MID BLOCK #57 PROJECT

MANHATTAN, NEW YORK

Site Management Plan

NYSDEC Site Number: C231062

Prepared for:

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Mid Block #57 LLC
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TABLE OF CONTENTS

CERTIFICATION 1

1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM 2
- 1.1 Introduction 2
  - 1.1.1 General 2
  - 1.1.2 Purpose 3
  - 1.1.3 Revisions 4
- 1.2 Site Background 4
  - 1.2.1 Site Location and Description 4
  - 1.2.2 Site History 5
  - 1.2.3 Geologic Conditions 5
- 1.3 Summary Of Remedial Investigation Findings 6
- 1.4 Summary of Remedial Actions 10
  - 1.4.1 Removal of Contaminated Materials from the Site 11
  - 1.4.2 Site-Related Treatment Systems 12
  - 1.4.3 Residual Contamination 12

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN 13
- 2.1 Introduction 13
  - 2.1.1 General 13
  - 2.1.2 Purpose 13
- 2.2 Engineering Controls 13
  - 2.2.1 Engineering Control Systems 13
    - 2.2.1.1 Sub-slab Depressurization System 13
    - 2.2.1.2 Vapor Barrier/Waterproofing Membrane 14
  - 2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems 15
    - 2.2.2.1 Sub-slab Depressurization System (SSDS) 15
    - 2.2.2.2 Monitored Natural Attenuation and Contingency Groundwater Treatment Injection Points 15
- 2.3 Institutional Controls 16
- 2.4 Inspections and Notifications 17
  - 2.4.1 Inspections 17
  - 2.4.2 Notifications 18
- 2.5 Contingency Plan 19
  - 2.5.1 Emergency Telephone Numbers 19
  - 2.5.2 Map and Directions to Nearest Health Facility 20
  - 2.5.3 Response Procedures 22

3.0 SITE MONITORING PLAN 23
- 3.1 Introduction 23
  - 3.1.1 General 23
  - 3.1.2 Purpose and Schedule 23
- 3.2 Media Monitoring Program 24
  - 3.2.1 Groundwater Monitoring 25
    - 3.2.1.1 Sampling Protocol 25
    - 3.2.1.2 Monitoring Well Repairs, Replacement and Decommissioning 27

TABLE OF CONTENTS

(Continued)

3.2.2 Sub-Slab Soil Vapor Monitoring 27
3.2.2.1 Soil Vapor Sampling and Analytical Protocol 28
3.3 Site-Wide Inspection 28
3.4 Monitoring Quality Assurance/Quality Control 29
3.5 Monitoring Reporting Requirements 30

4.0 OPERATION AND MAINTENANCE PLAN 32
4.1 Introduction 32
4.2 Engineering Control System Operation and Maintenance 32
4.3 Engineering Control System Performance Monitoring 34
4.3.1 Monitoring Schedule 34
4.3.2 General Equipment Monitoring 35
4.3.3 System Monitoring Devices and Alarms 35
4.4 Maintenance and performance monitoring Reporting Requirements 35
4.4.1 Routine Maintenance Reports 36
4.4.2 Non-Routine Maintenance Reports 36

5.0 INSPECTIONS, REPORTING AND CERTIFICATIONS 37
5.1 Site Inspections 37
5.1.1 Inspection Frequency 37
5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports 37
5.1.3 Evaluation of Records and Reporting 37
5.2 Certification of Engineering and Institutional Controls 38
5.3 Periodic Review Report 39
5.4 Corrective Measures Plan 40

TABLES

1. Summary of Groundwater Elevations
2. Summary of Volatile Organic Compounds in End Point Soil Samples
3. Summary of Semi-Volatile Organic Compounds in End Point Soil Samples
4. Summary of Metals in End Point Soil Samples

FIGURES

1. Site Location Map
2. Site Plan
3. Generalized Geologic Cross Section
4. Groundwater Elevation Contour Map
5. Proposed Remediation Plan (Prior to Remedial Work)
6. Post Excavation End Point Sampling Locations
7. Post Excavation Bottom Elevations
8. Post Remediation On Site Monitoring Wells

APPENDICES

A. Environmental Easement
B. Metes and Bounds
C. Historic Geotechnical Investigation
D. Contingency Groundwater Injection Points, Monitoring Wells and Soil Vapor Monitoring Points
E. Waterproofing and Vapor Barrier Design Drawings
F. Monitoring Well Boring Logs
G. Groundwater Sampling Log
H. Site-wide Inspection Log
I. Quality Assurance Project Plan (QAPP)
J. SSDS Operations and Maintenance Manual

PLATE

1. SSDS Design Drawing

CERTIFICATION

I, Joshua B. Levine, certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

084925
NYS Professional Engineer #

12/3/13
Date

Signature

1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 Introduction

This document is required as an element of the remedial program at the Mid Block #57 Project (hereinafter referred to as the "Site" or the "BCP Site") under the New York State (NYS) Brownfield Cleanup Program (BCP) administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with Brownfield Cleanup Agreement (BCA), as amended, Index #A2-0611-1008, Site #C231062, which was executed on April 27, 2009 and amended on August 18, 2011, December 21, 2011 and June 18, 2012 to update entity names party to the BCA.

1.1.1 General

Durst Development L.L.C., 57 Sandwich LLC, 57 West Development LLC (formerly known as 57 Mini LLC), Mid Block #57 LLC, 57th Avenues Developer LLC (formerly known as Nations Developer 57 LLC), Durst Pyramid LLC (formerly known as DFR 57 LLC), and Devco Nations, LLC (all entities collectively identified as "Applicants" hereafter) entered into the BCA with the NYSDEC to remediate a 1.36 acre property located in Manhattan, New York City, New York. The BCA required Applicants to investigate and remediate contaminated media at the Site. A figure showing the Site location and boundaries of this 1.36-acre Site is provided in Figure 1. The boundaries of the Site are more fully described in the metes and bounds Site description that is part of the Environmental Easement (Appendix A).

The Site is progressing towards achieving a Track 1 Unrestricted Cleanup. Although Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs) have been achieved in accordance with the Remedial Action Work Plan (RAWP), dated February 2010, residual groundwater and/or soil vapor contamination remains in the subsurface at this Site, which is hereafter referred to as "residual contamination." This Site Management Plan (SMP) was prepared to manage residual contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. It is anticipated that Track 1 Unrestricted Use Cleanup objectives for groundwater and soil vapor will be achieved within five years after the date of the Certificate of Completion, at which time

NYSDEC would extinguish the Environmental Easement of record and Site Management Plan promptly thereafter. All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by Remedial Engineering, P.C., on behalf of the Applicants, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement for the Site.

1.1.2 Purpose

The Site contains contamination left after completion of the remedial action. Engineering Controls have been incorporated into the Site remedy to control exposure to remaining contamination during the use of the Site to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the New York County Clerk, will require compliance with this SMP and all ECs and ICs placed on the Site. The ICs place restrictions on Site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary to ensure compliance with all ECs and ICs required by the Environmental Easement for residual contamination at the Site. This SMP has been approved by the NYSDEC, and compliance with this SMP is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining contamination at the Site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; (3) operation and maintenance of all treatment, collection, containment, or recovery systems; (4) performance of periodic inspections, certification

of results, and submittal of Periodic Review Reports; and (5) defining criteria for termination of treatment system operations.

To address these needs, this SMP includes three plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems.

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to NYSDEC.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the BCA (Index #A2-0611-1008; Site #C231062) for the Site, and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions to this SMP will be proposed in writing to the NYSDEC's project manager. In accordance with the Environmental Easement for the Site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.2 Site Background

Provided below is a description of the Site location, history and geologic conditions.

1.2.1 Site Location and Description

The Site is located in the Borough of Manhattan, New York City, New York and is identified as Block 1105, and Lots 5 (part of), 14, 19, and 43 on the New York City Tax Map. The Site is an approximately 1.36-acre area bounded by 58th Street to the north,

57th Street to the south, the eastern limits of tax lot 43 to the east, and bisects tax lot 5 to the west with the western limits of the Site located 250 feet east of 12th Avenue (see Figures 1 and 2). The boundaries of the Site are more fully described in Appendix B – Metes and Bounds.

1.2.2 Site History

The Site formerly contained an Airborne Express parcel warehouse and vehicular maintenance building (631-649 West 57th Street; tax lot 5), a Potamkin Toyota auto service repair facility (623-629 West 57th Street; tax lot 14), the Copacabana Night Club (615-621 West 57th Street; tax lot 19), and Dynasty Auto Body Facility (616-618 West 58th Street; tax lot 14).

East of the Site and bordering 11th Avenue is The Helena (tax lot 23 (formerly lots 23 and 29)), an active rental residential tower with market and affordable housing, and Manhattan Mini Storage (tax lot 36). The Helena is located at 601 West 57th Street (southeast corner of block) and Manhattan Mini Storage is located at 847-853 Eleventh Avenue (northeast corner of block). West of the Site is a portion of the former Airborne Express parcel warehouse lot and the former Artkraft Strauss lot located at 830 12th Avenue. All of the aforementioned facilities on the Site were demolished and the Site is being redeveloped into a mixed use residential tower with ground floor commercial space. Site redevelopment is anticipated to be completed in 2015.

Historic storage, transfer, and usage of petroleum products and chlorinated solvents on Site resulted in impacts to soil, soil vapor, and groundwater prior to remediation.

1.2.3 Geologic Conditions

The Site contains shallow bedrock occurring approximately 3 to 17 feet below land surface (bls) and steeply sloped bedrock towards the Hudson River in the eastern half of the Site. On the western half of the Site, the bedrock is identified at approximately 55 feet bls and is overlain by a 15-foot thick sand/till layer, followed by a 20-foot thick organic silty clay layer. The bedrock is characterized as hard weathered gray mica schist, granite, and gneiss.

Prior to remediation, a 12 to 25 feet thick urban fill layer had overlain the 20-foot thick organic silty clay layer and bedrock. The urban fill layer was removed during remediation and the building's foundation will lie directly on top of the bedrock, the organic silty clay layer and imported clean fill material meeting the Track 1 SCOs.

According to the Langan "Interim Report Geotechnical Engineering Investigation" and the Mueser Rutledge "Geotechnical Investigation Boring Location Plan" (Mueser Geotechnical Investigation"), the historic (pre-1892 Sanborn map) limits of the Hudson River shoreline bisected the Site in the former Potamkin and Copacabana properties. A large quantity of urban fill was likely used to extend the shoreline on the western half of the Site prior to 1892.

Four geologic cross sections are shown in Appendix C from the Mueser Rutledge Geotechnical Investigation and a generalized geologic cross section of the Site is presented in Figure 3.

In general, Site groundwater flows in a west/northwesterly direction towards the Hudson River. The groundwater levels measured on June 2013 are provided in Table 1. A groundwater flow map is shown in Figure 4.

1.3 Summary Of Remedial Investigation Findings

A Remedial Investigation (RI) was performed to characterize the nature and extent of contamination at the Site. The results of the RI are described in detail in the following reports:

- Phase I Environmental Site Assessment, West 57th Street Property, New York, New York, GCI Environmental Advisory, Inc., June 1998.
- Focused Subsurface Site Investigation, Durst –West 57th Street Project, ATC Associates Inc., December 10, 1998.
- Remedial Investigation Report, West 57th Street Project, 601-657 West 57th Street, New York, New York, NYSDEC Spill No. 98-10172, ATC Associates Inc., March 24, 2000.

- Revised Remedial Action Plan, West 57th Street Project, 601-657 West 57th Street, New York, New York, NYSDEC Spill No. 98-10172, ATC Associates Inc., March 24, 2000.

- Third Supplemental Geotechnical Investigation, Block 1105 – Residential Development, New York, New York, Mueser Rutledge Consulting Engineers, November 15, 2002 (Revised January 16, 2003).

- Underground Storage Tank Closure Report, West 57th Street Site, West 57th – 58th Street & 11th – 12th Avenues, New York New York, ATC Associates Inc., August 5, 2003.

- Remedial Investigation Summary Report, Site C231062, Manhattan, New York, Roux Associates, Inc., December 3, 2007.

Generally, the RI determined that onsite soil was contaminated with petroleum-related volatile organic compounds ("VOCs") and semi-VOCs ("SVOCs") in excess of the NYCRR Subpart 375.6 unrestricted, restricted residential, and restricted commercial SCOs across the Site. Metals attributed to urban fill were detected in excess of the unrestricted, restricted commercial and restricted industrial SCOs. Onsite and offsite groundwater was impacted with low levels of VOCs in excess of the Ambient Water Quality Standards and Guidance Values ("AWQSGVs"). The RI also indicated that one chlorinated VOC, PCE, was detected in soil vapor in the southeast portion of the Airborne Express property at concentrations that required monitoring.

Below is a summary of Site conditions when the RI was performed in 2007 prior to Site remediation.

Soil

A review of soil quality data obtained during the RI indicated that petroleum-related VOCs and SVOCs (associated with gasoline, diesel, or fuel oil) were observed at concentrations above unrestricted SCOs at varying depths throughout the Site. Multiple VOCs (1,3,5-trimethylbenzene, ethylbenzene, and xylenes) were detected at concentrations above the restricted residential SCOs and 1,2,4-trimethylbenzene was detected at concentrations above the restricted commercial SCOs at multiple locations (AX-1, AX-2, and SB-18).

The highest concentrations of petroleum related compounds detected above unrestricted SCOs most commonly occurred at sample depths between 10 to 20 feet bls. The petroleum related compounds detected onsite are most likely indicative of historic UST leaks.

The areas of the Site containing petroleum-impacted soil in excess of the unrestricted SCOs are the eastern portion of the Airborne Express property (tax lot 5) extending onto the former Potamkin property (tax lot 14) and the southern portion of the former Copacabana property (tax lot 19).

The following metals were detected in excess of the SCOs across the Site: arsenic, barium, copper, lead, mercury, and zinc. All of these metals were detected in excess of the restricted commercial SCOs with exception to zinc, which was detected in excess of unrestricted SCOs. These metal exceedances are most likely indicative of the large quantities of urban fill that were present across the Site and are not likely due to any isolated release or petroleum-related discharge, although it is possible that the lead exceedances in the former Airborne Express, Potamkin, and Dynasty Auto properties were attributed to the historic use and storage of leaded gasoline products.

Site-Related Groundwater

Shallow groundwater (less than 30 feet bls) is impacted by low concentrations of petroleum-related compounds and associated degradation products beneath the Site. A plume of petroleum-impacted groundwater extends laterally offsite toward the southwest beneath 57th Street and north under 58th Street. The downgradient extent of the plume was delineated by non-detected concentrations of VOCs in well MW-2 on the northwest corner of the block. Upgradient groundwater, as defined by MW-7 on 11th Avenue and MW-11 on 57th Street, is not impacted by VOCs or SVOCs. The plume's highest concentrations were observed in the northeast corner of Airborne Express Property and the southwest corner of Copacabana property. Based upon the spatial extent and concentrations of petroleum-related VOCs and SVOCs in soil and groundwater, the source areas can be attributed to former UST clusters on the eastern portion of the

Airborne Express property, central/southeastern portion of the Potamkin property, and southwest portion of the Copacabana property.

The presence of low level exceedances of the AWQSGVs and limited downgradient extent of the VOC plume indicates that in situ biodegradation of VOCs in groundwater is occurring. The relative low permeability of the fill and silt units beneath the Site result in low groundwater flow rates that, together with in situ biodegradation, have limited the downgradient migration of VOCs. Therefore, the plume is in a stable configuration and not increasing significantly in downgradient extent.

Site-Related Soil Vapor

Soil vapor samples resulted in several detections of the chlorinated solvent PCE across the Site. PCE was detected in 7 of the 12 soil vapor samples at concentrations ranging from 18 $\mu g/m^3$ to 240 $\mu g/m^3$. The PCE degradation product, TCE, was detected less frequently (one in twelve samples at 6.4 $\mu g/m^3$). PCE was detected in five of the six former SVE wells on-site.

The soil vapor data indicated the presence of PCE contamination on-site, although the presence of a PCE source was not confirmed from soil and groundwater sampling from this area.

Underground Storage Tanks

Thirty-one underground storage tanks (USTs) and 452 yards of petroleum contaminated soil were excavated and disposed offsite as documented in the August 5, 2003 Underground Storage Tank Closure Report prepared by ATC Associates, Inc. Additional petroleum impacted soil was identified and removed during Site-wide remediation in accordance with the RAWP for the Site.

Two 550-gallon gasoline USTs were identified on August 20, 2012 and properly cleaned and disposed during Site remediation. This UST removal was documented in BCP monthly reports submitted to NYSDEC in accordance with the RAWP for the Site.

1.4 Summary of Remedial Actions

The Site was remediated in accordance with the NYSDEC-approved RAWP dated February 2010.

The following is a summary of the Remedial Actions for the Site:

1. Excavation and off-site disposal of soil exceeding the unrestricted use SCOs presented in the Subpart 375.6 Regulations at any depth above bedrock.

2. Groundwater remediation during construction activities consisting of excavation dewatering, treatment and off-site disposal;

3. Site Monitoring of airborne VOCs and particulates in accordance with a NYSDEC approved Community Air Monitoring Plan (CAMP) for all intrusive and soil handling activities;

4. Implementation of proper dust and odor suppression techniques for all intrusive and soil handling activities;

5. Import of materials to be used for backfill and cover in compliance with: (a) Subpart 375 – 6.7d, and (b) all Federal, State and local rules and regulations for handling and transport of material;

6. Implementation of a Stormwater Pollution Prevention Plan;

7. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;

8. Collection and analysis of post excavation end-point samples to evaluate the performance of the remedy with respect to attainment of unrestricted SCOs;

9. Post remediation groundwater monitoring;

10. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;

11. Installation of a vapor barrier below the proposed building bottom slab and outside foundation walls and a passive sub-slab depressurization system (SSDS) beneath the bottom slab, as a contingency against soil vapor intrusion in the event that residual soil vapor or groundwater contamination remains following the remedy.

12. Filing of an Environmental Easement for the site to ensure implementation of any required Institutional or Engineering controls.

13. Publication of a Site Management Plan for management of residual contamination as required by the Environmental Easement, including (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting;

Excavation and end-point sampling to confirm soil removal and off-site disposal to meet the unrestricted SCOs was completed at the Site in April 2013.

1.4.1 Removal of Contaminated Materials from the Site

Based on the results of the RI, the contaminated soil zone was located within the upper 20 feet of fill. As per the February 2010 RAWP, all on-Site soils with contaminant concentrations in excess of the unrestricted SCOs were excavated from land surface to bedrock and end point soil sampling was conducted to confirm the removal of all soils with concentrations in excess of the unrestricted SCOs. A list of the unrestricted SCOs for the primary contaminants of concern (COCs) and applicable land use for this Site is provided in Tables 2 through 4.

Remedial Engineering P.C. provided full-time oversight during excavation activities to ensure that the soil excavation and disposal was completed in accordance with the RAWP and all applicable regulations. The excavation of all soil was completed by The Laquila Group, Inc. under the supervision of Hunter Roberts Construction Group. Transport and disposal of soil was performed by Clean Earth Inc. During excavation and load-out, Remedial Engineering P.C. oversaw all loading of trucks and issued the soil manifests to the truck driver prior to the truck leaving the Site. Haul vehicles for bulk soil were secured with appropriate tight-fitting covers prior to exiting the construction area to prevent a release of waste. All trucks were appropriately decontaminated before they left the Site.

All impacted soil excavated from the Site was transported and disposed of in accordance with all applicable federal, state, and local regulations. 66,234.62 tons of soil was disposed of as non-hazardous waste. 8,311.14 tons of soil was disposed of as hazardous for Lead. A figure showing areas where excavation was performed is shown in Figure 5.

Figure 6 provides the post excavation end point sample locations and Figure 7 provides the surveyed excavation bottom elevations after soil removal.

33,585 tons of clean fill meeting the unrestricted SCOs was imported to the Site for use as backfill from Modern Industries' Kearny, New Jersey facility. Clean fill was pre-approved by NYSDEC prior to import and placement onsite and is documented in the Final Engineering Report for the Site.

1.4.2 Site-Related Treatment Systems

No long-term treatment systems were installed as part of the Site remedy.

A passive sub-slab depressurization system (SSDS) was installed under the Site as a precautionary measure in case sub-slab soil vapor testing indicates that sub-slab venting is required.

1.4.3 Residual Contamination

All contaminated soil has been removed down to bedrock (no residual soil contamination) and only clean fill meeting unrestricted SCOs is present beneath the Site.

Tables 2 through 4 and Figure 6 summarize the results and location of all soil samples remaining at the Site after completion of Remedial Action.

Post-remedial soil vapor and groundwater will be monitored under this SMP to confirm that no residual contamination remains in these media.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 Introduction

2.1.1 General

Since residual contaminated groundwater and/or soil vapor exists beneath the Site, EC/ICs are required to protect human health and the environment. This Engineering and Institutional Control Plan (EC/IC Plan) describes the procedures for the implementation and management of all EC/ICs at the Site. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC with the Applicants' consent.

2.1.2 Purpose

This plan provides:

- A description of all EC/ICs on the Site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the features to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of EC/ICs; and
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the Site remedy, as determined by the NYSDEC.

2.2 Engineering Controls

2.2.1 Engineering Control Systems

Provided below is a description of the engineering controls for the Site.

2.2.1.1 Sub-slab Depressurization System

A passive sub-slab depressurization system (SSDS) was installed under the Site as a contingency measure to prevent soil vapor intrusion at locations shown in Plate 1. The SSDS is comprised of perforated 4" PVC piping installed within a gravel encased filter fabric wrap underneath the first floor slab (See Plate 1, Detail 1). The sub-slab piping

network leads back to a basement mechanical room where it can be connected to an active blower to draw a vacuum from under the slab at the BCP Site. Sub-slab piping is not present underneath the basement slab since the basement slab extends beneath the water table.

The passive SSDS contains two soil vapor monitoring points that are available for sub-slab soil vapor sampling and sub-slab vacuum confirmation. The locations of the two sub-slab vapor monitoring points are depicted in Plate 1.

The SSDS was installed as a precautionary measure in case sub-slab soil vapor sampling results indicate that active sub slab venting is required to prevent soil vapor intrusion. Once the building slab is completed, sub-slab soil vapor samples will be collected and analyzed (See Section 3 of this SMP). If sampling indicates that active sub-slab depressurization is required, as determined by NYSDEC and NYSDOH, then SSDS blowers in the basement mechanical room will be turned on to withdraw soil vapor from underneath the slab of the BCP Site.

Procedures for operating and maintaining the SSDS are documented in the Operation and Maintenance Plan (Section 4 and Appendix J of this SMP). Procedures for monitoring the system are included in the Monitoring Plan (Section 3 and Appendix J of this SMP). The Monitoring Plan also addresses severe condition inspections in the event that a severe condition, which may affect controls at the Site, occurs.

2.2.1.2 Vapor Barrier/Waterproofing Membrane

A vapor barrier and foundation waterproofing membrane consisting of W.R. Grace Preprufe® and Florprufe® products were installed beneath the basement and first floor slabs and surrounding the exterior foundation sidewalls to provide an airtight and watertight envelope and prevent soil vapor and water intrusion into the building. The Grace Preprufe® 300R dual purpose waterproofing and vapor barrier membrane was installed in areas where the slab and foundation is below the water table, and the Grace Florprufe® 120 vapor barrier membrane was installed in areas where the slab is above the water table. The vapor barrier and waterproofing membranes were installed per the

design drawings provided in Appendix E and installation of the membrane was inspected by Langan Engineering for compliance with the design drawings.

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.6 of NYSDEC DER-10.

2.2.2.1 Sub-slab Depressurization System (SSDS)

If deemed necessary, the active SSDS for the BCP Site will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that the active SSDS is no longer required, a proposal to discontinue the active SSDS will be submitted by the Applicants to the NYSDEC and NYSDOH.

2.2.2.2 Monitored Natural Attenuation and Contingency Groundwater Treatment Injection Points

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC, until residual groundwater concentrations are found to be consistently below NYSDEC standards or have become asymptotic at an acceptable level over an extended period. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

Four (4) vertical groundwater treatment injection points were installed through the 1st floor parking slab to access and treat underlying groundwater as a contingency groundwater treatment measure. Groundwater treatment via in situ chemical oxidation (ISCO) is proposed as a contingency option to meet the Track 1 Unrestricted remedial goals, pending the results of onsite groundwater quality monitoring (See Section 3 of this SMP). The locations and construction of the contingency groundwater treatment injection points are depicted in Appendix D.

2.3 Institutional Controls

A series of Institutional Controls is required by the RAWP to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and (3) limit the use and development of the Site to residential and less restrictive uses consistent with zoning only.

Adherence to these Institutional Controls on the Site is required by the Environmental Easement and will be implemented under this Site Management Plan. These Institutional Controls are:

- Compliance with the Environmental Easement and this SMP by the Grantor and the Grantor's successors and assigns;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- All Engineering Controls on the Controlled Property must be inspected at a frequency and in a manner defined in the SMP.
- Groundwater and soil vapor monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP;

Institutional Controls identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

The Site has a series of Institutional Controls in the form of Site restrictions. Adherence to these Institutional Controls is required by the Environmental Easement. Site restrictions that apply to the Controlled Property are:

- The property may only be used for residential and less restrictive uses consistent with zoning provided that the long-term Engineering and Institutional Controls included in this SMP are employed.
- The property may not be used for a higher level of use, such as unrestricted use without additional remediation and amendment of the Environmental Easement, as approved by the NYSDEC;

- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- The use of the groundwater underlying the property is prohibited without treatment rendering it safe for intended use;
- the Controlled Property shall not be used for raising livestock or producing animal products for human consumption;
- The Applicants will submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow and will be made by an expert that the NYSDEC finds acceptable.

2.4 Inspections and Notifications

Inspection and notification requirements for the Site are addressed below.

2.4.1 Inspections

Inspections of all remedial components installed at the Site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive Site-wide inspection will be conducted annually, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether Engineering Controls continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during monitoring events;
- If Site records are complete and up to date; and
- Changes, or needed changes, to the remedial or monitoring system;

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5).

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the EC/ICs implemented at the Site by a qualified environmental professional as determined by NYSDEC.

2.4.2 Notifications

Notifications will be submitted by the Applicants to the NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the BCA, 6 NYCRR Part 375, and/or Environmental Conservation Law.
- Notice within 48-hours of any damage or defect to the foundation, structures or engineering control that reduces or has the potential to reduce the effectiveness of an Engineering Control and likewise any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the Site, with written confirmation within seven days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

Any change in the control of the Site or the responsibility for implementing this SMP to a party other than an Applicant will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of the BCA, and all approved work plans and reports, including this SMP.

- Within 15 days after the transfer of control of the Site or responsibility for implementing this SMP to an entity other than the Applicant, the new entity's name, contact representative, and contact information will be confirmed in writing.

2.5 Contingency Plan

Emergency conditions are not anticipated to be associated with the engineering controls currently installed at the Site (e.g., vapor barrier, passive SSDS, and contingency groundwater injection points). However, emergencies may occur including injury to personnel, fire or explosion, environmental release, or serious weather conditions. If emergencies do occur, then the emergency contacts provided in Section 2.5.1 below will be notified as appropriate.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance, the Applicants or their representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to the Remedial Engineer (Joshua Levine, P.E.) that has certified this document. These emergency contact lists must be maintained in an easily accessible location at the Site.

Emergency Contact Numbers

Medical, Fire, and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

Qualified Environmental Professional/ Remedial Engineer: Joshua Levine, P.E. Remedial Engineering P.C.	(631) 232-2600
NYSDEC Project Manager: Dana Kaplan	(718) 482-7541
NYSDOH Project Manager: Dawn Hettrick	(800) 458-1158 Ext. 2-7880

* Note: Contact numbers subject to change and should be updated as necessary

2.5.2 Map and Directions to Nearest Health Facility

Site Location: 625 West 57th Street, NY, NY

Nearest Hospital Name: Roosevelt Hospital

Hospital Location: 1000 Tenth Avenue, New York, NY 10019
Located on east side of Tenth Avenue between West 58th and West 59th Streets

Hospital Telephone: (212) 523-4000

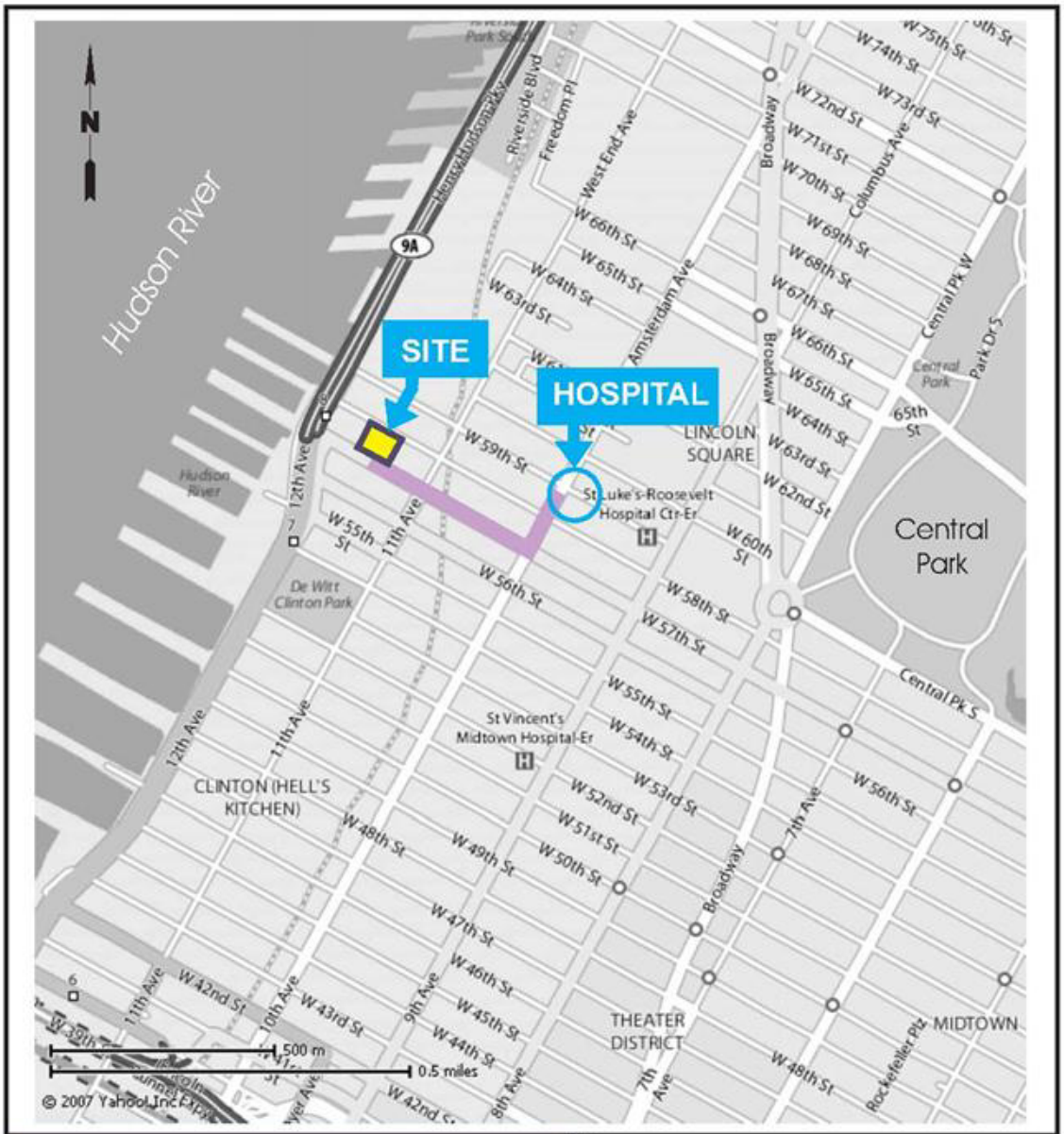
Directions to the Hospital:

1. From Site, head east on West 57th Street towards 10th Avenue
2. Turn left onto 10th Avenue to head north
3. Head north one block on 10th Avenue
4. Hospital entrance is located on right side of 10th Avenue between 58th and 59th Streets.

Total Distance: 0.3 miles

Total Estimated Time: 2-5 minutes

Map Showing Route from the Site to the Hospital



ROUTE TO ROOSEVELT HOSPITAL

- From Site, head east on W 57th Street toward 11th Avenue.
- Turn left onto 10th Avenue.
- Enter Roosevelt Hospital at 1000 10th Avenue.
- Entrance is on east side of 10th Avenue between 58th and 59th Street.
- Hospital Phone: (212) 523-4000

Title:

HOSPITAL ROUTE MAP

SITE MANAGEMENT PLAN
MID BLOCK #57 PROJECT

Prepared for:

DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: J.L.	Date: 16JUL13	FIGURE
Prepared by: B.H.C.	Scale: AS SHOWN	-
Project Mgr.: J.L.	Project No.: 1338.0003Y002	
File: 1338.0003Y206.07.CDR		

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2.5.3 Response Procedures

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list is found in Section 2.5.1 of this Contingency Plan. The list will also be posted prominently at the Site and made readily available to all personnel at all times.

Some of the response procedures for emergency conditions have been described below:

a) Spill Response Procedures: The NYSDEC's Spill Guidance Manual (1.1: Spill Reporting and Initial Notification Requirement) will be complied with in case of any future spill that may occur at the Site in future. As described in the manual, petroleum spills must be reported to the NYSDEC unless all of the following criteria are met:

- The spill is known to be less than 5 gallons; and
- The spill is contained and under the control of the spiller; and
- The spill has not and will not reach the State's water or any land; and,
- The spill is cleaned up within 2 hours of discovery.

All reportable petroleum spills and most hazardous materials spills must be reported to DEC hotline (1-800-457-7362) within New York State. The manual indicates that for spill not deemed reportable, it is strongly recommended that the facts concerning the incident be documented by the spiller and a record be maintained for one year.

b) Evacuation Plan: As indicated in the NYSDEC's Spill Guidance Manual (1.3: Emergency Response) protection of public health and safety during a spill or fire response may require evacuating residents and other personnel from the area temporarily. The manual indicates that a decision to evacuate is usually prompted by the discovery that an imminent health and/or safety threat exists. Common examples are when explosive conditions are detected in a structure, when the spilled material is inherently toxic or releases toxic vapors, or toxic. As indicated in the manual, when an emergency situation that may warrant an evacuation is realized, following actions will need to be performed:

- Notifying the agencies (Fire, Police and Health Departments) who have the authority to evacuate residents, and
- Providing technical support and advice to these agencies, as requested, consistent with Bureau of Spill Prevention and Response (BSPR) authority.

3.0 SITE MONITORING PLAN

3.1 Introduction

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the Site and all affected Site media identified below. Monitoring of other Engineering Controls is described in Chapter 4, Operation, Monitoring and Maintenance Plan. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of groundwater.
- Assessing compliance with applicable NYSDEC standards, criteria and guidance, particularly the AWQSGVs for Class GA groundwater identified in TOGS 1.1.1;
- Assessing achievement of the remedial performance criteria.
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.
- Preparing the necessary reports for the various monitoring activities.
- To adequately address these issues, this Monitoring Plan provides information on:
  - Sampling locations, protocol, and frequency;
  - Information on all designed monitoring systems (e.g., well logs);
  - Analytical sampling program requirements;
  - Reporting requirements;
  - Quality Assurance/Quality Control (QA/QC) requirements;
  - Inspection and maintenance requirements for monitoring wells;
  - Monitoring well decommissioning procedures; and
  - Annual inspection and periodic certification.

If required by NYSDEC, quarterly monitoring of the performance of the remedy and overall reduction in contamination on-site will be conducted for the first two (2) years. If continued groundwater monitoring is deemed necessary by NYSDEC, the frequency thereafter will be determined by NYSDEC. Trends in contaminant levels in groundwater in the affected areas, will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. If onsite groundwater concentration trends indicate that groundwater treatment is necessary to comply with the Track 1 Unrestricted remedial goals, then in situ chemical oxidation (ISCO) treatment injections will be proposed to NYSDEC under separate cover.

Monitoring programs are summarized below and outlined in detail in Section 3.2.

Monitoring/Inspection Schedule

Monitoring Program	Frequency*	Matrix	Analysis
Groundwater Monitoring	Quarterly for 2 years (8 sampling events)	Groundwater	USEPA Method 8260 for VOCs
Soil Vapor Monitoring	To Be Determined based on initial results	Soil Vapor	USEPA Method TO-15

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH

3.2 Media Monitoring Program

The media monitoring program includes quarterly groundwater sampling from two onsite monitoring wells and analysis of groundwater samples for VOCs and sampling of sub-slab soil vapor for VOCs at a frequency to be determined to document that remediation has complied with the requirements of a Track 1 Unrestricted Cleanup, as determined by NYSDEC.

The procedures and scope of the media monitoring program are provided below.

3.2.1 Groundwater Monitoring

If required by NYSDEC, groundwater monitoring will be performed on a quarterly basis for two (2) years to assess the performance of the remedy.

Two (2) monitoring wells have been installed in the parking garage to monitor groundwater conditions at the Site. The network of on-site wells has been designed to measure post-remediation groundwater quality until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic. Monitoring will continue for two (2) years or unless NYSDEC determines in writing that further monitoring is required.

Figure 8 and Appendix D show the on-site monitoring well locations. Monitoring well construction logs are included in Appendix F.

The sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

Deliverables for the groundwater monitoring program are specified below.

3.2.1.1 Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log presented in Appendix G. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

Two 2-inch diameter permanent groundwater monitoring wells have been installed at the locations shown in Figure 8. Well construction includes approximately 20 feet of well screen material to account for fluctuations in water table elevation. After screen and riser installation, a sand pack was placed around the screen extending to two feet above the top of the screened zone. The screen zone was set to straddle the apparent water table interface as observed during well construction. A minimum two-foot thick bentonite pellet seal was then installed above the sand pack and hydrated using potable water. The

remaining annular space above the bentonite seal was filled with cement-bentonite grout. The wells were finished at grade with steel bolt-down manhole covers. Following monitoring well installation, submersible pumps were used to develop the wells to remove any fine-grained material in the vicinity of the well screen and to promote hydraulic connection with the surrounding formation.

Representative groundwater samples will be collected using low-flow sampling techniques from the two wells. A representative groundwater sample will be collected from each well with a peristaltic pump and dedicated tubing. Sampling will be conducted in accordance with NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and Sampling Guidelines and Protocols, dated March 1991. Groundwater wells will be gauged with a water level meter to record a depth to groundwater reading (1/100 foot), and if necessary, an interface meter to determine the thickness of LNAPL or DNAPL. The well casings will be surveyed by a NYS licensed surveyor to facilitate preparation of a groundwater contour map and determine the direction of groundwater flow.

Groundwater samples will be submitted to a NYSDOH Environmental Laboratory Accreditation Program (ELAP)-certified laboratory for USEPA Method 8260 for VOCs.

QA/QC procedures will be used to provide performance information with regard to accuracy, precision, sensitivity, representation, completeness, and comparability associated with the sampling and analysis for this monitoring. Field QA/QC procedures will be used (1) to document that samples are representative of actual conditions at the Site and (2) identify possible cross-contamination from field activities or sample transit. Laboratory QA/QC procedures and analyses will be used to demonstrate whether analytical results have been biased either by interfering compounds in the sample matrix, or by laboratory techniques that may have introduced systematic or random errors to the analytical process. QA/QC samples (field and trip blanks, duplicates, etc.) will be collected and analyzed at an ELAP-certified laboratory.

3.2.1.2 Monitoring Well Repairs, Replacement and Decommissioning

If biofouling or silt accumulation occurs in the on-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan), if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

3.2.2 Sub-Slab Soil Vapor Monitoring

If required by NYSDEC, sub-slab soil vapor monitoring will be performed once following construction of the first floor slab and prior to building occupancy to determine if active operation of the SSDS is necessary. If initial sub-slab soil vapor monitoring results determine that active operation of the SSDS is required, then the Applicant may re-sample sub-slab soil vapor before the system is activated (up to 5 years from COC date as long as building is unoccupied) to assess if active operation of the system is necessary during building occupancy.

Two (2) sub slab soil vapor monitoring points have been installed in the parking garage to monitor sub-slab soil vapor conditions at the Site. The sub-slab soil vapor monitoring points have been designed to measure post-remediation soil vapor quality until soil vapor VOC concentrations are found to be below NYSDOH standards. Future soil vapor monitoring is not required during active operation of the SSDS (if SSDS operation is

necessary), but future soil vapor monitoring can be conducted by the Applicant to demonstrate that the SSDS has achieved the remedial goals and active operation is no longer necessary. Approval will be obtained from NYSDEC and NYSDOH prior to performing any proposed sampling during active operation of the SSDS.

Appendix D and Plate 1 show the on-site soil vapor monitoring point locations.

The sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

3.2.2.1 Soil Vapor Sampling and Analytical Protocol

To sample the soil vapor monitoring points, six-liter SUMMA canisters fitted with eight-hour flow controllers and an in-line filter will be affixed to the soil vapor point tubing. Prior to collection of the samples, the vapor points will be purged of a minimum of one well volume. A tracer gas (i.e., laboratory grade helium) will be used to enrich the atmosphere in the immediate vicinity of the sampling location in order to test the efficacy of the seal and verify that ambient air is not being drawn into the sample. Following purging and verification with the tracer gas, the soil vapor sample will be directed to the laboratory supplied six-liter SUMMA canister. Upon opening the SUMMA canister valve, the vacuum present within the canister will extract the soil vapor from the subsurface into the canister. Based on a volume of six liters and a sample time of eight hours, soil vapor will be extracted at a flow rate of approximately 0.01 liters per minute.

Following collection of the soil vapor samples, the samples will be shipped following proper chain-of-custody procedures to an ELAP-certified laboratory for analysis of VOCs in accordance with EPA Method TO-15.

3.3 Site-Wide Inspection

Site-wide inspections will be performed on a regular schedule at a minimum of once a year. Site-wide inspections will also be performed after all severe weather conditions that may affect Engineering Controls or monitoring devices. During these inspections, an

inspection form will be completed (Appendix H). The site wide inspection form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- The Site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection;
- Compliance with permits and schedules included in the Operation and Maintenance Plan; and
- Confirm that Site records are up to date.

3.4 Monitoring Quality Assurance/Quality Control

All sampling and analyses will be performed in accordance with the requirements of the Quality Assurance Project Plan (QAPP) prepared for the Site (Appendix I). Main Components of the QAPP include:

- QA/QC Objectives for Data Measurement
- Sampling Program:
  - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
  - Sample holding times will be in accordance with the NYSDEC ASP requirements.
  - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody
- Calibration Procedures:
  - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
  - The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.

- Analytical Procedures
- Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.
- Internal QC and Checks
- QA Performance and System Audits
- Preventative Maintenance Procedures and Schedules
- Corrective Action Measures

3.5 Monitoring Reporting Requirements

Forms and any other information generated during regular monitoring events and inspections will be kept on file. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan of this SMP.

All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. A quarterly monitoring report will also be prepared following each sampling event. The report (or letter) will include, at a minimum:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (e.g., groundwater, etc);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;

- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (o be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether groundwater conditions have changed since the last reporting event.

Data will be reported in hard copy or digital format as determined by NYSDEC. A summary of the monitoring program deliverables are summarized below.

Schedule of Monitoring/Inspection Reports

Task	Reporting Frequency*
Groundwater Monitoring	Quarterly

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC

4.0 OPERATION AND MAINTENANCE PLAN

4.1 Introduction

This Operation and Maintenance Plan describes the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site. The only engineering control with any mechanical components is the SSDS, in the event that it is required to operate actively. This Operation and Maintenance Plan:

- Includes the steps necessary to allow individuals unfamiliar with the Site to operate and maintain the SSDS;
- Includes an operation and maintenance contingency plan; and,
- Will be updated periodically to reflect changes in Site conditions or the manner in which the SSDS are operated and maintained.

Information on non-mechanical Engineering Controls (i.e., monitoring wells, vapor barrier) is provided in Section 3 - Engineering and Institutional Control Plan. A copy of this Operation and Maintenance Plan, along with the complete SMP, will be kept at the Site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of the SMP.

4.2 Engineering Control System Operation and Maintenance

An Operations, Maintenance, and Monitoring (OM&M) Manual for the SSDS is provided in Appendix J. The OM&M Manual provides a description of OM&M requirements for:

A. Start-Up Testing;

B. System Operation: Routine Operation Procedures;

C. System Operation: Routine Equipment Maintenance; and

D. System Operation: Non-Routine Equipment Maintenance.

The items discussed in the O&M Manual include:

- Manufacturer's recommendations;
- Manufacturer provided Literature;

- Pre-start up inspection requirements;
- Baseline measurements;
- System Testing methods:
  - Checks for leaks;
  - Checks of seals;
  - Check of backdrafts;
  - Pressure tests;
  - System balancing;
  - Warning devices;
  - Sampling.
- Manufacturer's recommendations;
- Troubleshooting Guide;
- Adjustment and repairs;
- Operation schedule.
- Inspection Procedures;
- Routine maintenance activities and minimum schedules;
- Warning devices;
- Damage Identification;
- Reduced effectiveness monitoring;
- System or component replacement.

The system testing described in Appendix J will be conducted on a monthly basis. If, in the course of the SSDS lifetime, significant changes are made to the system, then the system must be restarted and the OM&M Manual revised accordingly.

4.3 Engineering Control System Performance Monitoring

SSDS performance monitoring is discussed below. The SSDS has been designed and installed to mitigate possible soil vapor intrusion into the building. The SSDS provides a third level of protection in addition to the primary vapor barrier and secondary building heating ventilation and air conditioning (HVAC) system. The SSDS was installed from September 2013 to December 2013 and will be tested and operational in 2014.

4.3.1 Monitoring Schedule

The SSDS monitoring schedule provided in Section 5 of Appendix J (OM&M Manual) includes a description of baseline and monthly monitoring inspection activities. Monthly SSDS performance monitoring tasks will include verification of:

- Blower inlet vacuum;
- Knockout tank inlet vacuum;
- Blower outlet discharge pressure;
- Knockout tank water level (confirm empty);
- Blower effluent PID reading; and
- Sub–slab vacuum monitoring point vacuum readings.

In addition, system startup testing procedures are provided in Section 5.2 of Appendix J. Sub-slab vacuum confirmation readings measured during system startup testing will be provided to NYSDEC and NYSDOH prior to system operation.

Inspection frequency is subject to change with the approval of the NYSDEC. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Monitoring deliverables for the SSDS are specified later in this SMP.

4.3.2 General Equipment Monitoring

A visual inspection of the complete system will be conducted during the monitoring event. SSDS components to be monitored include, but are not limited to, the following:

- Blower inlet vacuum, exit pressure, flow rate, and temperature;
- Moisture separator status;
- General system piping condition; and
- Sub-Slab monitoring point vacuum readings
  - (via micromanometer with accuracy <0.001 inches of water column).

A complete list of components to be checked is provided in the Inspection Checklist, presented in Appendix J. If any equipment readings are not within their typical range, any equipment is observed to be malfunctioning, or the system is not performing within specifications, maintenance and repair as per the Operation and Maintenance Plan are required immediately, and the SSDS restarted.

4.3.3 System Monitoring Devices and Alarms

The SSDS has a warning alarm light to indicate that the system is not operating properly. In the event that the warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSDS restarted. Operational problems will be noted in the subsequent Periodic Review Report.

4.4 Maintenance and performance monitoring Reporting Requirements

Maintenance reports and any other information generated during regular operations at the Site will be kept on-file. All reports, forms, and other relevant information generated will be available upon request to the NYSDEC and submitted as part of the Periodic Review Report, as specified in the Section 5 of this SMP.

