma_{allowable}$ = "OK"

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Bolts in Splice: M27

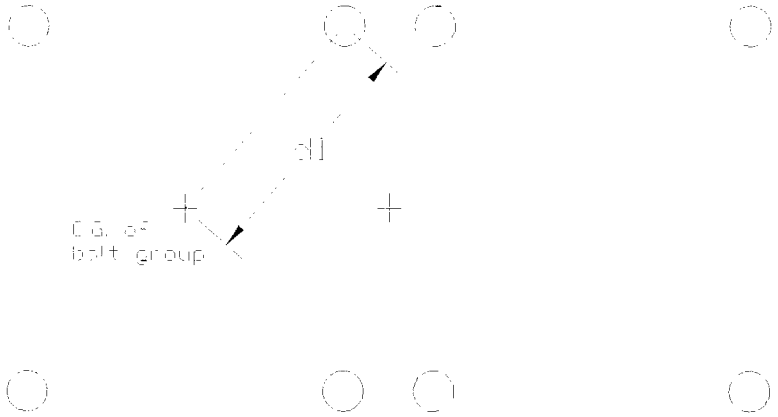
Grade : **8.8**

Area : $A_{M27} := 459 \cdot mm^2$

$A_{M27} = 0.71\,in^2$

Yield Stress : $Fy_{M27} := 640 \cdot \frac{N}{mm^2}$

$Fy_{M27} = 92.8\,ksi$



Tensile Strength : $Fut_{M27} := 800 \cdot \frac{N}{mm^2}$

$Fut_{M27} = 116\,ksi$

$d1 := \sqrt{(100 \cdot mm)^2 + (200 \cdot mm)^2}$ $d1 = 224\,mm$ $d1 = 8.8\,in$

Allowable Shear Stress in bolt : $F_v := (0.22) \cdot Fut_{M27}$ $F_v = 176 \frac{N}{mm^2}$

$F_v = 25.5\,ksi$

Worst Case for Bolts ; 0.6 D + W1 $Mx := 378.2 \cdot kip \cdot in$ $V := 2.33 \cdot kip$ $T := 6.88 \cdot kip$

Considering only the 4 bolts in the middle to resist the full moment and forces, the resulting force on 1 bolt is :

$F_T := \frac{T}{4}$ $F_T = 1.72\,kip$

$F_V := \frac{V}{4}$ $F_V = 0.58\,kip$

$F_{B1} := \frac{Mx \cdot d1}{4 \cdot d1^2}$ $F_{B1} = 10.7\,kip$

$F_{res} := F_{B1} + \sqrt{F_T^2 + F_V^2}$ $F_{res} = 12.6\,kip$

Shear Stress on Bolt taking Double Shear into account :

$f_{res} := \frac{F_{res}}{(2) \cdot A_{M27}}$ $f_{res} = 8.8\,ksi$ < $F_v = 25.53\,ksi$ **O.K.**

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Bearing on Steel Splice and main Profile from the Bolts :

Steel Splice :

Wall thickness : $t_{splice} := 6 \cdot mm$

Diameter in Splice : $d_{splice} := 34 \cdot mm$

Allowable Bearing Pressure : $F_p := 1.2 \cdot Fut_{AE355}$ $F_p = 85.3\,ksi$

Actual Bearing Pressure : $\frac{F_{res}}{(2) \cdot d_{splice} \cdot t_{splice}} = 19.9\,ksi$ $< F_p = 85.28\,ksi$ **O.K.**

Aluminum Profile :

Wall thickness : $t_{380} := 6 \cdot mm$

Diameter in Profile : $d_{profile} := 29.2 \cdot mm$

Allowable Bearing Pressure : $F_p := 39 \cdot ksi$

Actual Bearing Pressure : $\frac{F_{res}}{(2) \cdot d_{profile} \cdot t_{380}} = 23.1\,ksi$ $< F_p$ **O.K.**

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9. Leg Connnection Design

Steel Profile:

The splice is connected to the main profiles by 4 bolts of M16.

Material : Steel AE235 Profile : 150 x 150 x 5 mm

$Fy_{AE235} := 235 \cdot \frac{N}{mm^2}$ $Fy_{AE235} = 34.1\,ksi$

$Fut_{AE235} := 340 \cdot \frac{N}{mm^2}$ $Fut_{AE235} = 49.3\,ksi$

$E_{AE235} := 210000 \cdot \frac{N}{mm^2}$ $E_{AE235} = 30458\,ksi$

Properties of Profile :

$A_{splice} := 2900 \cdot mm^2$ $A_{splice} = 4.5\,in^2$

$I_{xsplice} := 10174166 \cdot mm^4$ $I_{xsplice} = 24.4\,in^4$

$y_{x\_splice} := 75 \cdot mm$ $y_{x\_splice} = 3\,in$

$S_{x\_splice} := 135656 \cdot mm^3$ $S_{x\_splice} = 8.3\,in^3$

Allowable Stress on Splice :

$\sigma_{allowable} := (0.6) \cdot Fy_{AE235}$ $\sigma_{allowable} = 141 \frac{N}{mm^2}$ $\sigma_{allowable} = 20.45\,ksi$

Load Case : 0.6 D + W1 **Member 1 :** $Mx := 132.4 \cdot kip \cdot in$ $V := 6.06 \cdot kip$ $T := 5.41 \cdot kip$

$\sigma := \frac{T}{A_{splice}} + \frac{Mx}{S_{x\_splice}}$ $\sigma = 17.2\,ksi$

σ is less than or equal to $\sigma_{allowable}$ = "OK"

Load Case : D + S (bal) **Member 1 :** $Mx := 106.0 \cdot kip \cdot in$ $V := 4.9 \cdot kip$ $C := 6.6 \cdot kip$

$\sigma := \frac{C}{A_{splice}} + \frac{Mx}{S_{x\_splice}}$ $\sigma = 14.3\,ksi$

σ is less than or equal to $\sigma_{allowable}$ = "OK"

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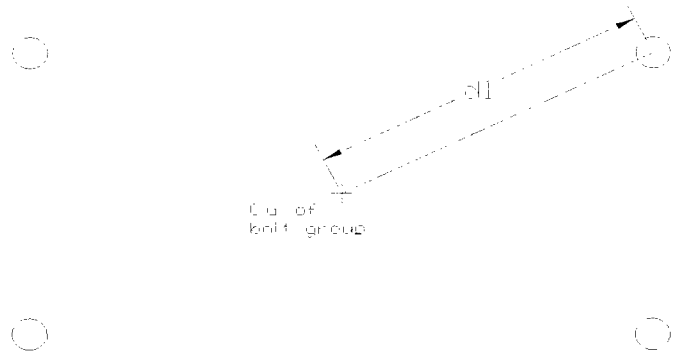
Bolts in Splice: M16

Grade : **8.8**



Area : $A_{M16} := 157 \cdot mm^2$

$A_{M16} = 0.24\,in^2$

Yield Stress : $Fy_{M16} := 640 \cdot \frac{N}{mm^2}$

$Fy_{M16} = 92.8\,ksi$

Tensile Strength : $Fut_{M16} := 800 \cdot \frac{N}{mm^2}$

$Fut_{M16} = 116\,ksi$

$d1 := \sqrt{(40 \cdot mm)^2 + (155 \cdot mm)^2}$ $d1 = 160\,mm$ $d1 = 6.3\,in$

Allowable Shear Stress in bolt : $F_v := (0.22) \cdot Fut_{M16}$ $F_v = 176 \frac{N}{mm^2}$

$F_v = 25.5\,ksi$

Worst Case for Bolts ; 0.6 D + W1 $Mx := 132.4 \cdot kip \cdot in$ $V := 6.06 \cdot kip$ $T := 5.41 \cdot kip$

Considering only the 4 bolts in the middle to resist the full moment and forces, the resulting force on 1 bolt is :

$F_T := \frac{T}{4}$ $F_T = 1.35\,kip$

$F_V := \frac{V}{4}$ $F_V = 1.51\,kip$

$F_{B1} := \frac{Mx \cdot d1}{4 \cdot d1^2}$ $F_{B1} = 5.3\,kip$

$F_{res} := F_{B1} + \sqrt{F_T^2 + F_V^2}$ $F_{res} = 7.3\,kip$

Shear Stress on Bolt taking Double Shear into account :

$f_{res} := \frac{F_{res}}{(2) \cdot A_{M16}}$ $f_{res} = 15\,ksi$

f_{res} is less than or equal to F_v = "OK"

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Bearing on Steel Splice and main Profile from the Bolts :

Steel Splice :

Wall thickness : $t_{splice} := 5 \cdot mm$

Diameter in Splice : $d_{splice} := 22.5 \cdot mm$

Allowable Bearing Pressure : $F_p := 1.2 \cdot Fut_{AE235}$ $F_p = 59.2\,ksi$

Actual Bearing Pressure : $\frac{F_{res}}{(2) \cdot d_{splice} \cdot t_{splice}} = 20.9\,ksi$ $< F_p = 59.18\,ksi$

Aluminum Profile :

Wall thickness : $t_{380} := 6 \cdot mm$

Diameter in Profile : $d_{profile} := 18.5 \cdot mm$

Allowable Bearing Pressure : $F_p := 39 \cdot ksi$

Actual Bearing Pressure : $\frac{F_{res}}{(2) \cdot d_{profile} \cdot t_{380}} = 21.2\,ksi$ $< F_p$

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Bolt connecting Splice to baseplate : M36

Grade : 8.8

Area : $A_{M36} := 817 \cdot mm^2$ $A_{M36} = 1.27\,in^2$

Yield Stress : $Fy_{M36} := 640 \cdot \frac{N}{mm^2}$ $Fy_{M36} = 92.8\,ksi$

Tensile Strength : $Fut_{M36} := 800 \cdot \frac{N}{mm^2}$ $Fut_{M36} = 116\,ksi$

Allowable Shear Stress in bolt : $F_v := (0.22) \cdot Fut_{M36}$ $F_v = 176 \frac{N}{mm^2}$ $F_v = 25.5\,ksi$

Worst Support Reaction Case for Bolt ; D + S bal $H := 4.894 \cdot kip$ $V := 10.416 \cdot kip$

Shear Stress on Bolt taking Double Shear into account : $f_{res} := \frac{V}{(2) \cdot A_{M36}}$ $f_{res} = 4.1\,ksi$ $< F_v$ **O.K.**

Bearing on Steel Splice and Steel Baseplate :

Steel Splice :

Wall thickness : $t_{splice} := 5 \cdot mm$

Diameter in Splice : $d_{splice} := 45 \cdot mm$

Allowable Bearing Pressure : $F_p := 1.2 \cdot Fut_{AE235}$ $F_p = 59.2\,ksi$

Actual Bearing Pressure : $\frac{V}{(2) \cdot d_{splice} \cdot t_{splice}} = 14.9\,ksi$ $< F_p$ **O.K.**

Steel Baseplate :

Wall thickness : $t := 15 \cdot mm$

Diameter in Baseplate: $d_{baseplate} := 38 \cdot mm$

Actual Bearing Pressure : $\frac{F_{res}}{(2) \cdot d_{baseplate} \cdot t} = 4.1\,ksi$ $< F_p$ **O.K.**

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10. Baseplate Design

Steel Profile:

Material : Steel S235 Plate no.2 : 200 x 15 x 265 mm
Plate no.4 : 90 x 10 x 100 mm

$Fy_{S235} := 235 \cdot \frac{N}{mm^2}$ $Fy_{S235} = 34.1\,ksi$

$Fut_{S235} := 340 \cdot \frac{N}{mm^2}$ $Fut_{S235} = 49.3\,ksi$

$E_{S235} := 210000 \cdot \frac{N}{mm^2}$ $E_{S235} = 30458\,ksi$

Section : $A_{24} := (15mm \cdot 200mm) + (10mm \cdot 90mm)$ $A_{24} = 3900\,mm^2$ $A_{24} = 6\,in^2$

Center of Gravity: $y := \frac{[(15mm \cdot 200mm) \cdot 97.5mm] + [(10mm \cdot 90mm) 45mm]}{A_{24}}$ $y = 85.4\,mm$ $y = 3.4\,in$

Moment of Inertia: $I := \frac{200mm \cdot (15mm)^3}{12} + \left[3000mm^2 \cdot (97.5mm - y)^2\right] + \frac{10mm \cdot (90mm)^3}{12} + \left[900mm^2 \cdot (45mm - y)^2\right]$

$I = 2.57 \times 10^6\,mm^4$ $I = 6.2\,in^4$

Section Modulus: $S := \frac{I}{y}$ $S = 3 \times 10^4\,mm^3$ $S = 1.8\,in^3$

Moment arm above Section : $d_B := 150 \cdot mm$

Allowable Stress on Profile : $\sigma_{allowable} := (0.6) \cdot Fy_{S235}$ $\sigma_{allowable} = 141 \frac{N}{mm^2}$ $\sigma_{allowable} = 20.45\,ksi$

$LoadCase_0$ = "D + Snow (bal)" **Node reaction 1 :** $H_0 = 3.44\,kip$ $V_0 = 4.92\,kip$

Stress of the Section : $\sigma := \left| \frac{V_0}{(2) \cdot A_{24}} - \frac{H_0 \cdot d_B}{S} \right|$ $\sigma = 10.7\,ksi$ $< \sigma_{allowable} = 20.45\,ksi$

O.K.

$LoadCase_1$ = "0.6 D + W3" **Node reaction 1 :** $H_1 = 3.75\,kip$ $V_1 = 11.1\,kip$

Stress of the Section : $\sigma := \left| \frac{V_1}{(2) \cdot A_{24}} - \frac{H_1 \cdot d_B}{S} \right|$ $\sigma = 11.1\,ksi$ $\leq \sigma_{allowable} = 20.45\,ksi$

O.K.

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Bending of Base Plate - plate No.1 :

The reaction forces act on a distance "d" above the bottom side of plate No.1 : $d := 160 \cdot mm$

The Base Plate is shown in figure 25. It has the following dimensions.

Length : $L := 600 \cdot mm$

Width : $W := 400 \cdot mm$

Thickness : $T := 10 \cdot mm$

Surface area : $A := L \cdot W$ $A = 240000\,mm^2$ $A = 372\,in^2$

$LoadCase_0 =$ "D + Snow (bal)" **Node reaction 1 :** $H_0 = 3.44\,kip$ $V_0 = 4.92\,kip$

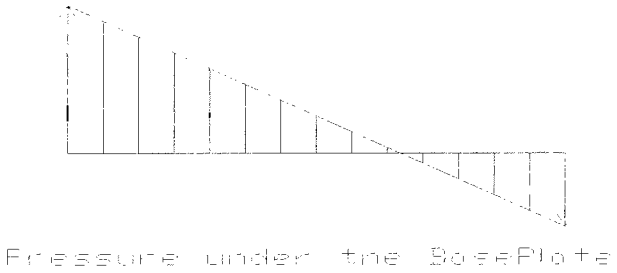
These forces result in the following pressure under the baseplate:

$$f_{max} := \frac{V_0}{A} + \frac{H_0 \cdot d \cdot (6)}{L \cdot W^2} \qquad f_{max} = 244.48 \frac{kN}{m^2}$$

$f_{max} = 0.035\,ksi$

$$f_{min} := \frac{V_0}{A} - \frac{H_0 \cdot d \cdot (6)}{L \cdot W^2} \qquad f_{min} = -61.92 \frac{kN}{m^2}$$

$f_{min} = -0.009\,ksi$



Section A-A :

The pressure f_A equals : $f_A := f_{max} - \left(\left|f_{max}\right| + \left|f_{min}\right|\right) \cdot \frac{122.5 \cdot mm}{400 \cdot mm}$ $f_A = 150.6 \frac{kN}{m^2}$ $f_A = 0.02\,ksi$

The moment resulting from the pressure under the plate equals :

$$M_A := \left(\frac{f_{max} + f_A}{2}\right) \cdot 122.5 \cdot mm \cdot \left(\frac{122.5 \cdot mm}{2} \cdot 600 \cdot mm\right)$$ $M_A = 0.89\,kN \cdot m$ $M_A = 7.9\,kip \cdot in$

The actual stress equals : $\sigma_A := \frac{M_A \cdot 6}{L \cdot T^2}$ $\sigma_A = 88.9 \frac{N}{mm^2}$ $\sigma_A = 12.9\,ksi$

The actual stress is less than the allowable stress; BasePlate is **O.K.**

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Section B-B :

The mean pressure equals : $f_{mean} := \frac{f_{max} + f_{min}}{2}$ $f_{mean} = 91.3 \frac{kN}{m^2}$ $f_{mean} = 0.01\,ksi$

The moment at section B-B equals :

$M_B := \left(f_{mean} \cdot 100mm\right) \cdot \frac{100 \cdot mm}{2} \cdot (400 \cdot mm)$ $M_B = 0.18\,kN \cdot m$ $M_B = 1.6\,kip \cdot in$

The actual stress equals : $\sigma_B := \frac{M_B \cdot 6}{W \cdot T^2}$ $\sigma_B = 27.4 \frac{N}{mm^2}$ $\sigma_B = 4\,ksi$

The actual stress is less than the allowable stress; BasePlate is **O.K.**

$LoadCase_1 = "0.6\ D + W3"$ **Node reaction 1 :** $H_1 = 3.75\,kip$ $V_1 = 11.1\,kip$

The vertical force is an uplift on the stiffened baseplate :
Assume middle stiffeners no.4 (10 x 40 mm) resists all the uplift.

Length of stiffener : $L := 166 \cdot mm$

Depth of stiffener and baseplate : $d := 50 \cdot mm$

Thickness of stiffener : $t := 10 \cdot mm$

Moment on stiffener : $M := \frac{V_1 \cdot L}{8}$ $M = 9.07\,kip \cdot in$

Section Modulus : $S := \frac{t \cdot d^2}{6}$ $S = 0.25\,in^3$

The actual stress equals : $\sigma := \frac{M}{(2)S}$ $\sigma = 122.9 \frac{N}{mm^2}$ $\sigma = 17.8\,ksi$

The actual stress is less than the allowable stress; BasePlate is **O.K.**

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11. Gable End Upright Design

Gable Uprights :

This gable uprights are made from the ALU270-profile. The uprights are connected to the gable end arch by means of a hinge. They are also connected to the upright baseplate by means of a hinge.

Material : 6061-T6

Allowable Bending Stress : $\sigma_{allowable} := 19 \cdot ksi$

	Upright profile - outer		Upright profile - reinforcement	
Moment of Inertia (strong) :	$I_{x_{e270}} = 27288132.26\ mm^4$	$I_{x_{e270}} = 65.56\ in^4$	$I_{x_{e260}} = 25519981.17\ mm^4$	$I_{x_{e260}} = 61.31\ in^4$
Section Modulus (strong) :	$S_{x_{e270}} = 202134.31\ mm^3$	$S_{x_{e270}} = 12.33\ in^3$	$S_{x_{e260}} = 196307.55\ mm^3$	$S_{x_{e260}} = 11.98\ in^3$

Upright #1 :

Gable Length : $L = 7.45\ m$ $L = 24.4\ ft$

Longitudinal Wind Pressure : $q = \begin{pmatrix} -546.71 \\ 503.32 \end{pmatrix} Pa$ $q = \begin{pmatrix} -11.42 \\ 10.51 \end{pmatrix} psf$

Width of loaded area: $W = 5.81\ m$ $W = 19.06\ ft$

Uniform Load on Gable : $Q := q \cdot W$ $Q = \begin{pmatrix} -217.7 \\ 200.4 \end{pmatrix} plf$

Moment on Gable : $M := \frac{Q \cdot L^2}{8}$ $M = \begin{pmatrix} -195 \\ 179.6 \end{pmatrix} kip \cdot in$

Bending Stress on Gable : $\sigma := \frac{M}{S_{x_{e270}} + S_{x_{e260}}}$ $\sigma = \begin{pmatrix} -8 \\ 7.4 \end{pmatrix} ksi$ $|\sigma_0|$ is less than or equal to $\sigma_{allowable}$ = "OK"
$|\sigma_1|$ is less than or equal to $\sigma_{allowable}$ = "OK"

Reinforcement Length (min) : $L_{re} = 0\ m$ $L_{re} = 0\ ft$

Starting Point of reinforcement : $x := \frac{L - L_{re}}{2}$ $x = 12.2\ ft$

Moment at Starting Point : $M_x := \frac{Q \cdot x \cdot (L - x)}{2}$ $M_x = \begin{pmatrix} -195 \\ 179.6 \end{pmatrix} kip \cdot in$

Bending Stress at Starting Point : $\sigma := \frac{M_x}{S_{x_{e270}}}$ $\sigma = \begin{pmatrix} -15.8 \\ 14.6 \end{pmatrix} ksi$ $|\sigma_0|$ is less than or equal to $\sigma_{allowable}$ = "OK"
$|\sigma_1|$ is less than or equal to $\sigma_{allowable}$ = "OK"

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Upright #2 :

Gable Length : $L = 10.25\,m$ $L = 33.6\,ft$

Longitudinal Wind Pressure : $q = \begin{pmatrix} -546.71 \\ 503.32 \end{pmatrix} Pa$ $q = \begin{pmatrix} -11.42 \\ 10.51 \end{pmatrix} psf$

Width of loaded area: $W = 6\,m$ $W = 19.69\,ft$

Uniform Load on Gable : $Q := q \cdot W$ $Q = \begin{pmatrix} -224.8 \\ 206.9 \end{pmatrix} plf$

Moment on Gable : $M := \frac{Q \cdot L^2}{8}$ $M = \begin{pmatrix} -381.3 \\ 351 \end{pmatrix} kip \cdot in$

Bending Stress on Gable : $\sigma := \frac{M}{S_{x_{e270}} + S_{x_{e260}}}$ $\sigma = \begin{pmatrix} -15.7 \\ 14.4 \end{pmatrix} ksi$ $|\sigma_0|$ is less than or equal to $\sigma_{allowable}$ = "OK"
$|\sigma_1|$ is less than or equal to $\sigma_{allowable}$ = "OK"

Reinforcement Length (min) : $L_{re} = 6.36\,m$ $L_{re} = 20.9\,ft$

Starting Point of reinforcement : $x := \frac{L - L_{re}}{2}$ $x = 6.4\,ft$

Moment at Starting Point : $M_x := \frac{Q \cdot x \cdot (L - x)}{2}$ $M_x = \begin{pmatrix} -234.4 \\ 215.8 \end{pmatrix} kip \cdot in$

Bending Stress at Starting Point : $\sigma := \frac{M_x}{S_{x_{e270}}}$ $\sigma = \begin{pmatrix} -19 \\ 17.5 \end{pmatrix} ksi$ $|\sigma_0|$ is less than or equal to $\sigma_{allowable}$ = "OK"
$|\sigma_1|$ is less than or equal to $\sigma_{allowable}$ = "OK"

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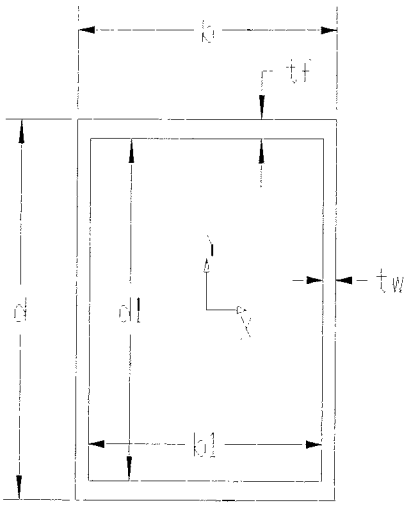
12. Purlin Design

Purlin design : ALU 129

$K_x := 1$ $K_y := 0.9$

$L = 15.86\,ft$ (unbraced length of purlin)

Maximum Axial Compression Force due to Fabric and/or Wind loading: $P_c = 5698\,lbf$



Cross-sectional area: $A_{g_{e129}} = 1.46\,in^2$

Moment of Inertial: $I_{x_{e129}} = 5.44\,in^4$

$I_{y_{e129}} = 3.09\,in^4$

Radius of gyration: $r_{x_{e129}} = 1.93\,in$

$r_{y_{e129}} = 1.45\,in$

Slenderness ratio: $a := \max\left(\frac{K_x \cdot L}{r_{x_{e129}}}, \frac{K_y \cdot L}{r_{y_{e129}}}\right)$ $a = 117.7$

Allowable Stress : From table 2-21 Aluminum code book Spec.7 $Fa := \frac{51000}{a^2} \cdot ksi$ $Fa = 3.7\,ksi$

Actual Stress : $fa := \frac{P_c}{A_{g_{e097}}}$ $fa = 4.9\,ksi$

I.E : $\frac{fa}{Fa} = 1.33$ **<= 1.33**

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Peak Purlin design : ALU 133

$K_x := 0.9$ $K_y := 0.9$ $L = 15.86\,ft$

Maximum Axial Compression Force due to Fabric and/or Wind loading : $P_c = 2444\,lbf$

Cross-sectional area: $A_{g_{e133}} = 2.48\,in^2$

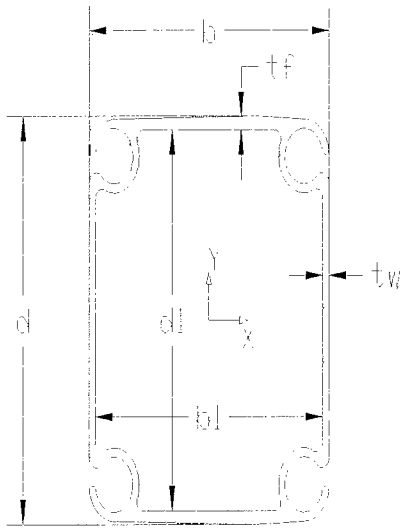
Moment of Inertial: $I_{x_{e133}} = 8.89\,in^4$

$I_{y_{e133}} = 3.84\,in^4$

Radius of gyration: $r_{x_{e133}} = 1.89\,in$

$r_{y_{e133}} = 1.24\,in$

Slenderness ratio: $a := \max\left(\frac{K_x \cdot L}{r_{x_{e133}}}, \frac{K_y \cdot L}{r_{y_{e133}}}\right)$ $a = 137.7$



Allowable Stress : From table 2-21 Aluminum code book Spec.7 $Fa := \frac{51000}{a^2} \cdot ksi$ $Fa = 2.7\,ksi$

Actual Stress : $fa := \frac{P_c}{A_{g_{e133}}}$ $fa = 1\,ksi$

I.E : $\frac{fa}{Fa} = 0.37$ **< 1.0 O.K.**

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13. Bracing Cables

The bracing cables are constructed of ϕ 5/8" 6x19 Galvanized Improved Plow IWRC wire rope.
The cables are connected to the arch frames by means of an eyebolt and shackle.
The length of the cable is adjusted by means of a 7/8 x 12" Jaw & Jaw turnbuckle (Built-in Safety factor of 5.0).
Cable components are connected together with 3/4" S-210 Shackles (Built-in Safety factor of 6.0).

Nominal Strength of Cable : $CableCapacity := 17.9 \cdot ton$

Working Load of Turnbuckle : $TBuckleCap := 7200 \cdot lb$

Working Load of Shackle : $ShackleCap := 4.75 \cdot ton$

Recommended Safety Factor is : $SF := 3$

The max force in the ***Bracing Cable*** is : $T_{max} = 7.36\,kip$

$$BracingCable := if\left[\frac{0.9(CableCapacity)}{SF \cdot \left(\frac{ton}{2000lbf}\right)} > T_{max}, "is\ OK", "is\ not\ OK"\right]$$

$BracingCable = "is\ OK"$

$$Turnbuckle := if\left(\frac{TBuckleCap}{\frac{ton}{2000lbf}} > T_{max}, "is\ OK", "is\ not\ OK"\right)$$

$Turnbuckle = "is\ not\ OK"$

$$Shackle := if\left(\frac{ShackleCap}{\frac{ton}{2000lbf}} > T_{max}, "is\ OK", "is\ not\ OK"\right)$$

$Shackle = "is\ OK"$

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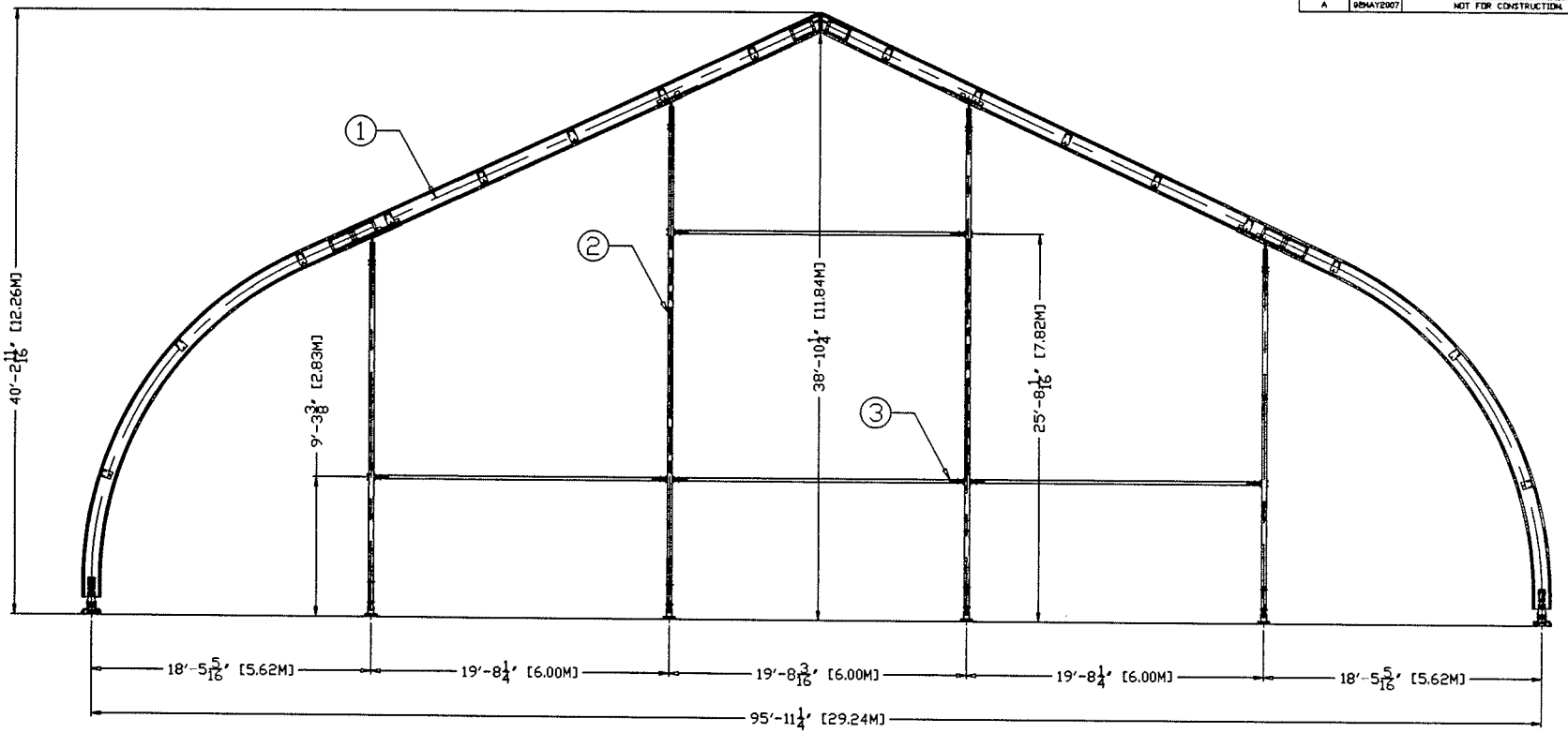
APPENDIX A

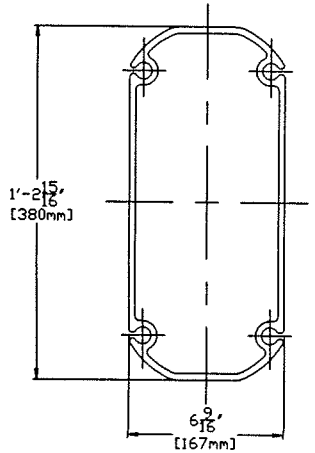
FIGURES AND SKETCHES

REV.	DATE	DESCRIPTION	NAME
0	30JUL2004	ORIGINAL RELEASE	AMM
A	08MAY2007	NOT FOR CONSTRUCTION, ADDED PROFILES	KZ

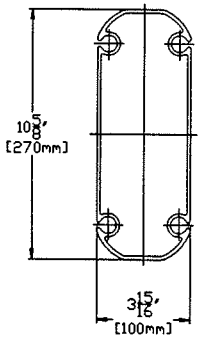


PROFILES

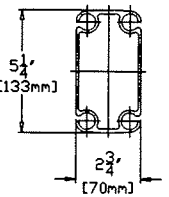
① CURVE & ROOF TRUSS



② GABLE UPRIGHT



③ GABLE HORIZONTAL



NOT FOR CONSTRUCTION

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TITLE: TFS R 29.2M - 380 GABLE VIEW w/ PROFILES

DRAWN: DC	CHECKED: AMM	DATE: 30JUL2004	REV.: A

SIZE	SCALE	JOB No.:	DWG. NO.:
C	NTS		S244

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APPENDIX B

COMPUTER MODEL INPUT

TFS/R 29.2M with 380 extrusion

VisualAnalysis 5.00 Report
Company: Universal Fabric Structures Engineer: Brian Szkaradnik
Project File: 380 TFS 29.2M-5M-115B.VAP
Folder: J:\PRECONTRACTS\Universal Rentals\ER495 - TFSR29x35 Hemstead NY\Calculations\

Table of Contents

Model Summary

Structure Type: Plane Frame
The model is linear.
The model will have 46 unique mode shapes.
25 Nodes, and 71 Degrees of Freedom
The size of the model is:
   1151 in, in the X direction
   475.3 in, in the Y direction
24 Member Elements

Nodes

Node	X *in*	Y *in*	Fix DX	Fix DY	Fix RZ
1	0.000	0.000	Yes	Yes	No
2	1151.2	0.000	"	"	"
3	0.000	21.500	No	No	"
4	1151.2	21.500	"	"	"
5	13.100	111.70	"	"	"
6	1138.1	111.70	"	"	"
9	165.50	284.10	"	"	"
10	985.70	284.10	"	"	"
13	308.20	350.60	"	"	"
14	843.00	350.60	"	"	"
15	379.60	384.00	"	"	"
16	771.60	384.00	"	"	"
19	497.00	438.70	"	"	"
20	654.20	438.70	"	"	"
21	522.30	450.50	"	"	"
22	628.90	450.50	"	"	"
25	575.60	475.30	"	"	"
E7	71.100	214.20	"	"	"
E8	1080.1	214.20	"	"	"
PG1	234.90	316.50	"	"	"
PG2	451.00	417.20	"	"	"
PG3	700.20	417.20	"	"	"
PG4	916.30	316.50	"	"	"
S1	206.20	303.10	"	"	"
S2	945.00	303.10	"	"	"

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length *in*	Weight *lb*	Rz1	Rz2	One Way
M1	ALU 380	Aluminum	1	3	21.500	23.9374	Fix	Fix	Normal
M2	"	"	4	2	21.500	23.9374	"	"	"
M3	"	"	3	5	91.146	101.479	"	"	"
M4	"	"	6	4	91.146	101.479	"	"	"
M5	"	"	5	E7	117.77	131.123	"	"	"
M6	"	"	E8	6	117.77	131.123	"	"	"
M7	"	"	E7	9	117.46	130.778	"	"	"
M8	"	"	10	E8	117.46	130.778	"	"	"
M9	"	"	9	S1	44.916	50.0085	"	"	"
M10	"	"	S2	10	44.916	50.0085	"	"	"
M11	"	"	S1	PG1	31.674	35.2649	"	"	"
M12	"	"	PG4	S2	31.674	35.2649	"	"	"
M13	"	"	PG1	13	80.844	90.0086	"	"	"
M14	"	"	14	PG4	80.844	90.0086	"	"	"
M15	"	"	13	15	78.826	87.7621	"	"	"
M16	"	"	16	14	78.826	87.7621	"	"	"
M17	"	"	15	PG2	78.741	87.6680	"	"	"
M18	"	"	PG3	16	78.741	87.6680	"	"	"
M19	"	"	PG2	19	50.776	56.5328	"	"	"
M20	"	"	20	PG3	50.776	56.5328	"	"	"
M21	"	"	19	21	27.916	31.0813	"	"	"
M22	"	"	22	20	27.916	31.0813	"	"	"
M23	"	"	21	25	58.787	65.4517	"	"	"
M24	"	"	25	22	58.787	65.4517	"	"	"

Section Properties

Section	Theta *deg*	Ax *in^2*	Iz *in^4*	Sz(+y) *in^3*	Sz(-y) *in^3*
ALU 380	0.0000	11.31700	308.9599	41.30300	41.30300

Material Properties

Material	Strength *psi*	Elasticity *psi*	Poisson	Density *lb/in^3*	Therm. Coeff. *in/in/deg-F*
Aluminum	-NA-	10100000.0	0.3000	0.10	0.000

Nodal Supports

Node	Fix DX	Fix DY	Fix RZ
1	Yes	Yes	No
2	"	"	"

Service Load Cases

Load Case	Load Source	Self Weight	Self X	Self Y	Self Z	Load	Exclusive
(1) D (Dead load)	Dead loads	None	0.0000	0.0000	0.0000	25	No
Lr Roof Live Load	Roof Live l	"	NA	NA	NA	14	"
Snow Balanced	Snow loads	"	NA	NA	NA	14	"
Snow Unbalanced	"	"	NA	NA	NA	7	"
Wind 1 (Lateral +)	Wind +X loa	"	NA	NA	NA	24	Yes

Load Case	Load Source	Self Weight	Self X	Self Y	Self Z	Load Exclusive
Wind 2 (Lateral -)	"	"	NA	NA	NA	24 "
Wind 3 (Longitudinal +)	"	"	NA	NA	NA	24 "

Member Uniform Loads

Load Case	Member	Direction	Offset *in*	End Offset *in*	Magnitude
(1) D (Dead load)	M3	DY	0.0000	91.1463	-1.6700 lb/in
"	M4	"	0.0000	91.1463	-1.6700 lb/in
"	M5	"	0.0000	117.7720	-1.6700 lb/in
"	M6	"	0.0000	117.7720	-1.6700 lb/in
"	M7	"	0.0000	117.4622	-1.6700 lb/in
"	M8	"	0.0000	117.4622	-1.6700 lb/in
"	M9	"	0.0000	44.9165	-1.6700 lb/in
"	M10	"	0.0000	44.9165	-1.6700 lb/in
"	M11	"	0.0000	31.6741	-1.6700 lb/in
"	M12	"	0.0000	31.6741	-1.6700 lb/in
"	M13	"	0.0000	80.8437	-1.6700 lb/in
"	M14	"	0.0000	80.8437	-1.6700 lb/in
"	M15	"	0.0000	78.8259	-1.6700 lb/in
"	M16	"	0.0000	78.8259	-1.6700 lb/in
"	M17	"	0.0000	78.7413	-1.6700 lb/in
"	M18	"	0.0000	78.7413	-1.6700 lb/in
"	M19	"	0.0000	50.7765	-1.6700 lb/in
"	M20	"	0.0000	50.7765	-1.6700 lb/in
"	M21	"	0.0000	27.9165	-1.6700 lb/in
"	M22	"	0.0000	27.9165	-1.6700 lb/in
"	M23	"	0.0000	58.7872	-1.6700 lb/in
"	M24	"	0.0000	58.7872	-1.6700 lb/in
Lr Roof Live Load	M11	DY proj.	0.0000	31.6741	-8.4200 lb/in
"	M12	"	0.0000	31.6741	-8.4200 lb/in
"	M13	"	0.0000	80.8437	-8.4200 lb/in
"	M14	"	0.0000	80.8437	-8.4200 lb/in
"	M15	"	0.0000	78.8259	-8.4200 lb/in
"	M16	"	0.0000	78.8259	-8.4200 lb/in
"	M17	"	0.0000	78.7413	-8.4200 lb/in
"	M18	"	0.0000	78.7413	-8.4200 lb/in
"	M19	"	0.0000	50.7765	-8.4200 lb/in
"	M20	"	0.0000	50.7765	-8.4200 lb/in
"	M21	"	0.0000	27.9165	-8.4200 lb/in
"	M22	"	0.0000	27.9165	-8.4200 lb/in
"	M23	"	0.0000	58.7872	-8.4200 lb/in
"	M24	"	0.0000	58.7872	-8.4200 lb/in
Snow Balanced	M11	"	0.0000	31.6741	-9.3300 lb/in
"	M12	"	0.0000	31.6741	-9.3300 lb/in
"	M13	"	0.0000	80.8437	-9.3300 lb/in
"	M14	"	0.0000	80.8437	-9.3300 lb/in
"	M15	"	0.0000	78.8259	-9.3300 lb/in
"	M16	"	0.0000	78.8259	-9.3300 lb/in
"	M17	"	0.0000	78.7413	-9.3300 lb/in
"	M18	"	0.0000	78.7413	-9.3300 lb/in
"	M19	"	0.0000	50.7765	-9.3300 lb/in
"	M20	"	0.0000	50.7765	-9.3300 lb/in
"	M21	"	0.0000	27.9165	-9.3300 lb/in
"	M22	"	0.0000	27.9165	-9.3300 lb/in
"	M23	"	0.0000	58.7872	-9.3300 lb/in
"	M24	"	0.0000	58.7872	-9.3300 lb/in
Snow Unbalanced	M12	"	0.0000	31.6741	-9.3300 lb/in
"	M14	"	0.0000	80.8437	-9.3300 lb/in
"	M16	"	0.0000	78.8259	-9.3300 lb/in
"	M18	"	0.0000	78.7413	-9.3300 lb/in
"	M20	"	0.0000	50.7765	-9.3300 lb/in

Load Case	Member	Direction	Offset *in*	End Offset *in*	Magnitude
"	M22	"	0.0000	27.9165	-9.3300 lb/in
"	M24	"	0.0000	58.7872	-9.3300 lb/in
Wind 1 (Lateral +)	M1	dy	0.0000	21.5000	-9.0400 lb/in
"	M2	"	0.0000	21.5000	14.3700 lb/in
"	M3	"	0.0000	91.1463	-9.0400 lb/in
"	M4	"	0.0000	91.1463	14.3700 lb/in
"	M5	"	0.0000	117.7720	-9.0400 lb/in
"	M6	"	0.0000	117.7720	14.3700 lb/in
"	M7	"	0.0000	117.4622	10.4200 lb/in
"	M8	"	0.0000	117.4622	15.7300 lb/in
"	M9	"	0.0000	44.9165	10.4200 lb/in
"	M10	"	0.0000	44.9165	15.7300 lb/in
"	M11	"	0.0000	31.6741	10.4200 lb/in
"	M12	"	0.0000	31.6741	15.7300 lb/in
"	M13	"	0.0000	80.8437	10.4200 lb/in
"	M14	"	0.0000	80.8437	15.7300 lb/in
"	M15	"	0.0000	78.8259	10.4200 lb/in
"	M16	"	0.0000	78.8259	15.7300 lb/in
"	M17	"	0.0000	78.7413	10.4200 lb/in
"	M18	"	0.0000	78.7413	15.7300 lb/in
"	M19	"	0.0000	50.7765	10.4200 lb/in
"	M20	"	0.0000	50.7765	15.7300 lb/in
"	M21	"	0.0000	27.9165	10.4200 lb/in
"	M22	"	0.0000	27.9165	15.7300 lb/in
"	M23	"	0.0000	58.7872	10.4200 lb/in
"	M24	"	0.0000	58.7872	15.7300 lb/in
Wind 2 (Lateral -)	M1	"	0.0000	21.5000	-17.9600 lb/in
"	M2	"	0.0000	21.5000	5.4500 lb/in
"	M3	"	0.0000	91.1463	-17.9600 lb/in
"	M4	"	0.0000	91.1463	5.4500 lb/in
"	M5	"	0.0000	117.7720	-17.9600 lb/in
"	M6	"	0.0000	117.7720	5.4500 lb/in
"	M7	"	0.0000	117.4622	1.5000 lb/in
"	M8	"	0.0000	117.4622	6.8100 lb/in
"	M9	"	0.0000	44.9165	1.5000 lb/in
"	M10	"	0.0000	44.9165	6.8100 lb/in
"	M11	"	0.0000	31.6741	1.5000 lb/in
"	M12	"	0.0000	31.6741	6.8100 lb/in
"	M13	"	0.0000	80.8437	1.5000 lb/in
"	M14	"	0.0000	80.8437	6.8100 lb/in
"	M15	"	0.0000	78.8259	1.5000 lb/in
"	M16	"	0.0000	78.8259	6.8100 lb/in
"	M17	"	0.0000	78.7413	1.5000 lb/in
"	M18	"	0.0000	78.7413	6.8100 lb/in
"	M19	"	0.0000	50.7765	1.5000 lb/in
"	M20	"	0.0000	50.7765	6.8100 lb/in
"	M21	"	0.0000	27.9165	1.5000 lb/in
"	M22	"	0.0000	27.9165	6.8100 lb/in
"	M23	"	0.0000	58.7872	1.5000 lb/in
"	M24	"	0.0000	58.7872	6.8100 lb/in
Wind 3 (Longitudinal +)	M1	"	0.0000	21.5000	15.6100 lb/in
"	M2	"	0.0000	21.5000	15.6100 lb/in
"	M3	"	0.0000	91.1463	15.6100 lb/in
"	M4	"	0.0000	91.1463	15.6100 lb/in
"	M5	"	0.0000	117.7720	15.6100 lb/in
"	M6	"	0.0000	117.7720	15.6100 lb/in
"	M7	"	0.0000	117.4622	21.5600 lb/in
"	M8	"	0.0000	117.4622	21.5600 lb/in
"	M9	"	0.0000	44.9165	21.5600 lb/in
"	M10	"	0.0000	44.9165	21.5600 lb/in
"	M11	"	0.0000	31.6741	21.5600 lb/in
"	M12	"	0.0000	31.6741	21.5600 lb/in
"	M13	"	0.0000	80.8437	21.5600 lb/in
"	M14	"	0.0000	80.8437	21.5600 lb/in

Load Case	Member	Direction	Offset End Offset in	Offset in	Magnitude
"	M15	"	0.0000	78.8259	21.5600 lb/in
"	M16	"	0.0000	78.8259	21.5600 lb/in
"	M17	"	0.0000	78.7413	21.5600 lb/in
"	M18	"	0.0000	78.7413	21.5600 lb/in
"	M19	"	0.0000	50.7765	21.5600 lb/in
"	M20	"	0.0000	50.7765	21.5600 lb/in
"	M21	"	0.0000	27.9165	21.5600 lb/in
"	M22	"	0.0000	27.9165	21.5600 lb/in
"	M23	"	0.0000	58.7872	21.5600 lb/in
"	M24	"	0.0000	58.7872	21.5600 lb/in

Nodal Loads

Load Case	Node	Direction	Magnitude
(1) D (Dead load)	25	DY	-155.0000 lb
"	S1	"	-100.0000 lb
"	S2	"	-100.0000 lb

Load Case Summary

7 Service Load Cases
18 Factored Combinations

Load Cases

Load Case
(8)(3) D + Lr
(9)(3) D + Snow Balanced
(10)(3) D + Snow Unbalanced
(11)(5) D + W2
(12)(5) D + W1
(13)(5) D + W3
(14)(6) D + 0.75W1 + 0.75 S Balanced
(15)(6) D + 0.75W1 + 0.75 S Unbalanced
(16)(6) D + 0.75W1 + 0.75Lr
(17)(6) D + 0.75W2 + 0.75 S Balanced
(18)(6) D + 0.75W2 + 0.75 S Unbalanced
(19)(1) D (Dead load)
(19)(6) D + 0.75W2 + 0.75Lr
(20)(6) D + 0.75W3 + 0.75 S Balanced
(20)Lr Roof Live Load
(21)(6) D + 0.75W3 + 0.75Lr
(21)Snow Balanced
(22)(7) 0.6D + W1
(22)Snow Unbalanced
(23)(7) 0.6D + W2
(23)Wind 1 (Lateral +)
(24)(7) 0.6D + W3
(24)Wind 2 (Lateral -)
(25)(6) D + 0.75W3 + 0.75 S Unbalanced
(25)Wind 3 (Longitudinal +)

Load Combination Summary

Factored Combination: (3) D + Lr

Scale factor = 1.00

Factor : Service Case

1.00 x (1) D (Dead load)

1.00 x Lr Roof Live Load
Factored Combination: (3) D + Snow Balanced
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
1.00 x Snow Balanced
Factored Combination: (3) D + Snow Unbalanced
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
1.00 x Snow Unbalanced
Factored Combination: (5) D + W2
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
1.00 x Wind 2 (Lateral -)
Factored Combination: (5) D + W1
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
1.00 x Wind 1 (Lateral +)
Factored Combination: (5) D + W3
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
1.00 x Wind 3 (Longitudinal +)
Factored Combination: (6) D + 0.75W1 + 0.75 S Balanced
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
0.75 x Wind 1 (Lateral +)
0.75 x Snow Balanced
Factored Combination: (6) D + 0.75W1 + 0.75 S Unbalanced
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
0.75 x Wind 1 (Lateral +)
0.75 x Snow Unbalanced
Factored Combination: (6) D + 0.75W1 + 0.75Lr
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
0.75 x Wind 1 (Lateral +)
0.75 x Lr Roof Live Load
Factored Combination: (6) D + 0.75W2 + 0.75 S Balanced
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
0.75 x Wind 2 (Lateral -)
0.75 x Snow Balanced
Factored Combination: (6) D + 0.75W2 + 0.75 S Unbalanced
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
0.75 x Wind 2 (Lateral -)
0.75 x Snow Unbalanced
Factored Combination: (6) D + 0.75W2 + 0.75Lr
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
0.75 x Wind 2 (Lateral -)
0.75 x Lr Roof Live Load
Factored Combination: (6) D + 0.75W3 + 0.75 S Balanced
Scale factor = 1.00
Factor : Service Case
0.75 x Wind 3 (Longitudinal +)
1.00 x (1) D (Dead load)
0.75 x Snow Balanced

Factored Combination: (6) D + 0.75W3 + 0.75Lr
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
0.75 x Wind 3 (Longitudinal +)
0.75 x Lr Roof Live Load
Factored Combination: (7) 0.6D + W1
Scale factor = 1.00
Factor : Service Case
0.60 x (1) D (Dead load)
1.00 x Wind 1 (Lateral +)
Factored Combination: (7) 0.6D + W2
Scale factor = 1.00
Factor : Service Case
0.60 x (1) D (Dead load)
1.00 x Wind 2 (Lateral -)
Factored Combination: (7) 0.6D + W3
Scale factor = 1.00
Factor : Service Case
0.60 x (1) D (Dead load)
1.00 x Wind 3 (Longitudinal +)
Factored Combination: (6) D + 0.75W3 + 0.75 S Unbalanced
Scale factor = 1.00
Factor : Service Case
1.00 x (1) D (Dead load)
0.75 x Wind 3 (Longitudinal +)
0.75 x Snow Unbalanced

Universal Fabric Structures
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APPENDIX C

COMPUTER MODEL OUTPUT

TFS/R 29.2M with 380 extrusion

VisualAnalysis 5.00 Report
Company: Universal Fabric Structures Engineer: Brian Szkaradnik
Project File: 380 TFS 29.2M-5M-115B.VAP
Folder: J:\PRECONTRACTS\Universal Rentals\ER495 - TFSR29x35 Hemstead NY\Calculations\

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Load Cases

Load Case
(8)(3) D + Lr
(9)(3) D + Snow Balanced
(10)(3) D + Snow Unbalanced
(11)(5) D + W2
(12)(5) D + W1
(13)(5) D + W3
(14)(6) D + 0.75W1 + 0.75 S Balanced
(15)(6) D + 0.75W1 + 0.75 S Unbalanced
(16)(6) D + 0.75W1 + 0.75Lr
(17)(6) D + 0.75W2 + 0.75 S Balanced
(18)(6) D + 0.75W2 + 0.75 S Unbalanced
(19)(6) D + 0.75W2 + 0.75Lr
(20)(6) D + 0.75W3 + 0.75 S Balanced
(21)(6) D + 0.75W3 + 0.75Lr
(22)(7) 0.6D + W1
(23)(7) 0.6D + W2
(24)(7) 0.6D + W3
(25)(6) D + 0.75W3 + 0.75 S Unbalanced

Member Extreme Results

Member	Fx(lc) *lb*	Vy(lc) *lb*	Mz(lc) *lb-in*
M1	-4925 (9)	-3444 (9)	-74039 (9)
"	11100 (24)	**6256 (22)**	132407 (22)
M2	-4925 (9)	-4089 (24)	-76122 (17)
"	11100 (24)	3584 (17)	84296 (24)
M3	-5369 (9)	-2722 (9)	-321139 (9)
"	11663 (24)	5220 (22)	570081 (22)
M4	-5369 (9)	-3860 (24)	-343308 (17)
"	11663 (24)	3107 (17)	371915 (24)
M5	**-5850 (9)**	-952 (20)	-403013 (9)
"	**12372 (24)**	2185 (23)	**715562 (22)**
M6	-5850 (9)	-1153 (24)	**-504324 (17)**
"	12372 (24)	1851 (14)	402912 (24)
M7	-5491 (9)	-3974 (24)	-403013 (9)
"	11843 (24)	1628 (9)	715562 (22)
M8	-5491 (9)	-1628 (9)	-504324 (17)
"	11843 (24)	3974 (24)	402912 (24)
M9	-4973 (9)	-3865 (24)	-221027 (9)
"	11318 (24)	2512 (9)	492407 (22)
M10	-4973 (9)	-2512 (9)	-440990 (17)
"	11318 (24)	3865 (24)	79316 (24)
M11	-4899 (9)	-2991 (24)	-229272 (25)
"	11357 (24)	2353 (9)	414286 (23)

Member	Fx(lc) lb	Vy(lc) lb	Mz(lc) lb-in
M12	-4899 (9)	-2353 (9)	-465958 (22)
"	11357 (24)	2991 (24)	108093 (10)
M13	-4761 (9)	-2353 (24)	-280554 (24)
"	11388 (24)	2069 (9)	378733 (11)
M14	-4761 (9)	-2069 (9)	-501842 (22)
"	11388 (24)	2353 (24)	205117 (10)
M15	-4418 (9)	-1308 (22)	-291070 (24)
"	11423 (24)	1317 (9)	298593 (11)
M16	-4418 (9)	-1442 (14)	-500903 (22)
"	11423 (24)	659 (24)	241523 (10)
M17	-4079 (9)	-1022 (23)	-268347 (24)
"	11459 (24)	2569 (24)	279703 (17)
M18	-4079 (9)	-2569 (24)	-440780 (22)
"	11459 (24)	617 (10)	242133 (10)
M19	-3742 (9)	-1126 (17)	-130108 (24)
"	11475 (24)	3640 (24)	234823 (17)
M20	-3742 (9)	-3640 (24)	-289779 (22)
"	11475 (24)	1087 (10)	221392 (10)
M21	-3525 (9)	-1296 (17)	22872 (10)
"	11490 (24)	4207 (24)	213667 (20)
M22	-3525 (9)	-4207 (24)	-163914 (23)
"	11490 (24)	1342 (10)	213667 (20)
M23	-3406 (9)	-1656 (17)	1428 (23)
"	11518 (24)	5411 (24)	424214 (13)
M24	-3406 (9)	**-5411 (24)**	-115511 (23)
"	11518 (24)	1880 (10)	424214 (13)

Nodal Reactions

Node	Result Case Name	FX lb	FY lb	MZ lb-in
1	(3) D + Lr First Order	3183	4589	-NA-
"	(3) D + Snow Balanced First Order	3444	**4925**	-NA-
"	(3) D + Snow Unbalanced First Order	2108	2648	-NA-
"	(5) D + W1 First Order	-5947	-4822	-NA-
"	(5) D + W2 First Order	-4551	313	-NA-
"	(5) D + W3 First Order	-3444	-10509	-NA-
"	(6) D + 0.75W1 + 0.75 S Balanced First O	-2263	-662	-NA-
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	-3265	-2369	-NA-
"	(6) D + 0.75W1 + 0.75Lr First Order	-2459	-914	-NA-
"	(6) D + 0.75W2 + 0.75 S Balanced First O	-1216	3189	-NA-
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	-2218	1482	-NA-
"	(6) D + 0.75W2 + 0.75Lr First Order	-1412	2937	-NA-
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-386	-4927	-NA-
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1388	-6634	-NA-
"	(6) D + 0.75W3 + 0.75Lr First Order	-582	-5179	-NA-
"	(7) 0.6D + W1 First Order	**-6256**	-5413	-NA-
"	(7) 0.6D + W2 First Order	-4859	-278	-NA-
"	(7) 0.6D + W3 First Order	-3753	**-11100**	-NA-
2	(3) D + Lr First Order	-3183	4589	-NA-
"	(3) D + Snow Balanced First Order	-3444	4925	-NA-
"	(3) D + Snow Unbalanced First Order	-2108	3754	-NA-
"	(5) D + W1 First Order	-454	-5794	-NA-
"	(5) D + W2 First Order	-1850	-659	-NA-
"	(5) D + W3 First Order	3444	-10509	-NA-
"	(6) D + 0.75W1 + 0.75 S Balanced First O	-2537	-1391	-NA-
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	-1535	-2269	-NA-
"	(6) D + 0.75W1 + 0.75Lr First Order	-2342	-1643	-NA-
"	(6) D + 0.75W2 + 0.75 S Balanced First O	-3584	2460	-NA-
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	-2583	1582	-NA-
"	(6) D + 0.75W2 + 0.75Lr First Order	-3389	2208	-NA-

Node	Result Case Name	FX *lb*	FY *lb*	MZ *lb-in*
"	(6) D + 0.75W3 + 0.75 S Balanced First O	386	-4927	-NA-
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	1388	-5805	-NA-
"	(6) D + 0.75W3 + 0.75Lr First Order	582	-5179	-NA-
"	(7) 0.6D + W1 First Order	-145	-6385	-NA-
"	(7) 0.6D + W2 First Order	-1541	-1251	-NA-
"	(7) 0.6D + W3 First Order	**3753**	-11100	-NA-

Nodal Displacements

Node	Result Case Name	DX *in*	DY *in*	RZ *deg*
1	(3) D + Lr First Order	0.0000	0.0000	0.97788
"	(3) D + Snow Balanced First Order	0.0000	0.0000	1.06193
"	(3) D + Snow Unbalanced First Order	0.0000	0.0000	1.16078
"	(5) D + W1 First Order	0.0000	0.0000	-3.34506
"	(5) D + W2 First Order	0.0000	0.0000	-3.04751
"	(5) D + W3 First Order	0.0000	0.0000	-0.72617
"	(6) D + 0.75W1 + 0.75 S Balanced First O	0.0000	0.0000	-1.81248
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	0.0000	0.0000	-1.73833
"	(6) D + 0.75W1 + 0.75Lr First Order	0.0000	0.0000	-1.87551
"	(6) D + 0.75W2 + 0.75 S Balanced First O	0.0000	0.0000	-1.58931
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	0.0000	0.0000	-1.51517
"	(6) D + 0.75W2 + 0.75Lr First Order	0.0000	0.0000	-1.65234
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.0000	0.0000	0.15169
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	0.0000	0.0000	0.22583
"	(6) D + 0.75W3 + 0.75Lr First Order	0.0000	0.0000	0.08866
"	(7) 0.6D + W1 First Order	0.0000	0.0000	**-3.42516**
"	(7) 0.6D + W2 First Order	0.0000	0.0000	-3.12761
"	(7) 0.6D + W3 First Order	0.0000	0.0000	-0.80627
2	(3) D + Lr First Order	0.0000	0.0000	-0.97788
"	(3) D + Snow Balanced First Order	0.0000	0.0000	-1.06193
"	(3) D + Snow Unbalanced First Order	0.0000	0.0000	-0.10140
"	(5) D + W1 First Order	0.0000	0.0000	-2.14813
"	(5) D + W2 First Order	0.0000	0.0000	-2.44568
"	(5) D + W3 First Order	0.0000	0.0000	0.72617
"	(6) D + 0.75W1 + 0.75 S Balanced First O	0.0000	0.0000	-2.30741
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	0.0000	0.0000	-1.58702
"	(6) D + 0.75W1 + 0.75Lr First Order	0.0000	0.0000	-2.24438
"	(6) D + 0.75W2 + 0.75 S Balanced First O	0.0000	0.0000	-2.53058
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	0.0000	0.0000	-1.81018
"	(6) D + 0.75W2 + 0.75Lr First Order	0.0000	0.0000	-2.46755
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.0000	0.0000	-0.15169
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	0.0000	0.0000	0.56871
"	(6) D + 0.75W3 + 0.75Lr First Order	0.0000	0.0000	-0.08866
"	(7) 0.6D + W1 First Order	0.0000	0.0000	-2.06803
"	(7) 0.6D + W2 First Order	0.0000	0.0000	-2.36558
"	(7) 0.6D + W3 First Order	0.0000	0.0000	0.80627
3	(3) D + Lr First Order	-0.3653	-0.0009	0.96437
"	(3) D + Snow Balanced First Order	-0.3967	-0.0009	1.04731
"	(3) D + Snow Unbalanced First Order	-0.4345	-0.0005	1.15184
"	(5) D + W1 First Order	1.2521	0.0009	-3.32010
"	(5) D + W2 First Order	1.1412	-0.0001	-3.02874
"	(5) D + W3 First Order	0.2706	0.0020	-0.71108
"	(6) D + 0.75W1 + 0.75 S Balanced First O	0.6789	0.0001	-1.80308
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	0.6506	0.0004	-1.72468
"	(6) D + 0.75W1 + 0.75Lr First Order	0.7025	0.0002	-1.86528
"	(6) D + 0.75W2 + 0.75 S Balanced First O	0.5958	-0.0006	-1.58456
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	0.5674	-0.0003	-1.50616
"	(6) D + 0.75W2 + 0.75Lr First Order	0.6193	-0.0006	-1.64676
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.0572	0.0009	0.15368
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-0.0855	0.0012	0.23208

Node	Result Case Name	DX *in*	DY *in*	RZ *deg*
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.0336	0.0010	0.09148
"	(7) 0.6D + W1 First Order	1.2820	0.0010	-3.39889
"	(7) 0.6D + W2 First Order	1.1711	0.0001	-3.10753
"	(7) 0.6D + W3 First Order	0.3005	0.0021	-0.78987
4	(3) D + Lr First Order	0.3653	-0.0009	-0.96437
"	(3) D + Snow Balanced First Order	0.3967	-0.0009	-1.04731
"	(3) D + Snow Unbalanced First Order	0.0369	-0.0007	-0.09245
"	(5) D + W1 First Order	0.8059	0.0011	-2.14664
"	(5) D + W2 First Order	0.9168	0.0001	-2.43799
"	(5) D + W3 First Order	-0.2706	0.0020	0.71108
"	(6) D + 0.75W1 + 0.75 S Balanced First O	0.8645	0.0003	-2.29697
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	0.5947	0.0004	-1.58083
"	(6) D + 0.75W1 + 0.75Lr First Order	0.8410	0.0003	-2.23477
"	(6) D + 0.75W2 + 0.75 S Balanced First O	0.9477	-0.0005	-2.51549
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	0.6779	-0.0003	-1.79934
"	(6) D + 0.75W2 + 0.75Lr First Order	0.9241	-0.0004	-2.45329
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.0572	0.0009	-0.15368
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-0.2126	0.0011	0.56246
"	(6) D + 0.75W3 + 0.75Lr First Order	0.0336	0.0010	-0.09148
"	(7) 0.6D + W1 First Order	0.7760	0.0012	-2.06785
"	(7) 0.6D + W2 First Order	0.8869	0.0002	-2.35920
"	(7) 0.6D + W3 First Order	-0.3005	0.0021	0.78987
5	(3) D + Lr First Order	-1.6940	0.1881	0.65934
"	(3) D + Snow Balanced First Order	-1.8402	0.2045	0.71692
"	(3) D + Snow Unbalanced First Order	-2.1199	0.2420	0.94538
"	(5) D + W1 First Order	6.1222	-0.7018	-2.74979
"	(5) D + W2 First Order	5.6358	-0.6525	-2.59637
"	(5) D + W3 First Order	1.1858	-0.1221	-0.37541
"	(6) D + 0.75W1 + 0.75 S Balanced First O	3.3819	-0.3916	-1.58795
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	3.1721	-0.3635	-1.41660
"	(6) D + 0.75W1 + 0.75Lr First Order	3.4916	-0.4038	-1.63113
"	(6) D + 0.75W2 + 0.75 S Balanced First O	3.0171	-0.3546	-1.47289
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	2.8073	-0.3265	-1.30154
"	(6) D + 0.75W2 + 0.75Lr First Order	3.1268	-0.3669	-1.51607
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.3204	0.0432	0.19283
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-0.5302	0.0714	0.36418
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.2107	0.0310	0.14965
"	(7) 0.6D + W1 First Order	6.2585	-0.7167	-2.80042
"	(7) 0.6D + W2 First Order	5.7721	-0.6674	-2.64701
"	(7) 0.6D + W3 First Order	1.3221	-0.1369	-0.42605
6	(3) D + Lr First Order	1.6940	0.1881	-0.65934
"	(3) D + Snow Balanced First Order	1.8402	0.2045	-0.71692
"	(3) D + Snow Unbalanced First Order	0.0611	-0.0004	0.10188
"	(5) D + W1 First Order	4.1500	0.4914	-2.09415
"	(5) D + W2 First Order	4.6364	0.5407	-2.24756
"	(5) D + W3 First Order	-1.1858	-0.1221	0.37541
"	(6) D + 0.75W1 + 0.75 S Balanced First O	4.3222	0.5033	-2.04500
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	2.9879	0.3497	-1.43091
"	(6) D + 0.75W1 + 0.75Lr First Order	4.2125	0.4911	-2.00182
"	(6) D + 0.75W2 + 0.75 S Balanced First O	4.6870	0.5403	-2.16006
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	3.3527	0.3867	-1.54597
"	(6) D + 0.75W2 + 0.75Lr First Order	4.5773	0.5281	-2.11688
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.3204	0.0432	-0.19283
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.0139	-0.1104	0.42126
"	(6) D + 0.75W3 + 0.75Lr First Order	0.2107	0.0310	-0.14965
"	(7) 0.6D + W1 First Order	4.0136	0.4766	-2.04351
"	(7) 0.6D + W2 First Order	4.5000	0.5259	-2.19693
"	(7) 0.6D + W3 First Order	-1.3221	-0.1369	0.42605
9	(3) D + Lr First Order	-1.7748	-0.1592	-0.67571
"	(3) D + Snow Balanced First Order	-1.9316	-0.1696	-0.73361
"	(3) D + Snow Unbalanced First Order	**-3.5613**	1.1950	-0.10458
"	(5) D + W1 First Order	10.7936	-4.0414	-0.16374
"	(5) D + W2 First Order	10.6270	-4.4446	-0.50234
"	(5) D + W3 First Order	0.4524	0.9220	0.78648

Node	Result Case Name	DX *in*	DY *in*	RZ *deg*
"	(6) D + 0.75W1 + 0.75 S Balanced First O	6.8082	-3.1267	-0.60302
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.5860	-2.1033	-0.13125
"	(6) D + 0.75W1 + 0.75Lr First Order	6.9258	-3.1189	-0.55960
"	(6) D + 0.75W2 + 0.75 S Balanced First O	6.6833	-3.4291	-0.85698
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.4610	-2.4057	-0.38521
"	(6) D + 0.75W2 + 0.75Lr First Order	6.8009	-3.4213	-0.81355
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.9477	0.5958	0.10964
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-2.1699	1.6192	0.58141
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.8301	0.6036	0.15307
"	(7) 0.6D + W1 First Order	**10.9230**	-4.0162	-0.10775
"	(7) 0.6D + W2 First Order	10.7564	-4.4194	-0.44635
"	(7) 0.6D + W3 First Order	0.5818	0.9472	0.84247
10	(3) D + Lr First Order	1.7748	-0.1592	0.67571
"	(3) D + Snow Balanced First Order	1.9316	-0.1696	0.73361
"	(3) D + Snow Unbalanced First Order	-1.3063	-1.4276	0.76900
"	(5) D + W1 First Order	9.6463	5.1338	-1.25450
"	(5) D + W2 First Order	9.8128	4.7306	-0.91589
"	(5) D + W3 First Order	-0.4524	0.9220	-0.78648
"	(6) D + 0.75W1 + 0.75 S Balanced First O	8.5217	3.7547	-0.46065
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	6.0933	2.8112	-0.43411
"	(6) D + 0.75W1 + 0.75Lr First Order	8.4041	3.7625	-0.50408
"	(6) D + 0.75W2 + 0.75 S Balanced First O	8.6467	3.4522	-0.20670
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	6.2182	2.5088	-0.18016
"	(6) D + 0.75W2 + 0.75Lr First Order	8.5290	3.4600	-0.25013
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.9477	0.5958	-0.10964
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.4807	-0.3477	-0.08310
"	(6) D + 0.75W3 + 0.75Lr First Order	0.8301	0.6036	-0.15307
"	(7) 0.6D + W1 First Order	9.5169	5.1590	-1.31049
"	(7) 0.6D + W2 First Order	9.6835	4.7558	-0.97188
"	(7) 0.6D + W3 First Order	-0.5818	0.9472	-0.84247
13	(3) D + Lr First Order	-0.8458	-2.1671	-0.79253
"	(3) D + Snow Balanced First Order	-0.9215	-2.3528	-0.86262
"	(3) D + Snow Unbalanced First Order	-3.1585	0.3215	-0.53298
"	(5) D + W1 First Order	10.3844	-3.1411	0.73744
"	(5) D + W2 First Order	10.5387	-4.2494	0.58454
"	(5) D + W3 First Order	-0.3027	2.5775	0.37409
"	(6) D + 0.75W1 + 0.75 S Balanced First O	7.1699	-3.8964	-0.02187
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.4921	-1.8906	0.22536
"	(6) D + 0.75W1 + 0.75Lr First Order	7.2267	-3.7570	0.03070
"	(6) D + 0.75W2 + 0.75 S Balanced First O	7.2857	**-4.7276**	-0.13655
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.6079	-2.7218	0.11069
"	(6) D + 0.75W2 + 0.75Lr First Order	7.3424	-4.5882	-0.08398
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.8454	0.3926	-0.29438
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-2.5232	2.3984	-0.04715
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.7886	0.5319	-0.24182
"	(7) 0.6D + W1 First Order	10.4426	-2.9618	0.79505
"	(7) 0.6D + W2 First Order	10.5969	-4.0701	0.64215
"	(7) 0.6D + W3 First Order	-0.2445	2.7568	0.43170
14	(3) D + Lr First Order	0.8458	-2.1671	0.79253
"	(3) D + Snow Balanced First Order	0.9215	-2.3528	0.86262
"	(3) D + Snow Unbalanced First Order	-2.0917	-3.1226	0.47367
"	(5) D + W1 First Order	10.3727	6.7078	0.05746
"	(5) D + W2 First Order	10.2184	5.5996	0.21037
"	(5) D + W3 First Order	0.3027	2.5775	-0.37409
"	(6) D + 0.75W1 + 0.75 S Balanced First O	8.3980	3.4904	0.61805
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	6.1381	2.9131	0.32634
"	(6) D + 0.75W1 + 0.75Lr First Order	8.3412	3.6297	0.56548
"	(6) D + 0.75W2 + 0.75 S Balanced First O	8.2822	2.6592	0.73273
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	6.0224	2.0819	0.44102
"	(6) D + 0.75W2 + 0.75Lr First Order	8.2254	2.7985	0.68016
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.8454	0.3926	0.29438
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.4145	-0.1847	0.00267
"	(6) D + 0.75W3 + 0.75Lr First Order	0.7886	0.5319	0.24182
"	(7) 0.6D + W1 First Order	10.3146	**6.8871**	-0.00015

Node	Result Case Name	DX *in*	DY *in*	RZ *deg*
"	(7) 0.6D + W2 First Order	10.1603	5.7789	0.15276
"	(7) 0.6D + W3 First Order	0.2445	2.7568	-0.43170
15	(3) D + Lr First Order	-0.4357	-3.0500	-0.60612
"	(3) D + Snow Balanced First Order	-0.4750	-3.3142	-0.66018
"	(3) D + Snow Unbalanced First Order	-2.8200	-0.4066	-0.62246
"	(5) D + W1 First Order	9.8955	-2.0851	0.93753
"	(5) D + W2 First Order	10.0839	-3.2747	0.96028
"	(5) D + W3 First Order	-0.3969	2.7968	-0.02334
"	(6) D + 0.75W1 + 0.75 S Balanced First O	7.1016	-3.7466	0.26094
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.3428	-1.5659	0.28923
"	(6) D + 0.75W1 + 0.75Lr First Order	7.1310	-3.5485	0.30149
"	(6) D + 0.75W2 + 0.75 S Balanced First O	7.2429	-4.6388	0.27800
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.4842	-2.4581	0.30630
"	(6) D + 0.75W2 + 0.75Lr First Order	7.2724	-4.4407	0.31855
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.6177	-0.0852	-0.45971
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-2.3764	2.0956	-0.43142
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.5882	0.1130	-0.41916
"	(7) 0.6D + W1 First Order	9.9244	-1.8428	0.97987
"	(7) 0.6D + W2 First Order	10.1129	-3.0324	1.00262
"	(7) 0.6D + W3 First Order	-0.3679	3.0391	0.01900
16	(3) D + Lr First Order	0.4357	-3.0500	0.60612
"	(3) D + Snow Balanced First Order	0.4750	-3.3142	0.66018
"	(3) D + Snow Unbalanced First Order	-2.2726	-3.5134	0.14358
"	(5) D + W1 First Order	10.1341	6.2061	0.73477
"	(5) D + W2 First Order	9.9456	5.0165	0.71201
"	(5) D + W3 First Order	0.3969	2.7968	0.02334
"	(6) D + 0.75W1 + 0.75 S Balanced First O	7.9206	2.4718	0.99328
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.8599	2.3224	0.60583
"	(6) D + 0.75W1 + 0.75Lr First Order	7.8911	2.6699	0.95273
"	(6) D + 0.75W2 + 0.75 S Balanced First O	7.7792	1.5796	0.97622
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.7186	1.4302	0.58877
"	(6) D + 0.75W2 + 0.75Lr First Order	7.7498	1.7777	0.93567
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.6177	-0.0852	0.45971
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.4430	-0.2345	0.07226
"	(6) D + 0.75W3 + 0.75Lr First Order	0.5882	0.1130	0.41916
"	(7) 0.6D + W1 First Order	10.1051	6.4484	0.69242
"	(7) 0.6D + W2 First Order	9.9167	5.2588	0.66967
"	(7) 0.6D + W3 First Order	0.3679	3.0391	-0.01900
19	(3) D + Lr First Order	-0.0549	-3.8772	-0.19938
"	(3) D + Snow Balanced First Order	-0.0600	-4.2157	-0.21749
"	(3) D + Snow Unbalanced First Order	-2.2107	-1.7210	-0.63525
"	(5) D + W1 First Order	8.8970	0.0755	1.17013
"	(5) D + W2 First Order	8.9668	-0.8734	1.33193
"	(5) D + W3 First Order	-0.1518	2.3011	-0.34888
"	(6) D + 0.75W1 + 0.75 S Balanced First O	6.6319	-2.7323	0.73038
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.0189	-0.8613	0.41707
"	(6) D + 0.75W1 + 0.75Lr First Order	6.6357	-2.4784	0.74397
"	(6) D + 0.75W2 + 0.75 S Balanced First O	6.6843	-3.4439	0.85174
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.0713	-1.5730	0.53842
"	(6) D + 0.75W2 + 0.75Lr First Order	6.6881	-3.1901	0.86532
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.1547	-1.0630	-0.40887
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.7677	0.8080	-0.72219
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.1509	-0.8092	-0.39529
"	(7) 0.6D + W1 First Order	8.9003	0.3738	1.18286
"	(7) 0.6D + W2 First Order	8.9701	-0.5751	1.34466
"	(7) 0.6D + W3 First Order	-0.1485	2.5995	-0.33615
20	(3) D + Lr First Order	0.0549	-3.8772	0.19938
"	(3) D + Snow Balanced First Order	0.0600	-4.2157	0.21749
"	(3) D + Snow Unbalanced First Order	-2.1425	-3.2404	-0.38594
"	(5) D + W1 First Order	9.0299	3.8511	1.44910
"	(5) D + W2 First Order	8.9600	2.9022	1.28729
"	(5) D + W3 First Order	0.1518	2.3011	0.34888
"	(6) D + 0.75W1 + 0.75 S Balanced First O	6.8132	0.0994	1.23404
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.1614	0.8309	0.78146

Node	Result Case Name	DX *in*	DY *in*	RZ *deg*
"	(6) D + 0.75W1 + 0.75Lr First Order	6.8095	0.3533	1.22045
"	(6) D + 0.75W2 + 0.75 S Balanced First O	6.7609	-0.6122	1.11268
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.1090	0.1192	0.66011
"	(6) D + 0.75W2 + 0.75Lr First Order	6.7571	-0.3584	1.09910
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.1547	-1.0630	0.40887
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.4971	-0.3316	-0.04370
"	(6) D + 0.75W3 + 0.75Lr First Order	0.1509	-0.8092	0.39529
"	(7) 0.6D + W1 First Order	9.0266	4.1494	1.43637
"	(7) 0.6D + W2 First Order	8.9567	3.2005	1.27457
"	(7) 0.6D + W3 First Order	0.1485	2.5995	0.33615
21	(3) D + Lr First Order	-0.0227	-3.9482	-0.12216
"	(3) D + Snow Balanced First Order	-0.0248	-4.2931	-0.13333
"	(3) D + Snow Unbalanced First Order	-2.0818	-1.9988	-0.62097
"	(5) D + W1 First Order	8.6512	0.6063	1.23295
"	(5) D + W2 First Order	8.6885	-0.2757	1.37199
"	(5) D + W3 First Order	-0.0814	2.1566	-0.30193
"	(6) D + 0.75W1 + 0.75 S Balanced First O	6.4714	-2.3866	0.83413
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	4.9287	-0.6659	0.46840
"	(6) D + 0.75W1 + 0.75Lr First Order	6.4730	-2.1279	0.84251
"	(6) D + 0.75W2 + 0.75 S Balanced First O	6.4994	-3.0482	0.93840
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	4.9567	-1.3275	0.57267
"	(6) D + 0.75W2 + 0.75Lr First Order	6.5010	-2.7895	0.94678
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.0780	-1.2239	-0.31703
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.6207	0.4968	-0.68276
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.0764	-0.9653	-0.30866
"	(7) 0.6D + W1 First Order	8.6525	0.9091	1.24048
"	(7) 0.6D + W2 First Order	8.6898	0.0270	1.37952
"	(7) 0.6D + W3 First Order	-0.0801	2.4594	-0.29440
22	(3) D + Lr First Order	0.0227	-3.9482	0.12216
"	(3) D + Snow Balanced First Order	0.0248	-4.2931	0.13333
"	(3) D + Snow Unbalanced First Order	-2.0538	-3.0512	-0.46881
"	(5) D + W1 First Order	8.7249	3.2003	**1.49294**
"	(5) D + W2 First Order	8.6876	2.3182	1.35391
"	(5) D + W3 First Order	0.0814	2.1566	0.30193
"	(6) D + 0.75W1 + 0.75 S Balanced First O	6.5606	-0.4411	1.21029
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.0017	0.4903	0.75868
"	(6) D + 0.75W1 + 0.75Lr First Order	6.5591	-0.1825	1.20192
"	(6) D + 0.75W2 + 0.75 S Balanced First O	6.5326	-1.1027	1.10602
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	4.9737	-0.1713	0.65441
"	(6) D + 0.75W2 + 0.75Lr First Order	6.5311	-0.8440	1.09764
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.0780	-1.2239	0.31703
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.4809	-0.2925	-0.13457
"	(6) D + 0.75W3 + 0.75Lr First Order	0.0764	-0.9653	0.30866
"	(7) 0.6D + W1 First Order	8.7236	3.5031	1.48541
"	(7) 0.6D + W2 First Order	8.6863	2.6210	1.34638
"	(7) 0.6D + W3 First Order	0.0801	2.4594	0.29440
25	(3) D + Lr First Order	0.0000	-4.0007	0.00000
"	(3) D + Snow Balanced First Order	0.0000	-4.3504	0.00000
"	(3) D + Snow Unbalanced First Order	-1.8232	-2.5576	-0.57617
"	(5) D + W1 First Order	8.0850	1.8315	1.40978
"	(5) D + W2 First Order	8.0850	1.0234	1.40978
"	(5) D + W3 First Order	0.0000	1.9953	0.00000
"	(6) D + 0.75W1 + 0.75 S Balanced First O	6.0637	-1.5067	1.05734
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	4.6964	-0.1621	0.62521
"	(6) D + 0.75W1 + 0.75Lr First Order	6.0637	-1.2444	1.05734
"	(6) D + 0.75W2 + 0.75 S Balanced First O	6.0637	-2.1128	1.05734
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	4.6964	-0.7682	0.62521
"	(6) D + 0.75W2 + 0.75Lr First Order	6.0637	-1.8505	1.05734
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.0000	-1.3838	0.00000
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.3674	-0.0393	-0.43213
"	(6) D + 0.75W3 + 0.75Lr First Order	0.0000	-1.1216	0.00000
"	(7) 0.6D + W1 First Order	8.0850	2.1375	1.40978
"	(7) 0.6D + W2 First Order	8.0850	1.3293	1.40978
"	(7) 0.6D + W3 First Order	0.0000	2.3013	0.00000