4.4.1 Routine Maintenance Reports

Checklists or forms (see Appendices G, H, and J) will be completed during the applicable routine maintenance event. Checklists/forms will include, but not be limited to the following information:

- Date;
- Name, company, and position of person(s) conducting maintenance activities;
- Maintenance activities conducted;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

4.4.2 Non-Routine Maintenance Reports

During each non-routine maintenance event, a form will be completed which will include, but not be limited to, the following information:

- Date;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Presence of leaks;
- Date of leak repair;
- Other repairs or adjustments made to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and,
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

5.0 INSPECTIONS, REPORTING AND CERTIFICATIONS

5.1 Site Inspections

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan and Section 4 Operation and Maintenance Plan of this SMP. At a minimum, a Site-wide inspection will be conducted annually. Inspections of remedial components will also be conducted when a breakdown of any treatment system component has occurred or whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

All inspections and monitoring events will be recorded on the appropriate forms for their respective system which are contained in Appendices G, H and J. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format in the Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

The results of the inspection and Site monitoring data will be evaluated as part of the EC/IC certification to confirm that the:

- EC/ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented;
- Operation and maintenance activities are being conducted properly; and, based on the above items,
- The Site remedy continues to be protective of public health and the environment and is performing as designed in the RAWP and FER.

5.2 Certification of Engineering and Institutional Controls

After the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare the following certification:

For each institutional or engineering control identified for the Site, I certify that all of the following statements are true:

- The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;
- The institutional control and/or engineering control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any Site management plan for this control;
- Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;
- Use of the Site is compliant with the environmental easement;
- The engineering control systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program and generally accepted engineering practices; and
- The information presented in this report is accurate and complete.
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Joshua Levine, P.E., of Remedial Engineering, P.C., located at 209 Shafter Street, Islandia, New York 11749, am certifying as Applicant's Designated Site Representative for the Site.

The signed certification will be included in the Periodic Review Report described below.

5.3 Periodic Review Report

A Periodic Review Report will be submitted to the Department every year, beginning fifteen months after the Certificate of Completion is issued. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix A (Metes and Bounds). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site;
- Results of the required annual Site inspections and severe condition inspections, if applicable;
- All applicable inspection forms and other records generated for the Site during the reporting period in electronic format;
- A summary of any discharge monitoring data and/or information generated during the reporting period with comments and conclusions;
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- A Site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the Site-specific RAWP, ROD or Decision Document;
  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
  - Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;

- Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
- The overall performance and effectiveness of the remedy.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office and Regional Office in which the Site is located, and in electronic format to NYSDEC Central Office, Regional Office and the NYSDOH Bureau of Environmental Exposure Investigation.

5.4 Corrective Measures Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a corrective measures plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the corrective measures plan until it is approved by the NYSDEC.

TABLES

1. Summary of Groundwater Elevations
2. Summary of Volatile Organic Compounds in End Point Soil Samples
3. Summary of Semivolatile Organic Compounds in End Point Soil Samples
4. Summary of Metals in End Point Soil Samples

Table 1. Summary of Groundwater Gauging, June 11, 2013
Site Management, Mid Block #57 Project, New York, New York

Well ID#	Measuring Point Elevation (feet above datum)	Depth to Bottom (feet bmp)	Depth to Water June 11, 2013 (feet bmp)	Groundwater Elevation June 11, 2013 (feet above datum)
MW-2	6.87	NM	NM	NA
MW-2D	NA	NM	NM	NA
MW-3	11.41	23.62	13.30	-1.89
MW-7	23.78	26.16	13.70	10.08
MW-8	12.56	19.13	13.87	-1.31
MW-9	15.46	19.78	16.71	-1.25
MW-10	14.20	20.14	16.54	-2.34
MW-11	17.67	23.36	12.98	4.69

Notes:
bmp - below measuring point
datum - Manhattan datum equal to 2.75 feet above National Geodetic Vertical Datum
NM - Not Measured
NA - Not Available

Table 2. Summary of Volatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-A2 2/15/2013 -13.25	POST EX-A3 2/15/2013 -12.25	POST EX-A4 2/15/2013 -11	POST EX - A5 1/22/2013 -10	POST EX - A6 1/22/2013 -8.5	POST EX-B2 2/15/2013 -12.75
1,1,1-Trichloroethane	680		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
1,1-Dichloroethane	270		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
1,1-Dichloroethene	330		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
1,2,4-Trimethylbenzene	3600		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
1,2-Dichlorobenzene	1100		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
1,2-Dichloroethane	20		1.7 U	1.8 U	1.7 U	1.2 U	1.1 U	1.7 U
1,3,5-Trimethylbenzene	8400		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
1,3-Dichlorobenzene	2400		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
1,4-Dichlorobenzene	1800		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
1,4-Dioxane	100		210 U	220 U	220 U	150 U	140 U	210 U
2-Butanone (MEK)	120		17 U	18 U	17 U	12 U	11 U	17 U
Acetone	50		31.4	35.7	31.4	13.8	16.6	34.4
Benzene	60		1.7 U	1.8 U	1.7 U	1.2 U	1.1 U	1.7 U
Carbon tetrachloride	760		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
Chlorobenzene	1100		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
Chloroform	370		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
cis-1,2-Dichloroethene	250		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
Ethylbenzene	1000		1.7 U	1.8 U	1.7 U	1.2 U	1.1 U	1.7 U
m+p-Xylene	--		1.7 U	1.8 U	1.7 U	1.2 U	1.1 U	1.7 U
Methylene chloride	50		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
MTBE	930		1.7 U	1.8 U	1.7 U	1.2 U	1.1 U	1.7 U
n-Butylbenzene	12000		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
n-Propylbenzene	3900		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
o-Xylene	--		1.7 U	1.8 U	1.7 U	1.2 U	1.1 U	1.7 U
sec-Butylbenzene	11000		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
tert-Butylbenzene	5900		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
Tetrachloroethene	1300		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
Toluene	700		1.7 U	1.8 U	1.7 U	1.2 U	1.1 U	1.7 U
trans-1,2-Dichloroethene	190		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U

Table 2. Summary of Volatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-A2 2/15/2013 -13.25	POST EX-A3 2/15/2013 -12.25	POST EX-A4 2/15/2013 -11	POST EX - A5 1/22/2013 -10	POST EX - A6 1/22/2013 -8.5	POST EX-B2 2/15/2013 -12.75
Trichloroethene	470		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
Vinyl chloride	20		8.5 U	8.8 U	8.7 U	6 U	5.6 U	8.6 U
Xylenes (total)	260		1.7 U	1.8 U	1.7 U	1.2 U	1.1 U	1.7 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards

Table 2. Summary of Volatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-B3 2/15/2013 -11.75	POST EX-B4 2/22/2013 -10.5'	POST EX-B5 2/22/2013 -9.5'	POSTEX-C2 3/13/2013 -13	POSTEX-C3 3/5/2013 -11.25'	POSTEX-C4 3/1/2013 -10'
1,1,1-Trichloroethane	680		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
1,1-Dichloroethane	270		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
1,1-Dichloroethene	330		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
1,2,4-Trimethylbenzene	3600		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
1,2-Dichlorobenzene	1100		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
1,2-Dichloroethane	20		1.7 U	1.6 U	1.5 U	1.5 U	1.8 U	1.6 U
1,3,5-Trimethylbenzene	8400		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
1,3-Dichlorobenzene	2400		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
1,4-Dichlorobenzene	1800		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
1,4-Dioxane	100		210 U	200 U	180 U	180 U	220 U	200 U
2-Butanone (MEK)	120		17 U	16 U	15 U	15 U	18 U	27.2
Acetone	50		34.5	19	18.4	15 U	14.8 J	**115**
Benzene	60		1.7 U	1.6 U	1.5 U	1.5 U	1.8 U	0.78 J
Carbon tetrachloride	760		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
Chlorobenzene	1100		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
Chloroform	370		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
cis-1,2-Dichloroethene	250		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
Ethylbenzene	1000		1.7 U	1.6 U	1.5 U	1.5 U	1.8 U	0.91 J
m+p-Xylene	--		1.7 U	1.6 U	1.5 U	1.5 U	1.8 U	0.43 J
Methylene chloride	50		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
MTBE	930		1.7 U	1.6 U	1.5 U	1.5 U	1.8 U	3.9
n-Butylbenzene	12000		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	0.83 J
n-Propylbenzene	3900		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	5.1 J
o-Xylene	--		1.7 U	1.6 U	1.5 U	1.5 U	1.8 U	1.6 U
sec-Butylbenzene	11000		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	0.73 J
tert-Butylbenzene	5900		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
Tetrachloroethene	1300		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
Toluene	700		1.7 U	1.6 U	0.49 J	1.5 U	1.8 U	0.34 J
trans-1,2-Dichloroethene	190		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U

Table 2. Summary of Volatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-B3 2/15/2013 -11.75	POST EX-B4 2/22/2013 -10.5'	POST EX-B5 2/22/2013 -9.5'	POSTEX-C2 3/13/2013 -13	POSTEX-C3 3/5/2013 -11.25'	POSTEX-C4 3/1/2013 -10'
Trichloroethene	470		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
Vinyl chloride	20		8.5 U	8.1 U	7.3 U	7.3 U	8.9 U	7.9 U
Xylenes (total)	260		1.7 U	1.6 U	1.5 U	1.5 U	1.8 U	0.43 J

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards

Table 2. Summary of Volatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POSTEX-C4 3/5/2013 -12'	POSTEX-D3 3/5/2013 -10.75'	POSTEX-D3 DUP 3/5/2013 -10.75'	POST EX-D4 2/1/2013 -9.5	POST EX-D5 2/1/2013 -8.5	POSTEX-C5 3/1/2013 -9'
1,1,1-Trichloroethane	680		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
1,1-Dichloroethane	270		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
1,1-Dichloroethene	330		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
1,2,4-Trimethylbenzene	3600		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
1,2-Dichlorobenzene	1100		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
1,2-Dichloroethane	20		1.2 U	1.7 U	1.7 U	1.7 U	1.3 U	1.3 U
1,3,5-Trimethylbenzene	8400		0.41 J	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
1,3-Dichlorobenzene	2400		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
1,4-Dichlorobenzene	1800		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
1,4-Dioxane	100		150 U	210 U	210 U	210 U	170 U	170 U
2-Butanone (MEK)	120		12 U	17 U	17 U	17 U	13 U	13 U
Acetone	50		12 U	22.2	21.5	17 U	13 U	19.5
Benzene	60		1.2 U	1.7 U	1.7 U	1.7 U	1.3 U	1.3 U
Carbon tetrachloride	760		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
Chlorobenzene	1100		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
Chloroform	370		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
cis-1,2-Dichloroethene	250		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
Ethylbenzene	1000		0.44 J	1.7 U	1.7 U	1.7 U	1.3 U	1.3 U
m+p-Xylene	--		1.2 U	1.7 U	1.7 U	1.7 U	1.3 U	1.3 U
Methylene chloride	50		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
MTBE	930		1.2 U	1.7 U	1.7 U	4.8	1.3 U	1.3 U
n-Butylbenzene	12000		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
n-Propylbenzene	3900		0.5 J	8.5 U	8.6 U	8.3 U	6.7 U	0.48 J
o-Xylene	--		1.2 U	1.7 U	1.7 U	1.7 U	1.3 U	1.3 U
sec-Butylbenzene	11000		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
tert-Butylbenzene	5900		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
Tetrachloroethene	1300		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
Toluene	700		1.2 U	1.7 U	1.7 U	1.7 U	1.3 U	1.3 U
trans-1,2-Dichloroethene	190		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U

Table 2. Summary of Volatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POSTEX-C4 3/5/2013 -12'	POSTEX-D3 3/5/2013 -10.75'	POSTEX-D3 DUP 3/5/2013 -10.75'	POST EX-D4 2/1/2013 -9.5	POST EX-D5 2/1/2013 -8.5	POSTEX-C5 3/1/2013 -9'
Trichloroethene	470		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
Vinyl chloride	20		6.2 U	8.5 U	8.6 U	8.3 U	6.7 U	6.6 U
Xylenes (total)	260		1.2 U	1.7 U	1.7 U	1.7 U	1.3 U	1.3 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards

Table 2. Summary of Volatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-D2 4/5/2013 -12'
1,1,1-Trichloroethane	680		8.2 U
1,1-Dichloroethane	270		8.2 U
1,1-Dichloroethene	330		8.2 U
1,2,4-Trimethylbenzene	3600		8.2 U
1,2-Dichlorobenzene	1100		8.2 U
1,2-Dichloroethane	20		1.6 U
1,3,5-Trimethylbenzene	8400		8.2 U
1,3-Dichlorobenzene	2400		8.2 U
1,4-Dichlorobenzene	1800		8.2 U
1,4-Dioxane	100		210 U
2-Butanone (MEK)	120		16 U
Acetone	50		19.3
Benzene	60		1.6 U
Carbon tetrachloride	760		8.2 U
Chlorobenzene	1100		8.2 U
Chloroform	370		8.2 U
cis-1,2-Dichloroethene	250		8.2 U
Ethylbenzene	1000		1.6 U
m+p-Xylene	--		1.1 J
Methylene chloride	50		4.7 J
MTBE	930		0.45 J
n-Butylbenzene	12000		8.2 U
n-Propylbenzene	3900		8.2 U
o-Xylene	--		0.44 J
sec-Butylbenzene	11000		8.2 U
tert-Butylbenzene	5900		8.2 U
Tetrachloroethene	1300		8.2 U
Toluene	700		1.6 U
trans-1,2-Dichloroethene	190		8.2 U

Table 2. Summary of Volatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-D2 4/5/2013 -12'
Trichloroethene	470		8.2 U
Vinyl chloride	20		8.2 U
Xylenes (total)	260		1.6

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards

Table 3. Summary of Semivolatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-A2 2/15/2013 -13.25	POST EX-A3 2/15/2013 -12.25	POST EX-A4 2/15/2013 -11	POST EX - A5 1/22/2013 -10	POST EX - A6 1/22/2013 -8.5	POST EX-B2 2/15/2013 -12.75
2-Methylphenol	330		86 U	89 U	88 U	78 U	75 U	88 U
3&4-Methylphenol	--		86 U	89 U	88 U	78 U	75 U	88 U
Acenaphthene	20000		43 U	45 U	44 U	39 U	37 U	44 U
Acenaphthylene	100000		43 U	45 U	44 U	39 U	37 U	44 U
Anthracene	100000		43 U	45 U	44 U	39 U	37 U	44 U
Benzo[a]anthracene	1000		43 U	45 U	44 U	39 U	37 U	44 U
Benzo[a]pyrene	1000		43 U	45 U	44 U	39 U	37 U	44 U
Benzo[b]fluoranthene	1000		43 U	45 U	44 U	39 U	37 U	44 U
Benzo[g,h,i]perylene	100000		43 U	45 U	44 U	39 U	37 U	44 U
Benzo[k]fluoranthene	800		43 U	45 U	44 U	39 U	37 U	44 U
Chrysene	1000		43 U	45 U	44 U	39 U	37 U	44 U
Dibenzo[a,h]anthracene	330		43 U	45 U	44 U	39 U	37 U	44 U
Dibenzofuran	7000		86 U	89 U	88 U	78 U	75 U	88 U
Fluoranthene	100000		43 U	45 U	44 U	39 U	37 U	44 U
Fluorene	30000		43 U	45 U	44 U	39 U	37 U	44 U
Hexachlorobenzene	330		86 U	89 U	88 U	78 U	75 U	88 U
Indeno[1,2,3-cd]pyrene	500		43 U	45 U	44 U	39 U	37 U	44 U
Naphthalene	12000		43 U	45 U	44 U	39 U	37 U	44 U
Pentachlorophenol	800		430 U	450 U	440 U	390 U	370 U	440 U
Phenanthrene	100000		43 U	45 U	44 U	39 U	37 U	44 U
Phenol	330		86 U	89 U	88 U	78 U	75 U	88 U
Pyrene	100000		43 U	45 U	44 U	39 U	37 U	44 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
Bold data indicates that parameter was detected above the NYSDEC
Part 375 Unrestricted Use Standards

Table 3. Summary of Semivolatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-B3 2/15/2013 -11.75	POST EX-B4 2/22/2013 -10.5'	POST EX-B5 2/22/2013 -9.5'	POSTEX-C2 3/13/2013 -13	POSTEX-C3 3/5/2013 -11.25'	POSTEX-C4 3/1/2013 -10'
2-Methylphenol	330		87 U	98 U	98 U	86 U	87 U	94 U
3&4-Methylphenol	--		87 U	98 U	98 U	86 U	87 U	94 U
Acenaphthene	20000		44 U	49 U	49 U	43 U	43 U	47 U
Acenaphthylene	100000		44 U	49 U	49 U	43 U	43 U	47 U
Anthracene	100000		44 U	49 U	49 U	43 U	43 U	47 U
Benzo[a]anthracene	1000		44 U	49 U	49 U	43 U	43 U	47 U
Benzo[a]pyrene	1000		44 U	49 U	49 U	43 U	43 U	47 U
Benzo[b]fluoranthene	1000		44 U	49 U	49 U	43 U	43 U	47 U
Benzo[g,h,i]perylene	100000		44 U	49 U	49 U	43 U	43 U	47 U
Benzo[k]fluoranthene	800		44 U	49 U	49 U	43 U	43 U	47 U
Chrysene	1000		44 U	49 U	49 U	43 U	43 U	47 U
Dibenzo[a,h]anthracene	330		44 U	49 U	49 U	43 U	43 U	47 U
Dibenzofuran	7000		87 U	98 U	98 U	86 U	87 U	94 U
Fluoranthene	100000		44 U	49 U	49 U	28.5 J	43 U	47 U
Fluorene	30000		44 U	49 U	49 U	43 U	43 U	47 U
Hexachlorobenzene	330		87 U	98 U	98 U	86 U	87 U	94 U
Indeno[1,2,3-cd]pyrene	500		44 U	49 U	49 U	43 U	43 U	47 U
Naphthalene	12000		44 U	49 U	49 U	43 U	43 U	56.2
Pentachlorophenol	800		440 U	490 U	490 U	430 U	430 U	470 U
Phenanthrene	100000		44 U	49 U	49 U	39.6 J	43 U	47 U
Phenol	330		87 U	98 U	98 U	86 U	87 U	94 U
Pyrene	100000		44 U	49 U	49 U	23 J	43 U	47 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
Bold data indicates that parameter was detected above the NYSDEC
Part 375 Unrestricted Use Standards

Table 3. Summary of Semivolatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:**	POSTEX-C4	POSTEX-D3	POSTEX-D3 DUP	POST EX-D4	POST EX-D5	POSTEX-C5
		Sample Date:	3/5/2013	3/5/2013	3/5/2013	2/1/2013	2/1/2013	3/1/2013
		Sample Elevation (ft)	-12'	-10.75'	-10.75'	-9.5	-8.5	-9'
2-Methylphenol	330		64 U	88 U	87 U	85 U	68 U	75 U
3&4-Methylphenol	--		64 U	88 U	87 U	85 U	68 U	75 U
Acenaphthene	20000		32 U	44 U	44 U	42 U	34 U	38 U
Acenaphthylene	100000		32 U	44 U	44 U	42 U	34 U	38 U
Anthracene	100000		32 U	44 U	44 U	42 U	34 U	38 U
Benzo[a]anthracene	1000		32 U	44 U	44 U	42 U	34 U	39.6
Benzo[a]pyrene	1000		32 U	44 U	44 U	42 U	34 U	38.3
Benzo[b]fluoranthene	1000		32 U	44 U	44 U	42 U	34 U	27.5 J
Benzo[g,h,i]perylene	100000		32 U	44 U	44 U	42 U	34 U	21.1 J
Benzo[k]fluoranthene	800		32 U	44 U	44 U	42 U	34 U	27.8 J
Chrysene	1000		32 U	44 U	44 U	42 U	34 U	37 J
Dibenzo[a,h]anthracene	330		32 U	44 U	44 U	42 U	34 U	38 U
Dibenzofuran	7000		64 U	88 U	87 U	85 U	68 U	75 U
Fluoranthene	100000		32 U	44 U	44 U	42 U	34 U	77
Fluorene	30000		32 U	44 U	44 U	42 U	34 U	38 U
Hexachlorobenzene	330		64 U	88 U	87 U	85 U	68 U	75 U
Indeno[1,2,3-cd]pyrene	500		32 U	44 U	44 U	42 U	34 U	20.9 J
Naphthalene	12000		32 U	44 U	44 U	42 U	34 U	38 U
Pentachlorophenol	800		320 U	440 U	440 U	420 U	340 U	380 U
Phenanthrene	100000		32 U	44 U	44 U	42 U	34 U	35.4 J
Phenol	330		64 U	88 U	87 U	85 U	68 U	75 U
Pyrene	100000		32 U	44 U	44 U	42 U	34 U	70.1

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
Bold data indicates that parameter was detected above the NYSDEC
Part 375 Unrestricted Use Standards

Table 3. Summary of Semivolatile Organic Compounds in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-D2 4/5/2013 -12'
2-Methylphenol	330		98 U
3&4-Methylphenol	--		98 U
Acenaphthene	20000		49 U
Acenaphthylene	100000		49 U
Anthracene	100000		49 U
Benzo[a]anthracene	1000		49 U
Benzo[a]pyrene	1000		49 U
Benzo[b]fluoranthene	1000		49 U
Benzo[g,h,i]perylene	100000		49 U
Benzo[k]fluoranthene	800		49 U
Chrysene	1000		49 U
Dibenzo[a,h]anthracene	330		49 U
Dibenzofuran	7000		98 U
Fluoranthene	100000		49 U
Fluorene	30000		49 U
Hexachlorobenzene	330		98 U
Indeno[1,2,3-cd]pyrene	500		49 U
Naphthalene	12000		49 U
Pentachlorophenol	800		490 U
Phenanthrene	100000		49 U
Phenol	330		98 U
Pyrene	100000		49 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards

Table 4. Summary of Metals in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in mg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-A2 2/15/2013 -13.25'	POST EX-A3 2/15/2013 -12.25'	POST EX-A4 2/15/2013 -11'	POST EX - A5 1/22/2013 -10'	POST EX - A6 1/22/2013 -8.5'	POST EX-A6 2/1/2013 -8.5'
Aluminum	--		15200	15400	14600	3950	9250	NA
Antimony	--		2.9 U	3.2 U	3.2 U	2.5 U	2.3 U	NA
Arsenic	13		9.3	11.8	8.9	3.8	4.1	NA
Barium	350		38.4	38.6	39.1	25 U	67.3	NA
Beryllium	7.2		0.79	0.82	0.76	0.25 U	0.72	NA
Cadmium	2.5		0.72 U	0.8 U	0.79 U	0.62 U	0.58 U	NA
Calcium	--		3010	3020	4090	1930	948	NA
Chromium, Hexavalent	1		0.61 U	0.63 U	0.63 U	0.48 U	**2.4**	0.6
Chromium, Trivalent	30		NA	NA	NA	7.8	18.9	NA
Chromium	30		27.7	29.7	27.6	7.8	21.3	NA
Cobalt	--		9.1	9.2	9.2	6.2 U	6.2	NA
Copper	50		11.8	12	11.7	4.3	12.2	NA
Cyanide, Free	27		0.36 U	0.37 U	0.38 U	0.26 U	0.28 U	NA
Iron	--		28200	29800	26900	10900	12000	NA
Lead	63		10.7	10.8	10.8	4.4	11.5	NA
Magnesium	--		6860	6920	6440	1390	2400	NA
Manganese	1600		593	586	554	180	87.6	NA
Mercury	0.18		0.05 U	0.051 U	0.051 U	0.035 U	0.035 U	NA
Nickel	30		22.5	22.9	22.8	6.7	13.4	NA
Potassium	--		3530	3650	3340	1200 U	1260	NA
Selenium	3.9		2.9 U	3.2 U	3.2 U	2.5 U	2.3 U	NA
Silver	2		0.72 U	0.8 U	0.79 U	0.62 U	0.58 U	NA
Sodium	--		1980	1740	1600 U	1200 U	1200 U	NA
Thallium	--		1.4 U	1.6 U	1.6 U	1.2 U	1.2 U	NA
Vanadium	--		31.6	33	31.6	12.8	27.6	NA
Zinc	109		63.8	64.3	62.7	17.5	31.3	NA

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
mg/kg - Milligrams per kilogram
ft bls - Feet below land surface
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards
NA - Not analyzed by laboratory

Table 4. Summary of Metals in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in mg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** / **Sample Date:** / **Sample Elevation (ft)**	POST EX-B2 2/15/2013 -12.75'	POST EX-B3 2/15/2013 -11.75'	POST EX-B4 2/22/2013 -10.5'	POST EX-B4 2/22/2013 -10.5'	POST EX-B5 2/22/2013 -9.5'	POST EX-B5 2/22/2013 -9.5'
Aluminum	--		14500	14600	16300	NA	15200	NA
Antimony	--		3.1 U	3.2 U	3.1 U	NA	2.9 U	NA
Arsenic	13		9.4	9	8.3	NA	8.4	NA
Barium	350		34.3	34.1	50.6	NA	46.8	NA
Beryllium	7.2		0.78	0.79	0.9	NA	0.83	NA
Cadmium	2.5		0.77 U	0.79 U	0.77 U	NA	0.72 U	NA
Calcium	--		2960	4120	3800	NA	4360	NA
Chromium, Hexavalent	1		0.62 U	0.61 U	0.61 U	0.61 U	**1.2**	0.6 U
Chromium, Trivalent	30		NA	NA	NA	NA	NA	NA
Chromium	30		26.9	28.1	28.3	NA	25.8	NA
Cobalt	--		9.7	9.3	9.5	NA	8.7	NA
Copper	50		12.7	11.9	14.2	NA	12.1	NA
Cyanide, Free	27		0.37 U	0.37 U	0.32 U	NA	0.33 U	NA
Iron	--		28600	27700	28300	NA	26500	NA
Lead	63		11.4	11	12.6	NA	11.2	NA
Magnesium	--		6790	6930	6570	NA	6070	NA
Manganese	1600		653	591	607	NA	565	NA
Mercury	0.18		0.049 U	0.05 U	0.05 U	NA	0.048 U	NA
Nickel	30		23.5	23	23.6	NA	21.7	NA
Potassium	--		3130	3300	3640	NA	3390	NA
Selenium	3.9		3.1 U	3.2 U	3.1 U	NA	2.9 U	NA
Silver	2		0.77 U	0.79 U	0.77 U	NA	0.72 U	NA
Sodium	--		1900	1860	1500 U	NA	1400 U	NA
Thallium	--		1.5 U	1.6 U	1.5 U	NA	1.4 U	NA
Vanadium	--		30.4	31.1	35.7	NA	32.6	NA
Zinc	109		67.3	64.3	66.1	NA	60.6	NA

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
mg/kg - Milligrams per kilogram
ft bls - Feet below land surface
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards
NA - Not analyzed by laboratory

Table 4. Summary of Metals in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in mg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** / **Sample Date:** / **Sample Elevation (ft)**	POSTEX-C2 3/13/2013 -13	POSTEX-C3 3/5/2013 -11.25'	POSTEX-C4 3/1/2013 -10'	POSTEX-C4 3/1/2013 -10'	POSTEX-C4 3/5/2013 -12'	POSTEX-D3 3/5/2013 -10.75'
Aluminum	--		16800	NA	13900	NA	NA	NA
Antimony	--		2.9 U	NA	2.8 U	NA	NA	NA
Arsenic	13		9.9	9.1	8.7	NA	2.2 U	10.9
Barium	350		42.9	44.2	46.4	NA	43.2	44.7
Beryllium	7.2		1.1	0.73	1.3	NA	0.28	0.75
Cadmium	2.5		0.73 U	0.75 U	0.71 U	NA	0.54 U	0.75 U
Calcium	--		2730	NA	2940	NA	NA	NA
Chromium, Hexavalent	1		0.6 U	0.62 U	0.57 U	0.57 U	0.46 U	0.63 U
Chromium, Trivalent	30		NA	28.9	NA	NA	15	28.9
Chromium	30		29.7	28.9	25.4	NA	15.2	28.9
Cobalt	--		10.5	NA	9	NA	NA	NA
Copper	50		13.1	14	19.5	NA	14.1	14.3
Cyanide, Free	27		0.33 U	1.4 U	0.32 U	NA	0.27 U	0.33 U
Iron	--		29400	NA	26100	NA	NA	NA
Lead	63		12.6	12.7	28.6	NA	6.5	12.4
Magnesium	--		7260	NA	6200	NA	NA	NA
Manganese	1600		706	521	519	NA	126	585
Mercury	0.18		0.048 U	0.045 U	**0.34**	NA	0.035 U	0.051 U
Nickel	30		25.2	24.3	22.4	NA	9.8	24.4
Potassium	--		3810	NA	3050	NA	NA	NA
Selenium	3.9		2.9 U	3 U	2.8 U	NA	2.2 U	3 U
Silver	2		0.73 U	0.75 U	0.71 U	NA	0.54 U	0.75 U
Sodium	--		1710	NA	1400 U	NA	NA	NA
Thallium	--		1.5 U	NA	1.4 U	NA	NA	NA
Vanadium	--		35.4	NA	31.1	NA	NA	NA
Zinc	109		71.5	66.4	71.4	NA	20	68

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ft bls - Feet below land surface
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NA - Not analyzed by laboratory

Table 4. Summary of Metals in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in mg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POSTEX-D3 DUP 3/5/2013 -10.75'	POST EX-D4 2/1/2013 -9.5'	POST EX-D5 2/1/2013 -8.5	POST EX-D5 2/7/2013 -10.5'	POSTEX-C5 3/1/2013 -9'	POSTEX-C5 3/1/2013 -9'
Aluminum	--		NA	15400	13300	NA	3910	NA
Antimony	--		NA	2.9 U	2.4 U	NA	2.4 U	NA
Arsenic	13		9.6	9.6	2.7	NA	2.4	NA
Barium	350		66.1	52.7	39.5	NA	24 U	NA
Beryllium	7.2		0.77	1.1	0.76	NA	0.7	NA
Cadmium	2.5		0.75 U	0.73 U	0.59 U	NA	0.6 U	NA
Calcium	--		NA	3340	1550	NA	1330	NA
Chromium, Hexavalent	1		0.62 U	0.6 U	0.48 U	NA	0.48 U	0.48 U
Chromium, Trivalent	30		28.8	NA	NA	NA	NA	NA
Chromium	30		28.8	28.2	**34.5**	15.9	7.2	NA
Cobalt	--		NA	9.5	5.9 U	NA	6 U	NA
Copper	50		15.8	11.8	15.3	NA	3.7	NA
Cyanide, Free	27		0.32 U	0.36 U	0.24 U	NA	0.27 U	NA
Iron	--		NA	29100	20000	NA	7610	NA
Lead	63		20	11.7	8.5	NA	5.4	NA
Magnesium	--		NA	6210	2170	NA	1460	NA
Manganese	1600		610	682	70	NA	150	NA
Mercury	0.18		0.045 U	0.047 U	0.035 U	NA	0.036 U	NA
Nickel	30		25	23.1	11.1	NA	5.6	NA
Potassium	--		NA	3360	2570	NA	1200 U	NA
Selenium	3.9		3 U	2.9 U	2.4 U	NA	2.4 U	NA
Silver	2		0.75 U	0.73 U	0.59 U	NA	0.6 U	NA
Sodium	--		NA	1500 U	1200 U	NA	1200 U	NA
Thallium	--		NA	1.5 U	1.2 U	NA	1.2 U	NA
Vanadium	--		NA	32.2	31.2	NA	9.2	NA
Zinc	109		72.4	66.1	25.2	NA	18.3	NA

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
mg/kg - Milligrams per kilogram
ft bls - Feet below land surface
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards
NA - Not analyzed by laboratory

Table 4. Summary of Metals in End Point Soil Samples, Mid Block #57 Project, Final Engineering Report
615-647 West 57th Street, New York, New York

Parameter (Concentrations in mg/kg)	NYSDEC Part 375 Unrestricted Use	**Sample Designation:** **Sample Date:** **Sample Elevation (ft)**	POST EX-D2 4/5/2013 -12'
Aluminum	--		15200
Antimony	--		2.9 U
Arsenic	13		10.5
Barium	350		38
Beryllium	7.2		0.75
Cadmium	2.5		0.72 U
Calcium	--		7900
Chromium, Hexavalent	1		0.63
Chromium, Trivalent	30		NA
Chromium	30		27.2
Cobalt	--		9.9
Copper	50		12.7
Cyanide, Free	27		0.3 U
Iron	--		28400
Lead	63		11
Magnesium	--		6640
Manganese	1600		903
Mercury	0.18		0.048 U
Nickel	30		23.3
Potassium	--		3370
Selenium	3.9		2.9 U
Silver	2		0.72 U
Sodium	--		2090
Thallium	--		1.4 U
Vanadium	--		32.9
Zinc	109		66.4

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
mg/kg - Milligrams per kilogram
ft bls - Feet below land surface
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards
NA - Not analyzed by laboratory

FIGURES

1. Site Location Map
2. Site Plan
3. Groundwater Elevation Contour Map
4. Generalized Geologic Cross Section
5. Proposed Remediation (Prior to Remedial Work)
6. Post Excavation End Point Sampling Locations
7. Final Excavation Elevations
8. Post-remediation Monitoring Wells

N

Title:

SITE LOCATION MAP

MID BLOCK #57 PROJECT

Prepared for:

DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: J.L.	Date: 16JUL13	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	1
Project Mgr.: J.L.	Project No.: 1338.0003Y002	
File: 1338.0003Y206.01.CDR		

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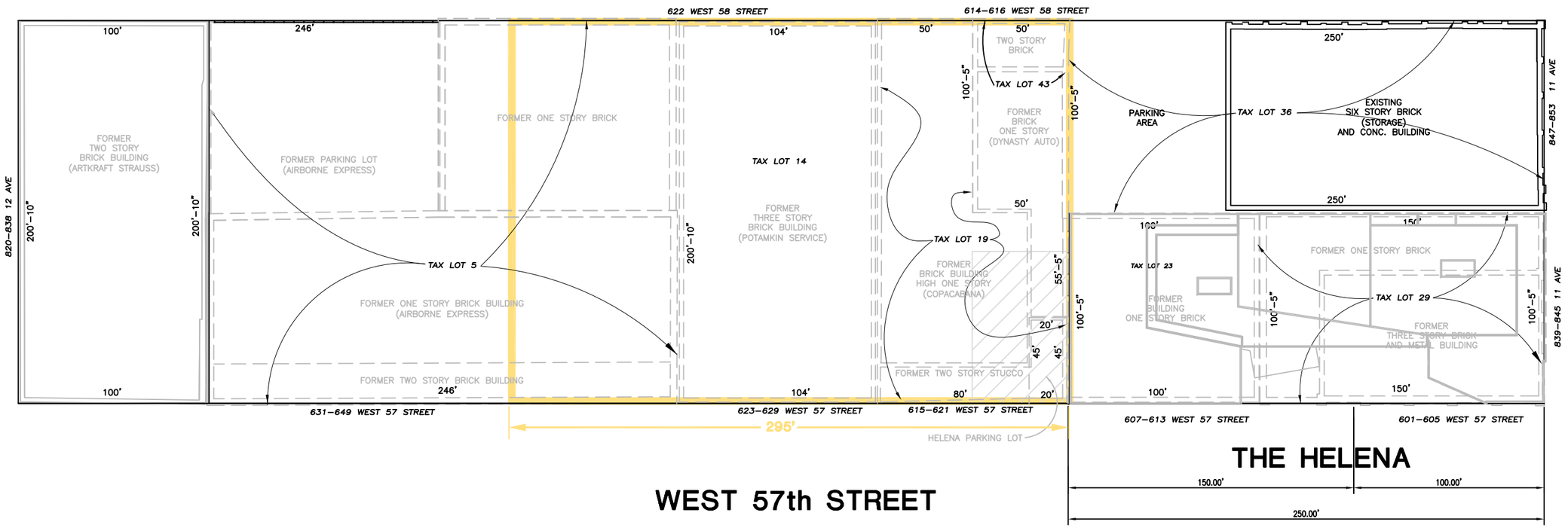
N

WEST 58th STREET

12th AVENUE

11th AVENUE



WEST 57th STREET

BLOCK 1105

LEGEND

LIMITS OF MID BLOCK #57 PROJECT

60' 0 60'

Title:

SITE PLAN

MID BLOCK #57 PROJECT

Prepared For:

DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting and Management

Compiled by: J.L.	Date: 25JUL13	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	2
Project Mgr: J.L.	Project: 1338.0003Y002	
File: 1338.0003Y206.02.DWG		

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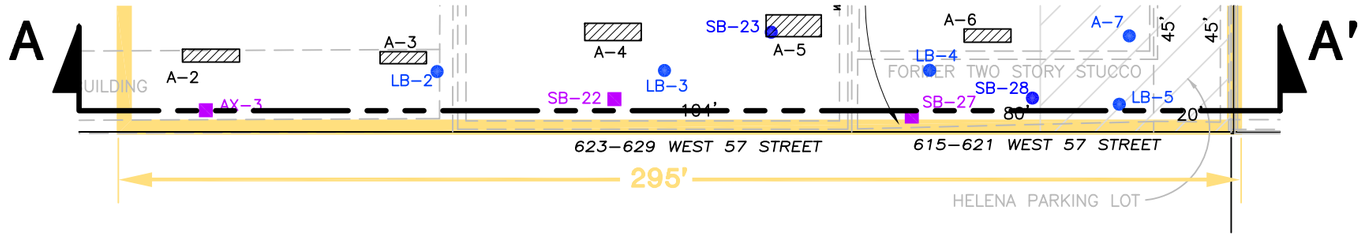

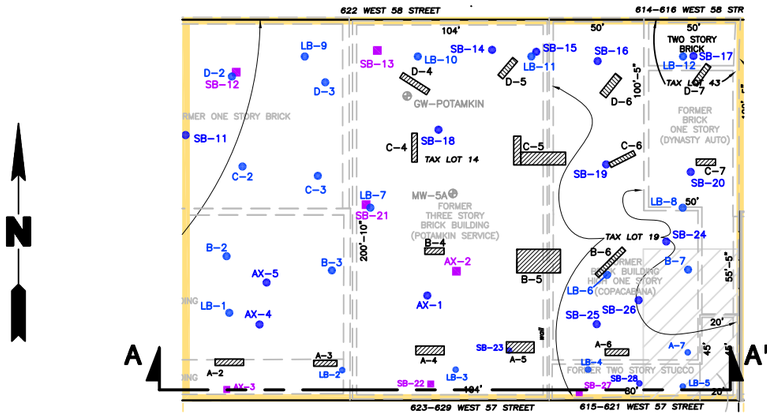

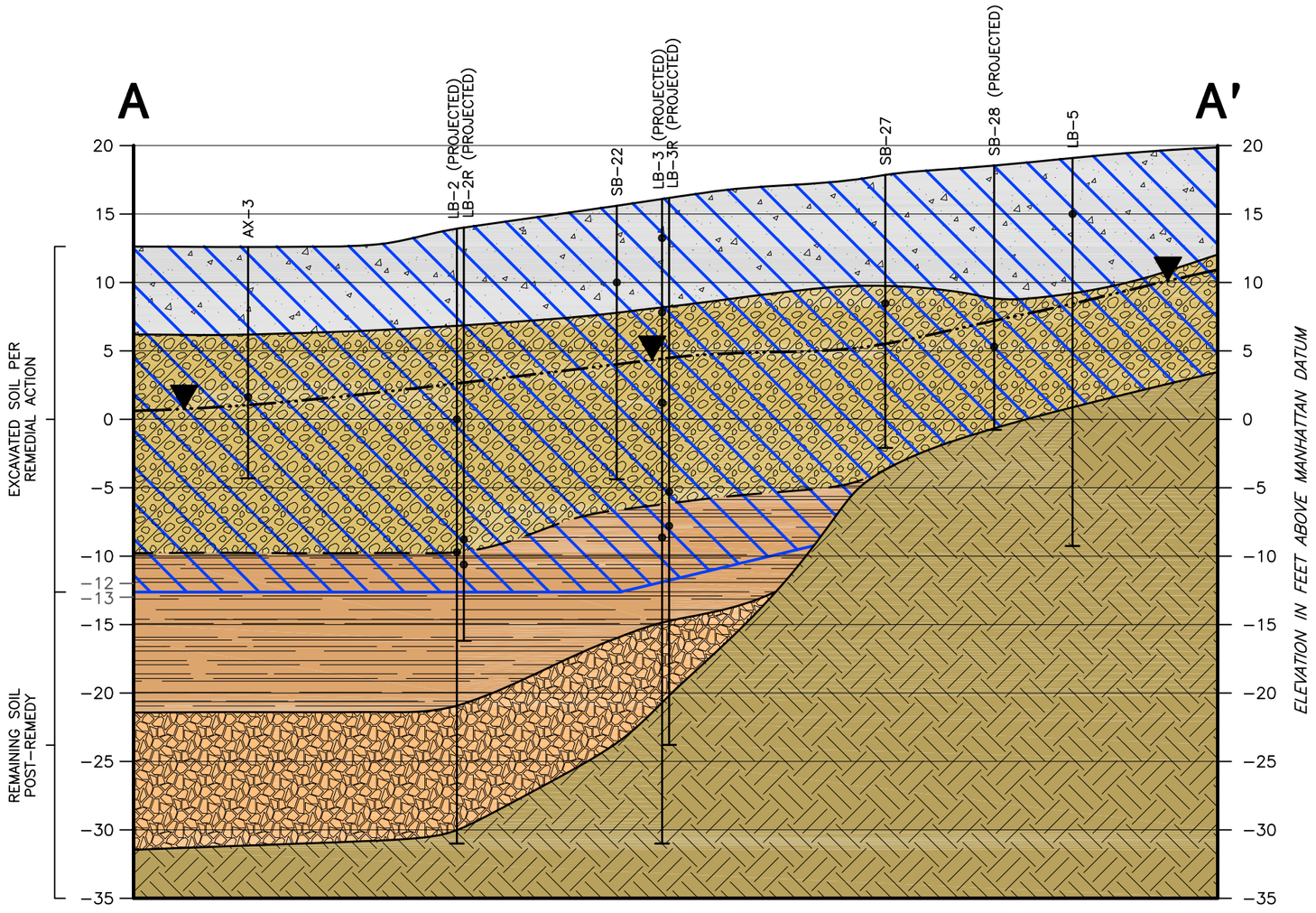

LEGEND

- LIMITS OF MID BLOCK #57 PROJECT
- TEST PIT LOCATION
- SB–10 ■ LOCATION AND DESIGNATION OF SOIL BORING, GROUNDWATER AND SOIL SAMPLE
- AX–7 ● LOCATION AND DESIGNATION OF SOIL BORING (SOIL SAMPLE ONLY)
- FILL MATERIAL: FINE TO MEDIUM SAND WITH BRICK, DECOMPOSED ASPHALT AND CONCRETE DEBRIS
- PETROLEUM IMPACTED BROWN/GRAY FINE TO COARSE SAND AND AND GRAVEL WITH DEBRIS (DASHED WHERE INFERRED)
- BROWN/GRAY SILTY CLAY
- BEDROCK: MEDIUM HARD TO HARD GRAY MICA SCHIST, GRANITE AND GNEISS
- BROWN FINE TO COARSE SAND WITH GRAVEL
- REMEDIAL ACTION EXCAVATION 2012–2013
- WATER TABLE ELEVATION (ESTIMATED FROM VARIOUS SOIL BORINGS 2007–2009)
- SB–27 — SOIL BORING ID
- SOIL SAMPLE COLLECTED
- BOTTOM OF BORING

10'
5'
0
0
40'

Title:
GENERALIZED GEOLOGIC CROSS SECTION

MID BLOCK #57 PROJECT

Prepared For:
DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting and Management

Compiled by: J.L.	Date: 25JUL13	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	
Project Mgr: J.L.	Project: 1338.0003Y002	3
File: 1338.0003Y206.04.DWG		

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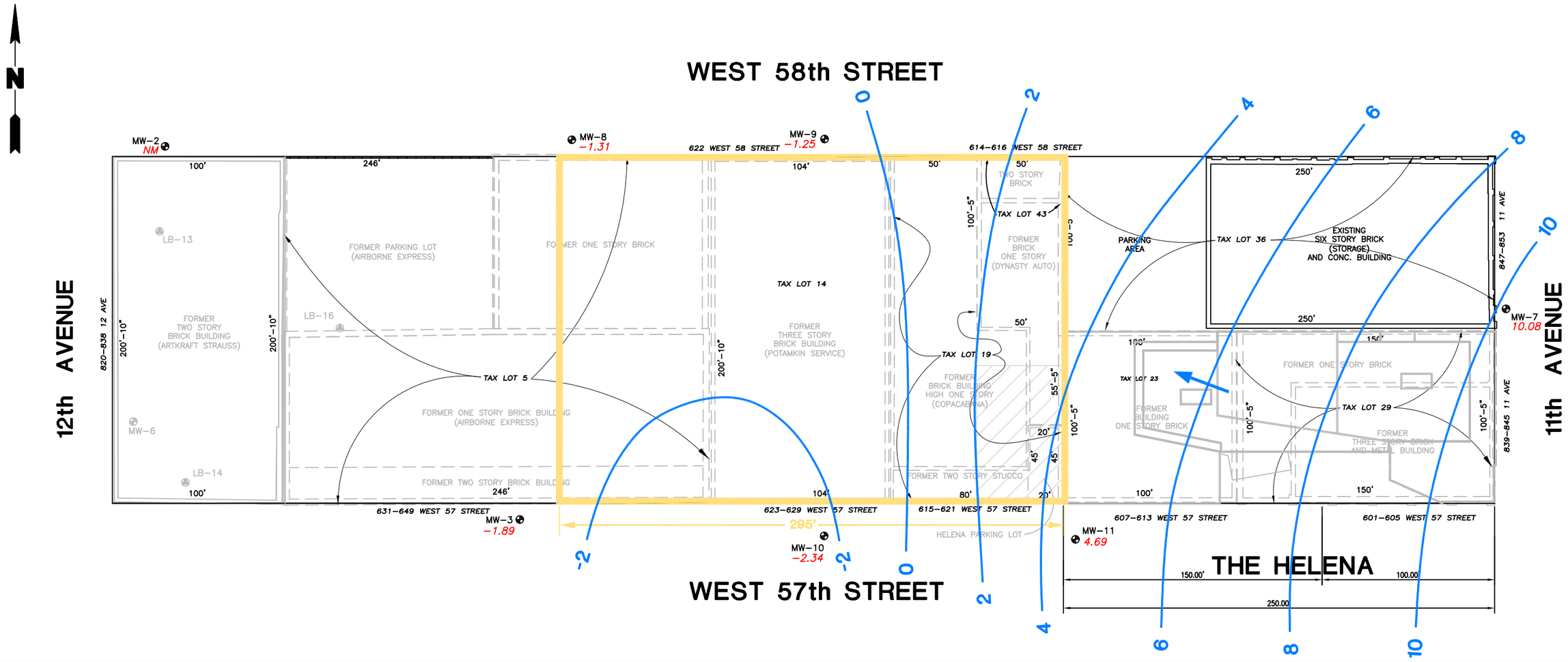

BLOCK 1105

LEGEND

- LIMITS OF MID BLOCK #57 PROJECT
- LB-13 — LOCATION AND DESIGNATION OF MONITORING WELL INSTALLED IN JULY 2010
- MW-3 — LOCATION AND DESIGNATION OF EXISTING MONITORING WELL
- MW-6 — LOCATION AND DESIGNATION OF FORMER MONITORING WELL (DESTROYED DURING FEBRUARY 2011 ARTKRAFT DEMOLITION.
- 4.69 — WATER-LEVEL ELEVATION (FEET RELATIVE TO MANHATTAN DATUM)
- 6 — LINE OF EQUAL WATER-LEVEL ELEVATION. DASHED WHERE INFERRED (FEET RELATIVE TO MANHATTAN DATUM)
- ESTIMATED DIRECTION OF GROUNDWATER FLOW

NOTES

1. MANHATTAN DATUM IS 2.75 FEET ABOVE NATIONAL GEODETIC VERTICAL DATUM.
2. MONITORING POINT ELEVATIONS WERE SURVEYED ON AUGUST 10, 2010 BY MONTROSE SURVEYING LLP.
3. MW-2 WAS INACCESSIBLE AND COULD NOT BE GAUGED.
4. JUNE 2013 GROUNDWATER CONTOURS REFLECT ACTIVE PUMPING CONDITIONS DURING CONSTRUCTION DEWATERING FROM PERIMETER WELLPOINTS LOCATED MIDBLOCK ALONG 57TH STREET AND 58TH STREET SIDEWALKS.

60' 0 60'

Title:

GROUNDWATER ELEVATION CONTOUR MAP JUNE 2013

MID BLOCK #57 PROJECT

Prepared For:

DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting and Management

Compiled by: J.C.	Date: 25JUL13	FIGURE 4
Prepared by: J.A.D.	Scale: AS SHOWN	
Project Mgr: J.L.	Project: 1338.0003Y002	
File: 1338.0003Y206.03.DWG		

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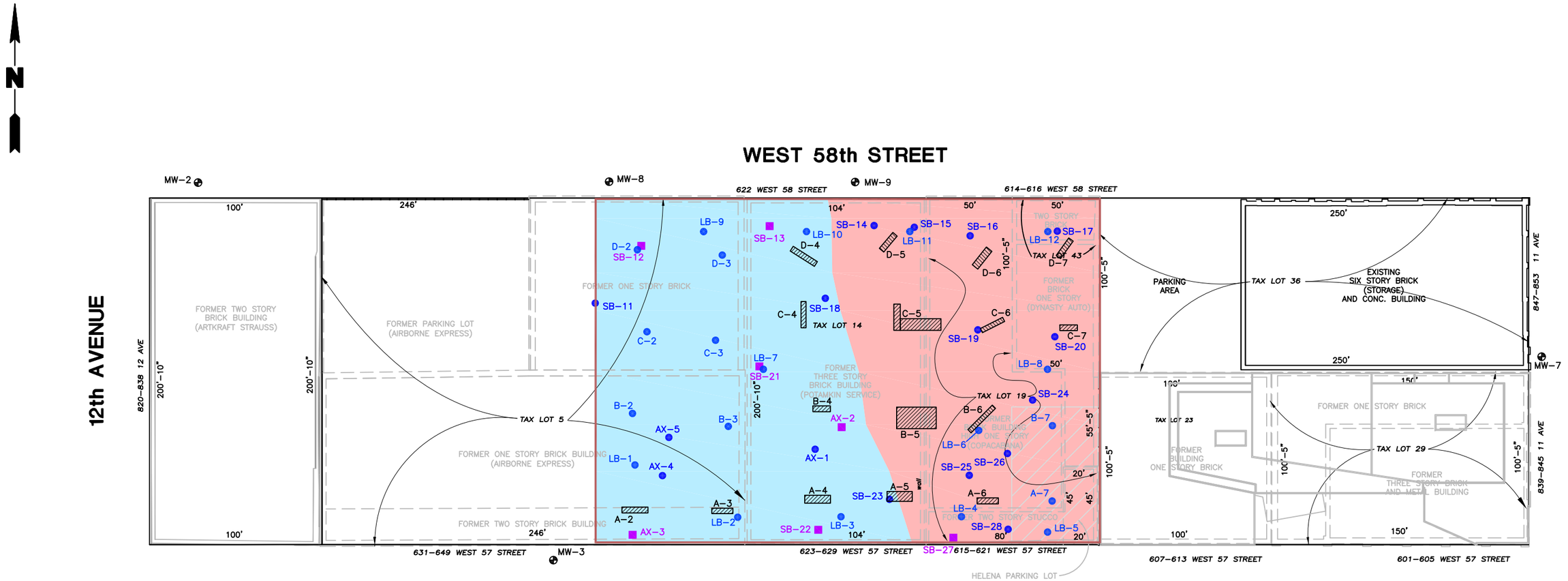

LEGEND

- LIMITS OF MID BLOCK #57 PROJECT
- EXCAVATION TO 25 FEET BELOW LAND SURFACE
- EXCAVATION TO BEDROCK
- TEST PIT LOCATION
- SB-10 ■ LOCATION AND DESIGNATION OF SOIL BORING GROUNDWATER AND SOIL SAMPLE)
- AX-7 ● LOCATION AND DESIGNATION OF SOIL BORING (SOIL SAMPLE ONLY)
- MW-3 ◓ LOCATION AND DESIGNATION OF EXISTING MONITORING WELL

NOTE

1. REMEDIAL ALTERNATIVE 1 INCLUDES EXCAVATION AND OFFSITE DISPOSAL OF ALL ON-SITE SOILS FROM LAND SURFACE TO 25 FEET BELOW LAND SURFACE OR BEDROCK AND END-POINT SOIL SAMPLING TO MEET TRACK 1-UNRESTRICTED SOIL CLEANUP OBJECTIVES (SCOs).
2. ADDITIONAL DEEPER EXCAVATION OF BEDROCK AND SOIL MAY BE NECESSARY TO MEET UNRESTRICTED SCOs OR FOR FOUNDATION CONSTRUCTION.

60' 0 60'

Title:

PROPOSED REMEDIATION PLAN (PRIOR TO REMEDIAL WORK)

MID BLOCK #57 PROJECT

Prepared For:

DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: J.L.	Date: 25JUL13	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	5
Project Mgr: J.L.	Project: 1338.0003Y002	
File: 1338.0003Y206.08.DWG		

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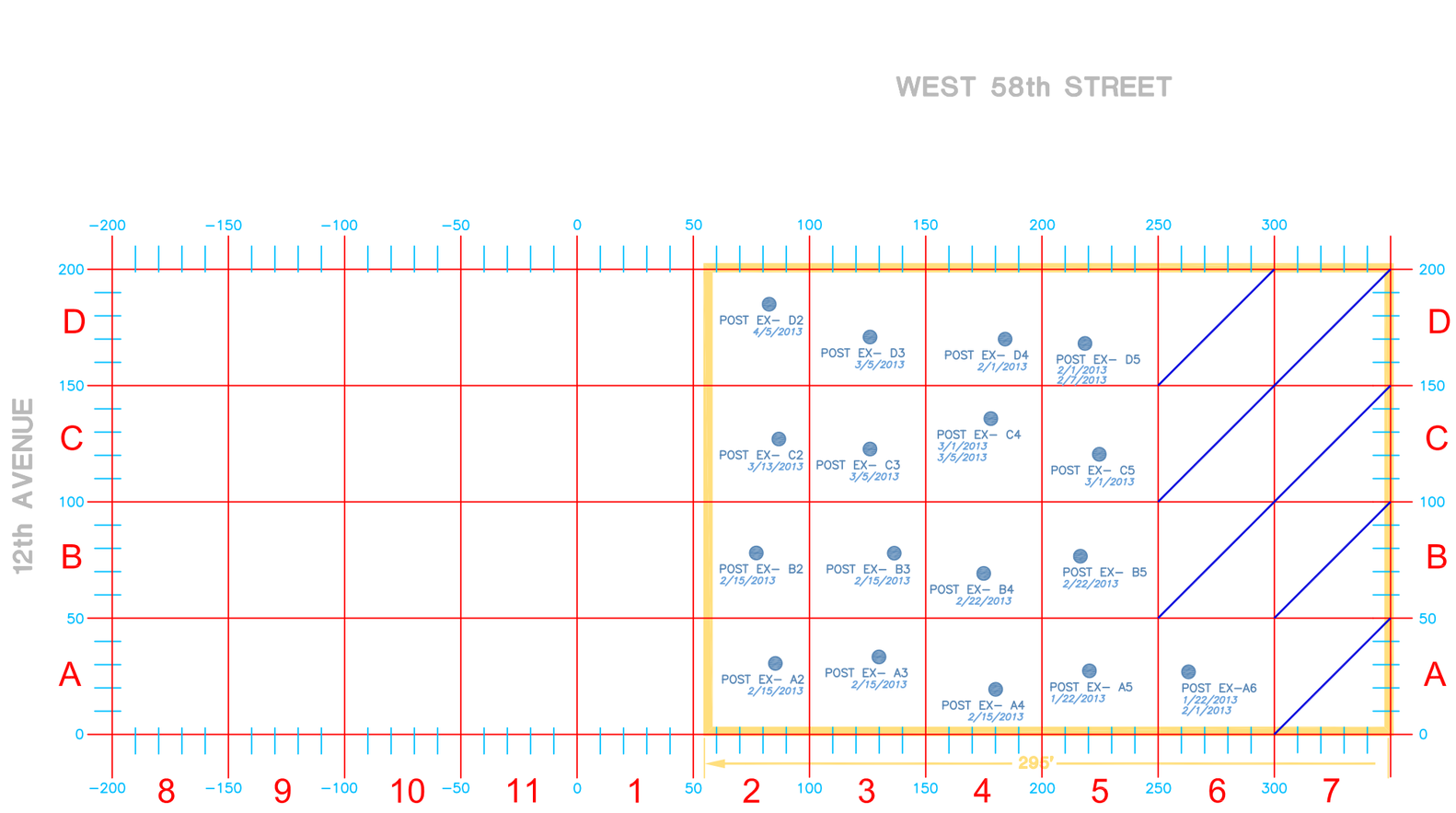

LEGEND

- LIMITS OF MID BLOCK #57 PROJECT
- ALPHA−NUMERIC GRID LINE
- EXCAVATED TO BEDROCK, NO ENDPOINT SAMPLE
- POST EX−A2 2/15/2013 — POST EXCAVATION END POINT SAMPLING LOCATION AND DESIGNATION

NOTES

1. ALPHA−NUMERIC GRID CELLS ARE SPACED EVERY 50 FEET.
2. THE FOLLOWING GRID CELLS WERE RESAMPLED AND CORRESPONDING DATES ARE PROVIDED ON THE SAMPLE DESIGNATION: A6, C4, AND D5.

60' 0 60'

Title:

POST EXCAVATION END POINT SAMPLING LOCATIONS

MID BLOCK #57 PROJECT

Prepared For:

DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: J.L.	Date: 25JUL13	FIGURE 6
Prepared by: J.A.D.	Scale: AS SHOWN	
Project Mgr: J.L.	Project: 1338.0003Y002	
File: 1338.0003Y206.05.DWG		

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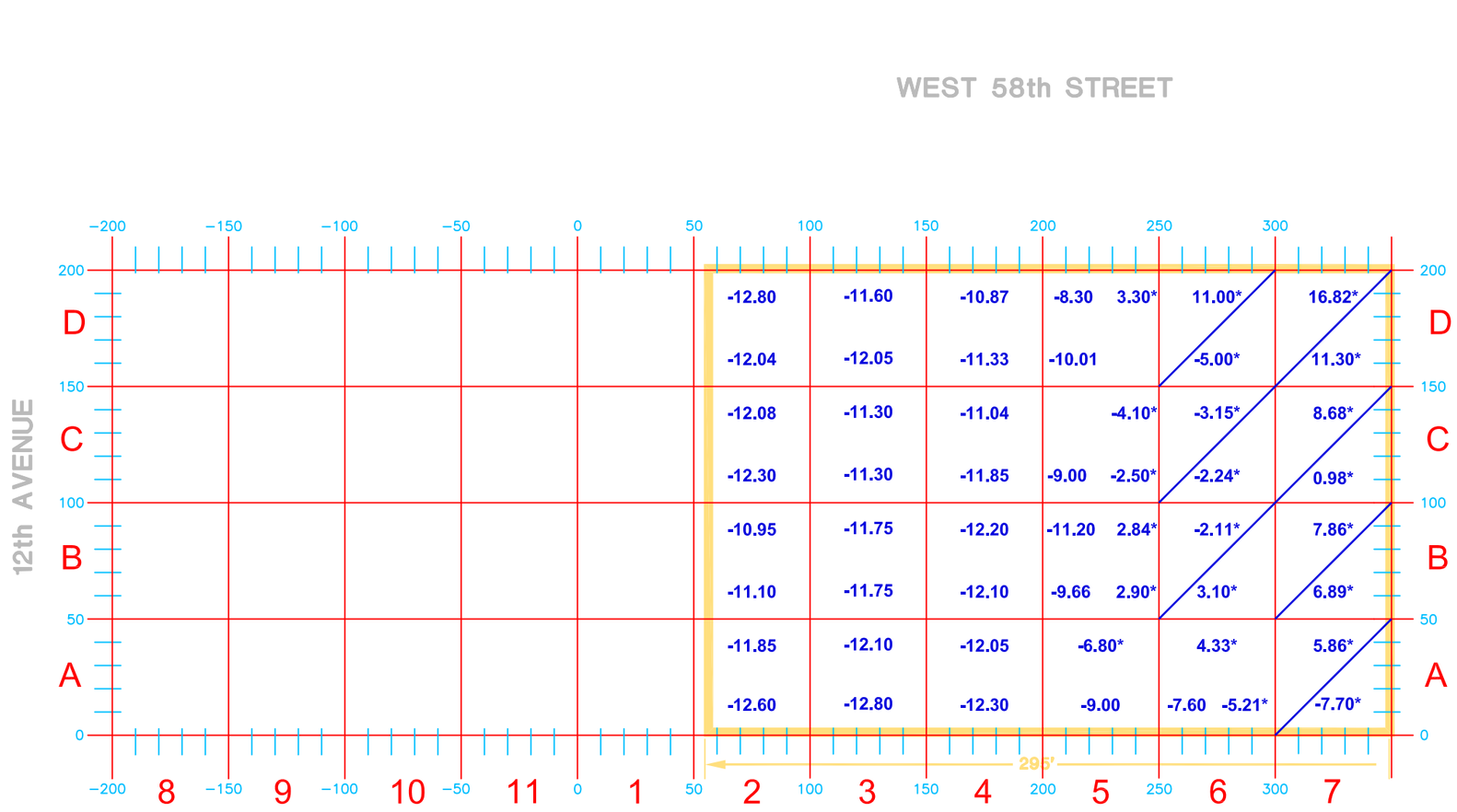

LEGEND

- LIMITS OF MID BLOCK #57 PROJECT
- ALPHA–NUMERIC GRID LINE
- EXCAVATED TO BEDROCK
- **-12.05** EXCAVATION BOTTOM ELEVATION (FEET ABOVE MEAN SEA LEVEL)
- **-2.24*** BEDROCK ELEVATION (FEET ABOVE MEAN SEA LEVEL)

NOTE

ALPHA–NUMERIC GRID CELLS ARE SPACED EVERY 50 FEET

60' 0 60'

Title:

POST EXCAVATION BOTTOM ELEVATIONS

MID BLOCK #57 PROJECT

Prepared For:

DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: J.C.	Date: 25JUL13	FIGURE 7
Prepared by: J.A.D.	Scale: AS SHOWN	
Project Mgr: J.L.	Project: 1338.0003Y003	
File: 1338.0003Y206.09.DWG		

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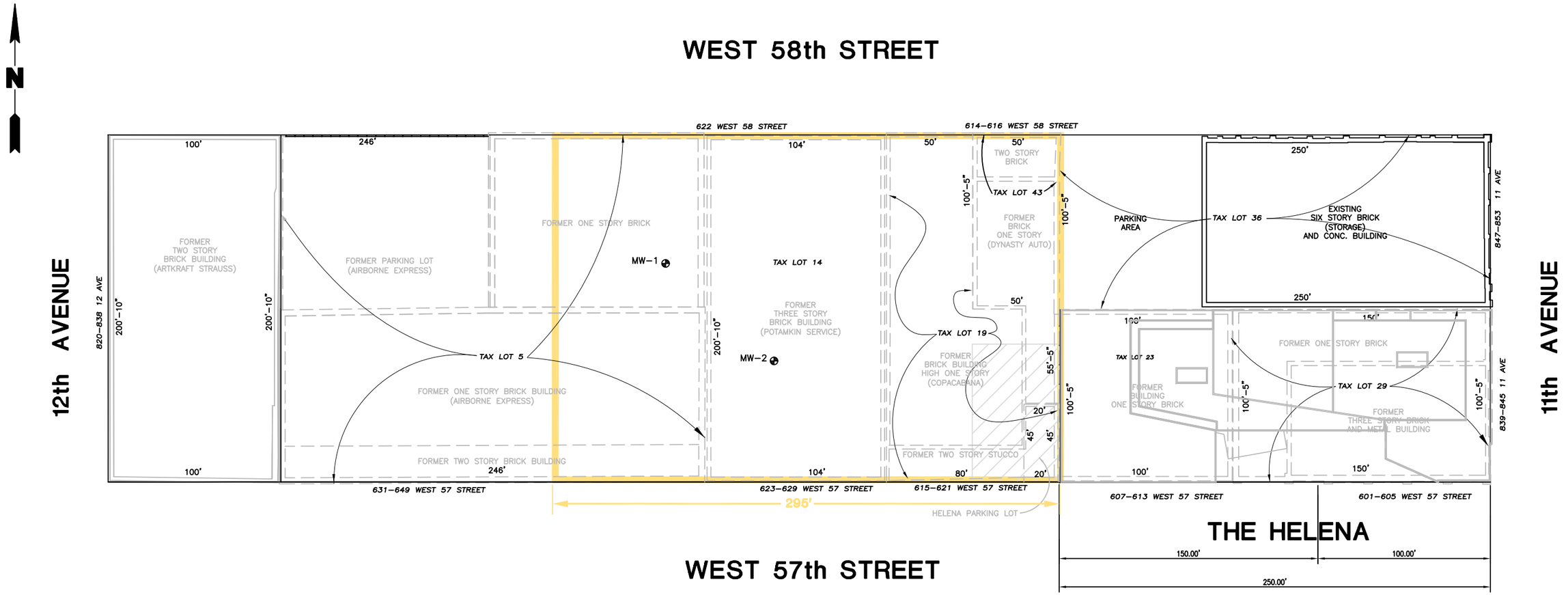

BLOCK 1105

LEGEND

LIMITS OF MID BLOCK #57 PROJECT

MW–1 LOCATION AND DESIGNATION OF MONITORING WELL

60' 0 60'

Title:

POST-REMEDIATION ON-SITE MONITORING WELLS

MID BLOCK #57 PROJECT

Prepared For:

DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting and Management

Compiled by: J.L.	Date: 25JUL13	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	8
Project Mgr: J.L.	Project: 1338.0003Y002	
File: 1338.0003Y206.02.DWG		

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APPENDICES

A. Environmental Easement

B. Metes and Bounds

C. Historic Geotechnical Investigation

D. Contingency Groundwater Injection Points, Monitoring Wells and Soil Vapor Monitoring Points

E. Waterproofing and Vapor Barrier Design Drawings

F. Monitoring Well Logs

G. Groundwater Sampling Log

H. Site-Wide Inspection Log

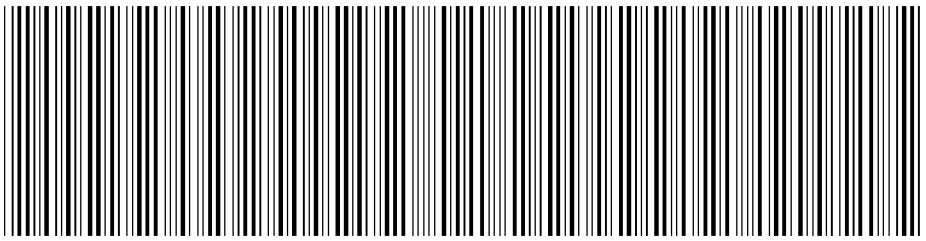
I. Quality Assurance Project Plan

J. SSDS Operations and Maintenance Manual

Environmental Easement

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument.The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.



2013111201346001002ED5A6

RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 23**

Document ID: 2013111201346001 Document Date: 11-06-2013 Preparation Date: 11-13-2013
Document Type: EASEMENT
Document Page Count: 21

PRESENTER:
CHICAGO TITLE INSURANCE CO. (PICK-UP)
711 THIRD AVE, 5TH FLOOR
3113-0071A
NEW YORK, NY 10017
212-880-1200
NYCOMMOPS@CTT.COM

RETURN TO:
CHICAGO TITLE INSURANCE CO. (PICK-UP)
OFFICE OF GENERAL COUNSEL NYSDEC
625 BROADWAY
ALBANY, NY 12233

PROPERTY DATA

Borough	Block	Lot		Unit	Address
MANHATTAN	1105	5	Partial Lot		631 WEST 57TH STREET

Property Type: RESIDENTIAL VACANT LAND

Borough	Block	Lot		Unit	Address
MANHATTAN	1105	14	Entire Lot		623 WEST 57TH STREET

Property Type: RESIDENTIAL VACANT LAND

☒ Additional Properties on Continuation Page

CROSS REFERENCE DATA

CRFN_____ *or* DocumentID_____ *or* _____ Year_____ Reel____ Page_____ *or* File Number_____

PARTIES

GRANTOR/SELLER:
FOUR PLUS CORPORATION
5251 HAPSTEAD HIGH STREET, SUITE 300
MONTGOMERY, AL 36116

GRANTEE/BUYER:
NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 BROADWAY
ALBANY, NY 12233

☒ Additional Parties Listed on Continuation Page

FEES AND TAXES

Mortgage :		
Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	151.00
Affidavit Fee:	$	0.00

Filing Fee:	$	250.00
NYC Real Property Transfer Tax:	$	0.00
NYS Real Estate Transfer Tax:	$	0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 11-25-2013 15:41
City Register File No.(CRFN):
2013000486616

City Register Official Signature

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

2013111201346001002CD726

RECORDING AND ENDORSEMENT COVER PAGE (CONTINUATION)

Document ID: 2013111201346001 Document Date: 11-06-2013 Preparation Date: 11-13-2013
Document Type: EASEMENT

PROPERTY DATA

Borough	Block	Lot		Unit	Address
MANHATTAN	1105	19	Entire Lot		615 WEST 57TH STREET

Property Type: RESIDENTIAL VACANT LAND

Borough	Block	Lot		Unit	Address
MANHATTAN	1105	43	Entire Lot		614 WEST 58TH STREET

Property Type: RESIDENTIAL VACANT LAND

PARTIES

GRANTOR/SELLER:
GE 57TH STREET NORTH HOLDINGS, LLC
C/O JPMORGAN CHASE BANK, N.A., 270 PARK AVENUE, 16TH FLOOR
NEW YORK, NY 10017

GRANTOR/SELLER:
EE 57TH STREET NORTH HOLDINGS, LLC
C/O JPMORGAN CHASE BANK, N.A., 270 PARK AVENUE, 16TH FLOOR
NEW YORK, NY 10017

GRANTOR/SELLER:
FADLING, LLC
C/O GOULSTON & STORRS, P.C., 400 ATLANTIC AVENUE
BOSTON, MA 02110

GRANTOR/SELLER:
SWALLOW, LLC
C/O GOULSTON & STORRS, P.C., 400 ATLANTIC AVENUE
BOSTON, MA 02110

GRANTOR/SELLER:
APPLEBY NORTH HOLDINGS, LLC
C/O WOMBLE CARLYLE SANDRIDGE & RICE, LLP, 5 EXCHANGE STREET
CHARLESTON, SC 29401

GRANTOR/SELLER:
DURST DEVELOPMENT L.L.C.
C/O THE DURST ORGANIZATION INC., ONE BRYANT PARK
NEW YORK, NY 10036

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 6th day of November, 2013 between Fee Owner(s) FOUR PLUS CORPORATION, having an office at 5251 Hapstead High Street, Suite 300, Montgomery, Alabama 36116; GE 57TH STREET NORTH HOLDINGS, LLC, having an office at c/o JPMorgan Chase Bank, N.A., 270 Park Avenue, 16th Floor, New York, NY 10017; EE 57TH STREET NORTH HOLDINGS, LLC, having an office at c/o JPMorgan Chase Bank, N.A., 270 Park Avenue, 16th Floor, New York, NY 10017, Attn: Andrew M. Feder, Special Assets Real Estate; FADLING, LLC having an office at c/o Goulston & Storrs, P.C., 400 Atlantic Avenue, Boston, MA 02110; SWALLOW, LLC, having an office at c/o Goulston & Storrs, P.C., 400 Atlantic Avenue, Boston, MA 02110, Attn: Nancy Samiljan Esq.; APPLEBY NORTH HOLDINGS, LLC, having an office at c/o Womble Carlyle Sandridge & Rice, LLP, 5 Exchange Street, Charleston, SC 29401, Attn: Graeme Philp, Esq.; and DURST DEVELOPMENT L.L.C., [Ground Lessee] having an office at c/o The Durst Organization Inc., One Bryant Park, New York, NY 10036, (collectively the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233.

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, are the owners and ground lessee of real property located at the address of 615-629 West 57th Street; part of 631-649 West 57th Street; 614-630 West 58th Street in the City, County and State of New York, known and designated on the tax map of the City Register of the City of New York as tax map parcel numbers: Block 1105 Lot (s) 5 (portion), 14, 19 and 43, being a portion of that property conveyed to the Grantor Fee Owners by the deeds listed on Schedule A and being a portion of that property leased by Grantor Fee Owners to Grantor

Ground Lessee by that certain Ground Lease dated February 1, 1999 to commence February 1, 1999 and terminating on February 1, 2098 recorded in the City Register of the City of New York as Reel 2886 Pg 2039. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.36 +/- acres, and is hereinafter more fully described in the Land Title Survey dated September 13, 2013, prepared by Montrose Surveying Co., LLP., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: A2-0611-1008, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement")

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Residential as described in 6 NYCRR Part 375-1.8(g)(2)(i), Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for raising livestock or producing animal products for human consumption, and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5 the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner and ground lessee of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by

the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee or ground leasehold interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C231062
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section

[10/12]

Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Grantor: FOUR PLUS CORPORATION

By: D Whitten Joyner

Print Name: D. Whitten Joyner

Title: President Date: 10/23/13

Grantor's Acknowledgment

STATE OF ~~NEW YORK~~ Alabama)
) ss:
COUNTY OF Montgomery)

On the 23 day of October, in the year 20 13, before me, the undersigned, personally appeared D Whitten Joyner, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Heather P. Norwood
Notary Public - State of ~~New York~~ Alabama

HEATHER P NORWOOD
Notary Public
State of Alabama
MY COMMISSION EXPIRES. APR 27, 2016

SEAL

Grantor: **GE 57th STREET NORTH HOLDINGS, LLC**
Sole Member: JP Morgan Chase Bank, N.A. and
George D. Endicott, as co-trustees, under
Agreement dated February 21, 2003 by
George D. Endicott F/B/O George D. Endicott

By: JP Morgan Chase Bank, N.A
As Co-Trustee, and not individually

By: _____

Print Name: Michael Pearlman

Title: Vice President Date: 10/30/13

By: _____
George D. Endicott, as Co-Trustee

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF NewYork)

On the 30th day of October, in the year 2013, before me, the undersigned, personally appeared Michael Pearlman personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

HIU TUNG TANG
NOTARY PUBLIC-STATE OF NEW YORK
No. 01TA6264806
Qualified in Queens County
My Commission Expires July 02, 2016

SEAL

Grantor: **GE 57th STREET NORTH HOLDINGS, LLC**
Sole Member: JP Morgan Chase Bank, N.A. and
George D. Endicott, as co-trustees, under
Agreement dated February 21, 2003 by
George D. Endicott F/B/O George D. Endicott

By: JP Morgan Chase Bank, N.A
As Co-Trustee, and not individually

By: _____

Print Name: George D. Endicott

Title: Co Trustee Date: 10/25/13

By: George D. Endicott
George D. Endicott, as Co-Trustee

Grantor's Acknowledgment

STATE OF ~~NEW YORK~~ Wisconsin)
) ss:
COUNTY OF Dane)

On the 25th day of October, in the year 2013, before me, the undersigned, personally appeared George Endicott, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

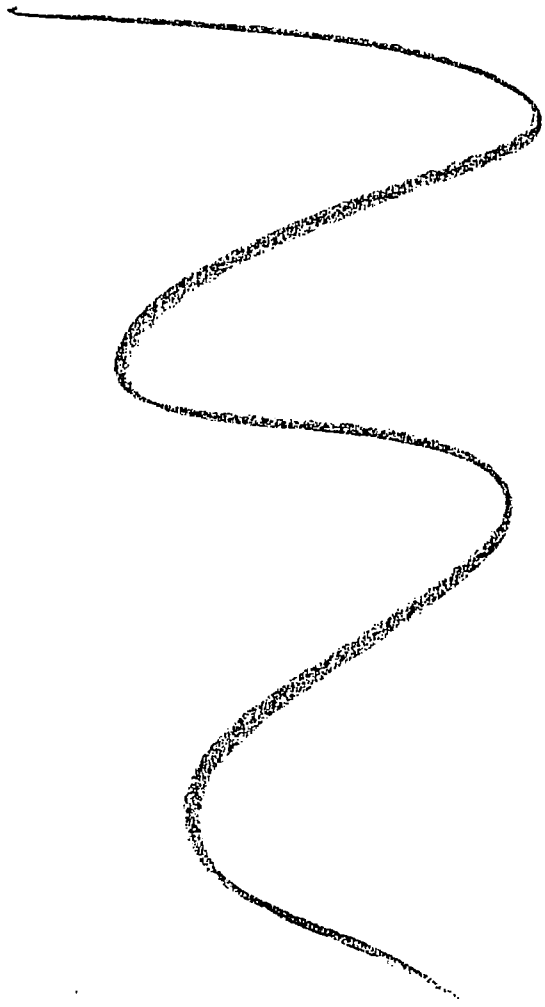
Amy Bauer
Notary Public - State of ~~New York~~ Wisconsin

My commission expires: 7-15-17

AMY BAUER NOTARY PUBLIC STATE OF WISCONSIN

SEAL

INTENTIONALLY OMITTED



Grantor: EE 57th STREET NORTH HOLDINGS, LLC

Sole Member: JP Morgan Chase Bank, N.A., as Trustee, under Agreement dated March 17, 2003 by Elizabeth Endicott F/B/O Elizabeth Endicott

By: JP Morgan Chase Bank, N.A.
As Trustee, and not individually

By: _____

Print Name: Michael Pearlman

Title: Vice President Date: 10/30/13

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF New York)

On the 30th day of October, in the year 2013, before me, the undersigned, personally appeared Michael Pearlman, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

HIU TUNG TANG
NOTARY PUBLIC-STATE OF NEW YORK
No. 01TA6264806
Qualified in Queens County
My Commission Expires July 02, 2016

SEAL

Grantor: FADLING, LLC

By: _____

Name: Anne B. Appleby

Title: Manager Date: _____

Grantor's Acknowledgment

STATE OF WA)
) ss:
COUNTY OF Thurston)

On the 29 day of October, in the year 2013, before me, the undersigned, personally appeared Anne Appleby, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Melissa Kirkeby 8/21/2014
Notary Public

MELISSA KIRKEBY NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 8-21-14

SEAL

Grantor: SWALLOW, LLC

By: Kate T. Lamdin

Name: Kate T. Lamdin

Title: Manager Date:

Grantor's Acknowledgment

STATE OF MA)
) ss:
COUNTY OF Hampshire)

On the 24 day of October, in the year 2013 before me, the undersigned, personally appeared Kate T Lamdin, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Deborah Lee Ward
Notary Public

DEBORAH LEE WARD
NOTARY PUBLIC
Commonwealth of Massachusetts
My Commission Expires Nov. 9, 2018

SEAL

Grantor: APPLEBY-NORTH HOLDINGS, LLC

By: F. Sandra Appleby

Print Name: F. Sandra Appleby

Title: Manager Date:

Grantor's Acknowledgment

STATE OF ~~NEW YORK~~ SOUTH CAROLINA)
) ss:
COUNTY OF COLLETON)

On the 24 day of Oct, in the year 2013, before me, the undersigned, personally appeared F. Sandra Appleby, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - ~~State of New York~~

My Commission Expires
April 7, 2019

SEAL

Grantor: DURST DEVELOPMENT L.L.C., a New York limited liability company

By: The Durst Manager LLC, a New York limited liability company, its Manager

By: SRDA Manager, LLC, a New York limited liability company, its Managing Member

By: _____

Print Name: Alexander Durst

Title: Co-Vice President Date: 10/25/2013

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Queens)

On the 25 day of October in the year 2013 before me, the undersigned, personally appeared Alexander Durst, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Tanya Alexandra Grimaldo
Notary Public - State of New York

Tanya Alexandra Grimaldo
Notary Public, State of New York
No. 01GR6256808
Qualified in Queens County
Commission Expires Mar. 5, 2016

SEAL

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 6 day of November, in the year 2013, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2014

SEAL

SCHEDULE "A"
ENVIRONMENTAL EASEMENT
PROPERTY DESCRIPTION

Metes and Bounds Description
Environmental Easement Area
Tax Block 1105 Tax Lots 14, 19, 43 and p/o Tax Lot 5:

ALL that certain plot, piece of parcel of land situate, lying and being in the Borough of Manhattan, County, City and State of New York, bounded and described as follows:

BEGINNING at a point on the northerly side of West 57th Street (60 feet wide), distant 255 feet easterly from the corner formed by the intersection of northerly side of West 57th Street, with the easterly side of 12th Avenue (irregular width);

RUNNING THENCE northerly parallel with the easterly side of 12th Avenue, 200 feet 10 inches to the southerly side of West 58th Street (60 feet wide);

RUNNING THENCE easterly along the southerly side of West 58th Street, 295 feet to a point;

RUNNING THENCE southerly parallel with the westerly side of 11th Avenue, 200 feet 10 inches to the southerly side of West 57th Street;

RUNNING THENCE westerly along the northerly side of West 57th Street, 295 feet to the point or place of BEGINNING.

Being the same piece or parcel of land (or part of) acquired under the following deeds:

a. FOUR PLUS CORPORATION (A NEW YORK CORPORATION) (AS TO AN UNDIVIDED 50% INTEREST)
b. EE 57TH STREET NORTH HOLDINGS LLC (A DELAWARE LIMITED LIABILITY COMPANY) (AS TO AN UNDIVIDED 11.25% INTEREST)
c. GE 57TH STREET NORTH HOLDINGS, LLC (A DELAWARE LIMITED LIABILITY COMPANY) (AS TO AN UNDIVIDED 11.25% INTEREST)
d. FADLING, LLC (A DELAWARE LIMITED LIABILITY COMPANY) (AS TO UNDIVIDED 9.1667 % INTEREST)
e. SWALLOW, LLC (A DELAWARE LIMITED LIABILITY COMPANY) (AS TO AN UNDIVIDED 9.1667% INTEREST)
f. APPLEBY NORTH HOLDINGS, LLC (A DELAWARE LIMITED LIABILITY COMPANY) (AS TO AN UNDIVIDED 9.1667% INTEREST)

PARCEL I (Tax Lot 14)

As to a.: Title acquired under Deed dated 9/15/1936, recorded 4/28/1938 in Liber 3990 cp 48 made by JOHN S. APPLEBY and JENAT DEWITT APPLEBY.

As to b: Title acquired under Deed dated 3/28/2008, recorded 4/2/2008 as CRFN 2008000170994, made by JPMORGAN CHASE BANK, N.A., as Trustee under that certain Revocable Trust, made by ELIZABETH ENDICOTT and dated 3/17/2003 (as to a 6.25% interest) and under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000170991, made by JPMORGAN CHASE BANK,

N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY. (As to a 5% interest)

As to c: Title acquired under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000170993, made by JPMORGAN CHASE BANK, N.A., and GEORGE ENDICOTT, as Co-Trustee under that certain Revocable Trust made by GEORGE ENDICOTT and dated 2/21/2003 (as to a 6.25% interest) and dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000170991, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY. (As to a 5% interest)

As to d: Title acquired under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000170991, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and dated 3/28/2008, recorded 4/29/2008 as CRFN2008000170992, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

As to e: Title acquired under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000170991, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000170992, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

As to f: Title acquired under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000170991, made by JPMORGAN CHASE BANK N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000170992, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

PARCEL II (Tax Lot 5):

As to a.: Title acquired under Deed dated 9/15/1936, recorded 4/28/1938 in Liber 3990 cp 48, made by JOHN S. APPLEBY and JENAT DEWITT APPLEBY.

As to b: Title acquired under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000171067, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain

Revocable Trust made by ELIZABETH ENDICOTT and dated 3/17/2003 (as to a 6.25% interest) and under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN2008000171065, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY. (As to a 5% interest)

As to c: Title acquired under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000171879, made by JPMORGAN CHASE BANK, N.A., and GEORGE ENDICOTT, as Co-Trustee under that certain Revocable Trust, made by GEORGE ENDICOTT and dated 2/21/2003 (as to a 6.25% interest) and under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000171065, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY. (As to a 5% interest)

As to d: Title acquired under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000171065, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000171066, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

As to e: Title acquired under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000171065, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000171066, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

As to f: Title acquired under Deed dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000171065, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and dated 3/28/2008, recorded 4/29/2008 as CRFN 2008000171066, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

PARCEL III (TAX LOT 19)

As to a: Title acquired under Deed dated 9/15/1936, recorded 4/28/1938 in Liber 3990 cp 48, made by JOHN S. APPLEBY and JENAT DEWITT APPLEBY.

As to b: Title acquired under Deed 3/28/2008, recorded 4/30/2008 as CRFN 2008000172809, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Revocable Trust made by ELIZABETH ENDICOTT and dated 3/17/2003 (as to a 6.25%) interest) and under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172806,

made by JPMORGAN CHASE Bank, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY. (As to a 5% interest)

As to c: Title acquired under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172808, made by JPMORGAN CHASE BANK, N.A. and GEORGE ENDICOTT, as Co-Trustee under that certain Revocable Trust made by GEORGE ENDICOTT and dated 2/21/2003 (as to a 6.25%) and under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172806, made by JPMORGAN CHASE BANK,N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY. (As to a 5% interest)

As to d: Title acquired under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172806, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172807, made by JPMORGAN CHASE BANK, N.A. as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

As to e: Title acquired under Deed 3/28/2008, recorded 4/30/2008 as CRFN 2008000172806,

made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172807, made by JPMORGAN CHASE BANK, N.A. as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest) As to f: Title acquired under Deed 3/28/2008, recorded 4/30/2008 as CRFN 2008000172806, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172807, made by JPMORGAN CHASE BANK, N.A. as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

PARCEL IV (Tax Lot 43):

As to a.: Title acquired under deed dated 9/15/1936, recorded 4/28/1938 in Liber 3990 cp 48, made by JOHN S. APPLEBY and JENAT DEWITT APPLEBY.

As to b: Title acquired under deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172897, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Revocable Trust made by ELIZABETH ENDICOTT and dated 3/17/2003 (as to a 6.25% interest) and under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN2008000172894, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY. (As to a 5% interest)

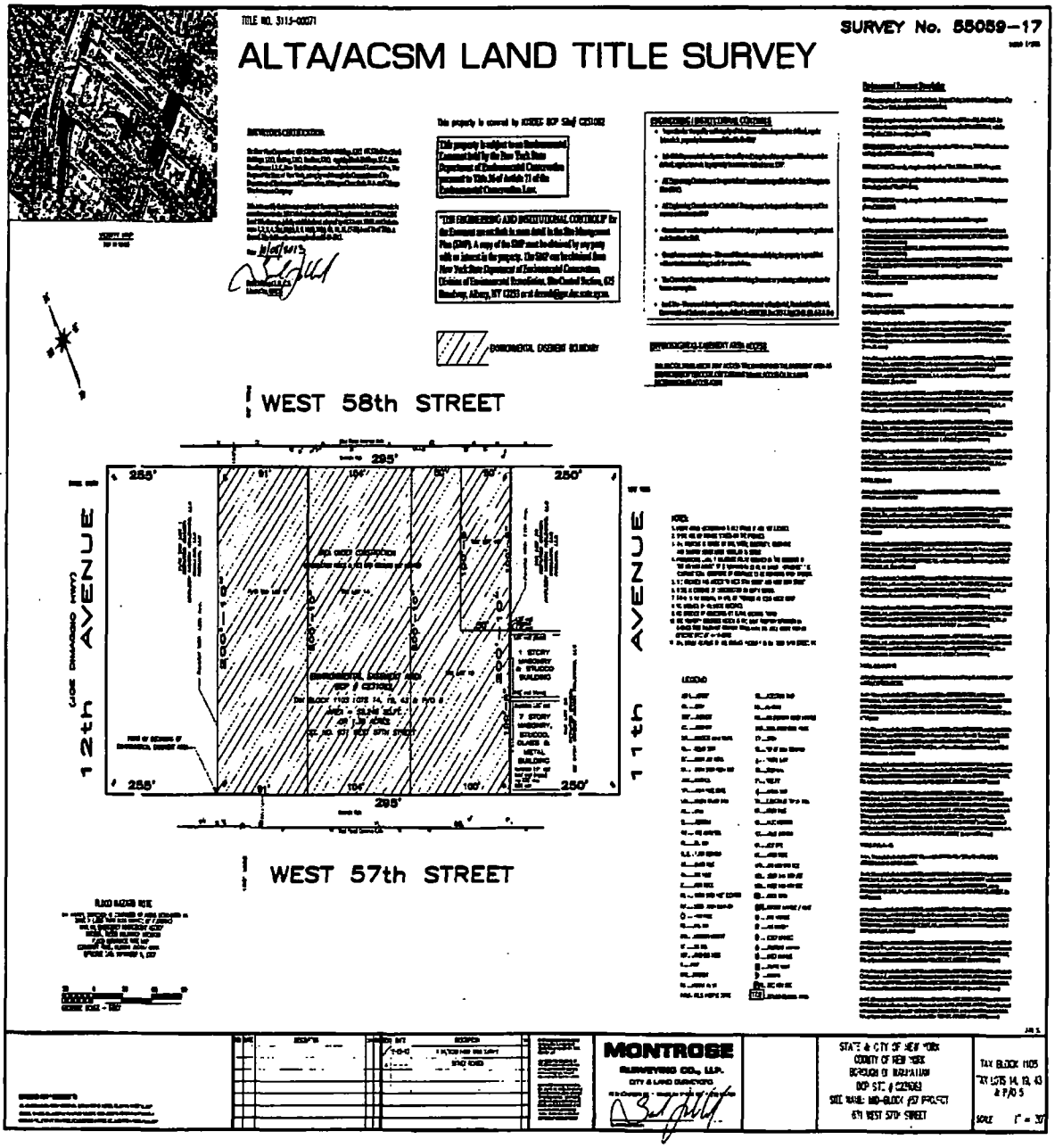
As to c: Title acquired under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172896, made by JPMORGAN CHASE BANK, N.A., and GEORGE ENDICOTT, as Co-Trustee under that certain Revocable Trust made by GEORGE ENDICOTT and dated 2/21/2003 (as to a 6.25% interest) and under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172894, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY. (As to a 5% interest)

As to d: Title acquired under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172894, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172895, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

As to e: Title acquired under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172894, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172895, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

As to f: Title acquired under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172894, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of FRANCIS APPLEBY (as to a 5% interest) and under Deed dated 3/28/2008, recorded 4/30/2008 as CRFN 2008000172895, made by JPMORGAN CHASE BANK, N.A., as Trustee of that certain Trust created under the Will of EDGAR T. APPLEBY. (As to a 4.1667% interest)

SURVEY


SURVEY No. 55059-17
ALTA/ACSM LAND TITLE SURVEY
WEST 58th STREET
WEST 57th STREET
12th AVENUE
11th AVENUE
MONTROSE
SURVEYING CO., LLP.

APPENDIX B

Metes and Bounds

Appendix B – Metes and Bounds

Property Address / Location

The property is known by the following street addresses (also see Tax Map Information in Section II of the BCP Application):

615 – 629 West 57th Street Part of (p/o) 631 – 649
West 57th Street

AND

614 – 630 West 58th Street p/o 632 – 650
West 58th Street

Metes and Bounds Description of the Property

The property is bounded and described as follows:

> BEGINNING at a point 250 west from the northwest corner of 57th Street and 11th Avenue (Latitude 40.770819°, Longitude -73.992269°); thence running westerly 295 feet along the north side of 57th Street; thence northerly and parallel to 12th Avenue 200 feet 10 inches to the southern side of 58th Street; thence easterly along the southern side of 58th Street, 295 feet; thence southerly and parallel to 11th Avenue 200 feet 10 inches to the place or point of beginning.

APPENDIX C

Historic Geotechnical Investigation

THIRD SUPPLEMENTAL
GEOTECHNICAL INVESTIGATION
BLOCK 1105 - RESIDENTIAL DEVELOPMENT
NEW YORK, NEW YORK

The Durst Organization
1155 Avenue of the Americas
New York, NY 10036

Mueser Rutledge Consulting Engineers
225 W. 34th Street, 14 Penn Plaza
New York, NY 10122

November 15, 2002
(Revised January 16, 2003)

Mueser Rutledge Consulting Engineers

225 W. 34th Street • 14 Penn Plaza • New York, NY 10122-0002
Tel: (917) 339-9300 • Fax: (917) 339-9400
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George J. Tamaro
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Partners

Elmer A. Richards
Edmund M. Burke
John W. Fowler
J. Patrick Powers
Consultants

James L. Kaufman
Daniel M. Hahn
Raymond J. Poletto
Roderic A. Ellman, Jr.
Thomas R. Wendel
Francis J. Arland
Robert M. Semple
Theodore Popoff
David R. Good
Senior Associates

Domenic D'Argenzio
Walter E. Kaeck
Robert K. Radske
Harro R. Streidt
Ketan H. Trivedi
Michael J. Chow
Alice Arana
Douglas W. Christie
Hiren J. Shah
Associates

Joseph N. Courtade
Director of Finance and Administration

Martha J. Huguet
Marketing Manager

November 15, 2002 **(Rev. January 16, 2003)**

The Durst Organization
1155 Avenue of the Americas
New York, NY 10036

Attention: Mr. Louis Esposito

Re: Third Supplemental Geotechnical Investigation
Block 1105 - Residential Development
New York, NY
MRCE File No. 9347A

Gentlemen:

We have completed a supplemental boring program at the southeast corner of Block 1105. This report briefly describes the boring program and subsurface conditions encountered, and provides foundation design and construction recommendations. Based on the supplemental borings, we updated the boring location plan, the rock surface contour map, and the geologic sections originally included in our November 22, 2000, September 25, 2001, and February 14, 2002 geotechnical reports. In addition, we developed three additional geologic sections within the present investigation site.

Upon completion of the supplemental borings, we issued a draft report dated November 15, 2002. That report included sufficient information for the structural engineer to proceed with foundation design, but lacked issues pertaining to the Manhattan Mini Storage building. This report supersedes the draft report. This report includes newly provided project information, and addresses issues related to the Manhattan Mini Storage building based on our basement observation, as there are no foundation drawings available.

PROJECT DESCRIPTION

Block 1105 encompasses the block bounded by W. 58th Street, W. 57th Street, 11th Avenue and 12th Avenue on Manhattan's west side. The proposed residential development utilizes the southeast portion of the block, extending about 250 feet along 57th Street and about 100 feet along 11th Avenue with a resulting area of about 25,000 square feet. We understand that a 36-story residential building is proposed. Based on drawings you provided, we estimate the footprint of the building at about 22,500 square feet. The building will include two levels of basement.

The site consists of a vacant lot on the west and one and three story brick buildings on the east. The vacant lot was occupied by a one-story brick building, which was demolished several months ago. The buildings on the east were used as a garage and automobile showrooms, and are both under demolition.