Node	Result Case Name	DX *in*	DY *in*	RZ *deg*
E7	(3) D + Lr First Order	-2.2565	0.5001	-0.06035
"	(3) D + Snow Balanced First Order	-2.4536	0.5447	-0.06399
"	(3) D + Snow Unbalanced First Order	-3.3748	0.9483	0.42797
"	(5) D + W1 First Order	9.8810	-2.8205	-1.39720
"	(5) D + W2 First Order	9.3885	-2.7743	-1.55271
"	(5) D + W3 First Order	1.2116	-0.1228	0.36326
"	(6) D + 0.75W1 + 0.75 S Balanced First O	5.7874	-1.7508	-1.08257
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.0964	-1.4481	-0.71360
"	(6) D + 0.75W1 + 0.75Lr First Order	5.9351	-1.7842	-1.07984
"	(6) D + 0.75W2 + 0.75 S Balanced First O	5.4179	-1.7162	-1.19919
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	4.7270	-1.4134	-0.83023
"	(6) D + 0.75W2 + 0.75Lr First Order	5.5657	-1.7496	-1.19646
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.7147	0.2725	0.23778
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.4057	0.5753	0.60675
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.5670	0.2391	0.24051
"	(7) 0.6D + W1 First Order	10.0544	-2.8557	-1.38654
"	(7) 0.6D + W2 First Order	9.5619	-2.8095	-1.54204
"	(7) 0.6D + W3 First Order	1.3850	-0.1579	0.37392
E8	(3) D + Lr First Order	2.2565	0.5001	0.06035
"	(3) D + Snow Balanced First Order	2.4536	0.5447	0.06399
"	(3) D + Snow Unbalanced First Order	-0.4877	-0.3158	0.51862
"	(5) D + W1 First Order	7.7135	2.5145	-1.84897
"	(5) D + W2 First Order	8.2060	2.5608	-1.69346
"	(5) D + W3 First Order	-1.2116	-0.1228	-0.36326
"	(6) D + 0.75W1 + 0.75 S Balanced First O	7.4085	2.2505	-1.35206
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.2026	1.6051	-1.01109
"	(6) D + 0.75W1 + 0.75Lr First Order	7.2607	2.2171	-1.35479
"	(6) D + 0.75W2 + 0.75 S Balanced First O	7.7779	2.2851	-1.23543
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.5720	1.6398	-0.89446
"	(6) D + 0.75W2 + 0.75Lr First Order	7.6302	2.2517	-1.23816
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.7147	0.2725	-0.23778
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.4912	-0.3728	0.10319
"	(6) D + 0.75W3 + 0.75Lr First Order	0.5670	0.2391	-0.24051
"	(7) 0.6D + W1 First Order	7.5401	2.4794	-1.85963
"	(7) 0.6D + W2 First Order	8.0326	2.5256	-1.70413
"	(7) 0.6D + W3 First Order	-1.3850	-0.1579	-0.37392
PG1	(3) D + Lr First Order	-1.3380	-1.1020	-0.83945
"	(3) D + Snow Balanced First Order	-1.4570	-1.1940	-0.91283
"	(3) D + Snow Unbalanced First Order	-3.4270	0.9030	-0.35976
"	(5) D + W1 First Order	10.7237	-3.8814	0.38463
"	(5) D + W2 First Order	10.7420	-4.6888	0.08182
"	(5) D + W3 First Order	0.0212	1.8629	0.70957
"	(6) D + 0.75W1 + 0.75 S Balanced First O	7.0685	-3.6816	-0.31590
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.5910	-2.1089	0.09890
"	(6) D + 0.75W1 + 0.75Lr First Order	7.1578	-3.6126	-0.26087
"	(6) D + 0.75W2 + 0.75 S Balanced First O	7.0823	-4.2872	-0.54301
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.6047	-2.7144	-0.12821
"	(6) D + 0.75W2 + 0.75Lr First Order	7.1715	-4.2181	-0.48798
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.9584	0.6266	-0.07220
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-2.4359	2.1994	0.34261
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.8691	0.6957	-0.01716
"	(7) 0.6D + W1 First Order	10.8185	-3.7814	0.44883
"	(7) 0.6D + W2 First Order	10.8368	-4.5888	0.14602
"	(7) 0.6D + W3 First Order	0.1160	1.9629	0.77377
PG2	(3) D + Lr First Order	-0.1576	-3.6541	-0.35751
"	(3) D + Snow Balanced First Order	-0.1719	-3.9724	-0.38971
"	(3) D + Snow Unbalanced First Order	-2.4509	-1.2045	-0.64723
"	(5) D + W1 First Order	9.3152	-0.8262	1.07609
"	(5) D + W2 First Order	9.4470	-1.9023	1.22268
"	(5) D + W3 First Order	-0.2842	2.5726	-0.30831
"	(6) D + 0.75W1 + 0.75 S Balanced First O	6.8699	-3.2444	0.54459
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.1607	-1.1684	0.35145
"	(6) D + 0.75W1 + 0.75Lr First Order	6.8807	-3.0057	0.56874
"	(6) D + 0.75W2 + 0.75 S Balanced First O	6.9688	-4.0514	0.65453

Node	Result Case Name	DX *in*	DY *in*	RZ *deg*
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.2595	-1.9755	0.46139
"	(6) D + 0.75W2 + 0.75Lr First Order	6.9795	-3.8127	0.67868
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.3296	-0.6952	-0.49370
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-2.0388	1.3807	-0.68685
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.3188	-0.4565	-0.46956
"	(7) 0.6D + W1 First Order	9.3251	-0.5425	1.09993
"	(7) 0.6D + W2 First Order	9.4570	-1.6187	1.24652
"	(7) 0.6D + W3 First Order	-0.2742	2.8563	-0.28446
PG3	(3) D + Lr First Order	0.1576	-3.6541	0.35751
"	(3) D + Snow Balanced First Order	0.1719	-3.9724	0.38971
"	(3) D + Snow Unbalanced First Order	-2.2541	-3.4771	-0.19791
"	(5) D + W1 First Order	9.5436	4.9448	1.25545
"	(5) D + W2 First Order	9.4118	3.8687	1.10886
"	(5) D + W3 First Order	0.2842	2.5726	0.30831
"	(6) D + 0.75W1 + 0.75 S Balanced First O	7.2742	1.0839	1.20406
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.4547	1.4554	0.76335
"	(6) D + 0.75W1 + 0.75Lr First Order	7.2634	1.3226	1.17992
"	(6) D + 0.75W2 + 0.75 S Balanced First O	7.1753	0.2768	1.09412
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.3559	0.6483	0.65340
"	(6) D + 0.75W2 + 0.75Lr First Order	7.1646	0.5155	1.06997
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.3296	-0.6952	0.49370
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.4899	-0.3238	0.05299
"	(6) D + 0.75W3 + 0.75Lr First Order	0.3188	-0.4565	0.46956
"	(7) 0.6D + W1 First Order	9.5337	5.2285	1.23161
"	(7) 0.6D + W2 First Order	9.4018	4.1524	1.08502
"	(7) 0.6D + W3 First Order	0.2742	2.8563	0.28446
PG4	(3) D + Lr First Order	1.3380	-1.1020	0.83945
"	(3) D + Snow Balanced First Order	1.4570	-1.1940	0.91283
"	(3) D + Snow Unbalanced First Order	-1.7331	-2.3469	0.71356
"	(5) D + W1 First Order	10.1931	6.3131	-0.66553
"	(5) D + W2 First Order	10.1748	5.5057	-0.36272
"	(5) D + W3 First Order	-0.0212	1.8629	-0.70957
"	(6) D + 0.75W1 + 0.75 S Balanced First O	8.6191	3.9643	0.10523
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	6.2266	3.0996	-0.04422
"	(6) D + 0.75W1 + 0.75Lr First Order	8.5299	4.0333	0.05019
"	(6) D + 0.75W2 + 0.75 S Balanced First O	8.6054	3.3587	0.33234
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	6.2128	2.4941	0.18289
"	(6) D + 0.75W2 + 0.75Lr First Order	8.5161	3.4278	0.27730
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.9584	0.6266	0.07220
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.4342	-0.2380	-0.07725
"	(6) D + 0.75W3 + 0.75Lr First Order	0.8691	0.6957	0.01716
"	(7) 0.6D + W1 First Order	10.0984	6.4131	-0.72973
"	(7) 0.6D + W2 First Order	10.0800	5.6057	-0.42691
"	(7) 0.6D + W3 First Order	-0.1160	1.9629	-0.77377
S1	(3) D + Lr First Order	-1.5293	-0.6892	-0.80032
"	(3) D + Snow Balanced First Order	-1.6650	-0.7453	-0.86979
"	(3) D + Snow Unbalanced First Order	-3.4998	1.0607	-0.26619
"	(5) D + W1 First Order	10.7897	-4.0269	0.18693
"	(5) D + W2 First Order	10.7343	-4.6732	-0.14754
"	(5) D + W3 First Order	0.1934	1.4869	0.77903
"	(6) D + 0.75W1 + 0.75 S Balanced First O	6.9805	-3.4942	-0.43340
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	5.6044	-2.1397	0.01930
"	(6) D + 0.75W1 + 0.75Lr First Order	7.0822	-3.4521	-0.38130
"	(6) D + 0.75W2 + 0.75 S Balanced First O	6.9390	-3.9790	-0.68425
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	5.5629	-2.6245	-0.23155
"	(6) D + 0.75W2 + 0.75Lr First Order	7.0407	-3.9369	-0.63215
"	(6) D + 0.75W3 + 0.75 S Balanced First O	-0.9667	0.6411	0.01068
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-2.3428	1.9956	0.46338
"	(6) D + 0.75W3 + 0.75Lr First Order	-0.8649	0.6832	0.06278
"	(7) 0.6D + W1 First Order	10.8992	-3.9590	0.24992
"	(7) 0.6D + W2 First Order	10.8439	-4.6053	-0.08455
"	(7) 0.6D + W3 First Order	0.3030	1.5548	0.84203
S2	(3) D + Lr First Order	1.5293	-0.6892	0.80032
"	(3) D + Snow Balanced First Order	1.6650	-0.7453	0.86979

Node	Result Case Name	DX *in*	DY *in*	RZ *deg*
"	(3) D + Snow Unbalanced First Order	-1.5608	-1.9759	0.76110
"	(5) D + W1 First Order	10.0078	5.9128	-0.92685
"	(5) D + W2 First Order	10.0631	5.2665	-0.59237
"	(5) D + W3 First Order	-0.1934	1.4869	-0.77903
"	(6) D + 0.75W1 + 0.75 S Balanced First O	8.6176	3.9606	-0.12154
"	(6) D + 0.75W1 + 0.75 S Unbalanced First	6.1982	3.0377	-0.20306
"	(6) D + 0.75W1 + 0.75Lr First Order	8.5158	4.0027	-0.17364
"	(6) D + 0.75W2 + 0.75 S Balanced First O	8.6591	3.4759	0.12932
"	(6) D + 0.75W2 + 0.75 S Unbalanced First	6.2397	2.5529	0.04779
"	(6) D + 0.75W2 + 0.75Lr First Order	8.5573	3.5179	0.07721
"	(6) D + 0.75W3 + 0.75 S Balanced First O	0.9667	0.6411	-0.01068
"	(6) D + 0.75W3 + 0.75 S Unbalanced First	-1.4527	-0.2818	-0.09220
"	(6) D + 0.75W3 + 0.75Lr First Order	0.8649	0.6832	-0.06278
"	(7) 0.6D + W1 First Order	9.8982	5.9808	-0.98984
"	(7) 0.6D + W2 First Order	9.9535	5.3345	-0.65537
"	(7) 0.6D + W3 First Order	-0.3030	1.5548	-0.84203

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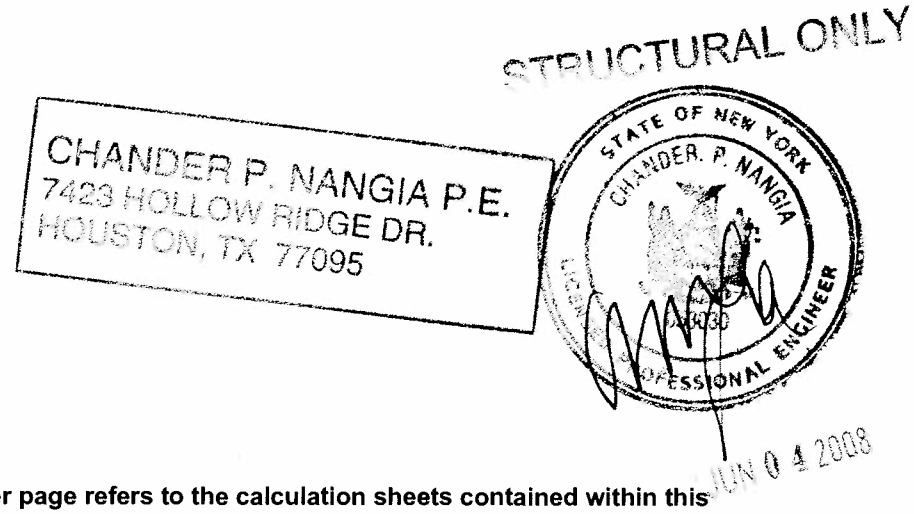
TFS/R 29.2M x 35M

KeySpan Hempstead Intersection Street Former MGP

Structural calculation for crane lifting of a temporary TFS/R structure according to New York Building Code



The professional engineer seal on this cover page refers to the calculation sheets contained within this document and to any Appendix or Table sheets that support this document. Any other drawings and documents may require a separate seal for coverage not provided here.

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Rev	Rev. Date	Sections Affected	Description
0	29 May 08	-	Original Issue
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1. Introduction

This document describes the structural design calculations for crane lifting a TFS/R style Tension Fabric Structure. The dimensions of the structure are as noted below.

Distance between two arches : $L_{bay} = 5\,m$

Overall length of lifted structure: $L_{length} = 35\,m$

Height of the peak : $z = 12.3\,m$

During a crane lift, the external loadings on the structure are due to the weight of the structure and any collateral loads hanging on or in the structure during the lifting process. Compression bar members are affixed between the arches to manage the longitudinal compression forces that occur during the lift.

The calculation is based on the finite element method and uses nodes which are connected by beams. The internal member forces are compared to forces determined in the general arch calculations.

The computational analysis is performed by the VisualAnalysis 5.0 computer program. The presentation calculations are done with the MathCAD computer program.

The design is governed by the following codes and guides:

- ASCE 7-02 (American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures, by reference)
- Aluminum Design Manual, Specifications & Guidelines for Aluminum Structures (The Aluminum Association, 2000)
- AISC ASD 9th edition (American Institute of Steel Construction, Manual of Steel Design, 1989)

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2. Project Parameters

Building Geometry

Building length:	$L_{length} = 114.83\,ft$	Peak height:	$z = 40.22\,ft$	
Building width:	$L_{width} = 95.93\,ft$	Eave height:	$h_e = 17.86\,ft$	
Bay spacing:	$L_{bay} = 16.4\,ft$	Mean roof height:	$h := 0.5\cdot(z + h_e)$	$h = 29.04\,ft$
Purlin spacing:	$L_{purlin} = 6.67\,ft$	Roof slope:	$\theta_t := \operatorname{atan}\left[\frac{2\cdot(z - h_e)}{L_{width}}\right]$	$\theta_t = 25\,deg$

Basic wind speed:	$V = 110\,mph$	*[Section 6.5.4]*
Category:	$Cat = "II"$	*[Table 1-1]*
Importance factor (wind):	$I_W = 1$	*[Table 6-1]*
Exposure:	$Exposure = "C"$	*[Sections 6.5.6.2 & 6.5.6.3]*
Expected life of structure (years):	$Life = 10$	

Extrusion Profile: **380**

Weight of the main profile : $Weight_{ALU380} := 11.91\,\frac{kg}{m}$

Weight of the fabric : $Weight_{fabric} := UnitWeight_{fabric}\cdot L_{bay}$ $Weight_{fabric} = 4.07\,\frac{kg}{m}$ $Weight_{fabric} = 0.23\,\frac{lb}{in}$

Weight of the Inside Liner : $Weight_{liner} := UnitWeight_{liner}\cdot L_{bay}$ $Weight_{liner} = 2.71\,\frac{kg}{m}$ $Weight_{liner} = 0.15\,\frac{lb}{in}$

Weight of the purlins : $Weight_{ALU97} := 2.03\cdot\frac{kg}{m}$ $Weight_{ALU97} = 0.11\,\frac{lb}{in}$

$Weight_{ALU129} := 2.56\cdot\frac{kg}{m}$ $Weight_{ALU129} = 0.14\,\frac{lb}{in}$

$Weight_{ALU133} := 4.35\cdot\frac{kg}{m}$ $Weight_{ALU133} = 0.24\,\frac{lb}{in}$

Total Length of arch : $Length_{arch} = 40.71\,m$

Weight of Peak Splice : $Weight_{peak\_splice} = 70\,kg$

Weight of Straight Splice: $Weight_{connection\_splice} = 45\,kg$

Weight of Light Assy: $Weight_{light\_assy} = 40\,lb$ (based on $Desc_{light\_assy} = "400W\ Direct\ w/\ lens\ \&\ guard"$)

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3. Determination of Loads

Dead Load :

The uniform loading on the arch consists of the weight of the :
- main profile
- purlins
- fabric

There are 10 heavy purlins (ALU 129/89), 6 light purlins (ALU 97/77), and 1 peak purlin (ALU 133/70) per bay.

$$Weight_{purlins} := L_{bay}\cdot\left(10\cdot Weight_{ALU129} + 6\cdot Weight_{ALU97} + 1\cdot Weight_{ALU133}\right)$$

$Weight_{purlins} = 210.65\,kg$ $\quad$ $Weight_{purlins} = 464.4\,lb$

This weight is divided by the total length of the arch. $Length_{arch} = 40.71\,m$ $\quad$ $Length_{arch} = 1603\,in$

Total Uniform weight :
$$Weight_{uniform} := Weight_{ALU380} + Weight_{fabric} + Weight_{liner} + \frac{Weight_{purlins}}{Length_{arch}}$$

$Weight_{uniform} = 23.9\,\frac{kg}{m}$ $\quad$ $Weight_{uniform} = 1.336\,\frac{lb}{in}$

Total Uniform weight : (gable arch)
$$Weight_{unif\_gable} := Weight_{ALU380} + \frac{Weight_{fabric} + Weight_{liner} + \frac{Weight_{purlins}}{Length_{arch}}}{2}$$

$Weight_{unif\_gable} = 17.9\,\frac{kg}{m}$ $\quad$ $Weight_{unif\_gable} = 1.002\,\frac{lb}{in}$

Local loadings are the weight of the peak splice, connection splices, and lighting assemblies.

$Weight_{peak\_splice} = 70.00\,kg$ $\quad$ $Weight_{peak\_splice} = 154.3\,lb$

$Weight_{connection\_splice} = 45.00\,kg$ $\quad$ $Weight_{connection\_splice} = 99\,lb$

A general lighting system is assumed. This consists of 400 watt, metal halide, high bay warehouse style light fixtures that weigh approximately 45 lbs each. The light fixtures will be evenly distributed throughout the structure and will be hung from the aluminum structure frame such that no more than two fixtures are attached to any single arch.

$Weight_{light\_assy} = 18.14\,kg$ $\quad$ $Weight_{light\_assy} = 40\,lb$

Other incidental loads due to electrical conduit or emergency lighting are negligible so do not impact these calculations.

Collateral Load :

The structure is designed to support the loads shown in this calculations. It may, or may not, be capable of supporting additional collateral loads. The owner of the structure shall not hang, or otherwise affix, additional loads to this structure without a review by an engineer qualified to make said review. Additionally, prior to adding load to this structure, the owner shall get a written confirmation by the qualified engineer as to the magnitude and location of the load, or loads, being applied.

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Snow Load :

Snow loads do not apply to the lifting procedure.

Roof Live Load :

Roof live load does not apply to the lifting process.

Wind Load :

Wind loads from wind conditions that would be considered safe by the crane operator are significantly lower than the design conditions for a structure affixed to the ground. Therefore, wind load are not considered in the lifting process.

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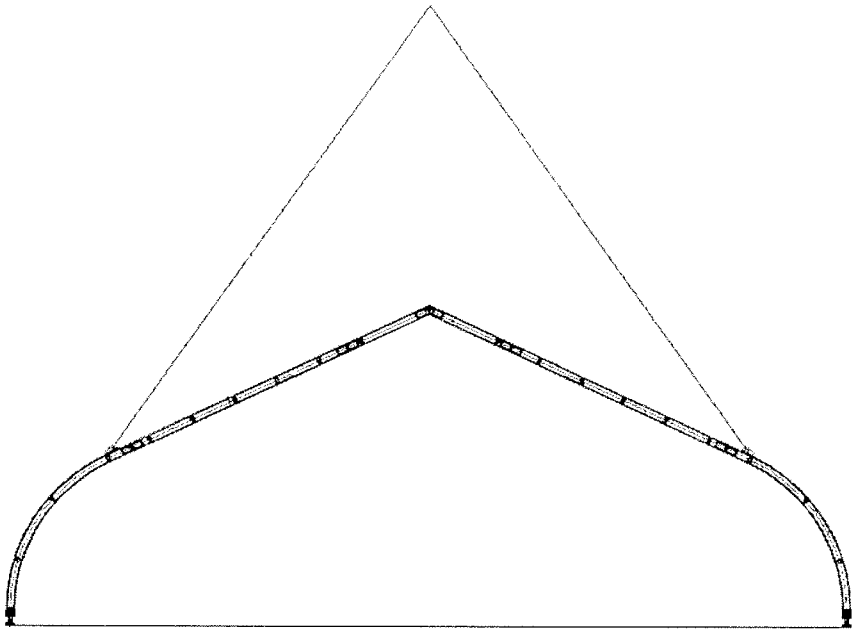
4. Reactions



- Interior arch reaction is 1,730 lbs vertically at each connection point, or 3,460 lbs at conjuction of cables.
- Gable arch reaction is 2,270 lbs vertically at each connection point, or 4,540 lbs at the junction of the cables.

Assumptions:

- Angle of each lifting cable is approximately 55° from horizontal when viewed from gable end of structure.
- Standard structure components are included (fabric and frame) plus lights and skid plates.

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5. Main Profile Design

The results of the internal member forces for the lifting model are lower than the results of the internal member forces for the model secured to the ground. Therefore, no futher analysis is required for the standard structural components.

OKAY by inspection.

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6. Compression Bar Design

Material properties :

Compression bar is manufactured from 3" round steel tube with wall thickness equal to 1/8".

Yeild strength of steel: $F_y = 36\,ksi$

Modulus of elasticity: $E = 29000\,ksi$

Outside diameter: $d = 3.00\,in$

Wall thickness: $t = 0.125\,in$

Inside diameter: $d' := d - 2 \cdot t$ $\quad d' = 2.75\,in$

Cross-sectional area: $A := \frac{\pi \cdot \left(d^2 - d'^2\right)}{4}$ $\quad A = 1.13\,in^2$

Moment of Inertia: $I := \frac{\pi \cdot \left(d^4 - d'^4\right)}{64}$ $\quad I = 1.17\,in^4$

Section Modulus: $S := \frac{\pi \cdot \left(d^4 - d'^4\right)}{32 \cdot d}$ $\quad S = 0.78\,in^3$

Radius of gyration: $r := \frac{\sqrt{d^2 + d'^2}}{4}$ $\quad r = 1.02\,in$

Unbraced length: $L := L_{bay}$ $\quad L = 16.4\,ft$

Allowable Stresses :

Design factors: $KLr := \frac{K \cdot L}{r}$ $\quad KLr = 193.5$ where $K = 1$

$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}}$ $\quad C_c = 126.1$

Allowable Compressive Stress:

$$F_a := \text{if}\left[KLr < C_c, \frac{\left(1 - \frac{KLr^2}{2 \cdot C_c^2}\right) \cdot F_y}{\left(\frac{5}{3}\right) + \left(\frac{3 \cdot KLr}{8 \cdot C_c}\right) - \left(\frac{KLr^3}{8 \cdot C_c^3}\right)}, \frac{12 \cdot \pi^2 \cdot E}{23 KLr^2}\right] \quad F_a = 3.99\,ksi$$

Allowable Tensile Stress: $F_t := 0.6F_y$ $\quad F_t = 21.6\,ksi$

Allowable Bending Stress: $F_b := 0.66F_y$ $\quad F_b = 23.8\,ksi$

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Actual Stresses :

Determine compression due to lift:

Vertical load at each attachment point (starting from gable, moving inward): $P_v = \begin{pmatrix} 2270 \\ 1730 \\ 1730 \\ 1730 \end{pmatrix}$ lbf

Total number of attachment points on structure: $n = 16$

Total lift weight: $P_{total} := \frac{n}{rows(P_v)} \cdot \sum P_v$ $P_{total} = 29840$ lbf

Distance between lift beam connection points: $L_{liftbeam} = 32.81$ ft

Horizontal offset of lifting cable: $Dist_x = \begin{pmatrix} 41.01 \\ 24.61 \\ 8.2 \\ -8.2 \end{pmatrix}$ ft

Vertical offset of lifting cable: $Dist_y = 73.32$ ft

Angle in plane of compression bar: $\alpha := atan\left(\frac{Dist_y}{Dist_x}\right)$ $\alpha = \begin{pmatrix} 60.78 \\ 71.45 \\ 83.62 \\ -83.62 \end{pmatrix}$ deg

Horizontal component of load: $P_h := \overrightarrow{(P_v \cdot \cos(\alpha) \cdot sign(Dist_x))}$ $P_h = \begin{pmatrix} 1108.15 \\ 550.44 \\ 192.34 \\ -192.34 \end{pmatrix}$ lbf

Maximum compression load in bar: $P_c := \sum P_h$ $P_c = 1658.59$ lbf

Actual compressive stress in bar: $f_a := \frac{P_c}{A}$ $f_a = 1.47$ ksi

Interaction Equations : $\frac{f_a}{F_a} = 0.37$ $InteractionCheck\left(\frac{f_a}{F_a}, 1\right) = \text{"OK"}$

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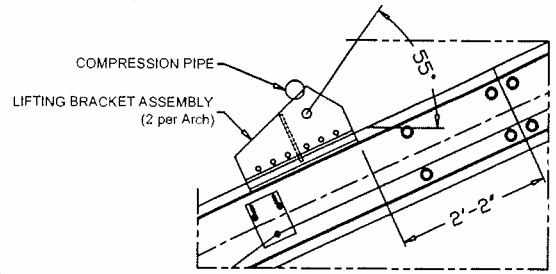
(215) 529-9921

APPENDIX A

Sketches

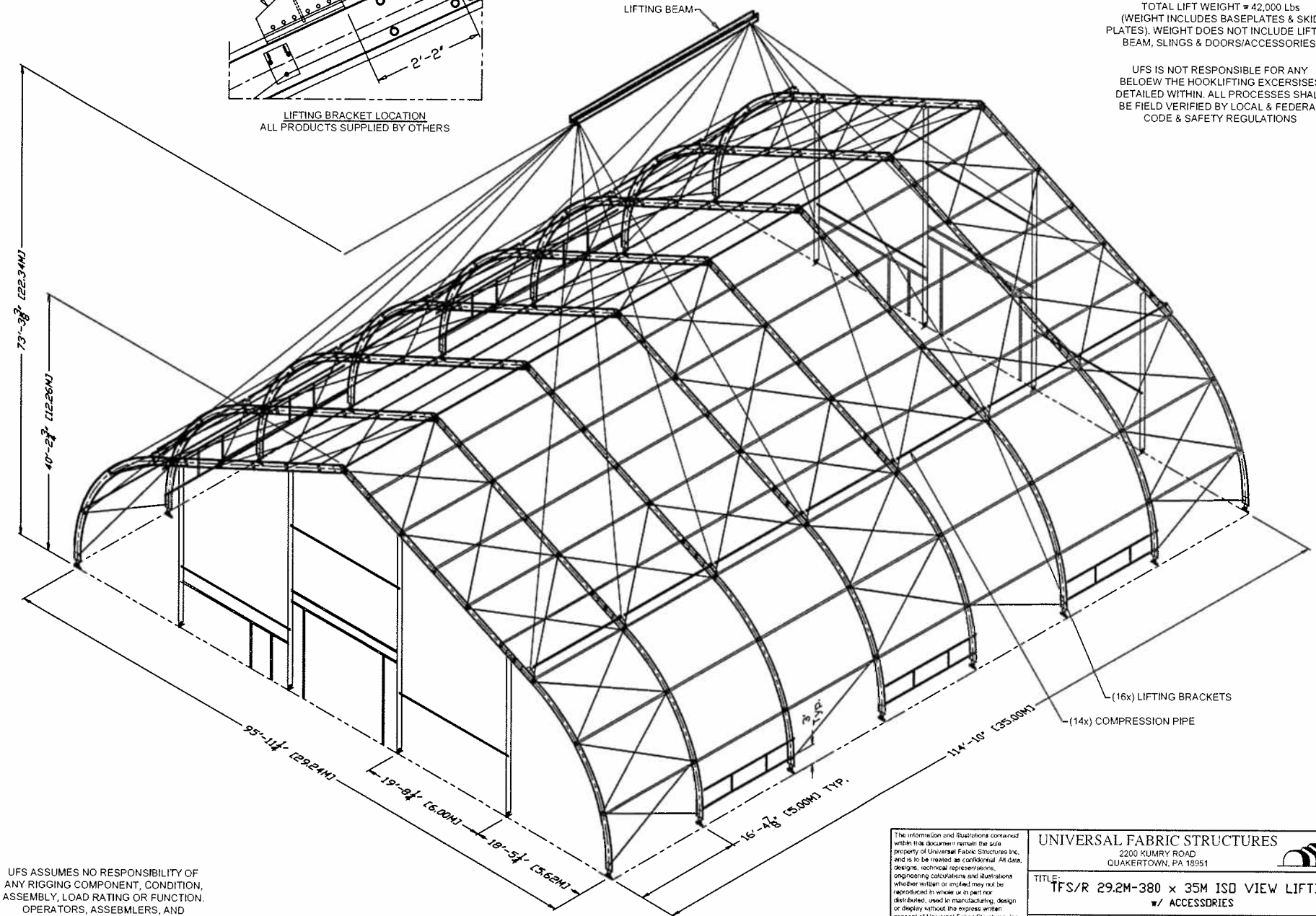
REV.	DATE	DESCRIPTION	NAME
0	30MAY2008	ORIGINAL RELEASE	SH



LIFTING BRACKET LOCATION
ALL PRODUCTS SUPPLIED BY OTHERS

TOTAL LIFT WEIGHT = 42,000 Lbs
(WEIGHT INCLUDES BASEPLATES & SKID PLATES). WEIGHT DOES NOT INCLUDE LIFTING BEAM, SLINGS & DOORS/ACCESSORIES.

UFS IS NOT RESPONSIBLE FOR ANY BELOEW THE HOOKLIFTING EXCERSISES DETAILED WITHIN. ALL PROCESSES SHALL BE FIELD VERIFIED BY LOCAL & FEDERAL CODE & SAFETY REGULATIONS



UFS ASSUMES NO RESPONSIBILITY OF ANY RIGGING COMPONENT, CONDITION, ASSEMBLY, LOAD RATING OR FUNCTION. OPERATORS, ASSEBMLERS, AND SUPPLIERS OF THE PRODUCT TAKE FULL RESPONSIBILITY FOR THE EXECUTION OF THIS LIFTING REFERENCE PLAN

KEYSPAN HEMPSTEAD INTERSECTION STREET FORMER MRP

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

TITLE:
TFS/R 29.2M-380 x 35M ISO VIEW LIFTING
w/ ACCESSORIES

DRAWN: SH	CHECKED: SF	DATE: 30MAY2008	REV.: 0
SIZE: C	SCALE: NTS	JOB No.:	DWG. NO.: ER495-107

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Universal Fabric Structures
2200 Kumry Road
Quakertown, PA 18951
(215) 529-9921

APPENDIX B

Computer Model Input

TFS/R 29.2M with 380 extrusion

VisualAnalysis 5.00 Report
Company: Universal Fabric Structures Engineer: Brian Szkaradnik
Project File: 380 TFS 29.2M-5M-Lift plain.VAP
Folder: J:\PRECONTRACTS\Universal Rentals\ER495 - TFSR29x35 Hemstead NY\Calculations\Lift Calcs\

Table of Contents

Model Summary

Structure Type: Plane Frame
The model is non-linear.
26 Nodes, and 75 Degrees of Freedom
The size of the model is:
   1151 in, in the X direction
   803.1 in, in the Y direction
26 Member Elements

Nodes

Node	X *in*	Y *in*	Fix DX	Fix DY	Fix RZ
1	0.000	0.000	No	No	No
2	1151.200	0.000	"	"	"
3	0.000	21.500	"	"	"
4	1151.200	21.500	"	"	"
5	13.100	111.700	"	"	"
6	1138.100	111.700	"	"	"
9	165.500	284.100	"	"	"
10	985.700	284.100	"	"	"
13	308.200	350.600	"	"	"
14	843.000	350.600	"	"	"
15	379.600	384.000	"	"	"
16	771.600	384.000	"	"	"
19	497.000	438.700	"	"	"
20	654.200	438.700	"	"	"
21	522.300	450.500	"	"	"
22	628.900	450.500	"	"	"
25	575.600	475.300	Yes	"	"
E7	71.100	214.200	No	"	"
E8	1080.100	214.200	"	"	"
N1	575.600	803.100	Yes	Yes	"
PG1	234.900	316.500	No	No	"
PG2	451.000	417.200	"	"	"
PG3	700.200	417.200	"	"	"
PG4	916.300	316.500	"	"	"
S1	206.200	303.100	"	"	"
S2	945.000	303.100	"	"	"

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length	Weight	Rz1	Rz2	One Way

					in	*lb*		
M1	ALU 380	Aluminum	1	3	21.500	23.9374	Fix	Fix	Normal
M2	"	"	4	2	21.500	23.9374	"	"	"
M3	"	"	3	5	91.146	101.479	"	"	"
M4	"	"	6	4	91.146	101.479	"	"	"
M5	"	"	5	E7	117.77	131.123	"	"	"
M6	"	"	E8	6	117.77	131.123	"	"	"
M7	"	"	E7	9	117.46	130.778	"	"	"
M8	"	"	10	E8	117.46	130.778	"	"	"
M9	"	"	9	S1	44.916	50.0085	"	"	"
M10	"	"	S2	10	44.916	50.0085	"	"	"
M11	"	"	S1	PG1	31.674	35.2649	"	"	"
M12	"	"	PG4	S2	31.674	35.2649	"	"	"
M13	"	"	PG1	13	80.844	90.0086	"	"	"
M14	"	"	14	PG4	80.844	90.0086	"	"	"
M15	"	"	13	15	78.826	87.7621	"	"	"
M16	"	"	16	14	78.826	87.7621	"	"	"
M17	"	"	15	PG2	78.741	87.6680	"	"	"
M18	"	"	PG3	16	78.741	87.6680	"	"	"
M19	"	"	PG2	19	50.776	56.5328	"	"	"
M20	"	"	20	PG3	50.776	56.5328	"	"	"
M21	"	"	19	21	27.916	31.0813	"	"	"
M22	"	"	22	20	27.916	31.0813	"	"	"
M23	"	"	21	25	58.787	65.4517	"	"	"
M24	"	"	25	22	58.787	65.4517	"	"	"
M25	Round1	User Def	N1	PG4	594.01	132.294	Free	Free	Tension
M26	"	"	PG1	N1	594.01	132.294	"	"	"

Section Properties

Section	Theta	Ax	Iz	Sz(+y)	Sz(-y)
	deg	*in^2*	*in^4*	*in^3*	*in^3*
ALU 380	0.0000	11.31700	308.9599	41.30300	41.30300
Round1	0.0000	0.78540	0.04909	0.09817	0.09817

Material Properties

Material	Strength	Elasticity	Poisson	Density	Therm. Coeff.
	psi	*psi*		*lb/in^3*	*in/in/deg-F*
Aluminum	-NA-	10100000.0	0.3000	0.10	0.000
User Def	-NA-	29000000.0	0.3000	0.28	0.000

Nodal Supports

Node	Fix DX	Fix DY	Fix RZ
25	Yes	No	No
N1	"	Yes	"

Service Load Cases

Load Case	Load Source	Self Weight	Self X	Self Y	Self Z	Load Exclusive
D (Dead load)	Dead loads	None	0.0000	0.0000	0.0000	27 No

Member Uniform Loads

Load Case	Member	Direction	Offset *in*	End Offset *in*	Magnitude
D (Dead load)	M3	DY	0.0000	91.1463	-1.6700 lb/in
"	M4	"	0.0000	91.1463	-1.6700 lb/in
"	M5	"	0.0000	117.7720	-1.6700 lb/in
"	M6	"	0.0000	117.7720	-1.6700 lb/in
"	M7	"	0.0000	117.4622	-1.6700 lb/in
"	M8	"	0.0000	117.4622	-1.6700 lb/in
"	M9	"	0.0000	44.9165	-1.6700 lb/in
"	M10	"	0.0000	44.9165	-1.6700 lb/in
"	M11	"	0.0000	31.6741	-1.6700 lb/in
"	M12	"	0.0000	31.6741	-1.6700 lb/in
"	M13	"	0.0000	80.8437	-1.6700 lb/in
"	M14	"	0.0000	80.8437	-1.6700 lb/in
"	M15	"	0.0000	78.8259	-1.6700 lb/in
"	M16	"	0.0000	78.8259	-1.6700 lb/in
"	M17	"	0.0000	78.7413	-1.6700 lb/in
"	M18	"	0.0000	78.7413	-1.6700 lb/in
"	M19	"	0.0000	50.7765	-1.6700 lb/in
"	M20	"	0.0000	50.7765	-1.6700 lb/in
"	M21	"	0.0000	27.9165	-1.6700 lb/in
"	M22	"	0.0000	27.9165	-1.6700 lb/in
"	M23	"	0.0000	58.7872	-1.6700 lb/in
"	M24	"	0.0000	58.7872	-1.6700 lb/in

Nodal Supports

Node	Fix DX	Fix DY	Fix RZ
25	Yes	No	No
N1	"	Yes	"

TFS/R 29.2M with 380 extrusion

VisualAnalysis 5.00 Report
Company: Universal Fabric Structures Engineer: Brian Szkaradnik
Project File: 380 TFS 29.2M-5M-Lift gable.VAP
Folder: J:\PRECONTRACTS\Universal Rentals\ER495 - TFSR29x35 Hemstead NY\Calculations\Lift Calcs\

Model Summary

Structure Type: Plane Frame
The model is non-linear.
26 Nodes, and 75 Degrees of Freedom
The size of the model is:
   1151 in, in the X direction
   803.1 in, in the Y direction
26 Member Elements

Table of Contents

Nodes

Node	X *in*	Y *in*	Fix DX	Fix DY	Fix RZ
1	0.000	0.000	No	No	No
2	1151.200	0.000	"	"	"
3	0.000	21.500	"	"	"
4	1151.200	21.500	"	"	"
5	13.100	111.700	"	"	"
6	1138.100	111.700	"	"	"
9	165.500	284.100	"	"	"
10	985.700	284.100	"	"	"
13	308.200	350.600	"	"	"
14	843.000	350.600	"	"	"
15	379.600	384.000	"	"	"
16	771.600	384.000	"	"	"
19	497.000	438.700	"	"	"
20	654.200	438.700	"	"	"
21	522.300	450.500	"	"	"
22	628.900	450.500	"	"	"
25	575.600	475.300	Yes	"	"
E7	71.100	214.200	No	"	"
E8	1080.100	214.200	"	"	"
N1	575.600	803.100	Yes	Yes	"
PG1	234.900	316.500	No	No	"
PG2	451.000	417.200	"	"	"
PG3	700.200	417.200	"	"	"
PG4	916.300	316.500	"	"	"
S1	206.200	303.100	"	"	"
S2	945.000	303.100	"	"	"

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length	Weight	Rz1	Rz2	One Way

					in	lb			
M1	ALU 380	Aluminum	1	3	21.500	23.9374	Fix	Fix	Normal
M2	"	"	4	2	21.500	23.9374	"	"	"
M3	"	"	3	5	91.146	101.479	"	"	"
M4	"	"	6	4	91.146	101.479	"	"	"
M5	"	"	5	E7	117.77	131.123	"	"	"
M6	"	"	E8	6	117.77	131.123	"	"	"
M7	"	"	E7	9	117.46	130.778	"	"	"
M8	"	"	10	E8	117.46	130.778	"	"	"
M9	"	"	9	S1	44.916	50.0085	"	"	"
M10	"	"	S2	10	44.916	50.0085	"	"	"
M11	"	"	S1	PG1	31.674	35.2649	"	"	"
M12	"	"	PG4	S2	31.674	35.2649	"	"	"
M13	"	"	PG1	13	80.844	90.0086	"	"	"
M14	"	"	14	PG4	80.844	90.0086	"	"	"
M15	"	"	13	15	78.826	87.7621	"	"	"
M16	"	"	16	14	78.826	87.7621	"	"	"
M17	"	"	15	PG2	78.741	87.6680	"	"	"
M18	"	"	PG3	16	78.741	87.6680	"	"	"
M19	"	"	PG2	19	50.776	56.5328	"	"	"
M20	"	"	20	PG3	50.776	56.5328	"	"	"
M21	"	"	19	21	27.916	31.0813	"	"	"
M22	"	"	22	20	27.916	31.0813	"	"	"
M23	"	"	21	25	58.787	65.4517	"	"	"
M24	"	"	25	22	58.787	65.4517	"	"	"
M25	Round1	User Def	N1	PG4	594.01	132.294	Free	Free	Tension
M26	"	"	PG1	N1	594.01	132.294	"	"	"

Section Properties

Section	Theta	Ax	Iz	Sz(+y)	Sz(-y)
	deg	*in^2*	*in^4*	*in^3*	*in^3*
ALU 380	0.0000	11.31700	308.9599	41.30300	41.30300
Round1	0.0000	0.78540	0.04909	0.09817	0.09817

Material Properties

Material	Strength	Elasticity	Poisson	Density	Therm. Coeff.
	psi	*psi*		*lb/in^3*	*in/in/deg-F*
Aluminum	-NA-	10100000.0	0.3000	0.10	0.000
User Def	-NA-	29000000.0	0.3000	0.28	0.000

Nodal Supports

Node	Fix DX	Fix DY	Fix RZ
25	Yes	No	No
N1	"	Yes	"

Service Load Cases

Load Case	Load Source	Self Weight	Self X	Self Y	Self Z	Load Exclusive
D (Dead load)	Dead loads	None	0.0000	0.0000	0.0000	29 No

Member Uniform Loads

Load Case	Member	Direction	Offset *in*	End Offset *in*	Magnitude
D (Dead load)	M3	DY	0.0000	91.1463	-1.6700 lb/in
"	M4	"	0.0000	91.1463	-1.6700 lb/in
"	M5	"	0.0000	117.7720	-1.6700 lb/in
"	M6	"	0.0000	117.7720	-1.6700 lb/in
"	M7	"	0.0000	117.4622	-1.6700 lb/in
"	M8	"	0.0000	117.4622	-1.6700 lb/in
"	M9	"	0.0000	44.9165	-1.6700 lb/in
"	M10	"	0.0000	44.9165	-1.6700 lb/in
"	M11	"	0.0000	31.6741	-1.6700 lb/in
"	M12	"	0.0000	31.6741	-1.6700 lb/in
"	M13	"	0.0000	80.8437	-1.6700 lb/in
"	M14	"	0.0000	80.8437	-1.6700 lb/in
"	M15	"	0.0000	78.8259	-1.6700 lb/in
"	M16	"	0.0000	78.8259	-1.6700 lb/in
"	M17	"	0.0000	78.7413	-1.6700 lb/in
"	M18	"	0.0000	78.7413	-1.6700 lb/in
"	M19	"	0.0000	50.7765	-1.6700 lb/in
"	M20	"	0.0000	50.7765	-1.6700 lb/in
"	M21	"	0.0000	27.9165	-1.6700 lb/in
"	M22	"	0.0000	27.9165	-1.6700 lb/in
"	M23	"	0.0000	58.7872	-1.6700 lb/in
"	M24	"	0.0000	58.7872	-1.6700 lb/in

Nodal Supports

Node	Fix DX	Fix DY	Fix RZ
25	Yes	No	No
N1	"	Yes	"

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Universal Fabric Structures
2200 Kumry Road
Quakertown, PA 18951
(215) 529-9921

APPENDIX C

Computer Model Output

App C - Computer Model Output.xmcd

TFS/R 29.2M with 380 extrusion

VisualAnalysis 5.00 Report
Company: Universal Fabric Structures Engineer: Brian Szkaradnik
Project File: 380 TFS 29.2M-5M-Lift plain.VAP
Folder: J:\PRECONTRACTS\Universal Rentals\ER495 - TFSR29x35 Hemstead NY\Calculations\Lift Calcs\

Table of Contents

Load Cases

Load Case	Strength	Service	Results
(1)D (Dead load)	No	No	Yes

Member Extreme Results

Member	Fx(lc) *lb*	Vy(lc) *lb*	Mz(lc) *lb-in*
M1	250 (1)	0 (1)	0 (1)
"	250 (1)	0 (1)	**0 (1)**
M2	250 (1)	0 (1)	0 (1)
"	250 (1)	0 (1)	0 (1)
M3	247 (1)	-58 (1)	-4272 (1)
"	398 (1)	-36 (1)	0 (1)
M4	247 (1)	36 (1)	-4272 (1)
"	398 (1)	58 (1)	0 (1)
M5	350 (1)	-295 (1)	-33304 (1)
"	521 (1)	-198 (1)	-4272 (1)
M6	350 (1)	198 (1)	-33304 (1)
"	521 (1)	295 (1)	-4272 (1)
M7	356 (1)	-639 (1)	-99099 (1)
"	473 (1)	-481 (1)	-33304 (1)
M8	356 (1)	481 (1)	-99099 (1)
"	473 (1)	639 (1)	-33304 (1)
M9	336 (1)	-788 (1)	-132984 (1)
"	368 (1)	-720 (1)	-99099 (1)
M10	336 (1)	720 (1)	-132984 (1)
"	368 (1)	788 (1)	-99099 (1)
M11	410 (1)	**-927 (1)**	-161584 (1)
"	433 (1)	-879 (1)	-132984 (1)
M12	410 (1)	879 (1)	-161584 (1)
"	433 (1)	**927 (1)**	-132984 (1)
M13	**-1395 (1)**	7 (1)	-161584 (1)
"	-1338 (1)	129 (1)	-156100 (1)
M14	-1395 (1)	-129 (1)	-161584 (1)
"	-1338 (1)	-7 (1)	-156100 (1)
M15	-1338 (1)	-115 (1)	-160500 (1)
"	-1282 (1)	4 (1)	-156095 (1)
M16	-1338 (1)	-4 (1)	-160500 (1)
"	-1282 (1)	115 (1)	-156095 (1)
M17	-1282 (1)	-232 (1)	-174052 (1)
"	-1227 (1)	-112 (1)	-160500 (1)
M18	-1282 (1)	112 (1)	-174052 (1)
"	-1227 (1)	232 (1)	-160500 (1)
M19	-1226 (1)	-311 (1)	-187891 (1)
"	-1190 (1)	-234 (1)	-174052 (1)
M20	-1226 (1)	234 (1)	-187891 (1)
"	-1190 (1)	311 (1)	-174052 (1)

Member	Fx(lc) *lb*	Vy(lc) *lb*	Mz(lc) *lb-in*
M21	-1191 (1)	-352 (1)	-197135 (1)
"	-1171 (1)	-310 (1)	-187891 (1)
M22	-1191 (1)	310 (1)	-197135 (1)
"	-1171 (1)	352 (1)	-187891 (1)
M23	-1171 (1)	-440 (1)	**-220397 (1)**
"	-1130 (1)	-351 (1)	-197135 (1)
M24	-1171 (1)	351 (1)	-220397 (1)
"	-1130 (1)	440 (1)	-197135 (1)
M25	**2110 (1)**	0 (1)	0 (1)
"	2110 (1)	0 (1)	0 (1)
M26	2110 (1)	0 (1)	0 (1)
"	2110 (1)	0 (1)	0 (1)

Nodal Displacements

Node	Result Case Name	DX *in*	DY *in*	RZ *deg*
1	D (Dead load) Static Nonl	**10.053**	**-7.179**	**1.5576**
2	"	**-10.05**	-7.179	**-1.5576**
3	"	9.469	-7.179	1.5576
4	"	-9.469	-7.179	-1.5576
5	"	7.018	-6.823	1.5543
6	"	-7.018	-6.823	-1.5543
9	"	2.485	-2.861	1.3762
10	"	-2.485	-2.861	-1.3762
13	"	1.112	0.082	0.9606
14	"	-1.112	0.082	-0.9606
15	"	0.617	1.138	0.7326
16	"	-0.617	1.138	-0.7326
19	"	0.107	2.230	0.3235
20	"	-0.107	2.230	-0.3235
21	"	0.050	2.352	0.2249
22	"	-0.050	2.352	-0.2249
25	"	0.000	**2.458**	0.0000
E7	"	4.263	-5.264	1.5157
E8	"	-4.263	-5.264	-1.5157
N1	"	0.000	0.000	0.0000
PG1	"	1.754	-1.295	1.1952
PG2	"	0.261	1.902	0.4919
PG3	"	-0.261	1.902	-0.4919
PG4	"	-1.754	-1.295	-1.1952
S1	"	2.044	-1.916	1.2807
S2	"	-2.044	-1.916	-1.2807

TFS/R 29.2M with 380 extrusion

VisualAnalysis 5.00 Report
Company: Universal Fabric Structures Engineer: Brian Szkaradnik
Project File: 380 TFS 29.2M-5M-Lift gable.VAP
Folder: J:\PRECONTRACTS\Universal Rentals\ER495 - TFSR29x35 Hemstead NY\Calculations\Lift Calcs\

Table of Contents

Load Cases

Load Case	Strength	Service	Results
(1)D (Dead load)	No	No	Yes

Member Extreme Results

Member	Fx(lc) *lb*	Vy(lc) *lb*	Mz(lc) *lb-in*
M1	250 (1)	0 (1)	0 (1)
"	250 (1)	0 (1)	**0 (1)**
M2	250 (1)	0 (1)	0 (1)
"	250 (1)	0 (1)	0 (1)
M3	247 (1)	-58 (1)	-4272 (1)
"	398 (1)	-36 (1)	0 (1)
M4	247 (1)	36 (1)	-4272 (1)
"	398 (1)	58 (1)	0 (1)
M5	350 (1)	-295 (1)	-33304 (1)
"	521 (1)	-198 (1)	-4272 (1)
M6	350 (1)	198 (1)	-33304 (1)
"	521 (1)	295 (1)	-4272 (1)
M7	356 (1)	-639 (1)	-99099 (1)
"	473 (1)	-481 (1)	-33304 (1)
M8	356 (1)	481 (1)	-99099 (1)
"	473 (1)	639 (1)	-33304 (1)
M9	336 (1)	-788 (1)	-132984 (1)
"	368 (1)	-720 (1)	-99099 (1)
M10	336 (1)	720 (1)	-132984 (1)
"	368 (1)	788 (1)	-99099 (1)
M11	482 (1)	**-1081 (1)**	-166463 (1)
"	505 (1)	-1033 (1)	-132984 (1)
M12	482 (1)	1033 (1)	-166463 (1)
"	505 (1)	**1081 (1)**	-132984 (1)
M13	**-1893 (1)**	183 (1)	-166463 (1)
"	-1837 (1)	305 (1)	-146750 (1)
M14	-1893 (1)	-305 (1)	-166463 (1)
"	-1837 (1)	-183 (1)	-146750 (1)
M15	-1837 (1)	60 (1)	-146750 (1)
"	-1781 (1)	179 (1)	-137361 (1)
M16	-1837 (1)	-179 (1)	-146750 (1)
"	-1781 (1)	-60 (1)	-137361 (1)
M17	-1781 (1)	-56 (1)	-137361 (1)
"	-1726 (1)	64 (1)	-136025 (1)
M18	-1781 (1)	-64 (1)	-137361 (1)
"	-1726 (1)	56 (1)	-136025 (1)
M19	-1569 (1)	-471 (1)	-159016 (1)
"	-1533 (1)	-394 (1)	-137047 (1)
M20	-1569 (1)	394 (1)	-159016 (1)
"	-1533 (1)	471 (1)	-137047 (1)

Member	Fx(lc) *lb*	Vy(lc) *lb*	Mz(lc) *lb-in*
M21	-1533 (1)	-512 (1)	-172721 (1)
"	-1514 (1)	-470 (1)	-159016 (1)
M22	-1533 (1)	470 (1)	-172721 (1)
"	-1514 (1)	512 (1)	-159016 (1)
M23	-1514 (1)	-600 (1)	**-205359 (1)**
"	-1473 (1)	-511 (1)	-172721 (1)
M24	-1514 (1)	511 (1)	-205359 (1)
"	-1473 (1)	600 (1)	-172721 (1)
M25	**2769 (1)**	0 (1)	0 (1)
"	2769 (1)	0 (1)	0 (1)
M26	2769 (1)	0 (1)	0 (1)
"	2769 (1)	0 (1)	0 (1)

Nodal Displacements

Node	Result Case Name	DX *in*	DY *in*	RZ *deg*
1	D (Dead load) Static Nonl	**9.078**	**-6.486**	**1.4230**
2	"	**-9.078**	-6.486	**-1.4230**
3	"	8.544	-6.486	1.4230
4	"	-8.544	-6.486	-1.4230
5	"	6.306	-6.161	1.4197
6	"	-6.306	-6.161	-1.4197
9	"	2.177	-2.557	1.2417
10	"	-2.177	-2.557	-1.2417
13	"	0.961	0.049	0.8280
14	"	-0.961	0.049	-0.8280
15	"	0.538	0.952	0.6235
16	"	-0.538	0.952	-0.6235
19	"	0.097	1.893	0.2885
20	"	-0.097	1.893	-0.2885
21	"	0.046	2.002	0.2036
22	"	-0.046	2.002	-0.2036
25	"	0.000	**2.099**	0.0000
E7	"	3.791	-4.738	1.3811
E8	"	-3.791	-4.738	-1.3811
N1	"	0.000	0.000	0.0000
PG1	"	1.523	-1.154	1.0592
PG2	"	0.233	1.605	0.4263
PG3	"	-0.233	1.605	-0.4263
PG4	"	-1.523	-1.154	-1.0592
S1	"	1.781	-1.707	1.1462
S2	"	-1.781	-1.707	-1.1462

Universal Fabric Structures
2200 Kumry Road
Quakertown, PA 18951
(215) 529-9921

TFS/R 29.2M x 35M

KeySpan Hempstead Intersection Street Former MGP

Ballast Block requirements for a temporary TFS/R 29.2m structure that is designed in accordance with the New York Building Code

STRUCTURAL ONLY

CHANDER P. NANGIA P.E.
7423 HOLLOW RIDGE DR.
HOUSTON, TX 77095

STATE OF NEW YORK
CHANDER P. NANGIA
PROFESSIONAL ENGINEER

JUN 04 2008

The professional engineer seal on this cover page refers to the calculation sheets contained within this document and to any Appendix or Table sheets that support this document. Any other drawings and documents may require a separate seal for coverage not provided here.

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Quakertown, PA 18951
(215) 529-9921

Ballast block requirements.

Design Criteria / Assumptions:

Wind load:
- Basic wind speed (3s gust), $V = 110$ mph
- Exposure category, Exposure = "C"
- Importance factor, $I_W = 1.00$
- Expected life (usage period), Life = 10 years
- Building is designed as enclosed

Main Arch Supports - Wind on side of structure:

From the computer model for loading condition = 0.6 x Dead Load + Wind on side of building:

$R_v = -5413$ lbf — net uplift reaction at each interior arch

$R_h = -6256$ lbf — net shear reaction at each interior arch

Friction coefficient between the steel and the soil:

$\mu = 0.5$

Determine weight required to resist only the horizontal shear force (neglecting the effect of uplift) from the dead load and wind load combination:

$$W_{reqd\_h} = \frac{|R_h|}{\mu}$$ required weight to resist horizontal shear based on frictional coefficient

$= 12512$ lbf

Determine weight required to resist only the vertical uplift force (neglecting the effect of shear) from dead load and wind load combination:

$W_{reqd\_v} = -R_v$ required weight to resist uplift forces.

$= 5413$ lbf

Total weight required to resist horizontal shear forces and vertical uplift forces:

$W_{required} := W_{reqd\_h} + W_{reqd\_v}$

$= 17925$ lbf weight required to resist forces

Determine number of customer supplied ballast blocks required to provide resistance:

$W_{block} = 10000$ lbf weight of one ballast block

$$N_{blocks} = \frac{W_{required}}{W_{block}}$$ minimum number of ballast blocks required.

$= 1.79$

$N_{provided} := ceil(N_{blocks})$

$= 2$

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Quakertown, PA 18951
(215) 529-9921

$W_{provided} = N_{provided} \cdot W_{block}$ weight provided to resist forces

$= 20000\ lbf$

Result = "A minimum of 2 ballast blocks are required per base plate."

Main Arch Supports - Wind on gable end of structure (wind braced bays):

From the computer model for loading condition = 0.6 x Dead Load + Wind on gable end of building:

$R_v = -16750\ lbf$ net uplift reaction at each wind braced arch

$R_h = 6783\ lbf$ net shear reaction at each wind braced arch

Determine weight required to resist only the horizontal shear force (neglecting the effect of uplift) from the dead load and wind load combination:

$$W_{reqd\_h} = \frac{|R_h|}{\mu}$$ required weight to resist horizontal shear based on frictional coefficient

$= 13566\ lbf$

Determine weight required to resist only the vertical uplift force (neglecting the effect of shear) from dead load and wind load combination:

$W_{reqd\_v} = -R_v$ required weight to resist uplift forces.

$= 16750\ lbf$

Total weight required to resist horizontal shear forces and vertical uplift forces:

$W_{required} := W_{reqd\_h} + W_{reqd\_v}$

$= 30316\ lbf$ weight required to resist forces

Determine number of customer supplied ballast blocks required to provide resistance:

$$N_{blocks} = \frac{W_{required}}{W_{block}}$$ minimum number of ballast blocks required.

$= 3.03$

$N_{provided} := ceil(N_{blocks})$

$= 4$ USE: $N_{provided} := 3$

$W_{provided} = N_{provided} \cdot W_{block}$ weight provided to resist forces

$= 30000\ lbf$

Result = "Say OKAY, due to safety factors and only 1% under calculated requirement"

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Gable Upright Supports - Wind on gable end of structure:

$Length_{uprights} = \begin{pmatrix} 24.44 \\ 33.63 \end{pmatrix} ft$ length of gable uprights

$Width_{eff} = 19.69\ ft$ effective width of loaded wind area

$q_h = 7.94\ psf$ wind pressure

$R_h := \frac{Length_{uprights} \cdot Width_{eff} \cdot q_h}{2}$ net shear reaction at gable supports

$= \begin{pmatrix} 1910 \\ 2628 \end{pmatrix} lbf$

Determine weight required to resist the horizontal shear force from the wind:

$W_{reqd\_h} = \frac{R_h}{\mu}$ required weight to resist horizontal shear based on frictional coefficient

$= \begin{pmatrix} 3820 \\ 5256 \end{pmatrix} lbf$

Determine number of customer supplied ballast blocks required to provide resistance:

$N_{blocks} = \frac{W_{reqd\_h}}{W_{block}}$ minimum number of ballast blocks required.

$= \begin{pmatrix} 0.38 \\ 0.53 \end{pmatrix}$

$N_{provided} := ceil(N_{blocks})$

$= \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

$W_{provided} = N_{provided} \cdot W_{block}$ weight provided to resist forces

$= \begin{pmatrix} 10000 \\ 10000 \end{pmatrix} lbf$

Result = "A minimum of 1 ballast blocks are required per base plate."

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Quality Shelter Solutions. . .Worldwide!

30 May 2008

RE: KeySpan Hempstead Intersection Street Former MGP

To Whom It May Concern:

This letter is in response to the ENTACT's request for modifications to the movable structure.

1) The anchorage of the structure originally utilized ballast blocks that were placed on ballast plates that were connected to the base plates of the structure. The ballast blocks, attached in this way, provided resistance to both uplift and lateral movement of the structure.

The alternate anchorage places the ballast blocks directly upon the ground in the same location as if they were situated on the ballast plate.

The resistance to uplift forces adjacent to wind braced bays is provided by a minimum of two (2) 10,000# ballast block per base plate. The block is secured to the structure with Grade 100 Allow Chain that has a minimum working load of 10,000 lb. The chain is connected to the structure via a crane lifting bracket that is clamped in such a position as to maintain a minimum chain angle of 30° to the horizontal. The chain is snug-fit with a load binder that has a minimum working load of 10,000 lb.

The resistance to uplift forces in arches that are not adjacent to wind braced bays can be reduced to one (1) 10,000# ballast block per base plate.

The resistance to lateral movement in arches adjacent to wind braced bays of the structure is provided with a minimum of two (2) 28mm x 1.5m stake that is secured through the skid plate and into the ground.

The resistance to lateral movement in arches not adjacent to wind braced bays can be reduced to one (1) stake.

The alternative anchorage, as described in the text above, is a satisfactory replacement for the original ballast plate design and has been reviewed and sealed by the New York State Professional Engineer.

Respectfully submitted,

CHANDER P. NANGIA P.E.
7423 HOLLOW RIDGE DR.
HOUSTON, TX 77095

STRUCTURAL ONLY

JUN 04 2008

Chander P. Nangia, New York PE #53030

2260 Kumry Road • Quakertown, PA 18951
PH: 215-529-0021 • FAX: 215-529-0936 • 1-800-611-8368
EMAIL: Sales@ufsinc.com • www.ufsinc.com

REV.	DATE	DESCRIPTION	NAME
0	28MAY2008	ORIGINAL RELEASE	SF
A	09JUN2008	WIND EXPOSURE CATEGORY WAS B	SF

GENERAL

1. IF ANY CONFLICTS OR INCONSISTENCIES EXIST BETWEEN THE SPECIFICATIONS AND THE DRAWINGS (INCLUDING THE GENERAL NOTES), THE DRAWINGS AND THE GENERAL NOTES SHALL TAKE PRECEDENCE.

2. ALL DIMENSIONS ON STRUCTURAL DRAWINGS SHALL BE CHECKED AND VERIFIED AGAINST ARCHITECTURAL DRAWINGS. ALL DIMENSIONS RELATING TO EXISTING SITE, BUILDINGS, INSTALLATIONS OR CONSTRUCTION SHALL BE FIELD VERIFIED, ALL DISCREPANCIES SHALL BE SUBMITTED TO THE ARCHITECT. DO NOT PROCEED WITH FABRICATION AND ERECTION OF MATERIALS AFFECTED UNTIL DISCREPANCIES ARE RESOLVED.

3. ALL OMISSIONS OR DISCREPANCIES IN THE WORKING DRAWING AND OR SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND/OR STRUCTURAL ENGINEER BEFORE PROCEEDING WITH ANY WORK INVOLVED.

4. DRAWINGS INDICATE GENERAL AND TYPICAL DETAILS OF CONSTRUCTIONS. WHERE CONDITIONS ARE NOT SPECIFICALLY INDICATED BUT ARE OF SIMILAR CHARACTER TO DETAILS SHOWN, SIMILAR DETAILS OF CONSTRUCTION SHALL BE USED SUBJECT TO REVIEW AND APPROVAL BY PROJECT ENGINEER OF RECORD.

5. DRAWINGS AND SPECIFICATIONS REPRESENT FINISHED STRUCTURE. CONTRACTOR SHALL BE RESPONSIBLE FOR MEANS AND METHODS OF CONSTRUCTION INCLUDING, BUT NOT LIMITED TO, SHORING AND TEMPORARY BRACING.

6. THE CONTRACTOR SHALL UNDERTAKE ALL NECESSARY MEASURES TO ENSURE SAFETY OF ALL PERSONS AND STRUCTURES AT THE SITE. OBSERVATION VISITS BY ARCHITECT OR STRUCTURAL ENGINEER SHALL NOT RELIEVE THE CONTRACTOR OF SUCH RESPONSIBILITY.

STRUCTURAL

1. CODES AND SPECIFICATIONS
   (A) AISC MANUAL OF STEEL CONSTRUCTION, ALLOWABLE STRESS DESIGN, 9TH EDITION
   (B) WELD IN ACCORDANCE WITH THE "STRUCTURAL WELDING CODE - STEEL" AWS D1.1
   (C) AISC SPECIFICATION FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS.
   (D) ALUMINUM DESIGN MANUAL, SPECIFICATIONS & GUIDELINES FOR ALUMINUM STRUCTURES

2. MATERIALS OF CONSTRUCTION:
   (A) STRUCTURAL WIDE FLANGE SHAPES; ASTM A992, GRADE 50
   (B) ANGLES, CHANNELS AND PLATES; ASTM A36 U.N.O.
   (C) TUBES; ASTM A500, GRADE B, Fy = 50ksi
   (D) PIPE COLUMNS; A53, GRADE B, TYPE E OR TYPE S U.N.O.
   (E) BOLTS; ASTM A325 OR A490

3. STRUCTURAL STEEL SHALL BE HOT DIPPED GALVANIZED PER ASTM A123 OR A123M. MINIMUM NOMINAL 1 MIL COATING.

4. STRUCTURAL BOLTS SHALL BE PLATED OR GALVANIZED PER ASTM A153 OR A153M.

ANCHORAGE

1. CONTRACTOR TO INSTALL ANCHOR BOLTS - LOCATION PER UNIVERSAL FABRIC STRUCTURES DIMENSIONS AND SPACING.

2. WHEN MOUNTING THE STRUCTURE ON A CONCRETE FOUNDATION, PROVIDE 3/4" DIA., A307 ANCHOR BOLT, L-SHAPED WITH MINIMUM EMBEDMENT OF 10" AND BENT PORTION OF 4" MIN. WITH STAINLESS STEEL WASHERS. ANCHOR BOLTS SHALL CONFORM TO AISC AND ACI STANDARDS REGARDING FABRICATION AND INSTALLATION.

3. WHEN MOUNTING THE STRUCTURE WITH STAKES, A PULL-TEST MUST BE PERFORMED BY QUALIFIED PERSONNEL TO DETERMINE THE MINIMUM STAKE REQUIREMENT - SIZE AND QUANTITY

FRAME CONNECTIONS

1. ATTACH HANGERS FOR PIPES, DUCTS, OR MECHANICAL AND ELECTRICAL EQUIPMENT TO ALUMINUM ARCH MEMBERS BY CLAMPS THAT DO NOT REMOVE MATERIAL FROM SUPPORTING MEMBER OR THAT REQUIRE WELDING OR DRILLING UNLESS OTHERWISE SHOWN OR APPROVED BY THE ENGINEER.

FABRIC

1. THE EXTERIOR FABRIC SHALL BE MINIMUM FINISH WEIGHT OF 22 OZ / SQ. YD. THE INTERIOR FABRIC SHALL BE MINIMUM FINISH WEIGHT OF 16 OZ / SQ. YD.

2. THE FABRIC SHALL CONFORM TO INTERNATIONAL FIRE STANDARDS IN FORCE FOR ESTABLISHMENTS THAT RECEIVE THE GENERAL PUBLIC.

3. FABRIC SHALL BE FLAME RETARDANT TO THE STANDARDS OF NFP 92.503 AND NFPA 701.

DESIGN LOADING CRITERIA

Building Loading Criteria with reference to IBC2006 International Building Code and ASCE7-05 Reference Standard (Minimum standard load - Except as noted otherwise below)		
Building Occupancy Category	Category II (Table 1604.5)	
Live Load - Roof	3.75 psf uniform, 500 lbs concentrated based on actual tensile fabric structure loads	
Snow Load		
Ground Snow Load	Pg = 30psf	Figure 1608.2
Exposure Factor	Ce = 0.9	Table 1608.3
Thermal Factor	Ct = 1.0	Table 1608.3.2
Snow Importance Factor	Is = 1.0	Table 1604.5
Flat Roof Snow Load	Pf = 18.9 psf	ASCE7-05 eq. 7-1
Slope Roof Design Snow Load	Ps = 13.1 psf	Paragraph 1608.4
SNOW SHEDDING IN EFFECT		
Wind Load		
Basic Wind Speed	V = 110 mph	Figure 1609
Wind Importance Factor	Iw = 1.0	Table 1604.5
Wind Exposure Category	Category C	Paragraph 1609.4
Pressure Coefficients	Gcpi = 0.18	ASCE7 Table 6-7
	GCp per ASCE7-05	Figures 6-5B & 6-8

STRUCTURAL ONLY

STATE OF NEW YORK
CHANDER P. NANGIA
LICENSED PROFESSIONAL ENGINEER

JUN 10 2008

CHANDER P. NANGIA P.E.
7423 HOLLOW RIDGE DR.
HOUSTON, TX 77095

LOCATION: NEW YORK

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

TITLE: TFS/R 29.2M - GENERAL NOTES

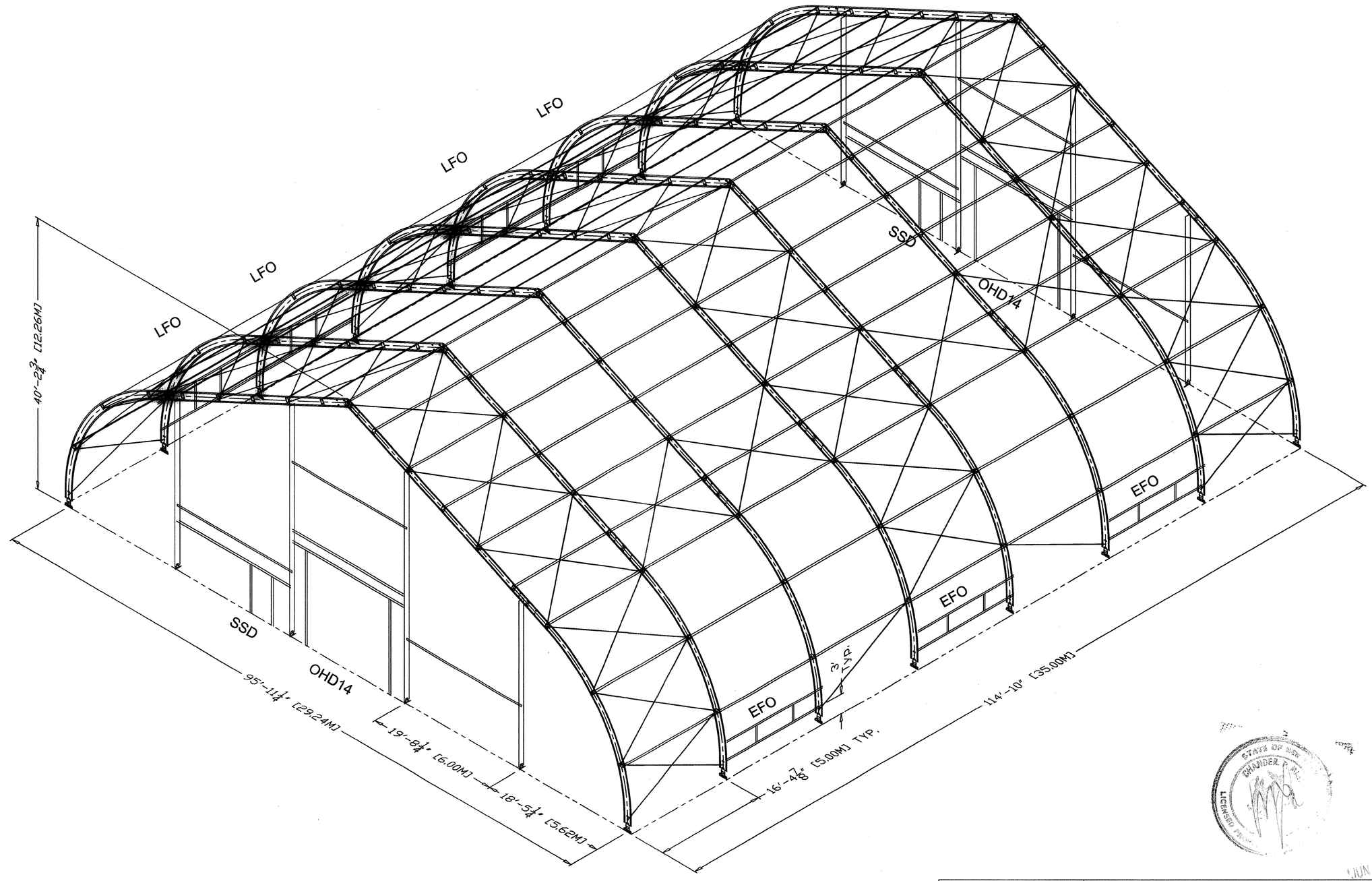
DRAWN: SF	CHECKED: SH	DATE: 28MAY2008	REV.: A

SIZE	SCALE	JOB No.:	DWG. NO.:
C	NTS	ER495	ER495-000

PROJECT NAME:

SHEET: 1 OF 1

REV.	DATE	DESCRIPTION	NAME
0	30MAY2008	ORIGINAL RELEASE	SH



NOTES:

SSD	(2x)	SINGLE STEEL PERSONNEL DOOR
OHD14	(2x)	~~44' x 14' OVERHEAD ROLL UP DOOR~~ FABRIC DOOR
EFO	(3x)	EXHAUST FRAMED OPENING (72"x30")
LFO	(4x)	LOUVER FRAMED OPENING (49"x49")

KEYSPAN HEMPSTEAD INTERSECTION STREET FORMER MGP

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

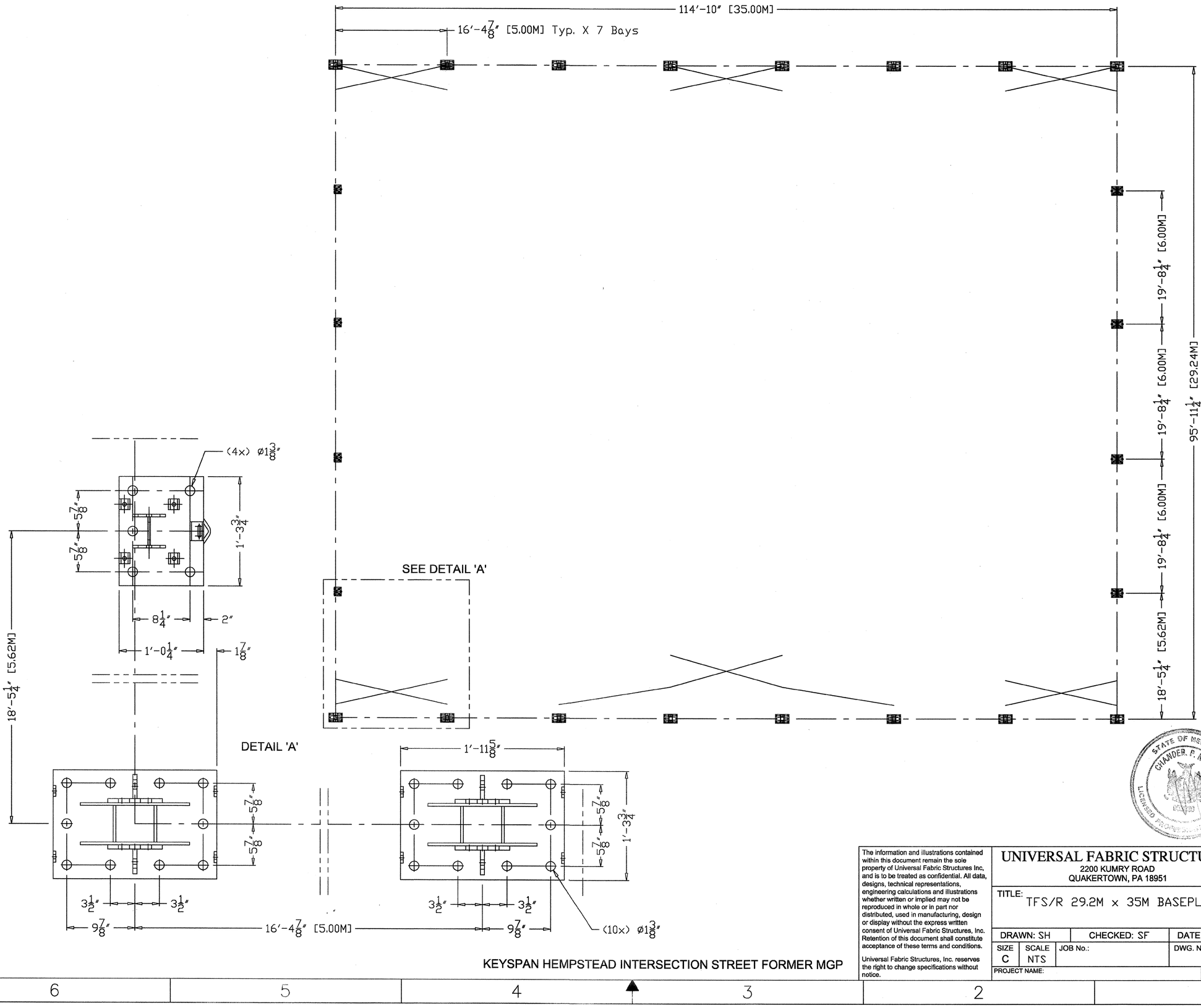
TITLE: TFS/R 29.2M-380 x 35M ISO VIEW w/ ACCESSORIES

DRAWN: SH	CHECKED: SF	DATE: 30MAY2008	REV.: 0
SIZE: C	SCALE: NTS	JOB No.:	DWG. NO.: ER495-101
PROJECT NAME:			SHEET: 1 OF 1

STATE OF NEW JERSEY CHANDER [illegible] LICENSED PROFESSIONAL ENGINEER

JUN 05 2008

REV.	DATE	DESCRIPTION	NAME
0	30MAY2008	ORIGINAL RELEASE	SH



STATE OF NEW YORK
CHANDER P. NAHATA
LICENSED PROFESSIONAL ENGINEER
JUN 05 2008

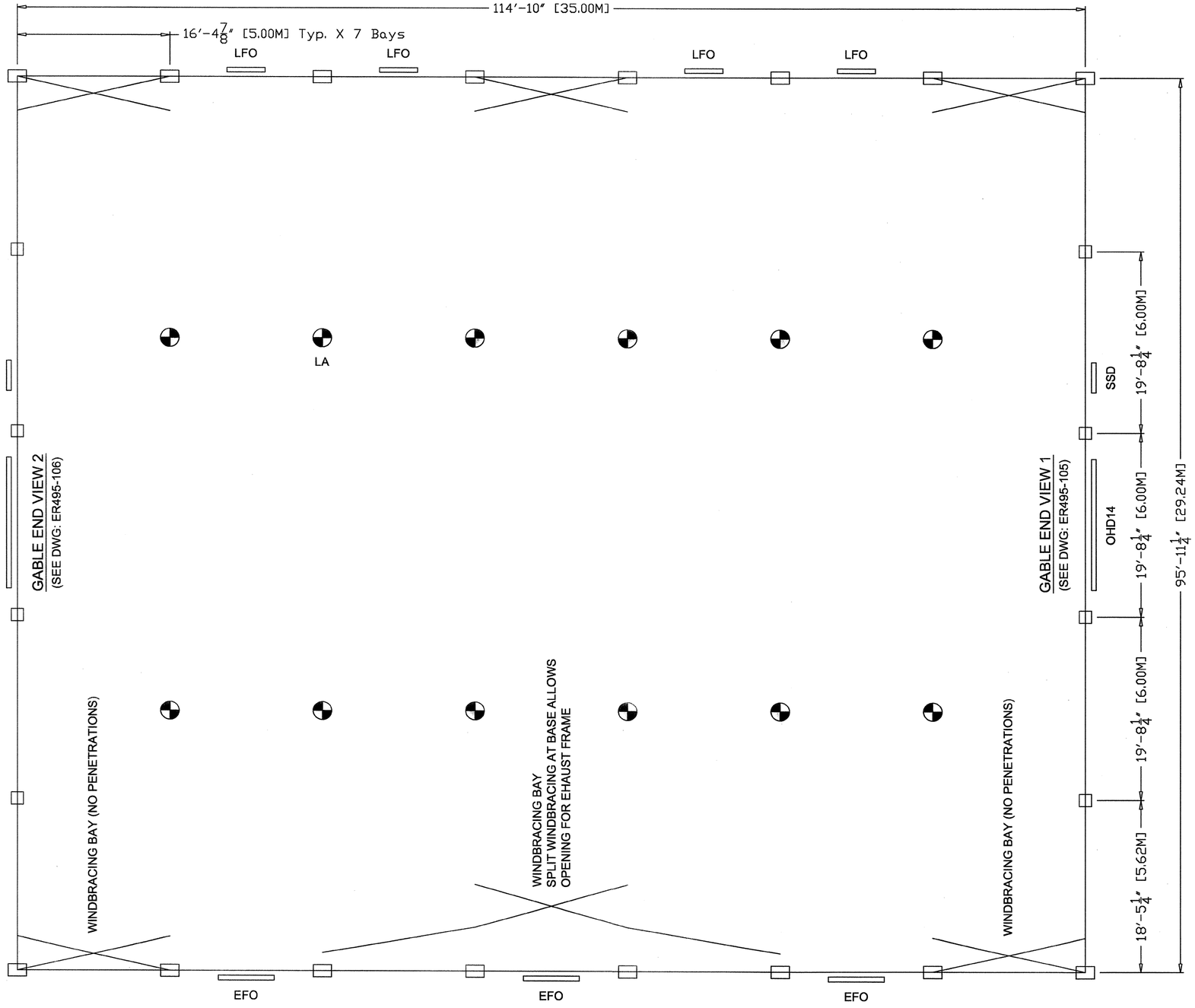
KEYSPAN HEMPSTEAD INTERSECTION STREET FORMER MGP

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

TITLE: TFS/R 29.2M x 35M BASEPLATE LAYOUT

DRAWN: SH	CHECKED: SF	DATE: 30MAY2008	REV.: 0
SIZE: C	SCALE: NTS	JOB No.:	DWG. NO.: ER495-102
PROJECT NAME:			SHEET: 1 OF 1

REV.	DATE	DESCRIPTION	NAME
0	29MAY2008	ORIGINAL RELEASE	SH



STATE OF NEW YORK
CHANDER P. NANDA
053030
LICENSED PROFESSIONAL ENGINEER

JUN 05 2008

NOTES:

SSD	(2x)	SINGLE STEEL PERSONNEL DOOR
OHD14	(2x)	14' x 14' ~~OVERHEAD ROLL UP DOOR~~ FABRIC DOOR
EFO	(3x)	EXHAUST FRAMED OPENING (72"x30")
LFO	(4x)	LOUVER FRAMED OPENING (49"x49")
LA	(12x)	LIGHT ASSEMBLY