Our previous investigations indicate that the site grade varies from about Elev. +24 at 11th Avenue to about Elev. +20 at the west end of the present development. Top of rock varies between Elev. +15 at the northwest corner and Elev. -10 at the northeast corner of the site. Elevations in this report refer to Borough President of Manhattan Datum, in which Elev. 0.0 is 2.75 feet above 1929 National Geodetic Vertical Datum, Mean Sea Level at Sandy Hook, NJ.

AVAILABLE INFORMATION

We used the following information in preparation of this report:

1. Conceptual Drawings, "11/57 Residential", Prepared by Fox & Fowle Architects, Dated September 20, 2002.

2. Phone Conversation with Severud Associates on December 23, 2002.

3. Geotechnical Investigation Report, Prepared by Mueser Rutledge Consulting Engineers, Dated November 22, 2000.

4. Supplemental Geotechnical Investigation Report, Prepared by Mueser Rutledge Consulting Engineers, Dated September 25, 2001.

5. Supplemental Geotechnical Investigation Report, Prepared by Mueser Rutledge Consulting Engineers, Dated February 14, 2002.

EXHIBITS

The following exhibits are attached to this report:

EXHIBITS	DESCRIPTION
Drawing No. B-1	Boring Location Plan (Rev. November 11, 2002).
Drawing No. R-1	Rock Surface Contour Plan (Rev. November 11, 2002).
Drawing No. GS-R	Geotechnical Reference Standards.
Drawing No. RC-1	Rock Core Classification Criteria.
Drawing No. GS-1	Geologic Section A-A (Rev. February 6, 2002).
Drawing No. GS-2	Geologic Sections B-B and C-C (Rev. November 11, 2002).
Drawing No. GS-3	Geologic Sections D-D through F-F.
Drawing No. GS-4	Geologic Sections G-G through I-I.
Table 1	Soil Design Parameters.
Appendix A	Boring Logs.

SUBSURFACE INVESTIGATIONS

Previous Subsurface Investigations - Between August 7 and October 6, 2000 we performed a preliminary boring program. That program consisted of sixteen borings (M-1 through M-16) which were laid out in the entire block bounded by 11th Avenue, 12th Avenue, W. 57 Street, and W. 58 Street. Due to limited access to the interiors of then existing buildings, most of the preliminary borings were drilled on the perimeter sidewalk. We summarized that investigation in our report dated November 22, 2000.

Between July 17 and August 9, 2001, we completed a supplemental boring program within the middle third of the block. The boring program consisted of 22 borings (B-1 through B-22), comprising 11 borings in the Airborne Express building, five borings in the Potamkin Services building, one boring in the Copacabana building, and five borings on the sidewalk. Subsequent to that investigation, we issued a geotechnical report dated September 25, 2001, which updated the November 22, 2000 report.

Between November 29 and December 21, 2001, a second supplemental boring program was performed within the westerly third of the block. The site had a footprint of about 51,000 square feet. A total of 16 borings (S-100 through S-115) were drilled which included three borings in the parking lot, nine borings in the Artkraft building, and four borings in the Airborne Express building. Subsequent to that investigation, we issued a geotechnical report dated February 14, 2002, which updated the September 25, 2001 report.

Present Subsurface Investigation - The present subsurface investigation was performed during the period from October 17 to October 22, 2002 within the southeast corner of the block. Borings performed in the past investigations indicate that the general excavation subgrade will be either in bedrock or near the rock surface. The New York City Building Code does not require borings where shallow foundations are used and bedrock can be inspected upon exposure. However, the interior of the present site was not previously explored, and additional top of rock information will be useful for design, cost estimating, and bidding purposes.

We performed five borings (R-200 through R-204) during the present investigation as shown on the attached Drawing B-1. The two borings in the vacant lot were drilled using a truck mounted drilling rig, while the three borings within the buildings were drilled using a track mounted drilling rig. The two rigs worked concurrently.

All borings were continuously inspected by our Resident Engineer, Mr. Andrew Klaetsch. All borings were made using rotary drilling techniques employing casing and mud as drilling fluid. The borings were made by Warren George Inc. Jersey Boring and Drilling, who performed the previous three boring programs, had visited the site and provided us with unit prices for the drilling. However, due to their inability to begin the work in a timely manner, you directed that MRCE engage Warren George Inc. to perform the drilling.

Soil samples were obtained with a standard, two inch O.D. split-spoon sampler, using a 140-pound drop hammer free falling 30 inches. The number of blows required to drive the

sampler through each of four six-inch increments of depth was recorded. The sum of the blows for the second and third six-inch intervals is defined as the Standard Penetration Test (SPT) Resistance, or N-value. The N-value is an index of the in-situ relative density of the material. Split-spoon samples were typically obtained continuously within the first ten feet and at five foot intervals of depth thereafter.

A minimum 10 feet of bedrock was cored in all borings to sample sound rock. Cores were taken with a double tube, N-size, diamond bit core barrel in runs up to five feet in length. Our Resident Engineer logged each core run, sketched the jointing patterns, measured recovery lengths and calculated Rock Quality Designation (RQD). RQD is the sum of the lengths of core pieces of intact rock over four inches in length between natural breaks expressed as a percentage of the total core run. Fractures which occurred as a result of drilling operations or extraction of the core samples (termed mechanical breaks) were not considered when measuring RQD.

All soil cuttings were contained to prevent cross contamination in the ground. At the completion of borings, all boreholes were backfilled with cement grout. As-drilled boring locations shown on the attached Drawing B-1were surveyed by Montrose Surveying Co. under subcontract to Warren George Inc.

All soil and rock samples were sent to our laboratory where field classifications were verified. Split-spoon samples were removed from their containers and examined. Field sample descriptions were revised as needed. Individual sample descriptions are included on the typed logs given in Appendix A.

SUBSURFACE CONDITIONS

All borings drilled for this investigation encountered fill over a sand/ till stratum, all underlain by decomposed rock/ bedrock. Individual soil and rock samples are described on the attached logs, and simplified logs are presented on the attached Geologic Sections A-A through I-I. The sections relevant to the present site are Section B-B, C-C, and G-G through I-I.

The Geologic Sections show the number and location of soil samples, their classification symbol using the Unified Soil Classification System (USCS), and SPT N-values. Rock core sample numbers, depth intervals, and lengths are shown, along with percent core recovery and RQD. Ground water levels are marked on the sections by inverted triangles. Soil and rock stratifications shown are necessary interpolations between borings and may not represent actual subsurface conditions.

Subsurface Conditions The soil strata encountered in the borings drilled in and around the residential development site are described below in their order of increasing depth:

> **Fill (F) (NYC Class 11-65)** A 5 to 17 feet thick layer of sandy fill was encountered in Borings R-200 through R-204. Much of the fill is described as brown loose to medium compact fine to coarse sand, some silt, and silty fine to coarse sand, some to trace gravel and rock fragments. This stratum was identified as fill by the inclusion of concrete, glass and cinder. N-values within this stratum varied widely between four and 34 blows per

foot with most N-values between seven and 25 blows per foot. High N-values were likely the result of the presence of large gravel, decomposed rock or miscellaneous debris. The fill is unsuitable for support of new structures.

Sand and Till (S/T) **(NYC Class 7-65)** - A sandy natural deposit up to 20 feet thick was found beneath the fill. Stratum S/T generally consists of brown medium compact to compact silty fine to coarse sand, some to trace clay and gravel. The presence of cobbles was noted in Borings R-203 and R-204. The upper portion of this stratum appears to be a post-glacial deposit or reworked glacial till. The lower portion of the stratum is glacial till. Most N-values within this stratum varied between 19 and 78 blows per foot. High N-values were likely the result of the presence of large gravel or decomposed rock.

Decomposed Rock (DR) (NYC Class 7-65) - Stratum DR is the product of physical and chemical decomposition of the underlying bedrock. This stratum consists of very compact brown fine to coarse sand, some to trace silt, trace to some rock fragments. This material is more soil-like than rock-like. It retains vestiges of its parent rock fabric, but has the consistency of soil. Where present, Stratum DR is one to seven feet thick. This stratum was absent in Borings R-200 through R-204, but was encountered in the borings previously drilled around the site.

Weathered Rock (WR) (NYC Class 4-65) - Stratum WR is rock with a highly weathered fabric, which can be broken easily and crumbles with difficulty by hand. This material is more rock-like than soil-like. It retains vestiges of its parent rock fabric. This stratum was encountered in our previous M, B, and S series borings drilled in the westerly third of Block 1105, and was not encountered in the site of the proposed residential development. Where present, Stratum WR is two to ten feet thick except in Boring B-6, where this stratum continued in three consecutive five feet rock cores (a total 15 feet). The boundary between Stratum DR and Stratum WR is often indefinite. When boundary uncertainty occurs, consistency of the material was used to distinguish between the two strata.

Bedrock (R) (NYC Classes 1-65, 2-65 and 3-65) - Previous borings indicate that bedrock conditions at the entire block are complex. Gray, gray white, and black mica schist or gneissic schist were mostly encountered in borings made on the western half of the block, and gray and white gray granite were encountered in borings made on the eastern half of the block. Gray granitic gneiss and schistose gneiss were encountered in borings randomly throughout the block. Based on the previous boring data, the residential development site is within the gray and white gray granite zone, which was confirmed by the five borings drilled during the present investigation. The bedrock cored in the five borings consists of medium hard to hard slightly weathered, gray granite, jointed to broken, with iron stained to weathered joints.

Rock core recoveries in the five borings with an NX size double-tube core barrel ranged from 92 to 99 percent. Rock joint frequency varies as indicated by RQD (Rock Quality

Designation) ranging from 60 to 92 percent. The attached rock surface contour plan, Drawing No. R-1, shows the rock surface elevations at the site. The highly uneven surface of the bedrock is due to the effects of ancient streams and glacial scouring.

Groundwater Conditions - During this investigation one piezometer was installed. Previously, Piezometers M-11AP and M-15P were installed at the northwest corner and northeast corner of the residential development site, respectively, during the investigation performed in 2000. In addition, we located one of the monitoring wells, MW-4, that ATC installed in 1999 on the 57th Street sidewalk. Our Resident Engineer observed groundwater levels in those piezometers during and after the boring program. The water levels observed in the piezometers are shown as inverted triangles in the attached geologic sections. The data indicate that groundwater levels vary from Elev. +14.3 at the northwest corner to Elev. +6.5 at the northeast corner of the site.

FOUNDATION RECOMMENDATIONS

You provided conceptual drawings dated September 17, 2002, which show the proposed residential building. The drawings indicate a 36-story building with two levels of basement for the entire footprint of the building. We were informed by Severud Associates that the floor to floor heights for the upper and lower basements will be about 14 feet and 12 feet, respectively. The bottom of the lowest basement slab will be at about Elev. -8.

Boring data indicate that the bedrock surface within the site is highly uneven with elevations ranging from Elev. +15 at the northwest corner to Elev. -10 at the northeast corner. With the lowest basement floor at Elev. -8, we expect that there will be substantial rock excavation to reach the subgrade level particularly in the westerly two thirds of the site. At the west end, the excavation will be about 12 to 25 feet into rock. At the middle of the site, excavation will be made about 18 to 25 feet into rock. At the east end of the site, rock dips down to 11th Avenue and excavation will be made primarily through soil with the rock surface near the general subgrade.

We recommend that all structural loads be directly supported on sound rock. Rock subgrade in the westerly two thirds of the site will be good quality due to the substantial amount of rock excavation. An allowable bearing value of 40 tons per square foot may be used in that area. Rock excavation in the easterly third will be substantially less. Our coring data indicate that bedrock near the surface may include rock of lesser quality due to weathering. Where rock excavation to reach quality rock becomes impractical, footings may be sized for an allowable bearing value of 20 tons per square foot. All bearing values must be verified by an experienced geotechnical engineer upon rock exposure.

Basement Slab - The lowest basement slab will be 14 to 22 feet below the water levels observed in the piezometers. Therefore, the proposed basement slab must be designed to deal with the hydrostatic pressure. The water pressure beneath the basement slab may be dealt with either as a pressure slab to resist the uplift, or by under-draining the slab to remove the pressures.

A pressure slab utilizes the column weight and/or weight of slab as a reaction against the upward pressure of groundwater. Between columns, tie down anchors can be used to resist the hydrostatic pressures and reduce slab thickness and reinforcement. Some leaks could occur through construction joints and cracks in the pressure slab. Basement leaks of this nature are commonly handled by providing a thin drainage course above the pressure slab, capped with a working floor slab. The drainage course would be gravity drained to a sump or ejector pit. However, we recommend that you carry a small budgetary contingency for repair to obvious leaks.

An under-drained slab reduces hydrostatic uplift by removal of groundwater. In this case, a permeable drainage course could be located below the full basement area to eliminate the water pressure on the slab. Drainage pipes and a properly filtered discharge zone would need to be designed. If this method is used, local sumps should be included in the under-slab drainage system. Such systems have been used in the past in the New York City, but to our knowledge, permits for permanent pumping of groundwater to combined sewers are not presently being issued.

In the westerly two thirds of the site, the basement will be mostly in rock. With the foundation wall keyed in rock, an under-slab drainage system will produce very small flows. Therefore, an under-slab drainage system will be practical for that portion of the site. At the easterly end of the site, the foundation wall may not reach rock or may bear on lesser quality rock with possible water bearing joints. The pumping quantity may be substantial so that a pressure slab would be a better alternative at the easterly third of the site. We understand that a decision has been made to use a pressure slab for the entire slab.

Foundation Walls - Foundation walls should be designed for lateral pressures due to earth, water and surcharge.

Soil design parameters are provided in the attached Table No. 1. A coefficient of horizontal pressure equal to the at-rest condition, K_o= 0.5, may be used for walls braced by floor slabs. A coefficient of active earth pressure, K_a=0.3, may be used where wall rotation is permitted. These values assume that backfill against the walls will be compacted with light walk-behind compactors such as a "jumping jack" to a minimum 90% modified Proctor maximum dry density. Heavy dynamic compaction equipment should not be operated within 5 feet of the basement wall to avoid high lateral stresses to the wall. If the foundation wall is cast directly against rock, lateral rock pressure may be estimated as 10 percent of effective overburden pressure. Water pressure and surcharge pressure will be additive.

Observed groundwater levels vary between Elev. +6.5 at the northwest corner and Elev. +14 at the northeast of the site. Groundwater at Elev. +14 may represent perched water with a limited recharge source. Therefore, design groundwater may be taken at Elev. +10 for the entire wall, provided that a drainage layer is installed between the foundation wall and rock. The drainage layer is designed to gravity drain high groundwater at the northwest corner to lower levels toward 11th Avenue and 12th Avenue. The drainage layer may consist of a geotextile drainage product

such as Miradrain or thin coarse gravel backfill placed behind the wall. The walls should be designed to withstand temporary water levels to Elev. +14 with an allowable overstress.

We recommend that all construction joints in foundation walls and basement slabs below grade be furnished with waterstops. Joints in basement slabs or walls below grade should have redundant systems such as PVC type waterstops with a bentonite strip. We recommend that membrane water proofing be applied to the pressure side of basement walls below grade.

Adjacent Underground Structures - Our November 22, 2000 report includes a set of drawings from the NYCDEP for the Pollution Control Intercepting Sewer that runs beneath 11th Avenue. The sewer line consists of a 14' outside diameter reinforced concrete tunnel with exterior "circular rib steel sets"at a spacing of about four feet. The reinforced concrete tunnel has a horse shoe-shaped interior. The sewer line slopes gently down toward the south with the invert at about Elev. -26.0 and the crown at Elev. -12.0 on the W. 58th Street side of 11th Avenue. At W. 57th Street, the sewer crown is shown near the top of bedrock. The attached Geologic Sections show approximate locations of the sewer line. A hypothetical line connecting the proposed building envelope to the invert of the circular rib steel sets is approximately at a 2.7 (H) to 1.0 (V) slope. Hence, new building loads will not adversely affect the interceptor sewer.

Earthquake Factors - The building design must comply with earthquake provisions in the New York City Building Code. We recommend using a Site Coefficient $S_o = 0.67$ for all foundations bearing on bedrock.

CONSTRUCTION RECOMMENDATIONS

Excavation - A substantial amount of rock excavation will be required at this site. Rock consists of sound granite, which will likely require blasting. All rock excavation next to the existing Manhattan Mini Storage building and along the building line should be line drilled with holes at close centers prior to blasting. Blasting should be carried out with light charges to limit vibrations that may damage adjacent structures and their foundations, dislodge rock supporting temporary excavation supports, or reduce the bearing capacity of bedrock at foundation level. A buffer zone of about three feet minimum width along the adjacent building would be prudent, where rock cannot be blasted, or only permitted to be pre-split with light charges. Hoe rams can cause harmful vibrations and should not be permitted within 25 feet of the adjacent building. Blasting vibrations may disturb occupants in the adjacent buildings. We recommend that specifications include limits on blasting vibrations. A pre-construction survey of nearby buildings will be necessary to set appropriate vibration limits.

Some of the rock excavation may require rock bolts depending on the local rock jointing. We recommend that the contractor retain an experienced professional engineer to inspect the rock excavation as it is exposed during construction and make recommendations on rock surface stabilization, if necessary. The specifications should also include an allowance for rock bolting and/or other stabilizing work.

Underpinning - A six story concrete structure, the Manhattan Mini Storage building, is located immediately north of the proposed building. The building has plan dimensions of about 160 feet in the east-west direction and about 100 feet in the north-south direction. The 160 feet side of the building will abut the proposed building. We reviewed Manhattan Land Books dating back to 1885. As the building is first shown in the 1927 Land Book and not shown in the 1916 Land Book, we believe that the building was built between 1916 and 1927. We attempted to obtain foundation drawings of the building at the Building Department, but none were available. On January 14, 2003, our Mr. Jong Choi visited the building to observe the basement. His observation indicates that the building has a basement below ground floor. The top of the ground floor was about four feet above the sidewalk grade at 11th Avenue and about 6.8 feet above the sidewalk grade at the west end of the building, as the sidewalk slopes down toward the west. The basement's slab to ceiling height was about 9.4 feet. Using the sidewalk grade at 11th Avenue at about Elev. 23, we estimate that the top of the basement slab is at about Elev. 16.5, which will be about 25 feet above the proposed excavation subgrade. No information is available as to support of the structure. As a portion of the slab subgrade is within the fill stratum, it is likely that the building is in part supported on or within the fill stratum. Therefore, the building may require underpinning prior to excavation below foundations of the building.

Rock surface in the southwest quadrant of the building is highest at Elev. +15.5, and drops off to Elev.-17 at the southeast corner of the building. The southwest portion of the building may be directly bearing on rock, while portion toward the southeast may be bearing on soil or may be supported by piles. In the absence of foundation drawings, we recommend that you carry a contingency budget for underpinning the entire south side of the building. The Contractor may be required to perform test pits to expose foundations prior to subgrade excavation. The extent to which underpinning is required may be determined based on the test pit investigation. The portion of the building bearing on rock may require rock bolts stabilizing the vertical rock surface below footings. All underpinning piers should be supported on rock.

Small movements are to be expected for any underpinning. The amount of movement is a function of the workmanship of the underpinning including the method of load transfer to the structure. If conventional pit underpinning is performed, dry pack should be rammed in place between the underpinning pier and the underside of the existing structure to minimize post construction settlement. Underpinning is conventionally designed by the contractor's engineer and submitted to the Owner for review prior to implementation.

Temporary Excavation System - Soil around the perimeter of the excavation should be retained by temporary excavation supports. The support system selected should be stiff and prevent migration of sand fines due to seepage. If soldier pile and lagging or sheet piling is selected by the excavation contractor, the installation should include rock pins at the toes of the support system where they bear on bedrock. The support system should be braced or tied back, and be relatively stiff so that lateral soil movements will not lead to subsidence of sidewalks or damage to buried utilities. If a portion of the Manhattan Mini Storage building is supported by piles, that portion of the excavation support may require internal bracing to protect the piles from damage which may be caused by tiebacks. We recommend the system proposed by the contractor be

EXHIBITS

designed by a professional engineer licensed in the State of New York, and submitted to the Owner for review prior to installation.

Construction Dewatering - Excavation subgrade will be about nine to 17 feet below the water levels observed in the piezometers. Groundwater will seep into the excavation through joints in the rock and flow through the soil above rock. As the rock subgrade will not be disturbed by water, the contractor can be permitted to dewater the rock excavation areas by pumping from local sumps at the base of the excavation. However, water flow into the excavation through the soil must be controlled to prevent the migration of soil fines that could lead to subsidence of ground beyond the excavation. Hence, we recommend that louvres between lagging boards be packed with straw.

We trust this report provides information you requested for the project. If you have any questions or if we can be of further assistance, please contact us.

Very truly yours,

MUESER RUTLEDGE CONSULTING ENGINEERS

By: _____
Jong W. Choi

By: _____
Joel Moskowitz

JWC:JM:f:\9347\residential-rpt.wpd

TABLE NO. 1

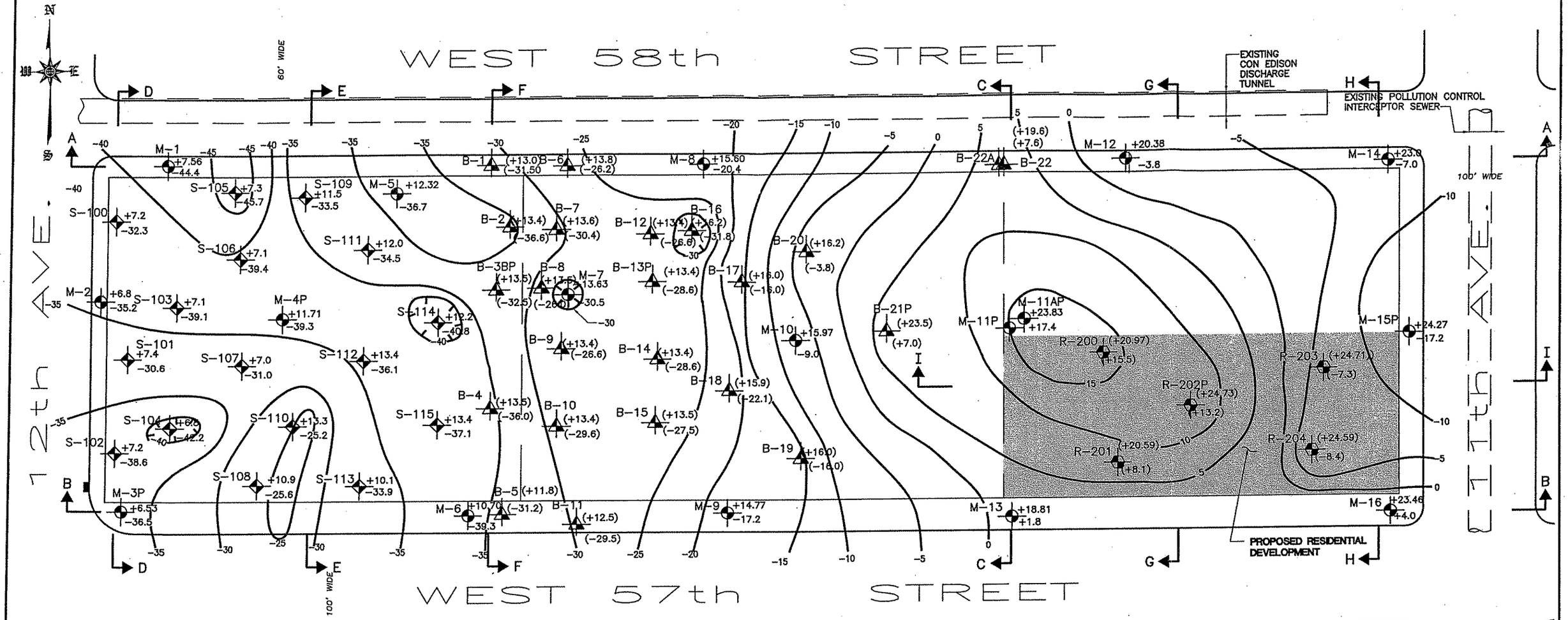
SOIL AND ROCK DESIGN PARAMETERS

DESCRIPTION	PARAMETER (Proofrolled Fill or S/T Strata)
1. Allowable bearing capacity for slab only	2 tsf
2. Unit weight of soil above water table Unit weight of soil below water table Unit weight of rock above water table Unit weight of rock below water table	125 pcf 63 pcf 160 pcf 100 pcf
3. Friction angle	34 degrees
4. Coefficient of friction between concrete and soil	0.40
5. Earth pressure coefficients Coefficient of active earth pressure Coefficient of at-rest earth pressure	 0.3 0.5
6. Lateral rock pressure coefficient Foundation walls cast directly against vertical rock face	0.1
7. Equivalent fluid pressures Flexible walls above water table Rigid walls above water table Flexible walls below water table Rigid walls below water table	 38 psf/ft 63 psf/ft 81 psf/ft 94 psf/ft
8. Seismic site coefficient for structures bearing on bedrock	0.67

Notes:

1. Structural walls retained at the top and bottom are considered rigid; walls restrained at the bottom and free at the top are considered flexible.
2. Stratum F is not considered suitable for support of the structure.

F:\93\9347\Soiltable-Helena.wpd



GRAPHIC SCALE

30' 20' 10' 0 30' 60'

BORING LOCATION PLAN NOTES:

1. SEE DRAWINGS NO. GS-1 THROUGH GS-4 FOR GEOLOGIC SECTIONS A-A THROUGH I-I.
2. FOR BORING NOTES, SEE DRAWING NO. B-1.
3. CONTOURS SHOWN ARE BY MRCE.

BORING LEGEND

M-N(P) G R — **MRCE BORINGS (2000)**
N – BORING NUMBER
P – PIEZOMETR INSTALLED
G – GROUND ELEVATION
R – TOP OF ROCK ELEVATION

B-N(P) (G) (R) — **MRCE BORINGS (JULY-AUGUST, 2001)**
N – BORING NUMBER
P – PIEZOMETR INSTALLED
G – GROUND ELEVATION
R – TOP OF ROCK ELEVATION

S-N G — **MRCE BORING (NOV.-DEC., 2001)**
N – BORING NUMBER
G – GROUND ELEVATION
R – TOP OF ROCK ELEVATION

R-N(P) (G) (R) — **MRCE BORINGS (2002)**
N – BORING NUMBER
P – PIEZOMETR INSTALLED
G – GROUND ELEVATION
R – TOP OF ROCK ELEVATION

A — LOCATION AND DESIGNATION OF GEOLOGIC SECTION

-10 — CONTOUR OF ROCK AND ELEVATION

REV.	DATE	BY	DESCRIPTION
3	11/5/02	J.W.C.	(1) R-SERIES BORING DATA WERE ADDED. (2) ROCK SURFACE CONTOURS WERE REVISED
2	2/5/02	J.W.C.	(1) S-SERIES BORING DATA WERE ADDED. (2) ROCK SURFACE CONTOURS WERE REVISED
1	9/6/01	J.W.C.	(1) B-SERIES BORING DATA WERE INCORPORATED.

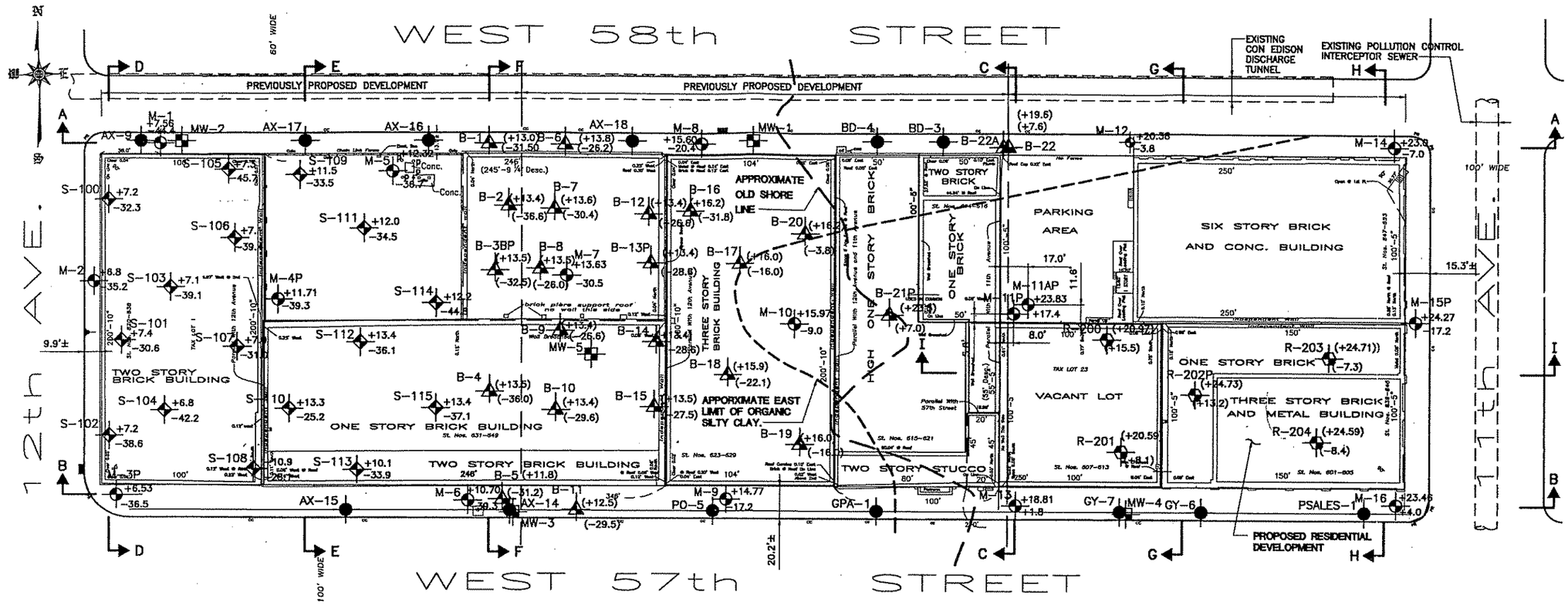
BLOCK 1105
NEW YORK NEW YORK

THE DURST ORGANIZATION, INC.
NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS
14 PENN PLAZA – 225 W. 34TH STREET, NY, NY 10122

SCALE	MADE BY E.C./J.R. DATE 11-22-00	FILE NO.
AS SHOWN	CH'KD BY J.W.C. DATE 11-22-00	9347

ROCK SURFACE CONTOUR PLAN — DRAWING NO. R-1



BORING LOCATION PLAN NOTES:

1. SEE DRAWINGS NO. GS–1 THROUGH GS–4 FOR GEOLOGIC SECTIONS A–A THROUGH I–I.
2. BORINGS PERFORMED DURING THE PERIOD FROM AUGUST 7 TO OCTOBER 6, 2000 UNDER THE INSPECTION OF MUESER RUTLEDGE CONSULTING ENGINEERS.
3. BORINGS PERFORMED DURING THE PERIOD FROM JULY 17 TO AUGUST 9, 2001 UNDER THE INSPECTION OF MUESER RUTLEDGE CONSULTING ENGINEERS.
4. BORINGS PERFORMED DURING THE PERIOD FROM NOVEMBER 29 TO DECEMBER 21, 2001 UNDER THE INSPECTION OF MUESER RUTLEDGE CONSULTING ENGINEERS.
5. BORINGS PERFORMED DURING THE PERIOD FROM OCTOBER 17 TO OCTOBER 22, 2002 UNDER THE INSPECTION OF MUESER RUTLEDGE CONSULTING ENGINEERS.
6. BORINGS INDICATED BY , AND WERE DRILLED BY JERSEY BORING AND DRILLING CO. BASED ON THE BORING LOCATION PLAN PREPARED BY MUESER RUTLEDGE CONSULTING ENGINEERS.
7. BORINGS INDICATED BY WERE DRILLED BY WARREN GEORGE INC. BASED ON THE BORING LOCATION PLAN PREPARED BY MUESER RUTLEDGE CONSULTING ENGINEERS.
8. ALL ELEVATIONS REFER TO THE BOROUGH OF MANHATTAN TOPOGRAPHICAL BUREAU DATUM WHICH IS 2.75 FEET ABOVE MEAN SEA LEVEL AT SANDY HOOK, 1929.
9. IN 2000, PIEZOMETERS WERE INSTALLED IN BORINGS M–3P, M–4P, M–11AP AND M–15P TO ELEVATIONS –46.5, –44.3, +7.3 AND –13.7, RESPECTIVELY.
10. IN 2001, PIEZOMETERS WERE INSTALLED IN BORINGS B–3P, B–13P, AND B–21P TO ELEVATIONS –32.3, –24.6, +7.3 AND +1.5, RESPECTIVELY.
11. IN 2002, PIEZOMETER WAS INSTALLED IN BORING R–202P TO ELEVATION +6.2.
12. JERSEY BORING AND DRILLING CO. IS LOCATED AT: 150 WRIGHT STREET, NEWARK, NJ 07114 (973–242–3800).
13. WARREN GEORGE INC. IS LOCATED AT: P. O. BOX 413, JERSEY CITY, NJ 07303 (201–433–9797).
14. BOTH BASE PLAN AND MRCE BORING LOCATIONS WERE SURVEYED BY MONTROSE SURVEYING CO. INC.

BORING LEGEND

M–N(P) G R — MRCE BORINGS (2000)
N – BORING NUMBER
P – PIEZOMETR INSTALLED
G – GROUND ELEVATION
R – TOP OF ROCK ELEVATION

B–N(P) (G) (R) — MRCE BORINGS (JULY–AUGUST, 2001)
N – BORING NUMBER
P – PIEZOMETR INSTALLED
G – GROUND ELEVATION
R – TOP OF ROCK ELEVATION

S–N G R — MRCE BORING (NOV.–DEC., 2001)
N – BORING NUMBER
G – GROUND ELEVATION
R – TOP OF ROCK ELEVATION

R–N(P) (G) (R) — MRCE BORINGS (2002)
N – BORING NUMBER
P – PIEZOMETR INSTALLED
G – GROUND ELEVATION
R – TOP OF ROCK ELEVATION

N — ATC BORINGS
N – BORING NUMBER
BORING LOCATIONS ARE APPROXIMATE.

MW — ATC MONITORING WELLS
MW – MONITORING WELL NUMBER
MONITORING WELL LOCATIONS ARE APPROXIMATE.

A — LOCATION AND DESIGNATION OF GEOLOGIC SECTION

GRAPHIC SCALE
30' 20' 10' 0 30' 60'

REV.	DATE	BY	DESCRIPTION
3	11–5–02	J.W.C.	① R–SERIES BORING LOCATIONS WERE ADDED.
2	1–23–02	J.W.C.	① S–SERIES BORING LOCATIONS WERE ADDED.
1	9/5/01	J.W.C.	① B–SERIES BORING LOCATIONS WERE ADDED.

BLOCK 1105
NEW YORK NEW YORK

THE DURST ORGANIZATION, INC.
NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS
14 PENN PLAZA – 225 W. 34TH STREET, NY, NY 10122

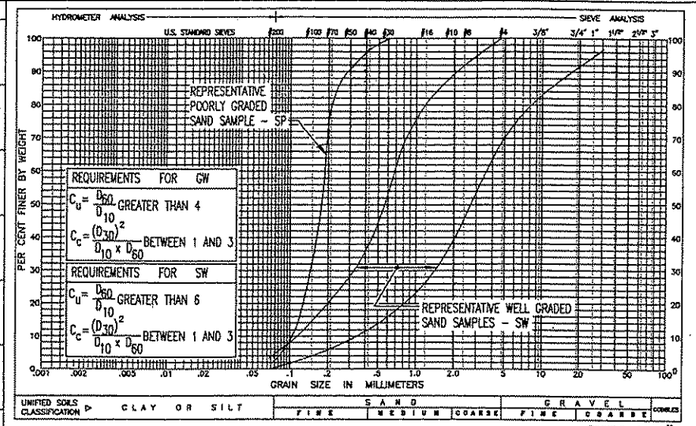
SCALE	MADE BY	DATE	FILE NO.
AS SHOWN	E.C./J.R.	11–22–00	9347
	CH'KD BY J.W.C.	DATE 11–22–00	DRAWING NO.
BORING LOCATION PLAN			B–1

UNIFIED SOIL CLASSIFICATION (INCLUDING IDENTIFICATION AND DESCRIPTION)

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES	FIELD IDENTIFICATION PROCEDURES (EXCLUDING PARTICLES LARGER THAN 3 IN. AND BASING FRACTIONS ON ESTIMATED WEIGHTS)
1	2		3	4	5
COARSE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE. (FOR VISUAL CLASSIFICATION, THE 1/4 -IN. SIZE MAY BE USED AS EQUIVALENT TO THE NO. 4 SIEVE SIZE)	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.	WIDE RANGE IN GRAIN SIZES AND SUBSTANTIAL AMOUNTS OF ALL INTERMEDIATE PARTICLE SIZES.
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.	PREDOMINANTLY ONE SIZE OR A RANGE OF SIZES WITH SOME INTERMEDIATE SIZES MISSING.
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES.	NONPLASTIC FINES OR FINES WITH LOW PLASTICITY (FOR IDENTIFICATION PROCEDURES SEE ML BELOW)
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES.	PLASTIC FINES (FOR IDENTIFICATION PROCEDURES SEE CL BELOW)
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE.	CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.	WIDE RANGE IN GRAIN SIZES AND SUBSTANTIAL AMOUNTS OF ALL INTERMEDIATE PARTICLE SIZES.
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.	PREDOMINANTLY ONE SIZE OR A RANGE OF SIZES WITH SOME INTERMEDIATE SIZES MISSING.
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES.	NONPLASTIC FINES OR FINES WITH LOW PLASTICITY (FOR IDENTIFICATION PROCEDURES SEE ML BELOW).
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES.	PLASTIC FINES (FOR IDENTIFICATION PROCEDURES SEE CL BELOW)
FINE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE					IDENTIFICATION PROCEDURES ON FRACTION SMALLER THAN NO. 40 SIEVE SIZE
					DRY STRENGTH (CRUSHING CHARACTERISTICS) / DILATANCY (REACTION TO SHAKING) / TOUGHNESS (CONSISTENCY NEAR PL)
	SILTS AND CLAYS LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS, SANDY SILTS, ROCK FLOUR, OR CLAYEY SILTS WITH SLIGHT PLASTICITY.	NONE TO SLIGHT / QUICK TO SLOW / NONE
			CL	INORGANIC CLAYS, OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.	MEDIUM TO HIGH / NONE TO VERY SLOW / MEDIUM
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.	SLIGHT TO MEDIUM / SLOW / SLIGHT
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS.	SLIGHT TO MEDIUM / SLOW TO NONE / SLIGHT TO MEDIUM
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.	HIGH TO VERY HIGH / NONE / HIGH
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.	MEDIUM TO HIGH / NONE TO VERY SLOW / SLIGHT TO MEDIUM
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS.	READILY IDENTIFIED BY COLOR, ODOR, SPONGY FEEL AND FREQUENTLY BY FIBROUS TEXTURE.

BOUNDARY CLASSIFICATIONS: SOILS POSSESING CHARACTERISTICS OF TWO GROUPS ARE DESIGNATED BY COMBINATIONS OF GROUP SYMBOLS, I.E.: SP-SC POORLY GRADED SAND WITH CLAY BINDER.

LABORATORY CLASSIFICATION CRITERIA

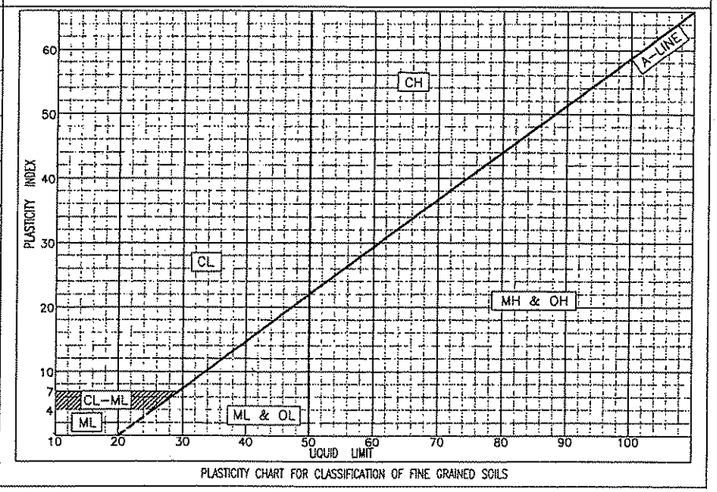


GRAIN SIZE PLOT

COBBLE 3-12 "
BOULDER > 12 "

DEPENDING ON PERCENTAGE OF FINES (FRACTION SMALLER THAN NO. 200 SIEVE SIZE) COARSE GRAINED SOILS ARE CLASSIFIED AS FOLLOWS:

LESS THAN 5%	GW, GP, SW, SP
MORE THAN 12%	GM, GC, SM, SC
5% TO 12%	BORDERLINE CASES REQUIRING USE OF DUAL SYMBOLS, I.E.: SP-SM, GP-GM.



PLASTICITY CHART FOR CLASSIFICATION OF FINE GRAINED SOILS

TERMINOLOGY USED IN MRCE SOIL DESCRIPTIONS

DEGREE OF COMPACTION FOR NON-PLASTIC SOIL	
DEGREE OF COMPACTION	BLOWS* PER FOOT
LOOSE	0 TO 10
MEDIUM COMPACT	11 TO 29
COMPACT	30 TO 50
VERY COMPACT	GREATER THAN 50

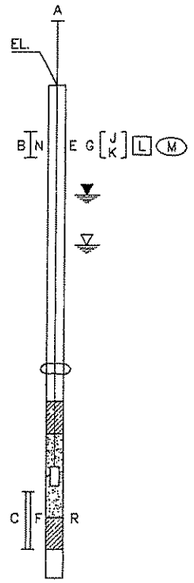
* STANDARD PENETRATION RESISTANCE USING 140 LB. HAMMER FREE FALLING 30 INCHES TO DRIVE A 2 INCH O.D. SPLIT-SPOON SAMPLER.

CONSISTENCY OF CLAY AND CLAYEY SILT +		
CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TSF)	IDENTIFICATION CHARACTERISTICS
SOFT	LESS THAN 0.5	EASILY REMOLDED WITH SLIGHT FINGER PRESSURE
MEDIUM	0.5 TO 1.0	REQUIRES SUBSTANTIAL PRESSURE FOR REMOLDING
STIFF	1.0 TO 4.0	DIFFICULT TO REMOLD WITH FINGERS
HARD	GREATER THAN 4.0	CANNOT BE REMOLDED WITH FINGERS

\+ NONPLASTIC SILTS ARE DESCRIBED USING DEGREE OF COMPACTION AS PRESENTED FOR NON-PLASTIC SOIL.

DESCRIPTION OF CONSTITUENT PERCENTAGES AS USED IN SOIL SAMPLE CLASSIFICATIONS

1% TO 12%	"TRACE"
13% TO 30%	"SOME"
31% TO 49%	ADJECTIVE FORM OF SOIL GROUP (EG. SANDY)
EQUAL AMOUNT	"AND" (EG. SAND AND GRAVEL)



BORING LEGEND

- A – NUMBER, TYPE AND LOCATION OF BORING
- EL. – GROUND SURFACE ELEVATION AT BORING
- B – NUMBER AND TYPE OF SAMPLE
  - D – DRY SAMPLE TAKEN WITH 2 INCH O.D. SPLIT SPOON
  - U* – UNDISTURBED SAMPLE TAKEN WITH 3 INCH O.D. FIXED PISTON TYPE SAMPLER
  - UD – UNDISTURBED SAMPLE EXTRUDED IN FIELD AND PLACED IN JAR DUE TO POOR RECOVERY OR DISTURBANCE
  - S – THIN TUBE SAMPLE TAKEN WITH SHELBY TUBE SAMPLER
  - W – WASH SAMPLE
  - NR – NO RECOVERY
- I – LENGTH OF SAMPLE ATTEMPT
- N – STANDARD PENETRATION RESISTANCE. NUMBER OF BLOWS FROM 140 LB. HAMMER FREE FALLING 30 INCHES REQUIRED TO DRIVE 2 INCH O.D. SPLIT SPOON SAMPLER ONE FOOT AFTER INITIAL PENETRATION OF 6 INCHES, UNLESS A SPECIFIC PENETRATION IS INDICATED.
  - P – PRESSED OR PUSH SAMPLE
  - WH – SAMPLE TAKEN UNDER WEIGHT OF HAMMER AND RODS
  - WR – SAMPLE TAKEN UNDER WEIGHT OF RODS
- E – AVERAGE NATURAL WATER CONTENT OF SAMPLE, IN PERCENT OF DRY WEIGHT
- G – UNIFIED SOIL CLASSIFICATON GROUP SYMBOL OF SAMPLE
- [J / K] = ATTERBERG LIQUID LIMIT VALUE / ATTERBERG PLASTIC LIMIT VALUE
- [L] – COMPRESSIVE STRENGTH IN TSF DETERMINED FROM UNCONFINED COMPRESSION TEST
- (M) – COMPRESSIVE STRENGTH IN TSF DETERMINED FROM UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
- – GROUNDWATER LEVEL OBSERVED IN BORING * – MUD LEVEL
- – GROUNDWATER LEVEL OBSERVED IN PIEZOMETER
- C – ROCK CORE NUMBER
- I – LENGTH OF CORE RUN
- F – LENGTH OF CORE RECOVERED EXPRESSED AS A PERCENT OF THE LENGTH OF CORE RUN
- R – ROCK QUALITY DESIGNATION-THE SUM OF THE LENGTHS OF PIECES OF RECOVERED CORE WHICH ARE EQUAL TO OR GREATER THAN FOUR INCHES IN LENGTH, EXPRESSED AS A PERCENTAGE OF THE TOTAL LENGTH OF CORE RUN. LENGTHS ARE MEASURED BETWEEN IN-SITU SEPARATIONS AND MECHANICAL BREAKS RESULTING FROM CORING ARE IGNORED.
- IMPERVIOUS SEAL
- SAND FILTER SURROUNDING PIEZOMETER INTAKE ELEMENT
- INTAKE ELEMENT
- COBBLE OR BOULDER

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GEOTECHNICAL REFERENCE STANDARDS

DRAWING NO. GS-R

TABLE R–1 ROCK CORE CLASSIFICATION CRITERIA

HARDNESS/SOUNDNESS CLASSIFICATION	TYPICAL GEOLOGIC CLASSIFICATION	IDENTIFICATION CHARACTERISTICS	GENERAL MINIMUM CORING CHARACTERISTICS				INTACT SPECIMEN TYPICAL MINIMUM COMPRESSIVE STRENGTH
			NX OR LARGER		BX OR SMALLER		
			REC	RQD	REC	RQD	PSI
HARD ROCK UNWEATHERED MAY BE JOINTED	–CRYSTALLINE IGNEOUS, OR METAMORPHIC ROCKS –HIGHLY SILICEOUS SEDIMENTARY ROCKS	– UNWEATHERED FABRIC – RINGS WHEN STRUCK WITH BAR – SHARP AND HARD FRACTURE SURFACE WHEN BROKEN MECHANICALLY – MAY BE JOINTED, BUT JOINTS ARE GENERALLY TIGHT. JOINTS MAY BE IRON STAINED. – DOES NOT DISINTEGRATE UPON EXPOSURE – DOES NOT SLAKE IN WATER	95 OR MORE	85 OR MORE	85 OR MORE	75 OR MORE	3,000
MEDIUM HARD ROCK SLIGHTLY WEATHERED MAY BE CLOSELY JOINTED	AS FOR HARD ROCKS AND: – MODERATELY SILICEOUS SEDIMENTARY ROCKS – CERTAIN CALCAREOUS ROCKS	AS FOR HARD ROCK, EXCEPT: – FABRIC MAY BE IRON STAINED – MAY BE CLOSELY JOINTED, BUT JOINTS ARE GENERALLY TIGHT. JOINTS HAVE SLIGHT WEATHERING OR MAY BE IRON STAINED.	70	50	50	40	1,500
INTERMEDIATE ROCK MODERATELY WEATHERED MAY BE CLOSELY JOINTED	AS FOR MEDIUM HARD ROCKS AND: – MOST SEDIMENTARY ROCKS OTHER THAN COMPACTION SHALES – MOST CALCAREOUS ROCKS WHICH ARE NOT POROUS	AS FOR MEDIUM HARD ROCK, EXCEPT: – MODERATELY WEATHERED FABRIC – WEATHERED JOINTS – THUDS WHEN STRUCK BY BAR – CAN BE INDENTED WITH A STEEL NAIL – BREAKS READILY WITH HAMMER – PIECES OF WEATHERED SURFACE CAN BE BROKEN OFF BY HAND – DOES NOT DISINTEGRATE UPON EXPOSURE – UNWEATHERED PIECES DO NOT SLAKE	50	35	35	25	500
WEATHERED ROCK HIGHLY WEATHERED MAY BE BROKEN	AS FOR INTERMEDIATE ROCKS AND: – COMPACTION SEDIMENTARIES – CALCAREOUS ROCKS WITH SOIL–FILLED CAVITIES	AS FOR INTERMEDIATE ROCK, EXCEPT: – HIGHLY WEATHERED FABRIC – CAN BE BROKEN EASILY, CRUMBLES WITH DIFFICULTY BY HAND – CAN BE SCRAPED BY KNIFE – MAY SOFTEN UPON EXPOSURE – MAY SLAKE IN WATER – STANDARD PENETRATION RESISTANCE EXCEEDS 50 BLOWS/FOOT	LESS THAN 50	LESS THAN 35	LESS THAN 35	LESS THAN 25	150
		WHEN RECOVERED WITH SOIL SAMPLING TECHNIQUES, DESCRIBED AS FOR SOILS INCLUDING USC GROUP SYMBOLS. (WTHD ROCK) ADDED TO DESCRIPTION.					
DECOMPOSED ROCK (RESIDUAL SOILS)	ALL ROCK TYPES	– ROCK TEXTURE AND STRUCTURE OFTEN PRESERVED – GENERALLY SOIL–LIKE IN CONSISTENCY – CAN BE CRUMPLED BY SLIGHT HAND PRESSURE – CAN BE PEELED WITH A KNIFE – STANDARD PENETRATION RESISTANCE LESS THAN 50 BLOWS/FOOT	GENERALLY RECOVERED WITH SOIL SAMPLING TECHNIQUES AND DESCRIBED AS FOR SOILS INCLUDING USC GROUP SYMBOLS. (DEC ROCK) ADDED TO DESCRIPTION.				

NOTES:

1. ROCK CORE DESCRIPTIONS REPRESENT ONLY THE MATERIAL RECOVERED IN THE CORING OPERATIONS.
2. GENERAL MINIMUM CORING CHARACTERISTICS ASSUME ROCK CORING WITH A DOUBLE TUBE SERIES "M" OR EQUIVALENT CORE BARREL USING GOOD CORING TECHNIQUES AND EQUIPMENT.
3. REC – RECOVERY IS THE LENGTH OF CORE RECOVERED, EXPRESSED AS A PERCENTAGE OF THE LENGTH OF CORE RUN.
4. RQD – ROCK QUALITY DESIGNATION IS THE SUM OF THE LENGTHS OF CORE PIECES FOUR INCHES OR LONGER EXPRESSED AS A PERCENTAGE OF THE TOTAL LENGTH OF CORE RUN. LENGTHS ARE MEASURED BETWEEN IN–SITU SEPARATIONS; MECHANICAL BREAKS RESULTING FROM CORING AND VERTICAL JOINTS ARE IGNORED.

TABLE R–2 WEATHERING AND JOINTING DEFINITIONS

DEGREE OF FABRIC WEATHERING

FABRIC WEATHERING		CHARACTERISTIC
Unweathered	UnW	No decomposition or discoloration rings when struck
Slightly Weathered	SlW	Iron Stained Rings when struck
Moderately Weathered	MdW	Deteriorated fabric Thuds when struck
Highly Weathered	HiW	Friable, easily broken by hand
Decomposed	Dec	Soil–like

DEGREE OF JOINT WEATHERING

JOINT WEATHERING		CHARACTERISTIC
Iron stained joints	FeJtS	Indicates movement of water along joints
Weathered joints	WJts	Joints are not tight and do not match. Joints have friable edges.

DEGREE OF JOINTING

JOINTING		JOINT FREQUENCY
Massive	Mssv	Less than 1 joint in 4 feet
Blocky	Blky	1 joint every 2 to 4 feet
Moderately Jointed	MdJtd	1 joint every foot to 2 feet
Jointed	Jtd	1 to 2 joints per foot
Closely Jointed	ClJtd	2 to 4 joints per foot
Broken	Bkn	More than 4 joints per foot

Vertical joints are ignored in RQD and joint frequency evaluations, but are noted in written descriptions and and on core sketches.

TABLE R–3 ABBREVIATIONS FOR ROCK CORE CLASSIFICATION

Blocky	Blky	Intermediate	Int
Broken	Bkn	Light	Lt
Brown	brn	Lignite	lign
Calcareous or Calcite	calc	Limestone	lms
Cavities	cvts	Jointed	Jtd
Chlorite	chl	Joints	Jts
Clay, Clayey	cl	Massive	Mssv
Closely Jointed	ClJtd	Medium Hard	MdHd
Coating on joint surface	coat	Mica, Micaceous	Mic
Crushed	crsh	Moderately Jointed	MdJtd
Dark	dk	Moderately Weathered	MdW
Decomposed	Dec	Pockets	pkts
Ditto	do	Quartz	qtz
Dolomite, Dolomitic	Dol	Recovery	Rec
Iron stained Joints	FeJts	Rock Quality Designation	RQD
Iron Stained	FeStn	Sand	sa
Feldspar	feld	Sandstone	ss
Foliation	Fol	Schist, Schistose	sch
Fractured	frct	Shale	sh
Fragments	fgmts	Shear zone	Sz
Gneiss, Gneissic	gns	Siliceous	sil
Gouge	gog	Silt	si
Granite, Granitic	gr	Slickensided	slks
Gray	gry	Slightly Weathered	SlW
Hard	Hd	Unweathered	UnW
Highly Weathered	HiW	Weathered	Wthd
Hornblende	Hbl	Weathered Joints	WJts
Injected	inj	Vein	Vn
Interbedded	Intrbd	Vertical Joints	VJts

TABLE R–4 ROCK CORE SKETCH KEY

SKETCH SYMBOLS

- Joint
- Healed Joint
- Broken
- Part of Core Not Recovered
- Cavities or Vugs in Core
- Clay
- Sand

JOINT ORIENTATION AND CONDITION

		SURFACE – CONDITION	
Parallel	//	Curved – C	Slick – 1
Crossing	X	Irregular – I	Smooth – 2
Foliation	F	Straight – S	Rough – 3
Stratification	S		
Unfoliated or Unstratified	U		
Mechanical Break	MB		

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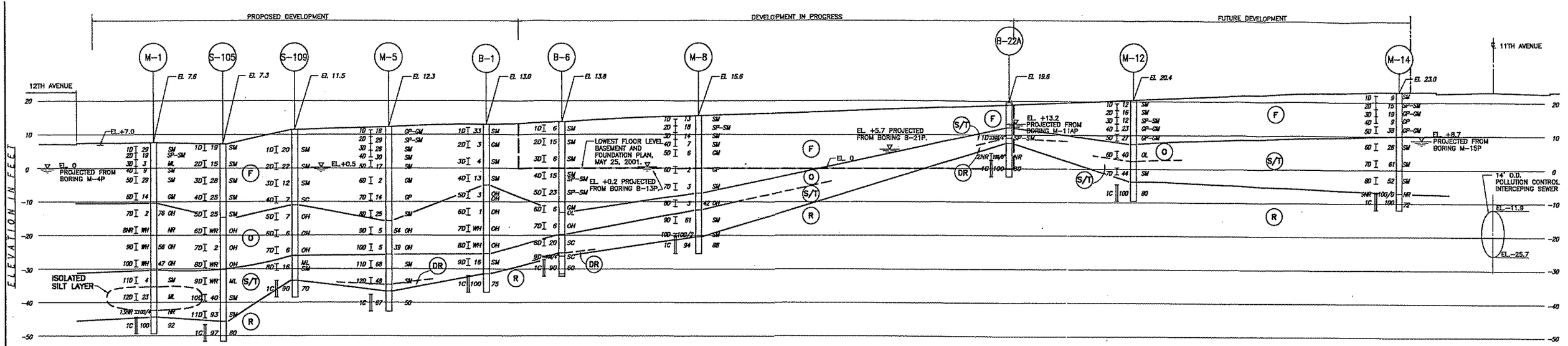
ROCK CORE CLASSIFICATION CRITERIA

DRAWING NO. RC–1



SECTION A–A

GENERAL STRATA DESCRIPTIONS:

(F) FILL:
BROWN MEDIUM COMPACT TO LOOSE FINE TO COARSE SAND, SOME SILT, AND SILTY FINE TO COARSE SAND, SOME TO TRACE GRAVEL, ROCK FRAGMENTS AND MISCELLANEOUS MATERIALS.

(O) ORGANIC SILTY CLAY
SOFT BLACK AND DARK GRAY ORGANIC SILTY CLAY, TRACE FINE SAND, SHELL AND WOODS.

(S/T) SAND AND TILL:
BROWN COMPACT AND VERY COMPACT SILTY FINE TO MEDIUM SAND, SOME TO TRACE COARSE SAND, TRACE GRAVEL.

(DR) DECOMPOSED ROCK:
VERY COMPACT BROWN FINE TO COARSE SAND, SOME TO TRACE SILT, TRACE TO SOME ROCK FRAGMENTS.

(WR) WEATHERED ROCK:
WEATHERED GRAY MICA SCHIST TO MICA SCHISTOSE GNEISS.

(R) BEDROCK:
MEDIUM HARD TO HARD SLIGHTLY WEATHERED TO MODERATELY WEATHERED, GRAY MICA SCHIST, GRANITE, AND GNEISS, JOINTED TO BROKEN, IRON STAINED TO WEATHERED JOINTS.

GEOLOGIC SECTION NOTES:

1. FOR BORING LOCATION PLAN AND NOTES, SEE DRAWING NO. B-1.
2. SOIL SAMPLE DESCRIPTIONS AND GROUND WATER OBSERVATIONS ARE GIVEN ON THE BORING LOGS IN APPENDIX A. SEE DRAWING GS-R FOR BORING LEGEND AND A SUMMARY OF THE UNIFIED SOIL CLASSIFICATION SYSTEM USED TO DESCRIBE THE SAMPLES.
3. BORINGS ILLUSTRATED ON THE GEOLOGIC SECTIONS ARE IN SOME CASES PROJECTED TO THE SECTION AND/OR OFFSET FOR CLARITY. STRATIFICATIONS SHOWN BETWEEN SOIL SAMPLES AND BEYOND BORINGS ARE NECESSARY INTERPOLATIONS BETWEEN BORINGS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.
4. WATER LEVELS SHOWN BY OPEN SYMBOLS WERE MEASURED IN WELL-POINT PIEZOMETERS.
5. THE POLLUTION CONTROL INTERCEPTING SEWER'S LOCATION IS APPROXIMATE. THE CROWN AND INVERT ELEVATIONS INDICATED REFER TO DIMENSIONS OF EXTERIOR TRIB STEEL SETS" THAT THE ORIGINAL DRAWINGS SHOW AT 4'± SPACING.

GRAPHIC SCALE

HORIZONTAL: 20' 10' 0 20' 40'

VERTICAL: 10' 5' 0 10' 20'

REV.	DATE	BY	DESCRIPTION
2	1-29-02	J.W.C.	① BORINGS S-105 AND S-109 WERE ADDED ② GEOLOGIC SECTIONS WERE ACCORDINGLY REVISED. ③ GROUNDWATER READINGS WERE UPDATED.
1	9/5/01	J.W.C.	① BORINGS B-1, B-6 AND B-22A WERE AD ② WATER READINGS WERE UPDATED.

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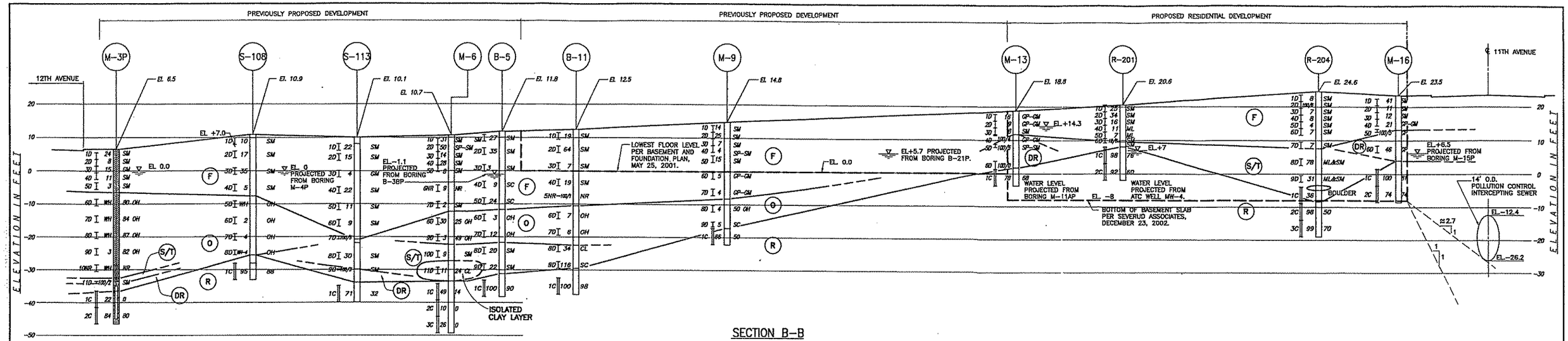
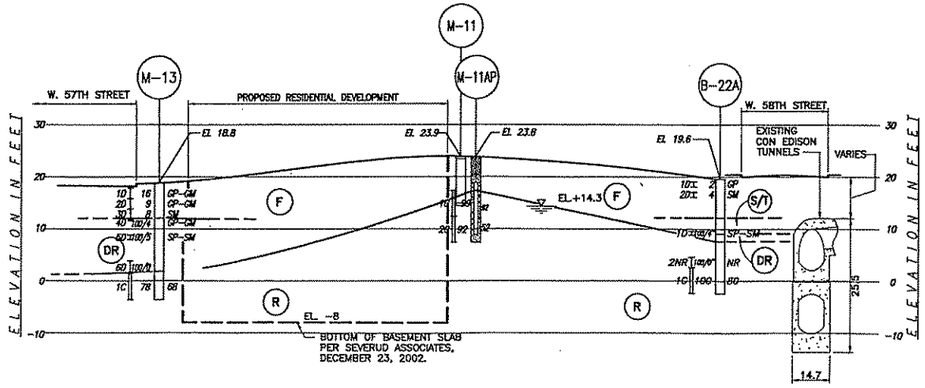
AS SHOWN	E.C./J.R.	11-22-00	9347
	CHKD BY J.W.C.	11-22-00	DRAWING NO.

GEOLOGIC SECTION A–A — GS-1



SECTION B–B



SECTION C–C

GENERAL STRATA DESCRIPTIONS:

(F) FILL:
BROWN MEDIUM COMPACT TO LOOSE FINE TO COARSE SAND, SOME SILT, AND SILTY FINE TO COARSE SAND, SOME TO TRACE GRAVEL AND ROCK FRAGMENTS.

(O) ORGANIC SILTY CLAY
SOFT BLACK AND DARK GRAY ORGANIC SILTY CLAY, TRACE FINE SAND, SHELL AND WOODS.

(S/T) SAND AND TILL:
BROWN COMPACT AND VERY COMPACT SILTY FINE TO MEDIUM SAND, SOME TO TRACE COARSE SAND, TRACE GRAVEL.

(DR) DECOMPOSED ROCK:
VERY COMPACT BROWN FINE TO COARSE SAND, SOME TO TRACE SILT, TRACE TO SOME ROCK FRAGMENTS.

(WR) WEATHERED ROCK:
WEATHERED GRAY MICA SCHIST TO MICA SCHISTOSE GNEISS.

(R) BEDROCK:
MEDIUM HARD TO HARD SLIGHTLY WEATHERED TO MODERATELY WEATHERED, GRAY MICA SCHIST, GRANITE, AND GNEISS, JOINTED TO BROKEN, IRON STAINED TO WEATHERED JOINTS.

GEOLOGIC SECTION NOTES:

1. FOR BORING LOCATION PLAN AND NOTES, SEE DRAWING NO. B-1.
2. FOR GEOLOGIC SECTION NOTES, SEE DRAWING NO. GS-1.

GRAPHIC SCALE

HORIZONTAL: 20' 10' 0 20' 40'

VERTICAL: 10' 5' 0 10' 20'

REV.	DATE	BY	DESCRIPTION
3	11-5-02	J.W.C.	① BORINGS R-201 AND R-204 WERE ADDED. ② GEOLOGIC SECTIONS WERE ACCORDINGLY REVISED. ③ GROUNDWATER READINGS WERE UPDATED.
2	1-29-02	J.W.C.	① BORINGS S-105 AND S-109 WERE ADDED. ② GEOLOGIC SECTIONS WERE ACCORDINGLY REVISED. ③ GROUNDWATER READINGS WERE UPDATED.
1	9/5/01	J.W.C.	① BORINGS B-5 & B-11 WERE ADDED. ② WATER READINGS WERE UPDATED. ③ SECTION C-C WAS REVERSED.

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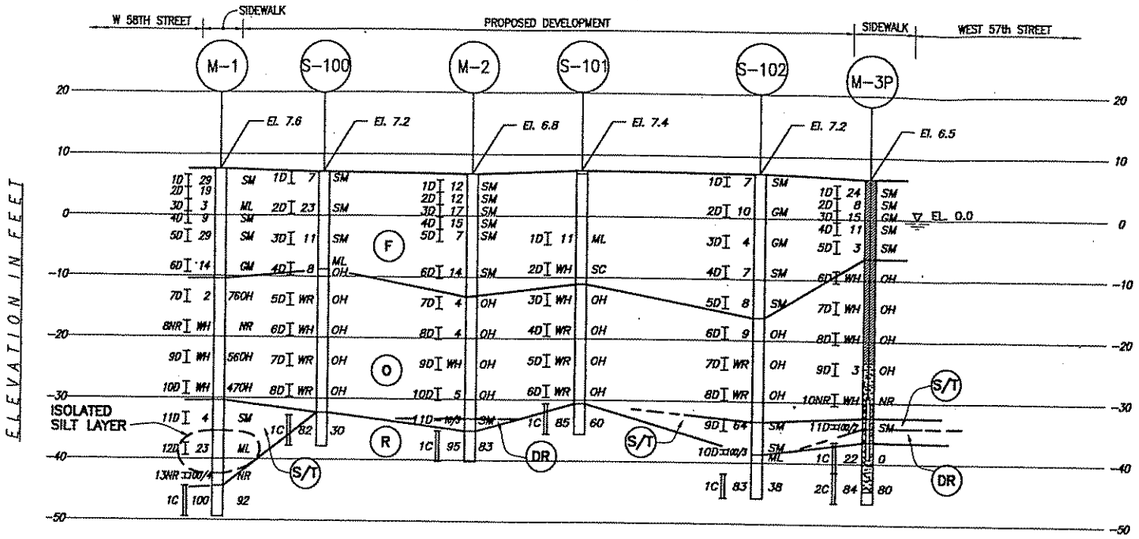
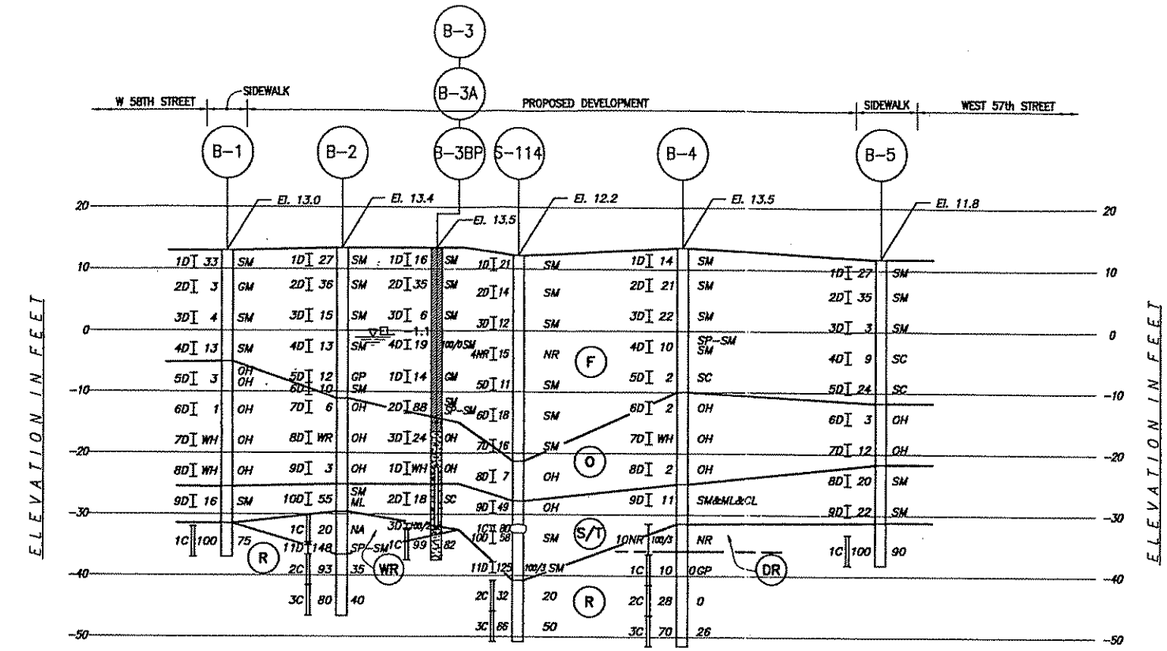
	CHKD BY J.W.C.	DATE 11-22-00	DRAWING NO.

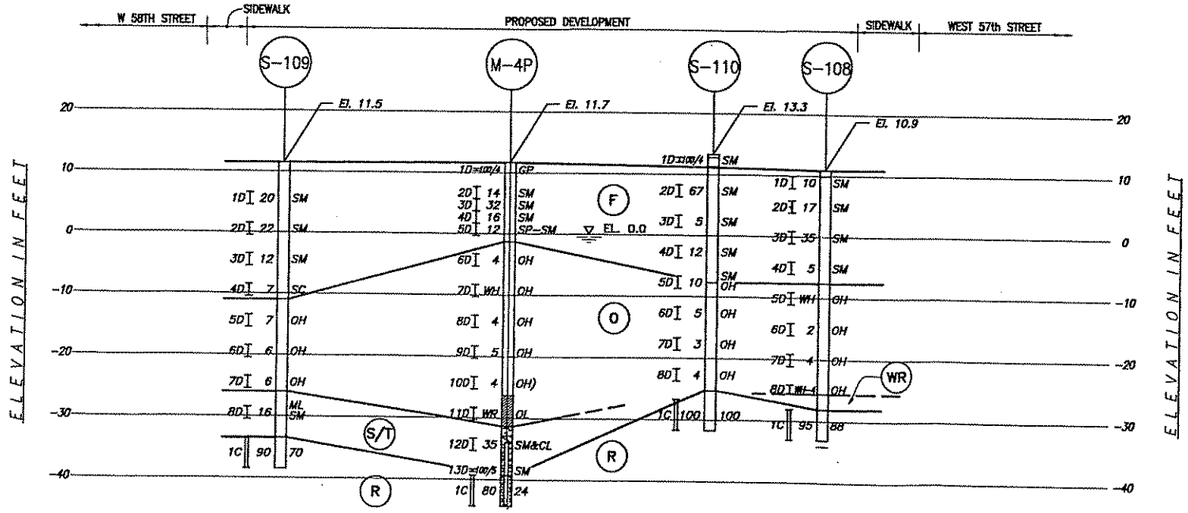
GEOLOGIC SECTIONS B–B & C–C — GS-2



SECTION D-D



SECTION F-F



SECTION E-E

GEOLOGIC SECTION NOTES:

1. FOR BORING LOCATION PLAN AND NOTES, SEE DRAWING NO. B-1.
2. FOR GEOLOGIC SECTION NOTES AND GENERAL STRATA DESCRIPTIONS, SEE DRAWING NO. GS-1.

GRAPHIC SCALE

HORIZONTAL: 20' 10' 0 20' 40'

VERTICAL: 10' 5' 0 10' 20'

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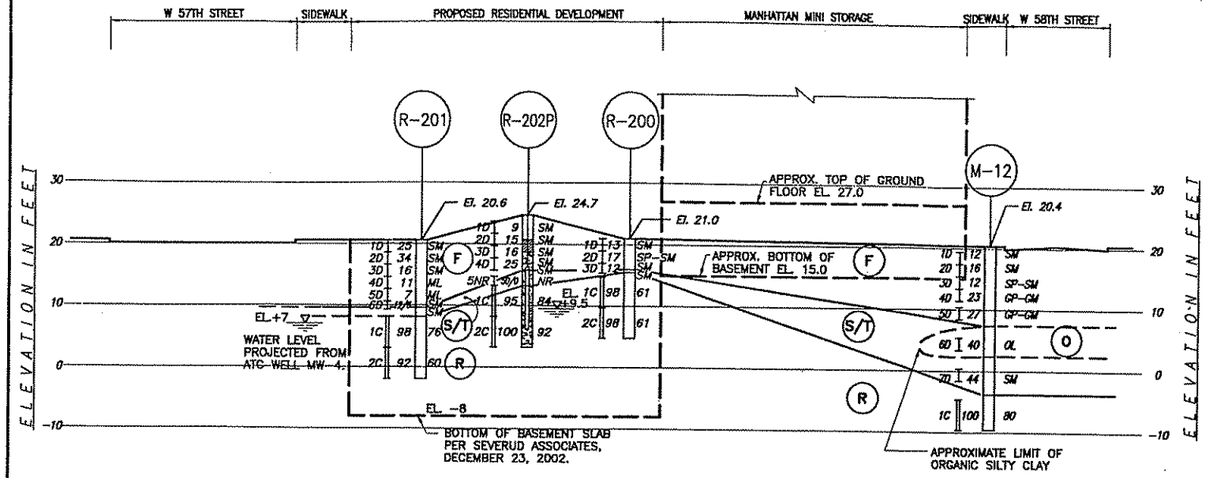
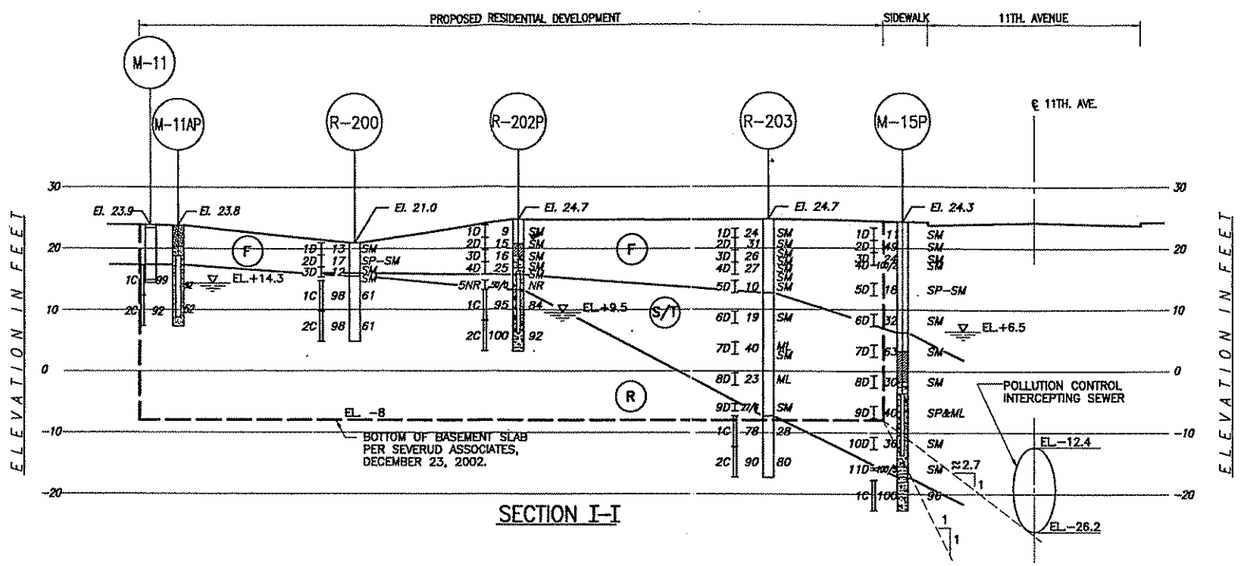
AS SHOWN	A.P.	2-5-02	9347
	CH'KD BY J.W.C.	DATE 2-5-02	DRAWING NO.

GEOLOGIC SECTIONS D-D, E-E & F-F

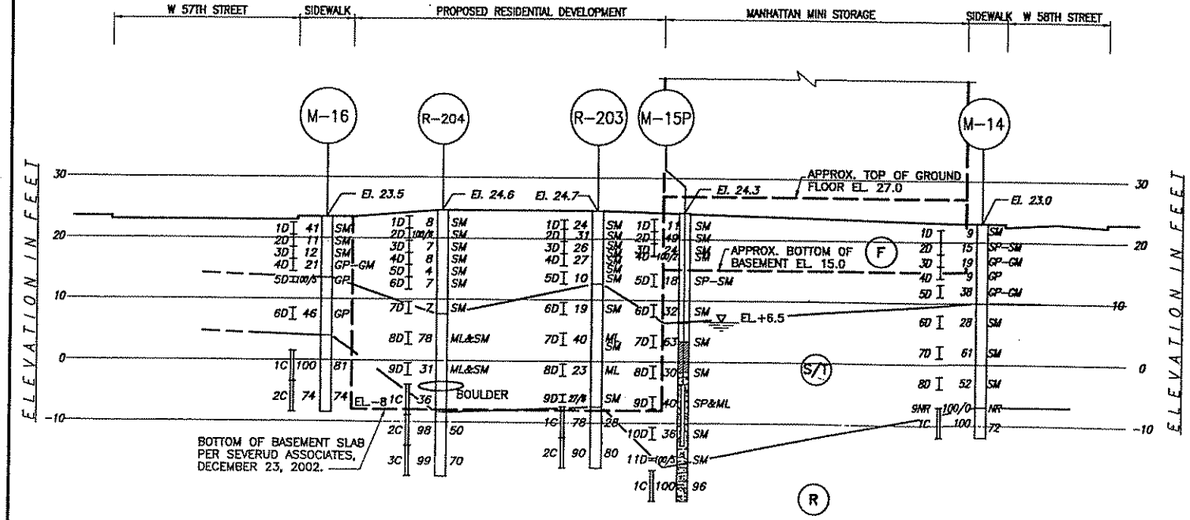
GS-3



SECTION G-G



SECTION I-I



SECTION H-H

GEOLOGIC SECTION NOTES:

1. FOR BORING LOCATION PLAN AND NOTES, SEE DRAWING NO. B-1.
2. FOR GEOLOGIC SECTION NOTES AND GENERAL STRATA DESCRIPTIONS, SEE DRAWING NO. GS-1.

GRAPHIC SCALE

HORIZONTAL: 20' 10' 0 20' 40'

VERTICAL: 10' 5' 0 10' 20'

BLOCK 1105

NEW YORK NEW YORK

THE DURST ORGANIZATION, INC.

NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS

14 PENN PLAZA - 225 W. 34TH STREET, NY, NY 10122

SCALE	MADE BY	DATE	FILE NO.
AS SHOWN	A.H.	11-05-02	9347-200
	CH'KD BY J.W.C.	DATE 11-05-02	DRAWING NO.

GEOLOGIC SECTIONS G-G, H-H & I-I

GS-4

Appendix A
(Boring Logs)

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. R-200
SHEET 1 OF 3
FILE NO. 9347-200
SURFACE ELEV. +21.0
RES. ENGR. ANDREW KLAETSCH

PROJECT: BLOCK 1105 - RESIDENTIAL DEVELOPMENT
LOCATION : NEW YORK, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.0	12-7	Brown gray fine to medium sand, sm silt,			DRILLED	
10-18-02		2.0	6-11	trace gravel, brick, mica, cinders (Fill) (SM)			AHEAD	
Friday	2D	2.0	10-8	Red black gravelly fine to coarse sand, some	F		4"	
Clear		4.0	9-12	cinders, trace silt (Fill) (SP-SM)				
52°F	3D	4.0	18-6	Top:Brn blk f-c sand, sm cndrs, silt(Fill)(SM)		5		
		5.6	6-50/1"	Bot:Red brn si f-c sand, tr cl, rock fgmts(SM)		5.5		
	1C	6.2	REC=98%	Medium hard slightly weathered, gray	S/T		4*	Lowered casing to
		11.2	RQD=61%	granite, jointed to closely jointed,			4*	6.2'.
				weathered joints, iron stained joints			3.5*	*Coring time in
						10	3.5*	minutes per foot.
					R		3.5*	
	2C	11.2	REC=99%	Medium hard slightly weathered, gray			3*	
		16.2	RQD=76%	granite, jointed to closely jointed, iron			4*	
				stained joints, weathered joints			4.5*	
						15	4*	
12:00							3.5*	End of Boring at
						16.2		16.2'.
						20		
						25		
						30		
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS
ROCK CORE SKETCH

BORING NO. R200
SHEET 2 OF 3
FILE NO. 9347-200
SURFACE ELEV.
RES. ENGR. A. Klaetsch

PROJECT BLOCK 1105 - RESIDENTIAL DEVELOPMENT

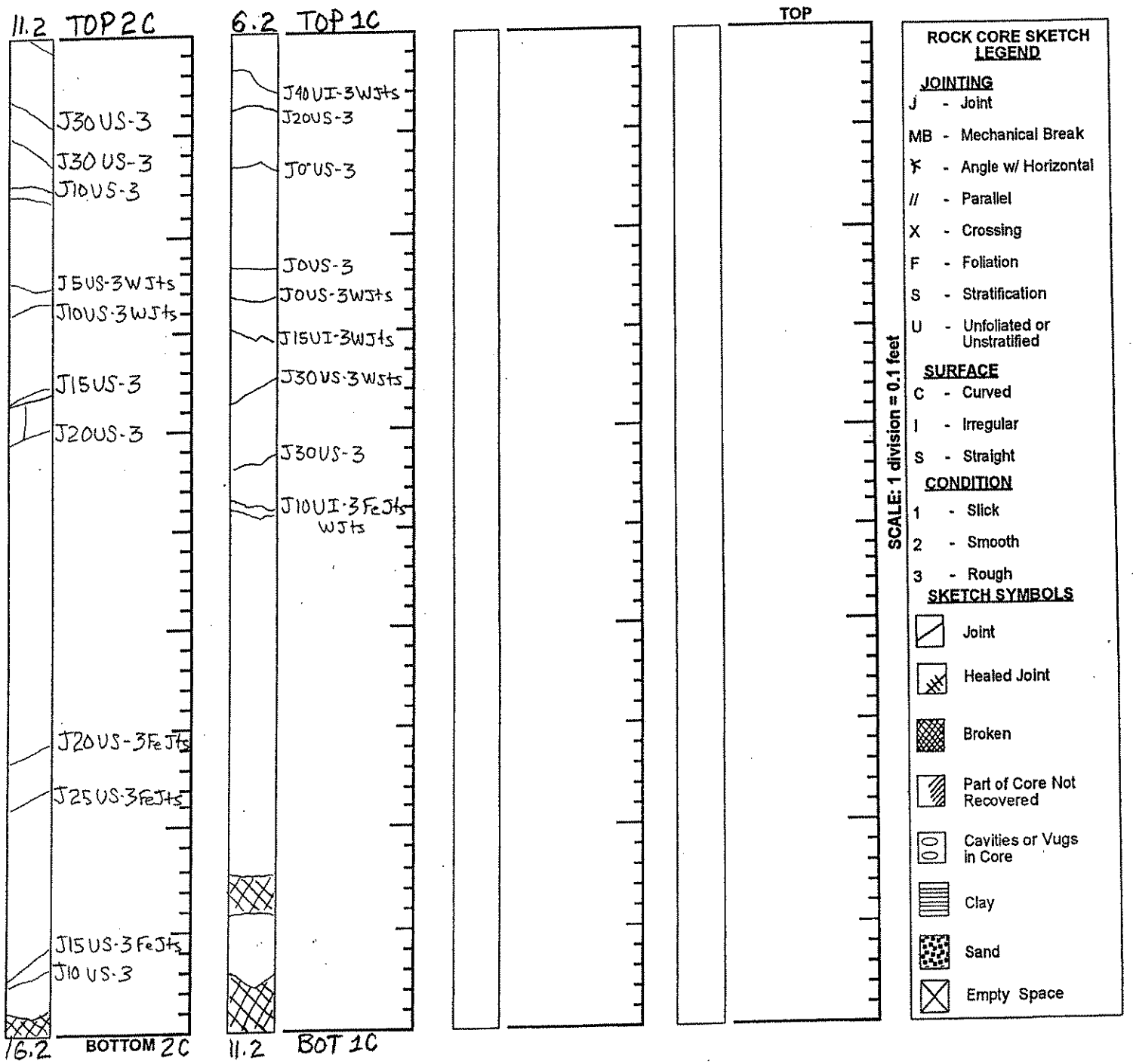
LOCATION NYC

Run No.	REC / RQD
2C	99/76

Run No.	REC / RQD
1C	98/61

Run No.	REC / RQD

Run No.	REC / RQD



ROCK CORE SKETCH LEGEND

JOINTING
- J - Joint
- MB - Mechanical Break
- ∢ - Angle w/ Horizontal
- // - Parallel
- X - Crossing
- F - Foliation
- S - Stratification
- U - Unfoliated or Unstratified

SURFACE
- C - Curved
- I - Irregular
- S - Straight

CONDITION
- 1 - Slick
- 2 - Smooth
- 3 - Rough

SKETCH SYMBOLS
- Joint
- Healed Joint
- Broken
- Part of Core Not Recovered
- Cavities or Vugs in Core
- Clay
- Sand
- Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. R-200
SHEET 3 **OF** 3
FILE NO.
SURFACE ELEV. 9347-200
DATUM

PROJECT DURST PROJECT NYC
LOCATION NEW YORK, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES	[ ] NO		
TRUCK	MOBILE B-61	MECHANICAL		DIA., IN	3	DEPTH, FT. FROM	0	TO
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER								

TYPE AND SIZE OF:
D-SAMPLER 2" O.D SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL LONGYEAR NX DOUBLE TUE
CORE BIT NX DIAMOND
DRILL RODS NWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8, 4-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
10-18-02	11:50	16.2	6.2	5.5	AT COMPLETION OF BORING.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	5.6	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10.0	OTHER:	

BORING CONTRACTOR WARREN GEORGE INC.
DRILLER REYNOLDS BRIDGEPAL HELPERS PAT CLANCY
REMARKS BOREHOLE CEMENT GROUTED UPON COMPLETION.
RESIDENT ENGINEER A. KLAETSCH DATE 10-18-02

BORING NO. R-200

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. R-201
SHEET 1 OF 3
FILE NO. 9347-200
SURFACE ELEV. +20.6
RES. ENGR. ANDREW KLAETSCH

PROJECT: BLOCK 1105 - RESIDENTIAL DEVELOPMENT
LOCATION : NEW YORK, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:50	1D	0.0	10-15	Brown fine to coarse sand, some silt, trace			USED	
10-17-02		2.0	10-12	brick, gravel, cinders (Fill) (SM)			REVERT	
Thursday	2D	2.0	25-15	Gray brown fine to coarse sandy gravel,				
Clear		4.0	19-26	some silt (Fill) (SM)				
60°F	3D	4.0	10-8	Brown micaceous silty fine to medium sand,		5		
		6.0	8-5	trace fine sandy silt layers (Fill) (SM)	F			
	4D	6.0	6-6	Gray fine to medium sandy silt, trace brick				
		8.0	5-13	layer, gravel (Fill) (ML)				
	5D	8.0	6-5	Gray fine sandy silt, trace brick, gravel (Fill)				
		10.0	2-1	(ML)		10		
	6D	10.0	6-12	Top: Brn gravelly f-c sand, sm silt (Fill) (SM)		11		Lowered 3" casing
		11.3	50/3"	Bot: Red brown f-c sand, sm silt, gravel (SM)	S/T			to 12.5'.
	1C	12.5	REC=98%	Medium hard slightly weathered, light gray		12.5	6*	*Coring time in
		17.5	RQD=76%	granite, jointed to closely jointed, iron			7*	minutes per foot.
				stainedjoints		15	7*	
							8*	
					R		6.5*	
	2C	17.5	REC=92%	Medium hard slightly weathered to			5*	
		22.5	RQD=60%	moderately weathered, light gray granite,			2*	
				trace mica schist zone, jointed to closely		20	2*	
				jointed, iron stained weathered joints			4*	
							4*	End of Boring at
13:15						22.5		22.5'.
						25		
						30		
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS
ROCK CORE SKETCH

BORING NO. R201
SHEET 2 OF 3
FILE NO. 9347-200
SURFACE ELEV.
RES. ENGR. A Klautsch

PROJECT BLOCK 1105-RESIDENTIAL DEVELOPMENT

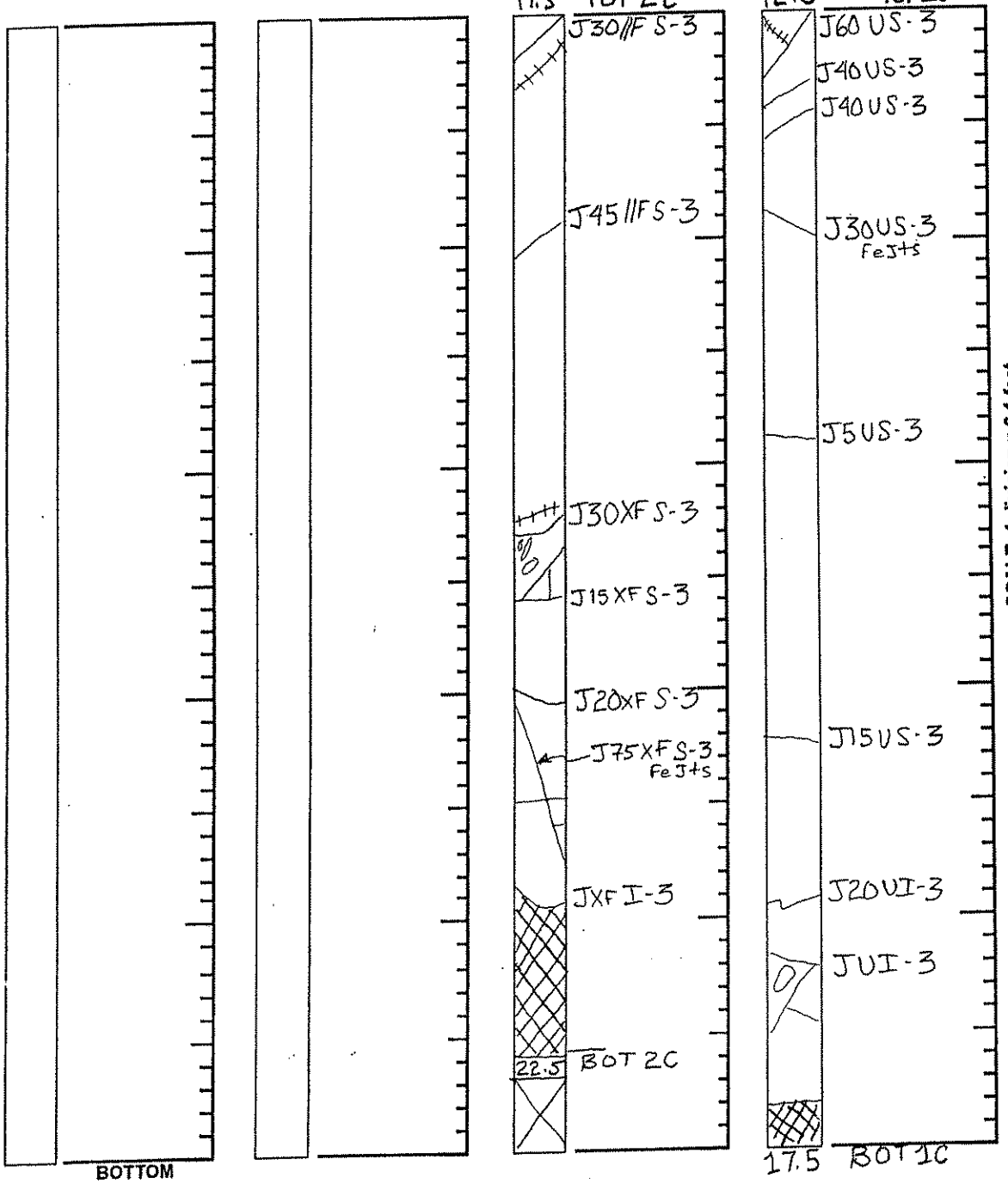
LOCATION NYC

Run No.	REC / RQD

Run No.	REC / RQD

Run No.	REC / RQD
2C	92/60

Run No.	REC / RQD
1C	98/76



SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH LEGEND

JOINTING
- J - Joint
- MB - Mechanical Break
- ∠ - Angle w/ Horizontal
- // - Parallel
- X - Crossing
- F - Foliation
- S - Stratification
- U - Unfoliated or Unstratified

SURFACE
- C - Curved
- I - Irregular
- S - Straight

CONDITION
- 1 - Slick
- 2 - Smooth
- 3 - Rough

SKETCH SYMBOLS
- Joint
- Healed Joint
- Broken
- Part of Core Not Recovered
- Cavities or Vugs in Core
- Clay
- Sand
- Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. R-201
SHEET 3 **OF** 3
FILE NO. 9347-200
SURFACE ELEV. +20.6
DATUM BPM

PROJECT BLOCK 1105 - RESIDENTIAL DEVELOPMENT
LOCATION NEW YORK, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	MOBILE B-61	MECHANICAL		DIA., IN 4	DEPTH, FT. FROM 0	TO 12.5	
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM	TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL LONGYEAR NX DOUBLE TUBE
CORE BIT NX DIAMOND
DRILL RODS NWJ

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8, 4-7/8 AT TOP
TYPE OF DRILLING MUD REVERT

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
10-17-02	14:15	21.1	12.5	8.1	AT COMPLETION OF BORING.
10-18-02	8:20	21.1	12.6	9.3	OVERNIGHT.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	12.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10.0	OTHER:	

BORING CONTRACTOR WARREN GEORGE INC.
DRILLER REYNOLDS BRIDGEPAL HELPERS PAT CLANCY
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER ANDREW KLAETSCH DATE 10-18-02

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. R-202P
SHEET 1 OF 5
FILE NO. 9347-200
SURFACE ELEV. +24.7
RES. ENGR. ANDREW KLAETSCH