KEYSPAN HEMPSTEAD INTERSECTION STREET FORMER MGP

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

TITLE: TFS/R 29.2M x 35M PLAN VIEW

DRAWN: SH	CHECKED: SF	DATE: 29MAY2008	REV.: 0
SIZE C	SCALE NTS	JOB No.:	DWG. NO.: ER495-103
PROJECT NAME:			SHEET: 1 OF 1

REV.	DATE	DESCRIPTION	NAME
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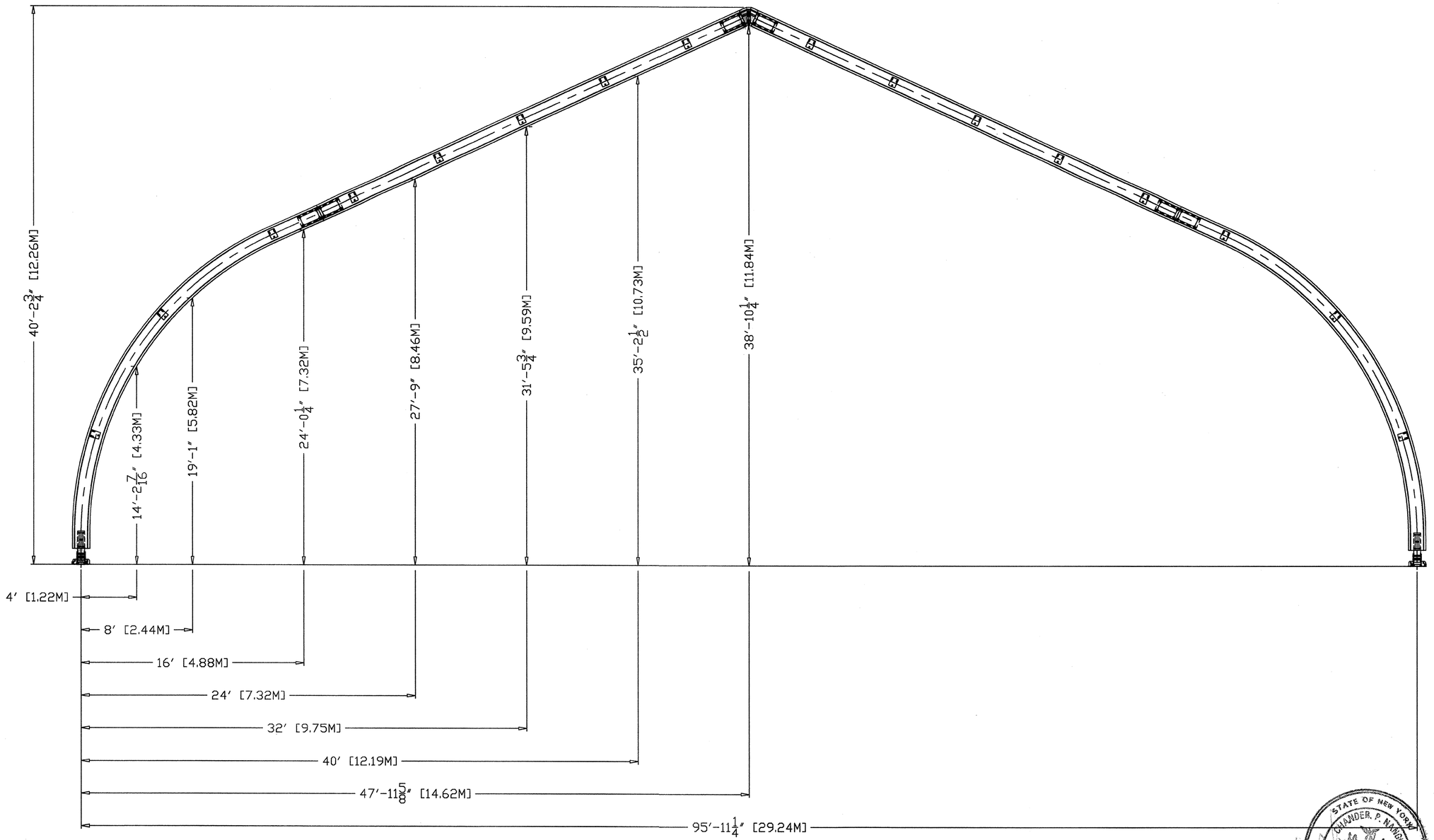

STATE OF NEW YORK
CHANDER P. NARULA
053030
LICENSED PROFESSIONAL ENGINEER
JUN 05 2008

KEYSPAN HEMPSTEAD INTERSECTION STREET FORMER MGP

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

TITLE:
TFS-R 29.2M ARCH VIEW
w- INTERIOR HEIGHTS

DRAWN: SH	CHECKED: SF	DATE: 29MAY2008	REV.: 0
SIZE C / SCALE NTS	JOB No.:	DWG. NO.: ER495-104	
PROJECT NAME:		SHEET: 1 OF 1	

REV.	DATE	DESCRIPTION	NAME
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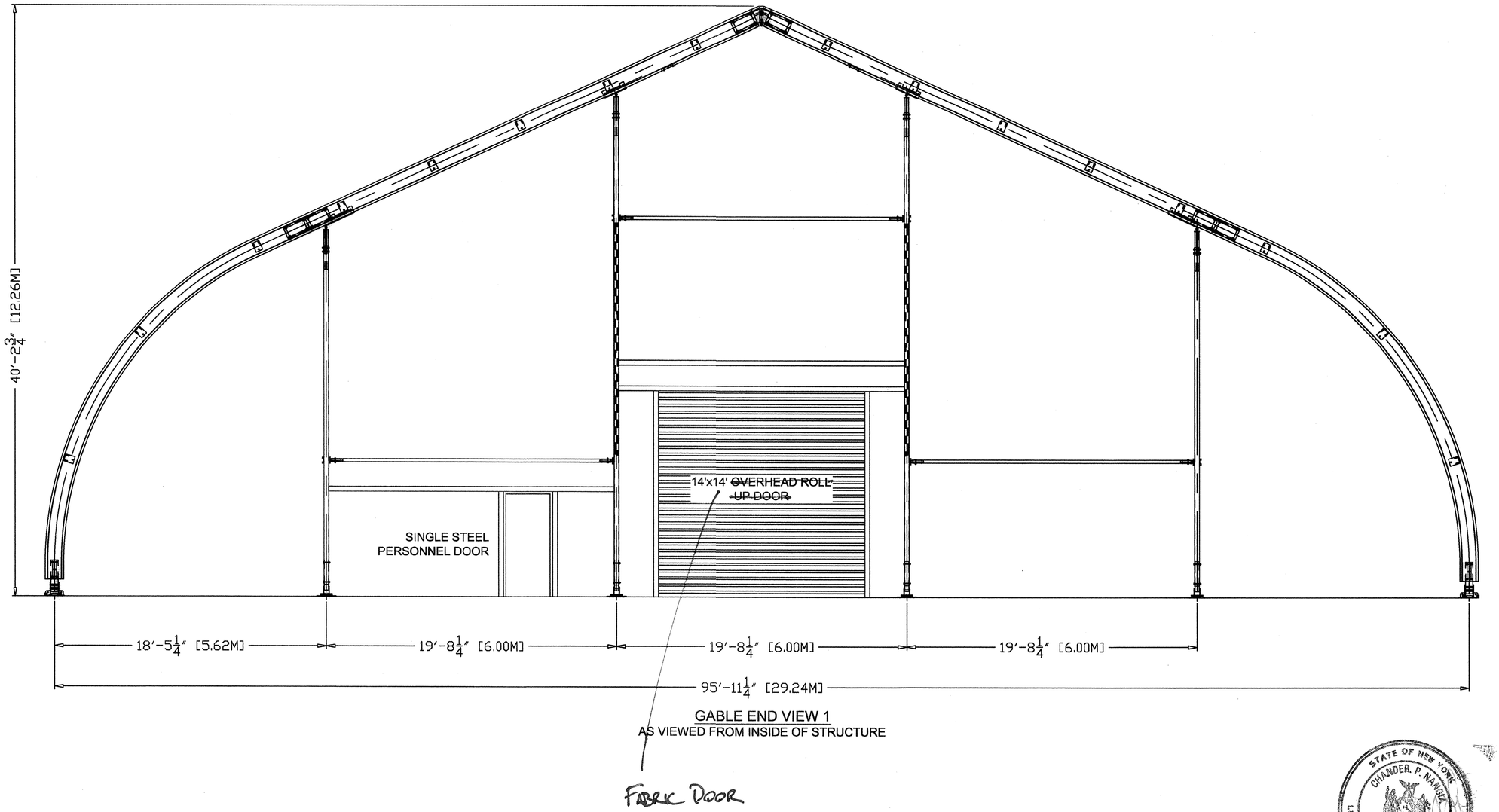

GABLE END VIEW 1
AS VIEWED FROM INSIDE OF STRUCTURE

FABRIC DOOR

STATE OF NEW YORK
CHANDER P. NARULA
053030
LICENSED PROFESSIONAL ENGINEER

JUN 05 2008

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

TITLE: TFS/R 29.2M GABLE END VIEW 1

DRAWN: SH	CHECKED: SF	DATE: 29MAY2008	REV.: 0
SIZE: C	SCALE: NTS	JOB No.:	DWG. NO.: ER495-105
PROJECT NAME: KEYSPAN HEMPSTEAD INTERSECTION STREET FORMER MGP			SHEET: 1 OF 1

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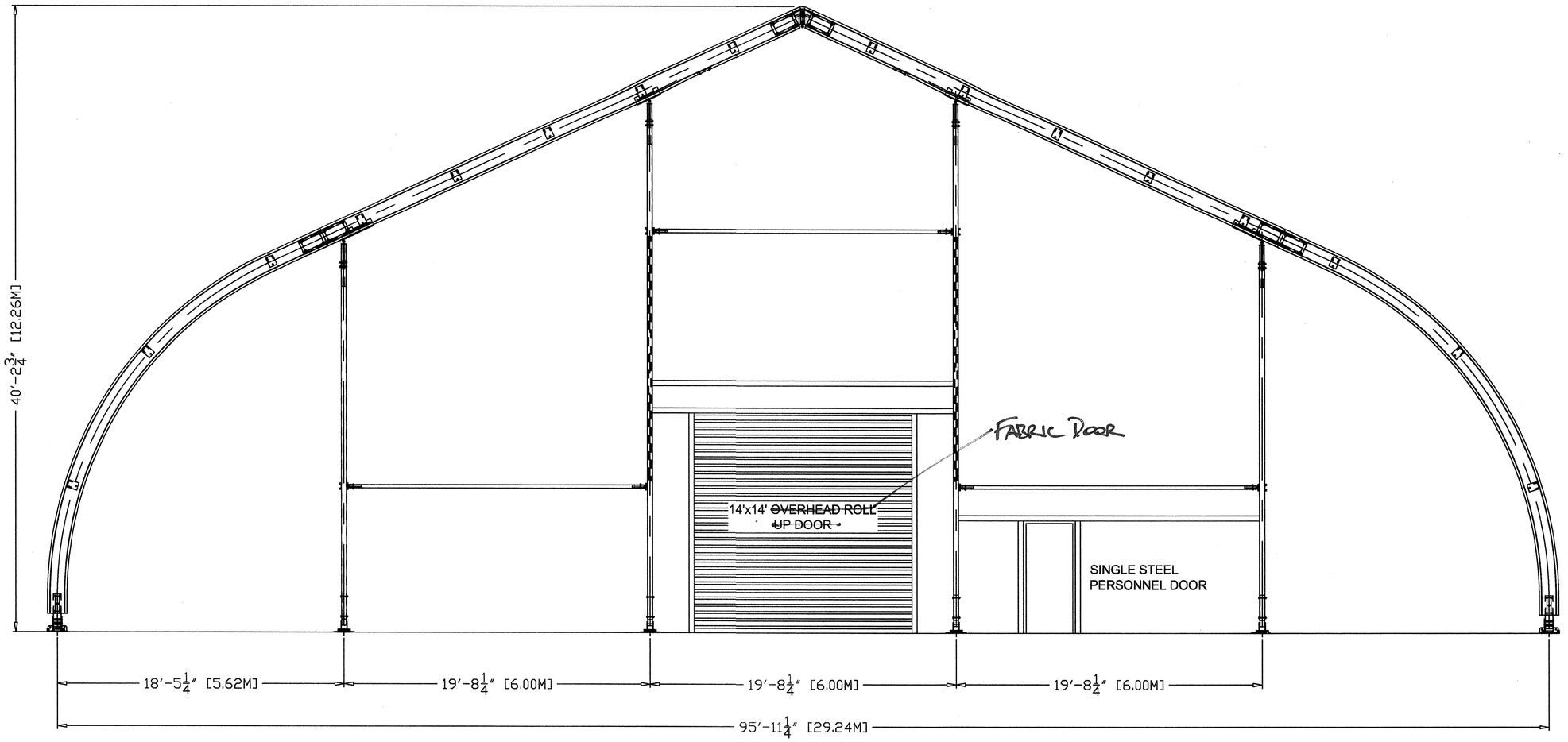

GABLE END VIEW 2
AS VIEWED FROM INSIDE OF STRUCTURE

STATE OF NEW YORK
CHANDER P. NANGIA
059030
LICENSED PROFESSIONAL ENGINEER

JUN 06 2008

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

TITLE: TFS/R 29.2M GABLE END VIEW 2

DRAWN: SH	CHECKED: SF	DATE: 29MAY2008	REV.: 0

SIZE	SCALE	JOB No.:	DWG. NO.:
C	NTS		ER495-106

PROJECT NAME: KEYSPAN HEMPSTEAD INTERSECTION STREET FORMER MGP

SHEET: 1 OF 1

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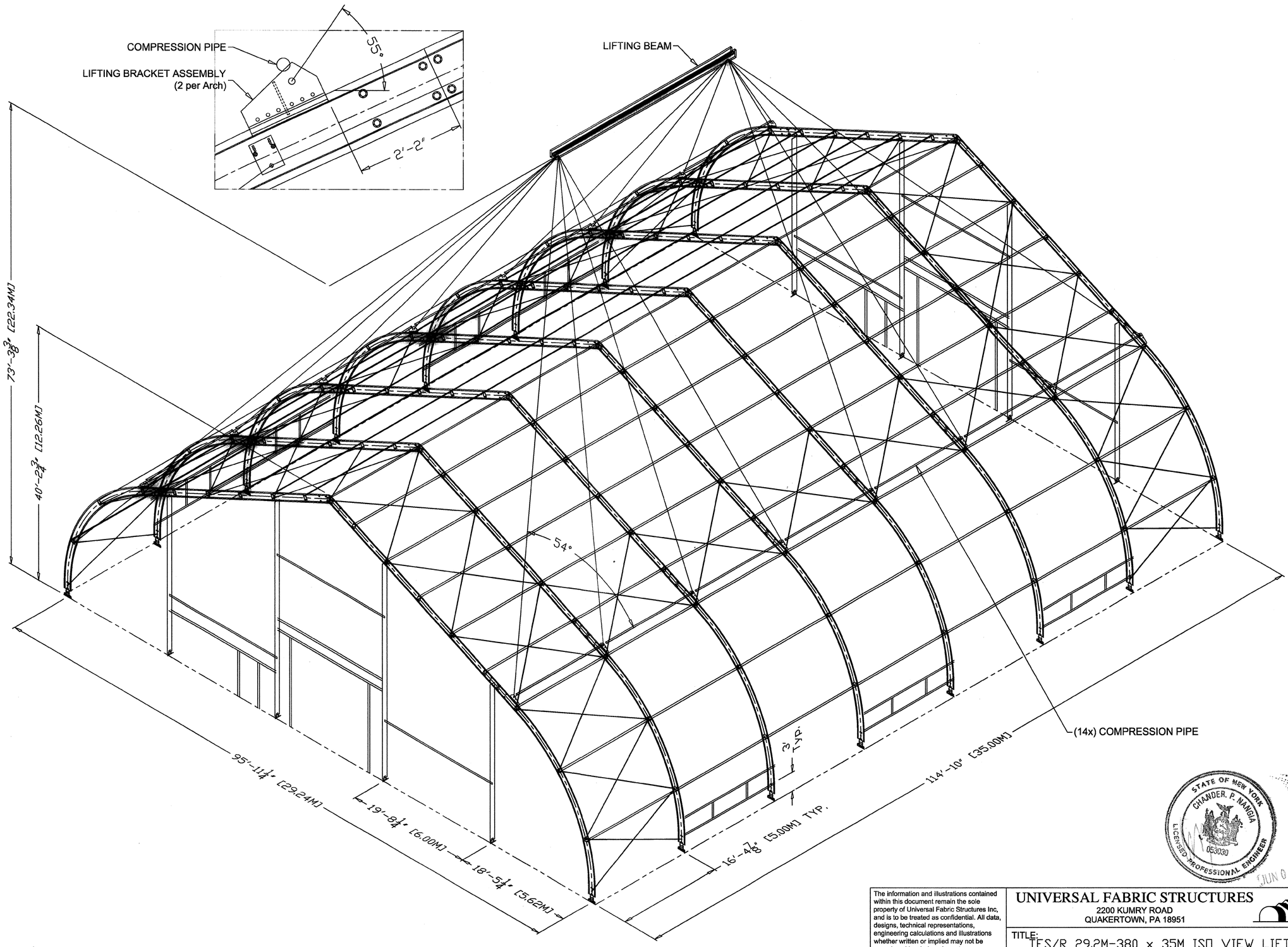


STATE OF NEW YORK
CHANDER P. NANDRA
063030
LICENSED PROFESSIONAL ENGINEER
JUN 05 2008

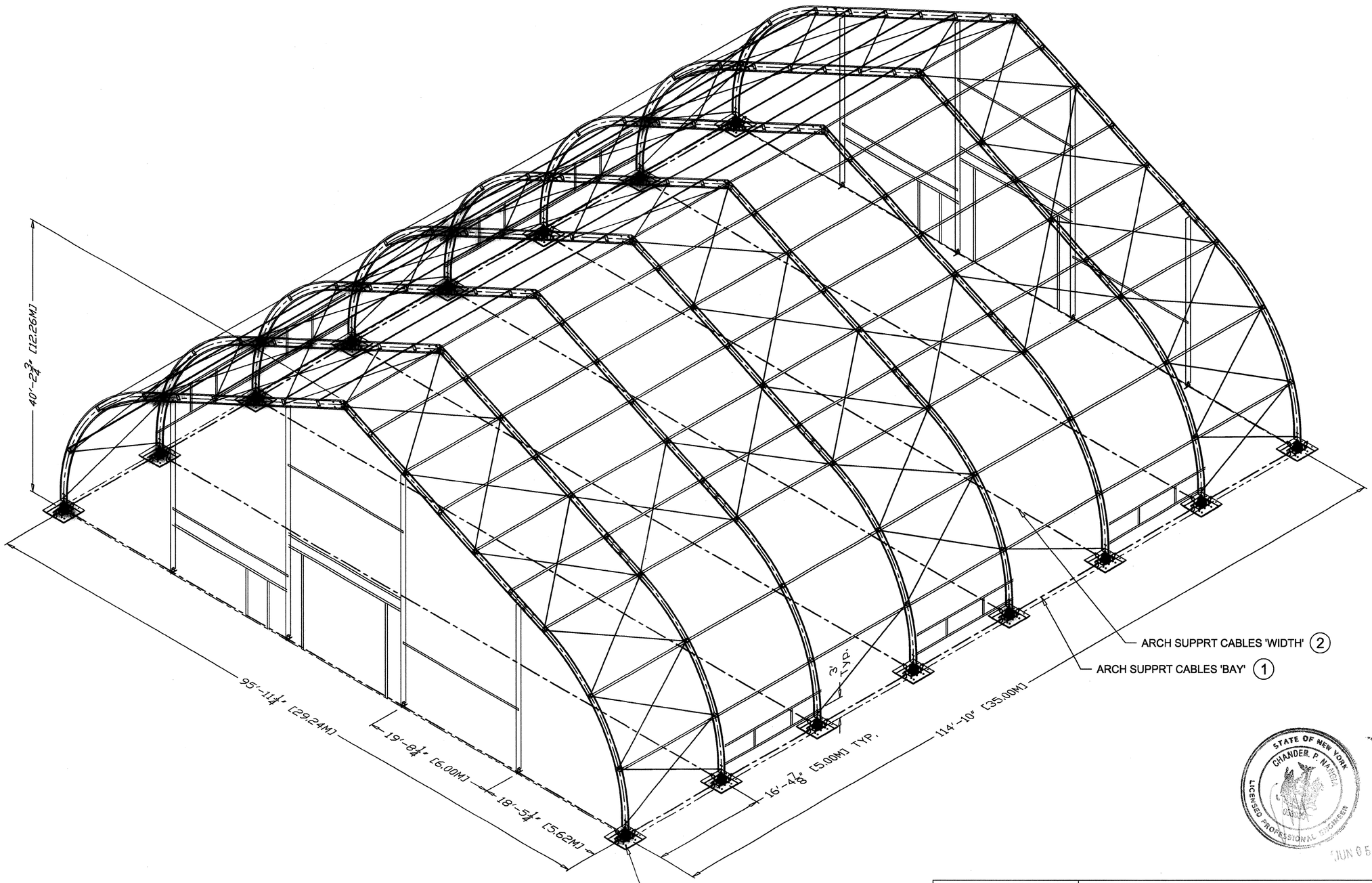
KEYSPAN HEMPSTEAD INTERSECTION STREET FORMER MGP

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

TITLE: TFS/R 29.2M-380 x 35M ISO VIEW LIFTING w/ ACCESSORIES

DRAWN: SH	CHECKED: SF	DATE: 30MAY2008	REV.: 0
SIZE: C	SCALE: NTS	JOB No.:	DWG. NO.: ER495-107
PROJECT NAME:			SHEET: 1 OF 1

REV.	DATE	DESCRIPTION	NAME
0	30MAY2008	ORIGINAL RELEASE	SH



1 - QTY (14) - L= 13'-3 1/4"
2 - QTY (8) - L= 92'-9 1/2"

* - LENGTHS OF SUPPORT CABLES ARE DETERMINED FROM CENTER OF HOLE ON CORRESPONDING LUGS OF SKIDS

** - UFS ASSUMES NO RESPONSIBILITY FOR THE DESIGN OR USE OF SUPPORT CABLES

KEYSPAN HEMPSTEAD INTERSECTION STREET FORMER MGP

STATE OF NEW YORK
CHANDER P. NARULA
LICENSED PROFESSIONAL ENGINEER
JUN 05 2008

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

TITLE:
TFS/R 29.2M-380 x 35M ISO VIEW
w/ SKID PLATES & SUPPORT CABLES

DRAWN: SH	CHECKED: SF	DATE: 30MAY2008	REV.: 0
SIZE: C	SCALE: NTS	JOB No.:	DWG. NO.: ER495-108
PROJECT NAME:			SHEET: 1 OF 1

Appendix H

Vapor Management System

(Provided in Electronic Format Only)

Newmark Engineering, P.C.

May 28, 2008

ETACT
1010 Executive Court, Suite 280
Westmont, IL 60559

Re: Keyspan Hempstead Intersection Former MGP Site
Villages of Garden City and Hempstead, New York
TIGG Model NB-20 Vapor Phase Granular Carbon Adsorption Vapor Management System

Gentlemen:

This letter will certify that the proposed TIGG Model NB-20 Vapor Phase Granular Carbon Adsorption Vapor Management system meets or exceeds the requirements of the subject Contract Technical Specification 13120.

The proposed system can manage 6 air exchanges per hour and is adequate to treat the recovered air from within the enclosure and remove contaminant to meet NYSDEC air emission standards until break through occurs, at which point the carbon bed will require replacement in accordance with manufacturer's Operating Manual.

This determination has been made by Newmark Engineering, P.C. who has performed a detailed review of contract technical specification and information provided in manufacturer's Operating Manual.

Newmark Engineering, P.C.

Glenn Newmark, P.E.
President

49 Claremont Ave, Montclair, NJ 07042 973-233-4242 Cell 646-529-2577

OPERATING MANUAL

NB20 Carbon Adsorber
& Fan/Filter Section

Entact & Associates, LLC

KEYSPAN PROJECT
Hempstead, NY

TIGG Corporation
1 Willow Ave
Oakdale, PA 15071
Ph: (724)703-3020
Fax: (724)703-3026
May 2008

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

The following sections discuss the specifications, design basis and recommended operating procedures for a Tigg Model NB-20 vapor phase granular carbon adsorption system

2.0 SPECIFICATIONS

Vessel Nomenclature	TIGG Model NB-20
Interior Width	86 in
Interior Length	352 in
Inside Height	92 in
Top Access	(6) 18 x 36 " Openings
Side Access	(1) 30 x 86 " Doors
Maximum Operating Pressure	14 in H_2O
Maximum Operating Temperature	140 deg F
Material of Construction	Carbon Steel
Lining	High Solids Epoxy
Exterior Paint	Acrylic Waterborne Primer and Enamel
Approximate Weight	15,000 lbs Empty; 35,000 lbs Full

3.0 DESIGN

3.1 Application

The vapor phase activated carbon unit is designed for the adsorption of VOC's and other contaminants from a process and/or waste stream.

3.2 Design Basis

The design basis for this operation is as follows:

Influent Type	Vapor with low relative humidity
Flow Rate	20,000 cfm per adsorber (max)
Temperature	<140 ^{o} F
Outlet Pressure	Ambient
Carbon Fill	16,000 lbs. std. fills
Contact Time	1.7 sec @ flow & fill

3.3 Air Volume

The air volume for the Structure is calculated using the following dimensions 96'w x 115'l x 45'h times 0.666. The volume was calculated at 287,000 cubic ft. The largest excavation volume in the building is planned to be 50'w x 50' l x 20' dp or 50,000 cuft. The required air exchange rate is to be 6 air changes per hour so multiplying the total of (287,000 cu. ft + 50,000) x 6 = 2,022,000 cu.ft. / hour. This converts to 33,700 cu. ft./min which is well within the capacity of two TIGG NB20 air flows @ 20,000 cfm/unit.

4.0 GENERAL PROCESS DESCRIPTION

4.1 Mode of Operation

The NB-20 utilizes a horizontal bed of TIGG 5C 0410 virgin/reactivated vapor phase granular activated carbon for the adsorption of organic compounds. Influent vapor will enter the NB-20 through two 20" OD duct fittings on one end of the unit. The vapors will then be distributed throughout the plenum chamber in the bottom of the unit. A support structure of carbon steel and polypropylene is installed horizontally on the top of the plenum to support a minimum 3 foot deep carbon bed. Influent vapors will flow from the bottom of the NB-20, up through the carbon bed and into the headspace of the unit. Treated vapor will exit the unit through two 20" OD duct fittings in the top of the NB-20. These vapors will be discharged through two silencer style stacks provided by TIGG Corporation.

4.2 Effluent Sampling / Change out Determination

The NB-20 units are provided with sample ports in the carbon bed at preset points representing 1/3 of the bed depth. Sample ports are also provided above and below the carbon bed to provide influent and effluent sampling points. It is not the intent of this section to describe a specific method of sampling or whether sampling is required. This is at the discretion of the operator.

4.3 Excessive Moisture Accumulation

If excessive moisture is present in process vapors, liquid may accumulate within the open bottom portion of the unit. Four ¾" drain plugs are located at the four corners of the unit floor. The drain plugs can be removed from the bottom side of the NB-20***. Note – removal of a drain plug may expose personnel to untreated process vapor and may result in spillage of contaminated liquid. Use appropriate personnel protection and dispose of any liquids in accordance with local regulations.***

5.0 INSTALLATION

5.1 Unpacking

When the NB-20 is delivered to the site, it should be checked thoroughly to ensure all required items have been received and the equipment is free of any shipping damage ***prior to signing the bill of lading***.

5.2 Rigging

The NB-20 units will be shipped to the jobsite with the full initial charge of carbon. The combined, loaded weight of the equipment will be 35,000 lbs. The unit is fitted with lifting lugs on the four corners. The unit should only be rigged by qualified personnel using proper rigging and techniques. The unit does not need to be installed on a concrete surface, a solid packed gravel or dirt surface will suffice.

5.3 Ducting and Peripheral Equipment

In addition to the adsorber, the system includes building inlet louvers and outlet building transitions. The fan/filter unit has an inlet vane damper on if for adjusting flow characteristics if require. This skid also contains the NEMA 3R combination reduced motor voltage starter and

quick disconnect. The fan specifications are:

Fan Capacity	20,000 CFM
Fan Static Pressure	20 in-wg
Fan MOC	Steel
Fan Motor	100 HP, TEFC, 3/60/460
Fan Controls – Soft	NEMA 4, Start/Stop PB, Disconnect, Pilot Light.
Pre-filter	24" x 24" x 2" High Capacity pleated filter and 24"x24"x15" deep pocket filters
Filter Outlet Connection	Two (2) 20" dia. - plain end.
Fan Outlet Connection	See drawings
Stack	20" dia.x 4' OAH.

6.0 STARTUP PROCEDURES

6.1 Refill of Fresh Carbon

NOTE: FOLLOW ALL LOCAL SAFETY REGULATIONS WHEN WORKING ON OR NEAR THE ADSORBERS.

Fresh carbon will arrive on one truck, in super sacks for the initial fill of the NB-20. Upon arrival of the truck, the following steps should be taken:

1. Remove the top hatches by loosening four clamps on each hatch and placing each hatch to the side.

2. Inspect the interior of the adsorber to ensure that there is no shipping damage to the plenum.

3. Prepare to load through hatch number 1.

4. Suspend a super sack above the hatch.

5. Lower the super sack as close to one side of the hatch as possible and empty.

6. Continue to load super sacks through the hatch until the carbon is within 1 - 2 feet of the opening (approximately two (2) super sacks). The carbon will have formed a cone shaped pile which could have an angle of repose between 20 and 30 degrees.

7. Push the carbon toward the sides and ends of the adsorber in an attempt to level it.

8. Empty next super sack into opposite side of the same hatch.

9. Continue until carbon is within 1 - 2 feet of the opening (approximately two (2) super sacks).

10. Repeat Step 7.

11. Repeat Steps 4 through 10 for hatch number 2.

12. Repeat Steps 4 through 10 for hatch number 3.

13. Repeat Steps 4 through 10 for hatch number 4.

14. Level carbon throughout the entire bed by using a steel (or aluminum) straight head rake and push/pull the carbon toward and away from the ends of the adsorber until level. ***Be careful to prevent damage of the high solids epoxy liner while raking the carbon***.

15. Close the top hatches by reversing Steps 1 and 2. ***Note: Do not tighten the access clamps more than 2 complete turns from first resistance***.

The actual depth of the carbon bed is a function of the packing density. For 20,000 lbs. of carbon the depth may vary as much as four (4) to five (5) inches. This variation will not affect the adsorption performance.

For a (20,000 pound) dense packing with an apparent density (AD) of 30 lbs/ft^3 the bed height is approximately 3.0 feet. If the carbon bed is loosely packed, or 90% of AD (resulting in a density of 27 lbs/ft^3), the bed height is 3.5 feet.

6.2 Removing Spent Carbon

Spent carbon may be removed by using a vacuum source, generally supplied by a vac-truck. Upon arrival of the truck, the following steps should be taken:

1. Open the top hatches, the side door should remain closed at this time.

2. The vacuum source is generally connected by hose to a section of ***plastic pipe***, which is inserted into one of the openings on the unit. ***Any metal fittings should be protected from the plenum and sides of the unit to prevent damage***.

3. Move the pipe around as the carbon level is lowered. The adsorber may require entry to remove any residual amounts of spent carbon. ***Follow appropriate OSHA confined space entry procedures to prevent worker injury.***

4. If the adsorber is being emptied for return, reattach the access covers and prepare the unit for loading onto the truck. If the unit is being refilled with carbon for continued use, please continue with steps 5 & 6.

5. Thoroughly inspect the interior lining and plenum material for damage once all of the spent carbon has been removed.

6. If the interior lining is undamaged and the plenum material is intact, the unit may be refilled in accordance with Section 6.1.

6.3 System start-up

The following items need to be completed before starting up the system. It is assumed that all equipment has been properly installed and that the ducting is installed and power has been terminated at the starter panels.

1. Inspect all inlet louvers to ensure that they are clear of all obstructions and that the mechanism operates freely.

2. Install air filter elements in the filter housing. Close and seal all access doors.

3. Install carbon in adsorber if required.

4. Examine the duct work to ensure that it has been installed correctly.

5. Make sure all sample valves, doors and hatches are closed on the adsorbers.

6. Open inlet vane damper on fan inlet.

7. Start fan and check for air flow.

8. Adjust damper, open or closed, to desired air flow.

6.4 Operation

1. Initially record the pressure drop across the filter section by reading the magnehelic gage on the side wall of the filter section. Initial differential pressures should be in the .25-.5 " w.c. range. If not, please call TIGG Corporation to inquire.
2. Check differential pressure daily and record the numbers. Once the differential pressure are 1.0" a filter section change should occur. If the 2" thick prefilters seem to be highly blinded, change these filters and start the system. If the differential pressure drops close to the starting dP then continue operation with the new prefilters only. If the pressure drop continues above the recommended starting pressures, change out the second row of deep pocket filters.
3. On a daily basis, please listen for the fan and it's operation and please note and strange sounds coming from this equipment, then contact TIGG Corporation with this information..

7.0 TROUBLESHOOTING

This section is intended to identify a portion of the more common problems which may be encountered during the operation of a granular activated carbon system. The following "cause and effect" discussion is not intended to be all inclusive since situations and circumstances will vary with each individual system by virtue of design, operating philosophy, etc. Therefore, this section should only be considered as a guideline for troubleshooting.

7.1 General

The problems which arise generally fall under the following categories:

- High pressure drop
- Poor adsorption and inefficient carbon usage
- Reduced air flow

7.2 High Pressure Drop in the Adsorber

High pressure drop in the adsorber can be caused by:

1. Excessive moisture accumulation in the plenum, and/or

2. Blinding of the plenum by particulates.

7.2.1 Excessive Moisture Accumulation

As discussed in Section 4.3, if excessive moisture is present in process vapors, liquid may accumulate within the open bottom portion of the unit. Excessive moisture accumulation may restrict or completely block portions of the inlet duct connection and the open space beneath the plenum. Either restriction or blockage will increase inlet velocities and pressure drop through the unit. Excessive moisture accumulation may be avoided by periodically inspecting the drain plugs and interior of the unit.

7.2.2 Blinding of the Plenum

The plenum is constructed of a polypropylene support plate. If the influent vapor contains an excessive amount of particulates, the particulates may build up on the underside of the plate, causing a restriction of the open area and an increase in pressure drop. If excessive blinding occurs within the unit, an upstream filter may be installed to remove the particulates prior to the adsorption unit.

7.3 Poor Adsorption and Inefficient Carbon Usage

Poor adsorption and/or inefficient carbon usage may be caused/remedied by the following:

1. Channeling – Level the carbon bed.

2. Carbon saturation - Change the carbon.

3. Increase in effluent concentration - Compare influent analyses.

4. Change in types of contaminants in the influent - Compare influent analyses.

5. Presence of non-adsorbable organics - Compare influent analyses.

7.4 Reduced Air Flow

Reduced air flow through the system can be caused by the following:

1. Blinding of the plenum.

2. Dirty pre-filters

3. Debris in the duct.

8.0 MAINTENANCE

8.1 Adsorber

The NB-20 Adsorber is designed to require minimal maintenance. The following items should be inspected and maintained as noted:

1. Internal inspection of the lining and plenum should be performed each time carbon is removed.

2. Inspect all attachment hardware (sliding hinges, safety catches and clamps) for damage.

3. Grease door hinges once every three (3) months.

4. Grease sliding fittings on doors (plates and brackets on hinge side) once every three months.

5. Grease turnbuckles (if applicable) once every three months.

6. Inspect all mechanical parts before and after carbon fill/replacement for signs of wear or damage. ***Repair or replace any excessively worn or damaged mechanical parts (hinges, chains, turnbuckles, clamps, etc.) immediately to prevent worker injury.***

7. Inlet pressure should be checked periodically to insure proper operation.

8. Process connections should be periodically inspected for signs of wear and/or leakage.

8.2 Fan & Filter

- Make sure fans are not operating when performing maintenance on the air handling system.

- Open drain in fan housing to remove any condensation.

- Inspect pre-filters and replace if necessary

- Perform fan maintenance per attached Fan Operation Manual.-

9.0 MINIMUM SAFETY PRECAUTIONS

All electrical, mechanical and rotating machinery constitute a potential hazard, particularly for those not familiar with the design, construction and operation. Accordingly, adequate safeguards (including use of protective equipment when necessary) should be taken with this equipment to safeguard the public (including minors) from injury and to prevent damage to the equipment, the associated system and the premises.

The operation, maintenance and repair of this equipment should be undertaken only by personnel qualified to do so. All such personnel should be thoroughly familiar with the equipment, the associated system and controls, and the procedures set forth in this manual. Proper care, procedures and tools must be used in handling, lifting, installing, operating, maintaining and repairing this equipment to prevent personal injury and/or property damage.

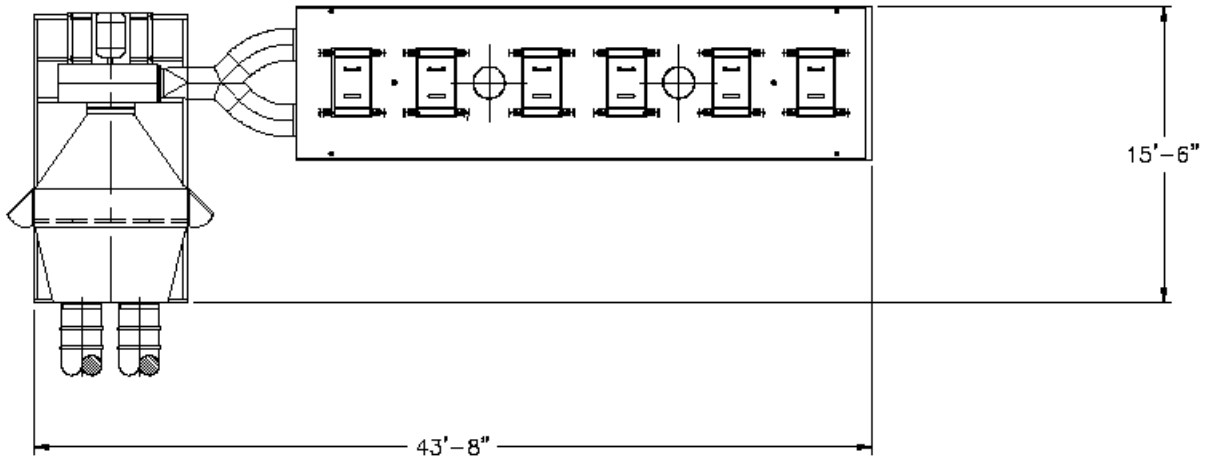
ACTIVATED CARBON CAN REDUCE OXYGEN LEVELS IN CONFINED SPACES. USE LOW OXYGEN SAFETY PROCEDURES WHEN ENTERING ADSORBER VESSELS

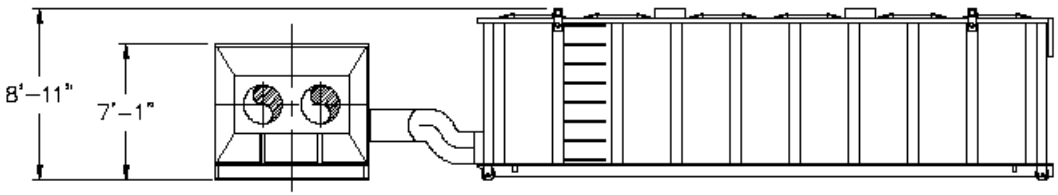
CONTAINING CARBON, OR FROM WHICH CARBON HAS BEEN REMOVED.

Contaminated water may contain chemicals or biological contaminants which could be harmful if exposed to the skin, inhaled or ingested. Accordingly, personnel who may be exposed directly to the mists produced by water jets or compressed air should wear appropriate OSHA protective equipment.

10.0 SPARE PARTS

The NB-20 adsorber does not require much in the way of spare parts. If, however, the unit does require replacement parts or maintenance, please contact TIGG Corporation at (800) 925-0011 for service.





NO.	REVISION	BY	DATE

PROJECT
ENTACT
BAYSHORE, NY

PROJ. NO.	E-07-012-JK
P.O. NO.	
DRAWN BY	JB
DESIGN BY	BB
CHKD. BY	BB
DATE	2/7/07
SCALE	NTS

TIGG corporation

NB-20 SYSTEM W/
STANDARD FAN UNIT

DWG. NO. N07-1085 REV. 0

NIXTOX BOX – LIFTING INSTRUCTIONS (NB10 AND NB20)

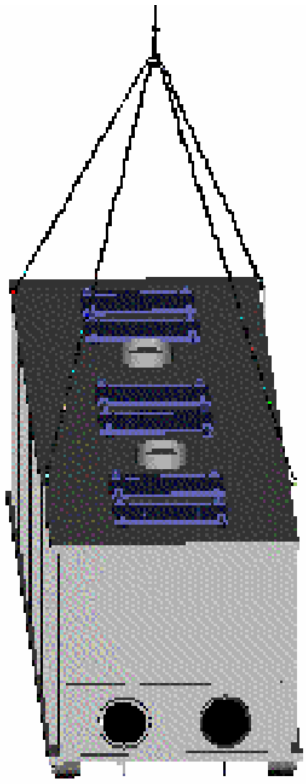
CARBON STEEL HIGH FLOW VAPOR ADSORBER

MODEL	MAX FLOW (CFM)	MAX PRESS (PSIG)	MAX TEMP (deg F)	Inlet/ Outlet	L X W X H (FT)	EMPTY BOX Weight (lbs)	STANDARD ADSORBENT FILL (LBS)	SHIPPING WEIGHT - STANDARD FILL (LBS)
NB-10	10000	AMB	130	20	264 X 94 X112	9000	12000	21000
NB-20	20000	AMB	130	20	360 X 94 X 112	15000	20000	35000

NOTES:

1) Do not exceed maximum flow conditions listed.
2) Dry virgin activated or reactivated carbon provided as standard adsorbent.
3) Standard adsorbent fill is based on a bed density of 29 lb/ft^3.
4) Standard adsorbent fill can differ based on variable bed density and alternate adsorbents.

The NB-10 and NB-20 high flow vapor adsorbers are intended to be lifted using a crane. When lifting the unit by a crane, install a 1-5/8" shackle in each of the four lifting lugs. Contact a rigging contractor for sizing of the crane and proper design of the lift.



TIGG corporation

P.O. Box 11661
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(412)257-9580
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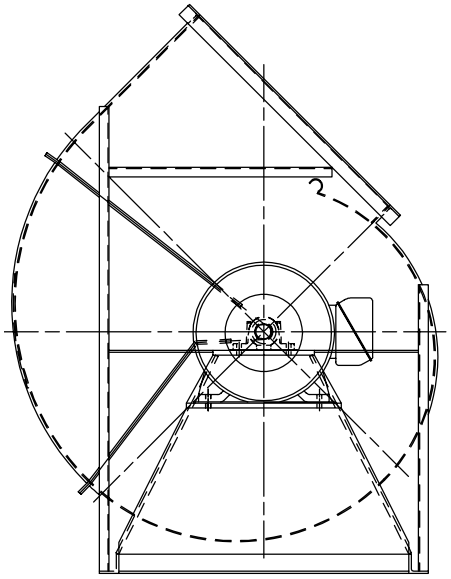
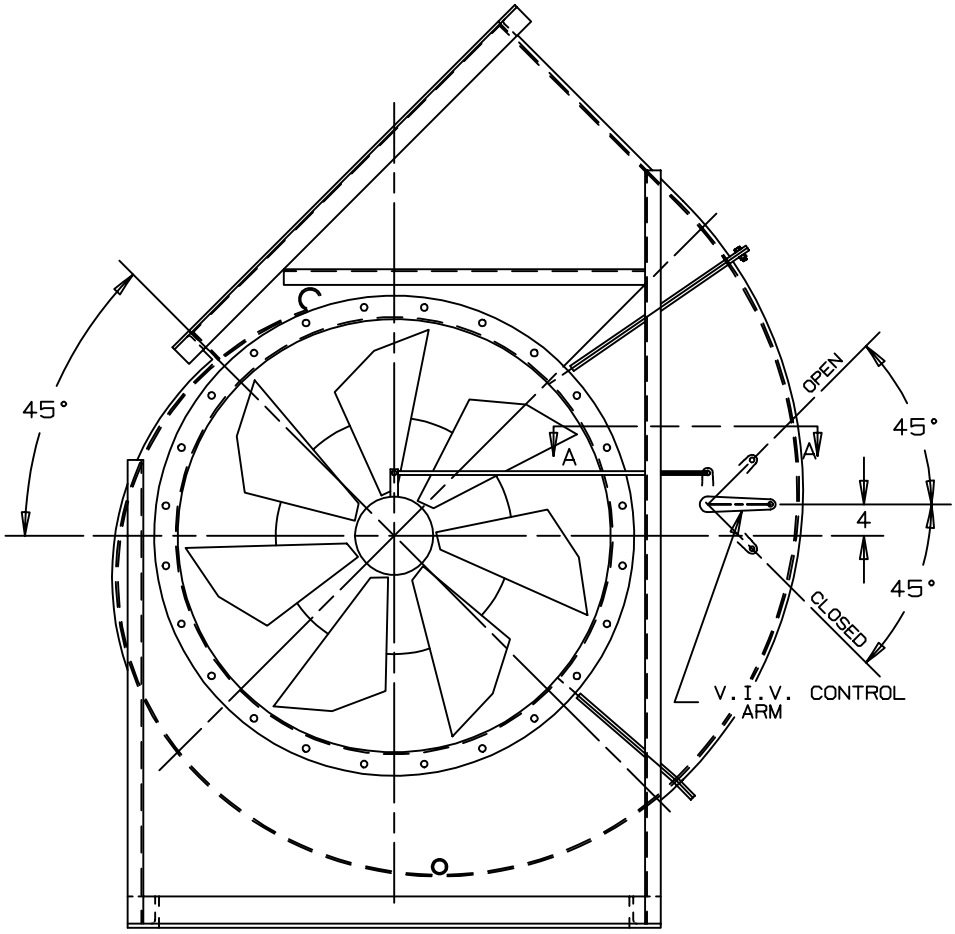
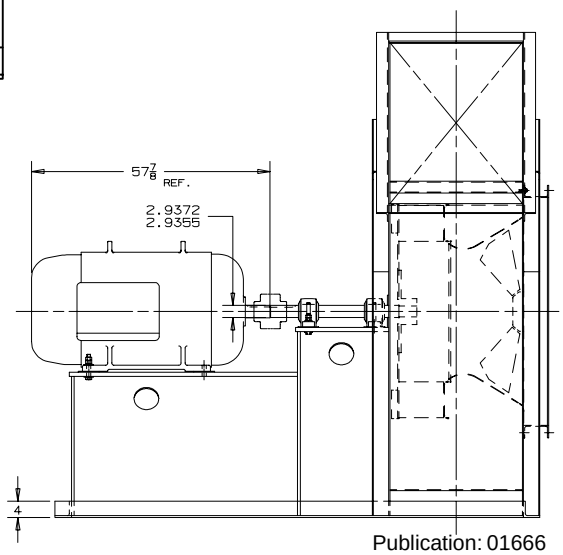


FAN EQUIPMENT OPERATION MANUAL

Fan Serial No. _____





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Telephone 204-222-4216
Telefacsimile 204-222-7601
901 Regent Avenue West
WINNIPEG, MANITOBA
CANADA
R2C 2Z8

1990

CML NORTHERN BLOWER INC.
STANDARD TERMS AND CONDITIONS and WARRANTY

STANDARD TERMS AND CONDITIONS

TERMS OF PAYMENT: Terms of payment are net thirty (30) days subject to the prior approval of the CML Northern Blower Inc. ("CML Northern") Credit Department. Notwithstanding such approval, if in CML Northern's judgement the customer's financial condition does not warrant the continuation of production or shipment on the original terms, CML Northern reserves the right to request payment in advance. Overdue accounts will bear interest at the prevailing bank rate charged to CML Northern.

ACCEPTANCE AND PRICES: Prices quoted for products manufactured by CML Northern are subject to acceptance by the purchaser no later than thirty (30) days from the date of the Quotation - Proposal.

Prices quoted for items which are not manufactured by CML Northern such as motors and drives, etc. are subject to change at any time the cost of such items charged to CML Northern changes.

Prices on orders for products manufactured by CML Northern are firm provided approval and release for production and shipment is received from the customer within ninety (90) days of the date of CML Northern's receipt of the customer's order and the products are shipped within twelve (12) months of the date of CML Northern's receipt of the customer's order. When such approval and release for production and shipment is received after ninety (90) days of the date of CML Northern's receipt of the customer's order or products are shipped after twelve (12) months of the date of CML Northern's receipt of the customer's order, such prices are subject to adjustment to CML Northern prices in effect on the date approval and release from customer is received by CML Northern or at time of shipment.

Orders for non-stock equipment released for production and scheduled by CML Northern cannot be rescheduled by the customer unless it is done at least eight (8) weeks before the CML Northern scheduled shipping date. If production is started the customer must accept delivery when the order is ready for shipment.

CANCELLATIONS: Accepted orders cancelled by the customer are subject to cancellation charges for all expenses incurred and commitments made by CML Northern. The cancellation charges on completed items will be one hundred (100%) percent of the selling price. The aforementioned cancellation charges shall not in any way whatsoever limit CML Northern's other remedies it may have at law including, without limiting the generality of the foregoing, the ability of CML Northern to claim and recover any amounts or damages to which CML Northern would otherwise be entitled by reason of accepted orders cancelled by the customer.

FREIGHT CLAIMS: Unless otherwise expressly agreed in writing, delivery of the product is made FOB CML Northern Plant. The liability and responsibility of CML Northern for the product ceases upon delivery of the product in good order to the carrier. **All claims for damage and shortage in transit are the customer's responsibility and the customer must file the claim against the carrier.** Claims for factory shortage will not be recognized unless such alleged shortage is reported to CML Northern in writing within ten (10) days after receipt of the product.

TAXES: The amount of any present or future taxes shall be added to the price contained herein and shall be paid by the customer in the same manner and with the same effect as if originally added thereto.

DELAYS: CML Northern shall not be liable to the customer or to any third party for any delays caused by riots, strikes, lockouts, weather, fire, floods, lack of transportation, accidents, the failure of CML Northern's suppliers to meet their contractual obligations, breakdowns, or any other contingency beyond CML Northern's reasonable control and receipt of the product by the customer shall constitute a waiver of all claims for loss or damage due to delay.

PRODUCT CHANGES: CML Northern reserves the right to change or modify the product in the interest of continuous product improvement without liability.

RETURNED GOODS: Goods may not be returned except by the written permission of the President, General Manager or General Sales Manager of CML Northern and when so returned will be subject to a handling charge and transportation costs.

MODIFICATION: These Standard Terms and Conditions may not be modified except by written agreement signed by the President, General Manager or General Sales Manager of CML Northern. **The failure of CML Northern to object to provisions contained in the customer's purchase orders or other communications shall not be deemed waiver of the Standard Terms and Conditions hereof or acceptance of such provisions.** No other terms and conditions other than the Standard Terms and Conditions contained herein and those terms and conditions with respect to the description of product, quantity and price contained in the "Quotation-Proposal" shall be binding upon CML Northern unless made in writing and signed by the President, General Manger or General Sales Manager of CML Northern. Without restricting the generality of the foregoing, agents and sales representatives of CML Northern do not have authority to modify these Standard Terms and Conditions.

WARRANTY

CML Northern Blower Inc. (the “Seller”) warrants products of its manufacture (the “product”, “equipment” or “fan”) to be free of defects in material and workmanship if properly installed, and cared for, and operated under normal conditions, and with competent supervision, all in accordance with the Seller’s Operation Manual. If any questions exist as to whether the proposed operation of the Seller's equipment is within "normal conditions" for such equipment, details of such proposed operation should be provided to the Seller at its Winnipeg factory. The Seller will review the proposed operation of the equipment (at a fee) and advise if the proposed operation is acceptable.

(1) The Seller’s obligation under this warranty is limited to the repair or replacement, at its option at its Winnipeg factory, of any defective part or parts which shall within one (1) year after shipment thereof to the original purchaser (the “Purchaser”), be returned to its Winnipeg factory with transportation charges prepaid by the Purchaser and upon such repair or replacement the Seller shall have fulfilled all its obligations to the Purchaser. The Seller will not be liable, in any circumstances, for costs or expenses incurred by the Purchaser or any person claiming through the Purchaser in the removal or replacement of equipment alleged to be defective. Except as specifically provided herein, the Seller will not be liable, in any circumstances, for any loss or damage of whatever nature or kind (including, without limiting the generality of the foregoing, direct, indirect, incidental or consequential loss or damage or damage resulting from business interruption) should the equipment be so defective as to preclude the remedy of warranted defects by repair or replacement. In such event, the Purchaser’s sole and exclusive remedy shall be the refund of the purchase price paid by the Purchaser for all the defective equipment.

(2) The Seller shall not be liable for the repair or replacement of any such defective part or parts, or for loss, damage, or any expense of repairs when any adjustment, alteration or repair shall have been made or attempted outside of its factory, except if such adjustment, alteration or repair outside its factory is made or attempted after the Seller’s written consent is first obtained.

(3) The Seller shall not be liable for any corrosion or fouling caused by any foreign substance deposited in or on the equipment.

(4) Because the Seller is unaware of any forms of construction, materials, alloys or coatings which will successfully resist all abrasion, erosion , corrosion, or deterioration from excessive heat, the Seller’s warranty does not apply when any of its products or equipment are subjected to conditions which cause such abrasion, erosion , corrosion or deterioration from excessive heat or any damages similar or related thereto.

(5) The performance of the Seller's fan equipment outside of the laboratory may vary widely and differ from the performance specifications contained in its sales literature. Therefore, the Seller cannot and does not guarantee or warrant the performance of its fan equipment at the Purchaser's location.

(6) ALL WARRANTIES OF THE SELLER, EXPRESS OR IMPLIED, WITH RESPECT TO MOTORS, SWITCHES, CONTROLS OR OTHER ACCESSORIES NOT MANUFACTURED BY THE SELLER, INCLUDING WARRANTIES OF MERCHANTABILITY, QUALITY OR FITNESS FOR ANY PARTICULAR PURPOSE, ARE HEREBY EXCLUDED.

(7) The Seller shall have no liability under the terms of this Warranty or otherwise where the Purchaser undertakes the responsibility of mounting the fan wheel directly to the motor or turbine shafts without the Seller having inspected and tested the assembled unit (at a fee) before the fan is operated in any fashion. If the Seller does not inspect and test the assembled unit within ten (10) days of being requested to do so by the Purchaser and receipt of payment of the aforementioned fee, the Seller shall be deemed to have waived its requirement to inspect and test the assembled unit.

(8) The Seller shall have no liability under the terms of this warranty or otherwise until the Purchaser has made full payment to the Seller for the product or equipment to which this warranty is to apply.

(9) NO WARRANTIES WHATSOEVER, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY, QUALITY OR FITNESS FOR ANY PARTICULAR PURPOSE, ARE MADE BY THE SELLER EXCEPT AS EXPRESSLY PROVIDED HEREIN.

(10) The terms of this warranty may not be modified except by written agreement signed by the President, General Manager or General Sales Manager of the Seller. The Seller’s failure to object to provisions contained in the Purchaser’s purchase orders or other communications shall not be deemed waiver of the terms and conditions hereof nor acceptance of such provisions. No representations or warranties other than those contained herein shall be binding upon the Seller unless made in writing and signed by the President, General Manager or General Sales Manager of the Seller. Without restricting the generality of the foregoing, agents and sales representatives of the Seller do not have authority to modify the the terms of this Warranty or make representations or warranties other than those contained herein.

CML NORTHERN BLOWER INC.
OPERATION MANUAL - FAN EQUIPMENT

SAFETY PRECAUTIONS

FAN EQUIPMENT CAN BECOME A SOURCE OF INJURY AND DEATH IF NOT PROPERLY INSTALLED, OPERATED OR MAINTAINED. Do not exceed the maximum operating temperature or speed limits for which the fan equipment was designed. Limits for some lines of fan equipment are given in CML Northern Blower Inc. ("CML Northern") catalogues. Limits for non-catalogued lines of fan equipment should be obtained in writing from the CML Northern Winnipeg factory and not otherwise. Do not rely on limits obtained in any other manner.

The user should make all personnel who operate or maintain the fan equipment aware of all possible hazards.

THE RESPONSIBILITY FOR PROVIDING SAFETY ACCESSORIES FOR FAN EQUIPMENT SUPPLIED BY CML NORTHERN IS THAT OF THE USER OF THE FAN EQUIPMENT. CML Northern sells its fan equipment with or without safety accessories, and accordingly, it can supply standard safety accessories upon receipt of an order. Ensure that all necessary safety accessories have been installed before operation of the fan equipment.

The warning notice set out below should be affixed upon the fan equipment:

CML NORTHERN BLOWER INC.

WARNING

This fan has rotating parts and may be hot. Keep body, hands and foreign objects away from inlet and outlet. Do not touch fan or motor during operation.

Operate, install and maintain only in strict accordance with safety practices and instructions in manufacturer's Operation Manual. Do not exceed the maximum operating temperature, speed, or vibration level identified in the manufacturer's catalogues and Operation Manual. Untrained personnel should never operate, install, adjust or maintain fan or motor.

ADDITIONAL SAFETY ACCESSORIES FOR THE FAN EQUIPMENT ARE AVAILABLE FROM THE MANUFACTURER. THE RESPONSIBILITY FOR PROVIDING SUCH ADDITIONAL SAFETY ACCESSORIES IS THAT OF THE USER OF THE FAN EQUIPMENT. CONSULT THE MANUFACTURER'S OPERATION MANUAL FOR GUIDANCE.

Before starting maintenance work, lock disconnect switch in the off position, de-energize and disconnect all power sources to the motor and to accessory devices and secure fan impeller. Cleanout doors must be secure during operation. Unsecured cleanout doors may shoot open during operation because of pressure build up inside the fan.

Do not start-up when fan impeller is rotating backwards.

FAILURE TO FOLLOW MANUFACTURER'S INSTRUCTIONS AS TO OPERATION, INSTALLATION, ADJUSTMENT, MAINTENANCE, SAFETY EQUIPMENT OR APPROPRIATE OPERATING CONDITIONS COULD RESULT IN DAMAGE TO THIS EQUIPMENT, DAMAGE TO OTHER EQUIPMENT, PERSONAL INJURY OR DEATH.

Should the warning notice not be affixed to the fan equipment purchased, CML Northern will supply such a warning notice upon request made to its head office.

The user of the fan equipment, in making its determination as to the appropriate safety accessories to be installed and any additional warning notices to be affixed upon the fan equipment, should consider (1) the location of the installation of the fan equipment, (2) the accessibility of employees and other persons to the fan equipment, (3) any adjacent equipment, (4) applicable building codes, and (5) applicable health and safety legislation.

Users and installers of the fan equipment should read "RECOMMENDED SAFETY PRACTICES FOR AIR MOVING DEVICES" which is published by the Air Movement and Control Association, 30 West University Drive, Arlington Heights, Illinois, 60004.

INSTALLATION, OPERATION & MAINTENANCE OF CML NORTHERN FAN EQUIPMENT

INTRODUCTION

The purpose of this section is to aid in the proper installation, operation, and maintenance of CML Northern fan equipment. These instructions are intended to supplement good general practices and are not intended to cover detailed instruction procedures.

The receipt, handling, installation, operation and maintenance of CML Northern fan equipment is the responsibility of the user. It is important that the installation and start-up of the fan equipment be supervised or inspected by personnel experienced in such work and equipment. Trained personnel are available from CML Northern, and arrangements for such supervision and inspection (at a fee) should be made through your local CML Northern representative or at CML Northern's head office. Failure to arrange for such supervision or inspection may affect or void the CML Northern Warranty (please refer to paragraph 7 of CML Northern's Warranty).

SHIPMENT & RECEIVING

CML Northern has thoroughly inspected the fan equipment at its factory and has prepared the fan equipment for shipment in accordance with the uniform freight classification followed by all carriers. The fan equipment should be in perfect condition when received, unless damaged in transit. Upon acceptance by the carrier, as evidenced by a signed bill of lading, the carrier accepts responsibility for all shortages or damage, whether concealed or evident. Claims covering shortages or damage must be made to the carrier by the purchaser. Any shortages or damage should be noted by the user on the delivery receipt.

The fan equipment may contain components manufactured by manufacturers other than CML Northern. Such other manufacturers may have furnished instructions and/or other literature concerning their component. A list of such instructions and/or other literature is forwarded with the fan equipment (see page 15 of this manual). If any of the items on the list are missing, please contact your CML Northern representative, CML Northern at it's head office or contact the component's manufacturer directly.

HANDLING

The fan equipment should be handled with care. Some fans are provided with lifting lugs or holes for easy handling. Others must be handled using nylon straps or well-padded chains and cables which protect the fan's coating and housing. Spreader bars should be used when lifting large parts.

Axial fans should be lifted by using straps around the fan housing only. DO NOT LIFT AXIAL FANS BY THE MOTOR, MOTOR BASE, IMPELLER OR FLANGES.

Centrifugal fans are best lifted using straps attached to structural base members of the fan. DO NOT LIFT CENTRIFUGAL FANS BY THE FAN SHAFT, IMPELLER, FLANGES OR INLET SUPPORTS.

Roof ventilators should be lifted by using straps attached to lifting lugs or base only. Spreader bars should also be used to avoid damage to the butterfly damper assembly or the weatherhood. DO NOT LIFT ROOF VENTILATORS BY THE BUTTERFLY DAMPER ASSEMBLY OR WEATHERHOOD.

Centrifugal rotor assemblies (i.e. impeller and shaft assemblies) have been designed to be supported by the shaft, and should be lifted by slings around the shaft as close as possible to the hub on each side of the impeller (wheel). Slings should not press against the side plates of the wheel as this may damage and distort the wheel. A spreader bar should be used when lifting the rotor assembly (Figure 1). The wheel should never rest on the side plates or blades, nor should the rotor assembly be lifted by any components of the fan wheel. To do so may damage the rotor assembly and destroy the dynamic balance that is necessary for low vibration operation. If this balance is destroyed, rebalancing of the rotor assembly will be necessary. If the wheel and shaft have not been assembled, the fan wheel may be lifted by a timber or wrapped bar of sufficient strength passed through the hub. The finished bore of the hub and the bearing surfaces of the shaft must also be protected from damage.

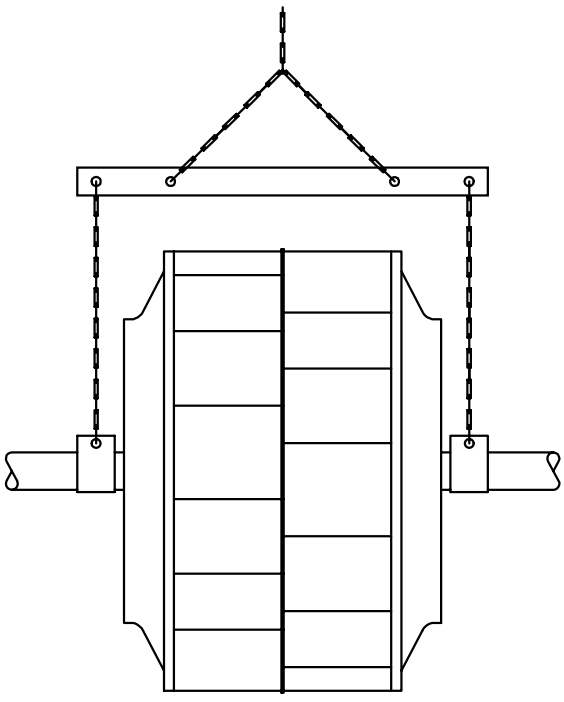


Fig. 1 *Correct use of spreader bar when lifting centrifugal rotor assembly.*

STORAGE

If fan equipment is not installed immediately, fans should be protected so as to remain dry at all times.

(1) If temporary storage is necessary:

Store in a dry area which is free of any vibration, and protect from extremes and rapid changes in humidity and temperature.

(A) Temperatures: between 50°F (10°C) and 120°F (49°C).

(B) Maximum relative humidity: 60%.

(C) Shock or vibration: 2 mils displacement maximum to prevent bearings from brinelling. Exceeding this limit will require vibration dampening material under the fan equipment.

(2) If extended storage is necessary:

Motor bearings and fan bearings are to be lubricated at the time of placement into extended storage. Motor shafts and fan shafts are to be manually rotated every month and additional lubricant added, purging some of the lubricant in the bearing cavity every six (6) months. LUBRICANT IN THE BEARINGS IS TO BE PURGED AT THE TIME OF REMOVAL FROM STORAGE, ENSURING THAT AN AMPLE SUPPLY OF FRESH LUBRICANT IS IN EACH LUBRICANT CAVITY. LUBRICANT USED MUST BE COMPATIBLE WITH THE LUBRICANT ALREADY IN THE MOTOR AND FAN BEARINGS.

Electric motors in storage may absorb moisture in their windings which may result in a significant loss of insulation resistance. When removed from storage the insulation resistance of all motors should be checked in accordance with the motor manufacturer's instructions or in accordance with IEEE standard 43-1974 "IEEE Recommended Practice for Testing Insulation Resistance of Rotating Machinery". Motors with insufficient insulation resistance must be cleaned and dried in accordance with motor manufacturer's instructions or IEEE standard 43-1974 to return the insulation resistance to acceptable levels. THE APPLICATION OF POWER TO A MOTOR WITH INSUFFICIENT INSULATION RESISTANCE MAY RESULT IN DAMAGE TO THE MOTOR OR DAMAGE TO OTHER EQUIPMENT.

On v-belt drive fans, belts should be checked at the time of removal from storage for proper v-belt tension. Tighten belts if necessary (refer to the "V-BELT DRIVE INSTALLATION" section on page 9 of this manual) .

When installing fan equipment after storage, follow the instructions contained in the "INSTALLATION OF FAN EQUIPMENT " and "OPERATION OF FAN EQUIPMENT" appearing at pages 8 and pages 10 of this manual respectively.

Storage records evidencing compliance with the above requirements should be maintained by the purchaser.

INSTALLATION OF FAN EQUIPMENT

(1) Safe and smooth operation of the fan equipment requires a proper foundation that is level, rigid, and of sufficient structure and mass to support the equipment. IT IS ALWAYS IMPERATIVE TO CONSULT A QUALIFIED STRUCTURAL ENGINEER IN ORDER TO DESIGN A PROPER FOUNDATION.

A properly designed concrete base is the preferred foundation. The concrete base mass should be a minimum of four times that of the fan equipment when the plan view area of the concrete base is no more than twice the plan view area of the fan equipment.

Steel platforms or bases are good alternatives when properly designed. Steel platforms must be braced in all directions. Care must be taken to ensure that the natural frequency of all steel base components differs significantly from the rotating speed of the fan and the driver. FAILURE TO HEED THIS GOOD DESIGN PRACTICE MAY RESULT IN A RESONANT CONDITION AND CONSEQUENT LIFE THREATENING CATASTROPHIC STRUCTURAL FAILURE.

Fans mounted off ground level should be rigidly mounted to a structural platform and should be placed as near as possible to, or over, a solid wall or column (refer to paragraph one of this section).

Supports for suspended fans must be crossbraced to prevent side sway.

(2) Fan equipment must be level prior to operation. Do not twist or distort fan equipment. Shim fan support points before tightening foundation bolts to help ensure distortion does not occur.

(3) For roof mounted fans, place the fan curb panel on the roof curb. Level and then anchor the unit to the curb using lag screws, neoprene washers and flat washers. DO NOT MOUNT UNSUPPORTED STACKS ON THE FAN. STACKS MUST BE INDEPENDENTLY MOUNTED TO THE ROOF. Anchor independently mounted stacks with guy wires to prevent side sway.

(4) Ducts must be independently supported, and must never be supported by the fan. Use flexible duct connections wherever possible. The independent mounting of stacks and ducts to the fan will ensure that the fan will not be twisted or deformed with the addition of external loads.

(5) It is recommended that access doors be placed in ductwork just ahead of the fan inlet and just behind the fan outlet for ease of inspection and maintenance. IN ORDER TO AVOID EQUIPMENT DAMAGE AND PERSONAL INJURY ACCESS DOORS IN A DUCT SYSTEM SHOULD BE SECURELY CLOSED AND SHOULD NEVER BE OPENED WITH THE FAN RUNNING.

(6) Lubricate fan bearings in strict accordance with bearing manufacturer's recommendations. Lubricate bearings upon receipt of fan. Do not overlubricate. Bearings should be locked to the shaft. Ensure that locking mechanisms on bearings are in correct position and that locking mechanisms are fastened before operation of fan.

(7) Flexible couplings must be installed and maintained in accordance with the coupling manufacturer's instructions. Refer to fan submittal drawings for details of drive arrangements and the general location of the coupling halves on the fan and motor shafts.

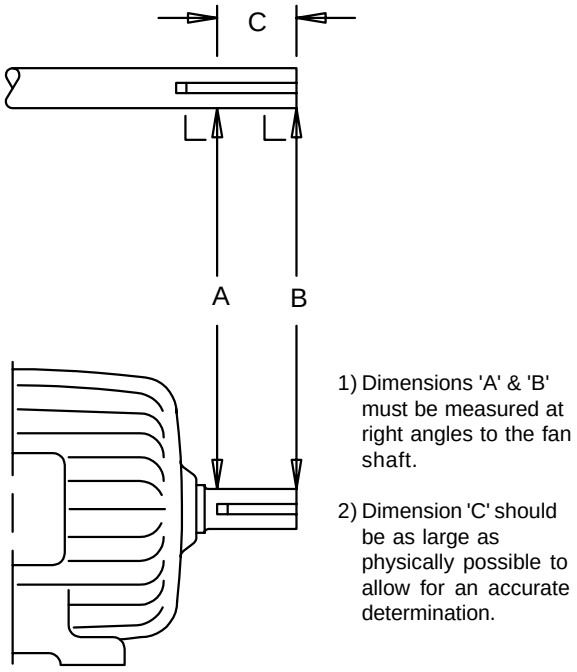


Fig. 2 *Determination of parallel shafts.*

V-BELT DRIVE INSTALLATION

V-belt drive systems are the most common type of belt systems used to drive fan equipment. Other types of belt systems are used ("cog", belts etc.) but are not discussed in this manual.

Proper alignment is essential to long fan bearing, driver bearing, v-belt and sheave life. Ensure that driver and fan shafts are parallel. The most common causes of misalignment are nonparallel shafts and improperly located sheaves. Where shafts are not parallel, v-belts on one side are drawn tighter and pull more than their share of the load. As a result, these v-belts wear out faster, requiring the entire set to be replaced before it has given maximum service. If the sheaves are misaligned, v-belts will enter and leave the grooves at an angle, causing excessive v-belt and sheave wear .

Shaft alignment can be checked by measuring the distance between the shafts at two or more locations as shown in Figure 2. If the distances are equal, the shafts are parallel.

Check the location of the sheaves on the shaft with a straight edge or a length of string. If the sheaves are properly aligned the string will touch them at the points indicated by the arrows in Figure 3. Rotating each sheave one-half (1/2) revolution will indicate if the sheave is misaligned or the shaft is bent. Correct any causes of misalignment.

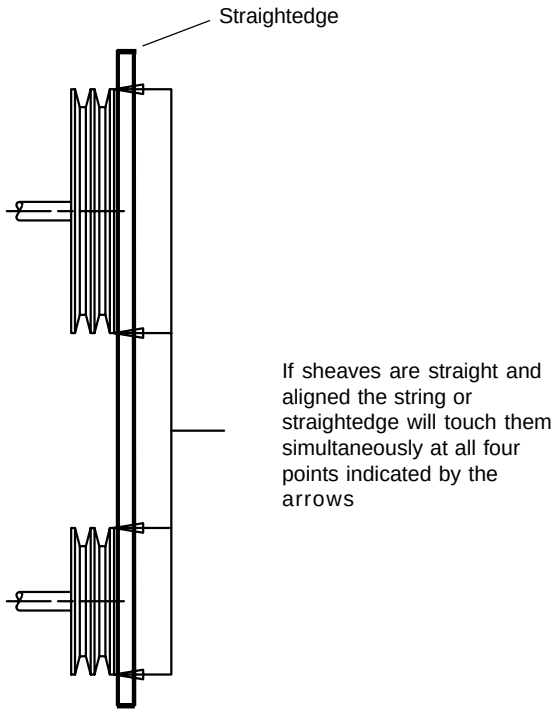


Fig. 3 *Sheave alignment.*

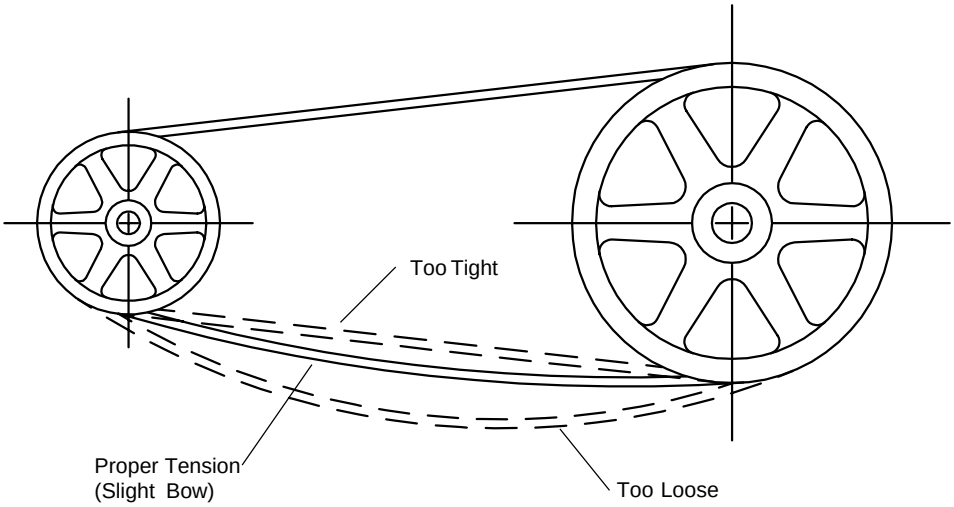


Fig. 4 *Belt tension.*

Always use matched v-belts and never mix new and used v-belts on a drive. Install v-belts correctly:

(i) Shorten the center distance between the driven and driver sheave so the v-belts can be slipped into the sheave groove without damage. While the v-belts are still loose on the drive, rotate the drive until all the slack is on one side. Then increase the center distance until the v-belts are snug (Figure 4). NOTE: Never "roll" or "pry" the v-belts into the sheave grooves. This can damage the v-belt cords and lead to v-belt turnover, short life, or actual breakage. Moreover, it is both difficult and unsafe to install v-belts this way. Keep takeup rails, motorbase, or other means of center distance adjustment free of dirt, rust, and grit. Lubricate adjusting screws and slide rails as required.

(ii) Operate the drive and fan a few minutes to seat the v-belts in the sheave grooves (operate the fan equipment only after following the procedure listed in the "Operation of Equipment" section of this manual). Observe the operation of the drive under its highest load condition (usually starting). A slight bowing of the slack side of the drive indicates proper tension. If the slack side remains taught during peak load, the drive is too tight. Excessive bowing or slippage indicates insufficient tension. If the v-belts squeal severely as the motor comes on or at some subsequent peak load, they are not tight enough to deliver the torque demanded by the fan. The fan should be stopped and the v-belts tightened.

(iii) Check the tension on a new drive frequently during the first day of operation by observing the slack side span. After a few days of operation the belts will seat themselves in the sheave grooves and it may become necessary to readjust so that the drive again shows a slight bow in the slack side.

OPERATION OF FAN EQUIPMENT

(1) Lock out all power sources.

(2) Ensure that bearings are properly aligned and lubricated with special attention to the locking mechanisms, cleanliness, and possible corrosion. Bearings showing signs of corrosion must be replaced prior to operation of fan equipment.

(3) Check set screws and keys (or taperlock hub if present) in fan impeller, and bolts on cooling wheel.

(4) Check foundation bolts and other hardware for tightness.

(5) Ensure that the fan housing, ducts, etc., are free of foreign objects.

(6) Ensure that all access doors are secure.

(7) Check the impeller to inlet cone and impeller to fan housing clearance to ensure that there is no interference. Turn the impeller by hand, ensuring that it rotates freely.

(8) On belt drive fans, check sheave alignment and v-belt tension (refer to the section entitled "V-BELT DRIVE INSTALLATION" on page 9 of this manual).

(9) If the fan is equipped with damper or variable inlet vane, close same to lessen starting load on motor. Ensure any dampers or variable inlet vanes furnished with the fan, or used in conjunction with the fan, do not stick or bind. If an automatic control mechanism is used to operate the damper or variable inlet vane, adjust the limits of travel of the automatic control mechanism in accordance with the control manufacturer's instructions to avoid putting force on the damper or variable inlet vane when it is fully opened or fully closed.

(10) If the fan is driven by an electric motor, read instructions of motor and starter manufacturer. Ensure that the motor and starter are set up in compliance with the motor and starter manufacturers' instructions prior to any application of electric power. If the fan is powered by some other form of driver, read the manufacturer's instructions prior start-up.

(11) If the fan is equipped with water cooled bearings turn on the water supply to the bearings prior to starting the fan. Consult the water cooled bearing manufacturer's instructions.

(12) If the fan is to handle a "hot gas" (i.e. a gas with a temperature greater than 150°F [65°C]) it is imperative that the fan be subject to only a slow gradual rate of gas temperature change, not to exceed a rate of 15°F/minute (8°C/minute). When the fan is being put in operation the temperature of the gas must not rise at a rate greater than 15°F/minute (8°C/minute). Never subject a "cold" fan to a "hot" gas stream. When the fan is being taken out of operation the temperature of the gas must not decline at a rate greater than 15°F/minute (8°C/minute), and when the gas temperature has reached a level of 150°F (65°C) or less it is imperative that the fan be operated at this temperature for a period of time sufficient to allow the entire fan structure to reach an equilibrium temperature of 150°F (65°C). Only when the entire fan structure has reached an equilibrium temperature of 150°F (65°C) or less can the fan be shut off and removed from operation. Failure to follow these instructions may result in damage to the fan equipment. NEVER EXCEED THE MAXIMUM OPERATING TEMPERATURE OR SPEED FOR WHICH THE FAN WAS DESIGNED.

(13) Connect the power source.

(14) Fan impeller should always be stationary prior to startup. Startup while fan impeller is rotating backwards can cause damage.

(15) Apply power to the driver momentarily (i.e. "bump") to check for proper rotation. Any dampers or other air control devices in the system should be at least partially closed during starting periods to reduce power requirements. Damper closure is particularly important in the case of a fan designed for high temperature operation being "run in" at a temperature less than design temperature.

(16) Apply power to the driver and allow the fan to come up to design speed. Turn off. Look and listen for any unusual noise or mechanical action while the impeller is still spinning. If any are noticed, lock out all power sources, locate cause and correct.

(17) Lock out all power sources and recheck tightness of all set screws, keys, foundation bolts and any other hardware. The initial start up will tend to relieve their tightness and they may require re-tightening.

(18) Reconnect all power sources.

(19) It is recommended that upon fan installation, the operating vibration levels be checked to ensure that the levels do not exceed the levels indicated on the inspection sheets shipped with the fan and/or the vibration levels set forth in the "Vibration" section of this manual.

Once it has been determined that the fan equipment is operating satisfactorily, it should be operated, if practical, for at least eight (8) continuous hours. Operation should be monitored at least once each hour during this period. Inspection should be made for any change of operation during this period. Some bearings will have to "run in" and will heat up during this period. The maximum bearing temperature should not exceed 200°F (93°C). It is normal for bearings lubricated with grease to purge a small amount of the grease through the bearing seals during run-in.

NOTE THAT ALL BOLTS, SETSCREWS AND V-BELTS SHOULD BE RE-TIGHTENED AFTER TWO (2) DAYS OF INITIAL OPERATION.

MAINTENANCE OF FAN EQUIPMENT

BEFORE STARTING MAINTENANCE WORK ON FAN EQUIPMENT LOCK MOTOR, LOCK DISCONNECT SWITCH IN THE OFF POSITION, DE-ENERGIZE AND DISCONNECT ALL POWER SOURCES TO THE MOTOR AND TO ACCESSORY DEVICES, AND SECURE FAN IMPELLER.

Bearings and Lubrication
Selection of the correct fan bearing lubricant and lubrication intervals depends on several factors. Extreme high or low temperatures and dirty or damp surroundings are all conditions that will create a requirement for more frequent lubrication or special lubricants. READ THE BEARING MANUFACTURER'S INSTRUCTIONS TO DETERMINE THE TYPE AND FREQUENCY OF BEARING LUBRICATION REQUIRED.

THE MOTOR BEARINGS SHOULD BE LUBRICATED IN ACCORDANCE WITH MOTOR MANUFACTURER'S LUBRICATION INSTRUCTIONS AND RECOMMENDATIONS SHOULD BE FOLLOWED CLOSELY.

Bearing failure may be caused by failure to lubricate as often as required, use of an excessive quantity of lubricant or the use of incompatible lubricants. Excessive vibration, especially if the bearing is not rotating, will also cause bearings to fail. Bearings must also be protected from water and moisture to avoid internal corrosion.

Bearings are susceptible to damage from exposure to excess shaft heat transfer which may occur when a fan operating at a temperature greater than 200°F (93°C) is shut down without a sufficient period of gradual temperature reduction. See section (12) of "Operation of Fan Equipment" set forth on page 11 of this manual.

Bearing Replacement
Replacement of fan bearings should not be required for many years if cared for strictly in accordance with bearing manufacturer's instructions. The procedure used to replace fan bearings will vary depending on the type of fan and the type of bearing. It is important that the replacement of bearings be supervised or inspected by personnel experienced in such work and equipment. Trained personnel are available from CML Northern and arrangements for such supervision or inspection (at a fee) should be made through your local CML Northern representative or at CML Northern's head office.