PROJECT: BLOCK 1105 - RESIDENTIAL DEVELOPMENT
LOCATION : NEW YORK, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
08:15							PUSH	9" Concrete at
10-21-02	1D	1.0	5-6	Brown fine to coarse sand, some silt,				surface.
Monday		3.0	3-3	cinders, trace gravel, brick (Fill) (SM)				
Cloudy	2D	3.0	3-6	Red brown fine to medium sand, some silt,	F			
50°F		5.0	9-11	trace cinders, gravel, brick (Fill) (SM)		5		
	3D	5.0	15-8	Brown black fine to coarse sand, some silt,			59	REC=4"
		7.0	8-12	trace gravel, cinders, mica (Fill) (SM)			55	
	4D	7.0	14-15	Top: Black fine to coarse sand, some silt,			51	
		9.0	10-10	trace mica, cinders (Fill) (SM)		9	24	
				Bot:Brn f-c sand, sm si, rock fgmts, mic(SM)		10	20/7"	Tip of casing at 9.7'.
	5NR	10.0	50/0"	No recovery	S/T		WATER	Hard drilling at 11'.
	1C	11.5	REC=95%	Medium hard slightly weathered, gray		11.5	5*	
		16.5	RQD=84%	granite, moderately jointed, iron stained			4*	
				joints to weathered joints			4*	
						15	7*	
							11*	
	2C	16.5	REC=100%	Hard slightly weathered to unweathered,	R		6*	
		21.5	RQD=92%	light gray granite, moderately jointed to			5*	
				jointed, iron stained joints to weathered			5*	
				joints		20	5*	
11:35							7*	End of Boring at
						21.5		21.5'.
						25		
						30		
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS
ROCK CORE SKETCH

BORING NO. R202P
SHEET 2 OF 5
FILE NO. 9347-200
SURFACE ELEV.
RES. ENGR. A. Klaetsch

PROJECT BLOCK 1105 - RESIDENTIAL DEVELOPMENT

LOCATION NYC

Run No.	REC / RQD

Run No.	REC / RQD

Run No.	REC / RQD
2C	100/92

Run No.	REC / RQD
1C	95/84

16.5 TOP 2C

11.5 TOP 1C

J15US-3 FeJts

J0US-3 FeJts, WJts

J10US-3 FeJts

J55US-3

J0US-3

J20US-3

J10UI-3

21.5 BOT 2C

J70US-3 FeJts

J5US-3 FeJts

J0UI-3 FeJts

J10US-3 FeJts

J5UC-3 FeJts WJts

J15US-3 FeJts

JI-3 FeJts

BOT 1C 16.5'

BOTTOM

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH LEGEND

JOINTING
- J - Joint
- MB - Mechanical Break
- ⊬ - Angle w/ Horizontal
- // - Parallel
- X - Crossing
- F - Foliation
- S - Stratification
- U - Unfoliated or Unstratified

SURFACE
- C - Curved
- I - Irregular
- S - Straight

CONDITION
- 1 - Slick
- 2 - Smooth
- 3 - Rough

SKETCH SYMBOLS
- Joint
- Healed Joint
- Broken
- Part of Core Not Recovered
- Cavities or Vugs in Core
- Clay
- Sand
- Empty Space

NOTES

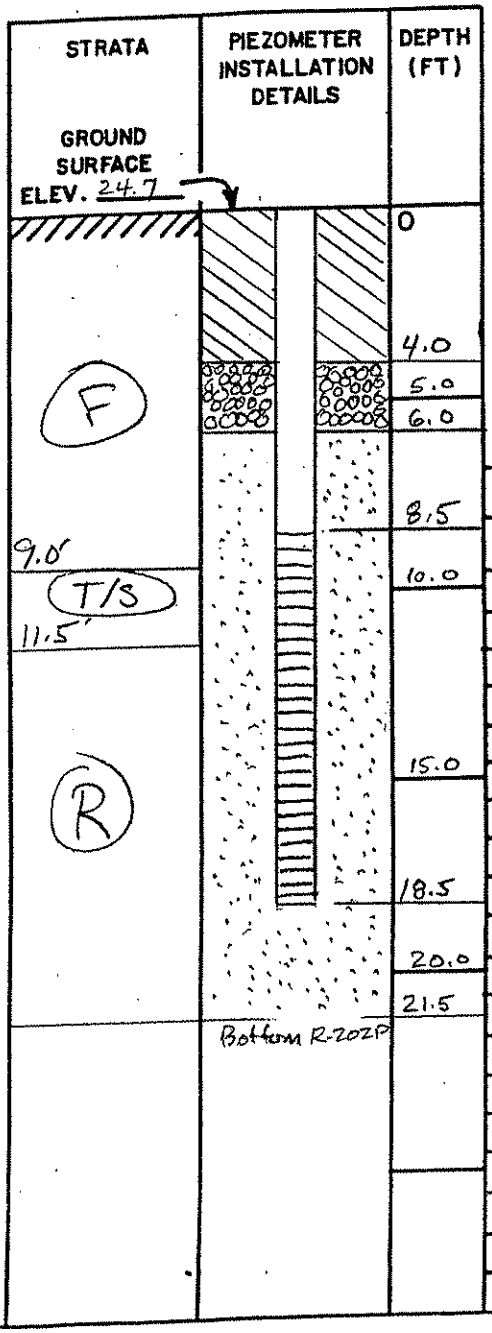
SHEET 3 OF 5
FILE NO. 9347-200
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT Block 1105 - Residential Development PIEZOMETER NO. R-202P
LOCATION New York New York
PIEZOMETER LOCATION See Plan DATE OF INSTALLATION 10/21/02
☐ SEE SKETCH ON BACK RES. ENG. A. Klaetsch

PIEZOMETER TYPE



INTAKE POINT

depth to bottom, ft = 21.5
depth to top, ft = 6.0
length, ft = 15.5 = L
diameter, in = 3 3/8, ft = 0.32 = 2R

STANDPIPE/RISER

elevation of rim, ft = 24.7
diameter, in = 1 1/4, ft = 0.1 = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
10/21	12:52	9.80'	+14.5	at completion
10/28	08:20	15.20'	+9.5	
10/30	10:20	15.30	+9.4	

GROUND SURFACE ELEV. 24.7

Sand Bentonite
Gravel Grout

PIEZOMETER NO. R-202P

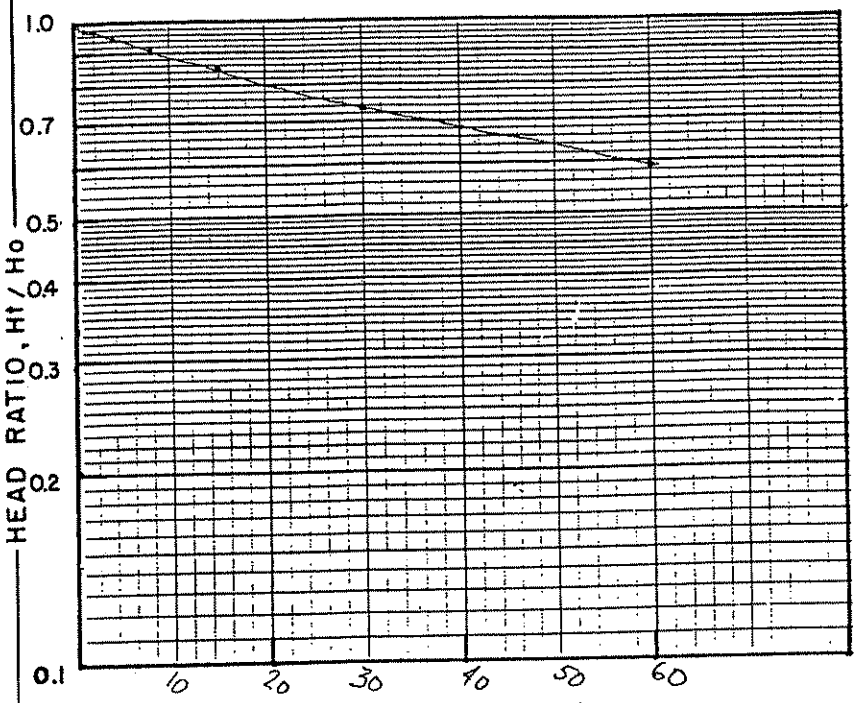
SHEET 4 OF 5
FILE NO. 9347-200
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

VARIABLE HEAD PERMEABILITY TEST

☐ BOREHOLE OR ☒ PIEZOMETER NO. R-202P
TEST NO.

PROJECT Block 1105 - Residential Development RES.ENG. A. Klaetsch
LOCATION New York, New York CALC.BY DATE
PIEZOMETER LOCATION See plan CH'KD BY DATE



INTAKE POINT

depth to bottom, ft = 21.5'
depth to top, ft = 6.0'
length, ft = 15.5' = L
diameter, in = 3 3/8, ft = _____ = 2R

STANDPIPE/RISER

diameter, in = 1 1/4, ft = _____ = 2r

depth of casing, ft = _____

depth to which standpipe was bailed, ft = 17.71 = Z

READING TIME			TEST DEPTH-RIM TO WATER ft.	DEPTH-RIM TO TIDE OR GWL ft.	UNBALANCED HEAD H ft.	HEAD RATIO Ht/Ho	REMARKS
DATE	CLOCK	Δt MIN.					
10/22/02	13:05		17.71	13.86	0		STATIC WATER LEVEL
	13:18:45	0	17.71		3.85'	1.0	INITIAL READING
	13:19:15	0.5	17.65		3.79'	0.984	
	13:19:45	1.0	17.60'		3.74'	0.971	
	13:20:45	2.0	17:58'		3.72'	0.966	
	13:22:45	4.0	17.52'		3.66'	0.951	
	13:26:45	8.0	17.35'		3.49'	0.906	
	13:33:45	15.0	17.14'		3.28'	0.852	
	13:48:45	30.0	16.70'		2.84'	0.738	
	14:18:45	60.0	16.16'		2.30'	0.597	

PIEZOMETER NO. R-202P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. R-202P
SHEET 5 **OF** 5
FILE NO. 9347-200
SURFACE ELEV. +24.7
DATUM BPM

PROJECT BLOCK 1105 - RESIDENTIAL DEVELOPMENT
LOCATION NEW YORK, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES	[ ] NO		
TRUCK	DK-50	MECHANICAL		DIA., IN 4	DEPTH, FT. FROM	0	TO	9.7
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO	
OTHER								

TYPE AND SIZE OF:
D-SAMPLER 2" O.D SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL LONGYEAR NX DOUBLE TUBE
CORE BIT NX DIAMOND
DRILL RODS NWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
10-21-02	12:50	21.5		9.8	AT COMPLETION OF BORING.
10-22-02	12:30	21.5		13.86	

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SEE SHEET NO. 4

STANDPIPE:	TYPE	PVC	ID, IN.	1-1/4	LENGTH, FT.	18.5	TOP ELEV.	+24.7
INTAKE ELEMENT:	TYPE	SLOTTED PVC	OD, IN.	1-3/8	LENGTH, FT.	10	TIP ELEV.	+6.2
FILTER:	MATERIAL	SAND	OD, IN.		LENGTH, FT.		BOT. ELEV.	+3.2

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	11.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10.0	OTHER:	

BORING CONTRACTOR WARREN GEORGE INC.
DRILLER JACOB HARRIS HELPERS GARY SMITH
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER ANDREW KLAETSCH DATE 10-21-02

BORING NO. R-202P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. R-203
SHEET 1 OF 3
FILE NO. 9347-200
SURFACE ELEV. +24.7
RES. ENGR. ANDREW KLAETSCH

PROJECT: BLOCK 1105 - RESIDENTIAL DEVELOPMENT
LOCATION : NEW YORK, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:30							DRILLED	9" Concrete at
10-21-02	1D	1.5	12	Brown fine to coarse sandy gravel, some			AHEAD	surface. REC=1"
Monday		3.0	12-9	silt, trace brick, concrete (Fill) (SM)			4"	Lowered casing to
Cloudy	2D	3.0	17-17	Brown fine to coarse sand, some brick,			64	2.5'; then drove
60°F		5.0	14-6	cinders, silt (Fill) (SM)		5	248	with 300 lb.
	3D	5.0	6-11	Top: Blk fine to coarse sand, some silt,	F		83	hammer.
14:30		7.0	15-26	cinders, trace brick, wood (Fill) (SM)			63	
08:00	4D	7.0	21-12	Bot: Brn si f-m sand, tr gvl, c sa (Fill) (SM)			49	
10-22-02		9.0	15-10	Top: Brown fine to coarse sand, some silt,			35	
Tuesday				cinders, trace gravel (Fill) (SM)		10	25	
Clear	5D	10.0	5-4	Bot: Brown silty fine to medium sand, trace			18	REC=2"
508f		12.0	6-22	fine sandy silt pockets, mica (Fill) (SM)		12	13	Occasional cobbles
				Brown silty fine to medium sand, trace clay			22	from 12' to 15'.
				(Possible Fill) (SM)			18	
						15	50	
	6D	15.0	9-8	Brown micaceous fine to coarse sand, some			61	
		17.0	11-15	silt, rock fragments (SM)			66	
							43	
							69	
						20	68	
	7D	20.0	5-15	Top: Stiff brown clayey silt, trace fine sand,				
		22.0	25-27	gray fine sandy silt layers (ML)	S/T			
				Bot: Gray silty fine sand, trace clay, coarse				
				sand, gravel, silty fine to medium sand				
				layers (SM)		25		
	8D	25.0	12-9	Gray silt, some fine sand, trace clay, coarse				
		27.0	14-18	sand, gravel (ML)				
						30		Hard drilling &
	9D	30.0	19-27	Gray silty fine to coarse sand, trace clay,				rod chatter from
		31.2	100/3"	gravel, white, decomposed rock (SM)		32		31.2' to 32'.
	1C	32.0	REC=78%	Intermediate moderately weathered to			4*	*Coring time in
		37.0	RQD=28%	slightly weathered, gray granitic, closely			5*	minutes per foot.
				jointed to broken, weathered joints to iron		35	6.5*	
				stained joints			4.5*	
					R		4*	
	2C	37.0	REC=90%	Medium hard to hard slightly weathered to			4*	
		42.0	RQD=80%	unweathered, gray granitic, jointed, slightly			5*	
				weathered joints		40	5*	
							6*	End of Boring at
12:10						42	4*	42'.
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS
ROCK CORE SKETCH

BORING NO. R203
SHEET 2 OF 3
FILE NO. 9347-200
SURFACE ELEV.
RES. ENGR. A. Klaetsch

PROJECT BLOCK 1105 - RESIDENTIAL DEVELOPMENT

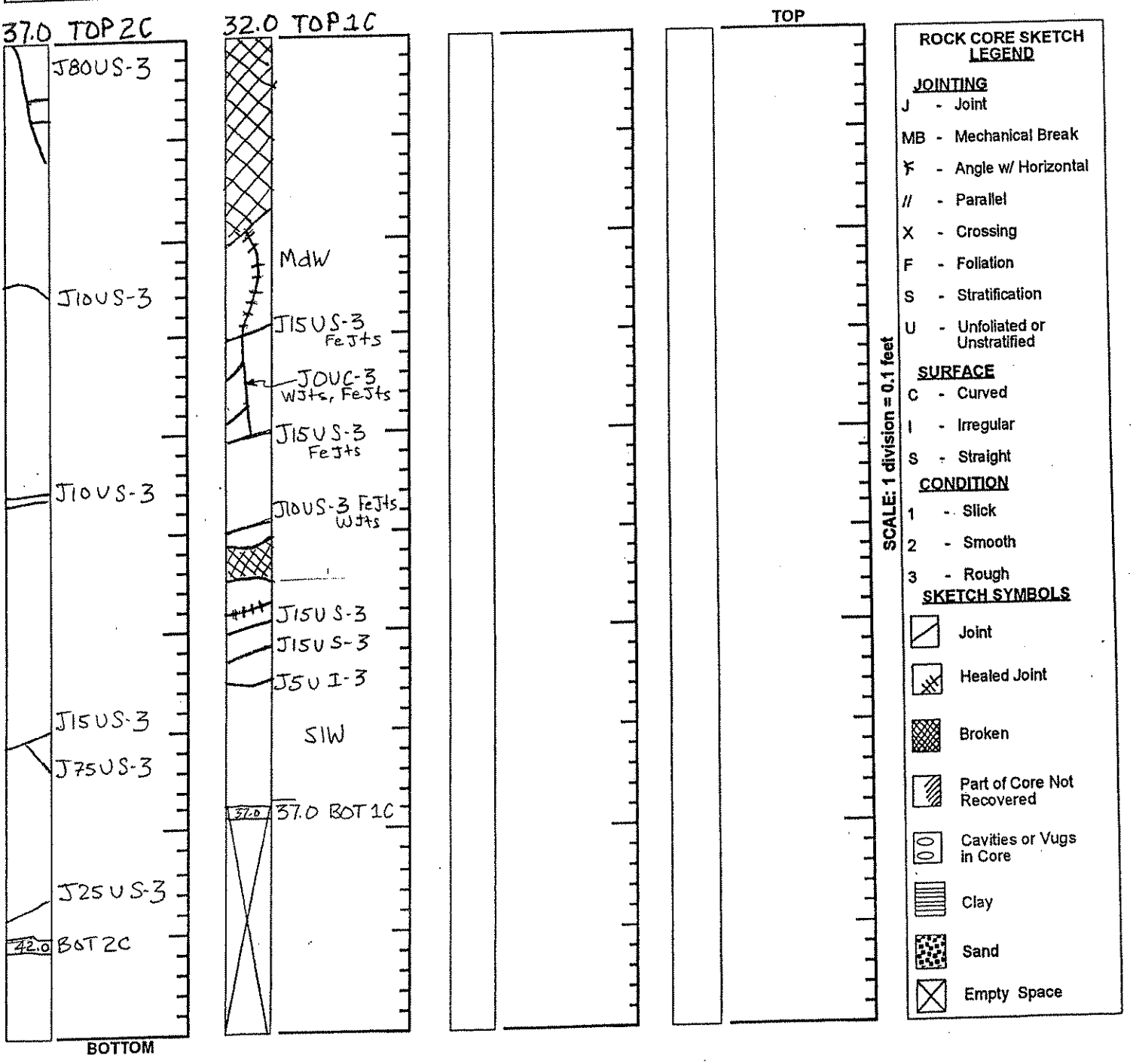
LOCATION NYC

Run No.	REC / RQD
2C	90/80

Run No.	REC / RQD
1C	78/28

Run No.	REC / RQD

Run No.	REC / RQD



NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. R-203
SHEET 3 **OF** 3
FILE NO. 9347-200
SURFACE ELEV. +24.7
DATUM BPM

PROJECT BLOCK 1105 - RESIDENTIAL DEVELOPMENT
LOCATION NEW YORK, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES	[ ] NO		
TRUCK	DK-50	MECHANICAL		DIA., IN 4	DEPTH, FT. FROM	0	TO	20
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO	
OTHER								

TYPE AND SIZE OF:
D-SAMPLER 2" O.D SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL LONGYEAR NX DOUBLE TUBE
CORE BIT NX DIAMOND
DRILL RODS NWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
10-22-02	12:10	42	20	11.1	AT COMPLETION OF BORING.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	32.0	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10.0	OTHER:	

BORING CONTRACTOR WARREN GEORGE INC.
DRILLER JACOB HARRIS HELPERS GARY SMITH
REMARKS BOREHOLE CEMENT GROUTED UPON COMPLETION.
RESIDENT ENGINEER ANDREW KLAETSCH DATE 10-22-02

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. R-204
SHEET 1 OF 3
FILE NO. 9347-200
SURFACE ELEV. +24.6
RES. ENGR. ANDREW KLAETSCH

PROJECT: BLOCK 1105 - RESIDENTIAL DEVELOPMENT
LOCATION : NEW YORK, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:35							PUSH	7" Concrete at
10-17-02	1D	1.0	3-3	Brown fine to coarse sand, some gravel, silt				surface.
Thursday		3.0	5-7	(Fill) (SM)				Wash ahead of
Clear	2D	3.0	100/6"	Brown black silty fine to medium sand,				casing; push to 10'.
60°F		5.0		some cinders, trace brick (Fill) (SM)		5		
	3D	5.0	3-3	Brown fine to coarse sand, some silt, trace				REC=3"
		7.0	4-5	gravel, brick, mica (Fill) (SM)				
	4D	7.0	4-4	Brown silty fine to coarse sand, some	F			
		9.0	4-5	cinders, trace mica (Fill) (SM)				
	5D	9.0	2-2	Brown fine to coarse sand, some silt,		10	▽	REC=4"
14:30		11.0	2-2	cinders, trace gravel, mica (Fill) (SM)			PUSH	
07:30	6D	11.0	2-3	Brown fine to coarse sand, some silt, trace			PUSH	
10-18-02		13.0	4-5	fine sandy silt pockets, cinders (Fill) (SM)			PUSH	
Friday							74	Water return.
Clear						15	WATER	Water loss at 15'.
50°F	7D	15.0	5-4	Brown fine to coarse sand, some silt, trace			USED	REC=4"
		17.0	3-3	clay, gravel (Possible Fill) (SM)		17		
						20		
	8D	20.0	13-18	Interlayered gray fine sandy silt & brown				
		22.0	60-35	red silty fine sand, trace gravel (ML&SM)				Occasional cobble
					S/T			from 22' to 28'.
						25		
	9D	25.0	10-11	Stiff brown clayey silt, trace fine to coarse				
		27.0	20-100	sand, gravel, some layers silty fine to				Casing to 28'; hard
				coarse sand, tr gravel, clay (ML&SM)		28	▽	drilling.
	1C	28.5	REC=36%	Top: Dark gray diabase boulder	BLDR		16*	*Coring time in
		33.5		Bot 6": Light gray cobbles		29.5	6*	minutes per foot.
							5*	
					S/T		3*	
						33	3*	
	2C	33.5	REC=98%	Top 1.5': Intermediate moderately			4*	
		38.5	RQD=50%	weathered to slightly weathered, gray		35	4*	
				granite, closely jointed to Bkn, WJts			13*	
				Bot 3.5': MdHd SlW, light gray granite,			12*	
				jointed, iron stained joints, mica	R		15*	
	3C	38.5	REC=99%	Medium hard slightly weathered, light gray			6*	
		43.5	RQD=70%	granite, jointed, weathered joints		40	6*	
							7*	
							8*	
13:20							7*	End of Boring at
						43.5		43.5'.
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS
ROCK CORE SKETCH

BORING NO. R204
SHEET 2 OF 3
FILE NO. 9347-200
SURFACE ELEV.
RES. ENGR. A. Klaetsch

PROJECT BLOCK 1105 - RESIDENTIAL DEVELOPMENT

LOCATION NYC

Run No.	REC / RQD

Run No.	REC / RQD
3C	99/70

Run No.	REC / RQD
2C	98/50

Run No.	REC / RQD
1C	36/_

38.5 TOP 3C
J5US-3 WJts
J5VS-3
J5US-3 WJts
J70US-3 WJts
J90UC-3 WJts
J10US-3 WJts
J10US-3 WJts
43.5 BOT 3C
BOTTOM

33.5 TOP 2C
J20U WJts
J75U WJts
MdW
J5US-3 FeJts
MB
J10US-3
38.5 BOT 2C

28.5 TOP 1C
Diabase
J30US-3
J60US-3
Cobbles
33.5 BOT 1C 33.5'

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH LEGEND

JOINTING
- J - Joint
- MB - Mechanical Break
- ∠ - Angle w/ Horizontal
- // - Parallel
- X - Crossing
- F - Foliation
- S - Stratification
- U - Unfoliated or Unstratified

SURFACE
- C - Curved
- I - Irregular
- S - Straight

CONDITION
- 1 - Slick
- 2 - Smooth
- 3 - Rough

SKETCH SYMBOLS
- Joint
- Healed Joint
- Broken
- Part of Core Not Recovered
- Cavities or Vugs in Core
- Clay
- Sand
- Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. R-204
SHEET 3 **OF** 3
FILE NO. 9347-200
SURFACE ELEV. +24.6
DATUM BPM

PROJECT BLOCK 1105 - RESIDENTIAL DEVELOPMENT
LOCATION NEW YORK, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES	[ ] NO		
TRUCK	DK-50	MECHANICAL		DIA., IN 4	DEPTH, FT. FROM	0	TO	28
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO	
OTHER								

TYPE AND SIZE OF:
D-SAMPLER 2" O.D SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL LONGYEAR NX DOUBLE TUBE
CORE BIT NX DIAMOND
DRILL RODS NWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
10-8-02	7:30	11	10	DRY	OVERNIGHT.
10-18-02	13:35	43.5	28	16	AT COMPLETION OF BORING.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

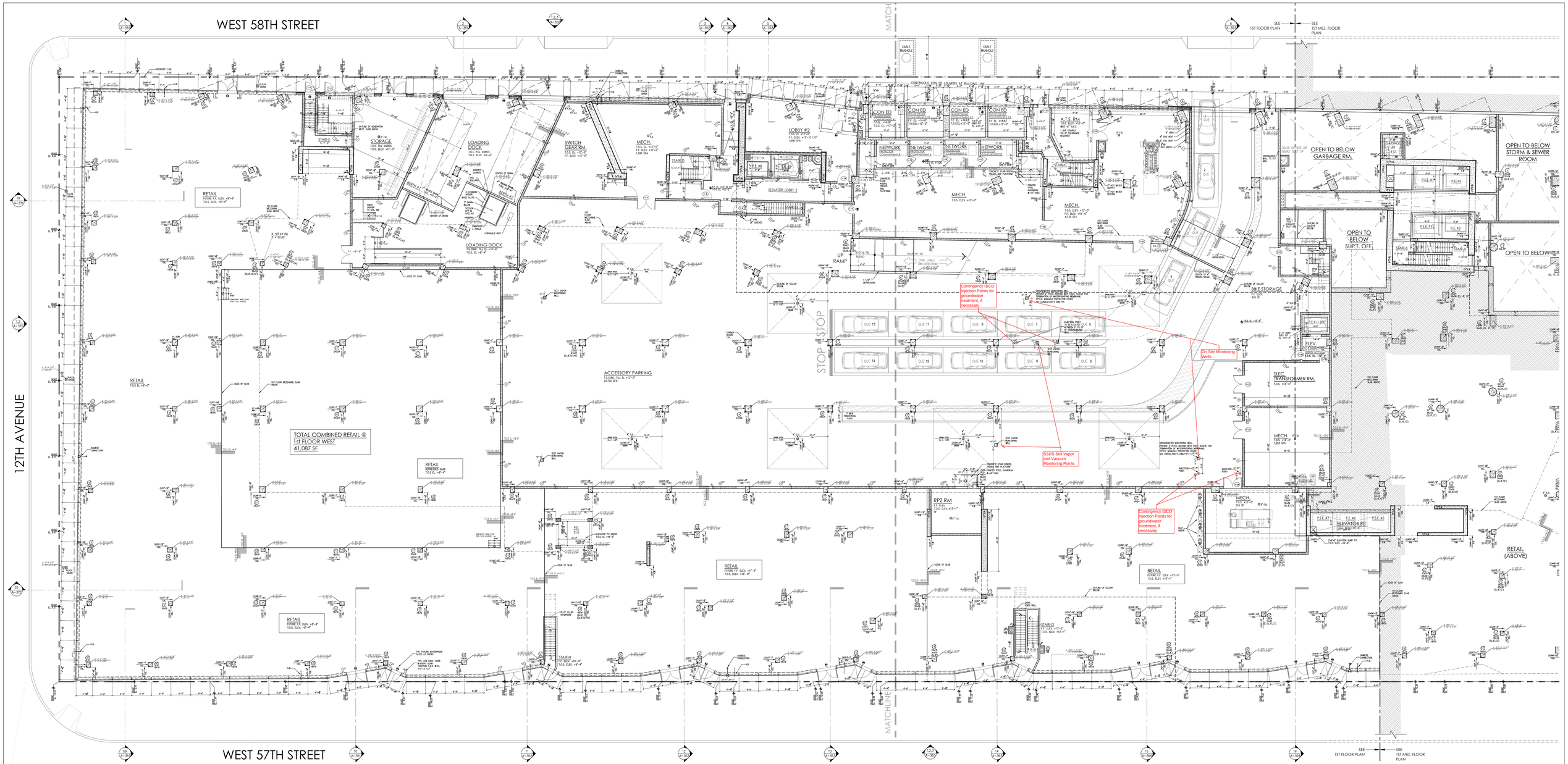
PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	28.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	15.0	OTHER:	

BORING CONTRACTOR WARREN GEORGE INC.
DRILLER JACOB HARRIS HELPERS ALVRO LONDON/DAVE HARRIS
REMARKS BOREHOLE CEMENT GROUTED UPON COMPLETION.
RESIDENT ENGINEER ANDREW KLAETSCH DATE 10-17-02

APPENDIX D

Contingency Groundwater Injection Points, Monitoring Wells and Soil Vapor Monitoring Points



SLCE *ARCHITECTS*
841 BROADWAY, NEW YORK, N.Y. 10003

WEST 57th STREET RESIDENTIAL DEVELOPMENT
BETWEEN WEST 57th STREET & WEST 58th STREET
NEW YORK, N.Y.
DFR-DURST FETNER RESIDENTIAL

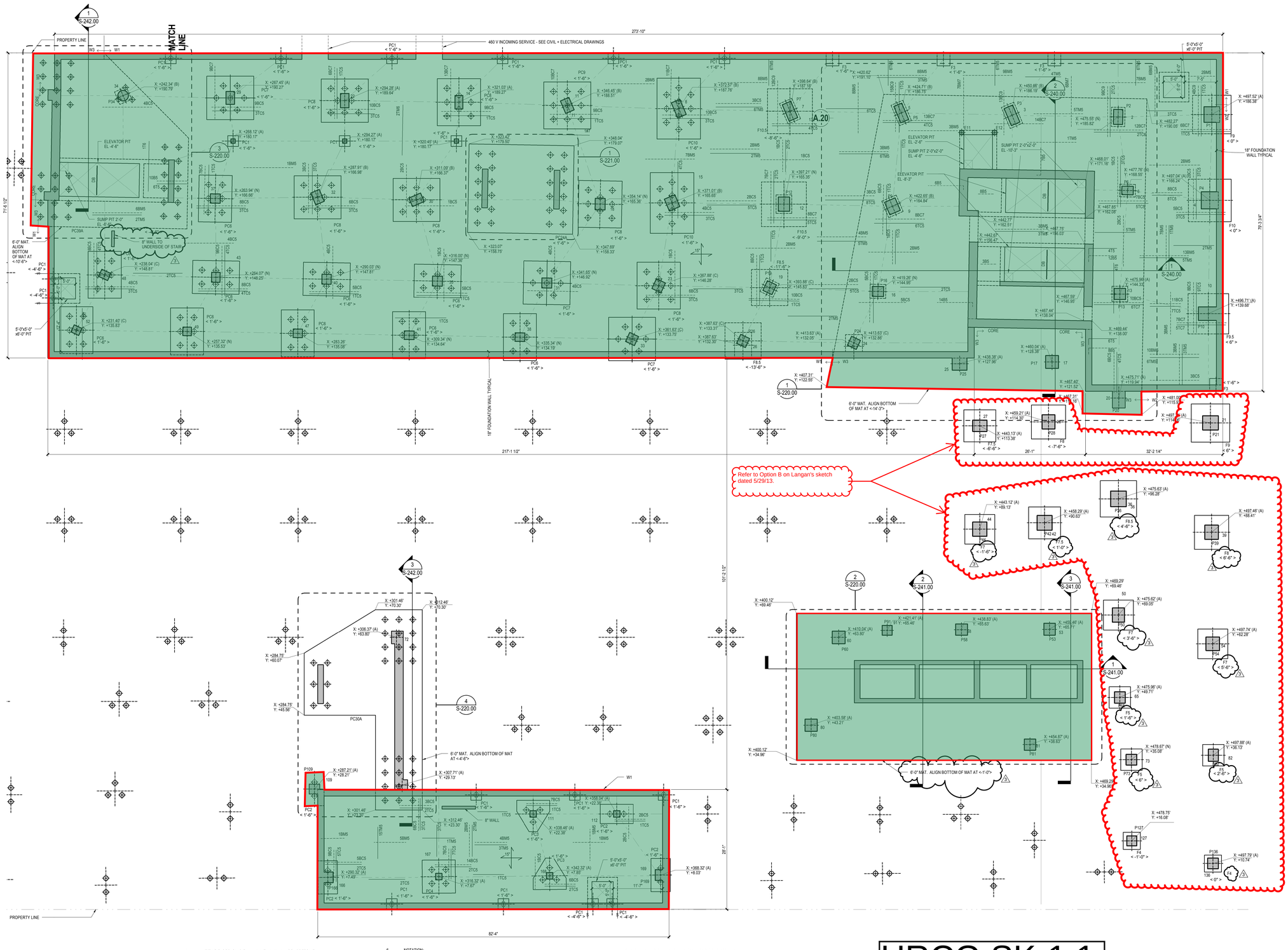
1st FLOOR PLAN WEST
SCALE: 1/8" = 1'-0"
5/13/2013
I:\DFR-West 57th Street (2010-18)\Drawings\SLCE\Construction Documents

SCHEME

I:\DFR-West 57th Street (2010-18)\Drawings\SLCE\Construction Documents\ARCH\1st Floor West.dwg, 5/13/2013 2:53:27 PM, DWG To PDF - No Layers as of 1:1

APPENDIX E

Waterproofing and Vapor Barrier Design Drawings



CONCRETE NOTES:

1. TOP OF ARCHITECTURAL FINISHED FLOOR IS AT ELEVATION +1'-6". TOP OF STRUCTURAL SLAB SHALL BE -0" FROM TOP OF FINISHED FLOOR U.O.N. THUS [x] ON PLAN REFERENCED TO TOP OF FINISHED FLOOR.
2. ALL SLABS SHALL BE 15" THICK UNLESS OTHERWISE NOTED.

   FOR 15" SLAB, #4 @12" TOP & BOTTOM EACH WAY CONT. U.O.N. ON PLAN.
3. PROVIDE THE FOLLOWING REINFORCEMENT AT COLUMNS IN ADDITION TO WHAT IS SHOWN IN PLAN FOR 15" THICK SLAB :

   SOUTH CELLAR COLUMN STRIP:
   BOTTOM BARS: 2#5 CENTERED ON COLUMNS, BOTH WAYS
   TOP BARS: 2#5 CENTERED ON COLUMNS, BOTH WAYS

   NORTH CELLAR COLUMN STRIP:
   BOTTOM BARS: 2#5 CONTINUOUS IN COLUMN STRIP, EAST-WEST
   TOP BARS: 2#5 CENTERED ON COLUMN, EAST-WEST

   ON THIS FLOOR:
   - BOTTOM BARS AT COLUMNS IN ALL STRIPS TO BE DETAILED AS TOP BARS.
   - TOP BARS AT MIDSPAN IN ALL STRIPS TO BE DETAILED AS BOTTOM BARS.
   - FACE OF PILE CAP TO BE CONSIDERED AS FACE OF COLUMN FOR DETERMINATION OF STRIP WIDTHS AND BAR CUT OFF LENGTHS

   REFER TO TYPICAL DETAILS FOR ADDITIONAL INFORMATION.
4. AT THIS FLOOR, SLAB SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 6,000 PSI.
5. SYMBOLS:

   ——— INDICATES ADDITIONAL TOP REINFORCING BARS. REFER TO TYPICAL DETAILS ON S-600 SERIES DRAWINGS.

   - - - - INDICATES ADDITIONAL BOTTOM REINFORCING BARS. REFER TO TYPICAL DETAILS ON S-600 SERIES DRAWINGS.

   INDICATES ASSUMED DIRECTION OF LOAD IN DESIGN. REFER TO TYPICAL DETAIL ON S-600 SERIES DRAWINGS FOR REBAR PLACEMENT GUIDELINES. LINES ARE OMITTED ON PLANS WHEN COLUMNS ALIGN ON A REGULAR GRID PATTERN.

   INDICATES SHEAR REINFORCING REQUIRED IN SLAB AROUND COLUMN. REFER TO TYPICAL DETAIL ON S-600 SERIES DRAWINGS.

   INDICATES x" CAMBER UPWARD WHEN DIFFERS FROM CAMBER SPECIFIED IN GENERAL NOTES.

   <...> INDICATES TOP OF FOOTING OR GRADE BEAM ELEVATION

   INDICATES STEP IN WALL FOOTING

   WX ⟷ WX INDICATES CHANGE IN WALL TYPE. SEE SCHEDULE S-206
6. NOTATION:

   xB... INDICATES REINFORCED CONCRETE BEAM AT FLOOR x. REFER TO BEAM SCHEDULE ON S-600 SERIES DRAWINGS.

   DB... INDICATES HSS6X4X3/8 ELEVATOR DIVIDER BEAM (NOT FIRE-PROOFED). REFER TO TYPICAL DETAIL ON S-500 SERIES DRAWINGS.

   CA/CB INDICATES COLUMN ABOVE/BELOW.

   PC... INDICATES PILE FOUNDATION. SEE DETAILS AND SCHEDULE SHEET S-201.

   F... INDICATES SPREAD FOOTING FOUNDATION. SEE DETAILS AND SCHEDULE SHEET S-202. FOUNDATIONS SHALL BE EXCAVATED TO SOLID ROCK PER GEOTECH REPORT

   P... INDICATES EXCAVATED PIER FOUNDATION. SEE DETAILS AND SCHEDULE SHEET S-202. FOUNDATIONS SHALL BE EXCAVATED TO SOLID ROCK PER GEOTCH REPORT.

   C... INDICATES SQUARE CAISSON BETWEEN SPREAD FOOTING ON ROCK AND STRUCTURAL SLAB SHEET
7. FOR COLUMN AND SLAB OPENING LOCATIONS, REFER TO ARCH DRAWINGS. FOR SUPERSTRUCTURE DETAILS, REFER TO S-600 SERIES DRAWINGS. FOR COLUMN SCHEDULE, REFER TO 300 SERIES DRAWINGS. FOR SHEAR WALL DETAILS, REFER TO 600 SERIES SERIES DRAWINGS. FOR GENERAL NOTES, REFER TO S-000 SERIES DRAWINGS.
8. COORDINATE SLEEVE NUMBERS AND LOCATIONS WITH MECHANICAL DWGS. AL SLEEVES OPENING MOST BE INDICATED ON SHOP DRAWING SUBMITTACS.
9. ◎ REPRESENTS ROCK SOCKETED DRILLED CAISSONS. SEE 1/S-801

HRCG SK-1.1

KEY

Waterproofing Under Slab: Prepruf 300R

Submitted For Record
Submittal: 071000.SK.001

PROJECT:
625 WEST 57TH STREET
RESIDENTIAL / MIXED USE DEVELOPMENT
WEST 57th STREET & 12th AVENUE
NEW YORK, NEW YORK

OWNER/DEVELOPER:
Durst Pyramid LLC
One Bryant Park
New York, NY 10036

ARCHITECT:
SLCEArchitects, LLP
841 BROADWAY
NEW YORK, NY 10003
TEL.: (212) 979-8400

DESIGN ARCHITECT:
BIG
601 W. 26th St. Suite 1255
New York, NY 10001
USA
347 964 3666
www.big.dk

STRUCTURAL ENGINEER:
Thornton Tomasetti
Thornton Tomasetti, Inc.
51 Madison Avenue
New York, NY 10010-1603
T 917.661.7800 F 917.661.7801

M.E.P.FP. ENGINEER:
DAGHER ENGINEERING, PLLC
29 Broadway, New York, NY 10006
T. 212.480.2591 F. 212.480.2654

LANDSCAPE ARCHITECT:
STARR WHITEHOUSE Landscape Architects and Planners PLLC
80 Maiden Lane, Suite 1901
New York, New York 10038
T 212.487.3272 F 212.487.3273

GEOTECHNICAL AND CIVIL ENGINEERING:
Langan Engineering & Environmental Services
Phone: 212.479.5400 Fax: 212.479.5444
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY

CONSTRUCTION MANAGER:
Hunter Roberts Construction Group
2 World Financial Center
New York, NY 10281

TRAFFIC CONSULTANT:
PHILIP HABIB & ASSOCIATES
226 WEST 26TH STREET
NEW YORK, NEW YORK 10001

BUILDING ENVELOPE CONSULTANT:
IBA
Israel Berger and Associates, LLC
360 PARK AVENUE SOUTH, 15th FLOOR
New York, NY 10016
TEL.: (212) 689-5389 FAX.: (212) 689-6449

LIGHTING DESIGNER:
bpi Brandston Partnership Inc.
302 Fifth Avenue, New York, NY 10001
main: 212.924.4050

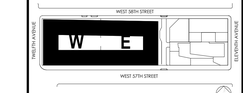
COMMISSIONING AGENT:
THE FULCRUM GROUP
61 BROADWAY SUITE 1605
NEW YORK, NY 10006

Reviewed for general conformance to the Contract Documents and coordination with contiguous work.
Date: 09/04/2013
Specr - Submittal# **071000.SK.001**
By: KRISHNEYASH
HUNTER ROBERTS CONSTRUCTION GROUP
2 WFC, 6th Floor, New York, NY 10281
This review does not relieve the Subcontractor of their responsibility to Hunter Roberts to make the work conform to the requirements of the Contract Documents. The Subcontractor also remains responsible to Hunter Roberts for all dimensions, correct fabrication and accurate fit with the work of other trades. The contents of this Submittal are subject to approval by the Architect.

△	05/08/2013	BULLETIN #6
△	04/01/2013	BULLETIN #4
	03/15/2013	ISSUED FOR DOB FILING
	03/01/2013	CONCRETE BID SET
△	02/12/2013	FOUNDATION BULLETIN #2
	01/25/2013	FOUNDATION BULLETIN #1
	09/11/2012	BID SET
	07/30/2012	DESIGN DEVELOPMENT ISSUANCE
	DATE:	REVISION

D.O.B. NUMBER:
NB#

NORTH: SCALE:

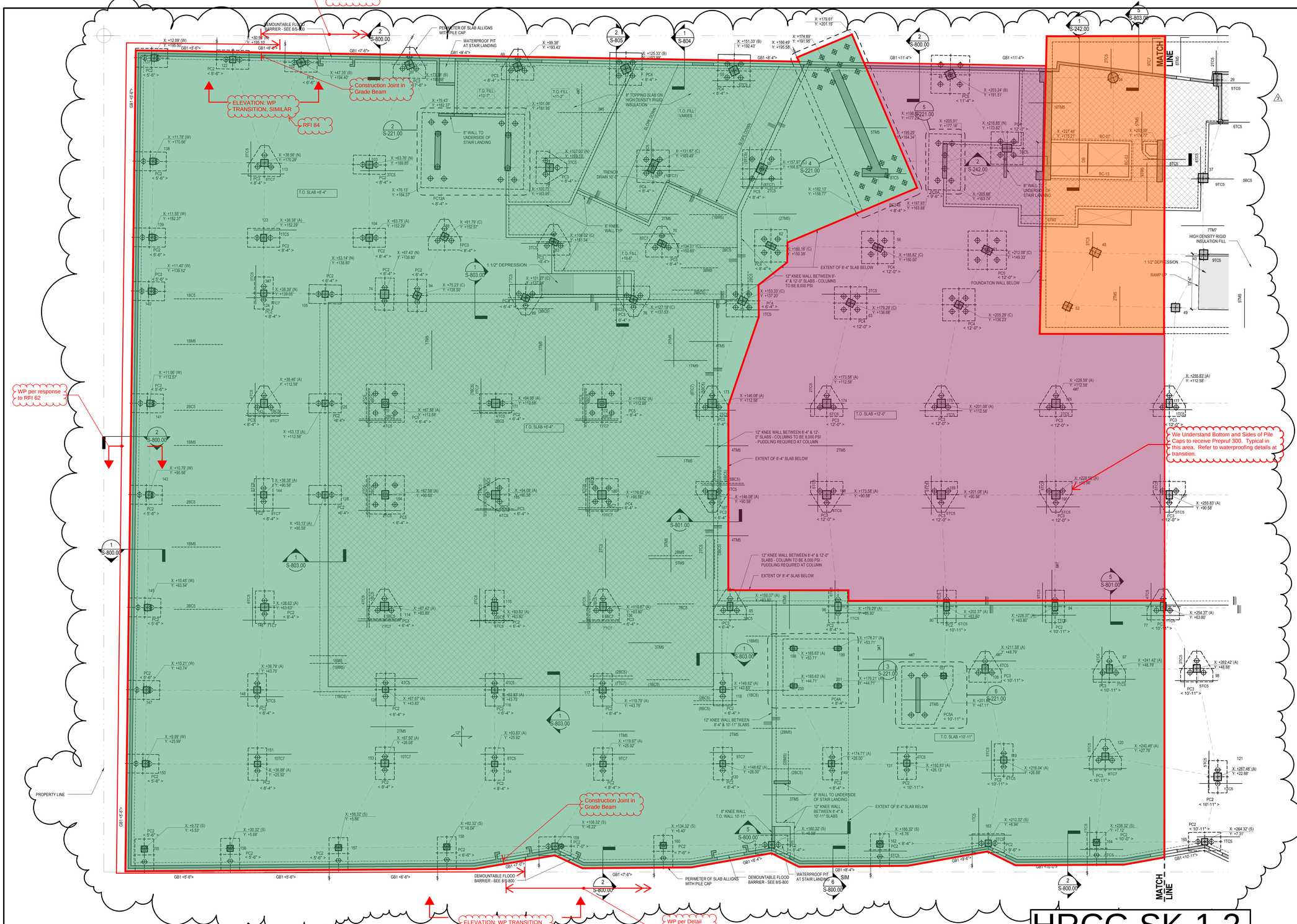
KEY PLAN:


DRAWING TITLE:
CELLAR PLAN

SEAL & SIGNATURE:

DATE:	05/08/2013
PROJECT No:	N10554.00
DRAWN BY:	JB
CHECKED BY:	RO
DWG. No.:	S-100.00
SHEET. No.:	OF

FILE No:



HRCG SK-1.2

KEY

- Waterproofing Under Slab: Prepruf 300R
- Vapor Barrier Under Slab: Florpruf 120
- Cellar Below, No Vapor Barrier, Please Confirm

Submitted For Record
Submittal: 071000.SK.001

CONCRETE NOTES:

1. TOP OF ARCHITECTURAL FINISHED FLOOR IS AT ELEVATION +12'-0". TOP OF STRUCTURAL SLAB SHALL BE -0" FROM TOP OF FINISHED FLOOR U.O.N. THUS [x] ON PLAN REFERENCED TO TOP OF FINISHED FLOOR.
2. X" — INDICATES X"-THICK FLAT PLATE. FOR 12" THICK SLAB, #5@12 BOTTOM CONTINUOUS EA. WAY U.O.N. ON PLAN.
   X" — INDICATES X" THICK ONE WAY SLAB. REFER TO SLAB SCHEDULE ON S-600 SERIES DRAWINGS.
   FOR THIS FLOOR, FACE OF PILE CAP TO BE CONSIDERED AS FACE OF COLUMN FOR DETERMINATION OF STRIP WIDTHS AND BAR CUTOFF LENGTHS.
3. PROVIDE THE FOLLOWING REINFORCEMENT IN ADDITION TO WHAT IS SHOWN IN PLAN :
   SLABS AT ELEVATION 8'-4" AND 8'-4" ONLY:
   #5@12 TOP AT COLUMN AND MIDDLE STRIPS CONTINUOUS EW&NS
   FOR THE BARS ABOVE: BOTTOM BARS @ ALL COLUMNS STRIPS ARE TO BE DETAILED AS TOP BARS. TOP BARS @ MID SPAN IN ALL STRIPS ARE TO BE DETAILED AS BOTTOM BARS.
   SLABS AT ELEVATION 16'-11", 17'-2", 18'-2", 19'-6" ONLY:
   #5@18 TOP AT COLUMN AND MIDDLE STRIPS CONTINUOUS EW&NS
   SLABS AT ELEVATION 10'-11", 12'-0", 13'-1" ONLY:
   #4@18 TOP AT COLUMN AND MIDDLE STRIPS CONTINUOUS EW&NS ADDITIONAL #4S TOP ON COLUMNS EW&NS
   AT CORE PROVIDE #4@12 TOP CONTINUOUS EA. WAY U.O.N. ON PLAN.
4. AT THIS FLOOR, SLAB SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 6,000 PSI.
5. SYMBOLS:
   — INDICATES ADDITIONAL TOP REINFORCING BARS. REFER TO TYPICAL DETAILS ON S-600 SERIES DRAWINGS.
   - - - - INDICATES ADDITIONAL BOTTOM REINFORCING BARS. REFER TO TYPICAL DETAILS ON S-600 SERIES DRAWINGS.
   - REINFORCING INDICATED ON PLAN AT RAISED FLOOR AREAS IS FOR SLAB BELOW TOPPING.
   - AT AREAS OF OVERLAPPING SLABS, REINFORCING INDICATED WITHIN (XX) IS FOR LOW SLAB.
   — — — — INDICATES ASSUMED DIRECTION OF LOAD IN DESIGN.
   REFER TO TYPICAL DETAIL ON S-400 SERIES DRAWINGS FOR REBAR PLACEMENT GUIDELINES. LINES ARE OMITTED ON PLANS WHEN COLUMNS ALIGN ON A REGULAR GRID PATTERN.
   ✳ INDICATES SHEAR REINFORCING REQUIRED IN SLAB AROUND COLUMN. REFER TO TYPICAL DETAIL ON S-600 SERIES DRAWINGS.
6. NOTATION:
   xB... INDICATES REINFORCED CONCRETE BEAM AT FLOOR x. REFER TO BEAM SCHEDULE ON S-600 SERIES DRAWINGS.
   DB... INDICATES HSS6X4X3/8 ELEVATOR DIVIDER BEAM (NOT FIRE-PROOFED). REFER TO TYPICAL DETAIL ON S-600 SERIES DRAWINGS.
   CA/CB INDICATES COLUMN ABOVE/BELOW.
   PC... INDICATES PILE FOUNDATION. SEE DETAILS AND SCHEDULE SHEET S-201.
   F... INDICATES SPREAD FOOTING FOUNDATION. SEE DETAILS AND SCHEDULE SHEET S-202. FOUNDATIONS SHALL BE EXCAVATED TO SOLID ROCK PER GEOTECH REPORT
   GB... INDICATES GRADE BEAM. SEE SCHEDULE SHEET S-213.
   ◇ INDICATES x" CAMBER UPWARD WHEN DIFFERS FROM CAMBER SPECIFIED IN GENERAL NOTES.
   <...> INDICATES TOP OF FOOTING OR GRADE BEAM ELEVATION
   INDICATES STEP IN WALL FOOTING
   P... INDICATES EXCAVATED PIER FOUNDATION. SEE DETAILS AND SCHEDULE SHEET S-202. FOUNDATIONS SHALL BE EXCAVATED TO SOLID ROCK PER GEOTCH REPORT.
   C... INDICATES SQUARE CAISSON BWTWEEN SPREAD FOOTING ON ROCK AND STRUCTURAL SLAB SHEET
7. FOR COLUMN AND SLAB OPENING LOCATIONS, REFER TO ARCH DRAWINGS. FOR SUPERSTRUCTURE DETAILS, REFER TO S-600 SERIES DRAWINGS. FOR COLUMN SCHEDULE, REFER TO 300 SERIES DRAWINGS. FOR SHEAR WALL DETAILS, REFER TO 600 SERIES SERIES DRAWINGS. FOR GENERAL NOTES, REFER TO S-000 SERIES DRAWINGS.
8. COORDINATE SLEEVE NUMBERS AND LOCATIONS WITH MECHANICAL DWGS.
9. ALL SLABS SUPPORTING RAMPS AND DRIVE SURFACES DO CORDSION INHIBITOR ADMIXTURE AND TRAFFIC COATING MEMBRANE. SEE GENERAL NOTES AND SPECIFICATIONS. SEE ARCH DRAWINGS FOR EXTENTS AND MEMBRANE SPECIFICATION.
10. ◎ REPRESENTS ROCK SOCKETED DRILLED CAISSONS. SEE 1/S-801.

PROJECT:
625 WEST 57TH STREET
RESIDENTIAL / MIXED USE DEVELOPMENT
WEST 57th STREET & 12th AVENUE
NEW YORK, NEW YORK

OWNER/DEVELOPER:
Durst Pyramid LLC
One Bryant Park
New York, NY 10036

ARCHITECT:
SLCEArchitects, LLP
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NEW YORK, NY 10003
TEL.: (212) 979-8400

DESIGN ARCHITECT:
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New York, NY

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Israel Berger and Associates, LLC
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LIGHTING DESIGNER:
bpi Brandston Partnership Inc.
302 Fifth Avenue, New York, NY 10001
main: 212.924.4050

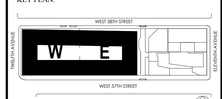
COMMISSIONING AGENT:
THE FULCRUM GROUP
61 BROADWAY SUITE 1605
NEW YORK, NY 10006

1	05/08/2013	BULLETIN #6
1	04/01/2013	BULLETIN #4
	03/15/2013	ISSUED FOR DOB FILING
	03/01/2013	CONCRETE BID SET
1	02/12/2013	FOUNDATION BULLETIN #2
	01/25/2013	FOUNDATION BULLETIN #1
	09/11/2012	BID SET
	07/30/2012	DESIGN DEVELOPMENT ISSUANCE
	DATE:	REVISION:

D.O.B. NUMBER:
NB#

NORTH | SCALE: 0

KEY PLAN:

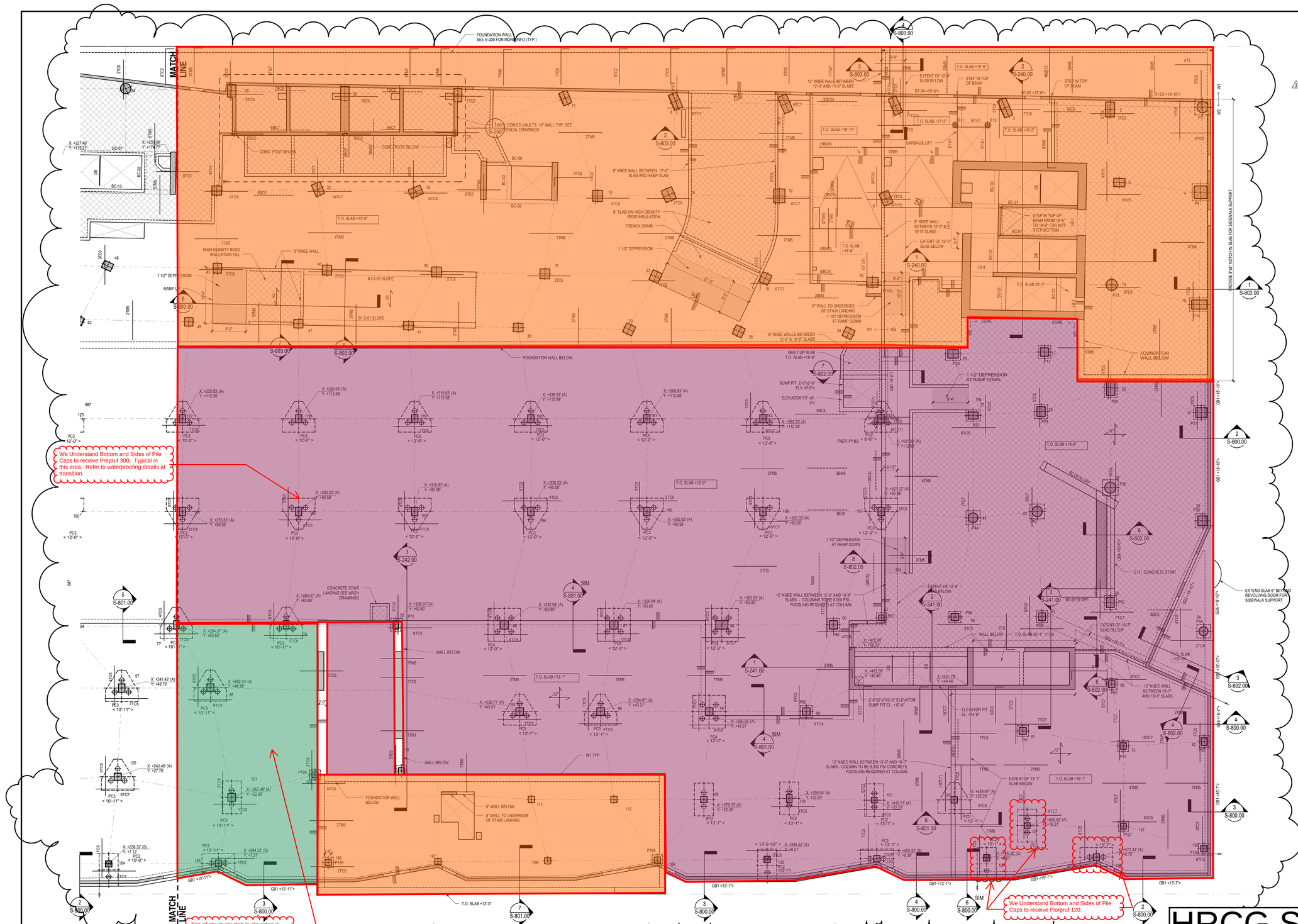


DRAWING TITLE:
PARTIAL 1ST FLOOR PLAN (WEST)

SEAL & SIGNATURE:

DATE:	05/08/2013
PROJECT No:	N10554.00
DRAWN BY:	JB
CHECKED BY:	RO
DWG. No.:	S-101.00
SHEET. No.:	OF

FILE No:



HRCG SK-1.3

CONCRETE NOTES:

1. TOP OF ARCHITECTURAL FINISHED FLOOR IS AT ELEVATION +12'-0". TOP OF STRUCTURAL SLAB SHALL BE -8" FROM TOP OF FINISHED FLOOR U.O.N. THUS ±___ ON PLAN REFERENCED TO TOP OF FINISHED FLOOR.
2. 'X' — INDICATES X"-THICK FLAT PLATE. FOR 12" THICK SLAB. #5@12 BOTTOM CONTINUOUS EA. WAY U.O.N. ON PLAN.
   'X' — INDICATES X" THICK ONE WAY SLAB. REFER TO SLAB SCHEDULE ON S-600 SERIES DRAWINGS.
   FOR THIS FLOOR, FACE OF PILE CAP TO BE CONSIDERED AS FACE OF COLUMN FOR DETERMINATION OF STRIP WIDTHS AND BAR CUTOFF LENGTHS.
3. PROVIDE THE FOLLOWING REINFORCEMENT IN ADDITION TO WHAT IS SHOWN IN PLAN :
   SLABS AT ELEVATION 6'-4" AND 8'-4" ONLY:
   #5@12 TOP AT COLUMN AND MIDDLE STRIPS CONTINUOUS EW&NS
   FOR THE BARS ABOVE: BOTTOM BARS @ ALL COLUMNS STRIPS ARE TO BE DETAILED AS TOP BARS. TOP BARS @ MID SPAN IN ALL STRIPS ARE TO BE DETAILED AS BOTTOM BARS
   SLABS AT ELEVATION 16'-11", 17'-2", 18'-2", 19'-6" ONLY:
   #5@18 TOP AT COLUMN AND MIDDLE STRIPS CONTINUOUS EW&NS
   SLABS AT ELEVATION 10'-11", 12'-0", 13'-1" ONLY:
   #4@18 TOP AT COLUMN AND MIDDLE STRIPS CONTINUOUS EW&NS ADDITIONAL #4@ TOP ON COLUMNS EW&NS
4. AT THIS FLOOR, SLAB SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 6,000 PSI.
5. SYMBOLS:
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   CA/CB INDICATES COLUMN ABOVE/BELOW.
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10. REPRESENTS ROCK SOCKETED DRILLED CAISSONS. SEE 1/S-801.

KEY

- Waterproofing Under Slab: Prepruf 300R
- Vapor Barrier Under Slab: Florpruf 120
- Cellar Below, No Vapor Barrier, Please Confirm

Submitted For Record
Submittal: 071000.SK.001

PROJECT:
625 WEST 57TH STREET
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WEST 57th STREET & 12th AVENUE
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NORTH
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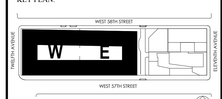
KEY PLAN:


DRAWING TITLE:
PARTIAL 1ST FLOOR PLAN (EAST)

SEAL & SIGNATURE:

DATE:	05/08/2013
PROJECT No:	N10554.00
DRAWN BY:	JB
CHECKED BY:	RO
DWG No.:	S-102.00
SHEET. No.:	OF

FILE No:

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■PRODUCT DATA ■UPDATES ■TECH LETTERS ■DETAILS ■MSDS ■CONTACTS ■FAQS

Florprufe™ 120

Integrally bonded vapor protection for slabs on grade

Description

Florprufe™ 120 is a high performance vapor barrier with Grace's Advanced Bond Technology™ that forms a unique seal to the underside of concrete floor slabs.

Comprising a highly durable polyolefin sheet and a specially developed, non-tacky adhesive coating, Florprufe 120 seals to liquid concrete to provide integrally bonded vapor protection.

Florprufe exceeds ASTM E1745 Class A rating.

Advantages

- Forms a powerful integral seal to the underside of concrete slabs
- Protects valuable floor finishes such as wood, tiles, carpet and resilient flooring from damage by vapor transmission
- Direct contact with the slab complies with the latest industry recommendations
- Remains sealed to the slab even in cases of ground settlement
- Ultra low vapor permeability
- Durable, chemical resistant polyolefin sheet
- Lightweight, easy to apply, kick out rolls
- Simple lap forming with mechanical fixings or tape

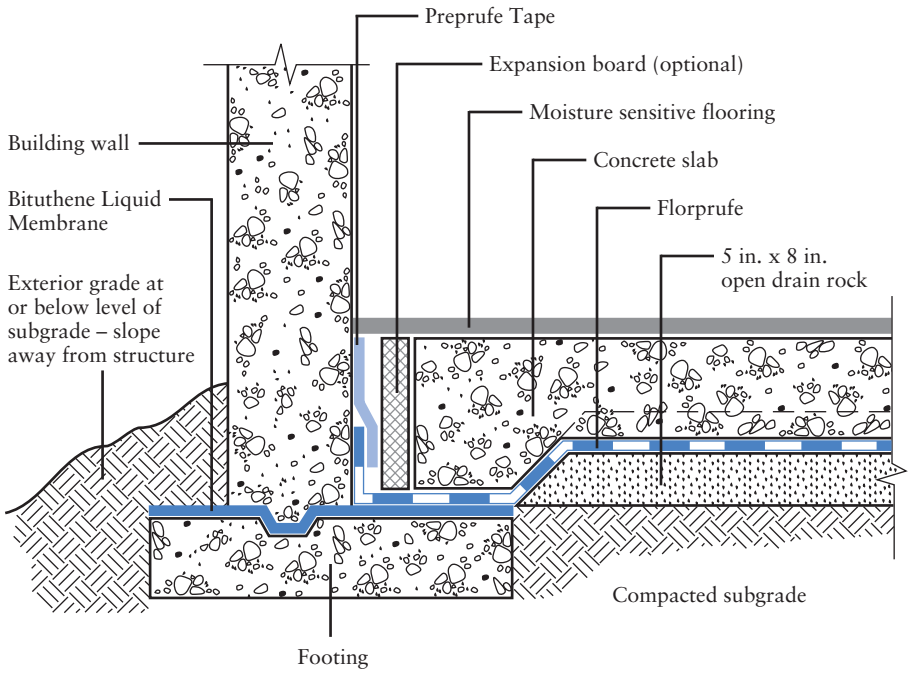
Use

Florprufe 120 is engineered for use below slabs on grade with moisture-impermeable or moisture-sensitive floor finishes that require the highest level of vapor protection.

Florprufe complies with the latest recommendations of ACI Committees 302 and 360, i.e. for slabs with vapor sensitive coverings, the location of the vapor barrier should always be in direct contact with the slab[1].

The membrane is loose laid onto the prepared sub-base, forming overlaps that can be either mechanically secured or taped. The unique bond of Florprufe to concrete provides continuity of vapor protection at laps. Alternatively, if a taped system is preferred, self-adhered Preprufe® Tape can be used to overband the laps.

Slab reinforcement and concrete can be placed immediately. Once the concrete is poured, an integral bond develops between the concrete and membrane.



Typical Assembly

[1] ACI 302.1R-96 Addendum

GRACE Construction Products

Supply

Florprufe 120

Supplied in rolls	1.2 m x 35 m (4 ft x 115 ft)
Roll area	42 m^2 (460 ft^2)
Roll weight	37 kg (81 lbs) approx.

Ancillary Products

Preprufe Tape is packaged in cartons containing 4 rolls that are 100 mm x 15 m (4 in. x 49 ft).
Bituthene Liquid Membrane is supplied in 5.7 L (1.5 gal) pails.

Physical Properties: Exceeds ASTM E1745 Class A rating

Property	Typical Value	Test Method
Color	White	
Thickness (nominal)	0.5 mm (0.021 in.)	ASTM D3767 – Method A
Water Vapor Permeance	0.03 perms	ASTM E96 – Method B[1]
Tensile Strength	68 lbs/in.	ASTM E154[1]
Elongation	300%	ASTM D412
Puncture Resistance	3300 gms	ASTM D1709[1]
Peel Adhesion to Concrete	>4 lbs/in.	ASTM D903

1. Test methods that comprise ASTM E1745 standard for vapor retarders

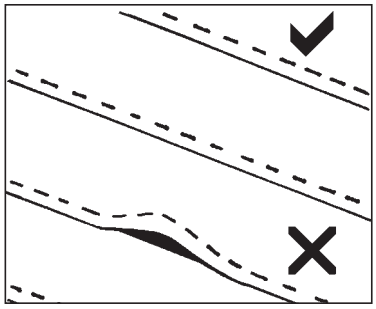


Figure 1

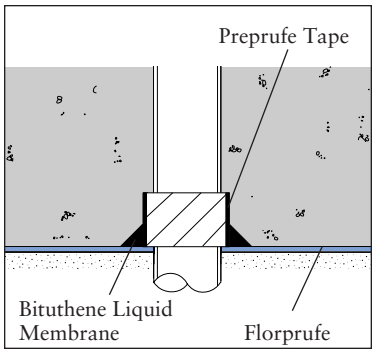


Figure 2

Installation

Health & Safety

Refer to relevant Material Safety Data Sheet. Complete rolls should be handled by 2 persons.

Florprufe 120 can be applied at temperatures of -4°C (25°F) or above. Membrane installation is unaffected by wet weather. Installation and detailing of Florprufe 120 are generally in accordance with ASTM E1643-98.

Prepare substrate in accordance with ACI 302.1R Section 4.1. Install Florprufe 120 over the leveled and compacted base. Place the membrane with the smooth side down and the plastic liner side up facing towards the concrete slab. Remove and discard plastic liner. End laps should be staggered to avoid a build up of layers.

Succeeding sheets should be accurately positioned to overlap the previous sheet 50 mm (2 in.) along the marked lap line.

Laps

1. **Mechanical fastening method –** To prevent the membrane from moving and gaps opening, the laps should be fastened together at 1.0 m (39 in.) maximum centers. Fix through the center of the lap area using 12 mm (0.5 in.) long washer-head, self-tapping, galvanized screws (or similar) and allowing the head of the screw to bed into the adhesive compound to self-seal. It is not necessary to fix the membrane to the substrate, only to itself. **Ensure the membrane lays flat and no openings occur.** (See Figure 1.) Additional fastening may be required at corners, details, etc. Continuity is achieved once the slab is poured and the bond to concrete develops.

   OR

2. **Taped lap method –** For additional security use Grace Preprufe Tape to secure and seal the overlaps. Overband the lap with the 100 mm (4 in.) wide Preprufe Tape, using the lap line for alignment. Remove plastic release liner to ensure bond to concrete.

Penetrations

Mix and apply Bituthene Liquid Membrane detailing compound to seal around penetrations such as drainage pipes, etc. (See Figure 2 and refer to the Bituthene Liquid Membrane data sheet, BIT-230.)

Concrete Placement

Place concrete within 30 days. Inspect membrane and repair any damage with patches of Preprufe Tape. Ensure all liner is removed from membrane and tape before concreting.

For Technical Assistance call toll free at 866-333-3SBM (3726).

web Visit our web site at www.graceconstruction.com

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W. R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140

Florprufe is a trademark and Preprufe is a registered trademark of W. R. Grace & Co.-Conn.

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GRACE Construction Products

GRACE

PREPRUFE® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R System includes:

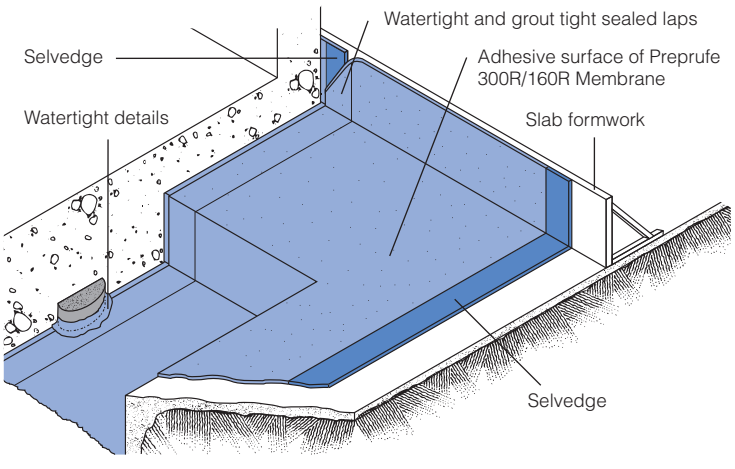
- **Preprufe 300R**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT**—for covering cut edges, roll ends, penetrations and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C)).
- **Preprufe Tape HC**—as above for use in Hot Climates (minimum 50°F (10°C)).
- **Bituthene® Liquid Membrane**—for sealing around penetrations, etc.
- **Adcor™ ES**—waterstop for joints in concrete walls and floors
- **Preprufe Tieback Covers**—preformed cover for soil retention wall tieback heads
- **Preprufe Preformed Corners**—preformed inside and outside corners

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted earth or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it**—prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered watertight laps** and detailing
- **Provides a barrier to water, moisture and gas**—physically isolates the structure from the surrounding ground
- **BBA Certified** for basement Grades 2, 3, & 4 to BS 8102:1990
- **Zero permeance** to moisture
- **Solar reflective**—reduced temperature gain
- **Simple and quick to install**—requiring no priming or fillets
- **Can be applied to permanent formwork**—allows maximum use of confined sites
- **Self protecting**—can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions**—cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant**—effective in most types of soils and waters, protects structure from salt or sulphate attack



Drawings are for illustration purposes only.
Please refer to graceconstruction.com for specific application details.

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 97/3325

Installation

The most current application instructions, detail drawings and technical letters can be viewed at graceconstruction.com. For other technical information contact your local Grace representative.

Preprufe 300R & 160R membranes are supplied in rolls 4 ft (1.2 m) wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

Substrate Preparation

All surfaces—It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability (see Figure 1).

Horizontal—The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.

Vertical—Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

Membrane Installation

Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions 55°F (<13°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Low Temperature (LT) is available for low temperature condition applications. Refer to Preprufe LT data sheet for more information.

Horizontal substrates—Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed (see Figure 2).

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Refer to Grace Tech Letter 15 for information on suitable rebar chairs for Preprufe.

Vertical substrates—Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length. Fastening can be made through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner.

Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Roll firmly to ensure a watertight seal.

Roll ends and cut edges—Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly (see Figure 3). Immediately remove printed plastic release liner from the tape.

Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit graceconstruction.com. This manual gives comprehensive guidance and standard details.

Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by power washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe membrane and tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength of 1500 psi (10 N/mm^2) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

Refer to Grace Tech Letter 17 for information on removal of formwork for Preprufe.

Figure 1

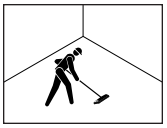


Figure 2

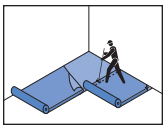
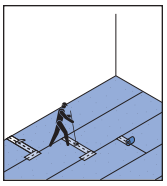
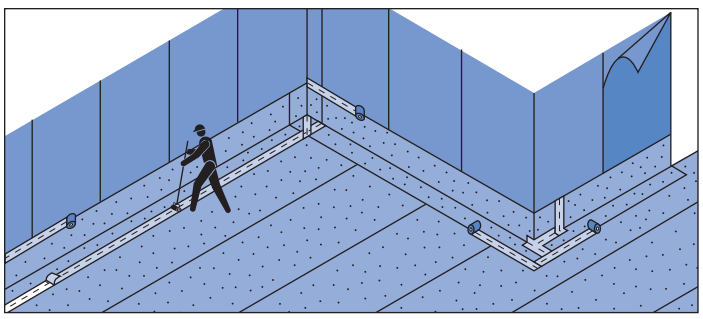


Figure 3

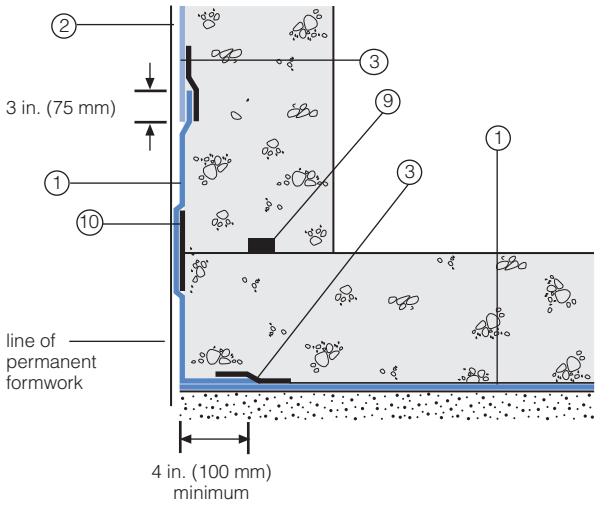




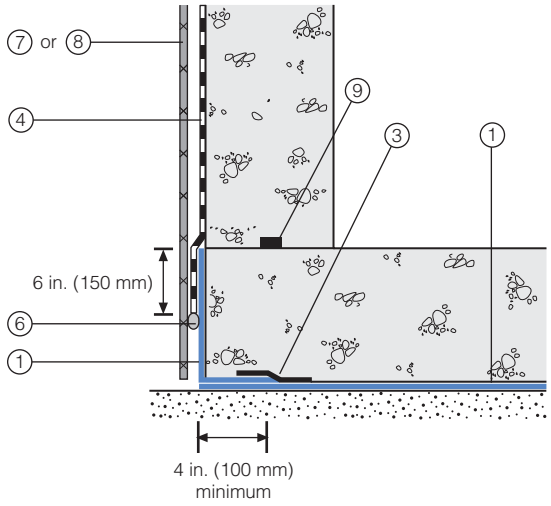
Detail Drawings

Details shown are typical illustrations and not working details. For a list of the most current details, visit us at graceconstruction.com. For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

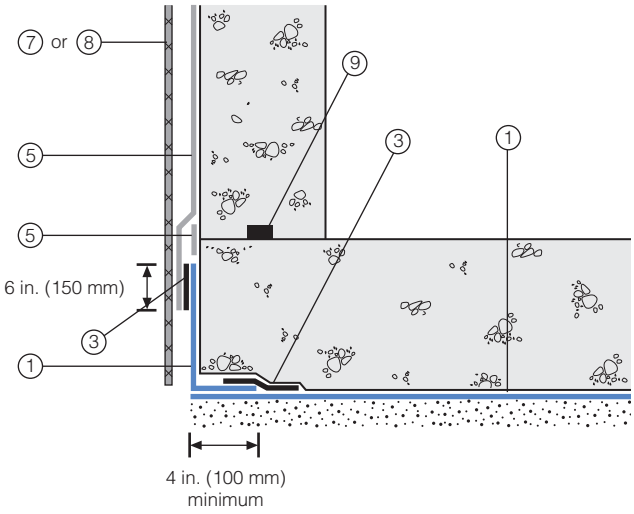
Wall base detail against permanent shutter



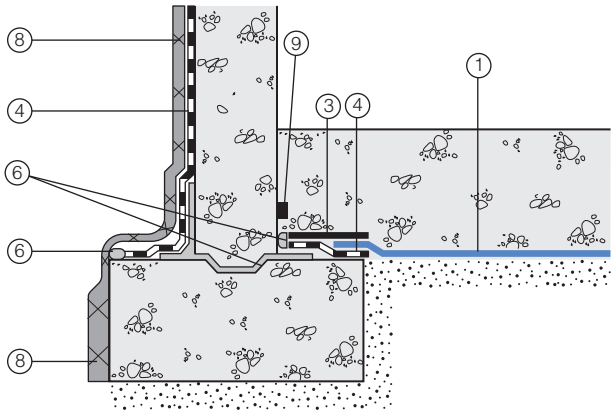
Bituthene wall base detail (Option 1)



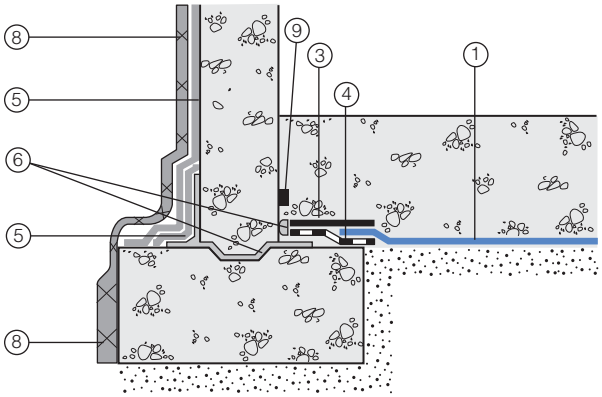
Procor wall base detail (Option 1)



Bituthene wall base detail (Option 2)



Procor wall base detail (Option 2)



1 Preprufe 300R
2 Preprufe 160R
3 Preprufe Tape
4 Bituthene
5 Procor
6 Bituthene Liquid Membrane
7 Protection
8 Hydroduct®
9 Adcor ES
10 Preprufe CJ Tape

Supply

Dimensions (Nominal)	Preprufe 300R Membrane	Preprufe 160R Membrane	Preprufe Tape (LT or HC*)
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	
Roll size	4 ft x 98 ft (1.2 m x 30 m)	4 ft x 115 ft (1.2 m x 35 m)	4 in. x 49 ft (100 mm x 15 m)
Roll area	392 ft^2 (36 m^2)	460 ft^2 (42 m^2)	
Roll weight	108 lbs (50 kg)	92 lbs (42 kg)	4.3 lbs (2 kg)
Minimum side/end laps	3 in. (75 mm)	3 in. (75 mm)	3 in. (75 mm)
* LT denotes Low Temperature (between 25°F (-4°C) and 86°F (+30°C)) HC denotes Hot Climate (50°F (>+10°C))			
Ancillary Products			
Bituthene Liquid Membrane—1.5 US gal (5.7 liter) or 4 US gal (15.1 liter)			

Physical Properties

Property	Typical Value 300R	Typical Value 160R	Test Method
Color	white	white	
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	ASTM D3767
Lateral Water Migration Resistance	Pass at 231 ft (71 m) of hydrostatic head pressure	Pass at 231 ft (71 m) of hydrostatic head pressure	ASTM D5385, modified[1]
Low temperature flexibility	Unaffected at -20°F (-29°C)	Unaffected at -20°F (-29°C)	ASTM D1970
Resistance to hydrostatic head	231 ft (71 m)	231 ft (71 m)	ASTM D5385, modified[2]
Elongation	500%	500%	ASTM D412, modified[3]
Tensile strength, film	4000 psi (27.6 MPa)	4000 psi (27.6 MPa)	ASTM D412
Crack cycling at -9.4°F (-23°C), 100 cycles	Unaffected, Pass	Unaffected, Pass	ASTM C836
Puncture resistance	221 lbs (990 N)	100 lbs (445 N)	ASTM E154
Peel adhesion to concrete	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D903, modified[4]
Lap peel adhesion	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D1876, modified[5]
Permeance to water vapor transmission	0.01 perms (0.6 ng/(Pa x s x m^2))	0.01 perms (0.6 ng/(Pa x s x m^2))	ASTM E96, method B
Water absorption	0.5%	0.5%	ASTM D570

Footnotes:

1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the membrane.
2. Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125 in. (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
3. Elongation of membrane is run at a rate of 2 in. (50 mm) per minute.
4. Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2 in. (50 mm) per minute at room temperature.
5. The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 2 in. (50 mm) per minute.

Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe 300R/160R. All Preprufe 300R/160R system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be handled by a minimum of two persons.

www.graceconstruction.com

For technical assistance call toll free at 866-333-3SBM (3726)

Adcor is a trademark and Preprufe, Bituthene and Hydroduct are registered trademarks of W. R. Grace & Co.–Conn.
Procor is a U.S. registered trademark of W. R. Grace & Co.–Conn., and is used in Canada under license from PROCOR LIMITED.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.–Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

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PF-111H Printed in U.S.A. 07/12 FA/PDF

GRACE

Monitoring Well Logs

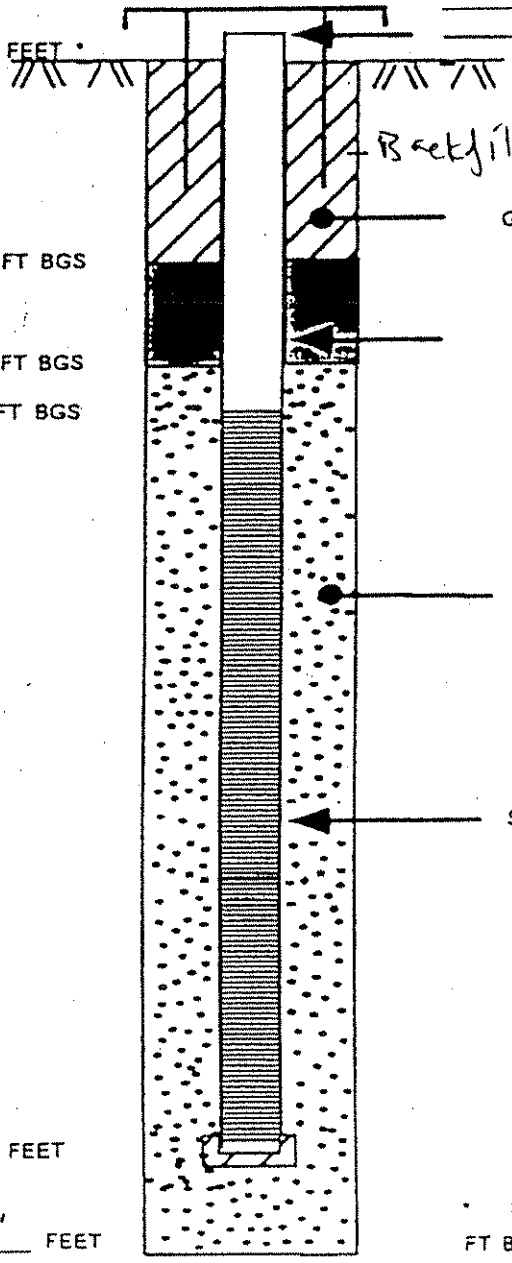
MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NO.: 18346-0001
PROJECT NAME: West 57th St
CLIENT: DURST organization
SITE LOCATION: West 58th St + 12th Ave

MONITORING WELL NAME: MW-2
INSTALLATION DATE(S): 11/15/99
COUNTY:
PERMIT NUMBER:

ELEVATION OF OUTER PROTECTIVE PROTESTIVE CASING _____ FEET *
GROUNDSURFACE ELEVATION _____ FEET *

HEIGHT OF MEASURING POINT (feet) _____
FEET* ELEVATION OF TOP OF CASING (MEASURING POINT) _____



DEPTH TO TOP OF Bentonite SEAL 5.5 FT BGS
DEPTH TO TOP OF SAND PACK 7 FT BGS
DEPTH TO TOP OF SCREEN 8 FT BGS

DEPTH TO BOTTOM OF SCREEN 23' FEET
DEPTH TO BOTTOM OF BOREHOLE 24' FEET

* RELATIVE TO MEAN SEA LEVEL
FT BGS FEET BELOW GROUND SURFACE

DRILLING METHOD: Hollow Stem
RILLING CONTRACTOR: ADT
REMARKS (WELL DRILLING): (DEPTH TO WATER) 13'
WELL DEVELOPMENT TECHNIQUE:
IEMARKS (WELL DEVELOPMENT): (DATE)
WELL INSTALLATION SUPERVISED BY: Winslow

WELL PURPOSE: monitoring well
DRILLING FLIUD: None
FLUID LOSS DURING DRILLING: NA
WATER REMOVED DURING DEVELOPMENT:
SIGNATURE:

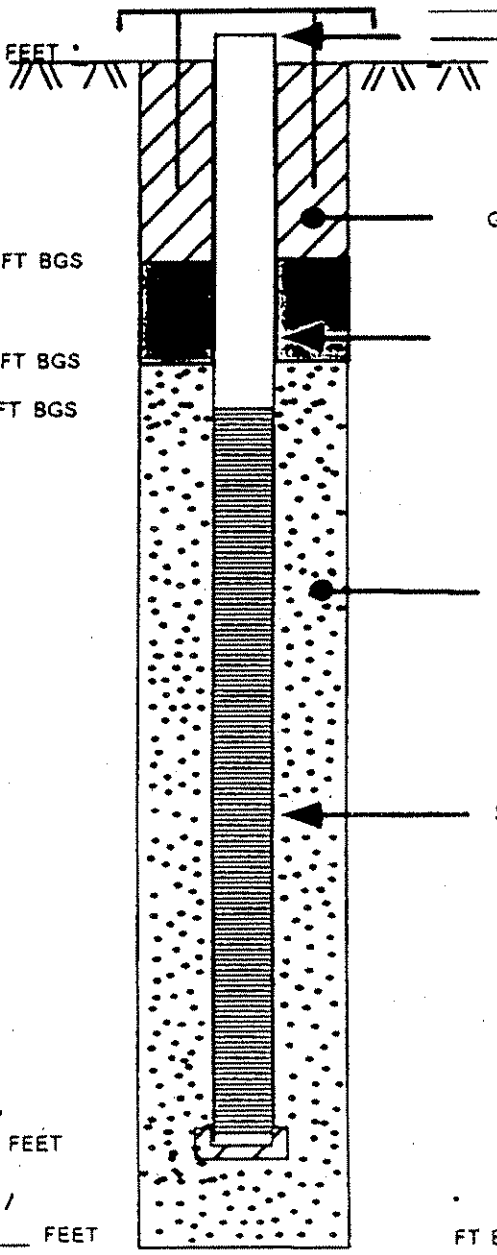
MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NO.: 18376-0001
PROJECT NAME: West 57th St
CLIENT: BURST
SITE LOCATION: West 57th St

MONITORING WELL ~~NAME~~: MW-3
INSTALLATION DATE(S): 11/15/99
COUNTY: NY
PERMIT NUMBER:

ELEVATION OF OUTER PROTECTIVE PROTESTIVE CASING _____ FEET *
GROUNDSURFACE ELEVATION _____ FEET *

HEIGHT OF MEASURING POINT (feet) _____
FEET* ELEVATION OF TOP OF CASING (MEASURING POINT)



DEPTH TO TOP OF Bentonite SEAL 5.5' FT BGS

DEPTH TO TOP OF SAND PACK 7' FT BGS

DEPTH TO TOP OF SCREEN 8' FT BGS

GROUT/SEAL _____

CASING TYPE PVC
SCHEDULE 40
DIAMETER 2"

SAND PACK TYPE #1

SCREEN TYPE PVC
SCHEDULE 40
DIAMETER 2"
SLOT SIZE 010

DEPTH TO BOTTOM OF SCREEN 23' FEET

DEPTH TO BOTTOM OF BOREHOLE 24' FEET

* RELATIVE TO MEAN SEA LEVEL
FT BGS FEET BELOW GROUND SURFACE

DRILLING METHOD: _____
DRILLING CONTRACTOR: _____
REMARKS (WELL DRILLING): (DEPTH TO WATER) _____
WELL DEVELOPMENT TECHNIQUE: _____
REMARKS (WELL DEVELOPMENT): (DATE) _____
WELL INSTALLATION SUPERVISED BY: _____

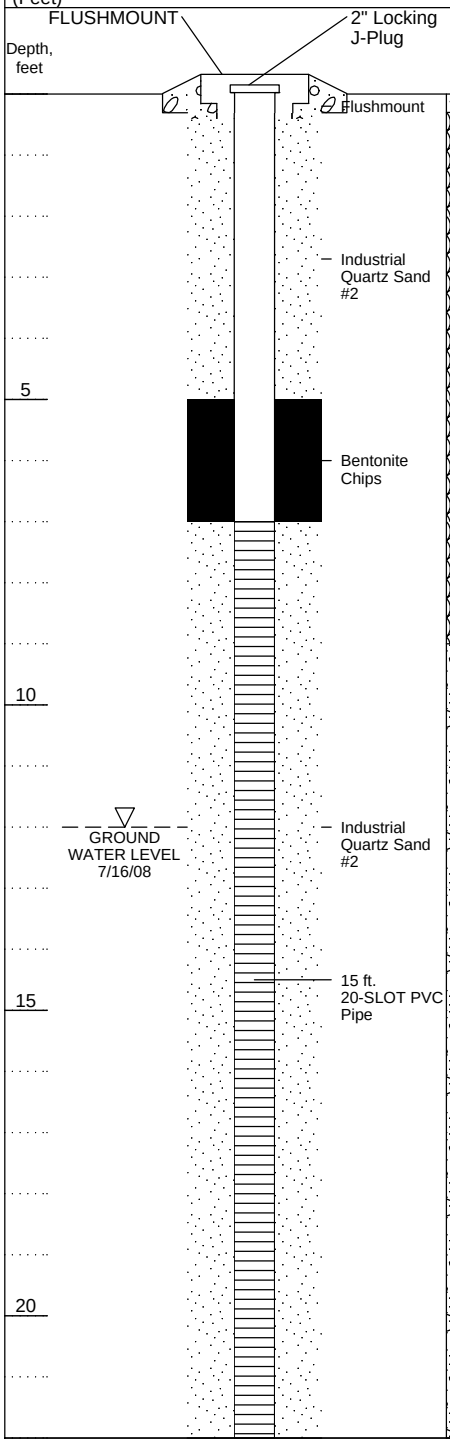
WELL PURPOSE: monitoring well
DRILLING FLUID: _____
FLUID LOSS DURING DRILLING: _____
WATER REMOVED DURING DEVELOPMENT: _____
SIGNATURE: _____

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

209 Shafter Street
Islandia, New York 11749
Telephone: (631) 232-2600
Fax: (631) 232-9898

WELL CONSTRUCTION LOG

WELL NO. **MW-8**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **133803Y / Durst Remedial Investigation**		LOCATION **615-649 W. 57th Steet**		
APPROVED BY **J. Levine**	LOGGED BY **S. Singh**	**New York, New York**		
DRILLING CONTRACTOR/DRILLER **ADT / Jeremy Meyers**		GEOGRAPHIC AREA **58th St. Sidewalk Bewteen 11th and 12th Ave**		
DRILL BIT DIAMETER/TYPE **4.25-in. / Auger**	BOREHOLE DIAMETER **8-inches**	DRILLING EQUIPMENT/METHOD **LC-55 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **7/14/08-7/16/08**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC**	TOTAL LENGTH **15.0**ft	DIA. **2-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **Morie #2**	



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete			
		FILL-Dark brown, with mixture of reddish gray, fine to coarse SAND, some Gravel; dry		0.0	
		FILL-Dark brown, fine to coarse SAND, litle Gravel, rock fragments; dry		0.0	
5		FILL-Dark brown, fine to coarse SAND, some Gravel, fragments of rock, ash and brick; dry	1 3 5 4	120	5-7' Recovery = 18"
		FILL-Dark brown, fine to coarse SAND, some Gravel, fragments of rock, ash, and brick; dry	2 6 6 4	10.8	7-9" Recovery = 18"
10		Light grayish brown, fine to coarse SAND, some Gravel; dry	7 11 9 13	0.0	9-11' Recovery =20"
		Dark brown to gray, fine to coarse SAND, some Gravel and rock fragments; moist	3 3 2 6	1.7	11-13' Recovery =14"; Sample collected and analyzed for VOCs (STARS list) USEPA 8260 and MTBE
		Dark brown, fine(+) to coarse SAND, some Gravel, hydrocarbon odor; wet	4 2 3 2	1658	13-15' Recovery = 20"; Sample collected and analyzed for VOCs (STARS list) USEPA 8260 and MTBE
15		Dark brown, fine to coarse SAND, some Gravel, rock fragments; wet	3 6 5 6	14.1	15-17' Recovery = 14"
		Gray, fine to coarse SAND, trace Gravel, hydrocarbon odor; wet	4 7 8 7	1621	17-19' Recovery = 4"
20			1 3 2 1	1479	19-21' Recovery = 20" Bottom of boring at 22' bls

BORING/FEET 133803Y.GPJ ROUX.GDT 11/23/09

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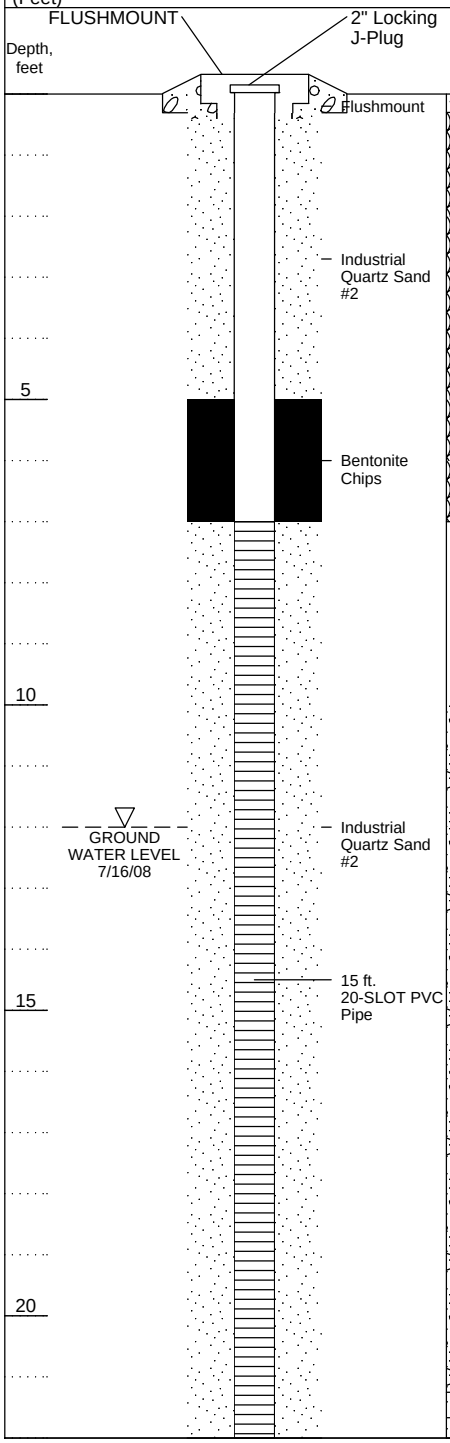
WELL CONSTRUCTION LOG

WELL NO. **MW-9**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **133803Y / Durst Remedial Investigation**		LOCATION **615-649 W. 57th Steet**		
APPROVED BY **J. Levine**	LOGGED BY **S. Singh**	**New York, New York**		
DRILLING CONTRACTOR/DRILLER **ADT / Jeremy Meyers**		GEOGRAPHIC AREA **58th St. Sidewalk Bewteen 11th and 12th Ave**		
DRILL BIT DIAMETER/TYPE **4.25-in. / Auger**	BOREHOLE DIAMETER **8-inches**	DRILLING EQUIPMENT/METHOD **LC-55 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **7/15/08-7/16/08**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **15.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**			
ELEVATION OF: (Feet) GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **Morie #2**	