Variable Inlet Vane
Once a year, the variable inlet vane coverplate should be removed and the moving parts re-packed with grease. The lubrication interval should be increased where moisture or particles are present in the airstream.

CAUTION: Where automatic control mechanisms are used to operate the variable inlet vane, care should be taken to correctly adjust control mechanism stroke limits as OVERTRAVEL MAY DAMAGE THE VARIABLE INLET VANE OPERATING MECHANISM.

Motors
DO NOT OPERATE THE MOTOR WITHOUT FIRST READING THE MOTOR MANUFACTURER'S INSTRUCTIONS. OPERATE THE MOTOR ONLY IN ACCORDANCE WITH THE INSTRUCTIONS.

The fundamental principle of electrical maintenance is to KEEP THE MOTOR CLEAN AND DRY. This requires periodic inspection of the motor. The frequency of the inspections depends upon the type of motor, the service and the motor manufacturer's instructions.

Periodic checks of voltage, frequency and current of a motor while in operation are recommended. Such checks ensure the correctness of frequency and voltage applied to the motor and yield an indication of the fan load. Comparison of this data with previous data will give an indication of the fan performance. Any serious deviations should be investigated and corrected.

Spare Parts
Spare parts may be ordered through your CML Northern sales office by providing the following information:

(1) Part name (e.g. impeller, shaft, motor, bearing, etc).

(2) Fan Serial Number from the nameplate.

(3) If possible, the fan shaft diameter or bearing size together with the fan class specified on the nameplate.

DUE TO THE SMALL NUMBER OF PARTS REQUIRED, SPARE PARTS LISTS ARE NEITHER NECESSARY NOR AVAILABLE.

Vibration
A vibration analyzer must be used to accurately determine the level of fan vibration. Vibration readings should be taken by personnel experienced with vibration analysis and vibration analysis equipment. Trained personnel are available from CML Northern, and arrangements for vibration analysis (at a fee) may be made through your local CML Northern representative or at CML Northern's head office.

The fan should not be operated unless the **vibration velocity** of the fan is less than 0.20 inches per second.

If the vibration analyzer being used to measure vibration levels will provide only **vibration displacement** readings refer to Figure 5. Figure 5 is a graph used to determine whether the **vibration velocity** of a fan is acceptable or unacceptable if the vibration analyser is capable of measuring only the **vibration displacement**. To utilize Figure 5 it is necessary to identify the following:

(1) the **vibration displacement** in mils (where 1 mil is equal to 1/1000th of an inch).

(2) the **vibration frequency** in cycles per minute (generally taken as the fan speed in rpm).

Find the vibration displacement on the left vertical axis of Figure 5, and the vibration frequency on the horizontal axis. DO NOT OPERATE THE FAN if the point of intersection of these values lies in the region labelled "UNACCEPTABLE". All points in the region labelled "UNACCEPTABLE" are indicative of vibration velocities exceeding 0.20 inches per second and corrective action must be taken to reduce the vibration velocity below this value before the fan is returned to normal operation.

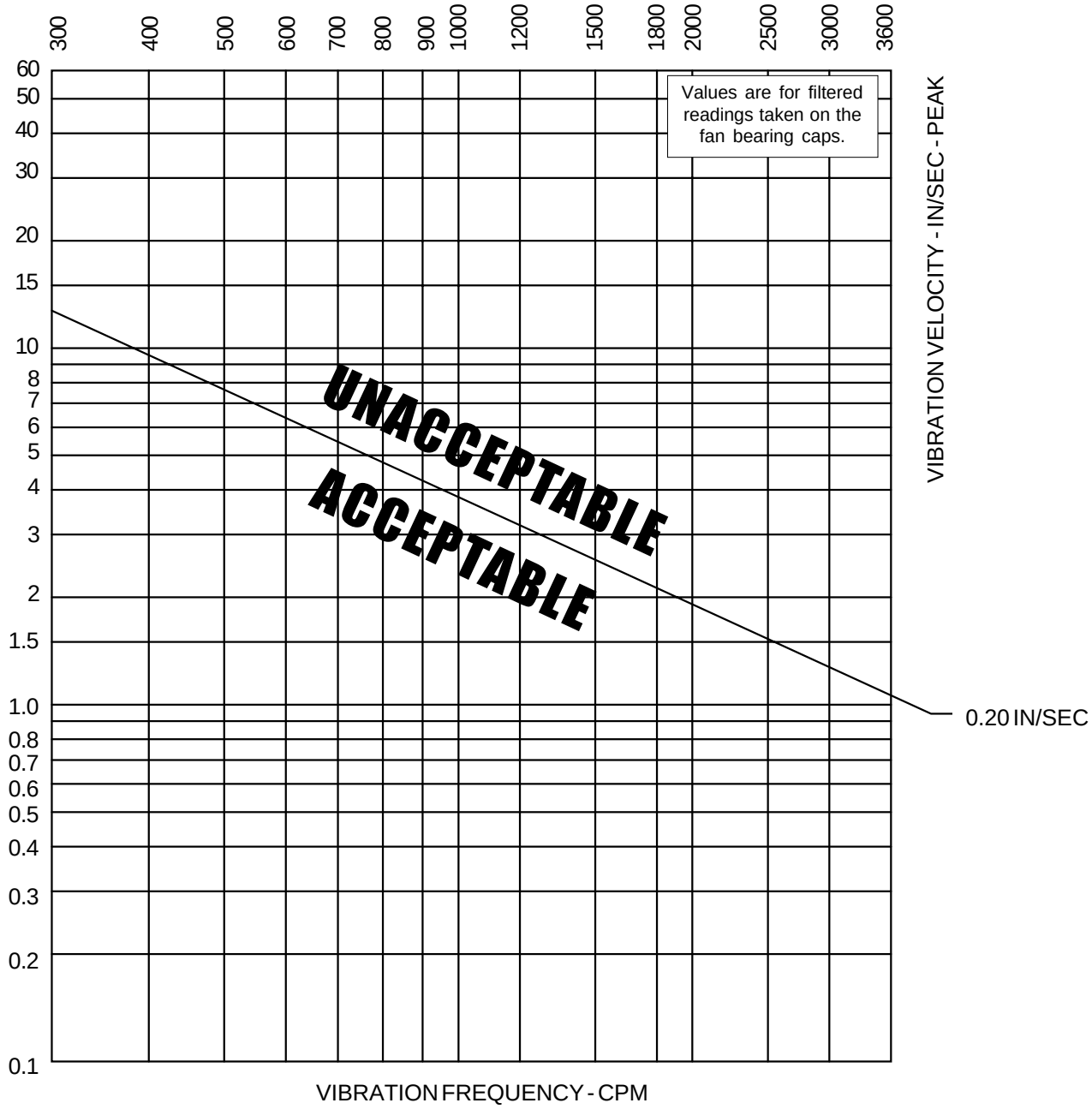


Fig. 5 *Fan Vibration Severity Chart*

FAN TROUBLE-SHOOTING CHART

PROBLEMS	PROBABLE CAUSES
INSUFFICIENT AIR FLOW	. duct elbows near fan inlet or outlet . restricted fan inlet or outlet . impeller rotating in wrong direction . fan speed lower than design . system resistance higher than design . dampers shut . faulty ductwork . dirty or clogged filters and/or coils . inlet or outlet screens clogged
EXCESSIVE AIR FLOW	. system resistance less than design . fan speed too high . filters not in place . registers or grilles not installed . improper damper adjustment
EXCESSIVE HORSEPOWER DRAW	. fan speed higher than design . gas density higher than design . impeller rotating in wrong direction . static pressure less than anticipated . fan size or type not appropriate for application
EXCESSIVE VIBRATION	. accumulated material on impeller . worn or corroded impeller . bent shaft . impeller or sheaves loose on shaft . motor out of balance . impeller out of balance . sheaves eccentric or out of balance . bearing or drive misalignment . mismatched belts . belts too loose or too tight . loose or worn bearings . loose bearing bolts . loose fan mounting bolts . weak or resonant foundation . foundation unlevel . structures not crossbraced . fan operating in unstable system condition
INOPERATIVE FAN	. blown fuse . broken belts . loose sheave . motor too small . wrong voltage

OTHER INSTRUCTIONS and LITERATURE

FAN EQUIPMENT SERIAL No._____ MAY CONTAIN COMPONENTS MANUFACTURED BY MANUFACTURERS OTHER THAN CML NORTHERN. SUCH MANUFACTURERS MAY HAVE FURNISHED INSTRUCTIONS AND/OR OTHER LITERATURE CONCERNING THEIR COMPONENT. A LIST OF SUCH INSTRUCTIONS AND/OR OTHER LITERATURE FORWARDED WITH FAN EQUIPMENT SERIAL No._____ IS GIVEN BELOW.

(1) CML NORTHERN BEARING LUBRICATION INSTRUCTIONS:

- ☐ LUBRICATION INSTRUCTIONS FOR DOUBLE ROW SPHERICAL ROLLER BEARINGS 22500 SERIES SPLIT PILLOW BLOCK.
- ☐ LUBRICATION INSTRUCTIONS FOR SERIES 22400 SERIES DOUBLE ROW SPHERICAL ROLLER BEARINGS.
- ☐ LUBRICATION INSTRUCTIONS FOR 300 SERIES BALL BEARINGS.
- ☐ LUBRICATION INSTRUCTIONS FOR 200 SERIES BALL BEARINGS.

(2) BEARING MANUFACTURER'S INSTRUCTIONS:

☐ YES ☐ NO

(3) MOTOR MANUFACTURER'S INSTRUCTIONS:

☐ YES ☐ NO

(4) COUPLING INSTRUCTIONS:

CML NORTHERN COUPLING INSTRUCTIONS	☐ YES	☐ NO
COUPLING MANUFACTURER'S INSTRUCTIONS	☐ YES	☐ NO

(5) ACTUATOR/CONTROLLER MANUFACTURER'S INSTRUCTIONS:

☐ YES ☐ NO

(6) OTHER LITERATURE/INSTRUCTIONS:

_____

_____

_____

_____

_____

NORTHERN BLOWER

FAN SERIAL NO. :

DRAWN : 2/21/2003 Neal Boyd

SALES OFFICE : CML Northern Blower Inc.

CUSTOMER : P.O. No. :

PROJECT :

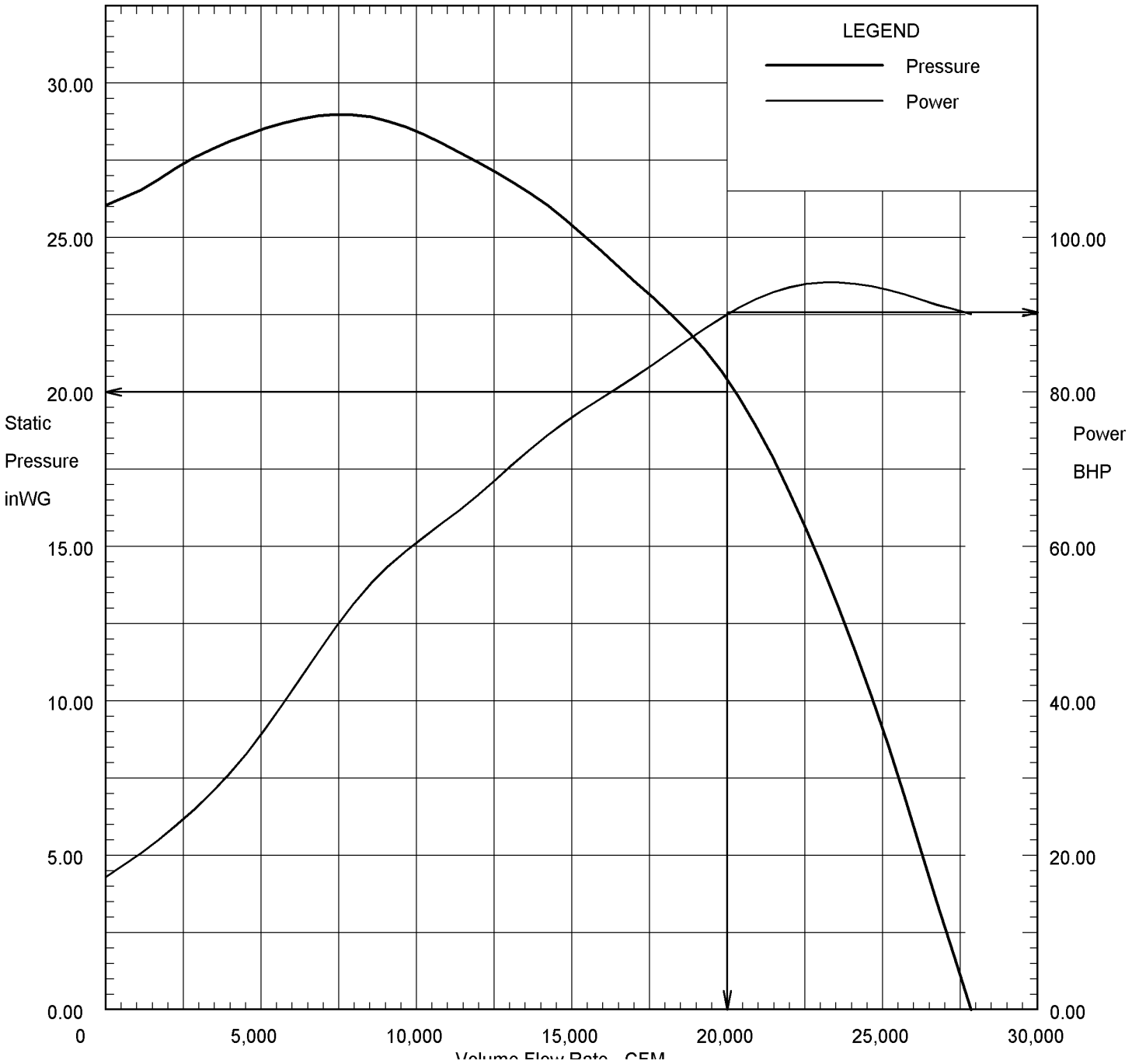
ENGINEER :

TAG :

FAN - DESCRIPTION : Design No. 4270 Size 4025- 4150 SISW Centrifugal

SELECTION : 20,000 CFM, 20.000 inWG SP, 90.29 BHP

CONDITIONS : Operating: 0.0750 lb/cu.ft, 70.0 F, 1780 RPM [142616A3,4270,3300,95]



Connections

The following connections are standard on the RSD starter:

Terminal	Use
TB1-1	Control Power - Line.
TB1-2	Control Power - Neutral.
TB1-3	Start/Stop relay - Seal-in contact.
TB1-4	Start/Stop relay - Line.
TB1-5	Start/Stop relay - neutral.
TB1-6	Fault contact - normally open.
TB1-7	Fault contact - common (rated 2A resistive, 1A inductive).
TB1-8	Fault contact - normally closed.
TB1-9	Up-to-Speed contact - normally open.
TB1-10	Up-to-Speed contact - common (rated 16A resistive, 8A inductive).
TB1-11	Up-to-Speed contact - normally closed.
TB1-12	Motor power - normally open.
TB1-13	Motor power - common (rated 16A resistive, 8A inductive).
TB1-14	Motor power - normally closed.
TB1-15	External fault input - line.
TB1-16	External fault input - neutral.
TB2-1	Internal power for potentiometer control voltage.
TB2-2	Voltage control signal input.
TB2-3	Voltage control signal common.
L1	Phase 1 power connection.
L2	Phase 2 power connection.
L3	Phase 3 power connection (three phase units only).
T1	Phase 1 motor connection.
T2	Phase 2 motor connection.
T3	Phase 3 motor connection (three phase units only).

Hazardous voltages can exist at the starter motor terminals even when the starter is in a stopped condition.

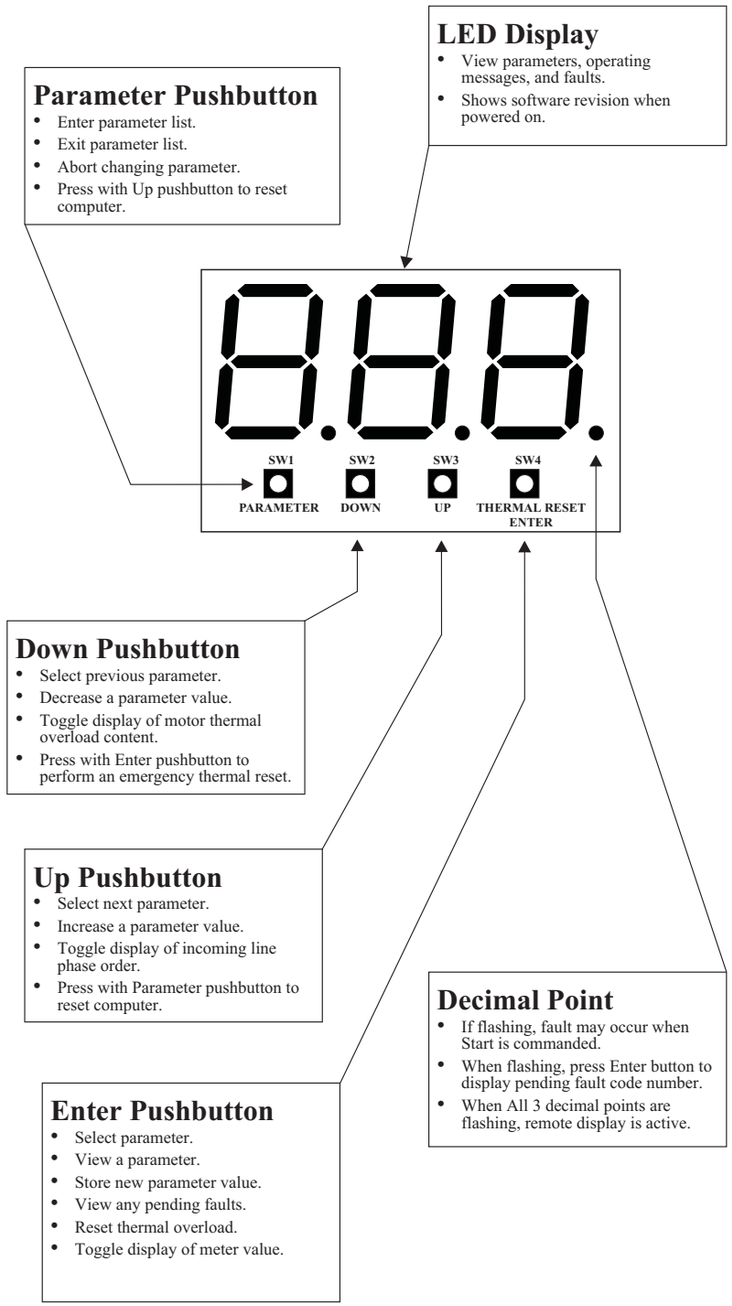
Do not connect power factor correction capacitors or surge capacitors between the RSD and the motor. Damage to the starter will result. Connect capacitors before the RSD utilizing a contactor with the coil energized by the up-to-speed contact.

Jumper Settings

Setting	JP1	JP2	JP3	JP4
Deceleration Enable	Out	x	x	x
4-20mA External Control	x	In	1-2	x
0-5VDC External Control	x	Out	2-3	1-2
0-10VDC External Control	x	Out	2-3	2-3
Potentiometer Control	x	In	Out	x

x = not relevant to setting

Operation



Operating Parameters

Parameter	Description	Default	Values
P1	Motor Full Load Amps	1	1A to 1.20kA
P2	Overload Multiplier	1.15	1.00, 1.05, 1.10, 1.15, 1.20, 1.25, 1.30, 1.35, 1.40
P3	Motor Thermal Overload	10	OFF, 10, 20, 30
P4	Initial Motor Starting Current	100	50% to 400%
P5	Maximum Motor Starting Current	600	200% to 600%
P6	Motor Ramp Time	15	0 sec. to 120 sec.
P7	Motor Stall Time	30	0 sec. to 240 sec.
P8	Deceleration Level 1	40	0% to 100%
P9	Deceleration Level 2	10	0% to 100%
P10	Deceleration Time	OFF	OFF, 1 sec. to 60 sec.
P11	Overcurrent Trip Level	50	50% to 400%
P12	Overcurrent Trip Time	OFF	A IS-AO I, OFF, E IS-EO I
P13	Undercurrent Trip Level	25	25% to 100%
P14	Undercurrent Trip Time	OFF	A IS-AO I, OFF, E IS-EO I
P15	Line Phase Sensitivity	InS	AbC, CbA, InS, SPH
P16	Motor Current Imbalance	20	5% to 40%
P17	Current Transformer Ratio	288	72, 96, 144, 288, 864, 2.64, 2.88, 5.76
P18	Meter Mode	10	0, 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 15
P19	Meter Dwell Time	2	OFF, 2 sec. to 30 sec.
P20	Passcode	OFF	1 to 255
P21	500% Current Kick Time	OFF	OFF, 0.1 to 5.0 sec.
P22	Starter Mode	nor	nor, Cn I, Cn2, Cn3

Programming

- Press the P button.
- Use the Up or Down button to select parameter to edit.
- Press the Enter button.
- Use the Up or Down button to select new value.
- Press the Enter button to store the new value or the P button to cancel.

Operating Messages

Message	Description
noL	No Line - Line voltage is not present.
rdY	Ready - Line voltage is present and starter is ready to run.
Acc	Accelerating - Start command was given and motor is accelerating.
uES	Up to Speed - The motor is at full speed.
run	Run - The ramp time has expired and the motor is at full speed.
dcL	Decelerating - Stop was given and the motor is decelerating (if set).
OL	Overload Warning - The overload is between 90% and 99% content.
OLL	Overload Lock - The overload has tripped and reset is not yet allowed.
OLt	Overload Trip - The overload has tripped and reset is allowed.
EnA	Enabled - Passcode protection is enabled.
d IS	Disabled - Passcode protection is disabled.
oxx	xx = overload thermal content in percentage. Press Down button to toggle.
cxx	xx = pending fault. Press enter button to toggle.
Fxx	xx = fault code.
no	No Change - Parameter is passcode protected and cannot be changed.
. . .	External display is active (flashing decimal points).
Axx	Automatically reset over/undercurrent fault after tripping in xx seconds.
txx	Manual reset over/undercurrent fault after tripping in xx seconds.

CT Burden Switch Settings

P17 = Current Transformer Ratio	P1 = Motor FLA (Amps)	Switch Settings (SW1 - SW2)
72:1 (4 passes through 288:1)	2A to 3A	Off - Off
72:1 (4 passes through 288:1)	5A to 8A	On - Off
72:1 (4 passes through 288:1)	9A to 16A	Off - On
72:1 (4 passes through 288:1)	12A to 21A	On - On
144:1 (2 passes through 288:1)	4A to 7A	Off - Off
144:1 (2 passes through 288:1)	10A to 17A	On - Off
144:1 (2 passes through 288:1)	18A to 33A	Off - On
144:1 (2 passes through 288:1)	23A to 43A	On - On
288:1	8A to 14A	Off - Off
288:1	19A to 35A	On - Off
288:1	35A to 66A	Off - On
288:1	46A to 87A	On - On
864:1	22A to 42A	Off - Off
864:1	55A to 105A	On - Off
864:1	104A to 199A	Off - On
864:1	136A to 263A	On - On
2640:1	67A to 128A	Off - Off
2640:1	167A to 322A	On - Off
2640:1	315A to 610A	Off - On
2640:1	416A to 804A	On - On
5760:1	146A to 281A	Off - Off
5760:1	364A to 704A	On - Off
5760:1	688A to 1330A	Off - On
5760:1	906A to 1600A	On - On

Fault Codes

Code	Description
F 1	Line phase sequence not ABC.
F2	Line phase sequence not CBA.
F3	System power is not three phase.
F4	System power is not single phase.
F5	Line frequency less than 23hz.
F6	Line frequency greater than 75hz.
F23	Line current unbalance is greater than set level.
F24	Line currents are very unbalanced.
F29	Operating parameters have been lost.
F30	3-phase default operating parameters have been loaded.
F3 1	1-phase default operating parameters have been loaded.
F52	Current flow is present while starter is in stopped state.
F54	Undercurrent trip.
F55	Overcurrent trip.
F60	No control input (4-20mA).
F70	Control power is low.
F7 1	CT burden switch changed while running.
F74	Motor stalled time elapsed before motor reached full speed.
F75	External Fault occured (Power removed from input).
F77	Control card fault.
F78	Control card Fault.
F90	Full-load amp (P1), CT ratio (P17), or CT Burden Switch set incorrectly
F92	Shorted SCR.
F97	Control Card Fault.
F98	Lost mains power.
F99	Excessively high load current.

BENSHAW
ADVANCED CONTROLS & DRIVES

RSD6
RediStart Digital
Quickstart Reference Guide

USA Headquarters: (412) 487-8235
USA West: (480) 905-0601
Canada: (519) 291-5112
Web Site: http://www.benshaw.com
E-mail: support@benshaw.com

THE BENSHAW PROMISE 3 Year Warranty

Publication #: 890001-06-06

Errata

ERRATA for bulletin 30072-450-61
ALTISTART® 48 Y-Range Soft Start Controllers Installation Guide

Retain for future use.

CORRECTIONS

If you have the **first printing** of installation guide 30072-450-61, **dated 06/2002**, make the following changes to the document. The printing date is in the header of most pages. In the following bullets, boldface indicates the correct word or phrase.

- Page 52, Table 22, under Logic inputs.

  Under LIL: force to local control mode, this should read “If a serial link is used and this function is set, the soft starter changes from **link** mode…”
- Page 53, Table 22, under End of Starting Relay R2.

  “**R2**” should be shown in the LCD display font.
- Page 59, Table 25, under Operating Time.

  The sentence in the third paragraph should read “The hour counter can be reset in **the link** mode…”
- Page 59, Table 25, under Display of the current state.

  The last bullet should read “nSt: force to freewheel stop by **a logic input or the** serial link.”
- Page 74, in Figure 33: Nonreversing with Shunt Trip Fault Isolation.

  An additional interposing relay (FR) should be added per Figure 2.
- Page 75, in Figure 34: Non Reversing with Isolation Contactor.

  The “FR” normally closed contact shown in the isolation contactor control circuit should be shown as a normally open contact, per Figure 1.

Figure 1: Corrections to Figure 34

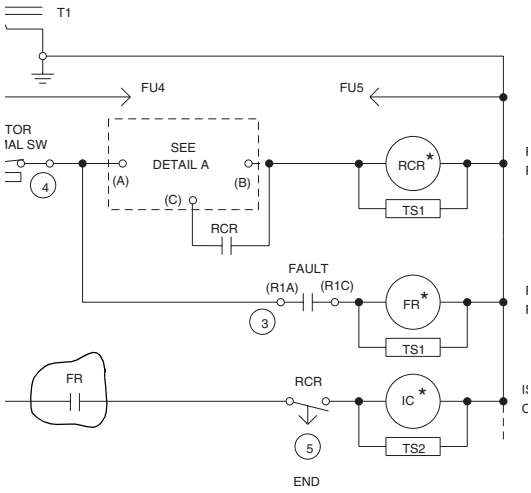
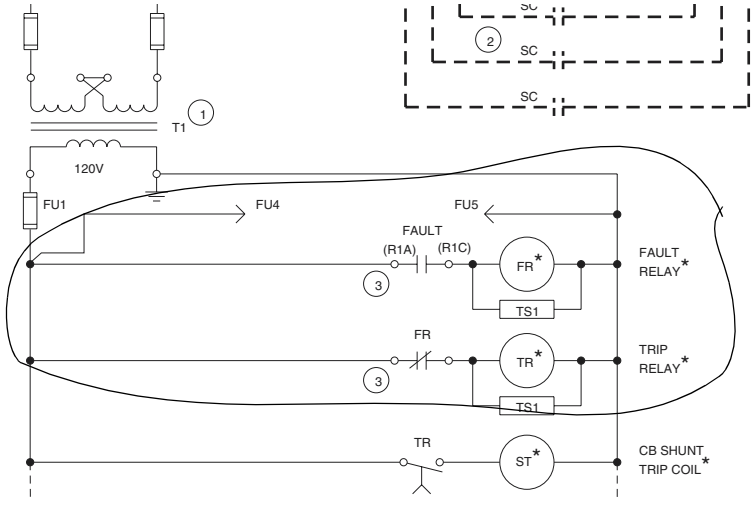


Figure 2: Corrections to Figure 33



Instruction Bulletin

30072-450-61
06/2002
Raleigh, NC, USA

ALTISTART® 48 Y-Range Soft Start Controllers
Installation Guide

Retain for future use.

SQUARE D

TABLE OF CONTENTS

SECTION 1— QUICK START PROCEDURE

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Do not operate or install any equipment that appears damaged.

Failure to follow this instruction can result in injury or equipment damage.

1. Before installing or storing the ALTISTART® 48 (ATS48) soft starter, thoroughly inspect it according to the instructions in “Receiving and Preliminary Inspection” on page 9.
   a. Verify that the soft starter catalog number printed on the label is the same as that on the packing slip and corresponding purchase order.
   b. Remove the ATS48 soft starter from its packaging and check that it has not been damaged during transit. if any damage is found, notify the carrier and your Schneider Electric representative.
2. Install the ATS48 soft starter in accordance with the mounting, ventilation, and environmental requirements specified under “Mounting” on page 17.

⚠ DANGER

HAZARDOUS VOLTAGE

Disconnect all power supplying this equipment prior to working on it.

Failure to follow this instruction will result in death or serious injury.

3. With the power removed, make the following connections to the ATS48 soft starter:
   a. Connect the 115 V or 230 Vac control supply to CL1 and CL2.
   b. Connect the power supply to 1/L1, 3/L2, and 5/L3.
   c. Connect the motor to 2/T1, 4/T2, and 6/T3.

   NOTE: If a shorting/bypass contactor is used, connect it between L1, L2, and L3 on the line side supply terminals and A2, B2, and C2 of the ATS48 soft starter. Refer to Figure 1 and to the wiring diagrams in Appendix A beginning on page 73.

Figure 1: Power Block Diagram

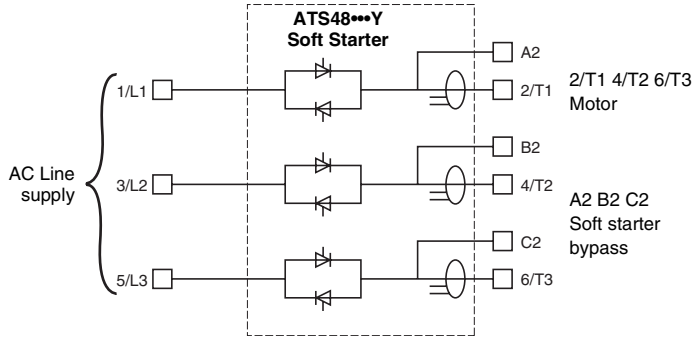
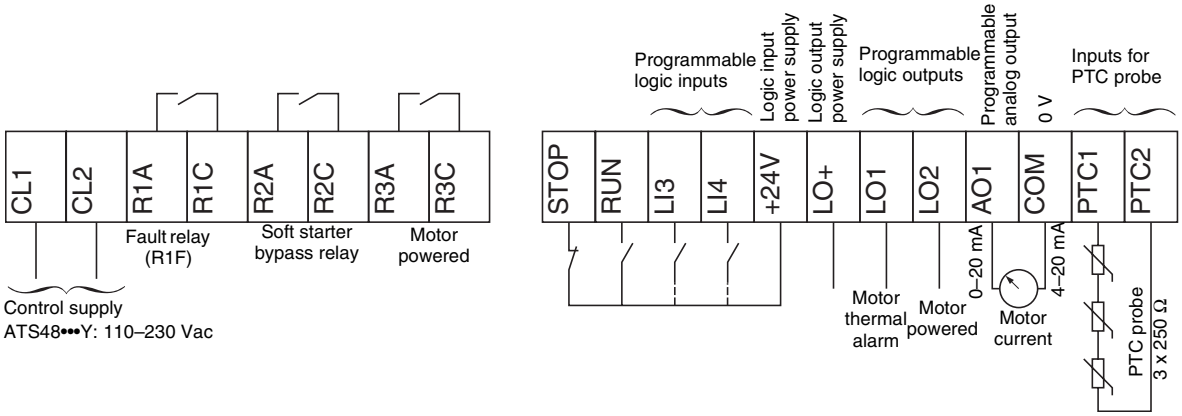


Figure 2: Control Circuit Terminal Configuration



NOTE: Wire the fault relay in the line contactor power supply sequence in order to open the electrical circuit in the event of a fault/trip condition.

4. Set parameter I_N (in the SEt menu, see page 41) to the motor nameplate current.
5. Apply power to the control terminals (CL1 and CL2). **Do not** apply power to the power terminals yet, and do not give a run command. The soft starter displays nLP to indicate that it is not powered up.
6. The ATS48 soft starter is factory configured for most standard duty applications. See Table 1 for the factory preset values. If the factory configuration is not suitable for your application, refer to “Programming” on page 37 for information on changing the parameter settings.
7. Apply power to terminals 1/L1, 3/L2, and 5/L3. The soft starter will display rdY indicating that it is powered up.
8. Connect +24 V to the RUN control terminal to start the system.

Table 1: Factory Configuration

Nominal motor current (I_N)	preset to correspond to 460 V rated motor current based on NFPA 70/NEC Table 430.150 ratings
Current Limit (ILt)	400% of the motor current I_N
Acceleration ramp (ACC)	15 seconds
Initial torque on starting (tq0)	20% of the nominal torque

Table 1: Factory Configuration *(continued)*

Stop (StY)	Freewheel stop (-F-)
Motor thermal protection (tHP)	Class 10 thermal overload protection curve
Display	rdY (soft starter ready) when power and control voltage are present and the motor is operating.
Logic inputs	
• LI1 • LI2 • LI3 • LI4	• STOP • RUN • Forced freewheel stop (LIA) • Forced local mode (LIL)
Logic outputs	
• LO1 • LO2	• Motor thermal alarm (tA1) • Motor powered (rnl)
Relay outputs	
• R1 • R2 • R3	• Fault relay (r1F) • Bypass relay at the end of starting • Motor powered (rnl)
Analog output (AO)	Motor current (OCr, 0–20 mA)
Communication parameters	• When connected via the serial link, the soft starter has a logic address (Add) of 0 • Transmission speed (tbr): 19200 bits per second • Communication format (FOr): 8 bits, no parity, 1 stop bit (8nl)

Table 4: Severe Duty Application, 208 to 690 V Supply (+10% to –15%, 50 or 60 Hz)

hp @ 208 V	hp @ 230 V	kW @ 440 V	hp @ 460 V	kW @ 500 V	hp @ 575 V	kW @ 690 V	Max. Current Rating for Class 10 Thermal Overload Protection	I_{CL} Rating	Catalog Number
2	3	5.5	7.5	7.5	10	11	12	17	ATS48D17Y
3	5	7.5	10	9	15	15	17	22	ATS48D22Y
5	7.5	11	15	11	20	18.5	22	32	ATS48D32Y
7.5	10	15	20	18.5	25	22	32	38	ATS48D38Y
10	—	18.5	25	22	30	30	38	47	ATS48D47Y
—	15	22	30	30	40	37	47	62	ATS48D62Y
15	20	30	40	37	50	45	62	75	ATS48D75Y
20	25	37	50	45	60	55	75	88	ATS48D88Y
25	30	45	60	55	75	75	88	110	ATS48C11Y
30	40	55	75	75	100	90	110	140	ATS48C14Y
40	50	75	100	90	125	110	140	170	ATS48C17Y
50	60	90	125	110	150	160	170	210	ATS48C21Y
60	75	110	150	132	200	200	210	250	ATS48C25Y
75	100	132	200	160	250	250	250	320	ATS48C32Y
100	125	160	250	220	300	315	320	410	ATS48C41Y
125	150	220	300	250	350	400	410	480	ATS48C48Y
150	—	250	350	315	400	500	480	590	ATS48C59Y
—	200	355	400	400	500	560	590	660	ATS48C66Y
200	250	400	500	—	600	630	660	790	ATS48C79Y
250	300	500	600	500	800	710	790	1000	ATS48M10Y
350	350	630	800	630	1000	900	1000	1200	ATS48M12Y

SPECIFICATIONS

Table 5: Environmental Characteristics

Degree of protection	• IP20 for ATS48D17Y to C11Y • IP00 for ATS48C14Y to M12Y
Shock resistance	Conforms to IEC 60068-2-27: • 15 g, 11 ms
Vibration resistance	Conforms to IEC 60068-2-6, NCF 20706 and BV1: • 15 mm peak from 2 to 13 Hz • 1 gn from 13 to 200 Hz
Soft starter audible noise level	Audible noise measurements taken from 3 ft (1 m) away. The noise levels may change depending on the fan characteristics: • ATS48D17Y to D47Y: 52 dBA • ATS48D62Y to C11Y: 58 dBA • ATS48C14Y to C17Y: 50 dBA • ATS48C21Y to C32Y: 54 dBA • ATS48C41Y to C66Y: 55 dBA • ATS48C79Y to M12Y: 60 dBA
Resistance to electrostatic discharges	Conforms to IEC 61000-4-2, Level 3
Immunity to radio-electric interference	Conforms to IEC 61000-4-3, Level 3
Immunity to rapid electrical transients	Conforms to IEC 61000-4-4, Level 4

Table 5: Environmental Characteristics *(continued)*

Ambient air temperature	Storage: • -13 to +158 °F (-25 to +70 °C) Operation: • 14 to +104 °F (-10 °C to +40 °C) without derating. • Up to +140 °F (+60 °C), derate the current by 2% for each °C above 40 °C. • 14 to 122 °F (-10 °C to +50 °C) with user provided shorting/bypass contactor.
Maximum relative humidity	95% without condensation or dripping water conforming to IEC 60068-2-3
Maximum ambient pollution	Conforms to IEC 60664-1, Pollution Degree 3
Maximum operating altitude	3300 ft (1000 m) without derating. Above this, derate the nominal current by 2.2% for each additional 330 ft (100 m) to a maximum of 6600 ft (2000 m).
Operating position	Maximum vertical inclination ±10° with respect to the normal mounting position.

Table 6: Electrical Characteristics

Operating category	Conforms to IEC 60947-4-2, AC-53a
Three-phase supply voltage	208 Vac -15% to 690 Vac +10%, 50/60 Hz
Frequency	Automatic sensing (preset), ±5%: • 60 Hz: 56.6 to 63.8 Hz • 50 Hz: 47.6 to 52.6 Hz Manual selection, ±20%: • 50 Hz: 40 to 60 Hz • 60 Hz: 48 to 72 Hz
Rated current (I_{CL})	21 device ratings, 17 to 1200 A
Silicon control rectifiers (SCRs)	1800 V peak inverse voltage (PIV) rating
Motor power	3 to 1200 hp
Motor voltage	208 / 230 / 380 / 460 / 575 / 690 Vac
Soft starter control circuit supply voltage	110 Vac -15% to 230 Vac, 50/60 Hz
Maximum control circuit consumption (with fans operating)	• ATS48D17Y to C17Y: 30 W • ATS48C21Y to C32Y: 50 W • ATS48C41Y to M12Y: 80 W
Protection	• Integrated thermal I^2t protection for motor (Class 2, 10, 10A, 15, 20, 25, 30 or no protection) and/or thermal protection with positive temperature coefficient (PTC) probes. • Motor underload settings • Current overload settings • Phase reversal • Phase loss • Automatic restart

The ATS48 controllers conform to IEC 60947-4-2 (EMC). In steady state, they emit a level of interference below the allowable levels defined in the standard.

Table 7: Electromagnetic Compatibility (EMC)

	Standards	Test Levels	Examples (sources of interference)
Immunity tests	IEC 61000-4-2, Level 3 Electrostatic discharge: • through contact • through air	 6 kV 8 kV	Contact with an electrically charged person
	IEC 61000-4-3, Level 3 Radiated electromagnetic fields	10 V/m	Equipment transmitting radio frequencies
	IEC 61000-4-5, Level 4 Rapid electrical transients: • Power supply cables • Control supply cables	 4 kV 2 kV	Opening/closing of a contactor
	IEC 61000-4-5, Level 3 Shock wave: • Phase-to-Phase • Phase-to-Ground	 1 kV 2 kV	—
	IEC 61000-4-12, Level 3 Damped oscillating waves	1 kV – 1 MHz	Oscillating circuit on the line supply
Radiated and conducted emissions	IEC 60947-4-2, Class A		
	IEC 60947-4-2, Class B on soft starters up to 170 A (ATS48D17Y to C17Y) shorting/bypass contactors must be used.		

Fuse selections in Table 8 are based upon 150% of nominal motor current. Ferraz-Shawmut fuses are recommended for the overcurrent protective device (OCPD).

Table 8: Short Circuit Protection Device (Type 1 Coordination)

Catalog Number	Fuse Class (Time Delay)	Short Circuit Current Rating @ 575 V (A)	Recommended OCPD Rating (A) @			
			208 V	230 V	460 V	575 V
ATS48D17Y	J	5000	15	20	20	25
ATS48D22Y	J	5,000	25	30	30	30
ATS48D32Y	J	5,000	35	40	40	40
ATS48D38Y	J	5,000	45	—	50	45
ATS48D47Y	J	5,000	—	60	60	60
ATS48D62Y	J	5,000	70	80	80	80
ATS48D75Y	J	10,000	90	100	100	90
ATS48D88Y	J	10,000	110	125	110	110
ATS48C11Y	J	10,000	125	150	150	150
ATS48C14Y	J	10,000	175	200	175	175
ATS48C17Y	J	10,000	200	225	225	225
ATS48C21Y	J	10,000	250	300	250	300
ATS48C25Y	J	18,000	300	350	350	350
ATS48C32Y	J	18,000	400	450	450	400
ATS48C41Y	J	18,000	500	500	600	500
ATS48C48Y	J (600 A) or L (650 A)	18,000	600	—	650	600
ATS48C59Y	L	30,000	—	700	700	700
ATS48C66Y	L	30,000	750	900	800	800
ATS48C79Y	L	42,000	1000	1000	1000	1100
ATS48M10Y	L	85,000	1350	1200	1400	1400
ATS48M12Y	L	85,000	1500	1600	1600	1600

SECTION 5— WIRING

Good wiring practice requires the separation of control circuit wiring from all power (line and load) wiring. Power wiring to the motor must have the maximum possible separation from all other power wiring. **Do not run them in the same conduit.** This separation reduces the possibility of coupling electrical noise between circuits.

INSTALLATION PRECAUTIONS

Follow these precautions when installing the ATS48 controller:

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand this manual in its entirety before installing or operating ATS48 controllers. Installation, adjustment, repair, and maintenance of these controllers must be performed by qualified personnel.
- The user is responsible for conforming to all applicable code requirements with respect to grounding all equipment. See Figures 11–15 on pages 25–29 for grounding points.
- Many parts in this controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically-insulated tools while making adjustments.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- Before installing or servicing the controller:
  - — Disconnect all power.
  - — Place a "DO NOT TURN ON" label on the controller disconnect.
  - — Lock the disconnect in the open position.
- Install all covers before applying power or starting and stopping the controller.

Failure to follow this instruction will result in death, serious injury, or equipment damage.

- Voltage and frequency specifications for the input line must match the controller configuration.
- A disconnect switch must be installed between the input line and the controller.

⚠ DANGER

HAZARDOUS VOLTAGE

- The solid state switches of the ATS48 controller's power circuit do not provide complete isolation from the AC line. Due to leakage currents through the solid-state switches, hazardous voltages can be present on the controller load-side power circuit whenever power is applied to the line side of the controller.
- Disconnect all power before servicing the controller or motor.

Electrical shock will result in death or serious injury.

- When using an isolation contactor, the contactor must close before or at the same time as the application of the controller run command. If line power is not detected at the L1, L2, and L3 terminals of the controller within 500 ms of this run command, a Phase Failure fault will occur.
- External overcurrent protection devices (OCPD), either fuses or a circuit breaker, must be installed on the line-side connections of the ATS48 controller. The maximum recommended OCPD rating, along with the associated controller short circuit withstand rating, is listed in Table 8 on page 14.

⚠ WARNING

OVERCURRENT DEVICES MUST BE PROPERLY COORDINATED

- An OCPD must be installed on the line-side of the ATS48 controller to achieve published short-circuit withstand ratings.
- Do not exceed the maximum OCPD ratings shown in Table 8 on page 14.
- Do not connect the controller to a power feeder whose short circuit capacity exceeds the controller short circuit withstand rating shown in Table 8 on page 14.

Failure to follow this instruction can result in death or serious injury.

- Power factor correction capacitors should not be connected to a motor controlled by an ATS48 controller. If power factor correction is required, the capacitors must be located on the line-side of the controller. A separate contactor should be used to switch the capacitors off when the motor is off, or during acceleration and deceleration.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Do not connect power factor correction capacitors to the load-side power circuit of the ATS48 controller.

Failure to follow this instruction can result in injury or equipment damage.

- The ATS48 controller uses solid-state power switches to control motor power. When checking the condition of conductor or motor insulation, do not connect the high potential dielectric test equipment or insulation resistance tester to the controller since the test voltages used may

damage the controller. Always disconnect the controller from the conductors or motor before performing such tests.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

- Do not perform high potential dielectric tests on circuits while the circuits are connected to the ATS48 controller.
- Any circuit requiring high potential dielectric tests must be disconnected from the controller prior to performing the test.

Failure to follow this instruction can result in injury or equipment damage.

- The ATS48 controller contains electronic protection to detect and signal failure of the solid-state switches.
- Since the solid-state switches may be incapable of completely blocking the motor power should a fault occur, auxiliary isolation on the line side of the controller is required. Use either a circuit breaker equipped with a shunt trip coil or an electromagnetic contactor. Connect the isolation device to the fault relay of the controller so that it opens the controller power circuit in the event of a controller fault. The isolation device must be capable of interrupting motor locked rotor current.

Refer to Appendix A beginning on page 73 for typical circuit diagrams that display the logic controlling the isolation device via the fault relay.

⚠ CAUTION

MOTOR OVERHEATING

Failure of the solid-state switches on the ATS48 controller can cause single-phase operation of the motor.

- Use an isolation device consisting of either a circuit breaker equipped with a shunt trip coil or an electromagnetic contactor to open the line-side of the controller.
- The isolation device must be capable of interrupting the motor locked rotor current.
- Connect the fault relay of the controller to open the isolation device in the event of a controller fault.

Failure to follow this instruction can result in injury or equipment damage.

⚠ WARNING

BRANCH CIRCUIT CONDUCTOR HAZARD

If system grounding is not adequate to handle ground fault levels which can exceed 1300% of motor full load amps (FLA), then this device may not protect the branch circuit conductors. In this case, external ground fault protection must be properly coordinated. Recommended solutions include:

- Time delay fuses coordinated to 125% of motor FLA. The fuses listed in Appendix B beginning on page 79 are sized to ensure proper coordination and may be used for applications that do not require start times longer than 50 seconds at 300% current limit or 20 seconds at 500% current limit.
- External overload relay. For multi-motor applications, applications in which motor does not match the controller size, or applications that use a full voltage bypass scheme, an external overload relay can be coordinated to protect conductors from a high-impedance ground fault.

Failure to follow this instruction can result in death or serious injury.

GENERAL WIRING PRACTICES

When wiring ATS48 controllers, follow the wiring practices required by national and local electrical codes. In addition, follow these guidelines:

- Use metallic conduit for all controller wiring. Do not run control and power wiring in the same conduit.
- Separate metallic conduits carrying power wiring or low-level control wiring by at least 3 in (80 mm).
- Separate non-metallic conduits or cable trays used to carry power wiring from metallic conduit carrying low-level control wiring by at least 12 in (305 mm).
- Always cross power and control wiring at right angles.

ADAPTATION TO LINE INPUT

The control circuit is completely independent of the power circuit. To apply control voltage, follow the instructions on the label located on the controller terminal strip. Remove the terminal cover label and connect single phase voltage of 110 to 230 Vac supply to terminals CL1 and CL2.

The power circuit adapts automatically to the input line voltage and frequency over a range of 208 to 690 V (+10% to –15%) for standard controllers.

POWER CONNECTIONS

Table 13: Wire Size and Tightening Torque

Terminals		ATS48D17Y–D47Y	ATS48D62Y–C11Y	ATS48C14Y–C17Y	ATS48C21Y–C32Y	ATS48C41Y–C66Y	ATS48C79Y–M12Y
Power Input, Power Output, Bypass/Shorting Contactor							
L1 / L2 / L3 T1 / T2 / T3 A2 / B2 / C2	**Max. Wire Size [1] AWG (mm)[2]**	8 AWG (16 mm^2)	2/0 AWG (50 mm^2)	2/0 AWG (95 mm^2)	Bus Bar (240 mm^2)	Bus Bar (2x240 mm^2)	Bus Bar (4x240 mm^2)
	Tightening Torque lb-in (N•m)	26 lb-in (3 N•m)	88 lb-in (10 N•m)	300 lb-in (34 N•m)	300 lb-in (34 N•m)	500 lb-in (57 N•m)	500 lb-in (57 N•m)
Ground Connections							
GND	**Max. Wire Size AWG (mm)[2]**	8 AWG (10 mm^2)	4 AWG (16 mm^2)	Bus Bar (120 mm^2)	Bus Bar (120 mm^2)	Bus Bar (240 mm^2)	Bus Bar (2x240 mm^2)
	Tightening Torque [2] lb-in (N•m)	15 lb-in (1.7 N•m)	26 lb-in (3 N•m)	238 lb-in (27 N•m)	238 lb-in 27 N•m	238 lb-in 27 N•m	238 lb-in (27 N•m)

[1] Power terminals are suitable for use with 75 °C rated conductors; copper only.

[2] Requires user supplied lug.

Figure 11: Power Connections ATS48D17Y to C11Y

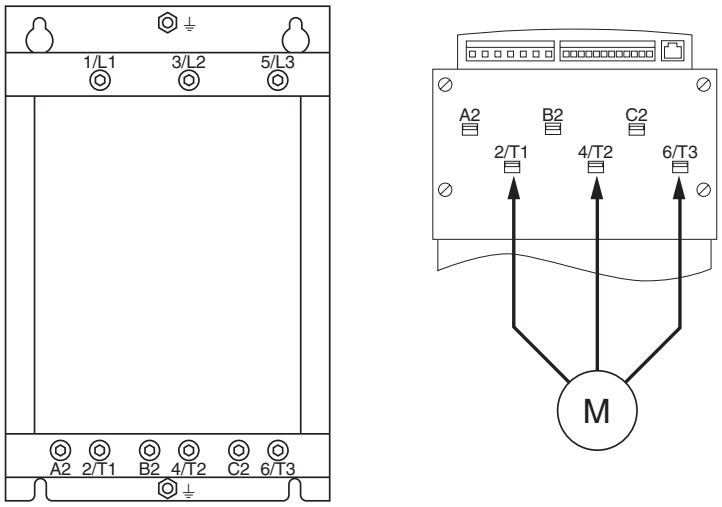


Figure 12: Power Connections ATS48C14Y to C17Y

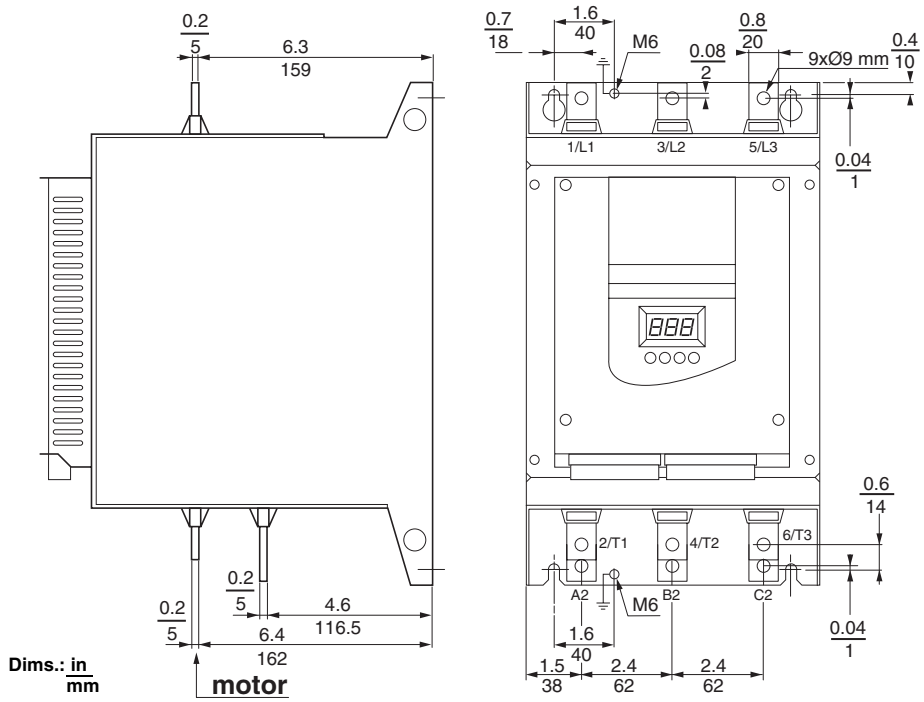


Figure 13: Power Connections ATS48C21Y to C32Y

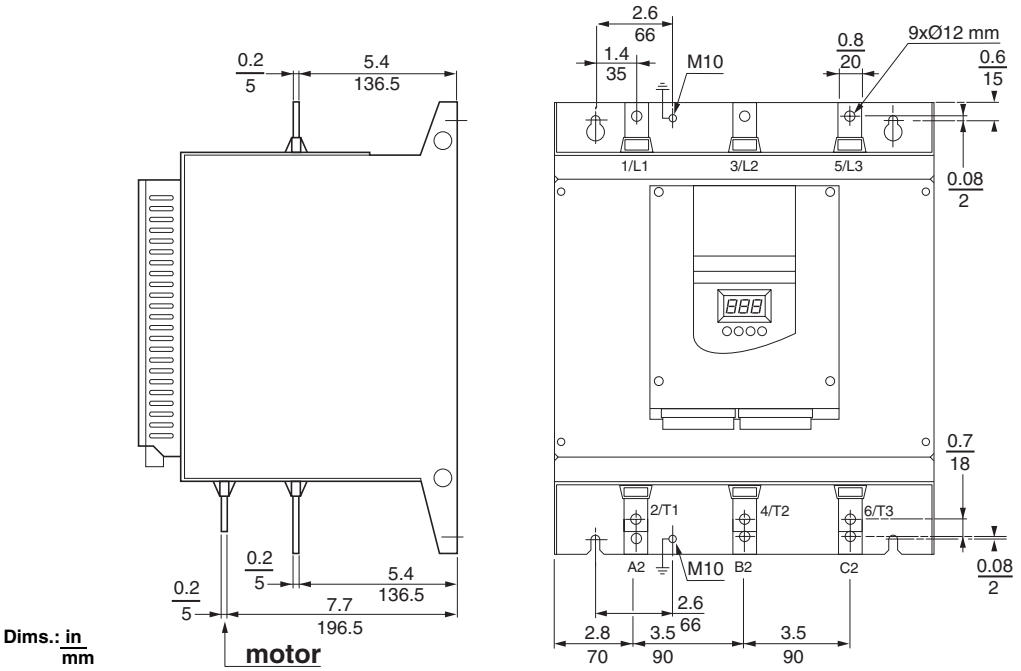


Figure 14: Power Connections ATS48C41Y to C66Y

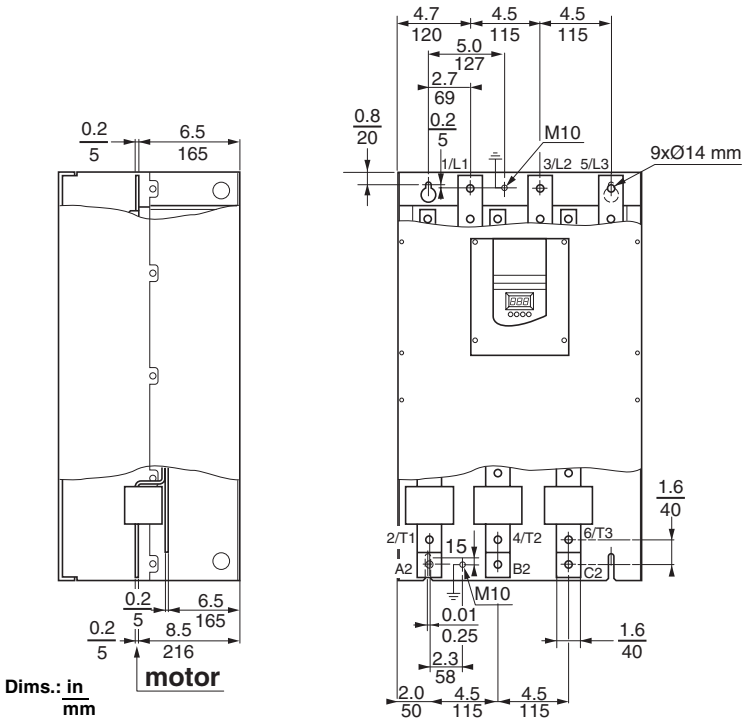
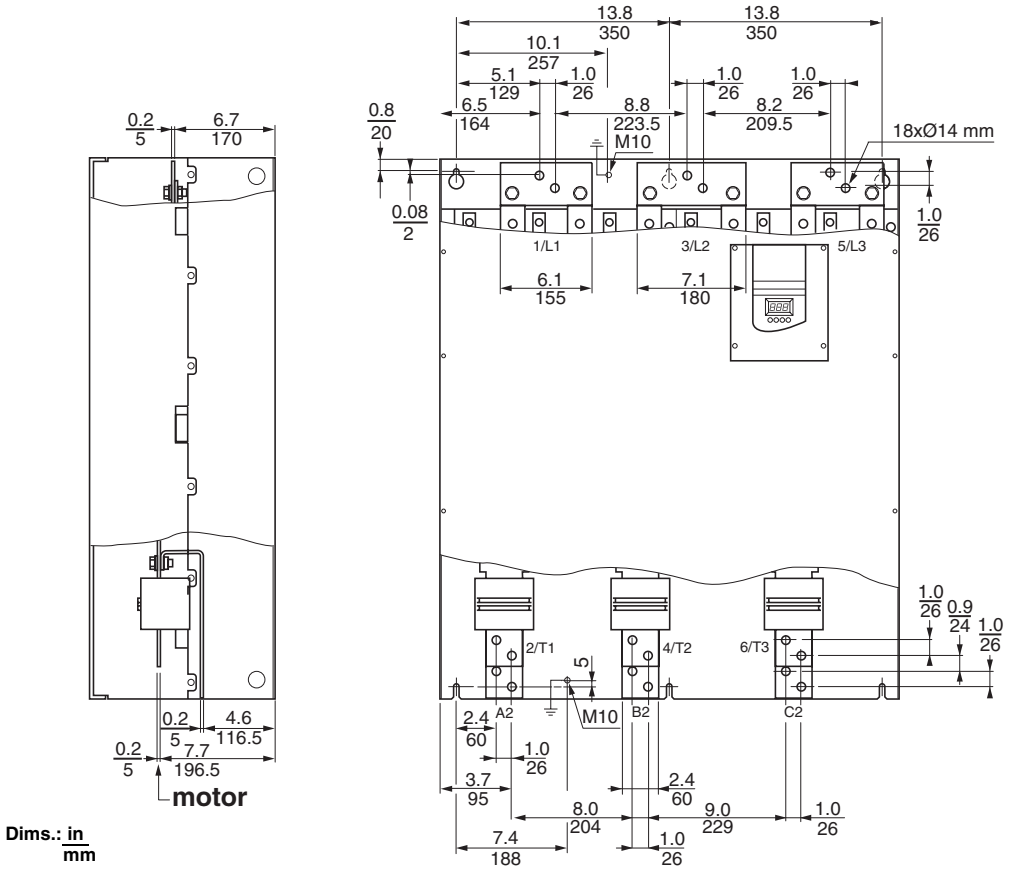


Figure 15: Power Connections ATS48C79Y to M12Y



CONTROL CONNECTIONS

Although all control inputs and outputs of the controller are isolated from the input lines, follow these control wiring precautions:

- Keep control wiring conductor runs short and direct.
- Ensure that the control contacts used with the controller inputs are rated for operation at open circuit voltages of 24 Vdc and closed circuit currents of 10 mAdc.
- The analog output requires twisted cable with a pitch of 1–2 inches. Use a cable shield. The shield must be terminated to ground at one end.
- Ensure that the coils of all relays and solenoids connected to the output contacts of the controller are equipped with appropriate transient suppressors.
- For proper control wiring, route conductors to avoid contact with other voltage potentials in the controller. Wire insulation must have the appropriate voltage rating for the voltage present.
- The control terminals are fitted with one way plug-in connectors with:
  - — Maximum wire size: 12 AWG (2.5 mm^2)
  - — Maximum tightening torque: 3.5 lb-in. (4 N•m)
- On ATS48C17Y to ATS48M12Y the protective cover must be removed in order to access the control terminals.

Layout of Control Terminals

Figure 16: Control Terminals

(RJ 45)

Table 14: Control Terminal Blocks

Terminal	Function	Characteristics
CL1, CL2	Control power supply	90 to 270 Vac, 50/60 Hz • Switch mode power supply with 25 VA consumption
R1A, R1C	R1 Relay: N.O. programmable contact	Minimum switching capacity: 10 mA for 6 Vdc
R2A, R2C	R2 Relay: N.O. starting relay contact	Maximum switching capacity on inductive load
R3A, R3C	R3 Relay: N.O. programmable contact	• 1.8 A for 230 Vac and 30 Vdc • Maximum voltage 400 Vac.
STOP RUN	Stop controller Run controller	4 logic inputs with 4.3 kΩ impedance Voltage (V): 30 V max., Current (I): 8 mA max. • State 1: V > 11V, I > 5 mA
LI3, LI4	Programmable inputs	• State 0: V < 5V, I < 2 mA
24V	Logic input power supply	+24 V ±25% isolated and protected against short circuits and overloads, maximum current of 200 mA.
LO+	Logic output power supply	Connect to 24 V or an external supply source
LO1 LO2	Programmable logic outputs	2 open collector outputs, compatible with Level 1 [PLC], IEC 60065A-68 standard. • Power supply +24 V (12 V min., 30 V max.) • Maximum current 200 mA per output with an external source
AO1	Programmable analog output	Output can be configured as 0–20 mA or 4–20 mA • Accuracy ±5% of the maximum value, maximum impedance 500 Ω
COM	I/O common	0 V
PTC1, PTC2	Input for PTC probes	Total resistance of probe circuit: 750 Ω at 25 °C • For example, three 250 Ω probes in series
RJ-45	Connector for • Remote keypad display • PowerSuite • Communication bus	RS-485 MODBUS

SECTION 6— APPLICATION AND PROTECTION

SOFT STARTER APPLICATIONS

The ATS48 soft starter must be selected for the nominal power of the motor and for the type of application, standard or severe duty. Standard and severe define the limiting values of the current and the duty cycle characteristics. The ATS48 controller is factory preset to start the motor in standard duty applications.

Standard Duty Applications

In standard duty applications, the ATS48 soft starter is designed to provide:

- Starting at 400% of I_N for 23 seconds, or 300% of I_N for 46 seconds, from a cold state
- Starting at 400% of I_N for 12 seconds, or 300% of I_N for 23 seconds, with a load factor of 50% and 10 starts per hour or an equivalent thermal cycling
- The motor thermal protection conforms to Class 10 overload protection.

Severe Duty Applications

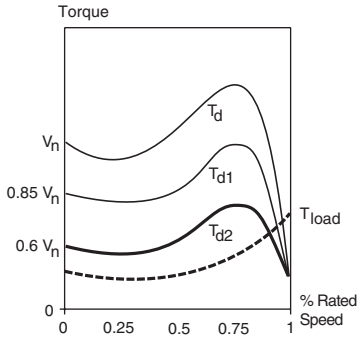
In severe duty applications, the ATS48 soft starter is designed to provide:

- Starting at 400% of I_N for 48 seconds, or 300% of I_N for 90 seconds, from a cold state
- Starting at 400% of I_N for 25 seconds with a load factor of 50% and 5 starts per hour or an equivalent thermal cycling
- The motor thermal protection conforms to Class 20 thermal overload protection.

Reduced Torque

The key to applying a soft start successfully is matching the load to the motor capability while starting with reduced voltage applied. The asynchronous motor associated with the ATS48 soft starter must be able to accelerate the driven load when supplied with reduced voltage and current. When reduced voltage is applied to a motor during acceleration, the current the motor draws is reduced by the ratio of the voltage applied. The torque produced by the motor varies with the square of the voltage at a fixed frequency. Figure 17 on page 32 shows the speed/torque characteristics as a function of the supply voltage.

Figure 17: Torque as a Function of Applied Voltage



$$T_{d1} \cong T_d\left(\frac{V_n}{V_r}\right)^2$$

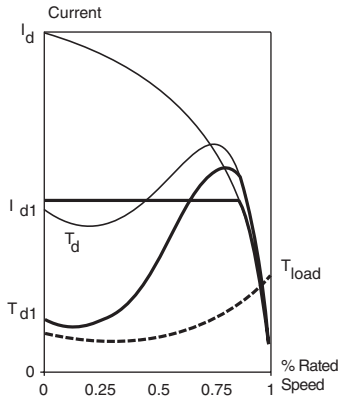
T_d = Torque developed at full voltage

T_{d1} = Torque developed with reduced voltage

V_n = Nominal voltage

V_r = Reduced voltage

Figure 18: Torque as a Function of Starting Current



I_d = Starting current at full voltage (locked rotor amps)

I_{d1} = Current limit during Soft Start

A soft start progressively increases voltage to the motor. By ramping the voltage, the ATS48 soft starter limits the amount of current the motor can draw during starting to a user-defined setting. Figure 18 shows the speed/torque characteristics of a motor as a function of starting current. The ATS48 soft starter provides optimal acceleration by ramping the acceleration torque within the envelope of curve T_{d1}.

INTELE™ Braking

When using INTELE braking, the stop time (t3) is less than the freewheel stopping time (t1). INTELE braking is a two-part braking process which does not require external components. It produces less motor heat than traditional DC injection braking.

INTELE braking is best used when all of the criteria below are met:

- 4-pole or 6-pole motors only
- motor slip is less than or equal to 3%

$$t(sec) = \frac{WK^2 \times \Delta rpm}{308 \times (T_{FLT} \times 0.40)}$$

where:

t(sec) = Calculated value must be equal to or less than 40

WK^2 = Connected motor load inertia (lb-ft^2)

Δrpm = Change in rpm or synchronous speed

T_{FLT} = Full Load Torque (lb-ft)

MOTOR PROTECTION AND DIAGNOSTICS

The ATS48 controller provides state-of-the-art motor protection. On all controllers, the motor protection features are available even if a shorting/bypass contactor is used to bypass the SCRs after the motor is up to speed. To assist with troubleshooting, the 3-digit LCD displays fault status codes. The controller memory registers and maintains the previous 5 faults, even following power loss.

Thermal Overload Protection

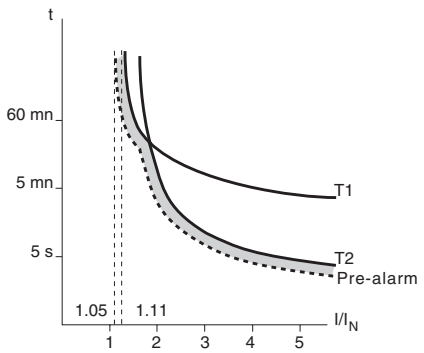
The ATS48 controller is a UL Listed motor controller with integrated motor and controller thermal protection. The motor and controller temperature are continuously calculated based on the controller nominal current and the current that is actually drawn. An electronic circuit, which stores the thermal state of the motor even if the supply power is disconnected, simulates the cooling curve.

Overload of any kind over any duration can cause the motor temperature to rise. As Figure 19 shows, the ATS48 controller creates a digital model of the motor temperature based on two thermal images. The first (T1) represents the level of temperature rise corresponding to iron (motor frame). The second (T2) represents the temperature rise of copper (stator, windings). For each thermal image, two levels of alarm are detected.

An overload pre-alarm is signaled by logic output LO1 when the motor has exceeded its nominal temperature rise threshold. A pre-alarm is signaled when the thermal state exceeds 105% for T1 and/or 130% for T2.

A thermal fault signal stops the motor when the temperature rise exceeds the critical threshold. A thermal fault is signaled by relay R1 when the motor thermal state exceeds 110% for T1 and 140% for T2.

Figure 19: Thermal Trip Curves



The ATS48 controller is preset to provide Class 10 thermal overload protection for standard duty applications. The ATS48 controller can be adjusted to provide Class 2, 10A, 10, 15, 20, 25, or 30 thermal overload protection, as necessary. Class 2 protection is available for applications such as submersible pumps, where very tight control of motor temperature is required. Class 30 protection is available for applications such as high inertia

loading, where a longer than normal starting time is required to accelerate the load to full speed. In addition, the internal overload protection may be disabled if motor protection is provided externally.

The various thermal overload protection classes are defined to meet the standards of IEC 60947-4-2 for starting from both cold and hot states. A cold state is defined as the stabilized motor thermal state when the motor is off. Figure 20 shows the approximate trip times for starting from a cold state.

Figure 20: Cold Start Curves

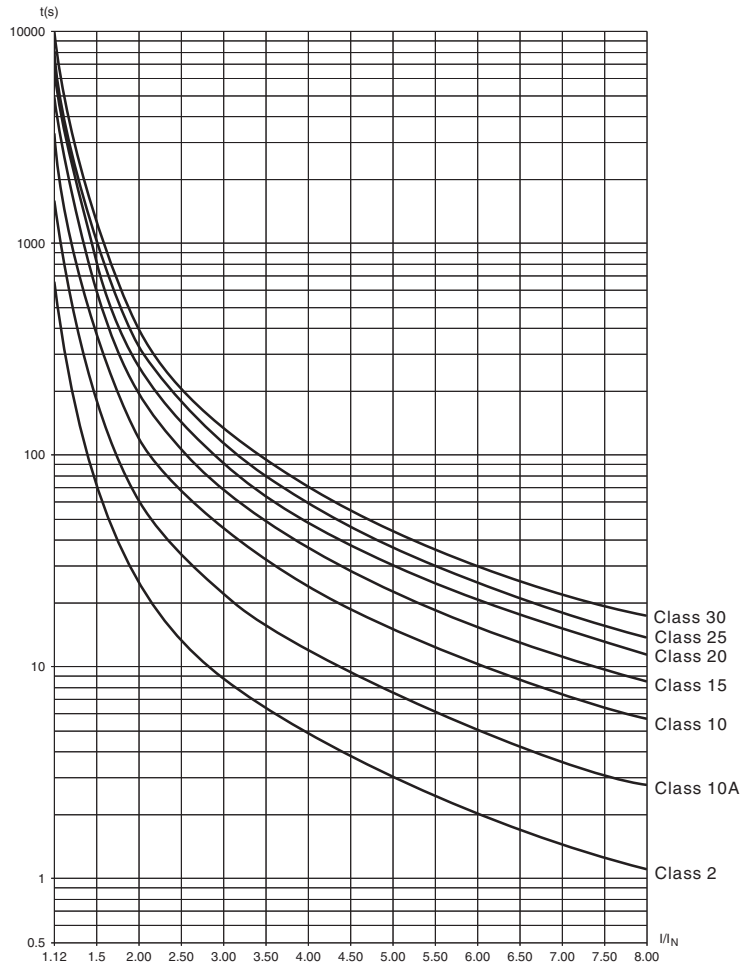


Table 15: Cold Start Trip Time

Standard Application (Class 10 Thermal Overload Protection)		Severe Application (Class 20 Thermal Overload Protection)	
3 I_N	5 I_N	3.5 I_N	5 I_N
46 s	15 s	63 s	29 s

Hot state is defined as the stabilized motor thermal state when the motor has been running at full load capacity. Figure 21 shows the approximate trip times for starting from a hot state.

Figure 21: Hot Start Curves

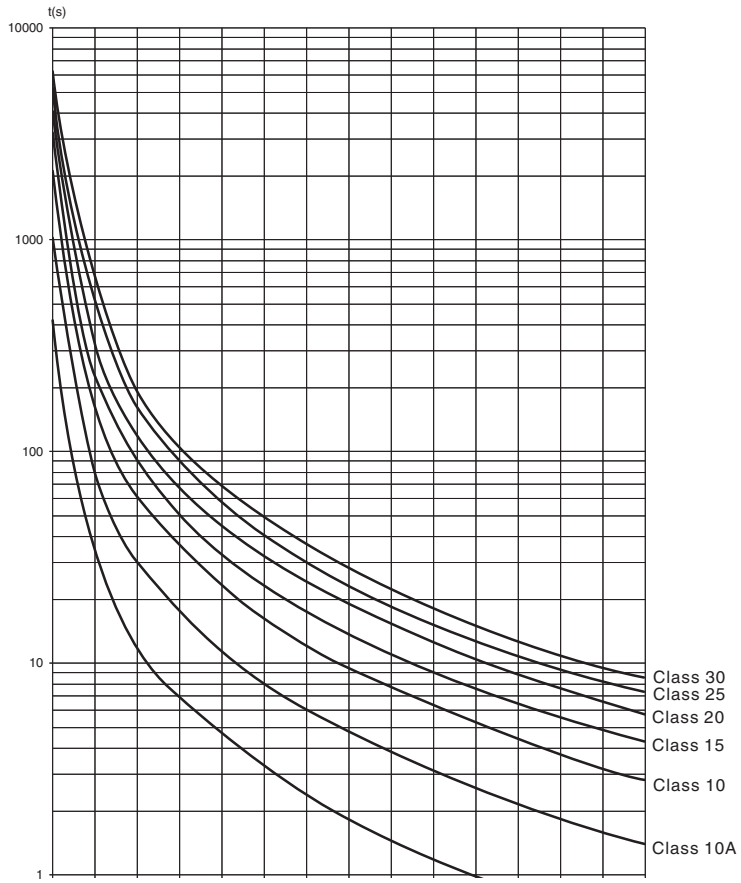


Table 16: Hot Start Trip Time

Standard Application (Class 10 Thermal Overload Protection)		Severe Application (Class 20 Thermal Overload Protection)	
3 I_N	5 I_N	3.5 I_N	5 I_N
23 s	7.5 s	32 s	15 s

Motor Thermal Protection with PTC Probes

PTC probes integrated in the motor to measure the motor temperature can be connected to the control card terminals. This analog value is managed by the controller.

The PTC probe thermal overshoot value can be processed and used in two ways:

- To stop the machine in the event of a fault if the signal is active.
- To activate an alarm if the signal is active. This alarm can be displayed in a controller status word (serial link) or on a configurable logic output.

NOTE: PTC probe protection does not deactivate the motor thermal protection provided by the calculation. Both types of protection can operate in parallel.

PREVENTIVE MAINTENANCE

The following steps should be done at regular intervals:

1. Check the condition and tightness of the connections.
2. Make sure ventilation is effective and the temperature around the controller remains at an acceptable level.
3. Remove any dust and debris from the controller, if necessary.

SECTION 7— PROGRAMMING

PROGRAMMING AND SETUP

Preliminary Recommendations

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure.
- Examples of critical control functions are Emergency Stop and Overtravel Stop.
- Separate or redundant control paths must be provided for critical control functions.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

If starting the soft starter from line power, limit operations to the duty cycle ratings described on page 31. Use inputs LI1 to LI4 to control the soft starter.

When changing the factory configuration, record your parameter settings in the Factory Settings table beginning on page 69.

When first commissioning an ATS48 controller on a 60 Hz system, perform a factory parameter reset (see FCS on page 50).

Programming the ATS48 controller is simplified by internal sequence selections and interlocks. For ease of setup, Square D recommends accessing the menus in the following order.

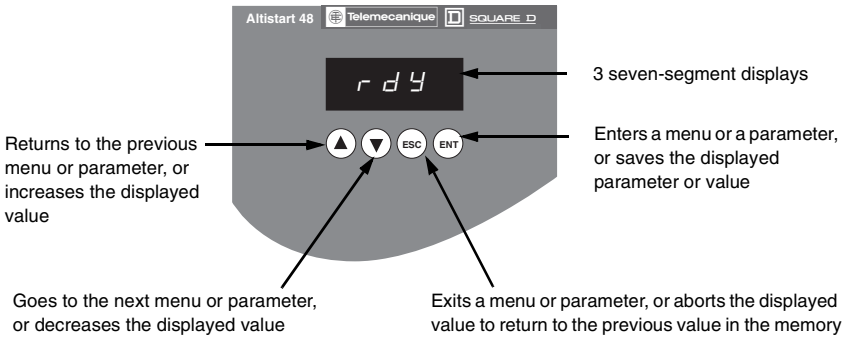
1. IO—Assignment of the inputs/outputs
2. drC—Advanced settings
3. SEt—Settings

Some steps may not be necessary.

Copy and use the Factory Settings table on pages 69–72 to record your settings.

DISPLAY UNIT AND PROGRAMMING

Figure 22: Display Functions



NOTE: Pressing ▲ or ▼ does not store the choices. To store the displayed choice, press ENT. The display flashes when a value is stored.

Display Principle

The display principle for numbers differs depending on the maximum scale of the parameter and its value, see Table 17 for examples.

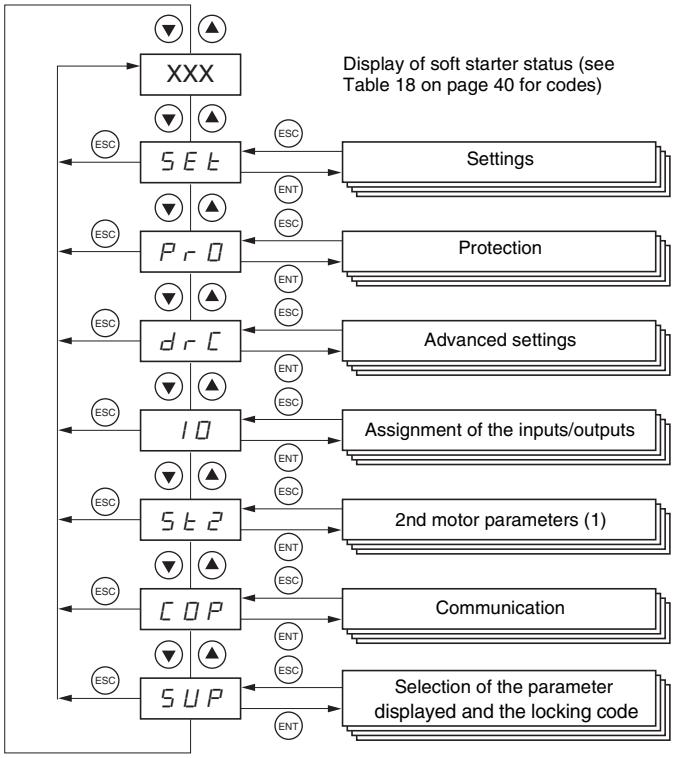
Table 17: How to Read Displayed Numbers

Range	Example	
	Display	Value
Max. scale 9990		
0.1 to 99.9	05.5 55.0 55.5	5.5 55 55.5
100 to 999	555	555
1000 to 9990	5.55	5550
Max. scale 99900		
1 to 999	005 055 550	5 55 550
1000 to 9990	5.55	5550
10000 to 99900	55.5	55500

MENUS

Menus are accessible in the order shown in Figure 23.

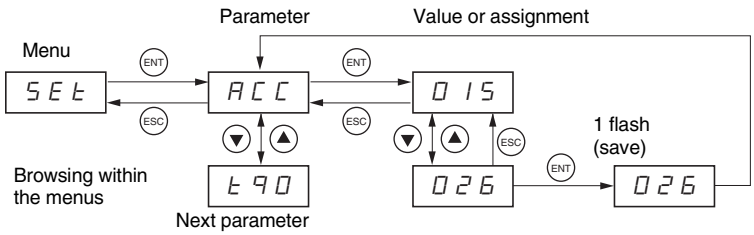
Figure 23: Accessing Menus



(1) Menu St2. is only available if the second set of motor parameters function is configured. See the I/O menu on page 51.

To store the displayed choice, press ENT. The display flashes when a value is stored. Navigate through the menus, depending upon the button pressed, as shown in Figure 24.

Figure 24: Accessing Parameters



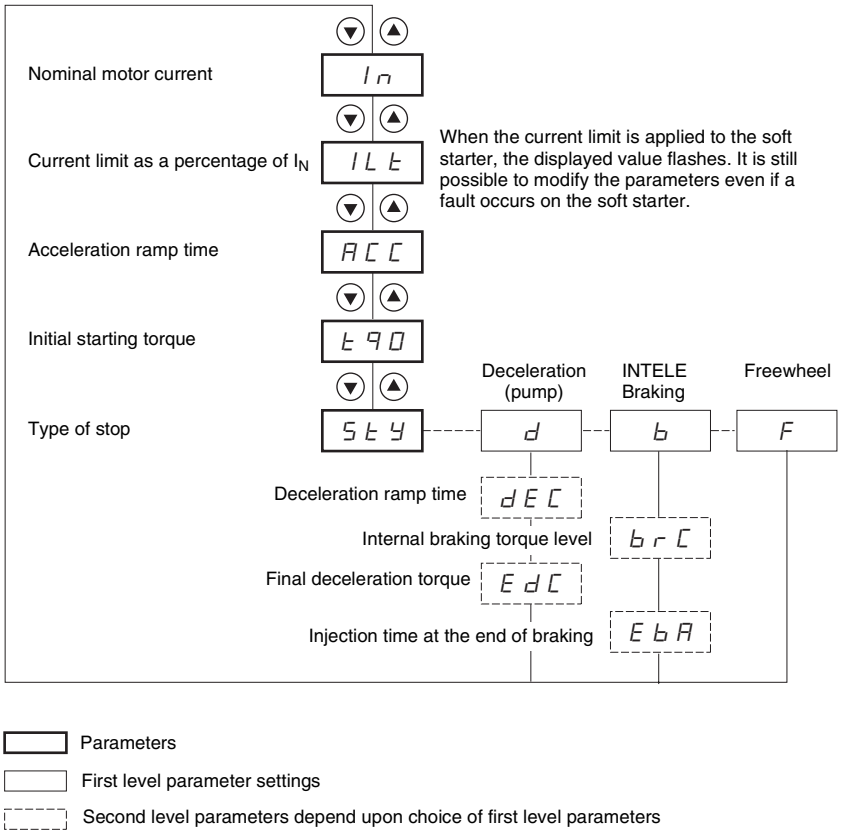
Refer to Table 18 for soft starter status codes.

NOTE: Shaded rows indicate typically locked out features.

Table 18: Soft Starter Status Codes

Status Code	Condition
Fault code	Faulty soft starter
nLP rdY	Soft starter without run command and: • Power not supplied • Power supplied
tbS	Starting time delay not elapsed
HEA	Motor heating in progress
Monitoring parameter selected by the user (SUP menu). Factory setting: motor current	Soft starter with run command
brL	Soft starter braking
Stb	Waiting for a command (RUN or STOP) in cascade mode

Figure 25: Settings Menu



To access the parameters, see Figure 24 on page 39.

Table 19: Settings Menu (SEt) Parameters

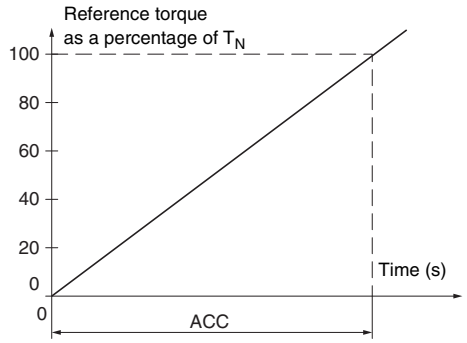
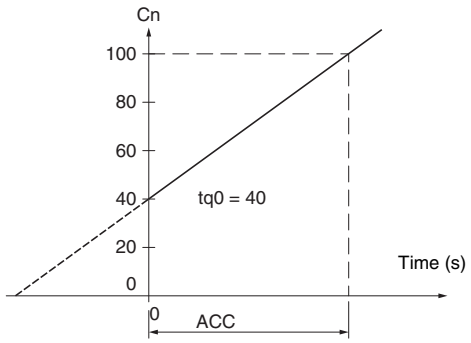
Code	Description	Setting Range	Factory Setting
	Nominal motor current	0.4 to 1.3 I_{CL}	*
In	Adjust the value to the nominal motor current indicated on the motor nameplate Ensure that the current is between 0.4 and 1.3 I_{CL} (I_{CL}: soft starter rating). * The factory setting corresponds to the usual value of a 460 V standardized motor in accordance with NEC and with Class 10 thermal overload protection.		
	Current limit	150 to 700% of I_N, limited to 500% of I_{CL}	400% of I_N
ILt	The current limit ILt is expressed as a percentage of I_N. It is limited to 500% of I_{CL} (soft starter rating, see Tables 3 and 4 on pages 11 and 12. Current limit = ILt x I_N. Example 1: I_N = 22 A, ILt = 300%, Current limit = 300% x 22 A = 66 A Example 2: ATS48C21Y, with I_{CL} = 210 A I_N = 195 A, ILt = 700%; Current limit = 700% x 195 = 1365, limited to 500% x 210 = 1050 A		
	Acceleration ramp time	1 to 60 s	15 s
ACC	This is the rise time of the soft starter torque between 0 and the nominal torque T_N (i.e., the gradient of the torque ramp on acceleration). 		
	Initial starting torque	0 to 100% of T_N	20%
tq0	Initial torque setting during the starting phases, varies from 0 to 100% of the nominal torque. 		
	Type of stop	d-b-F	-F-
StY	Three types of stop are possible: • **-d-**: Soft stopping by control of motor torque. The soft starter applies torque to the motor in order to decelerate progressively on the ramp, avoiding a rapid stop. This type of stop reduces the risk of water hammer on a pump. • **-b-**: INTELE braking stop: The soft starter generates braking torque in the motor which will slow the motor down if there is considerable inertia. (See page 32.) • **-F-**: Freewheel stop: The soft starter applies no torque to the motor.		

Table 19: Settings Menu (SEt) Parameters *(continued)*

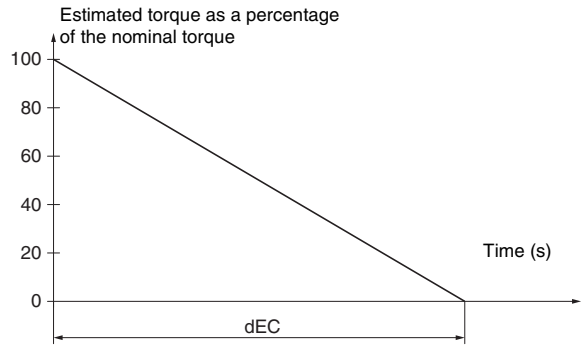
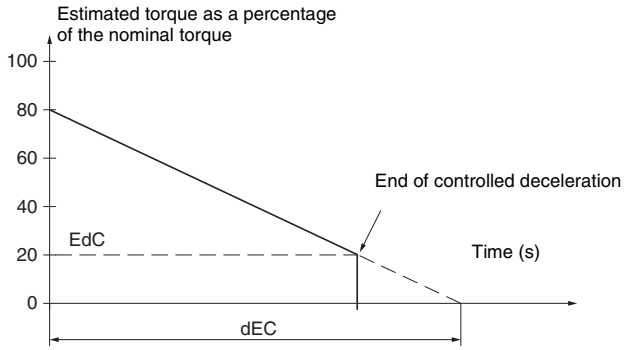
Code	Description	Setting Range	Factory Setting
dEC	**Deceleration ramp time**	1 to 60 s	15 s
	This parameter can only be accessed if StY is set to -d-. Selects the time (1 to 60 s) the soft starter will take to reduce the estimated torque to zero during a type -d- stop. This setting determines the gradient of the torque ramp on deceleration. This feature is useful in pumping applications to prevent hydraulic shock which may occur if the motor decelerates too quickly. 		
EdC	**Final deceleration torque**	0 to 100%	20%
	This parameter can only be accessed if StY is set to -d- and if the CLP parameter in the drive menu (drC) is still set to On (the factory setting). Selects the final torque level (0 and 100% of estimated torque) during a type -d- stop. This is the threshold at which the controlled stop ends and the freewheel portion of the stop begins. If the estimated torque at the start of deceleration is below 20, (i.e., 20% of the nominal torque) controlled deceleration is not activated, and the motor changes to freewheel mode. 		

Table 19: Settings Menu (SEt) Parameters *(continued)*

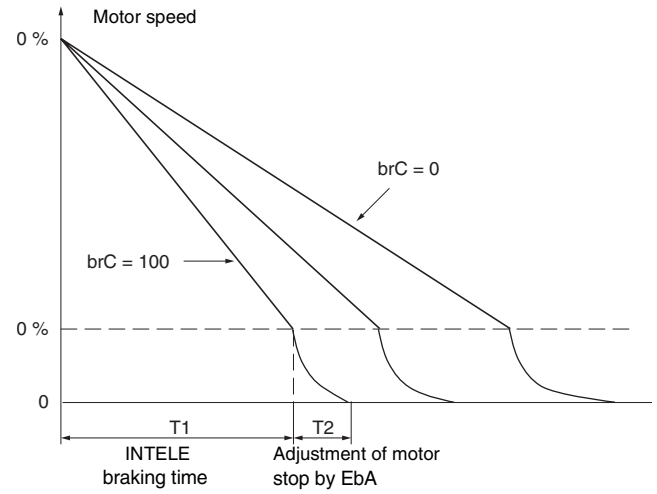
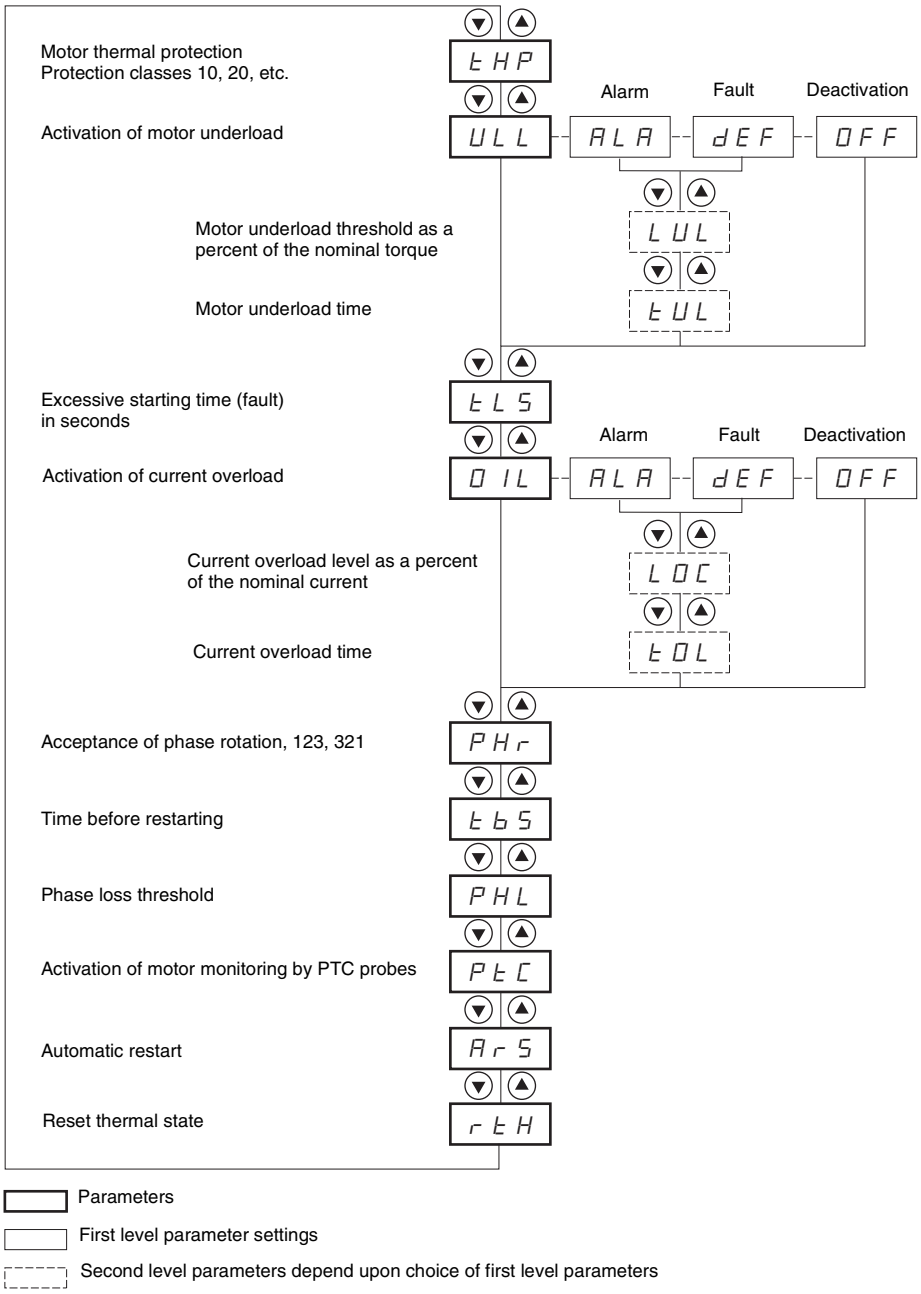
Code	Description	Setting Range	Factory Setting
brC	**Internal braking torque level**		0 to 100%
	This parameter can only be accessed if StY is set to -b-. Selects the braking torque level for stop type -b-. Braking is active up to 20% of the nominal speed. The total stop ramp depends on the setting of this parameter and also dependent on the motor loading. See EbA below.		
			
	Impulse brake injection time: T2 = T1 x EbA *NOTE: Time T1 is not determined by brC. T1 is the time required in seconds for the motor to fall from 100% of the nominal speed to 20% (depends on the motor and application characteristics).*		
EbA	**Injection time at the end of braking**	20 to 100%	20%
	This parameter can only be accessed if StY is set to -b-. Selects adjustment of the current injection time at the end of braking for stop type -b-. Can be set at 20 to 100% of the INTELE braking time (T1). Example: INTELE braking = 10 s (T1) The stopping time can vary from 2 to 10 s (T2) EbA = 20 Corresponds to an injection time of 2 s EbA = 100 Corresponds to an injection time of 10 s Factory setting: 20		

Figure 26: Protection Menu (PrO)



To access the parameters, see Figure 24 on page 39.

The protection parameters can only be modified when the motor is stopped.

⚠ CAUTION

UNINTENDED OPERATION

- The factory configuration of a monitoring alarm (ALA) indicates the presence of a fault but will not directly protect the installation.
- When using parameter ArS, ensure that an accidental start will not endanger personnel or equipment in any way

Failure to follow this instruction can result in death or serious injury.

Table 20: Protection Menu (PrO) Parameters

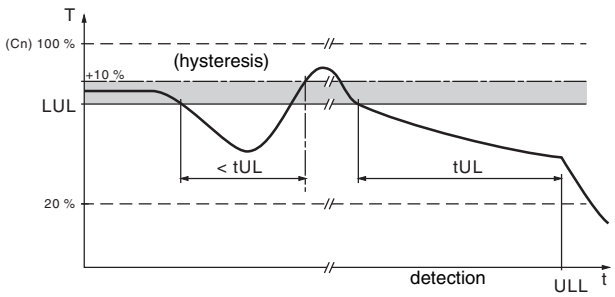
Code	Description	Setting Range	Factory Setting
tHP	**Motor thermal protection** See "Thermal Overload Protection" on page 33. • 30: Class 30 • 25: Class 25 • 20: Class 20 (severe application) • 15: Class 15 • 10: Class 10 (standard application) • 10A: Class 10A • 2: Sub-class 2 • OFF: no protection		10
ULL	**Activation of motor underload** If the motor torque is less than threshold setting of parameter LUL for longer than the time parameter tUL is set for, one of the following occurs: • ALA: an alarm activates (internal bit and configurable logic output) • dEF: the soft starter is locked and the ULF fault displays • OFF: no protection 		OFF
LUL	**Motor underload threshold** This parameter is not available if ULL is set to OFF. LUL can be set from 20% to 100% of the nominal motor torque.	20% to 100% of T_N	60%
tUL	**Motor underload time** This parameter is not available if ULL is set to OFF. Time delay tUL activates as soon as the motor torque falls below threshold LUL. It resets to zero if the torque rises above this LUL threshold by + 10% (hysteresis).	1 to 60 s	60 s
tLS	**Excessive starting time** If the starting time exceeds the value of tLS, the soft starter is locked and displays the fault StF. The conditions for the end of starting are: line voltage applied to the motor (min. firing angle) and motor current less than 1.3 I_N. • OFF: no protection	10 to 999 s or OFF	OFF

Table 20: Protection Menu (PrO) Parameters *(continued)*

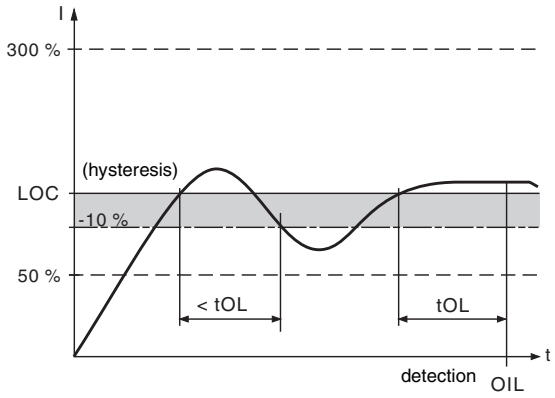
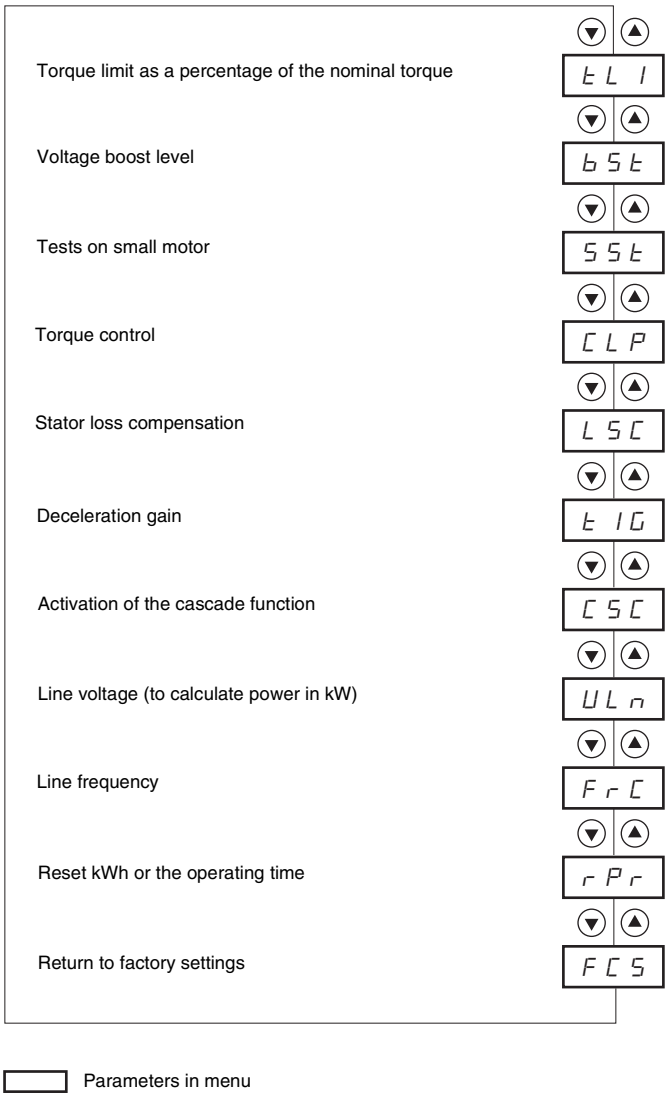
Code	Description	Setting Range	Factory Setting
OIL	**Activation of current overload**		OFF
	This function is only active in steady state. If the motor current exceeds the threshold setting of parameter LOC for longer than the time parameter tOL is set for, one of the following occurs: • ALA: an alarm activates (internal bit and configurable logic output) • dEF: the soft starter is locked and the OLC fault displays • OFF: no protection 		
LOC	**Current overload threshold**	50% to 300% of I_N	80%
	This parameter is not available if OIL is set to OFF. LOC can be set from 50% to 300% of the nominal motor current.		
tOL	**Current overload time**	0.1 to 60 s	10 s
	This parameter is not available if OIL is set to OFF. Time delay tOL activates as soon as the motor current rises above threshold LOC. It resets to zero if the current falls below this LOC threshold again by at least 10% (hysteresis).		
PHr	**Protection against line phase inversion**	321, 123, or no	no
	If the line phases are not in the order configured, the soft starter locks and displays the fault PIF. This parameter tells the soft starter the line phase order. • 321: reverse (L3 - L2 - L1) • 123: forward (L1 - L2 - L3) • no: not monitoring		
tbS	**Time before starting**	0 to 999 s	2 s
	This parameter avoids starts in quick succession which may overheat the motor. The time delay starts when the motor changes to freewheel mode. In 2-wire control, the motor is restarted after the time delay if the RUN command input is still activated. In 3-wire control, the motor is restarted after the time delay if a new RUN command is sent (rising edge). The soft starter displays tbS during the time delay.		
PHL	**Phase loss threshold**	5 to 10%	10%
	If the motor current falls below this threshold in one phase for 0.5 s or in all three phases for 0.2 s, the soft starter locks and displays the fault PHF. Can be set at between 5 and 10% of the I_{CL} soft starter rating.		
PtC	**Activation of motor monitoring by PTC probes**		OFF
	The PTC probes on the motor must be connected to the correct analog input. This protection is independent of the calculated thermal protection (tHP parameter). Both types of protection can be used simultaneously. • ALA: an alarm is activated (internal bit and assignable logic output) • dEF: the soft starter is locked and the OtF fault is displayed • OFF: no protection		

Table 20: Protection Menu (PrO) Parameters *(continued)*

Code	Description	Setting Range	Factory Setting
Ar S	**Automatic restart**	On - OFF	OFF
	If this function is active and the soft starter locks on a fault, the soft starter automatically restarts if the fault has disappeared and the other operating conditions permit the restart. A series of automatic attempts are made to restart the soft starter at intervals of 60 s. If a restart has not been possible after 6 attempts, the procedure is abandoned and the soft starter remains locked until it is switched off then switched on again or reset manually (see “Fault Management” on page 63). The following faults permit this function: PHF, FrF, CLF, USF. The soft starter fault relay remains activated if this function is active. The run command must be maintained. This function can only be used in 2-wire control. • OFF: Function inactive • On: Function active		
r t H	**Reset motor thermal state calculated by the soft starter**	no - YES	no
	• no: Function inactive • YES: Function active		

Figure 27: Advanced Setting Menu (drC)



The Advanced setting parameters can only be modified when the motor is stopped.

⚠ CAUTION

NO BRAKING AND LIMITED STOPPING

With parameter dLt, only freewheel type stopping is possible:

- Cascading is not possible
- Preheating is not possible

This limitation can result in injury.

Table 21: Advanced Setting Menu (drC) Parameters

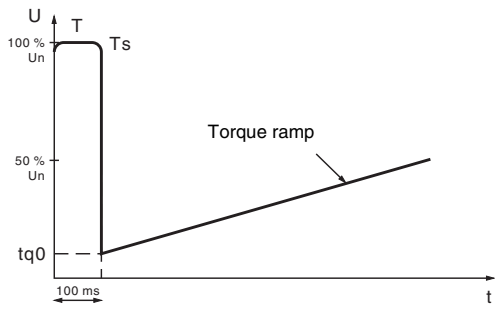
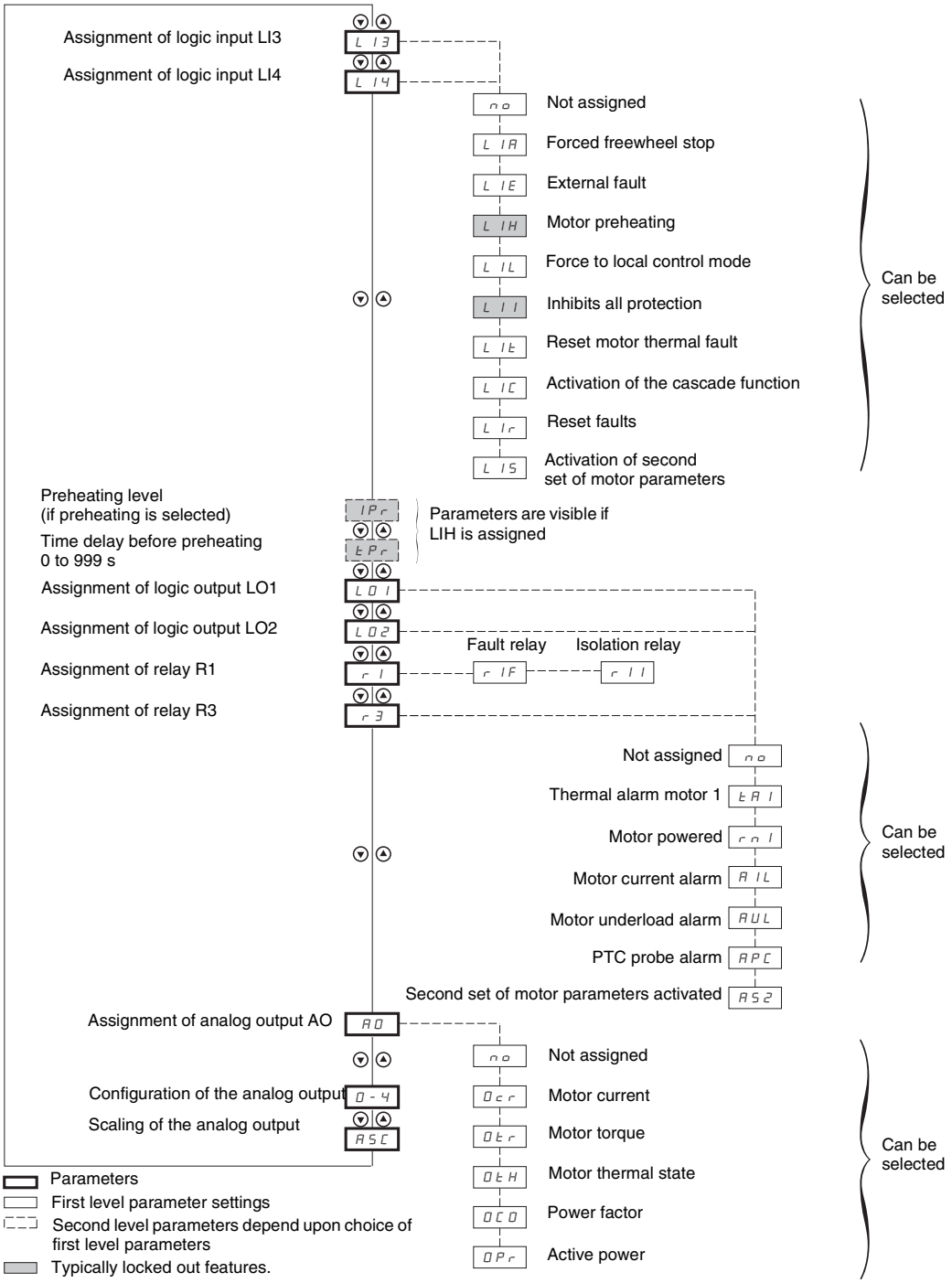
Code	Description	Setting Range	Factory Setting
tLI	**Torque limit** Use this parameter to limit the torque reference to avoid regenerative behavior in applications with high inertia. It can be used for constant torque starting if tq0 = tLI. • OFF: no limit • 10 to 200: limit set as a percentage of the nominal torque	10 to 200% or OFF	OFF
bSt	**Voltage boost level** If active, this parameter applies a user-set voltage when a run command is present for 100 ms. Once this time has elapsed, the soft starter follows a standard acceleration ramp starting at the initial torque value set (tq0). This function can be used to avoid any starting torque (phenomenon caused by friction on stopping or by mechanical play). • OFF: Function inactive • 50 to 100: setting as a percentage of the nominal motor voltage  *NOTE: When overrating the soft starter (Im motor> Im ATS48 soft starter), if the bSt value is set too high the soft starter can nuisance trip as an overcurrent (OCF) fault.*	50 to 100% or OFF	OFF
SSt	**Tests on small motor** Use this parameter to check the soft starter in a testing or maintenance environment, on a motor whose power is very much lower than the soft starter rating (in particular for high power soft starters). It automatically deactivates the torque control parameter, CLP. • OFF: function inactive • On: function active SSt returns to the OFF state as soon as the control voltage is disconnected. On the next power up, the PHF fault and the CLP parameter return to their initial configuration.	On - OFF	OFF
CLP	**Torque control** (type of control) • OFF: function inactive • On: function active In the On position, starting and deceleration follow the torque ramp. In the OFF position, starting and deceleration are controlled by voltage variation. Voltage control is recommended for applications which use motors in parallel on one soft starter or a motor whose power is very low in relation to the soft starter rating. When tests on smaller motor, SSt, is active CLP is set to OFF.	On-OFF	On

Table 21: Advanced Setting Menu (drC) Parameters *(continued)*

Code	Description	Setting Range	Factory Setting
LSC	**Stator loss compensation**	0 to 90%	50%
	Parameter active in acceleration phases (and deceleration phases if StY is set to -d-). In the event of torque oscillations, reduce this parameter gradually until the device is functioning correctly. Oscillations are most common if the soft starter is connected in motors with excessive slip.		
tIG	**Deceleration gain** (for torque control)	10 to 50%	40%
	This parameter can only be accessed if CLP is set to On and if the StY parameter (SEt Settings menu) is set to -d-. It can be used to eliminate instability during deceleration. Adjust the parameter in accordance with the oscillations.		
CSC	**Activation of the cascade function**	On-OFF	OFF
	• OFF: function inactive • On: function active This parameter can only be accessed if relay R1 has previously been assigned to the isolation relay function and if the forced freewheel stop and motor preheating functions are not configured in parameters LI3 or LI4 (IO menu). Assign an input LI = LIC. 255 motors max.		
ULn	**Line voltage**	180 to 790 V	690 V
	This parameter is used to calculate the power displayed (LPr and LAP parameters from the SUP menu). The display will only be accurate if this parameter has been set correctly.		
FrC	**Line frequency**	50-60- AUt	AUt
	• 50: 50 Hz (monitoring tolerance of frequency fault FrF = ± 20%). • 60: 60 Hz (monitoring tolerance of frequency fault FrF = ± 20%). • AUt: automatic recognition of the line frequency by the soft starter with frequency fault monitoring tolerance FrF = ± 5%. Selections 50 and 60 are recommended if the power supply is provided by a generating set, given their high tolerance.		
rPr	**Reset kWh or the operating time**	no-APH- trE	no
	• no: function inactive • APH: kWh reset to zero • trE: operating time reset to zero The reset command must be confirmed with ENT. APH and trE take effect immediately. The parameter then automatically returns to no.		
FCS	**Return to factory settings**	no-YES	no
	This is used to reset all parameters to their factory settings. • no: function inactive • YES: function active, must be pressed and held down (for approx. 2 s) in order to be accepted. The display flashes to confirm. The FCS parameter then automatically resets to no when you press ESC. This parameter cannot be modified via the remote keypad display.		

Figure 28: I/O Menu (IO)



To access the parameters, see Figure 24 on page 39.

NOTE: Logic input RUN, logic input STOP, and soft starter shorting/bypass contactor control (R2) cannot be assigned.

The I/O parameters can only be modified when the motor is stopped.

NOTE: Shading indicates a typically locked function. To unlock the function see LI3, LI4 Logic inputs. In order for functions LIH and LII to take effect, ENT must be pressed for 10 s (confirmed by flashing display). ***These parameters cannot be modified via the remote keypad display****.*

Table 22: I/O Menu (IO) Parameters

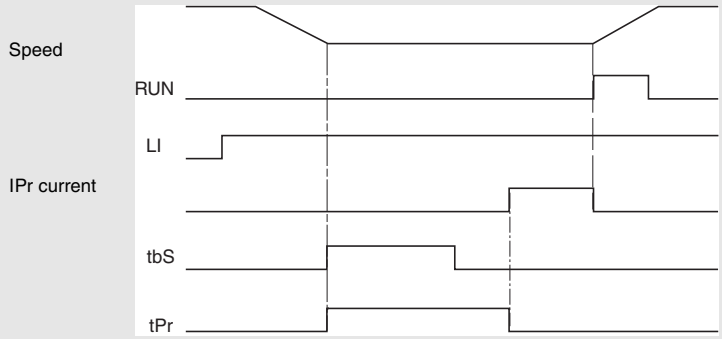
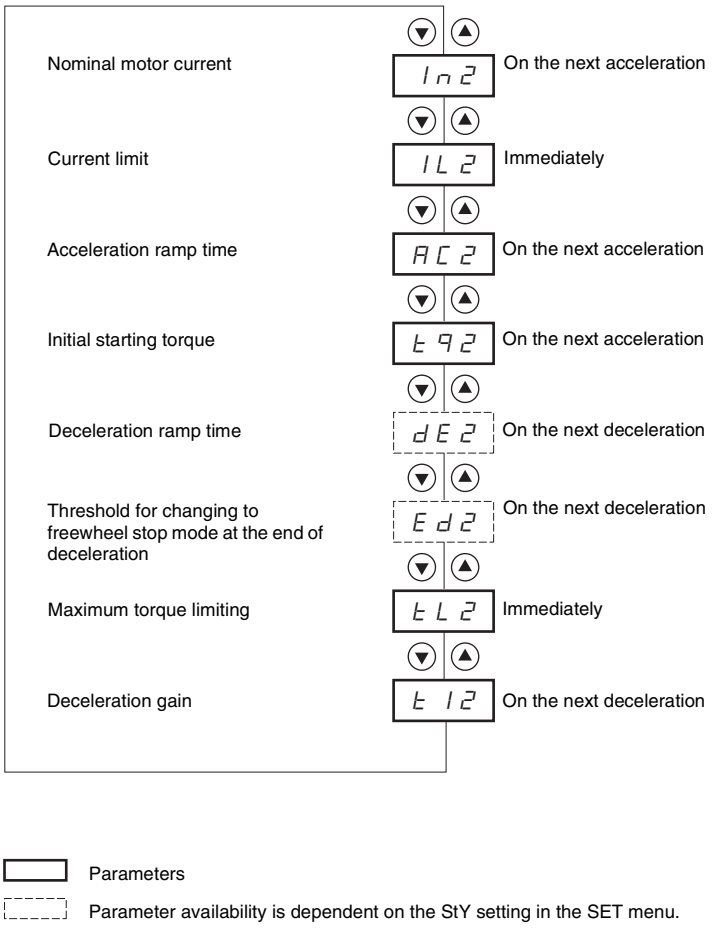
Code	Description	Setting Range	Factory Setting
	Logic inputs		LIA LIL
LI3 LI4	The selected function is active if the input is powered up. • no: not assigned. • LIA: forced freewheel stop It forces the configuration of a freewheel type stop, but does not control the stop, as soon as a STOP command is received. This selection does not appear if the CSC parameter in the drC menu is set to On. • LIE: external fault This enables the soft starter to detect an external user fault (level, pressure, etc.). The motor comes to a freewheel stop and the soft starter displays EtF. • LIL: force to local control mode If a serial link is used and this function is set, the soft starter changes from line mode (control via serial link) to local mode (control via keypad displays). • LIt: reset motor thermal fault • LIC: activation of the cascade function. This function disables motor thermal protection and requires that relay R1 be configured as an isolating relay. It can be used to start and decelerate several identical motors one after the other with a single soft starter. • LIr: reset faults which can be reset • LIS: activation of second set of motor parameters. This function allows start and deceleration of two different motors, one after the other, or one motor with two different configurations using a single soft starter. • LIH: motor preheating This selection does not appear if the CSC parameter in the drC menu is set to On. It is used to prevent the motor from freezing or to prevent temperature deviations which may cause condensation. If the input is active, once the motor has stopped an adjustable current IPr flows through motor after an adjustable time delay tPr. This current heats the motor without causing it to rotate. IPr and tbr must be adjusted (see below).  When the input activates and the motor has stopped and after time delays tPr and tbS (PrO menu) have elapsed, preheating starts. Preheating stops if the input deactivates, if a run command is sent, or if the STOP input activates. • LII: inhibits all protection *NOTE:* ***Use of this function invalidates the soft starter warranty****.* This is meant to be used to override the soft starter in the event of an emergency (smoke extraction system for example).		
IPr	**Preheating level**	0 to 100%	0%
	This parameter appears after LI3 or LI4 have been assigned to function LIH (motor preheating). It is used to set the preheating current. Use a true value current reading ammeter to set the current level. Parameter I_N has no effect on the IPr current.		
tPr	**Time delay before preheating**	0 to 999 mn	5 mn
	This parameter appears after LI3 or LI4 have been assigned to function LIH (motor preheating). Preheating starts when the input activates, after time delays tPr and tbS (PrO menu) have elapsed.		

Table 22: I/O Menu (IO) Parameters *(continued)*

Code	Description	Setting Range	Factory Setting
LO1 LO2	**Logic outputs** • no: not assigned. • tAI: motor thermal alarm, see page 33. • rnI: motor powered. • AIL: motor current alarm (threshold OIL and time tOL of PrO menu exceeded). See page 46. • AUL: motor underload alarm (threshold LUL and time tUL of PrO menu exceeded). See page 45. • APC: motor PTC probe alarm. See PtC on page 46. • AS2: second set of motor parameters activated. See LIS on page 52.		tAI rnI
r1	**Relay R1** • r1F: fault relay. In this mode, relay R1 activates when the soft starter is powered up (minimum CL1/CL2 control). Relay R1 deactivates when a fault occurs and the motor switches to freewheel mode. See the special case when the automatic restart function is activated and "Fault Management" on page 63. • r1I: isolation relay. Relay R1 is designed to control the line contactor on the basis of the RUN and STOP commands and to indicate faults. In this mode, relay R1 activates by a RUN command (or a preheating command). It deactivated at the end of braking or deceleration or when the motor switches to freewheel mode after a STOP command. It also deactivates when a fault occurs. The motor switches to freewheel mode at this point.		r1F
R2	end of starting relay R2 The end of starting relay R2 is activated when the soft starter is powered up, no faults are present, and the motor has completed the start-up phase. It is deactivated in the event of a stop request or a fault. It has one normally open contact (N/O). It can be used to bypass the ATS48 soft starter at the end of the starting phase. This is not a programmable feature.		
r3	**Relay R3** • no: not assigned. • tAI: motor thermal alarm. See page 33. • rnI: motor powered. • AIL: motor current alarm (threshold OIL and time tOL of PrO menu exceeded). See page 46. • AUL: motor underload alarm (threshold LUL and time tUL of PrO menu exceeded). See page 45. • APC: motor PTC probe alarm. See PtC on page 46. • AS2: second set of motor parameters activated. See LIS on page 52.		rnI
AO	**Analog output** • no: not assigned • OCr: motor current • Otr: motor torque • OtH: motor thermal state • OCO: power factor • OPr: active power		OCr
O4	**Configuration of the analog output AO** • 020: 0–20 mA signal • 420: 4–20 mA signal	020–420	020
ASC	**Scaling of the analog output** This parameter allows you to scale the analog output as a percentage of the nominal value of the parameter configured or, if the parameter is power factor, of 1 for the power factor.	50 to 500%	200

Figure 29: Second Motor Parameters Menu (St2)



This menu is only visible if a logic input is assigned to the function for activating a second set of motor parameters (LIS) in the I/O menu.

Table 23: Second Motor Parameters Menu (St2) Parameters

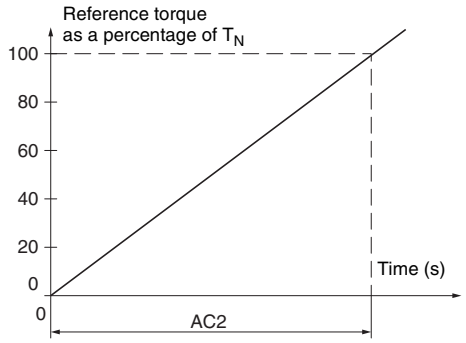
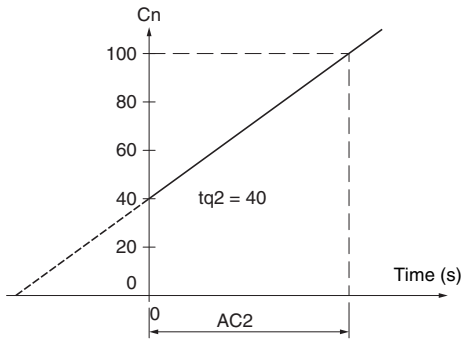
Code	Description	Setting Range	Factory Setting
In2	**Nominal motor current** Adjust the value of the nominal motor current indicated on the motor nameplate. Ensure that the current is between 0.4 and 1.3 I_{CL} (soft starter rating). See Tables 3 and 4 on pages 11 and 12. *NOTE: The factory setting of In2 corresponds with the usual value of a 460 V standardized motor in accordance with NEC and with Class 10 thermal overload protection.*	0.4 to 1.3 I_{CL}	See note.
IL2	**Current limit** The Current limit IL2 is expressed as a percentage of In2. It is limited to 500% of I_{CL} (see Tables 3 and 4 on pages 11 and 12). Current limit = IL2 x In2 Example 1: In2 = 21 A, IL2 = 300%, Current limit = 300% x 22 A = 66 A Example 2: ATS48C21Y, with I_{CL} = 210 A In2 = 195 A, IL2 = 700%, Current limit = 700% x 195 = 1365, limited to 500% x 210 = 1050 A	150 to 700% of I_N, limited to 500% of I_{CL}	400% of I_N
AC2	**Acceleration ramp time** This is the rise time of the soft starter torque between 0 and the nominal torque T_N (i.e., the gradient of the torque ramp on acceleration). 	1 to 60 s	15 s
tq2	**Initial starting torque** Initial torque setting during the starting phases, varies from 0 to 100% of the nominal torque. 	0 to 100% of T_N	20%

Table 23: Second Motor Parameters Menu (St2) Parameters *(continued)*

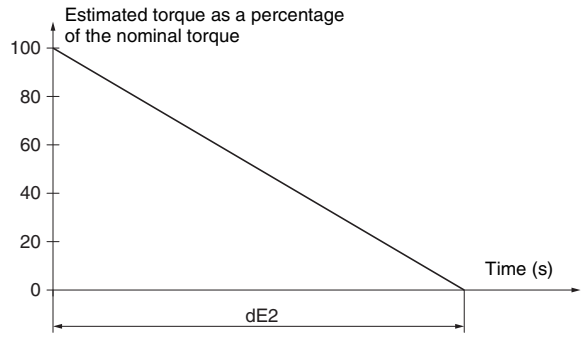
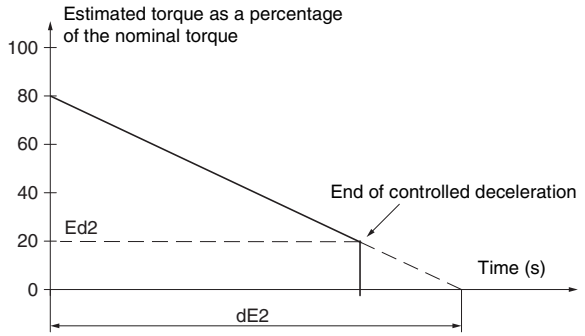
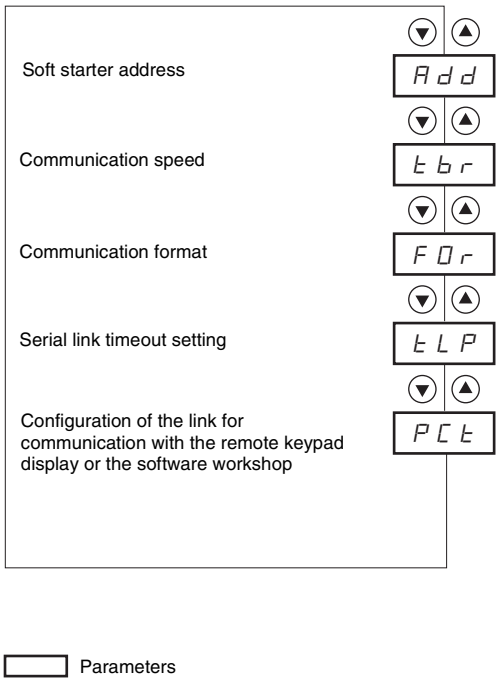
Code	Description	Setting Range	Factory Setting
dE2	**Deceleration ramp time**	1 to 60 s	15 s
	This parameter can only be accessed if StY is set to -d-. It sets a time, from 1 to 60 s, to switch from the estimated torque to zero torque (gradient of the torque ramp on deceleration when a -d- stop is applied). This modifies the progression of the deceleration and avoids hydraulic shocks in pump applications by modifying the gradient of the torque reference. 		
Ed2	**Final deceleration torque**	0 to 100%	20%
	This parameter can only be accessed if StY is set to -d- and if the CLP parameter in the drive menu (drC) is still set to the factory setting (On). It sets the final torque level from 0 and 100% of the torque estimated at the beginning of deceleration. In pump applications, deceleration control is not necessarily below a load level set by Ed2. If the estimated torque at the start of deceleration is below 20, (i.e., 20% of the nominal torque) controlled deceleration does not activate and the motor changes to freewheel mode. 		
tLI2	**Maximum torque limit**	10 to 200% or OFF	OFF
	This limits the torque reference to avoid regenerative behavior in applications with high inertia. It can be used for constant torque starting if tq2 = tLI. • OFF: no limit • 10 to 200: limit set as a percentage of the nominal torque		
tI2	**Deceleration gain** (for torque control)	10 to 50%	40%
	This parameter can only be accessed if CLP is set to On and if the StY parameter (SEt Settings menu) is set to -d-. It is used to eliminate instability during deceleration. Adjust the parameter in accordance with the oscillations.		

Figure 30: Communication Menu (COP)



The communication menu parameters can only be modified when the motor is stopped. The internal protocol used is MODBUS.

⚠ WARNING

LOSS OF COMMUNICATION CAN CAUSE LOSS OF PROTECTION

When using parameter tLP, ensure that the time set will not interfere with the safe operation of the machine.

Failure to follow this instruction can result in death or serious injury.

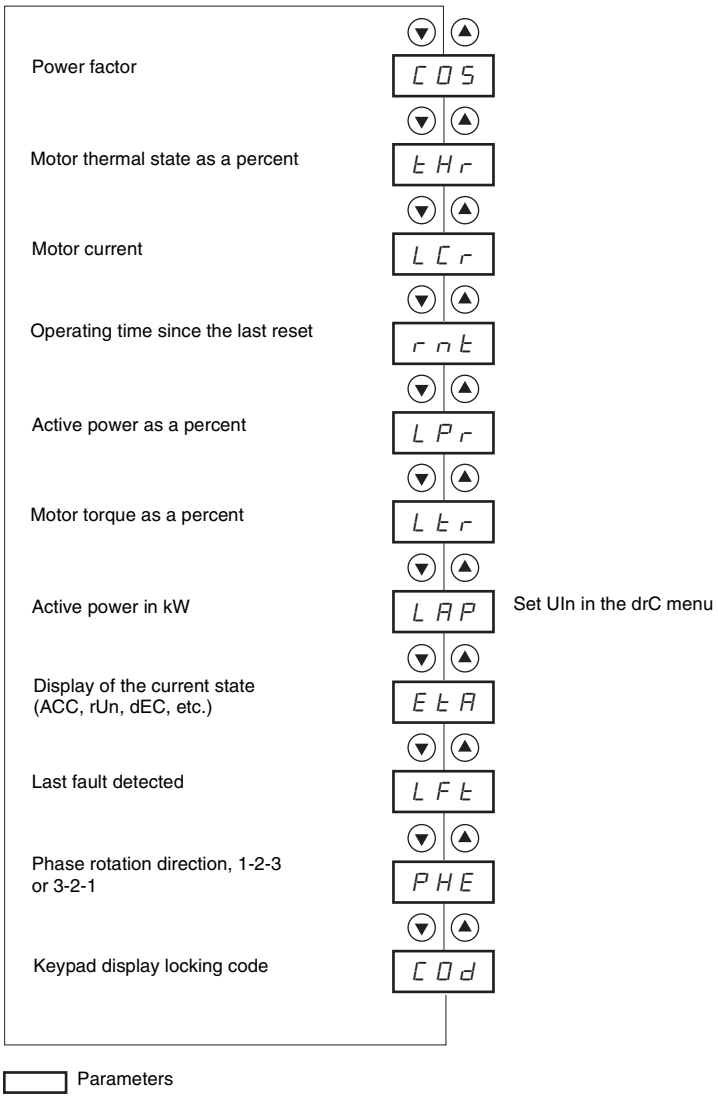
Table 24: Communication Menu (COP) Parameters

Code	Description	Setting Range	Factory Setting
Add	Soft starter address by the RS-485 serial link	0 to 31	0
tbr	Communication speed in kbps.	4.8 - 9.6 - 19.2	19.2
FOr	Communication format • 8o1: 8 data bits, odd parity, 1 stop bit • 8E1: 8 data bits, even parity, 1 stop bit • 8n1: 8 data bits, no parity, 1 stop bit • 8n2: 8 data bits, no parity, 2 stop bits		8n1

Table 24: Communication Menu (COP) Parameters *(continued)*

Code	Description	Setting Range	Factory Setting
tLP	Serial link timeout setting	0.1 to 60 s	5 s
PCt	Configuration of the serial link for communication with the **remote keypad display** • On: function active. Temporarily configures the soft starter (tbr and FOr) for communication with the remote keypad display. • OFF: function inactive **PCt returns to the OFF state as soon as the control voltage is disconnected. On the next power up, the tbr and FOr parameters return to their initial configuration.**		OFF

Figure 31: Parameter Displayed Menu (SUP)



The parameters in the SUP menu below can be modified with the motor stopped or running.

The factory setting displays the motor current (parameter LCr).

To save the chosen display:

- Press the ENT key once: the choice is temporary, it will be cleared at the next power up.
- Press the ENT key again for 2 seconds: the display flashes, the choice is permanent and cannot be modified.

Table 25: Parameter Displayed Menu (SUP) Parameters

Code	Parameter	Unit
COS	**Power Factor**	0.01
tHr	**Motor thermal state** varies from 0 to 125%. 100% corresponds to the nominal thermal state for the current I_N set.	%
LCr	**Motor current** In amperes up to 999 A (examples: 01.5 is 1.5 A, 15.0 is 15 A, 150 is 150 A) In kiloamperes starting at 1000 A (examples: 1.50 is 1500 A, 1.15 is 1150 A)	A or kA
rnt	**Operating time** in hours since the last reset. In hours up to 999 hrs (examples: 001 is 1 hr and 111 is 111 hrs) In kilo-hours from 1000 to 65535 (examples: 1.11 is 1110 hrs and 11.1 is 11100 hrs) Above 65535 hrs (65.5) the display resets to zero. Operating time is counted when the motor is not stopped, i.e. when the thyristors are fired (heating, acceleration, steady state, deceleration, braking) and in continuous bypass operation. The hour counter can be reset in line mode using the control word or via the keypad display with the motor stopped. When the power is removed from the 115 Vac control power supply the hour counter is saved in the EEPROM.	h or kh
LPr	**Active power** varies from 0 to 255%. 100% corresponds to the power at nominal current and at full voltage.	%
Ltr	**Motor torque** varies from 0 to 255%. 100% corresponds to the nominal torque.	%
LAP	**Active power in kW** This parameter requires configuration of the exact value of the line voltage ULn in the drC menu.	kW
ETA	**Display of the current state** • nLP: soft starter without run command and power not supplied • rdY: soft starter without run command and power supplied • tbS: starting time delay not elapsed • ACC: acceleration in progress • dEC: deceleration in progress • rUn: steady state operation • brL: braking in progress • CLI: soft starter in current limiting mode • nSt: force to freewheel stop by serial link	
LFt	**Last fault detected** (see page 63). If no faults have been saved, the display shows nOF.	

Table 25: Parameter Displayed Menu (SUP) Parameters *(continued)*

Code	Parameter	Unit
PHE	**Phase rotation direction** as viewed from the soft starter • 123: forward (L1 - L2 - L3) • 321: reverse (L3 - L2 - L1)	
COd	**Keypad display locking code** enables the soft starter configuration to be protected using an access code (password). **OFF**: no access locking codes • **To lock access**, enter a code (2 to 999). The number displayed can be increased using the ▲ key. Now press ENT. On appears on the screen to indicate that the parameters have been locked. **On**: a code is locking access (2 to 999) • **To unlock access**, enter the code (increasing the number displayed using the ▲ key) and press ENT. The code remains on the display and access is unlocked until the next power down. Parameter access will be locked again on the next power-up. • **If an incorrect code is entered**, On appears on the display and the parameters remain locked. **XXX**: parameter access is unlocked (the code remains on the screen). • **To reactivate locking with the same code** when the parameters have been unlocked, return to On using the ▼ button and then press ENT. On appears on the screen to indicate that the parameters have been locked. • **To lock access with a new code** when the parameters have been unlocked, enter a new code (change the number displayed using the ▲ or ▼ keys) and press ENT. On appears on the screen to indicate that the parameters have been locked. • **To clear locking** when the parameters have been unlocked, return to OFF using the ▼ button and press ENT. OFF remains on the screen. The parameters are unlocked and will remain unlocked until the next restart. **Remember to document your access code (password). Failure to do so could prevent use of the keypad in programming and configuration modes.**	

When access is locked using a code, only the monitoring parameters can be accessed, and with only a temporary choice of parameter displayed.

The choice of application functions can be limited by the incompatibility between certain functions. The functions that are not listed in this table are not incompatible with any other functions.

Figure 32: Compatibility

Functions	Soft stop	INTELE braking stop	Force freewheel stop	Thermal protection	Loss of a motor phase	Test on small motor	Cascade	Preheating
Soft stop								
INTELE braking stop								
Force freewheel stop								
Thermal protection								(2)
Loss of a motor phase								(1)
Test on small motor								
Cascade								
Preheating (3)				(2)	(1)			

Compatible functions
Incompatible functions
Not significant

(1) Motor phase loss not detected
(2) While the motor is preheating, the thermal protection is disabled. Set the preheating current IPr.
(3) In order for this feature to take effect, press ENT for 10 s (confirmed by flashing display). This parameter cannot be modified via the remote keypad display.

SECTION 8— FAULT MANAGEMENT

As a general rule, if a problem arises when the soft starter is started, it is advisable to restore the factory settings and reprogram your settings one by one. If this does not fix the problem follow the instructions below.

SOFT STARTER DOES NOT START, NO FAULT DISPLAYED

Determine whether or not the code displayed corresponds to the normal state of the soft starter (see Table 17 on page 38).

If no fault is displayed and the soft starter does not start:

- Check that the line supply is present on the control supply CL1/CL2 (see page 30).
- Check for the presence of the RUN/STOP commands (see Appendix A).

NON-RESETTABLE FAULTS

When a non-resettable fault appears the soft starter locks and the motor switches to freewheel mode.

The following are signals that a non-reset fault has occurred:

- Relay R2 opens.
- After the soft starter locks, Relay R1 opens.
- The fault code flashes on the display.
- The last 5 faults are stored and viewable with the PowerSuite software workshop.

Do the following before restarting the soft starter:

- Remove the fault cause(s), see Table 26.
- disconnect and reconnect the control supply

Table 26: Non-Reset Fault Correction

Fault Displayed	Probable Cause	Corrective Action
InF	**Internal fault**	Disconnect and reconnect the control supply. If the fault persists, contact Schneider Electric product support.
OCF	**Overcurrent:** • impeding short-circuit on soft starter output • internal short-circuit • bypass contactor stuck • soft starter is overloaded	Disconnect power to the soft starter, then: • Check the connecting cables and the motor isolation. • Check the thyristors. • Check the bypass contactor for a stuck contact. • Check the parameter value bSt in the menu drC (page 49).
PIF	**Phase inversion** The line phase inversion does not conform to the PHr, parameter setting in the Protection menu.	Invert two line phases or set PHr to no.
EEF	**Internal memory fault**	Disconnect and reconnect the control supply. If the fault persists, contact Schneider Electric product support.

RESETTABLE FAULTS WHEN CAUSES DISAPPEAR

When a resettable fault appears the soft starter locks and the motor switches to freewheel mode.

The following are signals that a resettable fault has occurred:

- Relay R2 opens.
- If relay R1 is configured as an isolating relay, it opens.
- The fault code flashes on the display as long as the fault is present.
- The last 5 faults are stored and viewable with the PowerSuite software workshop.

Do the following before restarting the soft starter:

- Remove the cause of the fault, see Table 27.
- In 2-wire control, maintain the run command on the RUN input.
- In 3-wire control, initiate a new run command (rising edge) on the RUN input.

Table 27: Resettable Fault Correction

Fault Displayed	Probable Cause	Corrective Action
CFF	**Invalid configuration on power-up**	• Revert to the factory setting in the drive menu drC. • Reconfigure the soft starter.
CFI	**Invalid configuration** The configuration loaded in the soft starter via the serial link is incompatible.	• Check the initial configuration. • Load a compatible configuration.

AUTO-RESET FAULTS (CUSTOMER CONFIGURABLE)

When an auto-reset fault appears the soft starter locks and the motor switches to freewheel mode. When an auto-reset fault occurs, the soft starter will automatically restart when the fault has cleared.

The following are signals that an auto-reset fault has occurred:

- Relay R2 opens.
- If relay R1 is configured as an isolating relay, it opens. R1 remains closed if it is configured as a fault relay, see page 53.
- The fault code flashes on the display as long as the fault is present.
- The last 5 faults are stored and viewable with the PowerSuite software workshop.

In 2-wire control, perform the following steps for any of the faults listed in Table 28 before restarting the soft starter:

- Remove the cause of the fault.
- Maintain the run command on the RUN input.

NOTE: The soft starter attempts to restart six times at 60 second intervals. If the fault is still present at the 6th attempt it trips, requiring a manual reset (see "Manual-Reset Faults" on page 65). If relay R1 is configured as a fault relay it opens.

Table 28: Auto-Reset Fault Correction (2-wire control)

Fault Displayed	Probable Cause	Corrective Action
PHF	**Loss of a line phase**	Check the line, the connection to the soft starter, and any isolating devices located between the line and the soft starter (such as contactors, fuses, and circuit-breakers).
	Loss of a motor phase If the motor current falls below an adjustable threshold PHL for 0.5 s (single phase) or for 0.2 s (3-phase). This fault can be configured in the Protection menu PrO, parameter PHL.	• Check the motor connection and any isolating devices located between the soft starter and the motor (such as contactors, fuses, and circuit-breakers). • Check the motor state. • Ensure that parameter PHL is compatible with the motor.
FrF	**Line frequency is out of tolerance.** This fault can be configured in the Advanced settings menu drC, parameter FrC.	• Check the line. • Ensure that parameter FrC is configured properly for the line used (generating set for example).

For any of the faults listed in Table 29 perform the following steps before restarting the soft starter:

- Remove the cause of the fault.
- In 2-wire control, maintain the run command.

Table 29: Auto-Reset Fault Correction

Fault Displayed	Probable Cause	Corrective Action
USF	**Power supply fault on a run command**	Check the power supply circuit and voltage.
CLF	**Control line failure**	Loss of CL1/CL2 for more than 200 ms

If the automatic restart function is not selected, see “Manual-Reset Faults” below for the indication of these faults and the restart instructions.

MANUAL-RESET FAULTS

When a manual reset fault appears, the soft starter locks and the motor switches to freewheel mode.

The following are signals that a manual-reset fault has occurred:

- Relay R2 opens.
- Relay R1 opens.
- The fault code flashes on the display as long as the fault is present.
- The last 5 faults are stored and viewable with the PowerSuite software workshop.

Perform the following steps before restarting the soft starter:

- Remove cause of the fault.
- In 2-wire and 3-wire control, initiate a new run command (rising edge) on the RUN input to reset the fault.

  NOTE: A reset will not take place on a run command if LI is assigned to the fault reset (LIr) function.
- In 2-wire and 3-wire control, initiate another new run command (rising edge) on the RUN input to reset the fault.

Table 30: Manual-Reset Fault Correction

Fault Displayed	Probable Cause	Corrective Action
SLF	**Serial link fault**	Check the RS-485 connection.
EtF	**External fault**	• Check the custom fault. • Check the mechanism for wear, mechanical play, lubrication, blockages, etc.. • Check the value of the tLs setting in the PrO menu, page 45. • Make sure the soft starter and motor are sized properly for the load and application.
OLC	**Current overload**	• Check the mechanism for wear, mechanical play, lubrication, blockages, etc.. • Check the value of parameters LOC and tOL in the PrO menu, page 46.
OLF	**Motor thermal fault**	• Check the mechanism for wear, mechanical play, lubrication, blockages, etc.. • Make sure the soft starter and motor are sized properly for the load and application. • Check the value of parameter tHP in the PrO menu (page 45) and that of parameter I_N in the SEt menu, page 41. • Check the electrical isolation of the motor. • Wait for the motor to cool before restarting.
OtF	**Motor thermal fault detected by the PTC probes**	• Check the mechanism for wear, mechanical play, lubrication, blockages, etc.. • Make sure the soft starter and motor are sized properly for the load and application. • Check the value of the PtC setting in the PrO menu, page 46. • Wait for the motor to cool before restarting.
ULF	**Motor underload**	• Check the hydraulic circuit. • Check the value of parameters LUL and tUL in the PrO menu, page 45.
LrF	**Locked rotor in steady state** This fault is only active in steady state with soft starter bypass contactor. It is detected if the current in a phase is greater than or equal to 5 I_N for more than 0.2 s.	Check the mechanism for wear, mechanical play, lubrication, blockages, etc..

RESET FAULTS USING A LOGIC INPUT

If a logic input LI is configured to reset motor thermal fault, LIt, or any other resettable fault, LIr, for the motor to restart, the following conditions must be met:

- The soft starter must send a pulse on logic input LI.
- In 2-wire control, the run command must be maintained on the RUN input.
- In 3-wire control, a new run command (rising edge) must be initiated on the RUN input.

TROUBLESHOOTING PROCEDURE

When troubleshooting the soft starter, discuss the symptoms of the reported problem with the operating personnel. Ask the operator to describe the problem and to identify when and where it first occurred. Then directly observe the controller and process. Copy the Troubleshooting Sheet on page 68 and use it to record the controller, motor, and peripheral equipment nameplate data.

TECHNICAL SUPPORT

For more information, call, fax, or write:

Square D / Schneider Electric Technical Support
8001 Highway 64 East
Knightdale, NC 27545-9023

Telephone: 919-266-8600 or 1-888-SQUARED (1-888-778-2733)
Fax: 919-217-6508
e-Mail: drivespsg@squared.com

ALTISTART 48 TROUBLESHOOTING SHEET

When requesting after-sales service, it is important to disclose all conditions under which the Square D / Schneider Electric equipment currently operates. This will help in diagnosing the system quickly.
FAX to: **Technical Support @ 919-217-6508**

DATE:
CONTACT NAME:
COMPANY:
ADDRESS:
CITY:
STATE:
PHONE:
FAX:

SOFT START CONFIGURATION

PART NUMBER: ATS48-_____ SERIAL NUMBER: 6W-_____

APPLICATION/EQUIPMENT DESIGNATION: _____

MOTOR NAMEPLATE DATA

HORSEPOWER: _____ VOLTAGE (3 PHASE): _____ FREQUENCY: _____ POLES: _____ FLA: _____

SERVICE FACTOR: _____ MOTOR TYPE/DESIGN: ☐ NEMA A ☐ NEMA B ☐ NEMA C ☐ NEMA D

MOTOR CABLE TYPE: _____ APPROXIMATE CABLE LENGTH (IN FEET): _____

POWER SOURCE AND ENVIRONMENT

VOLTAGE BETWEEN L1 AND L2: _____ VOLTAGE BETWEEN L2 AND L3: _____ VOLTAGE BETWEEN L3 AND L1: _____

SERVICE TRANSFORMER RATING: _____ KVA, _____% Z FREQUENCY: ☐ 60HZ OR ☐ 50 HZ

AMBIENT TEMPERATURES: _____ MIN °C (°F) _____ MAX °C (°F) HUMIDITY: _____

ALTITUDE IF GREATER THAN 3300 FEET ABOVE SEA LEVEL, SPECIFY: _____ FT

SOFT START FAULT CODES

REFER TO TABLES 28 THROUGH 33 FOR POSSIBLE CAUSES & CORRECTIVE ACTION

NON-RESET FAULTS	AUTO-RESET FAULTS (CUSTOMER CONFIGURABLE)	MANUAL RESET FAULTS	☐ **OLF – MOTOR THERMAL FAULT**
☐ **InF – INTERNAL FAULT**	☐ **PHF – LOSS OF PHASE OR LOSS OF MOTOR PHASE**	☐ **SLF – SERIAL LINK FAULT**	☐ **OHF – STARTER THERMAL FAULT**
☐ **OCF - OVERCURRENT**	☐ **FrF – LINE FREQUENCY (OUT OF TOLERANCE)**	☐ **EtF – EXTERNAL FAULT**	☐ **OtF – MOTOR THERMAL FAULT VIA PTC PROBES**
☐ **PIF – PHASE INVERSION**	☐ **USF – POWER SUPPLY**	☐ **StF – EXCESSIVE STARTING TIME**	☐ **ULF – MOTOR UNDERLOAD**
☐ **EEF – INTERNAL MEMORY**	☐ **CLF – CONTROL LINE FAILURE** (CL1/CL2)	☐ **OLC – CURRENT OVERLOAD**	☐ **LrF – LOCKED ROTOR (IN STEADY STATE)**

RESETTABLE FAULTS WHEN CAUSES DISAPPEAR	☐ **CFF – INVALID CONFIGURATION (POWER UP)**	☐ **CFI – INVALID CONFIGURATION (COMM)**

DETAILED DESCRIPTION OF PROBLEM (ATTACH WIRING DIAGRAM/SCHEMATICS IF APPLICABLE):

FACTORY SETTINGS

	Code	Designation	Factory Setting	Customer Setting	Parameter Range and Units
SEt Menu Settings	In	Current setting	Depends upon starter rating.		0.5 to 1.3 I_{CL} (A)
	IL	Current limit	400		150 to 500% of In
	ACC	Acceleration ramp time	15		1 to 60 s
	tQ	Initial starting torque	20		0 to 100% of T_N
	Stt	Type of stop	-F- (free wheel)		-d- deceleration -b- braked -F- free wheel
	dEC EdC	Deceleration ramp time Final deceleration torque	15 20		1 to 60 s 0 to 100% of estimated torque
	brC Ebt	Internal braking torque level Injection time at the end of braking	50 20		0 to 100 20 to 100
PRO Menu Protection	tHP	Motor thermal protection	10		OFF, 2, 10A, 10, 20, 25 or 30
	ULL	Activation of motor underload	OFF		OFF dEF: treated as fault ALA: treated as alarm
	LUL tUL	Motor underload threshold Motor underload time	60 60		20 to 100% of I_N 1 to 60 s
	tLS	Excessive starting time	OFF		OFF - 10 to 999 s
	OIL	Activation of current overload	OFF		ALA: treated as alarm dEF: treated as fault OFF: no protection
	LOC tOL	Current overload threshold Current overload time	80 10		50 to 300% of I_N 0.1 to 600 s
	PHr	Protection against line phase inversion	no		321: reverse (L3-L2-L1) 123: forward (L1-L2-L3) no: no monitoring
	tbS	Time before starting	2		0 to 999 s
	PHL	Phase loss threshold	10		5 to 10%
	PtC	Activation of motor monitoring by PTC probes	OFF		OFF dEF: treated as fault ALA: treated as alarm
	ArS	Automatic restart	OFF		OFF - On
	rtH	Reset motor thermal state	No		No - YES

FACTORY SETTINGS *(continued)*

	Code	Designation	Factory Setting	Customer Setting	Parameter Range and Units
drC Menu Advanced Settings	tLI	Torque limit	OFF		OFF - 10 to 200% of T_N
	bSt	Voltage boost level	OFF		50 to 100% of mains voltage
	SSt	Tests on a small motor	OFF		On - OFF
	CLP	Torque control (type of control)	On		On - OFF
	LSC	Stator loss compensation	50		0 to 90%
	tIG	Deceleration gain (for torque control)	40		10 to 50%
	CSC	Activation of cascade function	OFF		On - OFF
	ULn	Line voltage	690		180 to 790 V
	FrC	Line frequency	AUt		50 - 60 - AUt
	rPr	Reset kWh or the operating time	no		No - APH - trE
	FCS	Return to factory settings	no		No - YES

FACTORY SETTINGS *(continued)*

	Code	Designation	Factory Setting	Customer Setting	Parameter Range and Units
IO Menu (Management of Inputs / Outputs)	L I3 L I4	Logic inputs	LIA LIL		No: not assigned LIA: forced free wheel LIE: external fault LIH: not implemented LIL: force to local control mode LII: inhibition of faults LIt: reset motor thermal fault LIC: activate cascade function LIR: fault reset LIM: second configuration
	IPr	Preheating level	0%		0 to 100%
	tPr	Time delay before preheating	5 mn		0 to 999 minutes
	L O1 L O2	Logic outputs	tAI rnI		No: not assigned tAI: motor thermal alarm rnI: motor powered AIL: motor current alarm AUL: motor underload alarm APC: motor PTC sensor alarm AS2: second configuration active
	r1	Relay R1	r1F		R1F: fault R1I: isolation relay
	r3	Relay R3	rnI		No: not assigned tAI: motor thermal alarm rnI: motor powered AIL: motor current alarm AUL: motor underload alarm APC: motor PTC sensor alarm AS2: second configuration active
	AO	Analog output	OCr		No: not assigned Ocr: motor current Otr: motor torque OtH: motor thermal state 0C0: power factor OPr: active power
	O 4	Configuration of the analog output AO	020		020: 0 – 20 mA 420: 4 – 20 mA
	ASC	Scaling of the analog output	200		50 to 500%

FACTORY SETTINGS *(continued)*

	Code	Designation	Factory Setting	Customer Setting	Parameter Range and Units
St2 Menu 2nd Motor Parameters	In2	Nominal motor current	Depends upon starter rating.		0.5 -1.3 I_{CL} (A)
	IL2	Current limit	400		150 – 700% of In, limited to 500% of I_{CL}
	AC2	Acceleration ramp time	15		1-60 s
	tq2	Initial starting torque	20		0 – 100% of T_N
	dE2	Deceleration ramp time	15		1 to 60 s
	Ed2	Threshold for changing to freewheel stop mode at end of deceleration	20		0 to 100% of estimated torque
	tL2	Maximum torque limit	OFF		10 to 200%
	t I2	Deceleration gain (for torque control)	40		10 to 50%
COP Menu Communication	Add	Starter address	0		0 to 31
	tbr	Communication speed	19.2		4.8 – 9.6 – 19.2
	FOr	Communication format	8n1		8o1: 8 bits, odd, 1 stop bit 8E1: 8 bits, even, 1 stop bit 8n1: 8 bits, no parity, 1 stop bit 8n2: 8 bits, no parity, 2 stop bit
	tLP	Serial link timeout setting	5		0.1 to 60 s
	PCt	Configuration of serial link for communications with remote keypad display	OFF		On – OFF

APPENDIX A—RECOMMENDED WIRING DIAGRAMS

Figures 33–35 illustrate circuit diagrams for typical non-reversing and reversing applications in 2-wire and 3-wire control. The recommended circuit diagrams include SCR fault isolation for optimal protection of the motor, driven machinery, and operating personnel.

Table 31: Description of Logic for Recommended Wiring Diagrams

Item	Name	Description
IC1 IC1A	Isolation Contactor (Fwd)	The isolation contactor logic closes IC1 upon a start command and opens IC1 after the stop is complete. The RCR (or RFR and RRR for reversing) are timed contacts that must have a time delay greater than the deceleration ramp time or the INTELE braking time. When a coast stop is selected, the time delay must be set for a time that will allow complete decay of the motor residual voltage. The isolation contactor opens immediately upon a fault. The pilot relay (IC1A) is required when the IC1 contactor coil exceeds the relay rating.
IC2 IC2A	Isolation Contactor (Rev)	Used for reversing applications only, the IC2 must be mechanically interlocked to IC1. A reversing contactor may be used for the combination of IC1 and IC2. In general, the operation of IC2 is identical to IC1. The pilot relay (IC1A) is required when the IC1 contactor coil exceeds the relay rating.
SC SCA	Shorting Contactor and Pilot Relay	The shorting contactor is used to reduce the heat dissipated by the controller when the motor is operating at full speed and voltage. The controller provides proper sequencing of this contactor by the “end-start-up” relay. When the start is completed, the shorting contactor will be commanded to close. The controller will continue to monitor the motor thermal state and provide motor overload protection. Upon a stop command, the SC contactor will open, transferring the motor current to the SCRs to allow for controlled deceleration if desired. The pilot relay (SCA) is required when the SC contactor coil exceeds the relay rating.
TS	Transient Suppressors	Transient suppression of all relay and contactor coils (except ST) is recommended to minimize the possibility of electrical interference with the controller electronics and to increase relay contact life.
RCR	Run Command Relay	Used in all non-reversing logic (optional in shunt trip) for proper sequencing of contactor logic. When energized, RCR initiates the start sequence. When de-energized, stopping is initiated. Operator controls can be either on/off selector switch, HOA selector switch or start/stop push buttons. RCR remains energized during a fault. Once the fault condition has been cleared, RCR must be de-energized by a “stop” command then re-energized to restart the controller.
RFR	Run Forward Relay	Used for reversing applications only, this coil duplicates the functionality of RCR for the forward direction and is interlocked with the RFR relay.
RRR	Run Reverse Relay	Used for reversing applications only, this coil duplicates the functionality of RCR for the reverse direction and is interlocked with the RRR relay.
ST	Shunt Trip Coil	This coil is attached to the shunt trip coil on the disconnect and will energize 2 seconds after a controller fault by the TR timer contact. The time delay is to prevent nuisance tripping of the circuit breaker during controller power-up or during line undervoltage conditions.
TR	Trip Relay	Used in shunt trip circuit breaker logic only; coil energized upon a controller fault.
FR	Fault Relay	Used with logic diagrams that use an isolation contactor. The fault relay is energized during normal operation and deenergizes if the controller fault contacts open or if the motor thermal switch (if supplied) opens. FR also provides additional contacts for the controller fault output.

To select control operators (push buttons, pilot lamps, and selector switches), control power transformers, and wire management devices (control and power terminal strips, wire terminations) indicated on the recommended wiring diagram configurations, refer to the latest editions of Square D / Schneider Electric’s full line product catalogs.

Figure 33: Nonreversing with Shunt Trip Fault Isolation

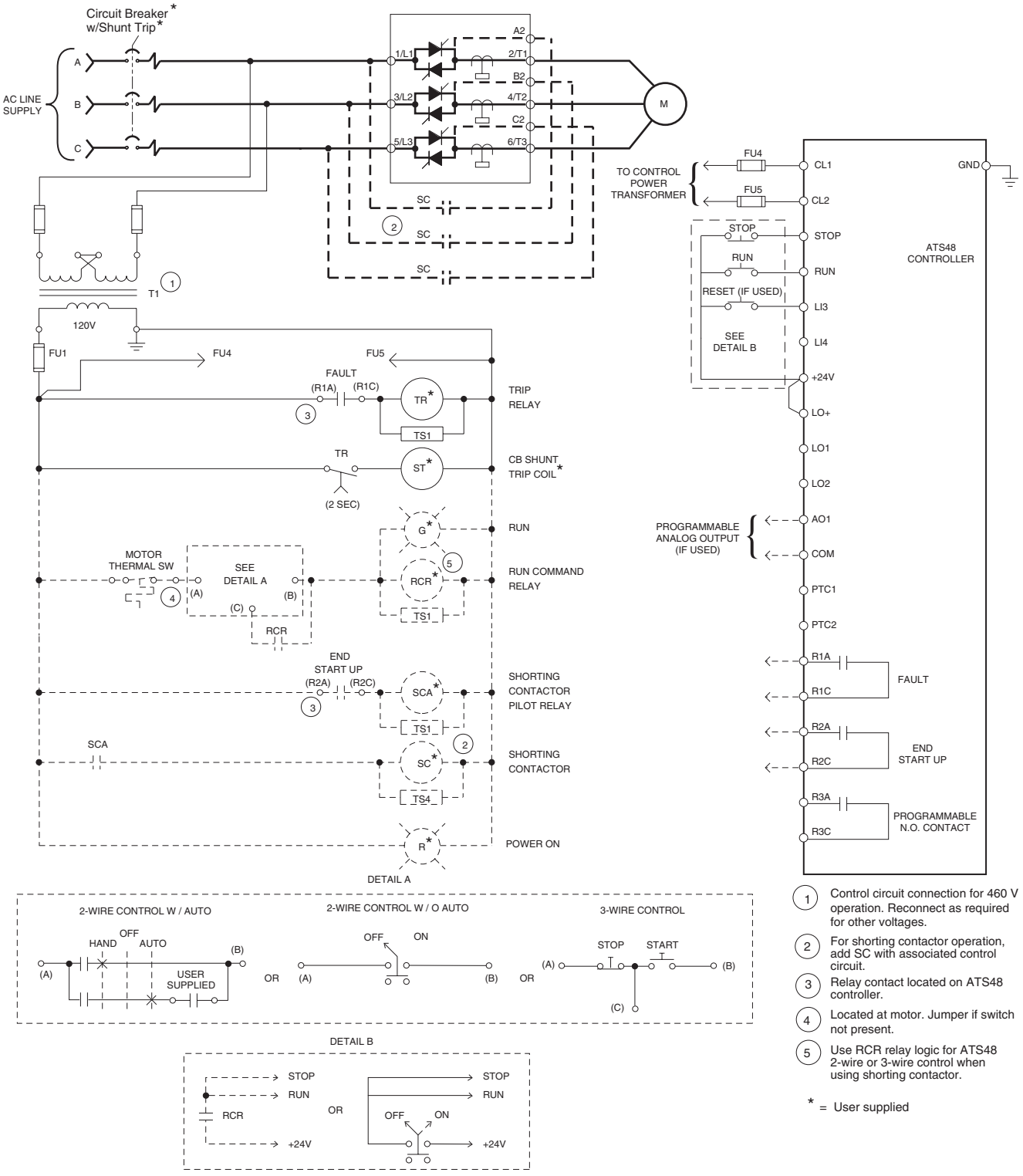
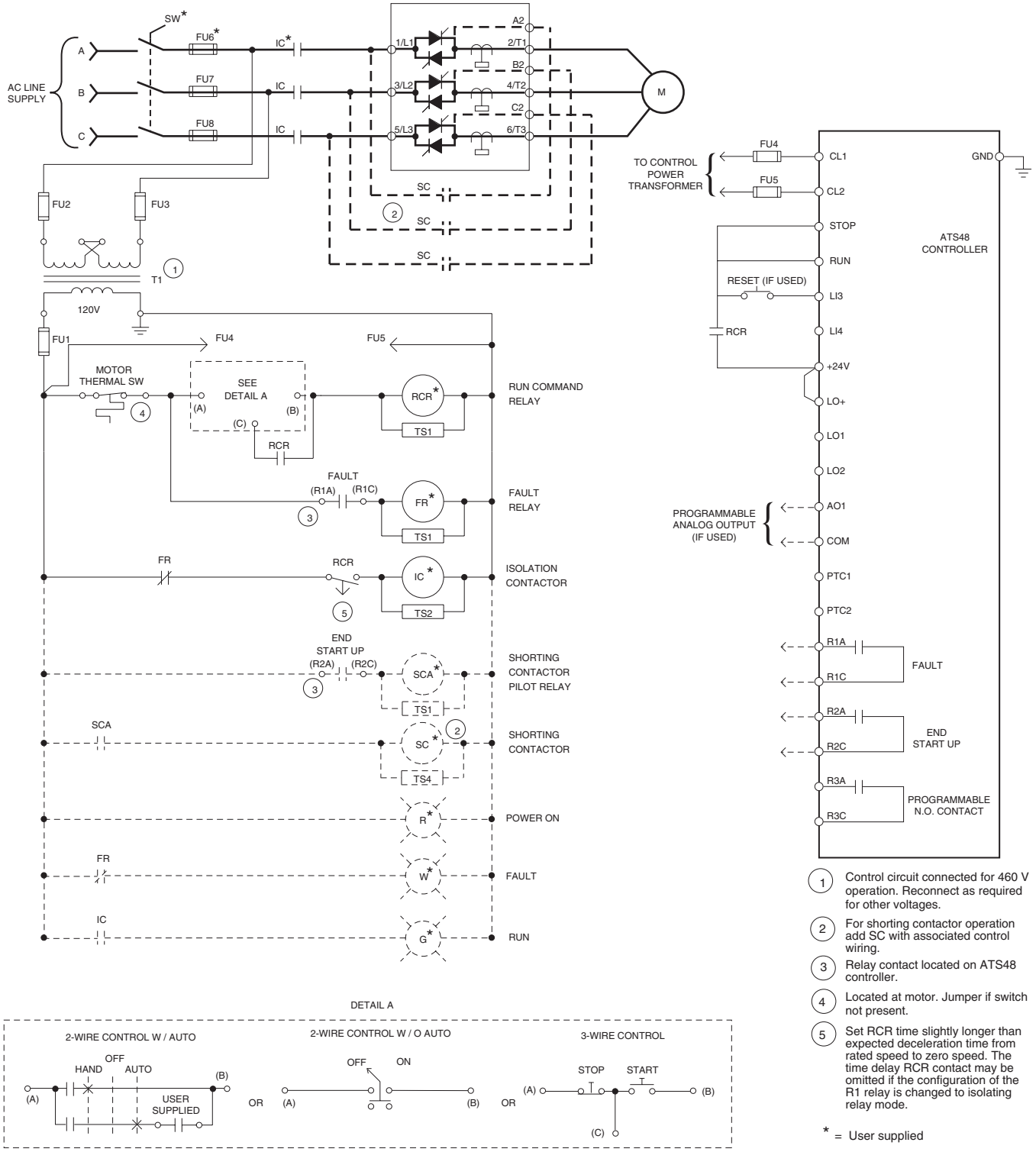


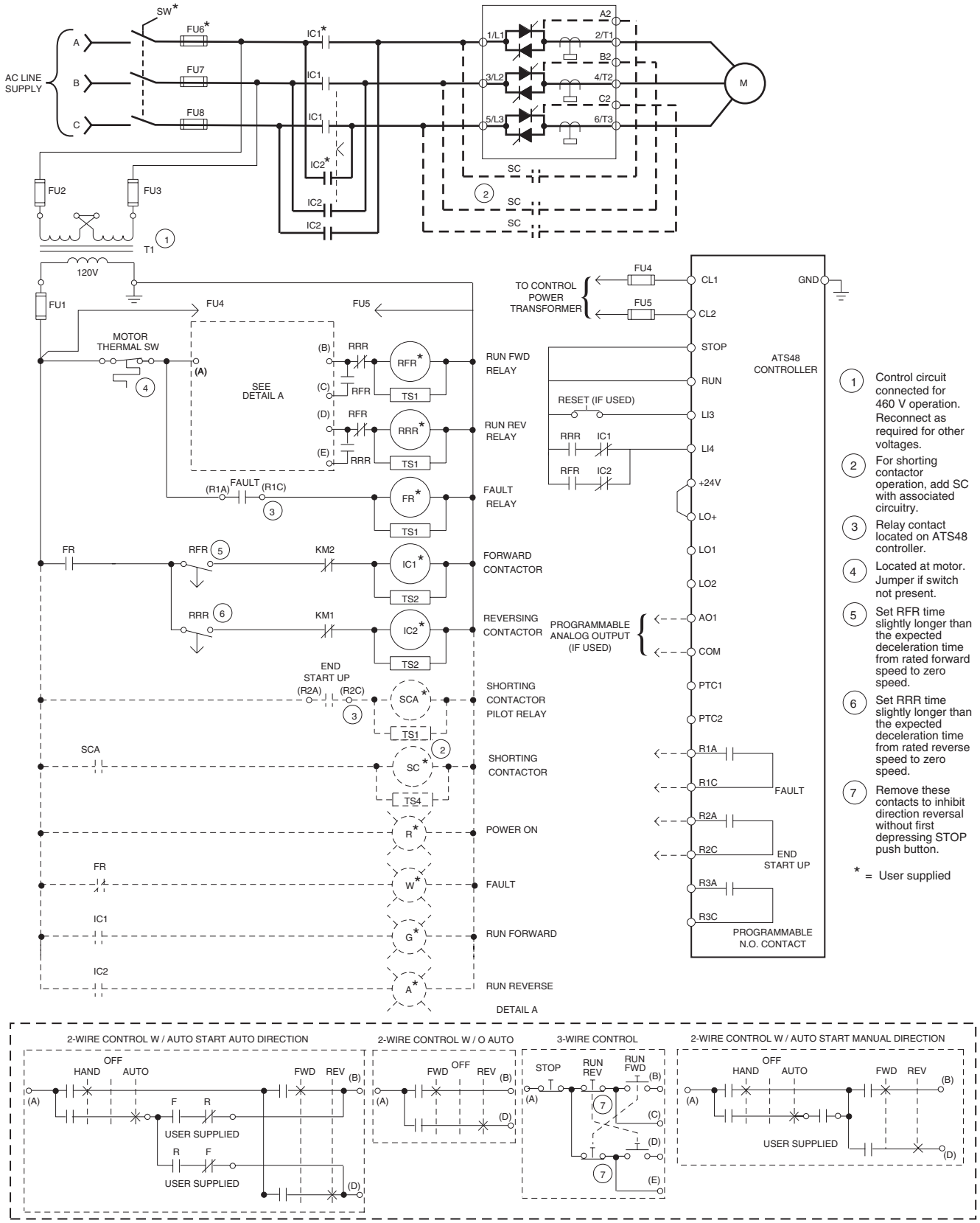
Figure 34: Nonreversing with Isolation Contactor



1. Control circuit connected for 460 V operation. Reconnect as required for other voltages.
2. For shorting contactor operation add SC with associated control wiring.
3. Relay contact located on ATS48 controller.
4. Located at motor. Jumper if switch not present.
5. Set RCR time slightly longer than expected deceleration time from rated speed to zero speed. The time delay RCR contact may be omitted if the configuration of the R1 relay is changed to isolating relay mode.

* = User supplied

Figure 35: Reversing with Isolation Contactors



APPENDIX B—RECOMMENDED COMPONENT LISTS

To select control operators (push buttons, pilot lamps, and selector switches), control power transformers, and wire management devices (control and power terminal strips, wire terminations) indicated on the recommended wiring diagram configurations, refer to the latest editions of Square D / Schneider Electric's full line product catalogs.

Table 32: Suggested Components for Standard Duty Applications

Induction Motor (M) Rated hp [1]				ATS48 Controller Model	Device Rated Current @40 °C [2]	Power Burden (VA)	Class CC Control Fuse Size (FU4/FU5 Fuses)	
208 V	230 V	460 V	575 V				@208/230 V (A)	@460/575 V (A)
3	5	10	15	ATS48D17Y	17	25	0.25	
5	7.5	15	20	ATS48D22Y	22	25	0.25	
7.5	10	20	25	ATS48D32Y	32	25	0.25	
10	—	25	30	ATS48D38Y	38	25	0.25	
—	15	30	40	ATS48D47Y	47	25	0.25	
15	20	40	50	ATS48D62Y	62	25	0.25	
20	25	50	60	ATS48D75Y	75	25	0.25	
25	30	60	75	ATS48D88Y	88	25	0.25	
30	40	75	100	ATS48C11Y	110	25	0.25	
40	50	100	125	ATS48C14Y	145	25	0.25	
50	60	125	150	ATS48C17Y	170	25	0.25	
60	75	150	200	ATS48C21Y	210	25	0.25	
75	100	200	250	ATS48C25Y	250	25	0.25	
100	125	250	300	ATS48C32Y	320	25	0.25	
125	150	300	350	ATS48C41Y	410	25	0.25	
150	—	350	400	ATS48C48Y	480	25	0.25	
—	200	400	500	ATS48C59Y	590	25	0.25	
200	250	500	600	ATS48C66Y	660	25	0.25	
250	300	600	800	ATS48C79Y	790	25	0.25	
350	350	800	1000	ATS48M10Y	1000	25	0.25	
400	450	1000	1200	ATS48M12Y	1200	25	0.25	

[1] Motor full load currents through 500 hp @ 460/575 V, 250 hp @ 230 V, and 200 hp @ 208 V are taken from the National Electrical Code (NEC) (NFPA 70-2002, Table 430.150). Above these ratings, motor full load currents are calculated based upon 1.2 A/hp for 460 V and 2.4 A/hp for 230 V. Motors listed are for standard duty applications. For severe duty applications, select the next larger controller size.

[2] The ambient temperature indicated in the table represents the temperature of the air surrounding the ATS48 controller. Any additional temperature factors associated with the enclosure system or actual installation ambient temperature must be considered when determining the actual rated current (I_{CL}) of the controller. For operating ambient above 40° C without a shorting/bypass contactor and 50° C with a shorting/bypass contactor but not exceeding 60° C, the rated current (I_{CL}) of the controller must be de-rated by 2% per °C.

Table 33: Additional Suggested Components for Standard Duty Applications

ATS48 Controller Model	IC1 [1, 2, 3]	IC2 [1, 2, 3]		SC [1, 2, 3]	Fusible Disconnect [4]			Thermal Magnetic Circuit Breaker [4, 8, 5]
	Isolation Contactor	Reversing Contactor [6]	Mechanical Interlock	Shorting Contactor (AC1)	Power Fuses Class/Rating	Fuse Block [7]	Molded Case Switch [8]	
D17Y	LC1D18	LC1D18	[9]	LC1D18	J / 25	60308J	FHL36000M	FAL36030
D22Y	LC1D25	LC1D25	[9]	LC1D25	J / 30	60308J	FHL36000M	FAL36040
D32Y	LC1D32	LC1D32	[9]	LC1D32	J / 40	60608J	FHL36000M	FAL36050
D38Y	LC1D40	LC1D40	[9]	LC1D40	J / 50	60608J	FHL36000M	FAL36060
D47Y	LC1D50	LC1D50	[9]	LC1D50	J / 60	60608J	FHL36000M	FAL36080
D62Y	LC1D65	LC1D65	[9]	LC1D65	J / 80	61038J	FHL36000M	FAL36090
D75Y	LC1D80	LC1D80	[9]	LC1D80	J / 100	61038J	FHL36000M	FAL36100
D88Y	LC1D80	LC1D80	[9]	LC1D80	J / 120	62003J	KHL36000M	KAL36110
C11Y	LC1D115	LC1D115	[9]	LC1D115	J / 150	62003J	KHL36000M	KAL36150
C14Y	LC1D150	LC1D150	[9]	LC1D150	J / 200	62003J	KHL36000M	KAL36200
C17Y	LC1F185	LC1F185	LA9FF970	LC1F185	J / 225	64033J	LHL36000M	LAL36225
C21Y	LC1F265	LC1F265	LA9FG970	LC1F265	J / 300	64033J	LHL36000M	LAL36250
C25Y	LC1F265	LC1F265	LA9FJ970	LC1F265	J / 350	64033J	LHL36000M	LAL36350
C32Y	LC1F400	LC1F400	LA9FJ970	LC1F400	J / 400	64033J	LHL36000M	LAL36400
C41Y	LC1F400	LC1F400	LA9FJ970	LC1F400	J / 500	6633J	MHL36000M	MAL36500
C48Y	LC1F500	LC1F500	LA9FJ970	LC1F500	J / 600	6633J	MHL360006M	MAL36600
C59Y	LC1F630	LC1F630	LA9FJ970	LC1F630	L / 700	[7]	MHL360008M	MAL36800
C66Y	LC1F800	LC1F800	LA9FJ970	LC1F800	L / 900	[7]	MHL360008M	MAL36900
C79Y	LC1BL33	LC1BL33	LA9FL970	LC1BL33	L / 1100	[7]	MHL36000M	[10]
M10Y	LC1BL33	LC1BL33	LA9FL970	LC1BL33	L / 1350	[7]	MHL36000M	[10]
M12Y	LC1BP33	LC1BP33	LA9FX970	LC1BP33	L / 1600	[7]	NCL3600012M	[10]

[1] All coils are selected for 120 V, 60 Hz operation. Refer to the Square D *Digest* for additional coil voltages or auxiliary contact configurations. One block may be added to each contactor.

[2] Power terminals are not included with LC1-F contactors. Refer to the latest editions of Square D / Schneider Electric's full line product catalogs for additional ordering information.

[3] The use of transient suppressors across all contactor coils is recommended. Refer to the latest editions of Square D / Schneider Electric's full line product catalogs for selection of transient suppressors.

[4] According to the National Electrical Code, branch circuit overcurrent protection must be provided for each controller. Short circuit protective devices recommended in this table are within NEC requirements for Type 1 coordination.

[5] According to the National Electrical Code, branch circuit overcurrent protection must be provided for each controller. Short circuit protective devices recommended in this table are within NEC requirements for Type 1 coordination.

[6] Reversing contactors for C11 through M12 controllers must be assembled from components. Parts quantities for a basic contactor assembly, minus the power connection links and terminals, are indicated before each part number. Refer to the latest editions of Square D / Schneider Electric's full line product catalogs for power connector link and terminal kits. Reversing contactor interlock units used for the C79 through M12 controllers are designed for vertical interlocking of the individual contactors. Horizontally interlocked contactors are used for D17 through C59 controllers.

[7] Fuse holder part number references are for Class J fuses only based on Ferraz Shawmut spring reinforced with box type connectors acceptable for Al/Cu wiring. Class L fuses require bolt-on connections to user-supplied power bus work.

[8] The molded case switches and circuit breakers selected require the addition of operator mechanisms to allow operation from the exterior of an enclosure. Refer to the latest editions of Square D / Schneider Electric's full line product catalogs for operator mechanism information. When using a shunt trip relay for SCR fault isolation, order a disconnect switch with suffix -1021 for addition of shunt trip coil.

[9] The D Line contactor is available as a reversing configuration. For these applications, change the IC1 part number prefix from LC1- to LC2- to order the IC1 and IC2 combination complete with mechanical interlocks.

[10] Devices rated above 660 A have not been coordinated with circuit breakers. You must use a Class L fuse for overcurrent protection with ATS48 controller models C79, M10, and M12.

APPENDIX C—OPTIONS AND ACCESSORIES

Tables 34–36 show the accessories available for ATS48 soft start controllers.

Table 34: Documentation

VVDED302023	MODBUS Protocol User's Manual (multilingual)
DCICD398111	Communications: Ethernet, FIPIO, DeviceNet, Profibus DP User's Manual (CD-ROM version only)

Table 35: Remote Keypad Display

VW3G48101	Remote mounting kit for keypad display (IP54). • 7-segment remote keypad display • Mounting kit containing cover, screws, and an IP54 seal on the front panel. • 9.8 ft (3 m) cable with a 9-way SUB-D connector for keypad display and an RJ-45 connector for connecting to an ATS48 controller.

Table 36: Protective Covers for Power Terminals

LA9F702	Set of six protective covers for ATS48C14Y to ATS48C17Y.
LA9F703	Set of six protective covers for ATS48C21Y, ATS48C25Y, and ATS48C32Y

NOTE: The ATS48 controller has 9 unprotected power terminals.

PowerSuite Advanced Dialogue Solutions

PowerSuite solutions are compatible with software version 1.30, build 5.

Table 37: Pocket PC/PDA Kits

VW3A8108EN (English) **VW3A8108FR (French)** **VW3A8108SP (Spanish)**	Complete PowerSuite Pak includes: • Palm size HP JORNADA 525 (Palm size PC terminal) with operating system, PC synchronization cable and power supply. • PowerSuite CD-ROM setup software [VW3A8014] • Connection cable [VW3A8111].
VW3A8102	Pocket PC/PDA setup kit includes: • CD-ROM containing setup software. • Connection kit for the Palm size PC terminal. Available in English, French, and Spanish operating systems.
VW3A8111	Cable connection kit for the Palm size PC terminal to an ATS48 controller includes: • (2) connection cables, 9.8 ft (3 m) each with two RJ-45 connectors. • (1) RJ-45/9-way SUB-D adaptor. • (1) converter marked "RS-232/RS-485 PPC" with one 9-way male SUB-D connector and 1-RJ-45 connector.

Table 38: PowerSuite Software for Personal Computers

VW3A8104	PowerSuite Test and Commissioning Software on CD for use with Microsoft® Windows 95, 98, and NT™ and Windows CE v3.0 for Pocket PCs/PDA.
VW3A8106	Cable connection kit for the Personal Computer to an ATS48 controller. • two connection cables, 9.8 ft (3 m) each with two RJ-45 connectors. • one RJ-45/9-way SUB-D adaptor. • one converter marked "RS-232/RS-485 PPC" with one 9-way male SUB-D connector and one RJ-45 connector.

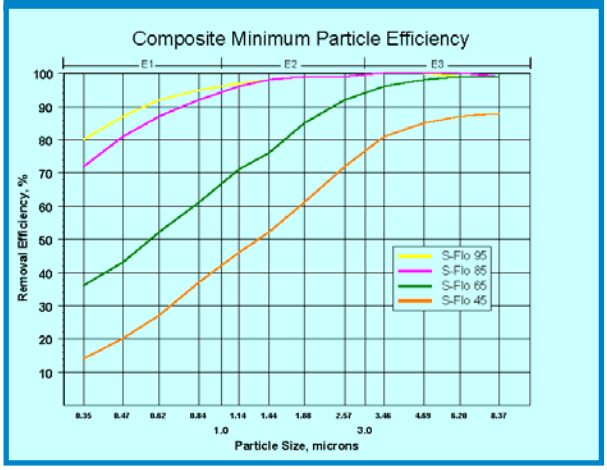
Factory repaired ATS48 controllers are available within 24 hours from a factory exchange pool, or your ATS48 controller can be factory repaired and returned. Contact your local Square D / Schneider Electric Distributor or

INDEX

s-flo

Extended Surface Multi-Pocket Synthetic Air Filters

Synthetic media extended surface air filter for high efficiency particulate removal



Values are MERVs when evaluated per ASHRAE 52.2.

The Camfil Farr S-Flo offers high efficiency particulate air filtration to address today's indoor air quality concerns. The S-Flo can remove contaminants such as fumes, smoke, bacteria, fungi, and virus-bearing droplet nuclei. S-Flo filters are available in the following efficiencies:

ASHRAE 52.1	ASHRAE 52.2	Eurovent/CEN
40-45%	MERV 9	EU5
60-65%	MERV 11	EU6
80-85%	MERV 13	EU7
90-95%	MERV 14	EU8

High Lofted Melt-Blown Synthetic Media

The Camfil Farr S-Flo includes a unique melt-blown synthetic media that provides critical capture of particles as small as 0.3 micron. The media incorporates a uniform high loft to provide a lower resistance to airflow than comparable high efficiency air filters. A lightweight scrim media backing ensures protection of the media and prevents media erosion.

Stronger than conventional media, the S-Flo can withstand the rigors of turbulent airflow common in certain industrial applications. Performance and configuration are unaffected by dust loading or humidity. The S-Flo may also be used in industrial applications involving chemicals that may be hostile to other types of filters.

The S-Flo is also the filter of choice for the removal of nuisance contaminants such as pollens, paper dust, and other atmospheric impurities.

Applications include commercial buildings, medical facilities, and industrial manufacturing facilities.

Camfil Farr	Product sheet
S-Flo	1205 - 0704
Camfil Farr—clean air solutions	

Melt-blown Synthetic Media (continued)

The Camfil S-Flo incorporates an exclusive blend of synthetic microfibers that are electrostatically enhanced during the fiber manufacturing process to enhance particle capture efficiency. Biologically inert, these fibers will not support microbial growth. The media is color-coded to allow quick identification of filter efficiency.

Yellow	90-95%	
Pink	80-85%	
Green	60-65%	
White	40-45%	

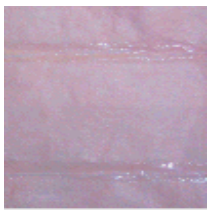
Individual pockets include internal stitching to maintain uniform airflow channels for even dust loading and long filter life. The S-Flo may be operated to a final resistance of 1.5" w.g. without affecting product performance. Camfil Farr manufactures the S-Flo to be capable of withstanding up to 5.0" w.g., ensuring product durability in the most demanding applications.

Performance

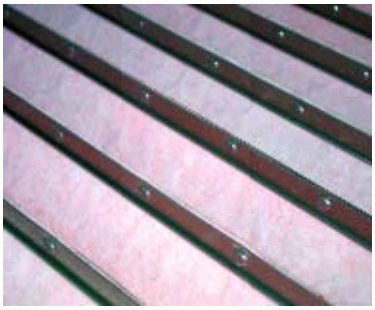
Synthetic fibers also offer a higher initial efficiency than media manufactured of many other types of fibers, making synthetics the obvious choice for applications where higher initial efficiencies may be critical. Camfil Farr S-Flo filters are available in fractional efficiencies from 40% to 95% on particles as small as 0.3 micron in size. MERV values range from 9 to 14 when evaluated under ASHRAE Standard 52.2 and dust spot efficiencies range from 40% to 95% when evaluated under ASHRAE Standard 52.1.

Stitch Sealant & Adhesive Bonding

Camfil Farr completely seals pocket stitching to eliminate the possibility of particle bypass through stitching penetrations. This unique sealant maintains a flexibility that is unaffected by varying airflows. The media is bonded around the pocket retainers to ensure a strong pocket-to-retainer seal and minimize the potential for pocket failure.



Sure-Clench® Crimp



Each galvanized steel pocket retainer is fastened with Camfil Farr's exclusive Sure-Clench crimp, creating a positive lock between pockets and eliminating the possibility of air bypass. Each pocket retainer includes rolled edges to prevent damage to the media and minimize sharp edges that may create a hazard to filter installers.

Galvanized Steel Header

A "J" return channel header, of one-piece corrosion resistant galvanized steel, has rolled edges to prevent damage to the filter media. When combined with the Sure-Clench Crimp and galvanized pocket retainers, a rigid and durable assembly is created for installation into side-access or built-up bank applications.

Leak-Free Filter Performance

Every Camfil Farr S-Flo includes a gasket on the vertical edge of the filter header. In a side-access housing, filters are mated header-to-header. A ¼" gap around a 24" by 24" filter can equate to 18% air bypass at 500 fpm. The S-Flo filter's gasket prevents air bypass and ensures that the air filter will clean all of the air moving through the system.

Configurations for any Application

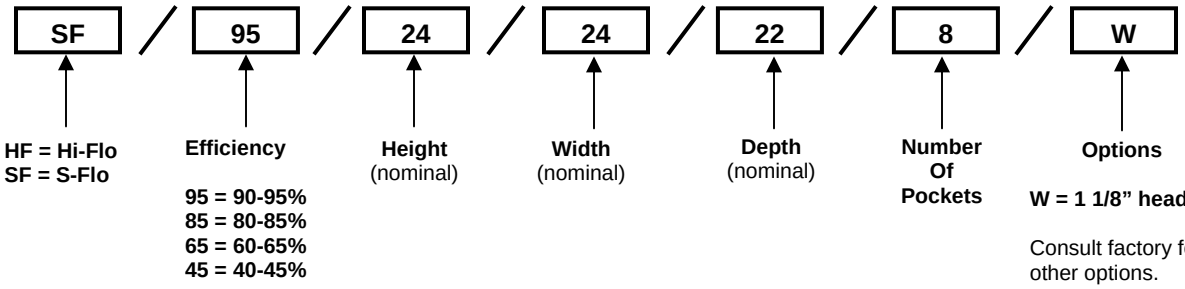
Camfil Farr S-Flo filters are available in a variety of configurations to suit your air quality requirements. Common configurations include from 3 to 12 pockets, depths of 15" to 30", and up to 101 square feet of effective media area.

When selecting an S-Flo for your system, you should select a filter with the greatest effective media area within the airflow parameters and space limitations for your system.

With effective removal of sub-micron particles, dependable construction, and high dust holding capacity, the S-Flo is the perfect fit for any application.

Camfil Farr S-Flo Selection Chart

Model Number (precede with SF and insert efficiency for *)	Number of Pockets	Dimensions[a] (nominal size) (inches) H x W x D	Airflow Capacity[b] (cfm)			Initial Resistance to Airflow (inches w.g.) [c]												Media Area (sq. ft.)
						MERV 14 (90-95%)			MERV 13 (80-85%)			MERV 11 (60-65%)			MERV 9 (40-45%)			
			Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High	
*/24/24/15/12	12	24 x 24 x 15	1000	1500	2000	0.21	0.35	0.50	0.17	0.28	0.40	0.13	0.21	0.30	0.11	0.18	0.25	58
*/24/20/15/9	9	24 x 20 x 15	750	1100	1500													44
*/24/12/15/6	6	24 x 12 x 15	500	750	1000													29
*/20/20/15/9	9	20 x 20 x 15	650	950	1275													37
*/24/24/30/10	10	24 x 24 x 30	2000	2400	2800	0.40	0.51	0.62	0.30	0.38	0.47	0.25	0.32	0.39	0.20	0.26	0.31	101
*/24/20/30/8	8	24 x 20 x 30	1600	1900	2250													81
*/24/12/30/5	5	24 x 12 x 30	1000	1200	1400													50
*/20/20/30/8	8	20 x 20 x 30	1350	1625	1875													68
*/24/24/22/10	10	24 x 24 x 22	1500	1750	2000	0.32	0.38	0.45	0.25	0.29	0.35	0.19	0.23	0.27	0.15	0.18	0.22	73
*/24/20/22/8	8	24 x 20 x 22	1200	1400	1600													58
*/24/12/22/5	5	24 x 12 x 22	750	875	1000													36
*/20/20/22/8	8	20 x 20 x 22	1000	1175	1350													49
*/24/24/30/8	8	24 x 24 x 30	1600	2000	2400	0.34	0.45	0.58	0.27	0.35	0.45	0.21	0.27	0.35	0.17	0.22	0.28	81
*/24/20/30/7	7	24 x 20 x 30	1400	1750	2100													70
*/24/12/30/4	4	24 x 12 x 30	800	1000	1200													40
*/20/20/30/7	7	20 x 20 x 30	1150	1450	1750													59
*/24/24/22/8	8	24 x 24 x 22	1500	1750	2000	0.35	0.42	0.50	0.28	0.34	0.40	0.21	0.25	0.30	0.18	0.21	0.25	58
*/24/20/22/7	7	24 x 20 x 22	1300	1500	1750													51
*/24/12/22/4	4	24 x 12 x 22	750	875	1000													29
*/20/20/22/7	7	20 x 20 x 22	1100	1300	1450													43
*/24/24/30/6	6	24 x 24 x 30	1500	1750	2000	0.39	0.46	0.55	0.32	0.38	0.45	0.25	0.29	0.35	0.20	0.24	0.28	63
*/24/20/30/5	5	24 x 20 x 30	1300	1500	1700													52
*/24/12/30/3	3	24 x 12 x 30	750	875	1000													31
*/20/20/30/5	5	20 x 20 x 30	1050	1225	1400													44
*/24/24/22/6	6	24 x 24 x 22	1500	1750	2000	0.44	0.53	0.63	0.36	0.43	0.51	0.27	0.32	0.38	0.21	0.25	0.30	45
*/24/20/22/5	5	24 x 20 x 22	1300	1500	1700													38
*/24/12/22/3	3	24 x 12 x 22	750	875	1000													23
*/20/20/22/5	5	20 x 20 x 22	1050	1225	1400													32



DATA NOTES:

[a] Standard S-Flo includes 0.88" (1" nominal) header. For 1.12" (1¼" nominal) header add a W to the end of the model number. Contact factory for lead times.

[b] Select 100% for constant volume systems and 80% of maximum design airflow for VAV systems. S-Flo filters perform satisfactorily over listed CFM range. Rated capacity is medium on chart.

[c] Recommended final resistance is 1.0" w.g. The Hi-Flo may be operated to 1.5" w.g. without affecting performance.

Special sizes are available, please contact factory. Pocket loops are recommended for 32" & 36" deep filters.

S-Flo filters with a 20" by 24" header size are available, consult factory for pricing and availability. System resistance is the same as 24" by 20" listed in above chart.

The S-Flo is classified by Underwriters Laboratories as UL Class 2.

Maximum operating temperature 158° F (70° C).

Performance tolerances conform to Section 7.4 of ARI Standard 850-78.

For lowest life cycle cost, select the filter with the greatest depth and media area that may be accommodated within the listed operating range of the filter.

Extended Surface Pocket Filter Options S-Flo

Camfil Farr Hi-Flo®

Camfil Farr also offers a glass microfiber media extended surface pocket filter that offers consistent efficiencies in the sub-micron particle ranges throughout the life of the filter. The Camfil Farr Hi-Flo is available in efficiencies of MERV 9, MERV 11, MERV 13 and MERV14 based upon evaluation using ASHRAE Standard 52.2-1999. Consult Camfil Farr Bulletin 1203-0602.

Cambridge-Style Header

S-Flo filters include a 0.88" header for installation into a nominal 1" deep filter track. The Cambridge Air Filter Company manufactured side-access housings that required a 1.12" header to fit in a nominal 1¼" filter track. To order S-Flo filters for these housings, add a 'W' to your model number or seek factory guidance.

UL Class 1 Hi-Flo®

The S-Flo is only available in UL Class 2. If UL Class 1 is required, the Camfil Farr Hi-Flo is available in a Underwriters Laboratories UL Class 1 configuration. It is important to note that both classes of filters will burn when attacked by flames, and both will self-extinguish when clean.

UL Class 1 - Air filters which, when clean, do not contribute fuel when attacked by flame and emit only negligible amounts of smoke.

UL Class 2 - Air filters which, when clean, burn moderately when attacked by flame, or emit moderate amounts of smoke, or both.

Consult Camfil Farr Bulletin 1203-0602. Consult factory for pricing and availability.

SPECIFICATIONS

1.0 General

1.1 - Air filters shall be high efficiency ASHRAE extended surface pocket style filters consisting of a melt-blown lofted synthetic media, a galvanized steel header and pocket retainers, and bonding agents to prevent air bypass and ensure leak free performance. The filter shall be capable of withstanding 5.0" w.g. without pocket failure.

1.2 - Sizes shall be as noted on drawings or other supporting materials.

2.0 Construction

2.1 - Filter media shall consist of melt-blown lofted synthetic media that is bonded to a permeable media support backing forming a uniform lofted filter blanket.
2.2 - Individual pockets shall contain a minimum of 40 stitching support points per square foot of media area. All stitching centers shall be sealed through the use of a foam based sealant that shall remain pliable throughout the life of the filter. The sides and ends of each pocket shall be sewn with a chain-link over lock stitch.
2.3 - Pockets shall be internally sewn with a variable pocket support stitch to promote uniform airflow across the surface of the media.
2.4 - Support members shall include a galvanized steel header and galvanized steel pocket retainers. The header shall be bonded to the media to prevent air bypass. Individual pocket retainers shall be fastened with a mechanical crimp to lock individual pockets together. The media pockets shall be bonded to the pocket retainers to prevent air bypass. The frame shall form a rigid and durable support assembly.
2.5 - A filter-to-filter sealing gasket shall be installed on one of the vertical members of the filter header.

3.0 Performance

3.1 - The filter shall have a Minimum Efficiency Reporting Value of (MERV 9, MERV 11, MERV 13, MERV 14) per ASHRAE Standard 52.2-1999.
3.2 - Supporting data; provide laboratory test reports for each listed efficiency including all details as prescribed in ASHRAE Standards 52.1 and 52.2.
3.3 - The filter shall be classified by Underwriters Laboratories as UL Class 2.
3.4 - Manufacturer shall provide evidence of facility certification to ISO 9001:2000.

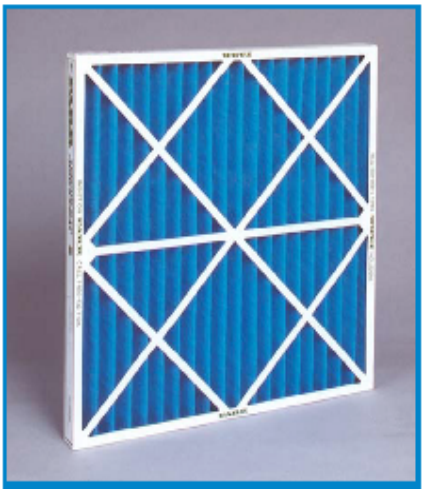
Items in parentheses () require selection.

Camfil Farr, Inc.
United States Tel: (973) 616-7300 Fax: (973) 616-7771
Canada Tel: (450) 629-3030 Fax: (450) 662-6035
E-mail: camfilfarr@camfilfarr.com

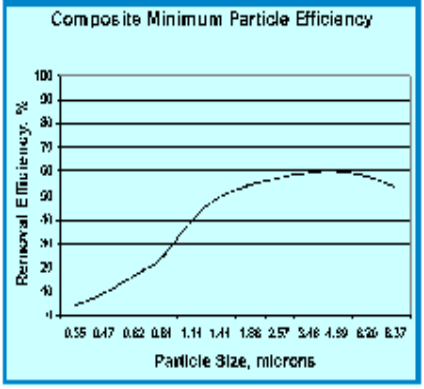
http://www.camfilfarr.info
http://www.camfilfarr.com

aeropleat® III

Standard-Capacity Pleated Panel Filter



An economical choice for those requiring MERV 6 efficiency in HVAC applications



Values are MERV when evaluated per ASHRAE Standard 52.2.

Meeting Today's Standards

The Camfil Farr Aeropleat® III pleated filter offers medium grade ASHRAE efficiency and sets the performance standard for those upgrading from lower efficiency throw-aways or pads. Using a mechanical particle capture principle, the Aeropleat III is a MERV 6 filter when evaluated per ASHRAE Standard 52.2-1999.

For Today's Applications

As a stand-alone filter, the Aeropleat III will remove many of the contaminants associated with today's indoor air quality concerns. Available in 1", 2" and 4" depths, its increased media area offers an extended service life when compared to lower efficiency throw-aways or pads. Applications include commercial buildings, educational facilities and specialty manufacturing. As a pre-filter, the Aeropleat III offers protection for the higher efficiency final filters required for today's high-technology applications.

Built for Today's HVAC Systems

- 10 pleats per linear foot (2" deep model) in a radial pleat design for full use of media area
- Optimum blend of cotton and synthetic fibers provides medium grade ASHRAE performance and increased dust-holding capacity
- Welded wire media grid is treated for corrosion resistance and prevents media oscillation or pull away
- High wet-strength beverage board frame creates a rigid and durable filter pack. The pack will withstand 2.0 "w.g. without failure
- Available in 1", 2" and 4" depths

camfil FARR

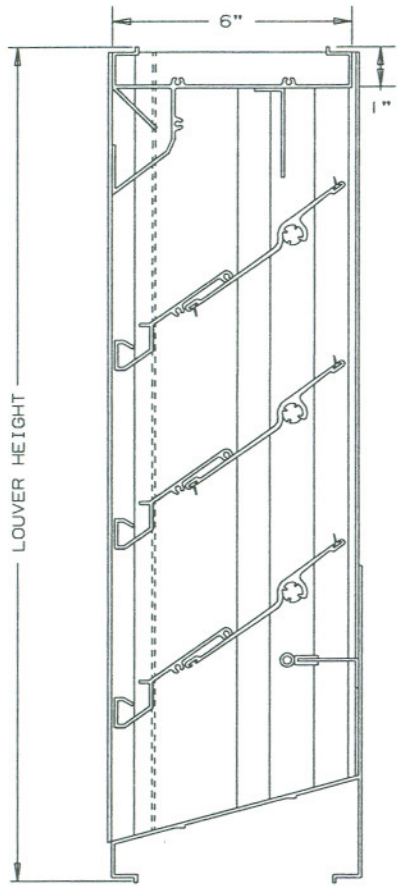
Camfil Farr	Product sheet
Aeropleat® III	1008-0603
Camfil Farr—clean air solutions	

ARROW

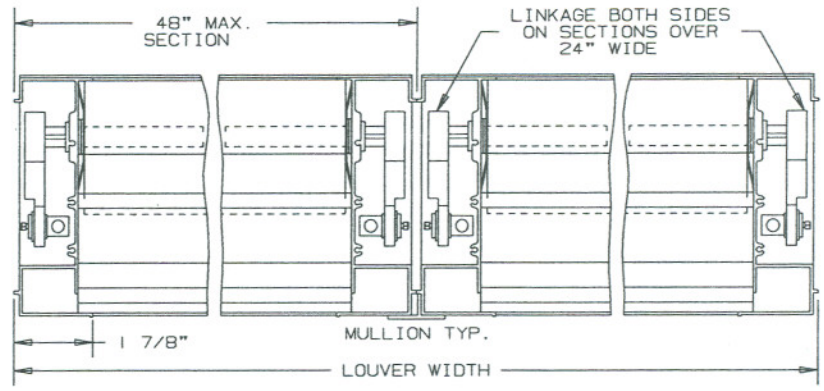
EXTRUDED ALUMINUM LOUVERS
COMBINATION ADJUSTABLE AND STATIONARY DRAIN
6" DEEP

TYPE EA-680-D

DRAIN LOUVER - 35° STATIONARY BLADES



NOT TO SCALE

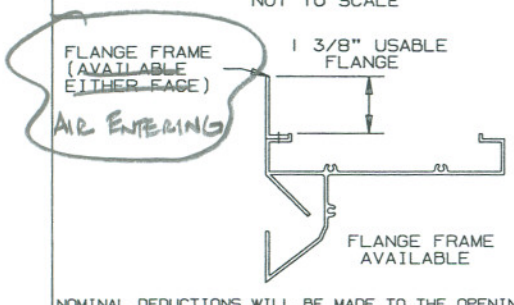


SPECIFICATIONS

FRAME AND STATIONARY BLADE: EXTRUDED ALUMINUM 6063-T6/T52 ALLOY, FRAME IS .080" THK., BLADE IS .080" THK. ON 4 1/2" CENTERS.
ADJUSTABLE BLADE: EXTRUDED ALUMINUM 6063-T6/T52 ALLOY, .125" THK.
FACE OF LOUVER: FULL WIDTH SILL WITH HEAD AND BLADES CONTAINED WITHIN THE JAMBS.
LINKAGE: EXTRUDED ALUMINUM, CONCEALED IN CHANNEL OUT OF AIRSTREAM. PIVOTS ARE .050" DIA. MACHINED STEEL, CADMIUM PLATED AND CHROMATE TREATED. PIVOTS ROTATE IN A CELCON BEARING. A .312" DIA. ALUMINUM LINKAGE ROD IS LOCKED TO THE PIVOT BY A 1/4-20 SET SCREW WITH AN EPOXY LOCKING PATCH.
SHAFTS: .50" DIA. ALUMINUM "PIN-LOCK" ROD.
SEALS: EXTRUDED SILICONE RUBBER SEAL AT BLADE EDGE. STAINLESS STEEL AT JAMB.
SCREENS: WHEN INDICATED, IN A REMOVABLE FRAME.
BIRD SCREEN - 1/2" FLATTENED ALUMINUM, .051" THK.
OR - 1/2" SQ. MESH, INTERMEDIATE DOUBLE-CRIMPED ALUMINUM WIRE, .063 DIA.
OR - 18/16 MESH, .011" DIA. ALUMINUM WIRE, INSECT SCREEN.
FINISH: MILL.
LOUVER SIZES: 12" x 12" MINIMUM PANEL SIZE.
48" x 96" MAXIMUM PANEL SIZE.

LOUVER PERFORMANCE STATEMENT

LOUVER MODEL EA-680-D SHALL BE FABRICATED TO PROVIDE A MINIMUM OF (52%), 8.24 SQUARE FEET OF FREE AREA FOR A 48" x 48" SIZE LOUVER AND BEAR THE AMCA CERTIFIED RATINGS PROGRAM SEAL FOR AIR PERFORMANCE AND WATER PENETRATION. THE RATINGS SHALL SHOW A BEGINNING POINT OF WATER PENETRATION AT .01 OUNCES PER SQUARE FOOT OF FREE AREA AT A FREE AREA VELOCITY OF 1029 FEET PER MINUTE, (8479) CUBIC FEET PER MINUTE. WITH A .11 INCHES WATER GAUGE PRESSURE DROP FOR AIR INTAKE.



OPTIONAL

- OTHER SCREENS
- ARCHITECTURAL FINISHES
- ACTUATORS (ELECTRIC, PNEUMATIC, MANUAL, ETC.)

FOR CERTIFIED RATINGS AUTHORIZED BY AMCA - SEE REVERSE SIDE

NOMINAL DEDUCTIONS WILL BE MADE TO THE OPENING SIZE GIVEN.

ITEM	QTY.	OPENING SIZE WIDTH	OPENING SIZE HEIGHT	LOUVER SIZE WIDTH	LOUVER SIZE HEIGHT	MULL	SCREENS TYPE	SCREENS LOC
1	12	48	48					

SHEET METAL WORKERS' INTERNATIONAL ASSOCIATION
UNION MADE

ARROW UNITED INDUSTRIES
A DIVISION OF MESTEK, INC.
314 RIVERSIDE DRIVE
WYALUSING, PA 18853
TEL: (570)746-1888 FAX: (570)746-9286

AGENT: _____

ARCH./ENG.:
CONTR.:
PROJECT:
EDR: ECN: JOB:
DATE: DWN.: DWG.:

LOUVER MODEL EA-680-D

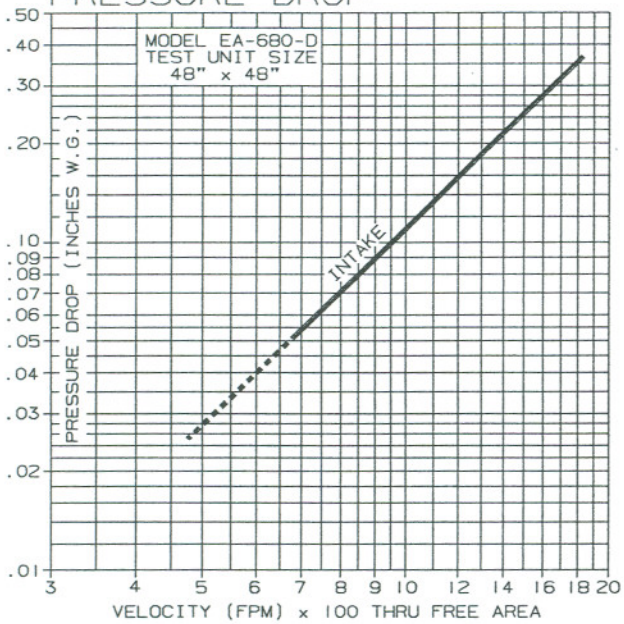
DRAIN LOUVERS

EXTRUDED ALUMINUM - COMBINATION ADJUSTABLE

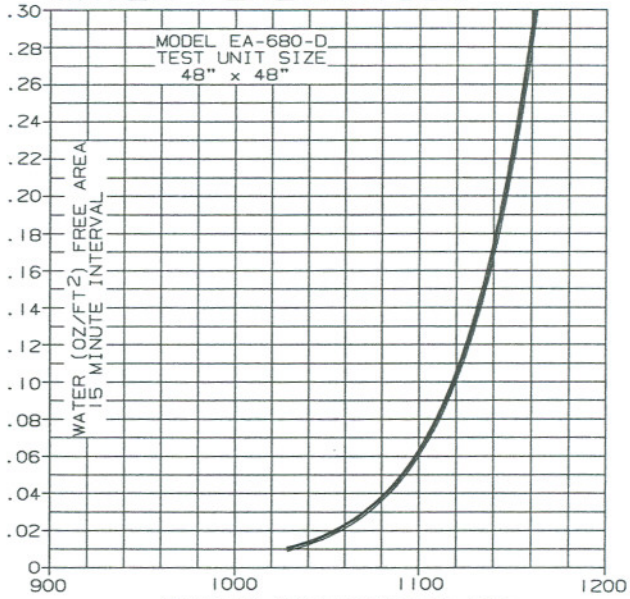
PERFORMANCE DATA

RATINGS DO NOT INCLUDE EFFECTS OF BIRDSCREEN.

PRESSURE DROP



WATER PENETRATION



1029 (FPM) BEGINNING OF WATER PENETRATION

FREE AREA

FREE AREA (SQ. FT.)							
HEIGHT \ WIDTH	12"	18"	24"	30"	36"	42"	48"
12"	.14	.24	.34	.45	.55	.65	.76
24"	.64	1.12	1.60	2.08	2.55	3.03	3.51
36"	1.00	1.76	2.51	3.26	4.02	4.77	5.52
48"	1.50	2.62	3.74	4.87	5.99	7.11	8.24
60"	2.00	3.50	4.99	6.49	7.99	9.49	10.99
72"	2.36	4.14	5.91	7.68	9.45	11.23	13.00
84"	2.86	5.00	7.14	9.28	11.42	13.57	15.71
96"	3.36	5.87	8.39	10.91	13.43	15.94	18.46

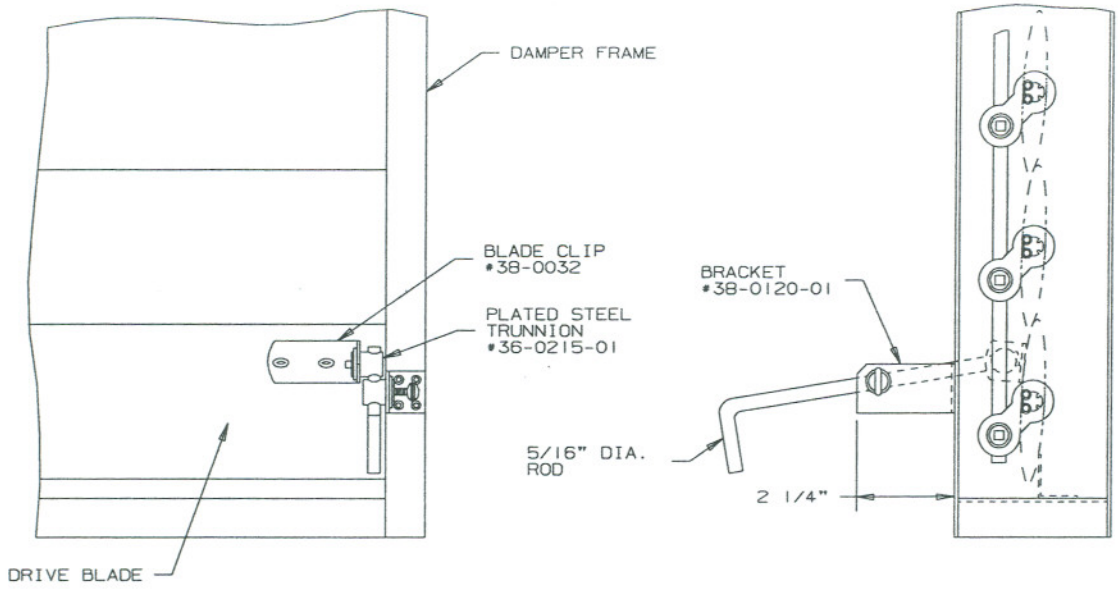
AIR LEAKAGE (LOUVER INSTALLATION POSITION, INTAKE) IS PER AMCA STANDARD 500 PROCEDURE FIG. 5.5.

AIR LEAKAGE WITH ADJUSTABLE BLADE IN CLOSED POSITION WITH A SEATING TORQUE OF 6.25 IN.LB./SQ. FT. OF LOUVER FACE AREA. LEAKAGE IS BASED ON A TEST OF A 48" x 48" LOUVER.

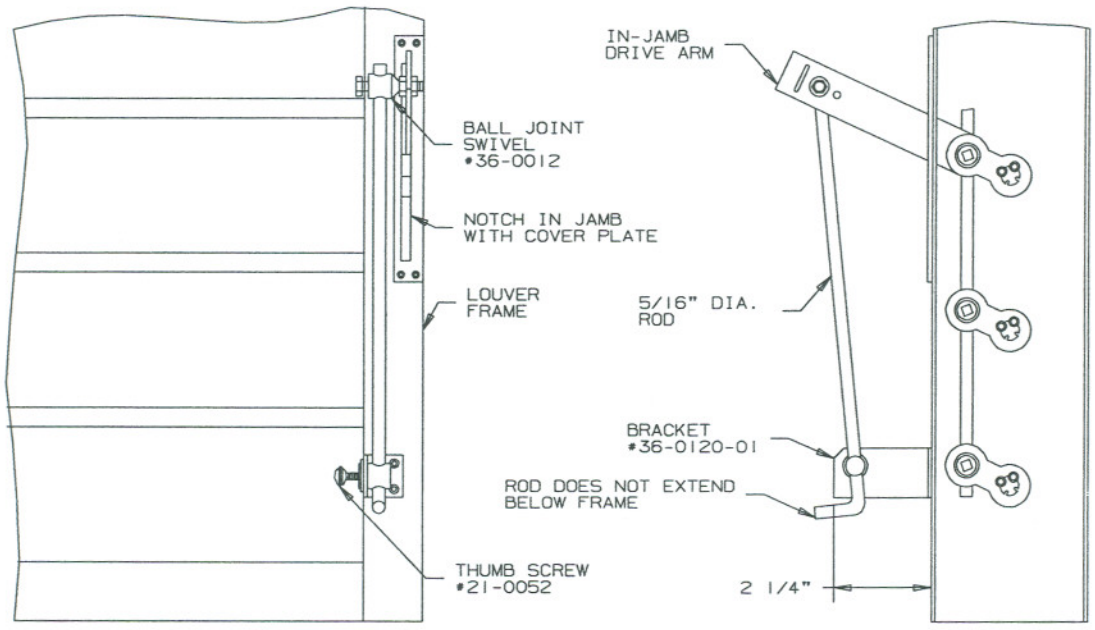
amca CERTIFIED RATINGS
WATER PENETRATION
AIR PERFORMANCE
AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

ARROW UNITED INDUSTRIES CERTIFIES THAT THE MODEL EA-680-D LOUVER SHOWN HEREIN IS LICENSED TO BEAR THE AMCA SEAL. THE RATINGS SHOWN ARE BASED ON TESTS AND PROCEDURES PERFORMED IN ACCORDANCE WITH AMCA PUBLICATION 511 AND COMPLY WITH THE REQUIREMENTS OF THE AMCA CERTIFIED RATINGS PROGRAM.

THE AMCA CERTIFIED RATINGS SEAL APPLIES TO AIR PERFORMANCE RATINGS AND WATER PENETRATION RATINGS.



TYPICAL WING SCREW OPERATOR CONNECTED TO BLADE



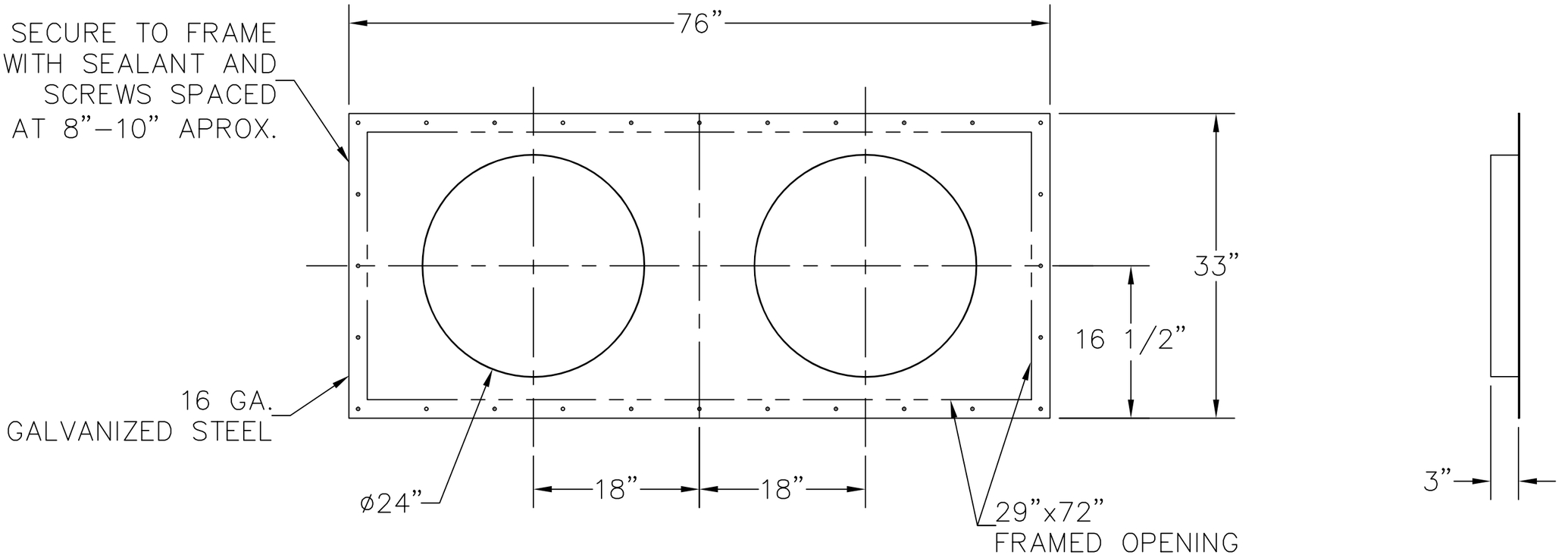
TYPICAL WING SCREW OPERATOR CONNECTED TO BLADE SHAFT

ARROW UNITED INDUSTRIES
A DIVISION OF MESTEK, INC.
314 RIVERSIDE DRIVE
WYALUSING, PA 18853
TEL: (717)746-1888 FAX: (717)746-9286

AGENT: _____

INSTALLATION, O-13 WING SCREW OPERATOR

781-C-1998



NO.	REVISION	BY	DATE

PROJECT

PROJ. NO.	E-05-048
P.O. NO.	

DRAWN BY	JB
DESIGN BY	BB
CHKD. BY	BB
DATE	7/15/05
SCALE	NTS

TIGG corporation

OUTLET TRANSITION

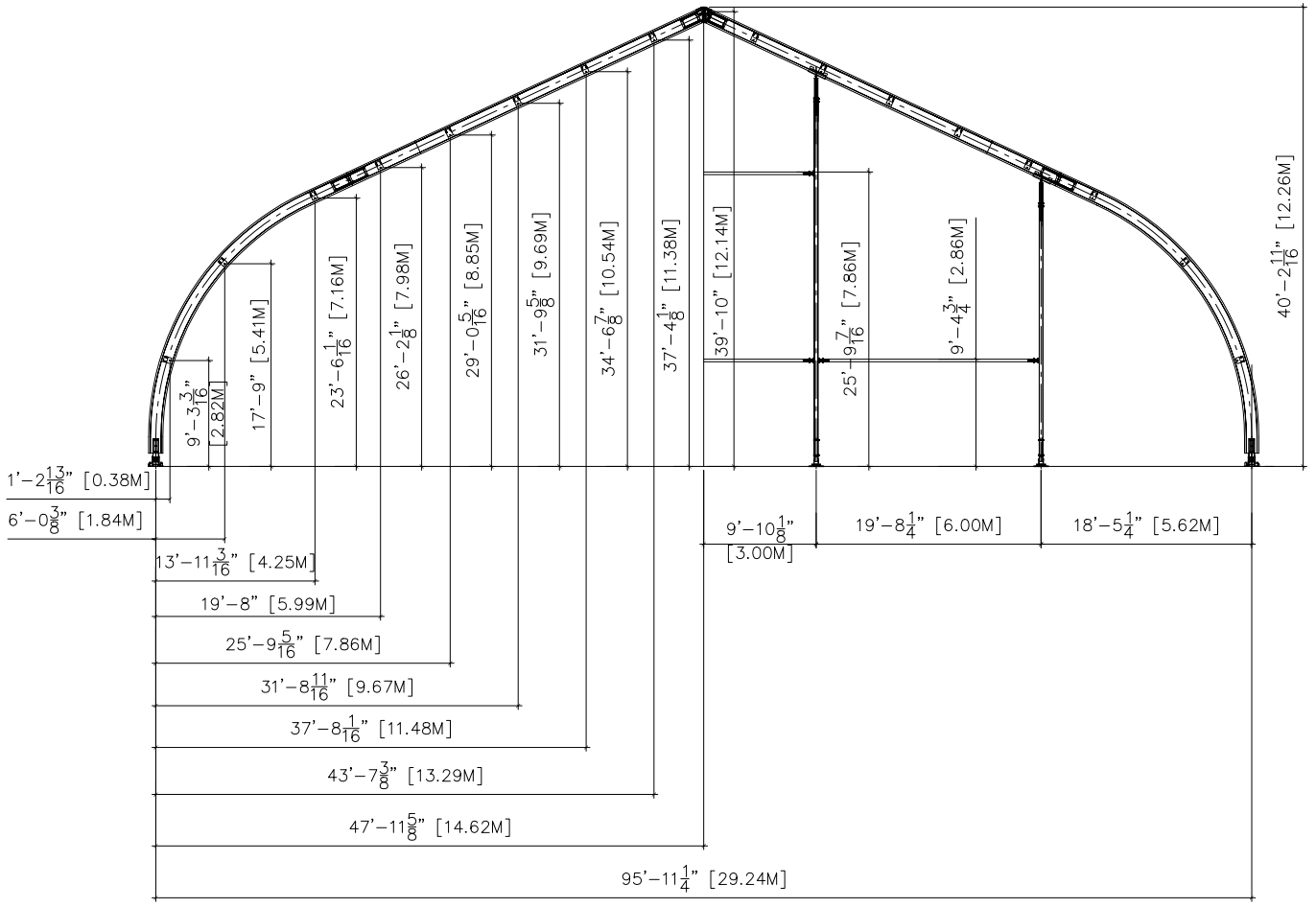
DWG. NO. C05-1044

REV. 0

ATTACHMENT A
SYSTEM EQUIPMENT LIST

	ADSORBER		FAN				FILTERS
System	Orientation	Model	Rotation	HP/Volt	STARTER	MAKE	SUPPLIER
A	NB-20	CW	100/460	SOFT	NORTHERN	TIGG	Pleated Panel & Pocket

System Appertances:	Per Unit	Units	Total QTY
Building Transitions	1	2	2
Exhaust Stacks	2	2	4
Air Intake Louvers	2	2	4
Fan Outlet Wye	1	2	2
20" flex Duct X 25'	2	2	4
24" flex Duct X 25'	2	2	4



NOTE: 29.2 Meter Wide (96') TFS/R Structure
Dimensions between, and locations of support points for lights, sound systems etc.

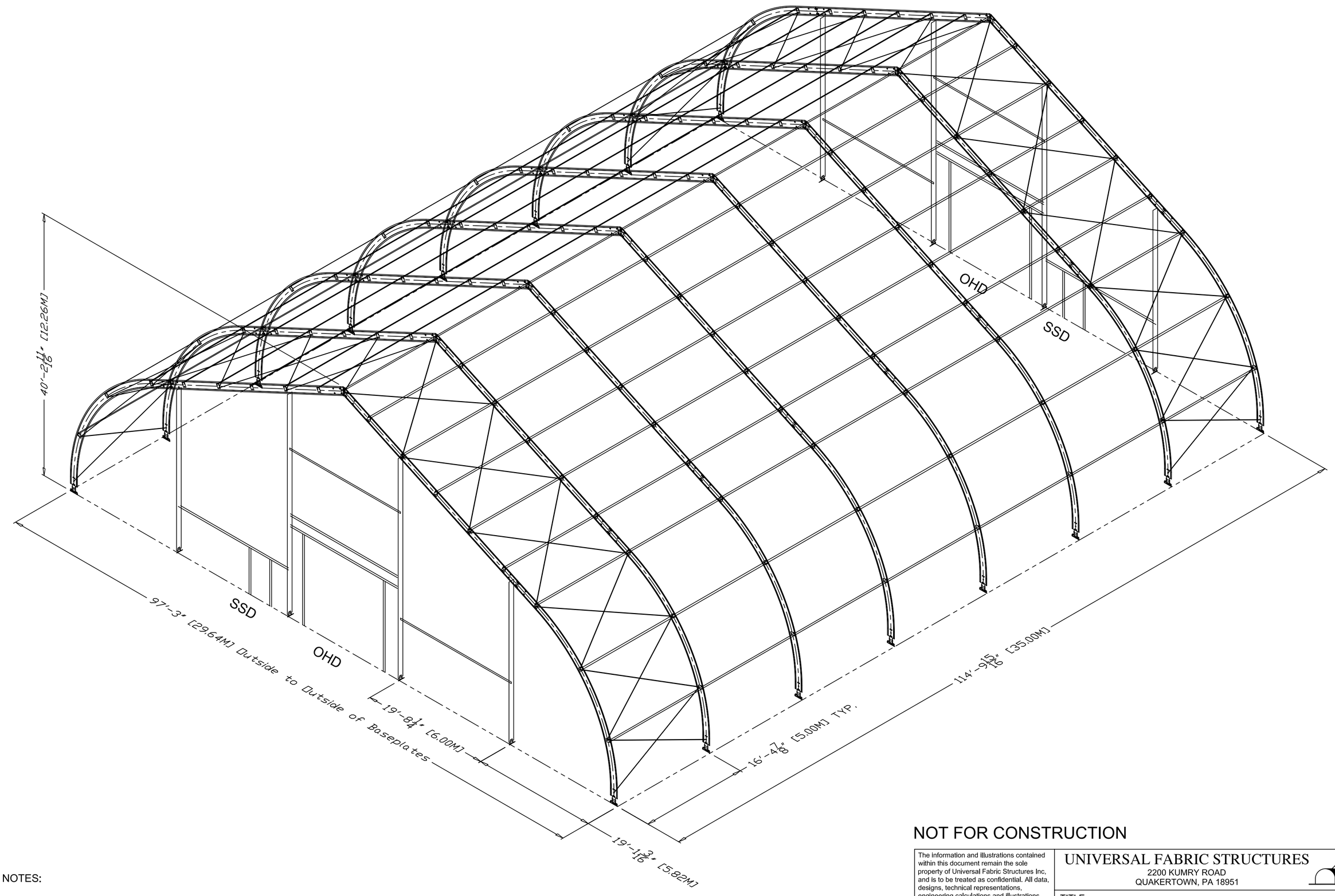
UNIVERSAL RENTALS

website: rentuniversal.com

TITLE:
TFS R29.2M (96')

DATE:	02/07/2008	DWG. NO.
DRAWN:	SLS	9
SCALE:		

REV.	DATE	DESCRIPTION	NAME
0	08MAY2008	ORIGINAL RELEASE	SH



NOTES:

SSD	(2x)	SINGLE STEEL PERSONNEL DOOR
OHD	(2x)	14' x 14' STEEL ROLL UP OVERHEAD DOOR

NOT FOR CONSTRUCTION

UNIVERSAL FABRIC STRUCTURES
2200 KUMRY ROAD
QUAKERTOWN, PA 18951

TITLE: TFS/R 29.2M-380 x 35M ISO VIEW
CABLE & PURLIN w/ DOORS

DRAWN: SH	CHECKED: SF	DATE: 08MAY2008	REV.: 0

SIZE	SCALE	JOB No.:	DWG. NO.:
C	NTS		S448

PROJECT NAME:

SHEET: 1 OF 1

Appendix I

Waste Disposal Matrix

(Facility Certifications Provided in Electronic Format Only)

KeySpan Hempstead Intersection Street Former MGP Site
Interim Remedial Measures
Villages of Garden City and Hempstead, New York
TRANSPORTATION & DISPOSAL MATRIX

Off-site Transportation & Disposal of Impacted Soil	**Low Temperature Thermal Desorption** **Clean Earth of Philadelphia, Inc.** 3201 South 61st Street Philadelphia, PA 19153 **PADEP Permit #301220** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous Waste • Moisture < 15% • Debris < 5% (non-crushable or steel debris) • No size restriction on crushable debris or steel (must come off of truck) • Debris over 2X2X2 and >5% - surcharged • TPH every 5,000 ppm over 1.5% - surcharged • Every % moisture > 15% - surcharged • Surcharges may apply to High Sulfur coal tar or coal tar slag	**Low Temperature Thermal Desorption** **Clean Earth of Southeast PA, Inc.** 7 Steel Road East Morrisville, PA 19067 **PADEP Permit #301254** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous Waste • Moisture < 15% • Debris < 5% (non-crushable or steel debris) • No size restriction on crushable debris or steel (must come off of truck) • Debris over 2X2X2 and >5% - surcharged • TPH every 5,000 ppm over 1.5% - surcharged • Every % moisture > 15% - surcharged • Surcharges may apply to High Sulfur coal tar or coal tar slag	**Low Temperature Thermal Desorption** **Mid-Atlantic Recycling Technologies, Inc. (CASIE)** 3209 N. Mill Road Vineland, NJ 08360 **Class B Permit # CBG030002** **NJDEP Facility No#132106** **Class D Permit # CDU040002** **NJDEP Facility No. 0614001405** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous • PCB's<2 PPM • Moisture< 20% • Moisture> 20% - surcharged • TPH < 10,000 PPM • TPH > 10,000 PPM –surcharged • Non-Crushable Debris > 2' and/or > 5% of load - surcharged
Alternate Off-site Transportation & Disposal of Impacted Soil	**Low Temperature Thermal Desorption** **Environmental Soil Management of NJ, LLC** 75 Crows Mill Road Keasbey, NJ 08832 **NJDEP #CBG 060002** **(Operating under Bayshore Recycling Corp Permit)** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous Waste • TPH < 1.5% • TPH every 5,000 ppm over 1.5% - surcharged • Crushable stone, concrete, brick to be 2'x2' or less and not exceed 1% of the load. • Non-Crushable Debris over 2X2X2 and >1% - surcharged • Moisture < 18% - surcharged • Clay Contents <15% • No high sulfur coal tar or coal tar slag will be accepted	**Low Temperature Thermal Desorption** **Clean Earth of New Castle, Inc.** 94 Pyles Lane New Castle, DE 19720 **Permit #SW-95/07** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous Waste • Moisture < 15% • Debris < 5% (non-crushable or steel debris) • No size restriction on crushable debris or steel (must come off of truck) • Debris over 2X2X2 and >5% - surcharged • TPH every 5,000 ppm over 1.5% -surcharged • Every % moisture > 15% -surcharged • **DE does not honor the EPA conditionally exempt waste determination for Benzene if material is D018**	

Rev. 2

KeySpan Hempstead Intersection Street Former MGP Site
Interim Remedial Measures
Villages of Garden City and Hempstead, New York
TRANSPORTATION & DISPOSAL MATRIX

Off-site Transportation & Disposal of Recovered Groundwater and Used Decontamination Liquids	**Water Treatment & Permitted Discharge** **Clean Water of New York, Inc.** 3249 Richmond Terrace Staten Island, NY 10303-0312 NYSDEC Part 360 Facility **DEC Permit No. 2-6401-00065/00001** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous • TOX < 1,000 PPM • TS & TSS < 1% • PCB's < 2ppm • As, Cr, PB < 100 PPM • Cadmium < 20 PPM • 5,000 Gallon Minimum	**Water Treatment & Permitted Discharge (Alternate)** **ERC - Environmental Recovery Corp.** 1076 Old Manheim Pike Lancaster, PA 17601 **PA Permit No. 301344** **Disposal Conditions:** • RCRA/DOT non-hazardous • BS&W < 2% • PCB's non-detectable • pH > 6 & < 9 • TOX < 1,000 PPM; TOX > 1,000 PPM will result in a surcharge • Material must be pumpable/flowable • Non-emulsified liquids only • As & Cr <5 ppm • Cd < 2ppm • Pb non-detectable • Flashpoint > 140o F • Solids and/or rag layers > 5% - surcharged • Specific gravity < 1.2	
Off-site Transportation & Disposal of NAPL	**Veolia ES Technical Solutions, LLC (10 day storage)** Long Island Office 3001 Burns Avenue Wantagh, NY 11793 **Waste Transporter Permit No. NJ 410** **Veolia ES Technical Solutions, LLC (TSDF)** 1 Eden lane Flanders, NJ 07836 US EPA ID: NJD980536593		

KeySpan Hempstead Intersection Street Former MGP Site
Interim Remedial Measures
Villages of Garden City and Hempstead, New York
TRANSPORTATION & DISPOSAL MATRIX

Off-site Transportation & Disposal of Construction and Demolition Debris (Contaminated Metal)	**Subtitle D Landfill** **APEX Environmental & MSW Landfill** 91999 Amsterdam Road Jewett, OH 43986 **Ohio EPA PTI #17-1194 and #06-6219** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous • No Free Liquids • Meets EPA Paint Filter Test • No MSW, Tires or Dimensional Lumber • Requires OH-EPA Waste Application Approval	**Subtitle D Landfill (Alternate)** **Waste Management, Inc.** **GROWS Landfill** 1513 Bordentown Road Morrisville, PA 19067 **Permit # 100148** **Waste Management, Inc.** **Tullytown Landfill** 200 Bordentown Road Tullytown, PA 19007 **Permit #101494** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous • No free liquids • Material Passes EPA Paint Filter Test • No MSW , Tires, or Dimensional Lumber • Requires PADEP review of waste characterization analysis and approval of Form U	
Off-site Transportation & Disposal of Construction and Demolition Debris (Clean Concrete)	**NYDEC Licensed Recycling Facility** **Omni Recycling** 114 Alder Street West Babylon, NY 11704 **Disposal Conditions:** • TSCA/RCRA Non-Hazardous • Material is free of contamination and considered “clean” by NYSDEC standard for Part B Recycling Facilities • Material < 2% soil per load		

KeySpan Hempstead Intersection Street Former MGP Site
Interim Remedial Measures
Villages of Garden City and Hempstead, New York
TRANSPORTATION & DISPOSAL MATRIX

Off-site Transportation & Disposal of Construction and Demolition Debris (Contaminated Concrete)	**Subtitle D Landfill** **APEX Environmental & MSW Landfill** 91999 Amsterdam Road Jewett, OH 43986 **Ohio EPA PTI #17-1194 and #06-6219** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous • No Free Liquids • Meets EPA Paint Filter Test • No MSW, Tires or Dimensional Lumber • All pricing contingent upon OH-EPA Waste Application Approval	**Secure Landfill Disposal (Alternate)** **Waste Management, Inc.** **GROWS Landfill** 1513 Bordentown Road Morrisville, PA 19067 **Permit # 100148** **Waste Management, Inc.** **Tullytown Landfill** 200 Bordentown Road Tullytown, PA 19007 **Permit #101494** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous • No free liquids • Material Passes EPA Paint Filter Test • No MSW , Tires, or Dimensional Lumber • All pricing upon PADEP review of waste characterization analysis and approval of Form U	
Off-site Transportation & Disposal of Trash	**Subtitle D Landfill** **Via Local RR Trans-load** **APEX Environmental & MSW Landfill** 91999 Amsterdam Road Jewett, OH 43986 **Ohio EPA PTI #17-1194 and #06-6219** **Disposal Conditions:** • TSCA/RCRA Non-Hazardous • No Free Liquids • Meets EPA Paint Filter Test • No MSW, Tires or Dimensional Lumber • All pricing contingent upon OH-EPA Waste Application Approval		

2008 OhioEPA 2008

Solid Waste Facility License
Municipal Solid Waste Landfill

License Expires December 31, 2008

Facility: Apex Sanitary Landfill (CID:148118)
11 County Road 78
Amsterdam, OH 43903

This license has been issued in accordance with the requirements of state law, is subject to revocation or suspension for cause, and is not transferable without the consent of the Board of Health and the Director of the Ohio Environmental Protection Agency.

Licensing Authority: Jefferson Co - MSWL

Conditions of Licensure

The Licensee hereunder, its agents, employees, and all others in active concert with said licensee, including the facility owner and operator, shall be subject to and shall comply with the following conditions of this license:

1. All applicable requirements of Ohio Revised Code Chapters 3734., 3767., 6111., and 3704.
2. All applicable requirements of Ohio Administrative Code Chapters 3745-27, 3745-28, 3745-29, 3745-30, 3745-31, and 3745-37.
3. Permits-to-install, plans, operational reports, other authorizing documents, and administrative and judicial orders applicable to this facility and as approved by the Director of the Ohio Environmental Protection Agency.
4. This license is conditional upon payment of the applicable fee to the Board of Health or the Director, as appropriate, within 30 days after issuance.
5. By applying for and accepting this license, the licensee specifically consents in advance and agrees to allow the Director, the Health District, or an authorized representative, to enter upon the licensee's premises at any reasonable time during the construction and/or operation of the facility for the purpose of inspecting, conducting tests, collecting samples, or examining records or reports pertaining to construction, modification, installation, or operation of the facility. The licensee hereby acknowledges and agrees that any and all rights of access granted herein shall not be deemed to be unreasonable or unlawful under Ohio Revised Code Sec. 3734.07.

The licensee, its agents, employees, and all others in active concert with said licensee shall maintain and operate the facility to which the license pertains in a sanitary manner so as not to create a nuisance, cause or contribute to water pollution, or create a health hazard. This license shall not be construed to constitute a defense to any civil or criminal action brought by the State of Ohio or any duly authorized representative thereof to enforce the provisions of Chapters 3734., 3767., 6111., or 3704. of the Ohio Revised Code, or regulations issued thereunder.

Issuance of this license does not relieve the licensee of the duty to comply with all applicable federal, state, and local laws, regulations and ordinances.

☐ **If Checked, Additional Conditions Apply to This License (See Back, or Attachment)**

Health Commissioner

12/18/07
Date Issued

State of New Jersey
Department of Environmental Protection

Richard J. Codey
Acting Governor

Bradley M. Campbell
Commissioner

Division of Solid & Hazardous Waste
P.O. Box 414 401 E. State Street
Trenton, New Jersey 08625-0414
Telephone: (609) 984-5950 Telecopier: (609) 633-9839
http://www.state.nj.us/dep/dshw

RECYCLING CENTER GENERAL APPROVAL FOR CLASS D RECYCLABLE MATERIALS (USED OIL)

Under the provisions of N.J.S.A. 13:1E *et seq.* and N.J.S.A. 13:1E-99.11 *et seq.*, known as the Solid Waste Management Act and New Jersey Statewide Mandatory Source Separation and Recycling Act, respectively, and pursuant to N.J.A.C. 7:26A-1 *et seq.*, known as the Recycling Regulations, this Approval is hereby issued to:

CASIE ECOLOGY OIL SALVAGE INC. (CASIE)

Facility Type:	Recycling Center
Lot & Block Nos:	Lot 17; Block 89
Municipality:	Vineland
County:	Cumberland
Facility ID No.:	0614001445
Permit No.:	CDU040002

This General Approval is subject to compliance with all conditions specified herein and all regulations promulgated by the Department of Environmental Protection (Department).

This General Approval shall not prejudice any claim the State may have to riparian land nor does it allow the registrant to fill or alter, or allow to be filled or altered, in any way, lands that are deemed to be riparian, wetlands, stream encroachment or flood plains, or within the Coastal Area Facility Review Act (CAFRA) zone or are subject to the Pinelands Protection Act of 1979, nor shall it allow the discharge of pollutants to waters of this State without prior acquisition of the necessary grants, permits, or approvals from the Department.

February 8, 2005
Issuance Date

Thomas Sherman
Assistant Director
Office of Permitting & Technical Programs

April 20, 2010
Expiration Date

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF AIR & WASTE MANAGEMENT
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

SOLID & HAZARDOUS WASTE
MANAGEMENT BRANCH

TELEPHONE: (302) 739-9403
FAX NO.: (302) 739-5060

June 30, 2005

Clean Earth of New Castle, Inc.
94 Pyles Lane
New Castle, DE 19720
Attn: Paul Lane

Subject: Renewal and modification of Resource Recovery Permit SW 95/07
Reference: Permit SW 95/07

Dear Mr. Lane:

Pursuant to Secretary's Order No. 2005-A-0024 Clean Earth of New Castle, Inc. is re-issued permit SW 95/07. The permit is now inclusive of major modifications which allow the acceptance of Non-Hazardous Recyclable Material (NHRM) following detailed criteria as specified in the June 2003 permit application.

Please note that as part of the hearing process the surrounding community will be notified of the acceptance of NHRM.

If you have any questions please contact Mr. James Short at (302) 739-9403.

Sincerely,

Nancy C. Marker
Environmental Program Manager II
Solid and Hazardous Waste Management Branch

NCM: JDS: jmr
CE Permit Cover Letter 063005.doc

Attachment

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF AIR & WASTE MANAGEMENT
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

SOLID & HAZARDOUS WASTE
MANAGEMENT BRANCH

TELEPHONE: (302) 739-9403
FAX NO.: (302) 739-5060

RESOURCE RECOVERY FACILITY
PERMIT NO. SW-95/07

Original Issue Date:	December 22, 1995
Original Expiration Date:	December 22, 1998
Renewal Date:	July 1, 2005
Expiration Date:	June 30, 2010
Issued to:	Clean Earth of New Castle, Inc. 94 Pyles Lane New Castle, DE 19720
Contact Person:	Mr. Paul Lane

Pursuant to 7 Del. C., Chapter 60, Section 3(a)(4) and the Policy Memorandum for Thermal Treatment of Petroleum Hydrocarbon Contaminated Soils (Policy Memorandum), the Department of Natural Resources and Environmental Control (DNREC) hereby provides a renewal and modification of the above referenced permit to operate the Clean Earth of New Castle, Inc. (CENC) thermal desorption facility located on Pyles Lane, New Castle, Delaware for the remediation of non-hazardous petroleum hydrocarbon contaminated soils. This permit is renewed in accordance with CENC's February 25, 1998 request to accept Non-Hazardous Recyclable Materials (NHRM), the "Resource Recovery Permit Renewal" application dated May 25, 2001 and the revised and completed application dated June, 2003. This permit is modified to allow for the addition of NHRM to amend soils treated by thermal desorption to produce a synthetic soil for beneficial reuse and supplement the municipal water supply used in the mixer cooler. Modifications in this permit also:

1. Clarify reporting requirements for incidents involving equipment failure,
2. Expand the General Conditions for proper operation of this facility,
3. Define the acceptable sources of petroleum contamination,
4. Expand the analytical requirements for treated soils,
5. Add the definitions of used and waste oil,
6. Further define acceptable reuses and analytical limits of treated soils and
7. Set performance standards for NHRM acceptance.

I. GENERAL CONDITIONS:

A. Applicability:

This Resource Recovery Facility permit applies to the process of storing, thermally treating and re-using soils contaminated with non-hazardous petroleum hydrocarbons, non-PCB containing mineral oil, Manufactured Gas Plant (MGP) coal distillate and the process of amending the treated soils with Non-Hazardous Recyclable Materials (NHRM) for beneficial reuse. The thermal desorption unit is permitted to treat at a rate not to exceed 60 tons/hour. The NHRM operational capacity will not exceed 1440 tons/day.

B. Security:

The permittee shall construct and maintain a security system necessary to restrict unauthorized personnel access to the facility.

C. Inspection and Maintenance:

The permittee shall conduct inspections weekly and maintain the facility in a manner to comply with the conditions of this permit.

D. Reporting:

As required by 7 Del. C. Section 6028, the permittee shall report any release of a pollutant at the facility to DNREC's Emergency Response number, 1-800-662-8802, immediately after appropriate emergency plans have been implemented. This reporting requirement shall also apply to fire or any other occurrence where equipment failure or malfunction results in or has the potential to result in an unpermitted release of a pollutant.

As required by the conditions of this permit, the permittee shall submit to DNREC:

1. All annual reports according to the requirements of Section III.E.

2. At least three (3) business days prior to accepting contaminated soil and within three (3) business days of receipt, CENC must submit documentation from the generator, his designated representative, or the appropriate regulatory agency that

   a) The site or process where the soil was generated was not contaminated by a RCRA listed or characteristic hazardous waste as defined by the *Delaware Regulations Governing Hazardous Waste* (DRGHW).
   b) For non-hazardous MGP contaminated soil, that oversight of MGP site remediation was conducted by the appropriate regulatory agency and that CENC is an acceptable form of treatment for this soil

E. Expiration:

This permit shall expire five (5) years from the Date of Renewal. Per *Delaware Regulations Governing Solid Waste* (DRGSW) Section 4.A.6, the permittee shall notify DNREC of their intent to renew within one hundred and eighty (180) days prior to expiration.

F. Access:

Representatives of DNREC may, at any reasonable time, inspect this facility to verify compliance with the permit requirements, the DRGSW and 7 Del C Chapter 60.

G. Revocation:

This permit may be revoked upon violation of the conditions of this permit, the DRGSW or 7 Del. C. Chapter 60.

H. Modifications:

DNREC has the authority to modify this permit at any time.

I. Permit availability:

A copy of this permit shall be maintained at this facility and available to any Department representative upon request.

J. Permit Transfer:

As required by DRGSW Section 4.A.8, a written request for transfer of the permit must be submitted to the Department at least 90 days prior to the date of the proposed transfer. The actual transfer will be contingent upon the tranferee's meeting all permit and regulatory requirements; until such time, the original permittee will remain liable regardless of who owns the facility.

K. Hours of Operation:

The hours of operation for this facility are 24 hours/day, 7 days per week; however, the thermal desorption unit and associated control equipment shall not operate more than 6000 hours per year.

L. Odor Control:

This facility shall not cause or allow the emission of an odorous air contaminant in such quantities as to interfere with any person's enjoyment of life or property. No odors may be perceived beyond the property boundary.

M. Erosion and Sediment Control Structure:

Due to stormwater runoff from contaminated soils and leakage of petroleum hydrocarbons from truck traffic and on-site equipment, sediment removed from the erosion and sediment (E&S) control structure will be contaminated with hydrocarbons. For this reason, prior to disposal or reuse, sediment removed from the E&S structure must be treated in the thermal desorption unit and must satisfactorily comply with the conditions of section III D of this permit. This sediment may be blended with treated or untreated soils as necessary to achieve appropriate moisture content for proper treatment in the thermal desorption unit.

N. Soil Tracking:

Vehicles exiting the facility shall not track soil or other materials onto any public road. If necessary, control measures must be implemented to comply with this requirement. When sweeping is used as a control measure, all collected soil and dirt must be treated in the thermal desorption unit.

II. AUTHORIZED WASTE TYPES:

A. Permitted:

Only soils contaminated with RCRA non-hazardous petroleum hydrocarbons, non-PCB mineral oils and RCRA non-hazardous Manufactured Gas Plants (MGP) coal distillates that meet the standards in Section III of this permit may be accepted at this facility for treatment in the thermal desorption unit. Acceptable sources of contamination from petroleum compounds are restricted to:

- Automotive crankcase and lubricating oils, fuel oils (ASTM numbers 1 through 6), diesel fuel, gasoline, kerosene and aviation fuel.
- Used oil, defined for the purposes of this permit as "Any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities (40 CFR §279.1)".
- Waste oil, defined for the purposes of this permit as "Wastes, such as bottom clean-out waste from virgin fuel oil storage tanks or virgin fuel oil spill cleanup that are not used oil because they have not been "used" for their intended purpose (50 FR 49174, November 29, 1985)".

Sources contaminated with used or waste oil not complying with these definitions may not be accepted by this facility. The permittee shall be responsible for determining that the contaminated soil is a non-hazardous waste as defined by the DRGHW.

Soils from drill cuttings generated at Underground Storage Tank sites may be placed with the excavated soil for analysis and treatment at the site of origin provided this procedure is permitted by the Underground Storage Tank Regulations in the state the drill cuttings were generated.

Non-Hazardous Recyclable Materials (NHRM) are materials that would otherwise be disposed of as waste that are used to augment treated soil, thereby conferring beneficial properties. Specific NHRM that comply with the requirements set forth in the remainder of this permit may be accepted for blending with treated soils to produce a synthetic soil.

B. Prohibited:

Any soil or NHRM determined to be RCRA hazardous (as defined by the DRGHW), whether listed or characteristic, by the generator, the generator's representative, CENC, or the DNREC, shall not be accepted at this facility. If hazardous material is delivered to this facility, it must be removed immediately and the affected area must be decontaminated. Removal, decontamination, and proper disposal of this material are the responsibility of CENC. For information on the proper handling and disposal of hazardous waste, please contact the Hazardous Waste Management Branch at 302-739-9403.

Blending of any untreated soils or NHRM for the purpose of contaminant dilution below regulated hazardous waste levels is strictly prohibited. Blending may be permitted only to achieve the physical soil characteristics necessary for proper treatment. MGP soils that have been blended, regardless of the percentage or source of blending material, must be treated strictly as MGP soils.

III. FACILITY OPERATION:

A. Operation and Requirements for Testing of Incoming Materials:

1. The permittee shall operate the facility in accordance with the Policy Memorandum, this permit, the "Clean Earth of New Castle Plan of Operation and Required Submissions" and the General Operations Plan submitted with the revised "Resource Recovery Permit Renewal" application dated June 2003.

2. The soil and NHRM sampling procedures and test methods shall be those described in the test methods table provided by Compliance Plus on June 29, 2005, or in the most current legal edition of EPA publication number SW-846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods." For this reason, the individual responsible for taking samples must be competent in the proper sampling techniques. All soil and NHRM samples and analyses must accurately represent the type and degree of contaminants present. TPH will be measured by DRO (Diesel Range Organics) when the following petroleum hydrocarbons are present: automotive lubricating oils, fuel oils (ASTM numbers 1 through 6), diesel fuel, kerosene and aviation fuel. GRO (Gasoline Range Organics) analysis will be used when the contaminant is gasoline. Contaminated soils and NHRM originating outside of Delaware which have not been sampled in accordance with SW-846 procedures, must be sampled and analyzed in accordance with procedures that have received prior approval by the Department.

3. In the case of petroleum and mineral oil contaminated soil, at least one composite representative sample must be taken for every 1000 tons of soil excavated or on a site-by-site basis and a complete analysis performed by an independent laboratory, as required by Section III.A.6. TPH and BTEX levels must be characterized based on State specific Underground Storage Tank or Spill Regulations. However, based on site conditions, more frequent sampling and analysis may be warranted. In the case of coal distillate contaminated soils from MGP sites the sampling frequency shall be one representative composite sample for every 1000 tons of soil or on a site-by-site basis. If a site-by-site basis sampling plan is invoked, the Department may set an alternate number of samples, but not less than the minimum number of samples indicated by the statistical analysis described in EPA SW-846, Chapter 9. The analysis required for MGP site soils is described in Section III.A.6.d. Emphasis must be placed on ensuring that the samples taken accurately represent actual site conditions.

4. All incoming loads must be tested using a Combustion/Micro-Coulometric Chloride Detection system:

   a) If the chloride test results are less than 50 parts per million (ppm), CENC can accept the soil.
   b) If the chloride test results are greater than 500 ppm, CENC must reject the soil.
   c) If the chloride test results are greater than 50 ppm and less than 500 ppm, CENC must analyze the soil for PCBs using the current EPA approved method.

5. The PCB acceptance parameters listed below apply to all incoming soils analyzed for PCB:

   a) Under no circumstances can CENC accept contaminated soil containing PCB that is not a petroleum, MGP, or mineral oil contaminated soil.
   b) If the PCB level is below 2 ppm, the soil may be accepted for treatment.
   c) If the PCB level is greater than 2 ppm, the load is considered to contain PCBs and must be classified as follows (see 40 CFR 761.3 Definitions, July 1, 2001 Edition):

      - If the PCB content is above 50 ppm, the load must be rejected
      - If the PCB content is $\leq$50 ppm and the PCB material was disposed of prior to April 18, 1978, the soil may be accepted
      - Regardless of the current PCB concentration, if the concentration of the original source of the PCB contamination was $\geq$50 ppm (beginning July 2, 1979) or $\geq$500 ppm (beginning April 18, 1978), the soil must be rejected.
      - If the PCB contamination resulted from a spill or release from a source not authorized for use under the regulations (40 CFR 761), the soil must be rejected.

      CENC's records must reflect this classification.

   d) Any waste accepted by CENC that does not conform to above shall promptly be disposed of in a facility permitted as a PCB treatment or disposal facility.

      Note: Per 40 CFR 761.50 (b) (3) (B) (iii): The owner or operator of a site containing PCB remediation waste has the burden of proving the date that the waste was placed in a land disposal facility, spilled, or otherwise released into the environment, and the concentration of the original spill. CENC must have appropriate written documentation to enable correct classification.

6. Analytical requirements for soil contaminated by petroleum hydrocarbon, mineral oil or MGP coal distillates are listed below:

a) For all incoming soils, if site knowledge or history indicates the possibility of contamination by herbicides, pesticides or any other contaminants defined in the "Delaware Uniform Risk-Based Remediation Standards", an analysis of any suspect contaminants must be performed. Specifically, for any site that has been used for the manufacturing, distribution, packaging of pesticides, herbicides or agricultural insecticides, TCLP analysis for these compounds will be required. Any location that has been abandoned will require TOX analysis screen for potential presence of pesticides and herbicides. If the TOX analysis exceeds 10 mg/kg a full TCLP including pesticides and herbicides must be run.

b) Soil contaminated by leaks from petroleum underground storage tanks excluding waste and used oil will require:

1) Toxicity Characteristic Leaching Procedures (TCLP) metals.
2) Total Petroleum Hydrocarbon (TPH). GRO/DRO analysis as specified in Section III.A.2
3) Benzene, Toluene, Ethylbenzene and Xylene (BTEX) for gasoline contamination only.
4) Poly Chlorinated Biphenyls (PCBs)
5) Ignitability and reactivity.

Note: For non-hazardous soils from Aboveground or Underground Storage Tanks (AST or UST) within Delaware, excluding waste oil, the analytical requirements requested by the DNREC Tanks Management Branch are adequate for acceptance of said soils at this facility. However, the DNREC Tanks Management Branch registration form, as well as the analytical results, must accompany said soils during transportation and be maintained on file at Clean Earth of New Castle, Inc. as evidence that the soils in question were generated within the State of Delaware and that they are non-hazardous.

c) Soil contaminated by surface spills from petroleum sources, non-PCB mineral oil, waste oil, used oil and underground storage tanks containing waste or used oil will require:

1) Complete TCLP (as required by Section III.6.a)
2) TPH
3) BTEX
4) PCBs.
5) TOX – If > 50 ppm analysis to identify the TOX compound must be performed.
6) Ignitability, Reactivity and Corrosivity

d) MGP coal distillate contaminated soils will require:

1) Complete Target Compound and Target Analyte lists expanded to include the following compounds: Vinyl Acetate, Carbazole, Chlordane, 2,4-D, 2,4,5-Trichlorophenoxypropionic Acid, Benzoic Acid, 2-Methylphenol and Pyridine. A Library Search must also be done to tentatively identify the 40 highest unknown peaks.

- If any of these total parameter levels exceed the regulatory limits for the TCLP constituents, TCLP analysis must be performed for those constituents.

2) TPH
3) PCBs
4) TOX – If > 50 ppm source must be identified
5) Ignitability, reactivity, corrosivity

6) Totals for the following PAH compounds:

Acenaphtyhlene	Benzo (g,h,i) perylene	Fluoranthene
Acenaphthene	Benzo(k) fluoranthene	Fluorene
Anthracene	Carbazole	Indeno (1,2,3-cd) pyrene
Benzo (a) anthracene	Chrysene	Naphthalene
Benzo (a) pyrene	Dibenz (a,h) anthracene	Phenanthrene
Benzo (b) flouranthene	Dibenzofuran	Pyrene

7) In the event that coke production also occurred at an MGP site the following four additional compounds must be reported:

Phenol 2-Methylphenol 4-Methylphenol 2,4-Methylphenol

In order to properly analyze for the aforementioned PAH and acid extractable compounds EPA method 8270 must be used with the following modifications: The matrix spike (MS) and matrix spike duplicate (MSD) and blank spike (LCS) must be spiked with the PAH compounds and the four phenols as described above. The percent recovery QC limits for these compounds are 50 to 125 percent. The relative percent difference QC limits for the four phenols and all PAH spiked compounds is 30 percent. Blank spikes (LCS) must be analyzed in conjunction with spiked samples. Base Neutral and acid extractable surrogates will be required for the analysis. The percent relative standard deviation (RSD) for the initial five point calibration for all compounds must be less than thirty percent. The percent difference (D) for continuing calibration and ending calibration (required after sample analysis) or the twelve hour calibration in the case of continuous operations must be less than twenty five percent. A Preparation Blank must be performed every day an extraction activity takes place and must meet appropriate QC criteria. The minimum response factors for all PAH compounds and acid extractables are 0.05.

Note: Whenever PCB's are detected as a result of the analysis required in this section, CENC must obtain from the generator in writing the classification of the source of the PCB as delineated in Section III.A.5 above and as defined in 40CFR 761.

e) While the process of adding NHRM to treated soils to improve their reuse has conceptually been approved, the sampling frequency and analytical parameters required to accept a specified NHRM will be approved for each NHRM by the Department on a case by case basis. Once CENC has demonstrated to the Department that the NHRM is an acceptable material, CENC must request that the specific NHRM be added to the permit and then the sampling frequency and analytical parameters will be formalized and become a requirement of this permit. CENC may not accept any NHRM until after the Department has granted written approval.

7. Soils with a TPH greater than 17,000 ppm may not enter the thermal treatment unit without prior blending to levels below 17,000 ppm.

8. Soils with a pH less than 4 or greater than 9 may not enter the thermal desorption unit.

9. The minimum temperature of the thermal desorption unit must be sufficient to meet the reuse requirements in Section III.D of this permit, and must comply with any and all requirements specified by this Department's Air Quality Management section.

10. CENC may not accept soils or NHRM from trucks which do not have a valid Delaware Solid Waste Transporters permit for petroleum contaminated soils. For liquid waste the transporter must have the appropriate transporter permit from the Division of Water Resources. For additional information the Division of Water Resources may be reached at 302-739-4762.

B. Storage:

Untreated Soil and NHRM - All accepted loads shall be stored in the storage facilities according to the facility description and operation, as described in the June 2003 permit application, until processed for treatment. No untreated soils, including untreated soil which has been removed from stone, brick, concrete, or related materials, may be stored outside. Stone, brick, concrete or other materials, which still contain contaminated soil, must be stored in a storage building. MGP soils and NHRM must be stored in a separate bin from other permitted soils. Each contaminated load and NHRM may be stored for a maximum of eight (8) weeks. The quantity of untreated soil in storage may not exceed 16,000 tons. Liquid NHRM must be contained in a storage tank with a secondary containment capacity at least 110 percent of the storage tank.

Treated Soil - Treated soils may be stockpiled uncovered, for up to 3 working days, while awaiting analytical results. Soils not meeting reuse limits must be retreated, resampled, and reanalyzed within 3 working days of receiving the lab results. If the treated analysis indicates the soil contaminant levels are below the permit limits, then the treated soil is suitable for reuse and covers are unnecessary. If, however, the permit reuse levels have not been achieved, then the soil must be covered or placed in storage, and within 24 hours after the second treatment attempt, the Department must be notified of the reason for treatment failure and a plan to remedy the unsuccessfully treated soils. The quantity of treated soil and treated soil blended with NHRM that may be stored at this facility may not exceed 25,000 tons.

C. Sampling:

1. Treated Soils and Treated Soils Blended with NHRM: At the end of each working day or every 300 tons, whichever occurs first, a composite sample of the soil treated that day shall be submitted to a laboratory within three working days and analyzed for Diesel Range Organics (DRO) (EPA method SW-846 8015 M).

   All sampling and analyses of treated soils and blends will be done according to the requirements set forth in Section 3 of the General Operations Plan included in the Clean Earth Permit Application revised and submitted in June 2003 and in particular, Table 5.1, 5.2 and 5.3. These tables are attached to this permit for clarity and ease of use.

2. DNREC retains the right to collect composite samples of the contaminated soil before and after treatment and of NHRM before and after blending, on a quarterly basis, for complete analyses as defined in section III.A.6 and for pathogen analysis. CENC shall bear the expense of all samples obtained and analyzed by the Department. CENC and DNREC retain the right to split samples for separate analysis.

D. Reuse:

Treated soils and blends with NHRM may be used in accordance with the requirements set forth in Section 3 of the General Operations Plan included in the Clean Earth Permit Application revised and submitted in June 2003 and in particular, Table 5.1, 5.2 and 5.3. These tables are added at the end of this permit. Treated soils supplied as landfill cover must also meet the permitted facility's criteria for landfill cover. For Delaware landfills, the landfill facility must obtain separate approval as required in section 5.I.c.(4) of the DRGSW to use Clean Earth treated soil and blends as landfill cover.

1. Table 5.1 applies to acceptable uses as topsoil for commercial or industrial reuse, such as blending with compost and landscaping applications for the purposes of establishing turf.

2. Table 5.2 applies to acceptable uses as construction material, road sub-base, structural and non-structural fill and landfill top or final construction cover.

3. Table 5.3 applies to acceptable uses as landfill operating cover (daily intermediate cover) and asphalt plant feed.

4. Treated soil or blends from this facility may not be used for landscaping that will result in direct dermal contact or for residential or agricultural purposes.

5. Treated soil or blends from this facility may not be used below the seasonal high water table or in direct contact with any surface water.

6. A contract to reuse the treated and NHRM blended soils in an environmentally sound manner must be maintained.

7. An environmentally sound policy for the reuse of the stone, brick, concrete and related material generated from the treatment and handling process must also be maintained.

E. Reporting: An annual report must be submitted by March 1st of every year with the following information:

1. a) Approval number, generator, site of origination (name, street address, city, state and zip code), type of contamination (spill, MGP or UST), level of contamination (TPH, PAH, BTEX), and quantity of soil in tons.
   b) Ticket number, incoming date, approval number, truck number, drivers name, solid waste or Division of Water Resources transporters number and net tons or gallons, as appropriate, of the load.

2. Rejected loads and reason for rejection.
3. Treated soils requiring re-treatment, reason, quantity, level and type of contamination.
4. Type of reuse, quantity, and location of treated soils and NHRM amended soils.
5. Thermal treatment facility maintenance and repair.
6. AST and UST registration forms and analytical results.
7. The quantity of MGP soils blended with non-MGP soils, the percentages of the blended mixture and the treatment temperature of the blended soils.
8. The type and quantity of NHRM blended with treated soils to produce a synthetic soil for beneficial reuse
9. The treatment levels achieved for TPH and PAH's.
10. The type and quantity of NHRM received in tons or gallons (as appropriate).
11. The annual report must include an updated estimate of the cost of closing the facility, per the requirements of Section 9.E.3.b of the DRGSW.
12. The financial assurance document, as defined in Section 4.A.11 of the DRGSW must be provided annually to include coverage of the updated cost of closure.
13. A review of the parameters in section III.A. 4, 5, 6, 7, 8 and 9 of this permit and tables 5.1, 5.2 and 5.3 attached hereto.
14. Groundwater monitoring results.

F. Recordkeeping: Copies of all records reported in E above shall be kept on site for a minimum of three (3) years and shall be available for DNREC review at any reasonable time.

G. Closure Plan:

Annually, the estimate of the cost of closing the facility must be updated, per the requirements of Section 9.E.3.b. The closure plan must be maintained current with an annual update to be must be maintained current Vehicles exiting the facility shall not track soil or other materials onto any public road. If necessary, control measures must be implemented to comply with this requirement. When sweeping is used as a control measure, all collected soil and dirt must be treated in the thermal desorption unit.

H. Ground Water Monitoring:

The permittee shall sample monitoring wells MW1, MW2, MW3, MW4, MW5, MW6 and MW7 quarterly (January, April, July, and October) and analyze for TPH, BTEX, specific conductance, and pH.

Issued by: Nancy C. Marker Date 7/1/05

Nancy C. Marker
Environmental Program Manager II
Solid and Hazardous Waste Management Branch

NCM: JDS: jmr
CE Permit SW-9507 070105 mod.doc

Permit Modification Synopsis:

The revised permit SW 95/07 supersedes all permits previously issued to this facility. The revisions between the previously issued permits and this permit primarily focus on the requirements necessary to properly manage nonhazardous coal tar contaminated soils from MGP sites.

December 22. 1995 revisions:

Modified to include the treatment of non-hazardous Manufactured Gas Plant (MGP) coal distillate contaminated soils

November 1, 2001 revisions:

Changed the TPH analysis method and made it more current with the industry standard and further detailed the requirements for reuse of the treated soil as landfill cover.

July 1, 2005 Renewal and Major Modifications – Per Secretary's Order 2005-A-0024, Permit SW-95/07 is issued with the following revisions:

- clarified the reporting requirements for incidents involving equipment failure,
- added new language which specifies specifically what sources of petroleum contamination are acceptable,
- clarified the notification requirements for acceptance of MGP sites,
- expanded the analytical requirements for MGP sites,
- defined the term "used" and "waste" oil
- provided the opportunity to accept "Non Hazardous Recyclable Materials" (NHRM) to blend with treated soils to produce a synthetic soil for beneficial reuse
- further refined acceptable uses of the treated soil by requiring the contaminant levels not exceed the levels set forth in the Delaware Uniform Risk-Based Remediation Standards and
- further described acceptable placement of the treated soil regarding ground and surface water,
- clarified the PCB levels permitted per 40 CFR 761,
- added RCRA metals analysis for treated soils.
- included storage in the adjacent leased area.

BUREAU OF WASTE MANAGEMENT

Permit
For
Solid Waste Disposal and/or Processing Facility
FORM NO. 8

Permit No. 301220
Date Issued April 24, 2000
Date Expired April 24, 2010

Under the provisions of the Pennsylvania Solid Waste Management Act of July 7, 1980, Act 97, a permit for a solid waste disposal and/or processing facility at (municipality) City of Philadelphia in the County of Philadelphia is granted to (applicant) Soil Remediation of Philadelphia, Inc. (address) 3201 South 61st Street, Philadelphia, PA 19153-3592.

This permit is applicable to the facility named as Soil Remediation of Philadelphia, Inc. and described as:

Latitude - 39°, 55', 16"

Longitude - 75°, 12', 52"

This permit is subject to modification, amendment and supplement by the Department of Environmental Protection and is further subject to revocation or suspension by the Department of Environmental Protection for any violation of the applicable laws or the rules and regulations adopted thereunder, for failure to comply in whole or in part with the conditions of this permit and the provisions set forth in the application No. 301220 which is made a part hereof, or for causing any condition inimical to the public health, safety or welfare.

See Attachment for waste limitations and/or special conditions

FOR THE DEPARTMENT OF
ENVIRONMENTAL PROTECTION

THIS PERMIT IS NON - TRANSFERABLE

Permit
For
Solid Waste Disposal and/or Processing Facility
FORM NO. 8

Permit No. 301220
Date Issued April 24, 2000
Date Expires April 24, 2010

1. This waste management permit is issued based upon application No. 301220, which was received in the Southeast Regional Office of the Department of Environmental Protection on November 17, 1996. This permit is for renewal and modification of the residual waste processing facility known as Soil Remediation of Philadelphia, Inc., located in the City of Philadelphia. Modifications include an expanded list of both waste to be processed and waste contaminants amenable to thermal remediation, the addition of an oily wastewater treatment process, increased processed and unprocessed waste storage piles, solid and liquid drum storage and processing areas, transfer operations for certain contaminated wastes, and provisions for the addition of various wastes and sludges to thermally remediated soil (pending separate general permit approval). This approved application consists of the following documents:

Form A received on November 7, 1996, resubmitted on January 11, 1999
Form B received on November 7, 1996, resubmitted on January 11, 1999
Form B1 received on November 7, 1996
Form HWC received on November 7, 1996, revised February 5, 1998, May 28, 1998, and May 19, 1999
Form D received on November 7, 1996, resubmitted on January 11, 1999
Form E received on November 7, 1996, resubmitted on January 11, 1999
Form G(A) received on November 7, 1996, resubmitted on January 11, 1999
Form I received on November 7, 1996, resubmitted on January 11, 1999
Form L and the PPC Plan received on November 7, 1996, revised February 5, 1998, January 11, 1999, and November 22, 1999
Form P received on November 7, 1996, revised April 17, 1998, February 5, 1998, May 28, 1998, January 11, 1999, December 6, 1999, and January 20, 2000
Form R received on November 7, 1996, revised April 17, 1998, February 5, 1998, May 28, 1998, January 11, 1999, December 6, 1999, and January 20, 2000
Form 5R received on November 7, 1996, resubmitted on January 11, 1999
Form 18R received on November 7, 1996
Form 23R received on November 7, 1996, resubmitted on January 11, 1999
Process Equipment Specifications received on November 7, 1996, resubmitted on January 11, 1999
Insurance Documentation received on June 22, 1998
Bonding Documentation received on November 7, 1996, revised April 17, 1998, February 5, 1998, and June 3, 1998

Permit
For
Solid Waste Disposal and/or Processing Facility
FORM NO. 8

Permit No. 301220
Date Issued April 24, 2000
Date Expires April 24, 2010

Drawing Numbers	Received Date	Revised Date
29390-D-006	November 7, 1996	January 20, 2000
29390-D-007	November 7, 1996	November 7, 1996
29390-D-010	November 7, 1996	June 22, 1998
29390-D-012	November 7, 1996	January 22, 1999
29390-D-013	November 7, 1996	January 22, 1999
29390-D-014	November 7, 1996	April 29, 1998
29390-D-015	November 7, 1996	June 22, 1998
29390-012-D	November 7, 1996	January 16, 1998

This approved application includes responses to the Department's review letters dated January 16, 1997, August 15, 1997, and November 9, 1998, received on April 17, 1997, February 5, 1998, and January 11, 1999, respectively, with additional information submitted on May 28, 1998, June 3, 1998, June 22, 1998, May 19, 1999, November 22, 1999, December 6, 1999, and January 20, 2000.

The contents of all the above listed documents are, hereby, incorporated in the permit as conditions with which the permittee must comply, except as they may be modified by the conditions of this permit.

2. Nothing in this permit shall be construed to supersede, amend, or authorize violation of, the provisions of any valid and applicable local law, ordinance, or regulation, provided that said local law, ordinance, or regulation is not pre-empted by the Pennsylvania Solid Waste Management Act, the Act of July 7, 1980, Act 97, 35 P.S. 6018.101, et seq.

3. As a condition of this permit, and of the permittee's authority to conduct the activities authorized by this permit, the permittee, hereby, authorizes and consents to allow authorized employees or agents of the Department, without advanced notice or a search warrant, upon presentation of appropriate credentials, and without delay, to have access to and to inspect all areas on which solid waste management activities are being or will be conducted. The authorization and consent shall include consent to collect samples of waste, water or gases, to take photographs, to perform measurements, surveys and other tests, to inspect any monitoring equipment, to inspect the methods of operation, and to inspect and/or copy documents, books or papers required by the Department to be maintained. This permit condition is referenced in accordance with Sections 608 and 610(7) of the Solid Waste Management Act, 35 P.S. Sections 6018.608 and 6018.610(7). This condition in no way limits any other powers granted under the Solid Waste Management Act.

Permit
For
Solid Waste Disposal and/or Processing Facility
FORM NO. 8

Permit No. 301220
Date Issued April 24, 2000
Date Expires April 24, 2010

4. This facility may not accept infectious waste, municipal sewage sludges, municipal waste incinerator ash, or categories of residual waste not approved in the permit application, unless the permit amendment application has been submitted and approved by the Department. This facility may not accept hazardous waste or municipal waste, except for those certain special handling wastes categories of municipal waste approved pursuant to this condition.

5. The permitted days and hours for acceptance of waste are to be Monday through Friday from 7:00 a.m. to 7:00 p.m. and Saturday 7:00 a.m. to 12:00 Noon. The facility's permitted days and hours of on-site operations are 24 hours per day, seven days per week, except as may be otherwise limited by Air Plan Approvals or permits issued by the City of Philadelphia's Air Management Services. Waste acceptance and/or operations may be extended due to extreme weather conditions in accordance with the following procedure. Prior to extending operations, justification for such an extension must be mailed or faxed to the Waste Management Program Manager or his designee. Written concurrence that the extension is justifiable needs to be received by the permittee from the manager, or his designee, before extended operations may be implemented. All other requests to extend operating hours must be requested in advance of need and be approved, in writing, in advance by the Department.

6. Upon written Department approval of the Phase I construction certification required pursuant to Condition 22, the facility may accept, for transfer operations and thermal processing, soils and other non-combustible solid materials that are contaminated with petroleum products (virgin and used) and non-petroleum hydrocarbons. For the purposes of this permit, materials are defined as the waste in which the contamination is present. The material itself may be a waste on its own, as a result of its subsequent contamination, or both. References to contaminated or processed material shall include both soil and other non-combustible solid material defined as follows, unless otherwise differentiated. Soil shall be limited to naturally occurring mineral grain and humus material directly removed from the earth's surface. Other non-combustible solid material shall be limited to sorbent media, filtration media, and casting sands, as described in Section 9.2 of Form P and Appendix A, Section A-3.2, of Form R. These other non-combustible solid materials, as defined above, are wastes and shall not be considered as, or characterized as, soil regardless of whether they contain soil or soil-like components.

   Petroleum and non-petroleum contaminants (e.g., petroleum fuels; mineral oils; natural and synthetic waxes; oils, fats and fat products; petroleum-based solvents; coal and coal products) shall be limited to those described in Table 1 (wastes for treatment) and Sections 9.3 through 9.3.6 of Form P and Appendix A, Section A-3.3 through A-3.3.6 of Form R.

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Transfer operations, limited to soil and non-soil contaminated material as defined above, shall not commence until the Department has approved the Phase I construction certification discussed above. No other wastes, including soil amendments, wastes for beneficial use, or oil/water wastes, may be accepted for transfer operations. Direct shipments of waste from the site of origin to another permitted facility are subject to regulation under 25 Pa. Code Chapter 299, and are in no way authorized under this permit.

Contaminated soil, as described above, may be used as fill after thermal processing, provided the processed soil complies with Condition 20. Contaminated material other than soil, as described above, shall be segregated, at all times, from contaminated or processed soil and shall only be blended with soil for processing in accordance with approved blending procedures. Processed contaminated material other than soil, whether segregated from or blended with soil, shall not be used as fill unless such use is otherwise approved as a beneficial use by a general permit.

7. Incoming petroleum and non-petroleum hydrocarbon contaminated materials are to be segregated and stored (testing and pre-processing storage) in an area totaling 10,156 cubic yards, as indicated on Drawing Nos. 29390 012-D and 29390-D-012. Storage areas shall be marked or delineated to allow for visual identification of their permitted boundaries (length, width and height).

8. Soil amendment/sludge waste materials for use in the soil reuse program shall be segregated and stored inside the building in an area totaling 1,666 cubic yards, as indicated on Drawing Nos. 29390-012-D and 29390-D-012. Allowable wastes and processing are described in the Treated Soil Reuse Program and in Forms P and R, except that said wastes shall only be mixed, blended or otherwise added to processed soil (post thermal treatment) and shall not be mixed, blended or otherwise added to soil prior to thermal processing. No storage or processing of these wastes may occur unless: (1) storage and processing is also conducted pursuant to, and consistent with, a general permit for beneficial use/processing issued by the Department; and (2) the Phase I and II construction certification required pursuant to Condition 22 has been approved in writing by the Department. Upon receipt of a general permit, the permittee shall file a report with the Southeast Regional Office notifying the Department of its intentions regarding implementation of the general permit and comparing operations authorized by the general permit against those authorized by this permit. If the Department determines that an amendment to this or any other permit is required to implement the terms and conditions of the general permit, the permittee shall file the necessary application(s) and obtain the necessary amendment(s) prior to implementing, at this facility, the activities authorized by the general permit. Storage areas shall be marked or delineated to allow for visual identification of their permitted boundaries (length, width and height). Until used for storage of soil amendment/sludge wastes pursuant to a general permit, this area may be used to store hydrocarbon contaminated media approved under Condition 6.

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9. Processed materials are to be segregated and stored in an area totaling 10,000 cubic yards, as indicated on Drawing No. 293490-006. Adjacent to this area, reformulated top soils are to be stored in an area totaling 2,301 cubic yards; however, no storage of reformulated top soils may occur unless their processing and storage is also conducted pursuant to, and consistent with, a general permit for beneficial use/processing issued by the Department. Storage areas shall be marked or delineated to allow for visual identification of their permitted boundaries (length, width and height). Until used for storage of reformulated top soils pursuant to a general permit, this reformulated top soil storage area may be used to store processed media.

Until Phase I construction certification required pursuant to Condition 22 has been submitted to, and approved by, the Department, the permittee shall confine processed material storage to the area indicated on Drawing No. 29390-D-007 (Existing Facility Layout) and shall be further limited to a storage capacity of no more than 4,725 cubic yards of processed soil in this area (Condition 10 of permit issued on July 2, 1992).

10. The operator shall inspect each load in accordance with its approved plan under Section 287.134 of the Residual Waste Regulations, to ensure compliance with that Section and Sections 293.201 and 297.201.

11. The operator shall maintain all analyses (pre-approval, pre-acceptance, post-treatment) of residual waste that is accepted under Section 287.134 of the Residual Waste Regulations on-site for a minimum of five years after the analyses are performed. These records must be made available to representatives of the Department upon request.

12. Daily operational records must be kept in a format outlined in Sections 293.251 and 297.261 of the Residual Waste Rules and Regulations. This must include the amount of contaminated material accepted for processing and transfer each day, processed each day, and added to the processed material storage pile each day; the amount of processed material transported off site each day; the type and amount of waste transferred each day; satisfactory written and analytical documentation demonstrating compliance with the post-process treatment requirements in Condition 20; and the number of waste transport vehicles entering and exiting the facility each day.

13. An annual operations report is to be submitted on or before June 30th of each year to the Department's Southeast Regional Office in accordance with the format outlined in Sections 293.252 and 297.262 of the Residual Waste Rules and Regulations. This must be accompanied by the annual permit administration fee.

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14. The maximum allowable concentration of hydrocarbons for incoming contaminated material may not exceed 30,000 mg/kg for volatile contaminants, and 400,000 mg/kg for semi-volatile contaminants. The API GC-FID Method for diesel range organics, expanded to C-44 must be utilized for total petroleum hydrocarbon testing (generator analysis). If the generator cannot obtain test results using the expanded method, the EPA 418.8 Method or the API-GC-FID Method for Diesel Range Organics must be utilized. For concentrations greater than 10,000 mg/kg, a Form U document must be submitted and be approved by the Department, in writing, prior to the acceptance of contaminated material having these concentrations from individual generators.

15. Acceptance limits for TOX concentrations for incoming contaminated material are to be 1,000 mg/kg. EPA Test Method No. 3540A/9020, within EPA Document No. SW-846, or an alternate method approved by the Department in writing, is to be utilized for testing incoming contaminated material for TOX concentrations.

16. EPA Test Method 3050/6010 or 7000, within EPA Document No. SW-846, or an alternate method approved by the Department in writing, is to be utilized to test incoming material for total metals concentrations.

17. EPA Method No. 5030A/8081, within an EPA Document No. SW-846, or an alternate method approved by the Department in writing, is to be utilized for testing incoming contaminated material for PCB concentrations.

18. No more than 122 waste hauling vehicles (processed and unprocessed, liquid and solid waste for processing or transfer operations) may enter and exit the facility each day. All waste hauling vehicles coming to this facility are to approach the facility from Passyunk Avenue going north on 61st Street. All waste hauling vehicles leaving the facility are to proceed south on 61st Street to Passyunk Avenue. A record of the number of waste hauling vehicles, including the type and estimated amount of waste being hauled, shall be kept as part of the daily operational record. Waste hauling vehicles entering the permitted area, whether for processing or transfer operations, shall be deemed to be received by the permittee for purposes of compliance with this permit. Any use of the terms "receipt," or receive or received in Forms P and R is limited to determining proper waste acceptance and management procedures and shall not be construed to limit the permittee's liability or responsibility regarding acceptance of waste at this facility.

19. Wastes and contaminated material, received at the facility, shall be analyzed for acceptance pursuant to the Waste Analysis Plan detailed in Form R, with the following additions:

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a. Each separate wastestream, as identified by a unique generator and/or residual waste code identification, prior to acceptance at the facility, shall have a representative sample analyzed for total metals, TCLP metals, TPH, TOX, PCBs, ignitability, corrosivity, radioactivity and reactivity. These analytical results are to be submitted to the Department on a quarterly basis. Re-occurring wastestreams shall be analyzed at a frequency of at least annually as described above, or shall be accompanied by a generator's certification attesting to the validity of the original analysis and stating that no change to the composition of the wastestream has occurred since the original analysis. Contaminated material from remediation of residential properties, Section 1.3.1.6 of Form R (virgin petroleum contaminated soils from residential properties, not to exceed 100 tons of contaminated soil per site), are excluded from this subcondition.

b. At a minimum frequency of once per month, the permittee shall subject a randomly selected wastestream to a complete analytical scan for total metals, TCLP (organics and inorganics), TPH, TOX, PCBs, ignitability, corrosivity, radioactivity and reactivity for purposes of quality control and verification of pre-approval testing and pre-acceptance screening procedures. The Department may, at its discretion, require that these analyses be conducted by a certified laboratory. These analytical results are to be submitted to the Department on a monthly basis for the first six months. Permittee may, upon completion of the first six months of testing, petition the Department to conduct the quality control and verification testing at a lesser frequency, subject to approved by the Department in writing.

20. Post-process testing shall be conducted on each production run as described in Section 1.5 of Form R. For the purposes of this permit, a production run is defined as the processing of a stable mix of waste under a fixed set of operating conditions. Post-process samples shall be collected after rehydration. Generator analysis may not be used to document total metal levels in the processed material for each production run. A minimum of one sample per hour, for each production run, shall be collected and the samples shall be analyzed in accordance with Section 1.5 of Form R. Hourly samples shall be composited and analyzed for each production run, if the run is less than one operating day (24-hour calendar day), or at the end of each operating day should the production run extend beyond a single operating day, whichever period is shorter. RCRA Metals in Table 9, Form R, shall equate to Post Process Total Metals in Table ATT2-1, Form R. Soil, non-combustible solid materials (materials), and soil/material blends shall be treated to levels necessary to allow these processed wastes to be used lawfully and consistent with applicable standards for the intended uses. The permittee shall, as part of its daily operational records, maintain adequate documentation to demonstrate compliance with this treatment requirement.

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21. A maximum of 250 drums of contaminated material (as defined in Condition 6) and a maximum of 250 drums of waste oil/water mixtures (Appendix A, Section A-3.3 of Form R) may be stored inside the storage building, as indicated on Drawing No. 29390-D-012.

22. Form 19R, Certification of Facility Construction Activity, must be submitted to the Solid Waste Manager in the Southeast Regional Office after this facility has been modified according to the approved plans. Said certification may be submitted in phases to cover phased construction of the proposed modifications as described in Attachment 1 of this permit. Operations related to facility modifications approved in this permit shall not be authorized until the required construction certification(s) for that phase has been submitted to, and approved by, the Department. Any modifications to the fire protection system required by the City Fire Marshall, shall be noted on the Phase I certification submission and shown on the as-built drawings submitted as part of the certification submission.

23. All references to steam cleaning operations have been withdrawn from the permit application.

24. The side streams of waste (plastic, wood demolition debris and stumps, metal demolition debris, large aggregates, and drums) unsuitable for thermal processing, after separation from the incoming contaminated media, shall be stored, either segregated or commingled, in the pre-processing storage area or in roll-offs, located as indicated on Drawing No. 29390-D-012, and disposed off site in a permitted landfill, or otherwise properly managed under the Solid Waste Management Act. Drums shall be managed in the drum storage/processing area inside the main building. All side stream wastes, other than drums, are to be incidental (less than 2 percent by volume per delivered load) to the waste streams received under the residual waste operations approved as part of this permit. The facility is not approved for receipt and processing of separate loads of construction/demolition waste (municipal waste).

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25. The facility is permitted to treat up to a maximum of 100 gallons per minute of waste oil/water mixtures (Appendix A, Section A-3.3 of Form R) under a separate oil/water treatment process. These mixtures shall consist of non-hazardous waste oils that are phase separated or emulsified in water. Oil/water separation technology shall be used to recover the waste oil for use as "on-specification waste oil fuel" (25 Pa. Code Section 266a.40(e)) in operating the thermal treatment unit, wastewater for rehydrating the soil to the desired moisture content, and separator waste solids amenable to treatment in the thermal unit. Waste acceptance testing shall be conducted on the oil fraction of the oil/water waste. Post-processing testing shall be conducted on each batch treatment storage tank (processed oil and processed wastewater) prior to use. Processed oil shall be tested for parameters in Table 7, Form R. Processed wastewater shall be tested for TPH, at a minimum. Permittee shall maintain adequate records to document the use of on-specification waste oil at this facility. PCB's levels in waste oils used as fuel for the thermal unit must be less than 2 ppm unless the permittee demonstrates compliance with the standards for burning used oil containing PCBs imposed by 40 C.F.R. 761.20(e) (relating to prohibitions for PCBs).

26. The oil/water separation process shall be located in the main building with storage tanks located in a separate containment area outside the main building. The storage tanks shall consist of a 30,000-gallon waste oil/water mixture storage tank, two 10,000-gallon processed waste oil storage tanks and two 8,000 gallon processed water storage tanks. This operation is depicted on Drawing No. 29390-D-012. Stormwater collected in the storage tank containment system shall be pumped to the oil/water separation process prior to discharge or reuse. Stormwater volumes shall be properly managed such that adequate secondary containment volume is maintained at all times in the tank containment system.

27. Processed material shall be rehydrated at all times. Under normal operating conditions, the processed wastewater from the oil/water separation process may be used to rehydrate the processed material to a desired moisture content. However, in the event excess processed water is generated and needs to be discharged to the sanitary sewer, it shall be discharged to the sanitary sewer, pursuant to approval obtained from the Philadelphia Water Department. Sampling performed to demonstrate compliance with Condition 20 shall be conducted after the rehydration of the processed material with the processed wastewater. Public water shall be utilized to rehydrate processed material in the event that processed wastewater is inadequate, unsuitable, or otherwise unavailable for purposes of rehydration.

28. Until the Phase III construction certification has been submitted to, and approved by, the Department, the permittee may not accept, store, or process waste oil/water mixtures pursuant to Condition 21, 25, and 26.

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29. A mechanized street sweeper shall be utilized to clean the internal roadways, to minimize fugitive dust from vehicular traffic, at a minimum of twice per operating day.

30. Both processed and unprocessed waste shall be delivered, or removed, from the facility in enclosed or tarped vehicles to minimize particulate and VOC emissions, during transport to or from the facility.

31. Until the Phase I construction certification has been submitted to, and approved in writing by, the Department, the facility shall:

    a. operate in accordance with the existing facility layout as shown on Drawing No. 29390-D-007;

    b. be limited to acceptance, for thermal processing, of virgin fuel contaminated soils.

    While operating under the limitations of this condition, or as otherwise limited by other conditions contained in this permit, the facility shall comply with all other terms and conditions of this permit.

32. The collateral bond, dated June 2, 1998, between Soil Remediation of Philadelphia, Inc. and the Department in the amount of $596,337.90 is, hereby, approved as part of this permit. Prior to the completion of the Phase I improvements approved as part of this permit, permittee shall have in place an additional bond in the amount of $274,858.00, bringing the total bond amount to $871,195.90. Upon receipt of written notice from the Department, this bond will have to be updated within 90 days in accordance with Chapter 287 of the Residual Waste Regulations.

Re 30 (GJC99WM)87-8

Pennsylvania Department of Environmental Protection

2 East Main Street
Norristown, PA 19401

January 19, 2007

Southeast Regional Office

484-250-5960
Fax 484-250-5961

CERTIFIED MAIL NO. 7001 2510 0005 9957 9912

Mr. Michael Goebner
Clean Earth of Southeast Pennsylvania, Inc.
7 Steel Road East
Morrisville, PA 19067

Re: Permit Renewal/Reissuance/Modification
Clean Earth of Southeast Pennsylvania, Inc.
Falls Township, Bucks County
ID No. 301254
APS No. 349490, AUTH No. 358980 (RPAP)
APS No. 349490, AUTH No. 535830 (Renewal and Reissuance

Dear Mr. Goebner:

The Pennsylvania Department of Environmental Protection (Department) has reviewed your application to renew the above referenced permit, to reissue the permit from R3 Technologies, Inc. and Soil Technology, Inc. to Clean Earth of Southeast Pennsylvania, Inc., and to modify the permit to incorporate a radiation protection action plan (RPAP). We have determined that you have satisfied all applicable requirements necessary to perform this activity. Therefore, we have issued the enclosed permit in accordance with Act 97, the Pennsylvania Solid Waste Management Act. Please direct any questions to Mr. James Wentzel, Chief, Engineering Services.

Compliance with the limitations and stipulations that have been set forth on your permit is mandatory.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 PA C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action, unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483.

This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statues and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

Thank you for your cooperation.

Sincerely,

Ronald C. Furlan, P.E.
Regional Manager
Waste Management Program

Enclosure: Permit

cc: Falls Township (w/enclosure)
Bucks County Health Department (w/enclosure)
Mr. Logan, CPS, Inc. (w/enclosure)
Re 30

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

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Under the provisions of the Pennsylvania Solid Waste Management Act of July 7, 1980, Act 97, a permit for a solid waste disposal and/or processing facility at (municipality) Falls Township in the County of Bucks is granted to (applicant) Clean Earth of Southeast Pennsylvania, Inc.

(address) 7 Steel Road East, Morrisville, PA 19067.

This permit is applicable to the facility named as: Clean Earth of Southeast Pennsylvania, Inc.

Latitude - 40°, 10', 45"

Longitude - 74°, 45', 55"

This permit is subject to modification, amendment and supplement by the Department of Environmental Protection and is further subject to revocation or suspension by the Department of Environmental Protection for any violation of the applicable laws or the rules and regulations adopted there under, for failure to comply in whole or in part with the conditions of this permit and the provisions set forth in the application No. 301254 which is made a part hereof, or for causing any condition inimical to the public health, safety or welfare.

See Attachment for waste limitations and/or special conditions.

FOR THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

THIS PERMIT IS NON - TRANSFERABLE

COMMONWEALTH OF PENNSYLVANIA
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1. This waste management permit is modified, reissued and renewed based upon applications No. 301254 (APS No. 349490 and AUTH No. 358980 – modification, APS No. 349940 and AUTH No. 535830 – renewal/reissuance), which were received in the Southeast Regional Office of the Department of Environmental Protection on June 15, 2001, and February 17, 2004. All aspects of the June 15, 2001, modification were subsequently withdrawn on March 30, 2004, except for the radiation protection action plan (RPAP) component. The February 17, 2004, renewal application was subsequently modified (twice) to incorporate the reissuance of the permit (1) from R3 Technologies, Inc. to Soil Technology, Inc. and then (2) from Soil Technology, Inc. to Clean Earth of Southeast Pennsylvania, Inc. All of these application requests have been combined into the permit action taken herein.

This approved application consists of the following documents (unless otherwise noted, received and revised refer to the dates documents were received by the Department and not necessarily the dates of the documents themselves):

General Information Form received on February 17, 2004, revised June 7, 2004, September 9, 2004, and June 1, 2006
Form A received on February 17, 2004, revised June 7, 2004, September 9, 2004, June 24, 2005, September 28, 2005, June 1, 2006, August 16, 2006, September 25, 2006, and January 16, 2007
Form B received on February 17, 2004, revised September 9, 2004
Form B1 received on February 17, 2004 and revised September 25, 2006
Form HW-C received on February 17, 2004, revised June 7, 2004, September 9, 2004, June 24, 2005, June 1, 2006, and August 16, 2006
Form D received on February 17, 2004, revised on September 9, 2004
Form E received on February 17, 2004, revised on June 7, 2004, September 9, 2004, June 1, 2006, August 16, 2006, and August 18, 2006
Form G(A) received on February 17, 2004, revised on September 9, 2004
Form I received on February 17, 2004, revised on September 9, 2004
Form L and the PPC Plan received on February 17, 2004, revised on September 9, 2004, and June 1, 2006
Form P received on February 17, 2004, revised on September 9, 2004, June 24, 2005, September 28, 2005, June 1, 2006, September 25, 2006, November 2, 2006, and January 16, 2007

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Form R received on February 17, 2004, revised on September 9, 2004, June 24, 2005, September 28, 2005, December 5, 2005 (page 7A only), June 1, 2006, September 25, 2006, November 2, 2006, and January 16, 2007
Form X received on May 1, 2002, revised on March 30, 2004, September 9, 2004, June 24, 2005, September 28, 2005, and August 16, 2006
Form 5R received on February 17, 2004, revised on September 9, 2004, and September 25, 2006
Form 18R received on February 17, 2004, revised on September 9, 2004
Bonding Estimates received on February 17, 2004, revised on September 9, 2004, June 24, 2005, September 28, 2005, December 5, 2005, June 1, 2006, and September 25, 2006
Drawing No. 1 received on February 17, 2004
Drawing No. 1A received on September 9, 2004, revised September 28, 2005
Drawing D-001, Site Plan, received on September 25, 2006, and revised November 2, 2006

This approved application includes responses to the Department's review letters of February 26, 2004, July 21, 2004, November 15, 2004, July 26, 2005, August 31, 2005 (via email), November 17, 2005 (via email), July 5, 2006, September 1, 2006, and October 23, 2006 (via email), received on March 5, 2004, September 9, 2004, June 24, 2005, September 28, 2005, December 5, 2005, August 16 and 18, 2006, September 25, 2006, and November 2, 2006, respectively, for the renewal/reissuance application. Also included are responses relating to Form X comments received on May 1, 2002, and March 30, 2004, which were subsequently revised by the September 9, 2004, June 24, 2005, September 28, 2005, and August 16, 2006, responses listed above.

The contents of all the above listed documents are, hereby, incorporated in the permit as conditions with which the permittee must comply. Where the terms or conditions of this permit differ from the above referenced documents, the terms or conditions of this permit shall apply. This permit replaces, in their entirety, the terms and conditions of the permit originally issued on March 15, 1994, and that permit's subsequent revisions.

(NOTE: For some of the forms listed above, particularly Forms A, E, HW-C, L, X and Drawing D-001, the last revision includes a complete, comprehensive revision to the form or drawing that fully replaces previous versions or revisions. For Forms P and R, the November 2, 2006, revisions are the last comprehensive revisions to each form that supersede all previous versions and which, in turn, have been modified on January 16, 2007 (Pages 19-20 only for Form P and pages 11-14 only for Form R). For other forms, the subsequent revisions may involve partial or component revisions that modify the

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previous version(s) without necessarily replacing those parts of the previous version(s) not specifically modified by the revision.)

2. Nothing in this permit shall be construed to supersede, amend, or authorize violation of, the provisions of any valid and applicable local law, ordinance, or regulation, provided that said local law, ordinance, or regulation is not pre-empted by the Pennsylvania Solid Waste Management Act, the Act of July 7, 1980, Act 97, 35 P.S. 6018.101, et seq.

3. As a condition of this permit, and of the permittee's authority to conduct the activities authorized by this permit, the permittee, hereby, authorizes and consents to allow authorized employees or agents of the Department, without advanced notice or a search warrant, upon presentation of appropriate credentials, and without delay, to have access to and to inspect all areas on which solid waste management activities are being or will be conducted. The authorization and consent shall include consent to collect samples of waste, water or gases, to take photographs, to perform measurements, surveys and other tests, to inspect any monitoring equipment, to inspect the methods of operation, and to inspect and/or copy documents, books or papers required by the Department to be maintained. This permit condition is referenced in accordance with Sections 608 and 610(7) of the Solid Waste Management Act, 35 P.S. Sections 6018.608 and 6018.610(7). This condition in no way limits any other powers granted under the Solid Waste Management Act.

4. a. This facility may not accept residual waste unless the Department has specifically approved the processing and management of the waste as a part of this permit.

   b. Hazardous waste may not be stored, processed or disposed at the facility.

   c. Municipal waste, including construction/demolition waste and sewage sludge, may not be stored processed or disposed at the facility.

   d. Other special handling wastes may not be stored, processed or disposed at the facility unless the Department has specifically approved the processing and management of the waste as a part of the permit.

   e. Sewage sludge that has been processed pursuant to a general permit issued by the Department's Bureau of Water Supply and Wastewater Management pursuant to 25 Pa. Code Chapter 271,

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Subchapter J, and that meets a Class A or Class B pathogen requirement (i.e., biosolids) may be accepted and further processed at this facility provided that said acceptance and processing is also conducted pursuant to a Bureau of Waste Management General Permit issued pursuant to 25 Pa. Code Chapter 271, Subchapter I, or Chapter 287, Subchapter H, subject to any additional limitations or restrictions as may be contained in this permit. The permittee shall submit to the Southeast Regional Office, Waste Management Program, an analysis of the terms and conditions of any such general permit that may be issued along with an evaluation of the impact of the general permit on the terms and conditions of this individual permit. The Department will review this analysis to determine if this permit requires revision or modification to adequately incorporate the processing and beneficial use requirements of the general permit. The Permittee shall not conduct processing or beneficial use operations under the general permit until or unless written approval is obtained from the Department's review pursuant to this sub-condition.

5. The permitted days and hours for acceptance of waste are Monday through Saturday from 6:00 a.m. to 6:00 p.m. The facility's permitted days and hours of on-site operations are 24 hours per day, seven days per week. Waste acceptance and/or operations may be extended due to extreme weather conditions in accordance with the following procedure. Prior to extending operations, justification for such an extension must be mailed or faxed to the Waste Management Program Manager or his designee. Written concurrence that the extension is justifiable needs to be received by the permittee from the manager, or his designee, before extended operations may be implemented. All other requests to extend operating hours must be requested in advance of need and be approved, in writing, in advance by the Department.

6. The maximum amount of solid waste (including any sewage sludge/biosolids accepted pursuant to Condition 4, above) and that may be accepted for processing shall not exceed 2,400 tons per day (tpd). Clean fill, as that material is defined by the Department's Management of Fill policy (Document Number 258-2182-773), shall only be managed at the facility pursuant to Section 2.5 of Form P and the amounts of clean fill received at the facility each day shall be counted against the facility's 2,400 tpd daily volume limitation until or unless a revised traffic impact study is submitted to and approved by the Department to address additional traffic associated with clean fill operations. Other than being counted towards the facility's daily volume limitation as described above and being included in the facility's record keeping requirements described in Conditions 8 and 9 of this permit, clean fill is not otherwise subject to regulation pursuant to this permit unless its management at the facility creates or contributes to on or off site nuisances.

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7. The operator shall inspect each load in accordance with its approved plan under 25 Pa. Code Section 287.134 of the Residual Waste Regulations, to ensure compliance with that Section and Section 297.201.

8. All analyses (including but not limited to pre-approval, pre-acceptance, post-treatment) of solid waste that is accepted at the facility and all documentation regarding environmental due diligence determinations for clean fill managed at the facility shall be maintained by the operator on-site for a minimum of five years after the analyses/determinations are performed, unless the permittee's application specifies a longer retention timeframe. These records must be made available to representatives of the Department upon request.

9. Daily operational records must be kept in a format outlined in Section 297.261 of the Residual Waste Rules and Regulations. This must include the type and amount of material (solid waste, clean fill) accepted each day, the source or generator of the material, the amount of material processed each day, the type and amount of material added to the processed material storage pile each day, the type and amount of material (solid waste, clean fill) transported off site each day, and the use and destination of the material that is transported off site each day.

10. An annual operations report is to be submitted on or before June 30th of each year to the Department's Southeast Regional Office in accordance with the format outlined in Section 297.262 of the Residual Waste Rules and Regulations. This must be accompanied by the annual permit administration fee.

11. The facility is permitted to accept and to process by physical means (screening, mixing or blending) and/or by thermal remediation the following contaminated materials: naturally-occurring soils and aggregates composed of clay, silt, sand, natural organic matter, gravel, rock and stone that are removed from the ground after becoming contaminated to non-hazardous levels by hydrocarbon contaminants. For the purposes of this permit, hydrocarbon contaminants shall consist of virgin and non-virgin petroleum hydrocarbons (gasoline; jet fuel; kerosene; diesel fuel; No. 2-6 fuel oil; asphalt, petroleum and coal tars; greases; crude oil; heating oil; and lubricating oil) and oxygenated hydrocarbons (alcohols; ethers; organic acids; and ethylene glycol). The descriptions and listings contained herein are intended to be limiting. When used in this permit, the terms "contaminated material", "contaminated materials", "hydrocarbon contaminant", and "hydrocarbon contaminants" shall be restricted to the descriptions and listings contained above. For contaminated materials or hydrocarbon contaminants that are not specifically described above, the permittee must submit a Form U disposal request for Department

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review and approval prior to acceptance and processing, and might be required to submit a permit modification if the request is deemed to be for a type of waste not approved in this permit.

12. a. Incoming contaminated material that is being sampled as part of the onsite waste acceptance and screening process shall be staged in the truck at the designated staging area (identified as the staging area for detected RAM loads) while awaiting review and acceptance of analytical results prior to being placed inside the contaminated material storage building (building). Incoming contaminated material that is not being sampled shall be visually inspected for compliance with the requirements of Form R, Section 3.2 prior to being placed inside the building. Incoming contaminated material from a particular job or from a particular job that is received during the operating day (in cases material receipt for a job extends beyond a single day) shall be segregated from other materials when initially placed inside the building until all onsite waste acceptance screening samples collected for that job, or for the batch of material received from that job during the operating day, have been analyzed and found acceptable. Should any screening sample collected for that job, or for the batch of material received from that job during the operating day, fail to meet acceptance criteria for any parameter analyzed, the segregated material shall be rejected (returned to the generator or sent to an acceptable processing or disposal facility) or else the entire quantity of segregated material shall be resampled by collecting and analyzing samples that are representative of the entire quantity of segregated material in the number specified by Condition 15 for that quantity of material. If the resampling demonstrates compliance with the facility's waste acceptance criteria, then the material may remain at the facility for processing. If the resampling indicates that all or a portion of the material does not meet waste acceptance criteria, then all or that portion of the material that is unacceptable shall be rejected. No blending of the material with other material inside the building shall occur until this procedure has been satisfied.

b. Incoming contaminated material shall be staged or stored in Areas 1 to 6, as indicated on Drawing No. 1A, except that non-recyclable oversized material may also be stored in Area 7 pursuant to Condition 19. Each storage area measures 28' wide by 130' deep as measured from the back wall of the building. All contaminated material must be stored inside the building and said storage shall be limited to the footprint defined by these six areas (168' wide by 130' deep), thereby maintaining a 20' clear zone between the edge of the permitted storage area and the front wall (overhead door side) of the building for unimpeded vehicle and equipment movement inside the building. Pile height must not be higher than the roof frame and shall be sufficiently below

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the roof frame to allow equipment to maneuver on and within the pile(s) without the possibility of the equipment damaging the roof or its supporting structure.

c. Areas 1 and 2 shall be used for the staging or storage of only regulated fill material or material intended for direct reuse without thermal remediation. In addition to any temporary segregation required pursuant to Condition 12a above, relating to segregation of material as part of the onsite waste acceptance screening procedures, regulated fill material and direct reuse material staged or stored in Area 1 and/or 2 at the same time are to be segregated from each other by physical barriers. No mixing or blending of regulated fill material with direct reuse material is allowed at any time. Incoming contaminated material requiring thermal remediation shall be staged or stored only in Areas 3 to 6. However, any or all of Areas 3 to 6 may be used to stage or store regulated fill material and/or direct reuse material provided that:

i. All material intended for thermal remediation is first removed from the area(s) and the area(s) are cleaned to the greatest extent practical;

ii. Regulated fill material and direct reuse material stored in the area(s) shall be physically segregated from each other as specified in Condition 12.c, above; and,

iii. The area(s) being used for staging or storage of regulated fill material and/or direct reuse material shall be clearly marked, including visual markings, to prevent the placement of contaminated material intended for thermal remediation in the area(s).

d. Except as may be allowed pursuant to Condition 19, relating to non-recyclable, oversized material storage, Area 7, as indicated on Drawing No. 1A, shall be used only for blending and/or physical processing preparation of contaminated material removed from storage from Areas 1 to 6. This use may entail staging of material removed from Areas 1 to 6 prior to, and/or after, blending or physical processing in preparation for being thermally remediated or moved to outside storage in the case of regulated fill or direct reuse materials not requiring thermal remediation. Incoming material shall not be directed to Area 7 for staging or storage. Further, Area 7 shall be used to stage and process either soil intended for thermal remediation or regulated fill/direct reuse materials, but not both at the same time. Regulated fill material and

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direct reuse material shall be segregated from each other at all times, including contact in processing equipment, when in Area 7. No regulated fill and/or direct reuse material may be in Area 7 at any time when material intended for thermal remediation is present, and visa versa. Area 7 , including processing equipment, shall be appropriately decontaminated when switching between the management of regulated fill, direct reuse materials or materials intended for thermal remediation so that cross-contamination between material types does not occur.

e. At no time may the amount of contaminated material inside the building (Areas 1 through 7 inclusive) exceed 17,500 tons. The permittee shall maintain adequate records of incoming and outgoing materials and material processed to determine the amount of contaminated material contained inside the building at any given time. Said determination must be provided to the Department upon request and shall be recorded in the facility's operational records on at least a daily basis. In addition, the permittee shall accurately measure the volume of all the contaminated material inside the building at least once per calendar quarter and compare the measured volume determination to the volume determination based on facility record keeping. Results of this determination shall be recorded as part of the facility's daily operation record. If the permittee, through its record keeping and quarterly measurement comparisons, is unable to document the amount of contaminated material inside the building to the Department's satisfaction, the permittee shall conduct pile volume measurements or surveys to determine the amount of contaminated material present upon written request from the Department.

13. Processed sewage sludge (i.e., biosolids) accepted pursuant to Condition 4, above, shall be stored in a 35' by 70' area within Area 7 as indicated on Drawing No. 1A. No more than 1000 tons of this material may be store on site at any time, not counting material that may be contained in processed soil blends stored in the outside processed soil stockpile area. When not used for biosolids storage, the 35' by 70' area may be used for activities approved for Area 7 in Condition 12, above. The permittee shall keep a Biosolids Evaluation and Certification Form, including all supporting documentation, for each generator on file at the facility for a minimum of 5 years.

14. Waste characterization shall be conducted in accordance with Section 2 of Form R, relating to types of contaminated wastes, site characterization, waste approval, characterization and approval for biosolids, and shipment of approved waste material. Each sample required for site characterization (Form R, Section 2.2, and Soil Profile Sheet Tables B and C) shall be a discrete grab sample when analyzing for TPH and TOX and a composite of at least three discrete and representative grab samples when analyzing

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for Total Metals, PCB, ignitability, reactivity and corrosivity, and each sample (grab or composite consisting of three grabs) shall be collected at the frequency specified in Table 1 of Form R, Section 2.3. The acceptance limits contained in Table 1, Form R, Section 2.3, are absolute maximums concentrations. TCLP is required when metals are twenty times the RCRA limits. When a project is not the result of a virgin petroleum fuel spill or tank pull, TCLP for RCRA organics is required.

15. Onsite waste acceptance shall be conducted in accordance with Section 3 of Form R, relating to screening of incoming loads, rejection of loads, and oversize material. All incoming contaminated material shall be screened onsite for total petroleum hydrocarbons (TPH), total organic halides (TOX), and polychlorinated biphenyls (PCBs). One grab sample per 60 tons of contaminated material containing the following (virgin or non-virgin) hydrocarbon contaminants shall be taken and analyzed for TPH, TOX and PCBs: gasoline; jet fuel; kerosene; diesel fuel; No. 2-4 fuel oil; heating oil; alcohols; ethers; organic acids; and ethylene glycol. One grab sample per 250 tons of contaminated material containing the following (virgin or non-virgin) hydrocarbon contaminants shall be taken and analyzed for TPH, TOX and PCBs: No. 5-6 fuel oil; asphalt, petroleum and coal tars; greases; crude oil; and lubricating oil. The maximum allowable concentration of TPH for incoming contaminated material may not exceed 45,000 mg/kg using a portable photo ionization detector (PID). The maximum allowable concentration of TOX for incoming contaminated material may not exceed 1000 mg/kg using a Dexsil L 2000 or equivalent. The maximum allowable concentration of PCBs for incoming contaminated material may not exceed 4 mg/kg using Dexsil extraction method or equivalent.

16. A Form U document must be submitted to the Department in accordance with the following procedures prior to the acceptance of (1) virgin and oxygenated hydrocarbon contaminated material with TPH concentrations between 10,000 and 45,000 mg/kg and (2) any non-virgin hydrocarbon contaminated material:

    a. All solid waste must be consistent with the requirements stated in the waste analysis and classification plan contained in Form R, as incorporated in Condition 1 of this permit, except to the extent that the requirements of Form R are superseded by the terms and conditions of this permit.

    b. The permittee shall not accept any solid waste not included in the Form R submission unless a permit modification is submitted to, and approved by, the Department.

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c. The permittee shall not accept, receive or process hazardous waste as defined in 25 PA Code Chapter 261a or 40 CFR Part 261.

d. Virgin hydrocarbon contaminated material with TPH concentrations less than 10,000 mg/kg and contaminated material from small quantity residual waste generators do not need to have Form U documents submitted to the Department prior to their acceptance at the facility and, consequently, are not subject to the submittal and review requirements described in Condition 16f. The permittee must keep waste characterization documents, including a Form U, on file at the facility to demonstrate that the waste streams accepted pursuant to this sub-condition are not hazardous, comply with the facility's waste characterization requirements as outlined in Condition 14, and comply with the requirements of this condition (other than 16f). A quarterly report, to be submitted within thirty (30) days of the end of the calendar quarter (Jan-Mar, Apr-Jun, Jul-Sep, Oct-Dec), shall be submitted to the Department's Southeast Regional Office listing information by generator including the waste type, approved quantity, quantity accepted, generator identification number, the identification number for each Form U document and the end use category that governed the level of remediation (see Condition 16g) for all waste received during the calendar quarter that did not require the submittal of a Form U to the Department.

e. All Form U documents must be kept on file and are to be available for inspection by the Department. Each Form U document shall be assigned a sequential identification number that is to be recorded on all forms submitted to the Department.

f. The permittee must submit a Form U waste processing request for each waste stream not exempted from the submission requirement pursuant to Condition 16d, above. Proof of submission to the Department shall be dated certified mail return receipt cards; signed, dated, acceptance receipts for hand delivered requests; signed, dated receipts for overnight mail/federal express delivery; or some other delivery/receipt mechanism as may be approved by the Department. The waste indicated on Form U may be accepted for processing by the permittee after fifteen (15) calendar days. If, at any time after the fifteen (15) calendar day period, it is determined by the Department that the waste accepted for processing is not consistent with the waste analysis and classification plan or the design of the facility, the permittee shall be subjected to all and any applicable enforcement action of the Solid Waste Management Act or

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the Department's rules and regulations promulgated thereunder. Absence of disapproval by the Department before and after the waiting period does not constitute an approval or final action of the Department.

g. All Form U documents shall indicate the intended end use mechanism for the material that is to be processed as well as the end use category (Category 1 – 5, refer to Form P, Section 4.6) that will govern the level of remediation.

17. a. After exiting the thermal treatment unit, processed material shall be conveyed by radial stacker to the Remediated Product stockpile area, as indicated on Drawing No. 1A. This area , also known as the temporary stockpile area, measures approximately 50' by 36' by 20' high and shall be limited to no more than 1333 cubic yards or 2000 tons at any time. Material shall remain at this location until post-treatment testing and analysis have been conducted to verify the effectiveness of the thermal remediation process. At a minimum, one grab sample per 50 tons of thermally processed material shall be collected and analyzed for TPH and volatile organic compounds (VOCs). Effective thermal remediation shall be based upon none of the TPH concentrations of the grab samples exceeding the applicable category limitation and none of the VOCs concentrations exceeding 2 ppm or the individual organic compound limitations specified by the implementing mechanism for the intended end use, with the latter not to exceed 250 ppm (see Form P, Section 4.6 and Table 4). Material meeting the effective remediation standards shall be moved and stored in the processed material storage area, pursuant to condition 18, below. Material not meeting the effective thermal remediation standards shall be moved inside the building for storage in Areas 3 – 6 pending re-processing, or for staging in Area 7 for immediate re-processing. Material returned to the building for re-processing shall be managed as contaminated material and shall be included as part of the 17,500-ton storage limitation contained in Condition 12, above.

b. Regulated fill and direct reuse material meeting end use requirements without thermal processing but only requiring physical processing shall be moved and stored in the outside processed material storage area, pursuant to condition 18, after physical processing.

c. Processed material, after being blended with biosolids as a soil amendment, shall be tested for the parameters and at the frequency specified in the general permit authorizing said processing and beneficial use.

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18. a. Material meeting the effective thermal remediation standards shall be moved from the temporary stockpile area and shall be stored in the processed material stockpile area, which is a kidney-shaped area approximately 200' by 350', as shown on Drawing No. 1A. In addition, regulated fill and direct reuse material shall be moved from Area 7 after physical processing and shall be stored in this processed material stockpile area. Within this area, processed material may be stored in any configuration within the area so long as no more than 7407 cubic yards or 11,100 tons of material is stored at any time and so that pile height does not exceed 20'. Piles shall be adequately segregated and marked (including batch numbers as well as narrative descriptors – regulated fill, Category 1-5 fill, etc.) according to end use requirements. All material placed in the processed material stockpile area shall meet the Category 1 effective remediation limit unless an agreement is in place with a defined end user for an end use allowing for a different effective remediation limit that also specifies a timeframe for, and quantity of, the material needed (see Form P, Section 4.6 and Table 4).

b. Once each operating day, the permittee shall monitor each new pile, or each existing pile to which additional material has been added, that contains regulated fill or direct reuse material. The pile(s) shall be monitored for VOCs in accordance with Section 4.6 of Form P. If any reading for a pile exceeds 100 ppm, that pile shall immediately be covered with a tarp or cover to minimize fugitive emissions, in accordance with Section 4.7.1 of Form P. If any reading for a pile exceeds 250 ppm, that pile shall immediately be relocated back into the building for storage in an appropriate area of the building (areas 3 – 6) to be managed as soil intended for thermal remediation pending re-processing, in accordance with Section 4.7.2 of Form P. A record shall be kept of the daily VOC readings, the TPH category of the each pile(s) corresponding to the daily VOC readings (and/or actual TPH values for each pile, if known), and each incident of implementation of the control measures required pursuant to Section 4.7 of Form P (cover or tarp placement, movement of material back into the building). Material returned to the building for re-processing shall be managed as contaminated material and shall be included as part of the 17,500-ton storage limitation contained in Condition 12, above.

c. Pursuant to Condition 6 of this permit, and as indicated on Drawing D-001, clean fill may be stored in a portion of the processed material stockpile area to the extent that said storage does not

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interfere with the permitttee's ability to abide by, or comply with, the terms and conditions of this permit. Clean fill shall be segregated from processed material by a physical barrier, which may be adjusted to suit operational needs.

d. The permittee shall maintain adequate records of incoming and outgoing materials and material processed to determine the amount of processed material contained outside the building (in areas described in Conditions 17 and 18 of this permit) at any given time. Said determination must be provided to the Department upon request and shall be recorded in the facility's operational records on at least a daily basis. If the permittee, through its record keeping, is unable to determine the amount of contaminated material outside the building to the Department's satisfaction, upon written request from the Department, the permittee shall configure the processed material outside the building in such a manner as to allow for pile volume measurements or surveys to be conducted to determine the amount of processed material present.

e. The storage of processed material and clean fill shall be in a manner that will not create a nuisance or be harmful to public health, safety, or the environment, and shall be in a manner that prevents the dispersal of processed material by wind or water erosion.

f. Runoff from the processed material storage area, including runoff from processed material and/or clean fill storage areas, shall not cause surface water pollution or groundwater degradation and shall be managed in accordance with The Clean Streams Law and regulations promulgated thereunder. Runoff from the processed material storage area shall be diverted or otherwise controlled so that runoff, including runoff-laden sediment, does not flow onto or through the clean fill storage area(s) or come in contact with clean fill material.

g. At a minimum of once per calendar quarter, the permittee shall collect a sample of stormwater runoff from the processed material storage area and analyze the sample for TPH, total suspended solids and the thirteen priority pollutant metals (total and dissolved), unless the permittee certifies that there was insufficient rainfall to generate runoff capable of being sampled in that calendar quarter. The sample shall be collected during the initial 30 minutes of the discharge from the processed material storage area, or as soon as practicable thereafter, and shall be collected prior to discharge to the sedimentation basin. Quarterly sample results shall be submitted to the Department's Southeast Region Waste Management Program Manager no later than 30 days after the end of the calendar quarter for which the sample was to be taken. After

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obtaining four quarters of actual sample results, the permittee shall submit a report evaluating (1) the quality of the stormwater runoff, (2) the effectiveness of runoff controls and (3) the need for continued or additional surface water and/or groundwater monitoring, pursuant to 25 Pa. Code 297.233. As a part of the evaluation, the permittee may request a reduction or elimination of the runoff-sampling program if it believes the data results support such a request. The quarterly sampling program shall remain in effect until modified or eliminated by the Department, in writing, pursuant to this condition.

19. Oversized material shall be limited to contaminated material approved for waste acceptance that fails to pass a two-inch or larger screen. Recyclable oversized material shall be oversized material as described above that is determined to be uncontaminated based on both visual inspection and portable PID testing. Recyclable oversized material may be stored either inside the building or outside the building in the treated material stockpile area described in Condition 18, above, and may be marketed for a suitable use, pending any additional testing that may be required for said use. The recyclable oversized material must be weighed or measured prior to placement outside the building and shall be counted as part of the 7407 cubic yard or 11,100-ton storage limitation contained in Condition 18, above, to prevent unacceptable amounts of "recyclable" material from being accumulated outside of coverage of the facility's bond. Non-recyclable oversized material shall be oversized material as described above that is determined to be contaminated based on either visual inspection or portable PID testing. Non-recyclable oversized material shall be stored inside the building in Areas 1 – 7 until it can be transported to an approved offsite disposal or processing facility. The amount of non-recyclable oversized material stored in this manner, and the amount of recyclable oversized material not stored outside the building, shall be counted as part of the 17,500-ton storage limitation contained in Condition 12, above.

20. The facility is not approved to accept or process wastes other than those authorized pursuant to Conditions 11, 13 and 19 above, relating to contaminated materials, biosolids and oversized materials, respectively, as those terms are defined or used in this permit. While it is acknowledged that there may be some unavoidable amounts of unacceptable material received, the amounts should be minimal and incidental. While the permittee has a plan to dissuade generators from sending loads containing unacceptable material by assessing a billable surcharge rate if unacceptable material of over 5% by volume is received, issuance of this permit shall in no way be construed as acceptance of that 5% figure as constituting a standard for minimal or incidental as neither 120 tpd (5% of 2400 tpd maximum daily volume) nor 875 tons total storage of unacceptable waste (5% of 17,500 tons maximum waste storage) is considered minimal or incidental.

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21. The permittee shall control and minimize conditions that are harmful to the environment or public health, or which create safety hazards, odors, dust, noise, unsightliness, and other public nuisances. With regard to transportation of waste to the facility, the permittee may implement a waste transport vehicle compliance plan (see Form R, Page 7A, as modified on December 5, 2005) whereby non-compliant vehicles will be subject to a "time out" to encourage compliance, subject to the following additional requirements:

    a. The "time out" shall be for at least a one-hour period commencing after the vehicle would normally be allowed to tip its waste. The time required for waste pre-acceptance screening (i.e., visual inspection, sampling, analysis, analytical review, issuance of a weight ticket and signed manifest) shall not be included in the "time out". Records of "time out" occurrences (date, transporter identification, time vehicle in, time vehicle out, reason for occurrence, etc.) shall be kept as part of the daily operational record.

    b. Pursuant to Section 6206(a) of Act 2002-90, the permittee may not accept a waste transportation vehicle without a current authorization sticker issued by the Department. Vehicles without the required current authorization sticker must be rejected and may not be subject to the "time out" provisions of the waste transport vehicle compliance plan.

    c. Waste transportation vehicles leaving the facility shall be in compliance with the transporter requirements of Chapter 299 of the residual waste regulations as well as the requirements of Act 2002-90, when applicable.

    d. The permittee shall keep a record of overweight vehicles in accordance with 25 Pa. Code 297.261(b)(12), relating to daily operational records.

    e. Where repeat occurrences for a transporter indicates that the waste transport vehicle compliance plan is not effective in minimizing harms, hazards or nuisances, it is the permittee's responsibility to take additional steps to obtain more effective compliance. This may require modification of the waste transport vehicle compliance plan. Continued reliance upon the waste transport vehicle compliance plan in the face of evidence indicating a failure achieve compliance will not shield the permittee against appropriate enforcement action on the part of the Department.

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22. The TPH concentration of contaminated material entering the primary thermal unit (PTU) shall be 10,000 mg/kg or less, based on blending calculations as presented on the Soil Storage and Chemistry Summary spreadsheets appended to Form P. The permittee may request to demonstrate the facility's capability to effectively remediate contaminated material at a higher concentration by submitting to the Department's Waste Management Program a protocol for such a demonstration. If said protocol is approved by the Department, or approved with modifications, the permittee may conduct the demonstration and may utilize the results of the demonstration to seek a modification of the limitation contained herein. In such an event, the permittee may submit a permit application to the Department to modify the subject limitation. Provided that the application seeks nothing other than to modify the 10,000 mg/kg limitation based upon the results of an approved demonstration protocol, the permit application may be processed as a minor modification to this solid waste permit. Should the application contain additional modification requests, then those additional modification requests will dictate the form of the application. Nothing in this condition shall be construed as indicating a commitment on the part of the Department to approve any such application.

23. The carbon adsorption system shall operate at all times when the PTU is not operating and hydrocarbon contaminated material is present in the building.

24. This renewal permit also approves the Radiation Protection Action Plan for Solid Waste (RPAP) dated May 1, 2002, and revised March 30, 2004, September 9, 2004, June 24, 2005, September 28, 2005, and August 16, 2006, as indicated in Condition No. 1 above.

a. Unless otherwise approved in writing by the Department, the stationary monitoring equipment shall be installed and the RPAP implemented as soon as possible, but in no instance later than three months after the date of this permit reissuance.

b. Pursuant to Section 613 of the Solid Waste Management Act, 35 P.S. Section 6018.613, the Department may recover its costs to abate a public nuisance related to radioactive waste including its costs of management, transport and disposal of the radioactive waste processed, stored, disposed, or rejected at the facility.

c. Approval of Form X does not guarantee operational effectiveness. Failure to operate this equipment to perform as intended or designed, and implement the RPAP according to the

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application documents herein approved, for any reason, shall be sufficient grounds for revocation or suspension of the facility's waste permit in part or in its entirety.

d. A Form 19R, Certification of Facility Construction, shall be submitted to the Regional Solid Waste Manager after the permittee has made the necessary modifications to its facility and is ready to implement the RPAP. The Form 19R shall indicate that all necessary equipment has been installed and is operational, and that the necessary staff training for use of the monitoring equipment and implementation of the RPAP has been provided.

The stationary monitoring equipment may be utilized, but the RPAP may not otherwise be implemented, until after the Form 19R has been submitted to, and approved by, the Department. Departmental approval may involve a site inspection, by either Waste Program staff alone or jointly by Waste Program and Radiation Protection Program staff, and may specify operational requirements or procedures to be implemented by the permittee during an initial trial period. These requirements or procedures will be designed to allow the Department's Area Health Physicist to evaluate the facility's ability to properly implement the approved Action Plan. The permittee is expected to comply with these operational requirements during the trial period to the same extent as if they were permit conditions.

e. Until such time as the stationary monitoring equipment is installed and utilized, the permittee shall screen all waste received for radioactivity using portable (handheld) monitoring equipment. No solid waste may be received unless radiation monitoring is conducted as part of the waste onsite waste acceptance screening. Until the stationary equipment is installed, the Form 19R submitted and approved, and the permittee authorized by the Department to implement the RPAP, the permittee shall conduct radiation monitoring using monitoring equipment in accordance with the Department's Document Number 250-3100-001, Guidance Document on Radioactive Monitoring at Solid Waste Processing and Disposal Facilities.

25. a. Contaminated material shall be processed, thermally remediated and tested to the extent necessary to allow the processed waste to be used lawfully and consistent with the applicable standards for the intended uses. The testing frequencies and acceptance criteria for incoming contaminated material approved in this permit are intended to allow for a hazardous waste determination and to provide sufficient data to establish blending ratios and production run concentrations for the purpose of physically processing and/or thermally remediating

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Permit
For
Solid Waste Disposal and/or Processing Facility
FORM NO. 8

Permit No. 301254
Date Issued January 19, 2007
Date Expired January 19, 2017

hydrocarbon contaminated material. The post-production testing approved in this permit is intended for determining the effective remediation of TPH and VOCs as a process control. The testing frequencies, parameters and criteria approved in this permit are not intended to be, and shall not be construed as, a substitute for the need to satisfy the testing frequencies, parameters and criteria of the implementing regulatory mechanism under which a particular production run or batch of processed material is intended to be used. The permittee remains responsible for conducting any and all necessary testing, beyond the minimum requirements contained in this permit, that may be required to satisfy the implementing mechanism for offsite use or disposal of processed contaminated material. The permittee shall, as part of the daily operation record, maintain adequate documentation to demonstrate compliance with this requirement.

b. Any material intended for use as regulated fill shall have been determined to be regulated fill in accordance with the requirements of the Department's Management of Fill policy (Document Number 258-2182-773) prior to receipt and acceptance at this facility. Processing of regulated fill at this facility shall be limited to physical processing of regulated fill and/or blending of regulated fill only with other regulated fill. Approval for the beneficial use of the regulated fill material pursuant to General Permit No. WMGR096 shall be obtained for each processed batch pile and the application must include the results of this facility's waste acceptance testing, blending calculations and post-process testing requirements. This facility shall not be considered a "source" of regulated fill, but may generate a processed batch pile of material that is suitable for use as regulated fill, subject to each batch pile qualifying for, and obtaining coverage under, General Permit No. WMGR096.

c. In cases where the implementing regulatory mechanism specifies end use parameters but does not specifiy testing frequencies to demonstrate compliance with those parameters, the permittee shall, at a minimum, obtain either pre- or post-testing data at the frequencies specified in Form R, Table 1, for any end use parameter not included in Table 1.

26. In the event that generator data is used to demonstrate compliance with end use inorganic requirements, the permittee shall collect a minimum of one grab sample per 250 tons (or increment thereof) of a production run for the purpose of conducting inorganic analysis confirmation testing. The grab samples so collected for a production run may be composited such that one composite is made for every 5000 tons (or increment thereof) of each production run, and the composite(s) shall be analyzed for inorganics. The results of the inorganic analysis/analyses shall be compared to the blending calculation estimates to

COMMONWEALTH OF PENNSYLVANIA
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verify the accuracy of the blending procedures. Should a composite analysis differ from the blending calculation estimate by more than 10%, then actual post-processing test results must be used if greater than the blending estimate for that production run. The permittee shall keep records of the inorganic confirmation testing as part of the daily operation record and shall submit quarterly reports to the Department's Southeast Regional Office (Waste Management Program Manager) detailing the results of the confirmation testing and describing any steps taken to explain and/or correct the inadequacies of the blending procedures.

27. In the event that actual post-processing test data is used to demonstrate compliance with end use inorganic requirements, the results of the post-processing inorganic analysis/analyses shall be compared to the pertinent blending calculation estimates to verify the accuracy of the blending procedures, and a record of the results of each comparison shall be made a part of the daily operation record. Should the analysis/analyses differ from the blending calculation estimate by more than 10%, the permittee shall investigate the reason for the deviation and shall note in the daily operation record any steps taken to explain and/or correct the inadequacies of the blending procedures

28. No waste may be stored at this facility for a period of more than one year. All processed material shall be managed as waste while at the facility. When being transported from the facility for offsite use, processed material shall be managed in accordance with the implementing regulatory mechanism under which it is intended to be utilized.

29. Revisions to the Department's Management of Fill policy (Document Number 258-2182-773) dated April 24, 2004, shall constitute grounds for reopening this permit to make any necessary modifications as may be warranted by the revisions

30. The bond between the permittee and the Department (initially in the amount of $1,920,000.00) is, hereby, approved as part of this permit. The bond must be updated after receiving written notice from the Department in accordance with Chapter 287 of the Residual Waste Regulations.

New York State Department of Environmental Conservation
Division of Legal Affairs, Region 2
47-40 21ST Street, Long Island City, NY 11101-5407
Phone: (718) 482-4965 • **FAX:** (718) 482-4962
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

June 25, 2007

Mr. Michael J. Tone, Esq.
Nixon Peabody LLP
50 Jericho Quadrangle, Suite 300
Garden City, NY 11753-2728

Re: Clean Water of New York - Part 360 Permit
DEC Permit No. 2-6401-00065/00001

Dear Mr. Tone:

This is in regards to Clean Water of New York, Inc.'s Part 360 Permit which has an expiration date of December 17, 2000.

Pursuant to the State Administrative Procedure Act § 401(2) and 6 NYCRR § 621.13(I), when a permitee has submitted a timely and sufficient application for renewal of a permit for an activity of a continuing nature, the existing permit does not expire until the New York State Department of Environmental Conservation ("DEC") has made a final decision on the renewal application and if such application has been denied, then not until the last day for seeking review of the agency order or any later date fixed by a court. A timely renewal application for a Part 360 Permit is one which is submitted no less than 180 calendar days prior to the permit expiration (*see* 6 NYCRR § 621.13(a)).

Clean Water of New York, Inc. submitted a sufficient renewal application for its Part 360 Permit on March 5, 1999, which is more than 180 calendar days prior to December 17, 2000. Therefore, the existing Part 360 Permit does not expire until the New York State Department of Environmental Conservation ("DEC") has made a final decision on the renewal application and if such application has been denied, then not until the last day for seeking review of the agency order or any later date fixed by a court.

If you have any questions regarding this issue, please contact me at (718) 482-4965.

Very truly yours,

Louis P. Oliva
Regional Attorney

cc: K. Brezner (DEC)
J. Cryan (DEC)
S. Zahn (DEC)
R. Probst (Clean Water)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WASTE MANAGEMENT PROGRAM
SOUTHCENTRAL REGION

FORM NO. 8

PERMIT FOR SOLID WASTE DISPOSAL AND/OR PROCESSING FACILITY

Permit No. 301344
Date Issued APR 25 2003
Date Expired APR 24 2013

Under the provisions of the Pennsylvania Solid Waste Management Act of July 7, 1980, Act 97, as amended, a permit for a solid waste disposal and/or processing at Manheim Township in the County of Lancaster is granted to:

Lancaster Oil, Inc.
1062 Old Manheim Pike
Lancaster, PA 17601

This permit is applicable to the facility named as:

Lancaster Oil Processing Facility
(Consisting of approximately 2.962 acres)

Latitude 40° 03' 15" N

Longitude 76° 18' 45" W

This permit is issued approving the operation of a residual waste processing facility to accept, process, and transfer residual wastes described in this permit, and approval of the radiation-monitoring plan. This permit is issued based upon the following submissions:

1. Application for Permit, prepared by Lancaster Oil Company, received August 28, 2001 consisting of the following:

   - General Information Form
   - Form A, Application for Municipal Waste Permit
   - Form B, Professional Certification
   - Form HWC, Compliance History
   - Form E, Contractual Consent of Landowner
   - Form L, Contingency Plan for Emergency Procedures
   - Form P, Incinerators and Other Processing Facilities
   - Form R, Waste Analysis and Classification Plan
   - Form 5R, Residual Waste Transfer Facilities/Composting Facilities/Incinerators and Other Processing Facilities
   - Form 23R, Control Plans
   - Form X, Radiation Protection Plan
   - Supporting Information

FOR THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

City of Lancaster

Department of Public Works Bureau of Wastewater Operations

INDUSTRIAL WASTE DISCHARGE PERMIT

Company Name: Lancaster Oil Company

Division Name:

Mailing Address: 1076 Old Manheim Pike

Lancaster PA 17601

Facility Address: 1076 Old Manheim Pike

Lancaster PA 17601

Company Phone: 717-393-2627

The above industrial user is authorized to discharge industrial waste to the City of Lancaster sewerage system in compliance with the City Ordinance-Chapter 249 or any amendments or revisions thereto, categorical pretreatment standards, any applicable provisions of Federal or State law or regulation, and in accordance with discharge point(s), effluent limitations, monitoring requirements, and other conditions set forth herein.

This permit is granted in accordance with the application filed on May 28, 2004 in the office of Wastewater Operations, and in conformity with plans, specifications, and other data submitted to the Control Authority in support of the above application.

The permit is issued for a specified time period, not to exceed five years, as indicated by the effective and expiration dates shown below. The industrial user shall apply for permit reissuance a minimum of 180 days prior to expiration of the existing permit.

Effective Date: August 22, 2004
Expiration Date: August 21, 2009

Mark Leonard

Issuing Agent
Mark Leonard-Wastewater Quality Supervisor

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Solid & Hazardous Waste Management Program
P.O. Box 414 401 East State Street
Trenton, New Jersey 08625-0414
Telephone: (609) 292-9880 Telecopier: (609) 633-9839
http://www.state.nj.us/dep/dshw

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

RECYCLING CENTER GENERAL APPROVAL FOR CLASS B RECYCLABLE MATERIALS FOR CONCRETE, ASPHALT, BRICK, BLOCK & PETROLEUM CONTAMINATED SOIL

Under the provisions of N.J.S.A. 13:1E-1 *et seq.* and N.J.S.A. 13:1E-99.11 *et seq.*, known as the Solid Waste Management Act and New Jersey Statewide Mandatory Source Separation and Recycling Act, respectively, and pursuant to N.J.A.C. 7:26A-1 *et seq.,* known as the Recycling Regulations, this approval is hereby issued to:

Bayshore Recycling Corp.

Facility Type:	Recycling Center for Class B Materials
Lot & Block Nos.:	Lots 1, 1-R, 2-B & 2-C, Block 51
Municipality:	Woodbridge Township
County:	Middlesex
Facility ID No.:	132397
Permit No.:	CBG060002

This General Approval is subject to compliance with all conditions specified herein and all regulations promulgated by the Department of Environmental Protection (Department).

This General Approval shall not prejudice any claim the State may have to riparian land nor does it allow the registrant to fill or alter, or allow to be filled or altered, in any way, lands that are deemed to be riparian, wetlands, stream encroachment or flood plains, or within the Coastal Area Facility Review Act (CAFRA) zone or are subject to the Pinelands Protection Act of 1979, nor shall it allow the discharge of pollutants to waters of this State without prior acquisition of the necessary grants, permits, or approvals from the Department.

December 6, 2007
Issuance Date

May 14, 2008
Modification Date

February 1, 2012
Expiration Date

Anthony Fontana

Anthony Fontana, Bureau Chief
Bureau of Transfer Stations &
Recycling Facilities

ANTHONY E. CORE, P.C.

ATTORNEYS AT LAW
173 SCHOOL STREET
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CHANTEL N. EDWARDS, ESQ.

LEGAL SUPPORT STAFF
EILEEN P. GETTER
VANESA E. SIGALA
PAMELA L. DONOHUE

November 8, 2007

Ms. Patricia DiMatteo
Chief Operating Officer
Omni Recycling of Babylon, Inc.
114 Alder Street
West Babylon, New York 11704

Re: New York State Department of
Environment Conservation ("NYSDEC")
Omni Recycling of Babylon, Inc. ("Omni Babylon")
Solid Waste Management Facility
Permit No. I-4720-00643/00002-0

Dear Ms. DiMatteo:

In response to your request, this letter will confirm the status of the above referenced solid waste management facility operating permit. As you know, our law firm together with Michael White, Esq., represented and assisted Omni Babylon in matters relating to the NYSDEC permit from the time Omni Babylon purchased the facility through the Bankruptcy Court and the permit was transferred to Omni Babylon to the present. I continue to work with Cameron Engineering & Associates, LLP, the environment consultant Omni Babylon has authorized to prepare and submit reports and plans on its behalf to the NYSDEC in the permit renewal process.

The permit was initially transferred to Omni Babylon on April 15, 1996, with an expiration date of April 14, 2001 and most recently amended by the NYSDEC at the request of the permittee on July 27, 2000. In accord with the permit conditions, a complete application for renewal of the permit was submitted to the NYSDEC 180 days before the reported expiration date. Attached is a copy of a letter dated October 16, 2000 from Cameron Engineering to the NYSDEC transmitting the renewal application. Pursuant to the requirements of Section 401(2) of the State Uniform Procedures Act (Article 70, ECL) and its implementing regulations (6NYCRR, Part 621) when a permittee has submitted a timely and sufficient application for renewal of a permit for an activity of a continuing nature, as Omni Babylon has done in the instant case, the existing permit does not expire until the NYSDEC has made a final decision on the renewal application. Therefore, the existing permit remains in effect. This status could also be confirmed directly with the NYSDEC as a matter of public information.

In addition and most recently, I attended a meeting at the NYSDEC offices in Stony Brook on October 31, 2007 and met with the Regional Director and his staff on another facility matter. In general conversation the Omni Babylon renewal was mentioned and it was indicated to me as well as Cameron Engineering that said renewal would be worked on forthwith.

If I can be of any further assistance in this matter, please feel free to call me.

Very truly yours,

Anthony E. Core, Esq.

AEC/epg

DEC PERMIT NUMBER
1-4720-00643/00002-0

FACILITY/PROGRAM NUMBER(S)
02M19

PERMIT

Under the Environmental Conservation Law

EFFECTIVE DATE
April 15 1996

EXPIRATION DATE(S)
April 14, 2001

TYPE OF PERMIT ☐ New ☐ Renewal ☐ Modification ☐ Permit to Construct ■ Permit to Operate

- ☐ Article 15, Title 5: Protection of Waters
- ☐ Article 15, Title 15: Water Supply
- ☐ Article 15, Title 15: Water Transport
- ☐ Article 15, Title 15: Long Island Wells
- ☐ Article 15, Title 27: Wild, Scenic and Recreational Rivers
- ☐ 6NYCRR 608: Water Quality Certification
- ☐ Article 17, Titles 7, 8: SPDES
- ☐ Article 19: Air Pollution Control
- ☐ Article 23, Title 27: Mined Land Reclamation
- ☐ Article 24: Freshwater Wetlands
- ☐ Article 25: Tidal Wetlands
- ■ Article 27, Title 7; 6NYCRR 360: Solid Waste Management
- ☐ Article 27, Title 9; 6NYCRR 373: Hazardous Waste Management
- ☐ Article 34: Coastal Erosion Management
- ☐ Article 36: Floodplain Management
- ☐ Articles 1, 3, 17, 19, 27, 37; 6NYCRR 380: Radiation Control
- ☐ Other:

PERMIT ISSUED TO	TELEPHONE NUMBER
Omni Recycling of Babylon, Inc.	

ADDRESS OF PERMITTEE
114 Alder Street
West Babylon, NY 11704

CONTACT PERSON FOR PERMITTED WORK	TELEPHONE NUMBER
Anthony E. Core, P.C. 114 Old Country Road, Mineola, NY 11501	

NAME AND ADDRESS OF PROJECT/FACILITY
Omni Recycling of Babylon, Inc.
114 Alder Street, West Babylon, between Alder and Plate, South of Pattan Avenue

LOCATION OF PROJECT/FACILITY
West Babylon

COUNTY	TOWN	WATERCOURSE	NYTM COORDINATES
Suffolk	Babylon		

DESCRIPTION OF AUTHORIZED ACTIVITY

Operation of a residential and commercial materials recycling facility, which will receive residential commingled containers, yard waste, construction and demolition waste and mixed commercial waste for separation and transfer. This facility has a design capacity of 324,000 tons per year.

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, the General Conditions specified (see page 2) and any Special Conditions included as part of this permit.

PERMIT ADMINISTRATOR:	ADDRESS
Robert A. Greene	Bldg. 40, SUNY, Room 219, Stony Brook, NY 11790-2356

AUTHORIZED SIGNATURE	DATE	
Robert A. Greene	4/15/96	Page 1 of 6

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

Solid & Hazardous Waste Management Program
P.O. Box 414
Trenton, NJ 08625-0414
Tel. No. (609) 984-5950
Fax. No. (609) 633-9839

Solid and Hazardous Waste Facility Permit

Under the provisions of N.J.S.A. 13:1E-1 et seq. known as the Solid Waste Management Act, this permit is hereby issued to:

VEOLIA ES TECHNICAL SOLUTIONS, LLC
1 Eden Lane
Flanders, NJ 07836

For the Purpose of Operating a:	Solid and Hazardous Waste Storage and Transfer Facility
Lot & Block Nos:	Lot 37, Block 4500
In the Municipality of:	Mount Olive Township
County:	Morris
Under Facility Permit No.:	HWP030002
EPA ID No.:	NJD980536593

This permit is subject to compliance with all conditions specified herein and all regulations promulgated by the Department of Environmental Protection.

This permit shall not prejudice any claim the State may have to riparian land, nor does it allow the permittee to fill or alter or allow to be filled or altered in any way, lands that are deemed to be riparian, wetlands, stream encroachment areas or flood plains, or that are within the Coastal Area Facility Review Act (CAFRA) zone or are subject to the Pinelands Protection Act of 1979, nor shall it allow the discharge of pollutants to waters of this State without prior acquisition of the necessary grants, permits, or approvals from the Department of Environmental Protection or the U.S. Environmental Protection Agency.

November 22, 2006
Issuance Date

Anthony Fontana, Chief
Bureau of Solid and Hazardous Waste Permitting – North

November 22, 2011
Expiration Date

Scope of Permit

The conditions of this permit are based on the New Jersey hazardous waste regulations at N.J.A.C. 7:26G and on the permit application submitted by the permittee. N.J.A.C. 7:26G "incorporates by reference" (with limited exception) the Federal hazardous waste regulations found at Parts 124, 260-266, 268 and 270, Title 40 of the Code of Federal Regulations (C.F.R.). In order to eliminate confusion, and to clearly describe the precise obligations that are imposed upon the permittee, only the specific Federal regulatory citations are listed in the conditions of this permit. For the applicable State regulatory citations, refer to N.J.A.C. 7:26G.

This permit, along with the referenced permit application documents herein specified, shall constitute the sole Solid and Hazardous Waste Facility Permit for the operation of the facility. Any Permit previously issued by the Solid and Hazardous Waste Management Program or its predecessor agencies is hereby superseded. The permittee need not comply with the conditions of this permit to the extent and for the duration such non-compliance is authorized by an emergency permit (40 C.F.R. 270.61).

Description of Solid and Hazardous Waste Activities

Veolia ES Technical Solutions, LLC (permittee) is a commercial environmental services company specializing in the classification, packaging and transportation of solid and hazardous waste. The permittee services a variety of industries including research and development, pharmaceutical and biotechnical, general manufacturing, educational institution, hospitals and government agencies.

This permit authorizes the permittee to operate a solid and hazardous waste storage facility. The permittee may accept containerized solid and hazardous waste from off-site generators for storage prior to transfer to off-site treatment, storage and disposal facilities. The designated storage areas consist of the shipping/receiving area and thirty-nine (39) trailer parking spaces. The facility has an authorized total storage capacity of one hundred and eighty-seven thousand (187,000) gallons. There is no disposal of solid or hazardous waste at the facility. All wastes received at the facility are shipped off site in containers to authorized facilities.

The permittee is also authorized to perform the following activities in the designated areas of the facility:

- Pressure check compressed and liquefied gas cylinders to determine if empty.
- De-pressurize non-regulated inert and noble gas cylinders
- Consolidate small containers of chemically compatible liquids into USDOT approved drums prior to transportation off-site.

Referenced Permit Application Documents

The permittee shall operate the facility, and construct or install associated appurtenances thereto, in accordance with the regulations contained in 40 C.F.R. Parts 260 through 270, the conditions of this permit, and the following permit application documents:

1. Veolia ES Technical Solutions, LLC Part B Permit Renewal Application dated September 30, 2003 signed by John P. Schantz, Branch Environmental, Health and Safety Manager.

2. Veolia ES Technical Solutions, LLC Part B Renewal Application dated December 29, 1992, signed by James T. Bell, Vice President.

3. The following drawings signed and sealed by a New Jersey registered professional engineer:

   (i) Exhibit A dated September 20, 2003 – General Site Plan and Location of Solid and Hazardous waste units. Signed and sealed by Lauren J. Coman, P.E.
   (ii) Drawing No. 030513, dated September 16, 2003 – General Site and Boundary Survey, Lot 37 Block 4500 Onyx Environmental Services, LLC, signed and sealed by J. Peters Borbas, P.E.
   (iii) Exhibit C dated November 11, 1985 – Site Detail drawings, signed and sealed by William L. Dean, P.E.

4. Supplemental information dated January 20, 2006, signed by John P. Schantz, Branch Environmental, Health and Safety Manager.

5. Request for a name change dated June 15, 2006, signed by John P. Schantz, Environmental, Health and Safety Manager.

In case of conflict, the applicable hazardous waste management regulations contained in 40 C.F.R. shall have precedence over the conditions of this permit, and the conditions of this permit shall have precedence over the Part B permit application documents.

One complete set of the permit application documents listed above, this Solid and Hazardous Waste Facility Permit, and all records, reports and plans as may be required pursuant to this permit shall be kept on-site and shall be available for inspection by authorized representatives of the Department upon presentation of credentials. The records, reports and plans required pursuant to this permit include the following:

Appendices

Appendix I: Permit Requirements, Veolia ES Solutions, LLC, NJD980536593, Solid and Hazardous Waste Facility Permit: HWP030002

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID & HAZARDOUS MATERIALS

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-410

Pursuant to Article 27,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

VEOLIA ES TECHNICAL SOLUTIONS, LLC
1 EDEN LANE
FLANDERS, NJ 07836

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

CONTACT NAME: DENISE KROUS
COUNTY: OUT OF STATE
TELEPHONE NO: (973)691-7321

EFFECTIVE DATE: 11/01/2007
EXPIRATION DATE: **10/31/2008**
US EPA ID NUMBER: NJD080631369

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY:

The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)
AERC COM, INC.	ALLENTOWN , PA	Non-Hazardous Industrial/Commercial Hazardous Industrial/Commercial
BIOMEDICAL WASTE OF N.C.	MATTHEWS , NC	Medical
Covanta Niagara, L.P.	Niagara Falls , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil Waste Oil
COVANTA UNION INC	RAHWAY , NJ	Non-Hazardous Industrial/Commercial
CWM CHEMICAL SERVICES LLC	MODEL CITY , NY	Non-Hazardous Industrial/Commercial Asbestos Petroleum Contaminated Soil Hazardous Industrial/Commercial Waste Oil
EXIDE CORPORATION	READING , PA	Non-Hazardous Industrial/Commercial Hazardous Industrial/Commercial
INMETCO	ELLWOOD CITY , PA	Non-Hazardous Industrial/Commercial Asbestos Petroleum Contaminated Soil Hazardous Industrial/Commercial Waste Oil Medical

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NOTE: By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the Environmental Conservation Law, all applicable regulations, and the General Conditions printed on the back of this page.

ADDRESS: New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials - Waste Transporter Program
625 Broadway, 9th Floor
Albany, NY 12233-7253

AUTHORIZED SIGNATURE: Antoinette Norfleet Date: 10/10/07

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID & HAZARDOUS MATERIALS

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-410

Pursuant to Article 27,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

VEOLIA ES TECHNICAL SOLUTIONS, LLC
1 EDEN LANE
FLANDERS, NJ 07836

CONTACT NAME: DENISE KROUS
COUNTY: OUT OF STATE
TELEPHONE NO: (973)691-7321

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

EFFECTIVE DATE: 11/01/2007
EXPIRATION DATE: **10/31/2008**
US EPA ID NUMBER: NJD080631369

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)
MARISOL INC	MIDDLESEX , NJ	Non-Hazardous Industrial/Commercial Asbestos Petroleum Contaminated Soil Hazardous Industrial/Commercial Waste Oil Medical
NORLITE CORPORATION	COHOES , NY	Non-Hazardous Industrial/Commercial Hazardous Industrial/Commercial Waste Oil
SABIN METAL CORPORATION	SCOTTSVILLE , NY	Non-Hazardous Industrial/Commercial Hazardous Industrial/Commercial
UNITED OIL RECOVERY	MERIDAN , CT	Non-Hazardous Industrial/Commercial Asbestos Petroleum Contaminated Soil Hazardous Industrial/Commercial Waste Oil
VEOLIA ENVIRONMENTAL SERVICES	FLANDERS , NJ	Non-Hazardous Industrial/Commercial
VEOLIA ENVIRONMENTAL SERVICES	PORT AUTHOR , TX	Non-Hazardous Industrial/Commercial
VEOLIA ENVIRONMENTAL SERVICES	FLANDERS , NJ	Asbestos
VEOLIA ENVIRONMENTAL SERVICES	PORT AUTHOR , TX	Asbestos
VEOLIA ENVIRONMENTAL SERVICES	FLANDERS , NJ	Petroleum Contaminated Soil
VEOLIA ENVIRONMENTAL SERVICES	PORT AUTHOR , TX	Petroleum Contaminated Soil
VEOLIA ENVIRONMENTAL SERVICES	FLANDERS , NJ	Hazardous Industrial/Commercial
VEOLIA ENVIRONMENTAL SERVICES	PORT AUTHOR , TX	Hazardous Industrial/Commercial
VEOLIA ENVIRONMENTAL SERVICES	FLANDERS , NJ	Waste Oil
VEOLIA ENVIRONMENTAL SERVICES	PORT AUTHOR , TX	Waste Oil Medical
VEOLIA ES TECHNICAL SOLUTIONS LLC	STOUGHTON , MA	Non-Hazardous Industrial/Commercial Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	SAUGET , IL	Non-Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	RAHWAY , NJ	Non-Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	PHOENIX , AZ	Non-Hazardous Industrial/Commercial

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID & HAZARDOUS MATERIALS

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-410

Pursuant to Article 27,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

VEOLIA ES TECHNICAL SOLUTIONS, LLC
1 EDEN LANE
FLANDERS, NJ 07836

CONTACT NAME: DENISE KROUS
COUNTY: OUT OF STATE
TELEPHONE NO: (973)691-7321

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

EFFECTIVE DATE: 11/01/2007
EXPIRATION DATE: **10/31/2008**
US EPA ID NUMBER: NJD080631369

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)
VEOLIA ES TECHNICAL SOLUTIONS, LLC	WEST CARROLLTON , OH	Non-Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	MENOMONEE FALLS , WI	Non-Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	PORT WASHINGTON , WI	Non-Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	SAUGET , IL	Asbestos
VEOLIA ES TECHNICAL SOLUTIONS, LLC	PHOENIX , AZ	Asbestos
VEOLIA ES TECHNICAL SOLUTIONS, LLC	WEST CARROLLTON , OH	Asbestos
VEOLIA ES TECHNICAL SOLUTIONS, LLC	MENOMONEE FALLS , WI	Asbestos
VEOLIA ES TECHNICAL SOLUTIONS, LLC	PORT WASHINGTON , WI	Asbestos
VEOLIA ES TECHNICAL SOLUTIONS, LLC	SAUGET , IL	Petroleum Contaminated Soil
VEOLIA ES TECHNICAL SOLUTIONS, LLC	WEST CARROLLTON , OH	Petroleum Contaminated Soil
VEOLIA ES TECHNICAL SOLUTIONS, LLC	MENOMONEE FALLS , WI	Petroleum Contaminated Soil
VEOLIA ES TECHNICAL SOLUTIONS, LLC	PORT WASHINGTON , WI	Petroleum Contaminated Soil
VEOLIA ES TECHNICAL SOLUTIONS, LLC	SAUGET , IL	Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	RAHWAY , NJ	Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	PHOENIX , AZ	Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	WEST CARROLLTON , OH	Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	MENOMONEE FALLS , WI	Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	PORT WASHINGTON , WI	Hazardous Industrial/Commercial
VEOLIA ES TECHNICAL SOLUTIONS, LLC	SAUGET , IL	Waste Oil
VEOLIA ES TECHNICAL SOLUTIONS, LLC	PHOENIX , AZ	Waste Oil
VEOLIA ES TECHNICAL SOLUTIONS, LLC	WEST CARROLLTON , OH	Waste Oil
VEOLIA ES TECHNICAL SOLUTIONS, LLC	MENOMONEE FALLS , WI	Waste Oil
VEOLIA ES TECHNICAL SOLUTIONS, LLC	PORT WASHINGTON , WI	Waste Oil
VEXOR TECHNOLOGY, INC	MEDINA , OH	Non-Hazardous Industrial/Commercial Asbestos Petroleum Contaminated Soil Hazardous Industrial/Commercial Waste Oil Medical
XEROX JOSEPH C WILSON CTR FOR TECHNOLOGY	WEBSTER , NY	Non-Hazardous Industrial/Commercial Hazardous Industrial/Commercial

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID & HAZARDOUS MATERIALS

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-410

Pursuant to Article 27,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

VEOLIA ES TECHNICAL SOLUTIONS, LLC
1 EDEN LANE
FLANDERS, NJ 07836

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

CONTACT NAME: DENISE KROUS
COUNTY: OUT OF STATE
TELEPHONE NO: (973)691-7321

EFFECTIVE DATE: 11/01/2007
EXPIRATION DATE: **10/31/2008**
US EPA ID NUMBER: NJD080631369

AUTHORIZED VEHICLES:
The Permittee is Authorized to Operate the Following Vehicles to Transport Waste:
(Vehicles enclosed in <>'s are authorized to haul Residential Raw Sewage and/or Septage only)

106 (One Hundred and Six) Permitted Vehicle(s)

CT 56461C
IL 2286003
IL P206972
IL P206977
IL P206991
IL P206992
IL P206993
IL P206995
IL P206996
IL P206997
IL P207016
IL P207023
IL P207030
IL P207033
IL P207034
IL P207054
IL P207056
IL P207062
IL P207064
IL P207075
IL P207083
IL P212553
IL P212554
IL P212561
IL P232220
IL P232221
IL P232222
IL P232225
IL P297106
IL P298709
IL P337752
IL P344381
IL P349028
IL P365440
IL P388700
IL P420750
IL P555164
IL P566247
IL P566248
IL P578769
IL P626456
LA E916932
MA 59027
MA 59548
MA 59549
MA 61392
MA 63389
MA 65762
MA 65763
MA E7685
MA E79130
MA G26280
MA G26281
MA G35586
MA J76118
MA K15447
MA K50655
MA K91507
MA K98856
MA L50049
MN PTH7946
NC PT45134
NJ T75F8Y
NJ T84F8Y
NJ T90F8Y
NJ T96F8Y
NJ X90H77
NJ X90H78
NJ X90H82
NJ X90H84
NJ X90H91
NJ X98R24
NJ X98R27
NJ XC263J
NJ XC862R
NJ XF849T
NJ XF880T
NJ XG948W
NJ XG959W
NJ XJ692K
NY 34373JH
NY 37877JW
NY 68610K
NY 68611K
NY 76151AP
NY 77422JF
NY AT27083
NY AT27086
NY AT27087
NY AT27088
VA 996649TR
WI ST21936
WI STL412335
WI STL424618
WI STL426226
WI STL426227
WI STL426630
WI STL426631
WI STL426639
WI STL426640
WI STL427292
WI STL427297
WI STL427301
WI STL430777
WI STL430778
WI STL450328
End of List

Pennsylvania Department of Environmental Protection

Lee Park, Suite 6010
555 North Lane
Conshohocken, PA 19428

February 9, 2000

Southeast Regional Office

610-832-6212
Fax 610-832-6143

CERTIFIED MAIL NO. P 092 246 942

Mr. Anthony W. Eith, P.E.
Engineering Manager
Waste Management Disposal Services
of Pennsylvania, Inc.
1121 Bordentown Road
Morrisville, PA 19067

Re: Northeast and Southwest Expansion
GROWS Landfill
Falls Township
Bucks County
ID No. 100148, APS No. 12969

Dear Mr. Eith:

Enclosed is Solid Waste Permit No. 100148 for the construction and operation of the Northeast and Southwest Expansions of GROWS Landfill, issued in accordance with Article V of the Solid Waste Management Act, 35 P.S. Sections 6018.101, et seq.

Compliance with the terms and conditions set forth in the permit is mandatory. You have the right to file an appeal as to these terms and conditions.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S., Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

If you have any questions about the enclosed permit or requirements of the Solid Waste Management Act, please contact Mr. James Wentzel, Chief, Engineering Services, at the number listed above.

Sincerely,

Ronald C. Furlan, P.E.
Regional Manager
Waste Management Program

Enclosure

cc: Falls Township (w/enclosure) **CERTIFIED MAIL NO. P 092 246 943**
Bucks County Health Department (w/enclosure) **CERTIFIED MAIL NO. P 092 246 944**

BUREAU OF WASTE MANAGEMENT

Permit
For
Solid Waste Disposal and/or Processing Facility
FORM NO. 8

Permit No. 100148
Date Issued February 9, 2000
Date Expired February 9, 2010

Under the provisions of the Pennsylvania Solid Waste Management Act of July 7, 1980, Act 97, a permit for a solid waste disposal and/or processing facility at Falls Township in the County of Bucks is granted to Waste Management Disposal Services of Pennsylvania, Inc. 1121 Bordentown Road, Morrisville, PA 19067.

This permit is applicable to the facility named as G.R.O.W.S. Landfill, Northeast and Southwest Expansion and described as:

Latitude - 40°, 08', 46"

Longitude - 74°, 46', 00"

This permit is subject to modification, amendment and supplement by the Department of Environmental Protection and is further subject to revocation or suspension by the Department of Environmental Protection for any violation of the applicable laws or the rules and regulations adopted thereunder, for failure to comply in whole or in part with the conditions of this permit and the provisions set forth in the application no. 100148 which is made a part hereof, or for causing any condition inimical to the public health, safety or welfare.

See Attachment for waste limitations and/or special conditions

FOR THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

THIS PERMIT IS NON - TRANSFERABLE

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Permit
For
Solid Waste Disposal and/or Processing Facility
FORM NO. 8

Permit No. 100148
Date Issued February 9, 2000
Date Expires February 9, 2010

1. This waste management permit is issued based upon the two-phase waste application No. 100148 that was received in the Southeast Regional Office of the Department of Environmental Protection. The Phase I submission was received on December 18, 1997 and the Phase II submission was received on October 6, 1998. This permit is for the 28 acre Northeast expansion area and the 5.2 acre Southwest expansion area at GROWS Landfill located in Falls Township, Bucks County. Also included is approval for the construction and operation of a new scale house and waste sampling/screening area that is non-contiguous to the landfill, but is included as a part of the GROWS landfill permit area. Any and all approvals granted under this permit are limited to the Northeast and Southwest expansion areas. This approved application consists of the following documents.

Phase I

Form A received on December 23, 1997
Form B received on December 23, 1997
Form B1 received on December 23, 1997
Form HWC received on December 23, 1997
Form D received on December 23, 1997, revised on May, 14, 1998
Form E received on December 23, 1997, revised on March 3, 1998
Form F received on December 23, 1997
Form 1 received on December 23, 1997, revised on May 14, 1998
Form 2 received on December 23, 1997, revised on May 14, 1998
Form 6 received on December 23, 1997
Form 7 received on December 23, 1997, revised on May 14, 1998 and September 9, 1998
Form 8 received on December 23, 1997, revised on May 14, 1998 and September 9, 1998
Form 11 received on December 23, 1997
Form 12 received on December 23, 1997, revised on May 14, 1998 and September 9, 1998
In Form 2, Figure 2-1, Sheet 1 to 4 received on December 12, 1997
In Form 6, Figure 6-1 to 6-7 received on December 12, 1997
In Form 7, Figure 7-1 to 7-12 received on December 12, 1997, Figure7-6 and 7-12 revised on May 14, 1998 and Figure 7-6 revised on September 9, 1998
In Form D, Figure 1 and 1A received on December 23, 1997 and revised on May 14, 1998

The approved Phase I application includes a response to the Department's review letters dated March 12, 1998 and March 30, 1998, received on May 14, 1998, and a response to the Department's June 26, 1998 review letter received on September 9, 1998.

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Permit
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Solid Waste Disposal and/or Processing Facility
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Date Expires February 9, 2010

Phase II

Form 3 received on October 6, 1998
Form 14 received on October 6, 1998, revised on June 15, 1999 and September 15, 1999
Form 18 received on October 6, 1998
Form 24 received on October 6, 1998, revised on June 15, 1999 and September 15, 1999
Form 25 received on October 6, 1998, revised on June 15, 1999
Form 28 received on October 6, 1998, revised on June 15, 1999 and September 15, 1999
Form 45 received on October 6, 1998
Form 46 received on October 6, 1998
Form G(A) received on October 6, 1998
Form G(B) received on October 6, 1998
Form I received on October 6, 1998, revised on June 15, 1999
Form H received on October 6, 1998
Form J received on October 6, 1998
Form K received on October 6, 1998
Form L and the PPC Plan received on October 6, 1998, revised on June 15, 1999
Form Q with two equivalencies received on October 6, 1998, revised on June 15, 1999
Bond documentation received on December 17, 1999

Drawing number 200390-01NE, indicating the permitted area received on October 6, 1998, revised on June 15, 1999.

Drawing number 200390-01NE to 36NE received on October 6, 1998 and Drawing number 01ANE, 01BNE and 09ANE received on June 15, 1999. Drawing number 200390-16NE-17NE, 28NE, and 32NE-36NE revised on March 17, 1999. Drawing number 200390-01NE-02NE, 04NE-12NE, 14NE-19NE, 21NE-22NE, 24NE, 27NE-30NE, and 32NE-36NE revised on June 15, 1999. Drawing number 200390-05NE, 14NE-15NE, 23NE and 30NE revised on September 15, 1999. Drawing number 200390-15NE-17NE & 32NE received on November 29, 1999.

Drawing number 200390-01SW to 28SW received on October 6, 1998 and Drawing 10ASW received on June 15, 1999. Drawing 200390-04SW, 06SW-08SW, 10SW-18SW, 22SW-24SW and 26SW revised on June 15, 1999. Drawing number 200390-15SW-16SW and 26SW revised on March 17, 1999. Drawing number 200390-08SW revised on September 15, 1999. Drawing number 200390-14SW-16SW revised on November 29, 1999.

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Permit
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FORM NO. 8

Permit No. 100148
Date Issued February 9, 2000
Date Expires February 9, 2010

The approved Phase II application includes responses to the Department's review letter dated February 19, 1999, received on March 17, 1999 and June 15, 1999; a response to the Department's August 31, 1999 review letter received on September 15, 1999; and a response to the Department's issues raised during a November 22, 1999 meeting received on November 29, 1999, December 3, 1999 and December 17, 1999. Also included are supplemental submissions received on November 3, 1998 for proof of public notice; January 11, 1999, a Geotechnical Analysis of Liner Strains report; March 17, 1999, a partial response to the technical review letter dated February 19, 1999, a September 30, 1999 letter of approval for landfill operating hours issued by Falls Township; a revised Form Q list of previously approved equivalencies dated January 10, 2000; and a letter dated January 17, 2000 requesting inclusion of previously approved design and operating procedures.

The contents of all the above listed documents are hereby incorporated in the permit as conditions with which the permittee must comply.

2. Nothing in this permit shall be construed to supersede, amend, or authorize violation of, the provisions of any valid and applicable local law, ordinance, or regulation, provided that said local law, ordinance, or regulation is not pre-empted by the Pennsylvania Solid Waste Management Act, the Act of July 7, 1980, Act 97, 35 P.S. 6018.101, et seq. and Act 101, the Municipal Waste Planning, Recycling and Waste Reduction Act.

3. As a condition of this permit, and of the permittee's authority to conduct the activities authorized by this permit, the permittee hereby authorizes and consents to allow authorized employees or agents of the Department, without advanced notice or a search warrant, upon presentation of appropriate credentials, and without delay, to have access to and to inspect all areas on which solid waste management activities are being or will be conducted. The authorization and consent shall include consent to collect samples of waste, water or gases, to take photographs, to perform measurements, surveys and other tests, to inspect any monitoring equipment, to inspect the methods of operation, and to inspect and/or copy documents, books or papers required by the Department to be maintained. This permit condition is referenced in accordance with Section 608 and 610 (7) of the Solid Waste Management Act, 35 P.S. Sections 6018.608 and 6018.610 (7). This condition in no way limits any other powers granted under the Solid Waste Management Act.

4. Form 37, Certification of Facility Construction Activity, is to be submitted to the Regional Solid Waste Manager in the Department's Southeast Regional Office after each pad or cell of the landfill is constructed, in accordance with the approved design plans including the subbase preparation, preparation of the witness zone, installation of the primary liner, installation of the leachate collection pipes and the preparation of the protective layer for the primary liner, prior to the start of landfilling operations for each pad or cell of the landfill site.

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Permit
For
Solid Waste Disposal and/or Processing Facility
FORM NO. 8

Permit No. 100148
Date Issued February 9, 2
Date Expires ~~February 9, 201~~

5. A daily operational record is to be maintained in accordance with Section 273.311 of the municipal waste management rules and regulations.

6. A quarterly operations report is to be submitted on or before the 20th day of April, July, October and January for the three-month period ending the last day of March, June, September and December, in accordance with Section 273.312 of the Municipal Waste Rules and Regulations.

7. An annual operations report is to be submitted to the Department's Southeast Regional Office on or before June 30 of each year in accordance with the format indicated in Chapter 273.313 of the municipal waste management rules and regulations. The annual report submitted to the Department is to be accompanied by the annual permit administrative fee.

8. An annual topographic survey is to be conducted and is to be submitted to the Southeast Regional Office's Waste Management Program concerning the elevation and total volume of area that has been filled. This is due as part of the annual operations report due on June 30 of each year.

9. No more than 10,000 tons of solid waste may be received at this facility for disposal on any single operating day. This figure represents the maximum daily volume of the facility, set pursuant to section 1112 of the municipal waste planning, recycling and waste reduction act, 53 P.S. § 4000.1112 (Act 101 of 1988) and the regulations of the Department. The permittee is advised that this section also provides that a mandatory civil penalty of $100 per ton applies to any excess volume received at this facility for any reason.

10. No more than an average of 10,000 tons of solid waste may be received at this facility for disposal per operating day during the standard calendar year quarter. This figure represents the average daily volume of the facility, set pursuant to Section 1112 of the Municipal Waste Planning, Recycling and Waste Reduction Act, 53 P.S. § 4000.1112 (Act 101 of 1988). The permittee is advised that this section also provide that a mandatory civil penalty of $100 per ton applies to any excess volume received at this facility for any reason.

    Compliance with this provision shall be calculated by dividing the total tons of solid waste received at this facility during a standard calendar year quarter, divided by the number of days during the quarter that the facility was permitted to operate, including partial days. Compliance during the quarter when this permit condition is modified shall be calculated by dividing the total tons of solid waste received during the partial quarter by the number of permitted operating days within that partial quarter.

BUREAU OF WASTE MANAGEMENT

Permit
For
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Permit No. 100148
Date Issued February 9, 20
Date Expires ~~February 9, 20~~

11. The Northeast and Southwest Expansion areas are permitted to accept waste and conduct landfill operations Monday through Saturday between the hours of 5:00 AM to 6:00 PM except that, pursuant to an agreement between the permittee and the host municipality, the facility may remain open until 7:30 PM no more than two times a week with the maximum number of 7:30 PM closures per year established at 50 times. Operations may be extended due to extreme weather conditions in accordance with the following procedure. Prior to extending operations, justification for such an extension must be mailed or faxed to the Waste Management Program Manager or his designee. Written concurrence that the extension is justifiable needs to be received by the permittee from the manager or his designee before extended operations may be implemented. All other requests to extend operating hours must be requested in advance of need and be approved in writing in advance by the Department. Records documenting compliance with the above approved hours shall be provided in the facility's daily, quarterly and annual reports.

12. A) This facility may not operate to receive waste unless the operator has established at least one drop-off center for the collection or sale of at least three recyclable materials chosen form the following: clear glass, colored glass, aluminum, steel and bimetallic cans, high-grade office paper, newsprint, corrugated paper and plastics. The drop-off center must be located at the facility or at a location that is easily accessible to substantial numbers of persons generating municipal waste that is processed or disposed of at the facility. The drop-off center shall be operated in compliance with Section 1502(b) of the Municipal Waste Planning, Recycling and Waste Reduction act, 53 P.S. Section 4000.1502(b).

B) The center shall be located at the facility or in a place that is easily accessible to persons generating municipal waste that is processed or disposed at the facility.

C) The drop-off center shall contain bins or containers where recyclable materials may be placed and temporarily stored. If the operation of the drop-off center requires attendants, the center shall be open at least 8 hours per week, including 4 hours during evenings or weekends.

D) Once every six months, the operator shall provide public notice of the availability of the drop-off center. The operator shall place an advertisement in a newspaper circulating in the municipality or provide notice in another manner approved by the Department in writing.

E) On or before February 15 of each year, the operator shall inform the host municipality in writing, of the weight and type of materials that were recycled in the previous calendar year, so that the host municipality may comply with the requirements of Section 304(f) of the Municipal Waste Planning, Recycling and Waste Reduction Act.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

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13. Except to the extent this permit provides otherwise, the permittee shall conduct solid waste management activities as described in the approved application. The permittee shall file an application for a permit modification with the Department and shall receive approval from the Department prior to receiving any waste volumes in excess of the maximum or average daily volume stated in the permit, and prior to conducting solid waste management activities not described in the approved application.

14. The permittee shall not violate, or cause or assist in the violation of, any provision of the Municipal Waste Planning, Recycling and Waste Reduction Act, 53 P.S. §4000.101 et seq., or the terms or conditions of any municipal waste management plan approved by the Department under that Act.

15. The permittee shall not act in a manner contrary to any municipal waste management plan approval by the Department pursuant to the Municipal Waste Planning, Recycling and Waste Reduction Act, nor shall the permittee fail to act in a manner that is consistent with any Municipal Waste Plan approved by the Department pursuant to that act.

16. The permittee shall not allow solid waste generated outside the host county of the permitted facility to be received, disposed or otherwise managed at the facility if the transportation to, or management at, the facility would violate applicable laws in effect in the county or state in which the waste was generated, or state or local solid waste management plan in effect where the waste was generated.

17. This facility may not accept for disposal, or for processing, except for composting, truckloads composed primarily of leaf waste.

18. No lead acid batteries shall be placed into mixed waste or be disposed of at this facility.

19. Form 19, Quarterly and Annual Groundwater Analysis Form, must be submitted in triplicate for the quarterly and annual testing of monitoring well Nos. GD22, GD25A, GD33, GU34, GU34D, GD37, GU39, GD44R, GD46, GD47R, GD49, GD47DR, GUS101, GDS102, GDS103, GD11, GD36, GD50, GD54, GTPINF, and GTPEFF. The sampling is to be performed on a quarterly basis for analysis, and the analytical data for all parameters shall be submitted to the Department within 90 days of the date the last well is sampled for each quarterly sampling event which end on March 31st, June 30th, September 30th, and December 31st, respectively.

20. A report on the sampling of the influent leachate for all parameters on Form 19 shall be presented in tabular form and on a graph and shall be submitted to the Department quarterly and annually with the monitoring well data. This sampling is to be done at the GROWS Landfill leachate treatment plant influent point.

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

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21. The sump areas of all landfill cells are to be tested to determine the integrity of the sump areas prior to certification and start of waste disposal operations in each cell.

22. The witness zone between the primary and secondary liner must be monitored on a weekly basis to determine the rate of flow, if any. These results must be submitted to the Department's Southeast Regional Office.

23. This condition constitutes the permittee's Waste Acceptance Plan for the Northeast and Southwest expansions:

A) The Waste Acceptance Plan for disposal of municipal waste requiring special handling, municipal like residual waste, and residual waste was originally issued on July 8, 1993, revised on December 27, 1993, and is replaced in its entirety by this Sub-Condition A:

I. The approved waste acceptance plan allows GROWS Landfill to accept the following categories of residual waste, municipal like residual waste, and municipal waste requiring special handling:

a) Combustion Residues

(1) Coal-Derived Bottom Ash
(2) Coal-Derived Fly Ash
(3) Flue Gas Desulfurization Residue (FGA)
(4) Incinerator Bottom Ash
(5) Incinerator Fly Ash
(6) Incinerator Mixed Ash

b) Metallurgical Process Residues

(1) Foundry Sand
(2) Slag
(3) Refractory Material
(4) Grindings, Shavings
(5) Ferrous Baghouse Dust
(6) Non-Ferrous Baghouse Dust
(7) Ferrous Scrap, including Auto Recycle
(8) Non Ferrous Scrap

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

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c) Sludges, Scales

(1) Water Treatment Sludge
(2) Industrial Wastewater Treatment Sludge, including Acid Mine Drainage Sludge
(3) Metallurgical Sludge
(4) Food Processing Sludge
(5) Paint, Coating Sludge and Scale
(6) Tank Bottoms
(7) Still Bottoms
(8) Oily Sludge, Petroleum Derived
(9) Emission Control Sludge
(10) Lime/Cement Kiln Scale, Residue
(11) Lime-Stabilized Spent Pickle Liquor

d) Chemical Wastes

(1) Acidic Chemicals (ph 2-6)
(2) Basic Chemicals (ph 8-12.5)
(3) Combustible Chemicals (flash point greater than 140°F)
(4) Chemical Salts
(5) Carbon Residues (e.g., Decoloring, Filtering)
(6) Surface Coatings (e.g., Solid, Semi-Solid Paints, Polishes, Adhesives, Inks)
(7) Filter Aids (e.g., Diatomaceous Earth, etc.)
(8) Filter Media
(9) Spent Dyes
(10) Detergents, Cleaning Agents
(11) Off-Specifications Products, Intermediates
(12) Pharmaceutical Wastes

e) Generic, Manufacturing or Production Wastes

(1) Leather Wastes
(2) Rubber, Elastomer Wastes
(3) Wood Wastes (including Particle Board, Sawdust, Shavings)
(4) Paper, Cardboard Wastes

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(5) Textile Wastes (including Yarn, Fabric, Fiber, Elastic)
(6) Glass Wastes excluding Industrial Refractory Material
(7) Polyethylene, Polystyrene, Polyurethane and Other Non-Halogenated Plastics
(8) Glass Reinforced Plastics
(9) Halogenated Plastics (PVC, Teflon, CPE)
(10) Electronic Component Wastes (Off-Spec Semi-Conductors, Circuit Boards)
(11) Agricultural Wastes (Fertilizers, Pesticides, Feed Supplements)
(12) Photographic Wastes (Film, Photographic Paper)
(13) Asphalt (Bituminous)
(14) Ceramic Wastes
(15) Linoleum Wastes
(16) Thermal Insulation Wastes (cellulose, glass-wool)
(17) Wiring, Conduit, Electrical Insulation

f) Special Handling Residues

(1) Asbestos-Containing Wastes (Insulation, Brake Lining)
(2) PCB-Containing Waste (less than 50 PPM)
(3) Oil-Contaminated Waste (Soils, Spent Absorbent, Oily Rags)
(4) Paints (solidified)
(5) Spent Catalysts
(6) Spills Residues
(7) Virgin Petroleum Fuel-Contaminated Soil and Debris (no more than 1% TPH concentrations)
(8) Waste Tires

g) Industrial Equipment, Scrap

(1) Pumping, Piping, Vessels, Instruments, Storage Tanks
(2) Scrap Materials from Maintenance, Product Turnaround

h) Municipal Sewage Sludge (stabilized or digested)
i) Infectious Waste Incinerator Ash (less than 5% volatile solids)
j) Sterilized Infectious and Chemotherapeutic Waste
k) Incinerator Ash From Captive Incinerators (less than 5% volatile solids)
l) Incinerator Ash From Commercial Resource Recovery Incinerators (less than 5% volatile Solids)
m) Friable Asbestos Demolition Waste
n) Non Mining Coal Residue

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o) Municipal Like Residual Wastes

(1) Animal Dropping (Manure)
(2) Cured Asphalt (Solidified)
(3) Carpet or Fabric Scraps (Yarn, Fiber, and Elastic)
(4) Ceramic Insulation Waste
(5) Cured Resin Waste
(6) Dead Animals (Non-Experimental)
(7) Empty Containers
(8) Empty (Dried) Commercial Paint Cans
(9) Fencing (Chain-Link, Barbed)
(10) Incandescent Light Tubes/Bulbs
(11) Foam Type Wastes (Rigid Plastic Foam, Expanded Polystyrene Foam, Polyurethane)
(12) Food Waste
(13) Fresh Air Intake Filters
(14) Gaskets-Unused (Rubber, Cork)
(15) Glass Reinforces Plastics (Fiberglass)
(16) Glass Waste
(17) Halogenated Plastics (PVC, CPE, Teflon)
(18) Labels/Packaging Waste
(19) Leather Scraps
(20) Linoleum Waste
(21) Metal Scrap
(22) Non-Halogenated Plastics
(23) Nylon Materials
(24) Oil Filters, Used (Hot Drained, Non-Terne Plated)
(25) Packing/Shipping Material
(26) Paper, Cardboard Waste
(27) Personal Protective Equipment Waste
(28) Unused Piping Waste
(29) Cured Rubber, Elastomer Waste
(30) Screen Waste
(31) Shingle Scrap
(32) Thermal Insulation Waste (Cellulose, Glass, Wool)
(33) Wire and Wire Scrap (Conduit, Electrical Insulation)
(34) Non-Treated Wood Waste

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p) Stabilized Waste (soil, sludge, sand blast, debris)
q) Municipal/Residual Waste Landfill and Transfer Station leachate to be deposited at the head of the treatment plant not in the landfill
r) Paint Filters
s) Sandblast Material and/or Shot or Black Beauty Waste
t) Landfill Leachate Treatment Sludge
u) Water Softener Resins
v) Quench Scale
w) Filter Sand
x) Wire Drawing Compound
y) RCRA Empty Containers/Raw Material Bags/Storage Tanks
z) Car/Truck Wastewater Grit/Sludge
aa) Grinding Wheels
bb) Animal Bedding and/or Research Animals
cc) Laboratory Waste
dd) Sterilized Laboratory Waste
ee) Non-Asbestos Brake Linings
ff) Pollution Control – Baghouse Dusts, Flue Dusts, etc.
gg) Dredge Material
hh) Railroad Ties/treated lumber
ii) Contaminated Soils/Site Clean-up
jj) Inorganic Ore and Raw Product Wastes
kk) Acid Neutralization Sludge
ll) Resin Waste
mm) Soil Washing Material
nn) Thermally Treated Soil
oo) Bio Remediated Soil
pp) Industrial Demolition Waste
qq) Fluorescent Light Tubes/Bulbs (Hg analysis only)
rr) Cathode Ray Tubes
ss) Auto Shredder Fluff
tt) Mill Scale Waste
uu) Non-Mining Coal Residue

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II. The maximum total concentrations for non-TCLP organics in residual waste and municipal waste requiring special handling are not to exceed the following limits: 2,500 ppm for aromatic hologenated hydrocarbons, 5,000 ppm for aliphatic halogenated hydrocarbons, 10,000 ppm for aromatic hydrocarbons and 50,000 ppm for volatile and semi-volatile organics.

III. For acceptance of virgin petroleum contaminated soil, Form U is to be substituted for Form FC-1 if the TPH concentration exceeds 1%, except as provided for in Condition 23.B. IX.

IV. The permittee shall not accept any residual waste or municipal waste requiring special handling whose chemical constituents are not included or are in excess of the maximum acceptance concentrations as delineated in the waste analysis and classification plan unless a major permit modification is submitted and approved by the Department. Any new waste request within the 900 category must be submitted as a major permit modification.

V. The permittee shall not accept, receive, dump, discharge, process or dispose hazardous waste as defined in 25 Pa. Code Chapter 261a or 40 C.F.R. Part 261.

VI. All residual, municipal like residual waste and municipal waste requiring special handling from new generators must be consistent with requirements stated in the Form R and Form S waste analysis and classification plan.

VII. The permittee must submit to the Department a waste disposal request and source reduction strategy from each individual large quantity residual waste generator. The permittee must submit a waste disposal request from each individual generator of municipal waste requiring special handling. Proof of submission to the Department would be dated certified mail return receipt cards, signed, dated, acceptance receipts for hand-delivered requests, or signed, dated receipt from overnight mail/federal express deliveries. The wastes indicated on Forms U, 35, 36, or 43 may be accepted for disposal by the permittee after fifteen (15) Department working days. If, at anytime, after the fifteen (15) working day period it is determined by the Department that the waste accepted is not consistent with the waste analysis and classification plan or the design of the landfill, or waste reduction strategy, the permittee shall be notified and acceptance of this waste may be prohibited until deficiencies have been corrected. The permittee may also be subjected to any and all applicable enforcement action to the solid waste management Act and the Rules and Regulations promulgated thereunder if waste is accepted not consistent with the waste analysis and classification plan.

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VIII. All submissions covered by Condition No. VII must be sent to the Host municipality and the Host County at the same time they are submitted to the Department.

IX. The permittee shall submit, to the Department's Southeast Regional Office, an amended appendix to the permit that lists all residual waste and municipal waste requiring special handling accepted for disposal at the facility. This amended appendix shall be submitted quarterly by April 20th, July 20th, October 20th and January 20th. This amended appendix shall include the information by generator including the waste type, approved quantity, quantity accepted, generator identification number and the identification number for each Form U, Form 35, Form 36, and Form 43 for all waste accepted at the landfill during the quarter covered by the report. The appendix must include the anniversary acceptance date for each generator of residual waste, and municipal waste requiring special handling.

X. Form 26R, the annual analysis report and annual analysis data from generators of municipal waste requiring special handling (Form 35, 36, and 43) is to be kept on file for each waste generator at the landfill site. This is due at GROWS Landfill from the generator one year after the Department receives the Form U, Form 35, 36, or form 43 submissions. For small quantity residual waste generators analysis data and or certification pertaining to hazardous waste determination criteria is to be kept on file. The waste cannot continue being accepted if the landfill does not have an annual submission of Form 26R or annual analytical data from generators of municipal waste requiring special handling on file.

XI. No more than 25% by weight of the total amount of waste accepted per day for disposal at the landfill site can be municipal sewage sludge. This must be documented in the daily operations report.

XII. Any new large quantity generator of municipal like residual waste that proposes to use GROWS Landfill must submit Form S and Form 25R when notified in writing by the Department to GROWS Landfill.

XIII. The landfill must keep certification documents from all small quantity generators on file indicating that their waste streams are not hazardous.

XIV. The landfill annual report submitted by June 30th of each year must include documentation that the analysis or certification required under Section 273.313 for chemical analysis of waste for each waste stream from each individual generator utilizing the landfill for disposal is on file.

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XV. All Form U, Form 35, Form 36, Form 43, and FC-1 documents must be kept on file and each assigned a sequential identification number which is to be recorded on all forms submitted to the Department. Form S documents must be kept on file.

XVI. Hazardous waste as defined under 25 Pa. Code 261a may not be accepted at the facility for disposal. Any residual waste generator whose analysis reaches 85% of the hazardous waste limit shall provide additional analysis and documentation to justify that the waste is below the hazardous waste limit.

XVII. No residual waste is to be accepted from any facility bulking/mixing different categories of residual (Form U) waste unless such facility is permitted by the Department for this purpose.

XVIII. Form U's from individual generators of friable asbestos waste do not have to be submitted.

XIX. New sources of incinerator residue from resource recovery incinerators shall be tested in accordance with the following procedure. The analysis data shall be submitted to the Southeast Regional Office. Analyses data generated by resource recovery incineration permit requirements can be submitted to comply with Conditions XIX a, b, c, and d.

a) A grab sample of resource recovery incinerator residue is to be taken from each incoming load of ash residue to be tested for pH. All of this sampling data shall be submitted with the data from the composite sampling below.

b) For a minimum of the first eight weeks of incinerator operation, testing shall be done on a weekly composite sample comprised of at a minimum daily grab samples. Each grab sample shall be tested for pH. The weekly composite sample shall be tested for pH, lead, chromium and cadmium. Also, for the initial sampling period, an analysis for all Form 41 parameters shall be run on each fourth week composite sample. All data from this sampling period shall be submitted to the Department at the conclusion of the eight-week period.

c) Upon receiving written approval from the Department, testing shall be done on monthly analyses for all Form 41 parameters and reserve alkalinity for a minimum of six months. The monthly composite sample is comprised of a minimum of one random grab sample from each day of operation. All grab samples shall be of an equal amount. Data from this sampling period is to be submitted to the Department on a monthly basis.

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d) Upon receiving written approval from the Department, testing shall be done on a quarterly basis for all Form 41 parameters and reserve alkalinity. The quarterly composite sample is comprised of weekly random grab samples. All grab samples shall be of an equal amount. Data from this sampling is to be submitted to the Department on a quarterly basis.

B. The permit amendment issued on August 11, 1997, for approving various revisions to the Form R Waste Analysis and Classification Plan is reflected in the following sub-conditions:

I) Infectious and chemotherapeutic incinerator ash must contain less than 5% volatile solids. Incinerator ash from other sources will have no volatile solids limit.

II) Wastes for quantity increase requests for previously approved waste streams from specific generators may be accepted for disposal immediately. Each request must include the most recent generator's annual report and analytical data for submissions more than 12 months old.

III) RCRA empty containers can be accepted as Form S waste.

IV) All solid wastes excluded as a hazardous waste under 40 CRF § 261.4(b) may be accepted for disposal except for waste categories listed below and formerly known as 25 PA Code §§ 261.4(a)(4), (6), (8), (10), (18), and (20), prior to the May 1, 1999 revisions. The unacceptable wastes will read as follows:

a) Source, special nuclear or by product material as defined by the Atomic Energy Act of 1954.

b) Household hazardous waste collected by a collection contractor under Section 1512 of Act 101.

c) Coal refuse as defined in the Coal Refuse Disposal Control Act.

d) Treatment sludges from coal mine drainage treatment facilities.

e) Pulping liquors (black liquor) that are reclaimed in a pulping liquor furnace and then re-used in the pulping process.

f) Spent sulfuric acid used to produce virgin sulfuric acid.

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V) Corrosively and Ignitability as defined in 40 C.F.R. §§ 261.21 and 261.22 will replace pH and Flash point, respectively, as acceptance criteria for disposal.

VI) If a specific waste stream has been found to be consistent based on 25 standard fingerprint analyses, then the frequency can be reduced to one standard fingerprint analysis per day for each waste stream from a specific generator.

VII) Sampling frequencies for oil contaminated waste, contaminated soils, site cleanup waste, soil washing material, thermally treated soil and bioremediated soil must satisfy the requirements of SW-846 (or equivalent). If the sampling frequency does not meet the requirements of SW-846 (or equivalent), then the sampling frequency must be at least one sample per 500 cubic yards.

VIII) All municipal sewage sludges must be digested or stabilized.

IX) A Form FC-1 is to be submitted for virgin petroleum contaminated soil and debris containing up to 10% total petroleum hydrocarbons. A Form U is to be submitted for virgin petroleum contaminated soil and debris containing greater than 10% total petroleum hydrocarbons.

24. All mixed loads of municipal like residual waste and municipal waste are to be managed as municipal waste in accordance with Act 101, the Municipal Waste Planning, Recycling and Waste Reduction Act.

25. This permit does not authorize the discharge of air emissions unless the Bureau of Air Quality has approved the discharge of these emissions.

26. Failure to obtain other necessary permits may result in the suspension or revocation of this waste management permit.

27. I) The two equivalency requests received on October 6, 1998 for use of a GCL as a subbase and AASHTO No. 57 as a protective cover are approved subject to the conditions listed below:

A) The Geosynthetic Clay Liner (GCL, a layer of sodium montmorillinite-bentonite between two layers of needle punched, non-woven geotextile) may be used in place of the six-inch thick sub-base layer on the disposal area floor and for a distance not to exceed five feet up the perimeter berm slopes on both the Northeast and Southwest Expansion areas. The GCL may not be used as a subbase equivalency as part of the proposed slope cap liner system in either of the expansion areas.

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This equivalency is approved subject to the following condition:

i) The GCL may only be used in place of the standard six-inch thick sub-base layer (25 PA Code § 273.253(b)(1-4)) if the sub-base slope is not greater than 3.5% (except as may be needed to extend no more than five feet up the perimeter berm) and a minimum of 6 inches of granular soil with a permeability equal to or less than 1x10(-3) cm/sec is placed immediately below the GCL as a subgrade for the GCL.

B) Currently, the approved 18 inches of protective cover aggregate material used at GROWS landfill is classified as washed, rounded to sub-rounded AASHTO No. 57 stone obtained from the mining operation at Warner company. A proposed alternative to the currently approved protective cover aggregate is classified as a sub-angular to angular AASHTO No. 57 crushed traprock product. Under this equivalency approval, AASTHO No. 57 aggregates may be utilized in the leachate collection system (protective cover) subject to the following requirements:

i) The maximum solid waste height shall not exceed 233.5 feet as shown in Form Q, Attachment A, Page 2;
ii) The maximum particle diameter of the AASTHO No. 57 aggregate shall be dmax=38mm;
iii) Two (2) 16 oz/sqyd layers of nonwoven geotextile shall be placed under the AASHTO No. 57 aggregate in order to meet the design requirements;
iv) The permittee shall provide in writing a notification to the Department of each source of the aggregate demonstrating compliance with condition (ii) above;
v) Nothing in this equivalency revises or amends final permitted elevations or slopes unless specifically approved by the Department in a separate major permit modification.

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27. II) The two equivalency requests received on June 15, 1999 and revised on September 15, 1999 for a subbase slope of up to 33% and an alternate leachate collection system within the protective liner are approved subject to the conditions listed below:

A) To install the slope cap liner system over the existing landfill slope, a gradient steeper than 25% (4H:1V), (25 PA Code § 273.253(b)(5)) is required. This equivalency for a subbase slope of greater than 25% is approved subject to the following conditions:

i) Sub-base slope shall be greater than 2% and less than 33%.
ii) A GCL component must not be used anywhere within the slope cap liner system due to slop stability concerns.
iii) The existing clay cap on Old GROWS landfill shall not be removed or disturbed, but may be grade for smoothness in preparation as a sub-base for the Northeast and Southwest expansions. The permittee must provide certification documentation that the clay cap being used for a subbase liner system component, together with intimate contact with the secondary geomembrane liner component, satisfies the USEPA's requirements for a composite liner should the permittee intent to conduct leachate recirculation over the lined area subject to this equivalency.

B) The equivalency request for the leachate collection piping system within the protective cover proposes to eliminate the need for leachate collection pipes within the slope cap liner system only. Because of the steepness of the slope of the slope cap liner system, the protective cover is intended to convey all the leachate above the primary liner via gravity flow to the cell floor that does incorporates leachate collection pipes as required by section 273.258(b). Because of the unique design features associated with this expansion over the slope cap liner area on top of Old GROWS landfill this equivalency approval is limited for the slope liner cap on existing Old GROWS landfill cap .

27. III) The following is a list of equivalencies that have been previously approved for GROWS Landfill and are also approved for the Northeast and Southwest expansions:

A) The use of maximum particle size of 3/8 inch and AASHTO No. 8 stone for leachate collection zone (protective cover)

B) The use of geonet material in the secondary leachate collection collection system (leachate detection zone) in place of standard material between primary and secondary liners.

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C) The use of gold anodized aluminum casing set 3 feet below ground surface to enclose monitoring wells instead of a steel casing set 10 feet below ground surface.

D) The use of 2-inch diameter casing instead of 4-inch diameter casing on monitoring wells.

E) The construction of a 40 foot wide bench for every 40 feet rise in elevation.

F) Construction of a 22 foot wide bench for every 40 feet rise in elevation of the landfill.

G) The utilization of 2% to max. 33% slope for subbase on perimeter berm and max. 50% slope on intermediate berm.

ADCM

28. The Alternate Daily Cover Materials (ADCM) listed in this condition are approved for the Northeast and Southwest expansions subject to the following subconditions:

A.) All storm water runoff from alternate daily cover must be managed as leachate unless otherwise approved in writing by the Department. Stormwater runoff from soil, from non-specific borrows area and clay loam soils applied as daily cover will not have to be managed as leachate.

B) No alternate daily cover is to be utilized on a side slope unless runoff from the alternate cover material is directed into the leachate collection system. Soils from non-specific off site borrow areas and clay loam soils can be placed on side slopes without directing runoff into the leachate collection system.

C) The Department is to be notified one week prior to making any changes in types of alternate daily cover utilized at the site.

D) The permit amendment issued to Waste Management of Pennsylvania for the utilization of Foam material as supplemental cover material, which was approved as an equivalency request can be utilized on the GROWS Landfill, Northeast and Southeast expansion areas.

E) The following daily and intermediate covers, approved on July 11, 1991 with the following permit conditions, are included in this permit:

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I) A list of daily and intermediate cover material:

a) Soils from nonspecific off-site borrow areas.
b) Clay loam soil from nonspecific off-site borrow areas.
c) Municipal sewage sludge treated with limekiln dust or cement kiln dust in accordance with the VFL technology process.
d) A mixture of lime and dewatered sewage sludge cake in accordance with the RDP sludge stabilization process.
e) Pasteurized municipal sewage sludge utilizing a lime additive in accordance with the Bio-gro/Bio-fix sludge process.
f) Water treatment plant sludge treated with limekiln dust or cement kiln dust in accordance with the VFL Technology process.
g) Municipal sewage sludge stabilized with fly ash.
h) Unscreened composted sewage sludge from the Philadelphia Water Department blended in a 1:1 ratio with soil containing coarse fragments no greater than three inches in diameter, with no more than 60 percent being retained on the No. 10 sieve.
i) Fly ash conditioned with cement kiln dust.

II) Physical test results of a representative composite sample must be submitted to the Southeast Regional Office for the acceptance of soil and clay loam soil from each new nonspecific off-site borrow source before utilization of these soils as daily or intermediate cover.

III) Physical test results of a representative composite sample for soil and clay loam soil from each nonspecific off-site borrow source must be submitted to the Southeast Region of the Department of Environmental Protection on an annual basis.

IV) TCLP testing is to be submitted prior to receipt of alternate cover material from the VFL Technology process, the RDP sludge stabilization process, the Bio-gro/Bio-fix sludge treatment process, sewage sludge stabilized with fly ash, unscreened composted sewage sludge, and conditioned fly ash. TCLP testing is to be conducted whenever there is a significant change in any of the components or processes that produce these alternate cover materials or at least on an annual basis and the results are to be submitted to the Southeast Regional Office for each of these alternate cover materials.

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V) Physical test results are to be submitted prior to acceptance and annually to the Southeast Regional Office for alternate cover materials from the VFL Technology process, the RDP sludge stabilization process, the Bio-gro/Bio-fix sludge treatment process, sewage sludge stabilized with fly ash, unscreened composted sewage sludge, and conditioned fly ash. Physical testing must also be conducted whenever there is a significant change in any of the components or processes that produce this alternate cover materials.

VI) Written approval from the Southeast Regional Office must be obtained prior to acceptance of the Chem Fix sludge material as alternate daily or intermediate cover.

VII) GROWS Landfill is permitted to utilize non-site specific off site sources of soil for construction material and cover material subject to the following sub-conditions:

a) Chemical analysis data of dredge material must be submitted to the Department for a composite sample in accordance with sampling protocol outlined in the EPA SW846 Manual for each dredge disposal area, or replenished dredge disposal area, 30 days prior to excavation, for the following parameters: antimony, arsenic, nickel, lead, barium, cadmium, chromium, silver, copper, mercury, selenium, zinc, volatile organics (EPA Method 240), semi-volatile organics including pesticides and PCB's (EPA Method 8250), cyanide, sulfide, oil and grease, TOC, PH, and radioactivity. The TCLP procedure is to be utilized.

b) Physical Test Data of dredge material consisting of one composite sample in accordance with the sampling protocol outlined in the EPA SW846 Manual for every 10,000 yards of dredge material to meet Section 273.232 of the municipal waste regulations, must be submitted to the Department 30 days prior to excavation of any dredge disposal site or replenished dredge disposal site.

VIII) A permit amendment application consisting of plans and an operational narrative for processing alternative cover material from the VFL Technology process, the RDP sludge stabilization process, the Bio-gro/Bio-fix sludge treatment process, sewage sludge stabilized with fly ash and conditioning fly ash with cement or lime kiln dust must be approved before any of these processes can be conducted within the permitted areas of GROWS Landfill.

IX) A plan that includes combustibility testing must be approved for the processing of unscreened composted sewage sludge with soil at a specific location within the permitted area of GROWS Landfill prior to the acceptance of this waste as alternate cover material.

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F) The following are the alternate daily cover materials approved on December 18, 1997 with the following permit conditions, are included in this permit:

I) Processed Construction and Demolition (C &D) Material (NWRO). The source of processed C & D material approved in this permit modification will be the STAR ADC materials (sized at two (2) inch minus material) produced at STAR's Vorick II facility in Brooklyn, NY, and Recovermat (SCRO);

II) Cornier WP-1440 FR Geomembrane Tarp (SCRO);

III). Integra 12 FR Geomembrane Tarp (SCRO).

a) All categories of alternate daily cover material approved by this permit modification are to be only utilized as daily cover.

b) Areas upon which processed C & D material has been used, must be covered with either conventional daily cover (soil) or additional waste within seven (7) days.

c) Areas upon which the geomembrane tarps have been used, a six-inch soil cover meeting the requirements of 25 Pa. Code Section 273.232© shall be applied by the permittee whenever the working face is idle for more than 48 hours.

d) Storage or stockpiling of any approved processed C & D alternate daily cover as approved by this permit modification shall not occur off the lined area of the landfill without obtaining written Department approval. In addition, the stockpile areas must have appropriate erosion and sedimentation controls in place before stockpiling is initiated.

e) If Department inspections indicate an alternate daily cover approved by this permit modification is not meeting the daily cover performance standards specified in 25 Pa. Code § 273.232, the permittee must:

i) Upon notification by the Department, immediately cease the use of the alternate daily cover. Notification can be in the form of an inspection report.

ii) Submit a report to the Department which explains why the alternate cover material is not meeting the applicable performance standards, and what steps will be implemented to improve the quality of the alternate daily cover and prevent non - compliance with 25 Pa. Code § 273.232.

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Under the above circumstances, the alternate daily cover may not be utilized until the Department is satisfied that the continued use of the alternate daily cover will not result in non-compliance with 25 Pa. Code § 273.232. In the event the alternate daily cover cannot meet the required performance standards, the Department reserves the right to revoke approval.

f) Each source of the processed construction and demolition material must be pre-approved in writing by the Department. With the issuance of this permit, STAR and Recovermat are approved for use under this condition.

g) Testing of incoming C & D materials and MSW incinerator ash, whether for disposal or use as an ADCM, shall comply with waste acceptance procedures as contained in this permit, or as subsequently modified by the Department. The processed C & D materials and the MSW incinerator ash are wastes and not recyclable materials, and count towards the average daily volume (ADV) of the facility. These wastes are subject to the host municipality benefit fee(s) of Act 101.

h) The thickness of processed C&D layer applied as ADCM must be sufficient to provide adequate coverage of waste to meet the daily cover performance standards and shall be between six to twelve inches in depth. Where a twelve-inch depth is not sufficient to provide adequate coverage, better waste compaction shall be practiced or other approved daily cover materials shall be utilized in place of processed C & D.

G Use of Posi-Shell, as an alternate daily cover material approved on June 22, 1998, with the following permit conditions:

I) This approval is limited to the Posi-Shell material that received approval as an alternate daily cover material (ADCM) and is listed on the statewide approved equivalency list. Based upon the Department's Policy and Procedure for Municipal Waste Facility Equivalency Approvals, the permittee is authorized to utilize this product, subject to the terms and conditions of its original approval, at GROWS Landfill. Failure of this product to perform satisfactorily at GROWS Landfill or failure of the permittee to comply with the terms and conditions upon which the original issuing region based its approval shall be grounds for revocation of the approval herein granted.

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II) Areas where Posi-Shell has been used must be broken up (cracked) before additional waste is placed on top.

III) Posi-Shell may not be used as an alternate daily cover in the following areas:

a) Each partial lift for which the operator intends to place no additional waste for three days.

b) Each partial or completed lift that represents final permitted elevations for that part of the facility.

H) Use of Propat (Patented process for shredding metal waste) as an alternate daily cover material, approved on July 13, 1998 with the following permit conditions, is included in this permit:

I) This approval is limited to the Propat material that received approval as alternate daily cover material (ADCM) and is listed on the statewide approved equivalency list. Based upon the Department's Policy and Procedure for Municipal Waste Facility Equivalency Approvals, the permittee is authorized to utilize this product at the Pottstown Landfill. Failure of this product to perform satisfactorily at the Pottstown Landfill, or failure of the permittee to comply with the terms and conditions, upon which the original issuing region based its approval, shall be grounds for revocation of the approval herein granted.

II) The Propat material shall have a moisture content, and contain cementitious material, as described in the manufacturer's patented process information, sufficient at all times to allow the material to meet the daily cover performance standards, but at no time shall the moisture content be below 15%.

III) The Propat material as received must be shredded to particle size no greater than two (2) inches.

IV) Prior to utilizing the Propat material approved in this modification, the permittee shall obtain, and keep available at the site for Department review, copies of the applicable permit approvals from the original issuing region. The permittee is responsible for demonstrating compliance with the terms and conditions of the original approval of the Propat material.

V) Areas upon which Propat has been used as an alternate daily cover material must be covered with either conventional daily cover (soil) or additional waste within seven (7) days. Propat may also be used as an alternate daily cover material on the leading edge of the fluff lift layer of waste in newly constructed cells. The Propat material is considered waste received and disposed.

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VI) The storm water from this alternate daily cover shall be treated as leachate and be diverted into the landfill.

I) Use of Non-Petroleum contaminated soil as an alternate daily cover material, approved on August 4, 1999 with the following conditions, is included in this permit:

I) This approval is limited to the Non-Petroleum Contaminated Soil that received approval as an alternate daily cover material (ADCM) from the Southcentral Regional Office and is listed on the statewide approval equivalency list. Based upon the Department's policy and procedure for municipal waste facility equivalency approvals, this ADCM may be approved via a minor modification for use at GROWS landfill. Failure of this material to perform satisfactorily at GROWS landfill or failure of the permittee to comply with the terms and conditions upon which the original issuing region based its approval shall be grounds for revocation of the approval herein granted.

II) All alternative daily cover material that does not meet the Department's current Clean Fill Policy must be managed and stored on a lined area of the landfill.

III) Soil contaminated with residual waste listed in Attachment I qualifies for use as daily cover, under the following conditions:

a) The primary source of soil contamination is approved for disposal in accordance with the facility's Form R, Waste Analysis and Classification Plan approval criteria.
b) It can be demonstrated that the soil meets the performance standards and design requirements of Section 273.232 of the Solid Waste Regulations.
c) Alternative daily cover material consists of primarily of soil, meeting the approximate maximum percentage of contaminants listed on Attachment I. Percentage may be calculated if actual quantities are known, or estimated using any available data.

IV) In addition to the residual waste contaminated soils listed in Attachment I, soils containing approximately 25 percent or less of Construction and Demolition Waste may be used as daily cover, provided that the alternate daily cover is composed of materials that are primarily six inches in diameter or smaller.

V) All Non-Petroleum Contaminated Soil used as an alternate daily cover material is a waste and not a recyclable material, and counts towards the average daily volume (ADV) of the facility. This waste is subject to the host municipality benefit fee(s) of Act 101.

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J) Use of Recycled Paper Deinking Sludge (RPDS), as an alternate daily cover material approved on October 6, 1998 with following permit conditions:

I) This approval is limited to the recycled paper deinking sludge (RPDS) generated by Marcal Paper Mills, Inc.(KAOFIN) for use as alternate daily cover at this time. Other sources of RPDS may not be used as alternate daily cover without first obtaining written approval from the Department.

II) If the Department determines, upon inspection, that the RPDS is not meeting the daily cover performance standards specified in Section 273.232(b), the permittee must:

a) Upon notification from the Department, immediately cease the use of RPDS as landfill alternate daily cover. Notification can be in the form of an inspection report.

b) Submit to the Department a report which explains why the RPDS is not adequately meeting the performance standard(s) as well as what steps will be taken to improve the quality of the alternate daily cover and prevent noncompliance with Section 272.232(b).

Under the above circumstances, the RPDS may not be utilized until the Department is satisfied that the continued use of RPDS will not result in noncompliance with Section 273.232(b). In the event the alternate daily cover cannot meet the required performance standards, the Department reserves the right to revoke approval.

III) A five day supply of daily cover soil material shall also be maintained on the site as required by Section 272.232(d), in the event that the RPDS does not comply with the performance standards as outlined in Condition 5 above.

IV) RPDS may not be applied as alternate daily cover within 40 linear feet of an exterior sideslope. If in the judgment of the Department, the RPDS is determined to be a causative agent in the generation of leachate seeps, the Department may suspend the use of RPDS as landfill daily cover.

V) The RPDS material should be dewatered to 35% to 60% or greater solids contents. The permittee must verify the solids content of incoming RPDS.

VI) RPDS may not be stored/stockpiled at the landfill for greater than 24 hours, i.e. this material is intended to be utilized for daily cover purposes, as it is generated on a daily basis. All RPDS must be stored stockpiled on the lined landfill area.

VII)The RPDS material is used as an alternate daily cover material, is a waste and not a recyclable material, and counts towards the average daily volume (ADV) of the facility. This waste is subject to the host municipality benefit fees(s) of Act 101.

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K) All processed or unprocessed materials consisting of municipal waste(s), or commingled mixtures of municipal and residual wastes, utilized as ADCM under equivalency approvals granted in this permit or subsequent modifications, are wastes and not recyclable materials, and count towards the average daily volume (ADV) of the facility. The wastes are subject to the host municipality benefit fee(s) of Act 101

29. The PECO Energy high power tension line must be relocated prior to the start of construction of Cell 10B and 11 of the Northeast Expansion. If the proposed PECO power line's relocated right-of-way passes over permitted area, e.g. sediment basin E and/or its affiliated structures, then the permittee must submit a copy of the agreement between the permittee and PECO Energy for the Department's review to demonstrate both continued access to the underlying permitted area and compatible operations between the power line and the landfill's facilities.

30. The new scale house and waste sampling/screening facility, and associated new access road, must be constructed and operational prior to the construction of cell 10A of the Northeast expansion. This new area, while non-contiguous to the landfill proper, is considered part of the landfill's permitted area and shall be used only for GROWS landfill's operation, unless otherwise authorized by subsequent permit amendments.

31. Sediment basin E must be constructed and operational prior to the construction of Cell 10A of the Northeast expansion.

32. Form 37 must be submitted immediately after construction of the new leachate pump house and the leachate conveyance pipes from the existing (modified) leachate collection box (wet well) used to serve Old GROWS landfill, for Department's approval.

33. Inspection and cleaning of the wet well (leachate box) should be performed prior to the start of filling in Cell 10A of the Northeast expansion. In addition, a test shall be conducted after submission of Form 37 construction certifications, but prior to the start of disposal operations in Cell 10A, for the purpose of demonstrating the performance of the design for the leachate collection box, conveyance pipes and leachate collection suction pumping system. The Department shall be notified at least one week prior to the performance test.

Inspection and cleaning of the wet well (leachate box) shall be performed annually for first two years and an annual report shall be submitted to the Department's Southeast Regional Office. Depending upon the findings of the annual inspections, the permittee may petition the Department to reduce the frequency to biennial (once every two years), including the submission of a biennial inspection report.

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34. The facility is approved to recirculate leachate only to the extent authorized by 25 PA Code § 273.274. Pursuant to 25 PA Code § 273.274(4), recirculation must be conducted with an approved piping system located under intermediate cover. No other method of leachate delivery or distribution, including the alternative methods discussed in the permit application, is approved at this time. Further, no alternate method of leachate recirculation, should one be allowed under future regulatory revisions, may be implemented without written Department approval. This approval may require the submission of a permit modification application. While approved for recirculation under Pennsylvania regulations as outlined above, the permittee is advised to obtain concurrence from the U.S.E.P.A. concerning the extent of compliance of the permittee's liner design with the U.S.E.P.A.'s composite liner requirements for leachate recirculation under 40 CFR Chapter 258.

35. According to the application, approximately 2.6 million gallons of leachate storage is required over a 30 day period for the GROWS Landfill. The landfill has over 3.6 million gallons of leachate storage available in the form of 0.76 million gallons of hard tankage at the leachate treatment plant, 0.5 million gallons of hard storage and 2.4 million gallons of modular tankage elsewhere at the facility. Any excess GROWS Landfill leachate storage capacity is utilized by the Tulltown Resource Recovery Facility Landfill, which has insufficient on-site leachate storage. Based upon the representations made in the application and supporting documentation, the Northeast and Southwest expansion areas have sufficient capacity to effectively manage anticipated 30 day leachate flows via on-site leachate storage, treatment and recirculation. Leachate hauling is not an approved method of leachate management and any off-site hauling of leachate shall be considered a violation of this permit.

In the event that the permittee determines that the hauling of leachate is necessary to address some unforeseen emergency situation, the permittee shall notify the Department in writing within twenty-four (24) hours of the initiation of leachate hauling. Said notification shall state the reason for the initiation of leachate hauling, the projected amount of leachate to be hauled (gallons and number of trucks) and the estimated duration of hauling. The written notification shall also state the current leachate treatment plant wastewater flow volume, the volume of leachate being recirculated, the amount of leachate contained in on-site storage and the current leachate generation flow rates. The Department shall also be notified in writing within twenty-four (24) hours of the termination of a hauling event. Said notice shall state the volume of leachate hauled (gallons and number of trucks), the actual duration of hauling, and the steps taken by the permittee to address the cause or reason for the emergency initiation of leachate hauling in violation of its permit. Should hauling be initiated due to the permittee's failure or inability to utilize all available leachate storage capacity, the permittee shall, upon written notification by the Department, take all steps necessary, and within the timeframe(s) allotted by the Department, to provide whatever additional storage, permanent replacement storage and/or additional on-site treatment capacity the Department determines is necessary to address violations of the leachate hauling prohibition. Nothing in this reporting and notification requirement shall be construed to authorize or sanction off-site hauling of leachate under this permit.

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36. The capping of the landfill must follow the "Cap as you Go" practice. The construction sequence of the landfill must be followed closely, as shown in Form 25, Appendix K, Table 2 rev. June 15, 1999, to insure this practice and to minimize open areas waiting to be capped.

37. Progress reports, including work performed, deviations from approved designs, and future work for construction, filling, and capping activities, shall be submitted to the Department on a weekly basis.

38. Any substitution of an equivalent material, which is not approved by the Department in the permit application for the landfill construction, shall be submitted to the Department for approval prior to its use.

39. The minor permit modification to the landfill gas system to allow for various gas well boot configurations, issued on October 22, 1998 with the following conditions, is included in this permit:

I) This approval will permit the applicant to utilize the proposed alternate gas well boots in order to account for settlement around the wells.

II) The proposed alternate gas well boots must be closely monitored for the first two years for failure due to landfill settlement. Monthly inspection reports on the alternate gas well boots must be maintained on-site in accordance with air and waste permit requirements.

III) GROWS, Inc. shall perform the necessary correction procedures to maintain a riser cap height of less than six (6) feet as measured from the final cover near the well.

40. The permit amendment for a salvaging plan consisting of the screening of Municipal Solid Waste (MSW) ash on the double lined landfill area on GROWS landfill, issued on December 18, 1997 and revised on July 13, 1998 with the following permit conditions, is included in this permit:

I) The minor modification permit application originally proposed to salvage different recyclable materials - cardboard, ferrous metals, non-ferrous metals, concrete, brick, asphalt shingles, wood - and to screen MSW ash on the active landfill area. The applicant withdrew the salvaging of all materials except for the screening of MSW ash in a response dated October 31, 1997. This permit modification is, therefore, limited to the screening of MSW ash to recover ferrous and non-ferrous metals. Operations shall be conducted on the intermediate cover of the double lined landfill as shown in Figure 1 and 2, Rev. 10/97.

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II) The location of the MSW ash processing area, as shown in Figure 3, Site Plan, dated August 1997, shall not be relocated unless the Department approves the new location. The applicant must submit a request, including a revised site plan, for the new location to obtain a letter of approval from the Department.

III) The demonstration of the ash screening operation has been satisfactorily completed pursuant to Permit Condition No. 6 contained in the modification on December 18, 1997. Final approval is granted to screen the MSW incinerator ash to recover ferrous and non-ferrous metal. The screened ash (<4" material) may be used for alternate daily cover, as governed under previous equivalency approvals and >4" rubble material (oversize - 4" to 12") may be used as temporary road surface material on traffic areas proximate to the landfill's active working face.

The storm water from this material shall be collected and treated as leachate and/or diverted into the lined area of the Landfill. Both processed and unprocessed MSW incinerator ash is a waste and not a recyclable material, and counts towards the average daily volume of the facility. This waste is subject to the host municipality benefit fee(s) of Act 101.

41. The permit amendment for the use of Glass Cullet material as gas extraction well backfill, gas system header backfill, leachate force main backfill, use in construction of landfill access road subbases and sub-grades, the use as general fill material and utilization beneath the final cap in areas of settlement and in the cap drainage layer, issued on December 22, 1993 with following permit conditions, is inlcuded in this permit:

I) Temporary landfill access road subgrades and subbases will utilize no more than 40% glass cullet/soil mixture.

II) Final landfill access road depicted on final development plans including subgrades and subbases will utilize no more than 10% glass cullet/soil mixture.

III) For road construction utilizing glass cullet and soil the ratio of glass cullet to soil will be done by the use of individual loads during road construction. For a 40% mixture three loads of soil must be mixed with two loads of glass cullet utilizing bulldozer to incorporate the two materials. For a 10 % mixture 9 loads soil will be mixed with one load of glass cullet utilizing a bulldozer to incorporate the two materials.

IV) For use of glass cullet in the landfill cap drainage layer engineering test must be performed to determine suitability including the permeability and grain size as required by the cap design criteria. As built documentation must be submitted with Form 37 pertaining to the use of glass cullet in the landfill cap drainage area.

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42. Landfill operating equipment used in construction or operation of the landfill (not including collection or transfer vehicles) may be washed within the limits of the active landfill. All wash water must be contained and directed to the landfill leachate collection system. All washing equipment will be of a high-pressure, low volume type to minimize the generation of wash water.

43. The surety bond dated December 8, 1999 between Waste Management Disposal Services of Pennsylvania, Inc. and the Department in the amount of $25,435,093.00 is hereby approved as part of this permit. Upon receipt of written notice from the Department this bond must be updated within 90 days in accordance with Chapter 271 of the municipal waste regulations.

Re 30 (RN99)342-10