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete			
		FILL-Brown, fine to coarse SAND, some Gravel, little cobble; dry		0.0	
		FILL-Brown, fine to coarse SAND, some Gravel, fragments of brick, rock (schist or red sandstone); dry		0.0	
5		FILL-Dark brown, fine to coarse SAND, some Gravel and rock fragments, ash lenses; dry	7 5		5-7' Recovery = 18"
		FILL-Brown, fine to coarse SAND, some Gravel, trace brick fragments; dry	7 10	121	
		No Recovery			7-10' No Recovery
10		Dark brown, fine to coarse SAND, little Gravel and rock fragments; moist	3 2 1 3	117	10-12' Recovery =10"; Sample collected and analyzed for VOCs (STARS list) USEPA 8260 and MTBE
		Dark brown to olive gray, fine to coarse SAND, some Gravel; wet	1 2 2 2	3.8	12-14' Recovery =14"
15			1 2 2 1	12.2	14-16' Recovery = 16"
		Gray to dark gray, fine to coarse SAND, some Gravel, hydrocarbon odor; wet	1 1 1 1	1697	16-18' Recovery = 20"; Sample collected and analyzed for VOCs (STARS list) USEPA 8260 and MTBE
			1 1 1 1	1678	18-20' Recovery = 10"
20			1 1 2 2	1537	20-22' Recovery = 24"
		Dark gray to black, Silty Sand, cohesive, hydrocarbon odor; wet	2	2.1	Bottom of boring at 22' bls

BORING/FEET 133803Y.GPJ ROUX.GDT 11/23/09

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Environmental Consulting & Management

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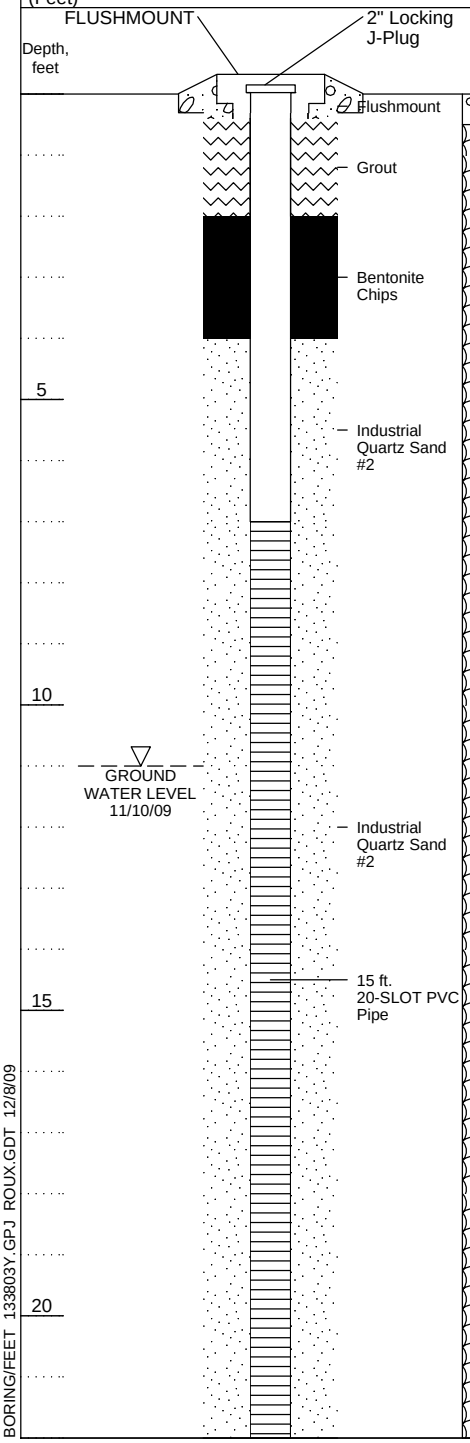
WELL CONSTRUCTION LOG

WELL NO. **MW-10**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **133803Y / Durst Remedial Investigation**		LOCATION **615-649 W. 57th Steet**		
APPROVED BY **J. Levine**	LOGGED BY **C.Roth**	**New York, New York**		
DRILLING CONTRACTOR/DRILLER **Associated Env. Serv. / Ryan Jensen**		GEOGRAPHIC AREA **58th St. Sidewalk Bewteen 11th and 12th Ave**		
DRILL BIT DIAMETER/TYPE **4.25-in. / Drive Sampler**	BOREHOLE DIAMETER **8-inches**	DRILLING EQUIPMENT/METHOD **CME / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **11/4/09-11/5/09**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC**	TOTAL LENGTH **15.0**ft	DIA. **2-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **Morie #2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete			
		FILL - Tanish black, SAND, stained			
		FILL - Black, SAND, brick, debris			
10		FILL - Brown-black, fine to coarse SAND and slag, little brick; wet		2036	Hydrocarbon odor; Sample collected (10-12' bls) and analyzed for VOCs, SVOCs and Metals
15		FILL - Black, fine to coarse SAND and GRAVEL; wet		485	Hydrocarbon odor
20		FILL - Black, fine to coarse SAND; wet		796	Hydrocarbon odor; Sample collected (18-20' bls) and analyzed for VOCs, SVOCs and Metals
					Bottom of boring at 22' bls

BORING/FEET 133803Y.GPJ ROUX.GDT 12/8/09

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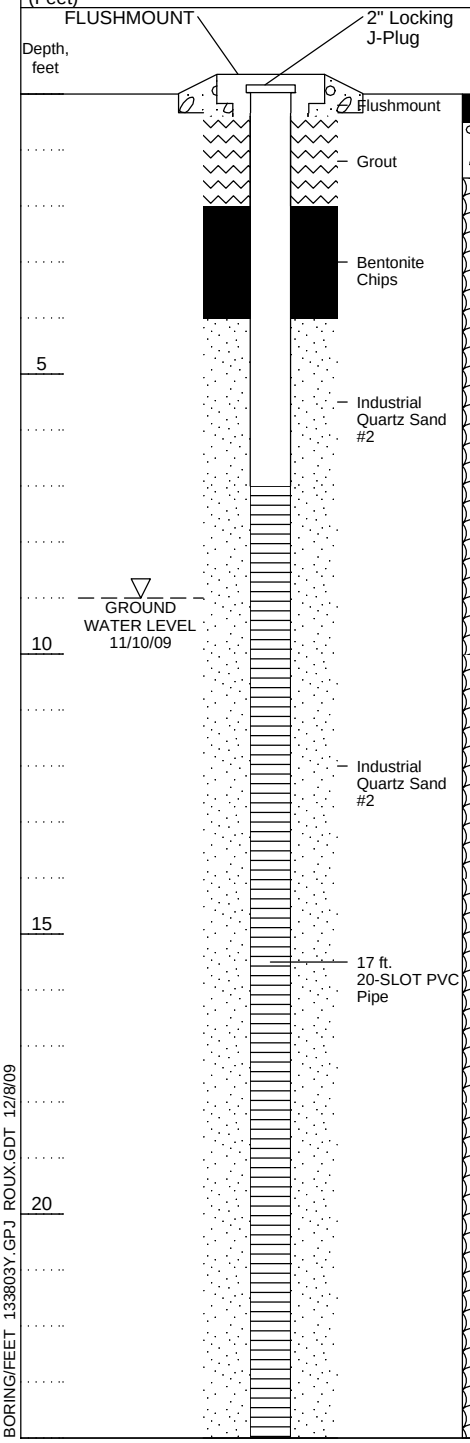
WELL CONSTRUCTION LOG

WELL NO. **MW-11**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **133803Y / Durst Remedial Investigation**		LOCATION **615-649 W. 57th Steet**		
APPROVED BY **J. Levine**	LOGGED BY **C.Roth**	**New York, New York**		
DRILLING CONTRACTOR/DRILLER **Associated Env. Serv. / Ryan Jensen**		GEOGRAPHIC AREA **58th St. Sidewalk Bewteen 11th and 12th Ave**		
DRILL BIT DIAMETER/TYPE **4.25-in. / Drive Sampler**	BOREHOLE DIAMETER **8-inches**	DRILLING EQUIPMENT/METHOD **CME / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **11/4/09-11/5/09**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC**	TOTAL LENGTH **15.0**ft	DIA. **2-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **Morie #2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Asphalt			
		Concrete			
		FILL- Brown, SAND and Cobble			
5					
10		FILL - Concrete, Gravel, and Slag, little coarse Sand; moist-wet			10-14' Recovery =10"; Hydrocarbon odor Sample MW-11 (10-12) collected and analyzed for VOCs, SVOCs and Metals
				3.8	
15		FILL - Brown, fine to coarse SAND and Wood; wet			
				5.6	
		FILL - Brown SAND and GRAVEL; wet			
20				1.7	
					Bottom of boring at 24' bls

BORING/FEET 133803Y.GPJ ROUX.GDT 12/8/09

Groundwater Sampling Log

Well Sampling Purge Log

Client: _____ **Project Number:** _____

Site Location: _____

Well No: _____ Weather: _____

Date: _____ Purge Water Disposal: _____

Sampled By: _____ Well Diameter / Type: _____

Depth to Product (ft): _____ Water Column (ft): _____

Depth to Water(ft): _____ Volume of Water in Well (gal) _____

Depth to Bottom (ft): _____ Volume of Water to Remove (gal): _____

well diameter:	1 in	2 in	4 in	6 in	8 in
gallons per foot:	0.041	0.163	0.653	1.469	2.611

Start Purging: _____ Purge Rate: _____

End Purging: _____ Volume of Water Removed (gal): _____

Method of Purge: Peristaltic Pump Method of Sampling: Low-Flow

Physical Appearance/ Comments: _____

Samples Collected: (analyses / no. bottles) _____

Duplicate Sample: _____ Laboratory : _____

Field Measurements:

Time	**DTP** ft	**DTW** ft	**pH** SU	**Conductivity** **mS/cm** - S/m	**Turbidity** NTU	**Dissolved O_2** mg/L	**Temperature** C^o	**ORP** mV

APPENDIX H

Site-Wide Inspection Log

Appendix H. Site Wide Inspection Checklist,
Mid Block #57 Project, New York, NY

Date: _____

Completed By: _____

Description	Status			Actions Taken / Comments
	Ok	Action Req.	N/A	
Sub Slab Depressurization System Equipment Room				
A. Aboveground Piping (Influent Manifold, Blower Piping)				
1 Inspect aboveground piping for cracks, leaks and support issues.				
2 Inspect vacuum/pressure gauges and flowmeters for proper operation.				
3 Inspect Foundation Sidewall piping penetration for cracks or water intrusion.				
B. Electrical				
1 Check that the electrical control panel is closed/secured.				
C. 60-Gallon Knock-out Tanks (#1 and #2)				
1 Check condition of vacuum filter.				
2 Check dilution valve for noises or leaks.				
4 Check for presence of water in knockout tank.				
Building Slab, Monitoring Wells and Soil Vapor Monitoring Points				
A. Concrete Visual Inspection; Confirm No Cracks or water intrusion are visible				
1 Inspect 1st Floor Slab for cracks, leaks and staining.				
2 Inspect Basement Slab for cracks, leaks and staining.				
B. Monitoring Wells/Injection Points				
1 Open flush mount monitoring well access coverplates, confirm locking J Plug is firmly secured to prevent water intrusion, gauge wells, secure J Plug and screw in well access coverplates.				
C. Soil Vapor Intrusion Points				
1 Open four flush mount soil vapor intrusion access coverplates, confirm access tube is capped to prevent vapor intrusion, measure vacuum, replace cap on tube, and screw in access coverplates.				

APPENDIX I

Quality Assurance Project Plan

December 3, 2013

QUALITY ASSURANCE PROJECT PLAN

Mid Block #57 Project
615-649 West 57th Street
New York, New York

Prepared for

DURST DEVELOPMENT, L.L.C.
One Bryant Park
New York, New York 10036

Remedial Engineering, P.C.
Environmental Engineers

and ROUX ASSOCIATES, INC.

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Project Organization and Responsibility 1

2.0 SAMPLING OBJECTIVES 3

3.0 SAMPLE MEDIA, LOCATIONS, ANALYTICAL SUITES, AND FREQUENCY 4
3.1 Post Excavation Soil Sampling 4
3.2 Backfill Sampling 5
3.3 Sub-Slab Soil Vapor Sampling 6
3.4 Groundwater Sampling 6
3.5 Analytical Laboratory 7
3.6 Laboratory Data Validation 7

4.0 FIELD SAMPLING PROCEDURES 8
4.1 Soil Sampling 8
4.2 Soil Vapor Sampling 8
4.3 Groundwater Sampling 8

5.0 SAMPLE HANDLING AND ANALYSIS 10
5.1 Field Sample Handling 10
5.2 Sample Custody Documentation 10
5.3 Sample Shipment 11
5.4 Quality Assurance/Quality Control 11

6.0 SITE CONTROL PROCEDURES 13
6.1 Field Work Zones 13
6.2 Decontamination 13
6.3 Waste Handling and Disposal 13

Tables

1. Summary of Analytical Methods/Quality Assurance Samples
2. Summary of Preservation, Holding Times, and Sample Containers

Appendices

A. Professional Profiles
B. Data Validator Resume

1.0 INTRODUCTION

Roux Associates, Inc. (Roux Associates) and Remedial Engineering, P.C. (Remedial Engineering) have developed this Quality Assurance Project Plan (QAPP) for the Mid Block #57 Project located at 615-649 West 57th Street, New York, New York (the Site) to describe in detail the field sampling and quality assurance/quality control methods to be used during groundwater sampling and soil management tasks.

The tasks covered by this QAPP are soil sampling, soil vapor sampling, and groundwater monitoring.

This QAPP was prepared in accordance with the NYSDEC's December 2002 Draft DER-10 Technical Guidance for Site Investigation and Remediation (DER-10) and provides guidelines and procedures to be followed by field personnel during performance of the remedial action sampling. Information contained in this QAPP relates to:

- Sampling objectives (Section 2);
- Sample media, sampling locations, analytical suites, sampling frequencies, and analytical laboratory (Section 3);
- Field sampling procedures (Section 4);
- Sample handling, sample analysis, and quality assurance/quality control (Section 5); and
- Site control procedures and decontamination (Section 6).

1.1 Project Organization and Responsibility

A general summary of the overall management structure for field activities and associated responsibilities of the technical staff is provided below. Professional Profiles for the key project personnel, identified below, are provided in Appendix A.

Project Manager: The Project Manager, Joshua Levine, P.E., bears the primary responsibility for the successful completion of the work assignment within budget and schedule, provides overall management for the execution of the project and directs the activities of the Site Manager and technical staff. The project manager performs technical review of all field activities, data review and interpretation and the report preparation. The Project Manager works closely with

the analytical laboratory, data validation, and surveyors during the execution of the field program. Activities of the Project Manager are supported by senior management, the Project Quality Assurance Coordinator, and support staff.

Site Manager: The Site Manager bears the primary responsibility for the successful execution of the field program. The site manager directs the activities of technical staff in the field and assists in the interpretation of all physical and chemical data, and report preparation. The Site Manager is responsible for the management of technical staff including hydrogeologists and technicians, and subcontractors such as drillers and surveyors.

Field Technical Staff: Field technical staff consists of engineers, hydrogeologists, geologists and technicians who will perform activities such as CAMP monitoring, soil sampling, water level measurements, groundwater sampling, and preparation of any field documentation which may be necessary.

Site Health and Safety Officer: The Site Health and Safety Officer (SHSO) will be responsible for the implementation of the HASP. The SHSO will recommend revisions to the HASP if field conditions warrant. Any necessary revision to the HASP will be submitted to the Corporate Office Health and Safety Manager for approval.

Project Quality Assurance Coordinator: The Project Quality Assurance Coordinator (PQAC), Mr. Michael Roux, provides technical quality assurance assistance; prepares, reviews, and approves the QAPP; oversees any contractor quality assurance activities to ensure compliance with contract specifications; and monitors field investigations, if necessary.

Laboratory Quality Assurance Officer: The Laboratory Quality Assurance Officer (LQAO) is identified by each laboratory contracted for analysis. The Laboratory Quality Assurance Officer will evaluate analytical results to ensure that the laboratory maintains a good performance and is responsible for the preparation of the analytical data package.

2.0 SAMPLING OBJECTIVES

The remedial action sampling program is designed to meet the data quality objectives (DQOs) set forth in the Draft DER-10. Specifically, analytical parameters selected for each sample, as described in Section 3, are comprehensive and are intended to meet the following objectives:

- Analyze post excavation soil samples for likely contaminants of concern given the known history and current use of the property (e.g., sampling for volatile organic compounds [VOCs] which were identified in previous investigations above the proposed restricted residential criteria, the unrestricted use criteria, or the protection of groundwater criteria presented in the Remedial Action Work Plan "RAWP");

- Analyze offsite backfill for parameters required to evaluate its suitability for use as backfill that meets the unrestricted use criteria;

- Analyze sub-slab soil vapor samples following the remedial action to evaluate levels of VOCs in soil vapor; and

- Analyze groundwater samples following the remedial action to evaluate levels of VOCs in groundwater.

Sampling procedures are discussed in Section 4 of this QAPP. A discussion of the DQOs and quality assurance/quality control for the project is provided in Section 5.

3.0 SAMPLE MEDIA, LOCATIONS, ANALYTICAL SUITES, AND FREQUENCY

The media to be sampled may include soil and groundwater. Sampling locations, analytical suites, and frequency vary by the type of media to be sampled. A discussion of the sampling for each type of soil and groundwater is provided below. Specifics regarding the collection of samples for each type of soil and groundwater are provided in Section 4 of this QAPP and summarized on Table 1.

3.1 Post Excavation Soil Sampling

Post excavation (i.e., end-point) bottom soil sampling (at a frequency of one sample per 2500 square feet of bottom area) would be conducted for constituents that exceeded the protection of groundwater criteria (as presented in the NYSDEC 6 NYCRR Part 375) for excavations extending deeper than 15 feet below land surface (ft bls). Areas that appear more heavily impacted, if any, will be given sampling preference. If the end-point bottom sample results indicate that concentrations of target constituents are detected below the proposed protection of groundwater criteria, the excavation activities will be considered complete. However, if concentrations of target constituents are detected at a level above the protection of groundwater criteria, the excavation activities, including additional end-point bottom sampling, will continue deeper until these conditions are met or to the maximum depth reasonably attainable. The maximum depth reasonably attained will be the extent feasible based on underground utilities, adjacent building foundations, and sidewalk or property boundary limitations. End-point sampling will only be conducted for soil and will not be conducted for areas where the excavation extends down to a bedrock bottom.

If sheeting is not encountered, end-point sidewall samples (at a frequency of one sample per 50 linear feet or at least one sample per sidewall) would be conducted for constituents that exceeded the protection of groundwater criteria for excavations extending deeper than 15 ft bls. Areas that appear more heavily impacted, if any, will be given sampling preference. If the end-point sidewall sample results indicate that concentrations of target constituents are detected below the protection of groundwater criteria, the excavation activities will be considered complete. However, if concentrations of target constituents are detected at a level above the protection of groundwater criteria, the excavation activities, including additional end-point sidewall sampling,

will continue until these conditions are met or to the extent feasible with underground utilities, adjacent building foundations and sidewalk or property boundary limitations.

Post excavation bottom and sidewall samples will be analyzed for the following parameters:

- Part 375 List VOCs by USEPA method SW-846-8260.
- Part 375 List SVOCs by USEPA method SW-846-8270.
- Arsenic, barium, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc by USEPA method SW-846-6010B and SW-846-7471.

QA/QC samples, including duplicates and matrix spike/matrix spike duplicate (MS/MSD) will be collected at a 5 percent of normal sample frequency (one field duplicate sample collected per 20 grab samples collected; one MS/MSD analyzed by laboratory per preparation batch).

3.2 Backfill Sampling

When excavation and removal of the impacted soil is complete, certain areas of the excavation may need to be backfilled and compacted using offsite clean fill material meeting the unrestricted use criteria for the parameters described below. The backfill material will be free of extraneous debris or solid waste.

For offsite fill material (common fill and topsoil), if the NYSDEC agrees that the material originated from a virgin source, then a minimum of one composite sample will be collected and analyzed per source. If the source is not virgin, the following sampling frequency will apply to each source: one composite sample per 500 cubic yards. The backfill material will be common fill material. The source of the offsite fill must be documented by the supplier, including the location where the fill was obtained and a brief history of the site that is the source of the fill.

Samples of offsite backfill will be analyzed by the supplier for the following parameters:

- Part 375 List Pesticides and polychlorinated biphenyls (PCBs) by USEPA methods SW-846-8081A/8082.
- Part 375 List VOCs by USEPA method SW-846-8260.
- Part 375 List SVOCs by USEPA method SW-846-8270.

- Arsenic, barium, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc by USEPA method SW-846-6010B and SW-846-7471.

QA/QC samples are not required for backfill samples.

3.3 Sub-Slab Soil Vapor Sampling

If required by NYSDEC, sub-slab soil vapor monitoring will be performed once following construction of the first floor slab and prior to building occupancy to determine if active operation of a sub-slab depressurization system (SSDS) is necessary. If initial sub-slab soil vapor monitoring results determine that active operation of the SSDS is required, then Roux Associates may re-sample sub-slab soil vapor before the system is activated (up to 5 years from Certificate of Completion (COC) date as long as building is unoccupied) to assess if active operation of the system is necessary during building occupancy.

Two (2) sub slab soil vapor monitoring points have been installed in the parking garage to monitor sub-slab soil vapor conditions at the Site. The sub-slab soil vapor monitoring points have been designed to measure post-remediation soil vapor quality until soil vapor VOC concentrations are found to be below NYSDOH standards. Future soil vapor monitoring is not required during active operation of the SSDS (if SSDS operation is necessary), but future soil vapor monitoring can be conducted to demonstrate that the SSDS has achieved the remedial goals and active operation is no longer necessary. Approval will be obtained from NYSDEC and NYSDOH prior to performing any proposed sampling during active operation of the SSDS.

The sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

Following collection of the soil vapor samples, the samples will be shipped following proper chain-of-custody procedures to an ELAP-certified laboratory for analysis of VOCs in accordance with EPA Method TO-15.

3.4 Groundwater Sampling

If required by NYSDEC, groundwater monitoring will be performed on a quarterly basis for two (2) years to assess the performance of the remedy.

Two (2) monitoring wells have been installed in the parking garage to monitor groundwater conditions at the Site. The network of on-site wells has been designed to measure post-remediation groundwater quality until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic. Monitoring will continue for two (2) years or unless NYSDEC determines in writing that further monitoring is required.

Field monitoring of selected indicator parameters and groundwater sampling for laboratory analyses will be conducted to evaluate concentrations of TCL VOCs by USEPA method SW-846-8260.

QA/QC samples, including duplicates and matrix spike/matrix spike duplicate (MS/MSD) will be collected at 5 percent of normal sample frequency. Field blanks will be collected at a frequency of one per day. Trip blanks will be submitted at a frequency of one per sample delivery group or one per 20 samples, whichever is greater.

3.5 Analytical Laboratory

Laboratory analyses will be performed by a NYSDOH ELAP certified laboratory in accordance with the July 2005 NYSDEC Analytical Services Protocol (ASP) using USEPA SW-846 Methods.

3.6 Laboratory Data Validation

If data validation is required, validation of laboratory generated data will be performed by Roux Associates (Appendix B). The data reviewer will conduct a systematic review of the anomalous data for compliance with the established QC criteria based upon the spike, duplicate and blank results provided by the laboratory. A Data Usability Summary Report (DUSR) will be prepared by a party independent from the laboratory performing the analysis in accordance with Appendix 2B of DER-10.

The data reviewer will identify any out-of-control data points and data omissions and interact with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the Project Manager based upon the extent of the deficiencies and their importance in the overall context of the project.

4.0 FIELD SAMPLING PROCEDURES

This section provides a discussion of the field procedures to be used for sampling of soil and groundwater.

4.1 Soil Sampling

Post excavation soil samples will be collected as a grab sample using pre-cleaned stainless steel sampling tools (i.e., trowels, spatulas, etc.) at the middle of the excavation or from an excavator bucket. However, areas that appear more heavily impacted, if any, will be given sampling preference. Samples will be labeled based on each area's designation.

4.2 Soil Vapor Sampling

To sample the soil vapor monitoring points, six-liter SUMMA canisters fitted with eight-hour flow controllers and an in-line filter will be affixed to the soil vapor point tubing. Prior to collection of the samples, the vapor points will be purged of a minimum of one well volume. A tracer gas (i.e., laboratory grade helium) will be used to enrich the atmosphere in the immediate vicinity of the sampling location in order to test the efficacy of the seal and verify that ambient air is not being drawn into the sample. Following purging and verification with the tracer gas, the soil vapor sample will be directed to the laboratory supplied six-liter SUMMA canister. Upon opening the SUMMA canister valve, the vacuum present within the canister will extract the soil vapor from the subsurface into the canister. Based on a volume of six liters and a sample time of eight hours, soil vapor will be extracted at a flow rate of approximately 0.01 liters per minute.

Following collection of the soil vapor samples, the samples will be shipped following proper chain-of-custody procedures to an ELAP-certified laboratory for analysis of VOCs in accordance with EPA Method TO-15.

4.3 Groundwater Sampling

Prior to sample and data collection, the monitoring wells will be gauged and then purged via low-flow means using a submersible or peristaltic pump. Samples and parameter readings will be collected using a low flow-through cell to prevent sample contact with atmospheric air. All well sampling activities will be recorded in a field book and a groundwater sampling log

presented. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

5.0 SAMPLE HANDLING AND ANALYSIS

To ensure quality data acquisition and collection of representative samples, there are selective procedures to minimize sample degradation or contamination. These include procedures for preservation of the samples, as well as sample packaging, shipping procedures, and quality assurance/quality control.

5.1 Field Sample Handling

A detailed discussion of the proposed number and types of samples to be collected during each task, as well as the analyses to be performed can be found in Section 3.0 of this QAPP.

5.2 Sample Custody Documentation

The purpose of documenting sample custody is to ensure that the integrity and handling of the samples is not subject to question. Sample custody will be maintained from the point of sampling through the analysis (and return of unused sample portion, if applicable).

Each individual collecting a sample is personally responsible for the care and custody of the samples. All sample labels should be preprinted or filled out using waterproof ink. The technical staff will review all field activities with the Field Team Leader to determine whether proper custody procedures were followed during the field work and to decide if additional samples are required.

All samples being shipped offsite for analysis must be accompanied by a properly completed chain of custody form. The sample numbers will be listed on the chain of custody form. When transferring the possession of samples, individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person and/or to/from a secure storage area and/or to the shipper, and/or to the laboratory.

Samples will be packaged for shipment and dispatched to the appropriate laboratory for analysis with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and/or secured with strapping tape in at least two locations for shipment to the laboratory.

5.3 Sample Shipment

Sample packaging and shipping procedures are based upon USEPA specifications, as well as U.S. Department of Transportation (DOT) regulations. The procedures vary according to potential sample analytes, concentration, and matrix and are designed to provide optimum protection for the samples and the public. All samples will be shipped within 24 hours of collection and will be preserved appropriately from the time of sample collection.

5.4 Quality Assurance/Quality Control

The primary DQO of the post excavation, backfill, and waste characterization soil sampling and groundwater sampling is that data are accurate and precise and, hence, representative of the actual site conditions. Accuracy refers to the ability of the laboratory to obtain a true value (i.e., compared to a standard) and is assessed through the use of laboratory quality control (QC) samples, including laboratory control samples and matrix spike samples, as well as through the use of surrogates, which are compounds not typically found in the environment that are injected into the samples prior to analysis. Precision refers to the ability to replicate a value and is assessed through both field and laboratory duplicate samples. Field MS/MSD and field duplicate samples will only be collected for the post excavation soil samples and all groundwater samples. They are not required for backfill samples.

Sensitivity is also a critical issue in generating representative data. Laboratory equipment must be of sufficient sensitivity to detect target compounds and analytes at levels below NYSDEC standards and guidelines whenever possible. Equipment sensitivity can be decreased by field or laboratory contamination of samples and by sample matrix effects. Assessment of instrument sensitivity is performed through the analysis of reagent blanks, near-detection-limit standards, and response factors. Potential field and/or laboratory contamination is assessed through use of trip blanks, method blanks, and equipment rinse blanks (also called “field blanks”). Field blanks will only be collected for the post excavation soil samples and are not required for the backfill samples.

All soil and groundwater sample analyses will be performed in accordance with the July 2005 NYSDEC ASP using USEPA SW-846 methods. The laboratory selected to analyze the field

samples collected during the remedial action will maintain New York State Department of Health (NYSDOH) ELAP CLP certification for each of the required analyses.

All groundwater sample laboratory data and post excavation data are to be reported in NYSDEC ASP Category B deliverables. Backfill characterization laboratory data are to be reported in NYSDEC ASP Category A deliverables.

6.0 SITE CONTROL PROCEDURES

Site control procedures have been developed to minimize both the risk of exposure to contamination and the spread of contamination during field activities at the site. In order to accomplish this objective, the QAPP addresses three main considerations:

- The establishment of discrete work zones in the work area;
- The decontamination of field equipment; and
- The handling and disposal of all remediation derived waste.

All personnel who come into designated work areas, including contractors and observers, will be required to adhere strictly to the conditions imposed herein and to the provisions of the contractor's Site-Specific Health and Safety Plan (HASP), which will be submitted under separate cover.

6.1 Field Work Zones

Field work zones will be limited to areas where excavation, stockpiling, and soil sampling is being conducted for the soil handling. Access to these areas will be limited in accordance with the HASP. Control of work zone access will be the responsibility of the individual(s) designated as a Site Health and Safety Manager. At the completion of each working day, all loose equipment (e.g., sampling equipment, coolers, etc.) will be secured. Heavy equipment, such as the excavator, may remain onsite within an established, secured zone.

6.2 Decontamination

In an attempt to avoid the spread of contamination, all excavation and sampling equipment must be decontaminated at a reasonable frequency. Temporary decontamination pads will be set up by the contractor as deemed necessary. The location of the decontamination area(s) will be determined as necessary during the field operations. The decontamination area will be constructed to ensure that any wash water generated during decontamination can be collected. Decontamination water (if any) will be disposed offsite at an approved disposal facility.

6.3 Waste Handling and Disposal

All impacted soil excavated from the Site and other remediation derived waste will be transported and disposed of in accordance with all applicable federal, state, and local regulations

at an approved disposal facility. The remediation derived waste that will be generated during the construction activities include:

- Impacted soil from the Site (nonhazardous);
- Personal Protective Equipment (PPE); and
- Decontamination water, if any is generated.

Haul vehicles for bulk soil will be secured with appropriate covers prior to exiting the construction area to prevent release of waste.

PPE generated during the implementation of the remedial action will be consolidated and stored in appropriate bulk containers (drums, etc.) and temporarily staged at a waste storage area within the Site limits. Any full or partially filled containers will be appropriately labeled after the completion of the work.

Decontamination water, if any, will be collected and disposed offsite at an approved disposal facility.

Table 1. Summary of Analytical Methods / Quality Assurance Samples, Mid Block #57 Project, New York, New York

Sample Medium	Sample Parameters	Field Samples	Duplicates[1]	Field Blanks[2]	Matrix Spikes[1]	Spike Duplicates[1]	Trip Blanks
Soil (Excavation Sidewalls)	VOCs	1 per 50 linear feet	5%	1 per day	5%	5%	0
	SVOCs	1 per 50 linear feet	5%	1 per day	5%	5%	0
	Metals	1 per 50 linear feet	5%	1 per day	5%	5%	0
Soil (Excavation Bottom)	VOCs	1 per 2500 square feet	5%	1 per day	5%	5%	0
	SVOCs	1 per 2500 square feet	5%	1 per day	5%	5%	0
	Metals	1 per 2500 square feet	5%	1 per day	5%	5%	0
Soil (Waste Characterization)[3]	As Dictated by Disposal facility	As Necessary	0	0	0	0	0
Soil (Offsite Backfill Material)	VOCs	1 per 500 cubic yards	0	0	0	0	0
	SVOCs	1 per 500 cubic yards	0	0	0	0	0
	Pesticides and PCBs	1 per 500 cubic yards	0	0	0	0	0
	Metals	1 per 500 cubic yards	0	0	0	0	0
Groundwater	STARS List VOCs	Quarterly sampling frequency	5%	1 per day	0	0	0

[1] - Based on 1 per 20 samples

[2] - Based on 1 per day

[3] - To be determined by disposal facility - assumed parameter and frequency

SDG - Sample delivery group

VOCs - Volatile organic compounds

SVOCs - Semivolatile organic compounds

TAL - USEPA Contract Laboratory Program Target Analyte List

Table 2. Summary of Preservation, Holding Times and Sample Containers
Mid Block #57 Project, New York, New York

Analysis	Bottle Type	Preservation[1]	Holding Time[2]
SOIL			
Volatile Organic Compounds (VOCs) SW-846 8260B	2 oz. wide-mouth glass w/teflon lined cap	Cool to 4°C	10 days
Semivolatile Organic Compounds (SVOCs) SW-846 8270C	4 oz. wide-mouth glass w/teflon lined cap	Cool to 4°C	5 days to extract 40 days for analysis
Metals SW-846 6010/7471	4 oz. wide-mouth glass glass	Cool to 4°C	6 months, except mercury (26 days)
Pesticide and PCB Organic Compounds SW-846 8081A/8082	4 oz. wide-mouth glass w/ teflon lined cap	Cool to 4°C	5 days to extract 40 day for analysis
Groundwater			
Volatile Organic Compounds (VOCs) SW-846 8260B	3 40-milliliter glass w/teflon lined cap	Cool to 4°C HCl	10 days

[1] All samples to be preserved in ice during collection and transport

[2] Days from Verified Time of Sample Receipt.

APPENDIX A

Professional Profiles

ROUX

Professional Profile

Joshua B. Levine, P.E.
Principal Engineer

Technical Specialties:
Remedial engineering design, implementation, construction management and operations and maintenance of soil, soil vapor and groundwater remediation systems. Varied experience with the New York State Brownfields Cleanup Program, New York City Voluntary Cleanup Program, State Superfund Program, Spills Program, USEPA Class V injection well closure, constructed wetlands, subsurface piping design, free-product and groundwater recovery systems, sub-slab depressurization systems, landfill cap design and permitting.

Experience Summary:
Fourteen years experience: Senior Engineer, Project Engineer, Staff Engineer, and Staff-Assistant Engineer with Roux Associates; Temporary Staff with First Coastal Corporation; Research Assistant with Tulane University

Credentials:
Professional Engineer, State of New York, 2007
B.S.E., Environmental Engineering, Tulane University 1997.
OSHA 40-hour Health & Safety Course, 2000.
OSHA 8-hour Health & Safety Refresher Course, 2001 - 2012.

Professional Affiliations:
Urban Land Institute
American Society of Civil Engineers
National Society of Professional Engineers
International Council of Shopping Centers
The Retail Network

Key Projects:

- Principal Engineer responsible for management of investigation and remediation at a one-acre brownfield site containing chlorinated solvents, heavy metals and petroleum compounds in soil, soil vapor and groundwater over one city block in Manhattan, New York. This project included the implementation of a Remedial Investigation, New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Application and Remedial Action Work Plan. Mr. Levine managed onsite and offsite groundwater, soil and soil vapor investigations on an expedited timeframe. In addition, Mr. Levine organized, prepared, submitted, and received approval for a BCP Application to NYSDEC which is expected to generate approximately 30 million dollars in tax credits for the site redevelopment. Due to careful attention to detail throughout the process and correspondence with NYSDEC, the BCP Application was deemed complete one day after it was submitted, expediting the process to conduct the investigation and remediation within the BCP.

- Principal Engineer responsible for supervising, reviewing and approval of multiple Phase 1 environmental site assessments in accordance with ASTM 1527-05.

- Principal Engineer responsible for managing an investigation and remediation of an occupied self storage warehouse facility in Staten Island under the jurisdiction of the New York City Mayor's Office of Environmental Remediation (NYCOER). This project was completed through the New York City Voluntary Cleanup Program and resulted in a Notice of Completion in 2013.

- Senior Engineer responsible for the pilot testing, design and installation of a sub-slab depressurization system (SSDS) to mitigate chlorinated solvent soil vapor contamination beneath an existing occupied shopping mall in Clifton, New Jersey. This project was completed within strict New Jersey Department of Environmental Protection regulatory response timeframes due to the site's Immediate Environmental Concern (IEC) status.

- Senior Engineer responsible for the design of a vapor barrier and sub-membrane depressurization system to prevent vapor intrusion into a former factory building, which is being converted into a residential structure at a Superfund Site in Sag Harbor, NY. Mr. Levine prepared design drawings and a description of proposed engineering controls for inclusion within the Site Management Plan that was submitted to NYSDEC. Mr. Levine developed engineering cost estimates for the construction of the vapor barrier and sub-membrane depressurization system. Net present value cost comparisons were performed for 30-year operation of an active depressurization system (with blowers for active vapor recovery) vs. 30-year operation of a passive depressurization system (piping network without blowers). The active depressurization system was proven most appropriate due to the greater level of protection provided by active blower operation when compared to the cost differential between the active and passive systems. In addition, Mr. Levine developed a vacuum enhanced product recovery program to expedite the closure of the site's open NYSDEC spill numbers.

- Senior Engineer responsible for managing the closure and abandonment of 53 Class V drywell structures at commercial warehouse facility in Syosset, New York. The drywell abandonment project was conducted in accordance with the USEPA Underground Injection Control Program as administered by Nassau County Department of Health (NCDOH). The project required coordination with the client and the facility operations, the client's onsite developer and his subcontractors, the NCDOH, the USEPA, the local union representatives, Nassau County Department of Public Works, and subcontractors in order to complete the job. Mr. Levine prepared all of the work plans, memoranda and summary reports in order to fulfill NCDOH and USEPA's requirements in order to obtain a No Further Action Letter, which was received in November 2007.

- Mr. Levine managed a Pre-Design Investigation and Treatability Study (PDI) Summary Report and a Focused Feasibility Study (FFS) to determine the proposed remedial action for a class 2 NY State Superfund Site. The PDI was integral in determining the suitability of various remedial treatment technologies prior to the evaluation of potential remedial alternatives in the FFS. Mr. Levine prepared multiple cost estimates prior to selecting the preferred remedy in the FFS to evaluate the cost-effectiveness of each remedial alternative assuming varying quantities of hazardous waste in the fill material. This value engineering exercise aided selection of the most cost effective remedy in the FFS and prepared the responsible party for potential full-scale remedial costs. In addition, Mr. Levine calculated the anticipated construction traffic volume attributed to each FFS remedial alternative to evaluate the potential short-term impacts to the community resulting from the remedial alternatives.

- Mr. Levine managed the remediation of eight drywell and catch basin structures at a major truck rental facility in Ronkonkoma, New York. The drywell remediation project was conducted in accordance with the Suffolk County Article XII requirements and entailed coordination with the client and the facility operations, the client's subcontractor, the client's laboratory, Suffolk County Department of Health (SCDOH), and Suffolk County Department of Public Works. This project was unique in that all of the drywell remediation pre-characterization and remediation work had to be completed within one month of receiving preliminary characterization data from SCDOH, with a threat of monetary penalty if this schedule was exceeded. Mr. Levine was able to achieve the project objective of completing the remediation in the timeframe specified by SCDOH. Mr. Levine prepared daily client updates prepared the Remediation Summary Report and follow up correspondence with SCDOH to make sure that they were satisfied with the project.

- Project Engineer and Project Manager responsible for conceptual design, final design, and construction management of a groundwater recovery and treatment system at an active petroleum terminal in New Windsor, New York. This project used the results of a comprehensive site specific soil and groundwater investigation to design the groundwater recovery and treatment system. The system design required piping head loss calculations per Darcy-Weisbach formula, Manning's formula and Hazen-Williams formula (with product specific information for valves and fittings), submersible groundwater extraction pump and explosion proof surface-mounted pump sizing, air stripping efficiency modeling, activated carbon

Joshua B. Levine, P.E.
Principal Engineer

isotherm calculations, air stripping vapor effluent calculations for stack effluent discharge compliance in accordance with New York State Department of Environmental Conservation (NYSDEC) Division of Air Resources (DAR-1), and implementation of an iron control system to prevent fouling of the treatment system conveyance piping and remedial equipment. Primarily responsible for the development and preparation of technical specifications (including Bid Documents (bid form and bid instructions) per Construction Specifications Institute (CSI) format and Engineers Joint Contract Document Committee (EJCDC) General Conditions for Division 0, piping material and valve schedule, major equipment list, instrumentation and control equipment list, technical operating system and control logic description, Health and Safety Plan, Community Air Monitoring Plan, Geosynthetic Clay Liner Repair Protocol), Contract design drawings, process and instrumentation diagram preparation, contractor bidding services and field supervision, construction submittal review, Remedial Action Summary Report including "As-Built" drawings and Operations, Maintenance, and Monitoring Plan per NYSDEC DER-10. This project required coordination with various subcontractors including electrical and mechanical subcontractors, a structural engineer, and remedial equipment vendors.

- Project Engineer and Project Manager responsible for design upgrades and overseeing remediation operations at five formerly active petroleum terminals and one active petroleum terminal in the New York region. These six sites required system optimizations to improve protection of public health and the environment and consistently maintain peak performance of two soil vapor extraction systems and two groundwater remediation systems, while concurrently fulfilling NYSDEC regulatory reporting requirements per New York Code of Rules and Regulations (6 NYCRR) Part 750. Each soil vapor extraction system contained multiple vapor extraction wells, a moisture separator, air dilution valve, in line filter screen, regenerative blower, and emissions stack. The groundwater remediation systems contained one shallow tray air stripping unit, one packed tower air stripping unit, bag filters, activated carbon adsorption units, recovery and transfer pumps, associated piping, and multiple safety, control, and isolation valves. Associated tasks include scheduling and management of staff and technical personnel, preparation of NYSDEC quarterly monitoring reports, discharge monitoring reports, system performance monitoring, groundwater sampling and water measurements, coordinating facility upgrades and routine equipment maintenance. Ancillary tasks performed include the preparation of divestment summary evaluations and the management of soil and groundwater investigations at two sites slated for potential sale. Obtained closure of the existing NYSDEC spill numbers at two sites, resulting in no further remedial activity necessary.

- Project Engineer responsible for providing engineering design support for the installation of a dual-phase free product and groundwater recovery and treatment system at a former petroleum refinery and bulk storage terminal in Brooklyn, New York. Major tasks included the preparation of Technical Specifications per CSI format, hydraulic pipe headloss calculations, free product recovery pipe headloss calculations, development and coordination of subcontract work authorizations and scope, Contract Drawing detail contributions and quality review for three separate subcontracts (Subcontract A: site work, subsurface piping, well house and directional drilling installation; Subcontract B: treatment building interior remedial equipment and mechanical work; and Subcontract C: electrical power and control subcontract). Hydraulic headloss calculations were performed using Hazen-Williams formula for sizing multiple variable speed submersible groundwater recovery pumps. Enforced the contractors' adherence with the CSI format technical specifications, contract drawings, and client's extensive corporate health and safety policy. This project required quality review for high density polyethylene (HDPE) piping fabrication and installation, horizontal directional drilling for conduit and HDPE pipe installation, petroleum-impacted soil/abandoned pipe handling and site work, concrete structure preparation and installation, overhead pipe rack arc welding and modification, steel pipe and HDPE pipe pressure testing, electrical conduit installation, power cable and fiberoptic control signal wire installation, and solenoid valve operational troubleshooting.

- Project Engineer for the conceptual design, final design, and construction management of a groundwater conveyance system located at a Delaware Superfund Site. The project consists of converting 5 monitoring wells into pumping wells with subsurface vaults. The individual wells' discharge piping was connected to a common header pipe and traveled approximately 2,700 feet to tie in to an existing air stripper. Numerous utility crossings, telemetric pump control wiring installation, and a horizontal directional drilling operation underneath a private railroad spur were involved. Major tasks included preparation of Technical Specifications and Contract Drawings including piping plan and profile, process and instrumentation diagram, multiple construction details, groundwater conveyance piping head loss calculations via Manning's Equation and Hazen-Williams formulas, air stripper atmospheric mass loading calculations based on design influent concentration, flow rate and packed tower removal efficiencies, design of a subsurface piping railroad crossing, subsurface piping trench load calculations using Marston's Load Equation for active vehicular traffic areas, treatment equipment vendor research, preparation of final "As-Built" drawings, contractor supervision, construction submittal review, project progress reports, weekly USEPA briefings, preparation of the final remedial action report, and contractor bidding services.

- Project Engineer overseeing contamination delineation, remedial efforts, and site closure for a large Manhattan office building. This task involved remedial oversight of free product delineation and free product removal from the subsurface soils immediately surrounding a 12,000 gallon subsurface number 6 fuel oil storage tank. This project required the provision of engineering support services for the development of an interim remedial plan to remove free product from the tank's surrounding subsurface soil. A petition for site closure was developed and accepted by the NYSDEC, resulting in closure of the Site's spill number and no further remedial action necessary.

- Project Engineer for the permitting and construction supervision of two separate high volume well redevelopment projects located at a major pharmaceutical manufacturing facility in Brooklyn, New York. These projects required obtaining wastewater quality control permits from the New York City Department of Environmental Protection (NYCDEP) and separate approvals from the Compliance Engineering Section and Division of Permitting and Connections to discharge greater than 10,000 gallons per day of redevelopment water into the City-owned combined sewer. Construction supervision required monitoring the well's specific yield and increase in capacity from 300 gpm to over 1000 gpm.

- Project Engineer for the field inspection and permitting services for two hazardous materials storage tanks at a metals plating facility in Freeport, New York. This project required the preparation, submission and procurement of a Toxic and Hazardous Materials Storage Facility Permit (Article XI) and Tank Registration from the Nassau County Department of Health (NCDOH). This Permit was obtained from NCDOH in accordance with NCDOH Article XI regulations and New York State's 6 NYCRR Part 596 and 599 requirements for hazard substance bulk storage and spill and overfill protection secondary containment for transfer areas. Designed the secondary containment and spill overfill protection for diked /transfer areas to satisfy Article XI and conducted the following tasks for this project: secondary containment capacity calculations; multiple site visits for development and submission of construction As-Built drawings; permit application correspondence with the NCDOH and client; and permit procurement to enable the client to increase profitability by putting the subject tanks into active service while fulfilling prerequisite safety controls.

Michael Roux
Principal Hydrogeologist

Technical Specialties:
Manages a variety of projects involving multimedia investigations, regulatory agency negotiation and remedial design. Clients include a diverse group of industrial, commercial, legal, lending institution, and municipal clients.

Experience Summary:
Fourteen years of experience: Senior Hydrogeologist and Project Hydrogeologist with Roux Associates; Geologist with Clough, Harbour & Associates, LLP, Syracuse, New York.

Credentials:
B.S., Geology, Binghamton University, 1993
NJDEP Subsurface Evaluator
OSHA 40-hour Health & Safety Course
OSHA 8-hour Confined Space Entry

Key Projects:

- Project Manager for remedial investigation and redevelopment activities with a Fortune 500 company in Staten Island, New York. Approximately 500,000 cubic yards of lead-hazardous material from a former metals recycling facility were used to fill low-lying areas of the site. Roux Associates, Inc. negotiated and designed a site remedy that saved the client millions of dollars by eliminating offsite disposal. The current remedy includes the design of a site cap, dredging of impacted sediment, decommissioning or rehabilitating site industrial sewers, and wetland mitigation. A key aspect of the project includes coordination of remediation activities with redevelopment activities. Roux Associates' previous site investigation activities included testing of soil, groundwater, surface water, and sediment; aquifer testing; geophysical and geotechnical investigations.

- Project Manager responsible for implementation and management of remedial investigation at a former 120-acre colorants production facility in Rensselaer, New York. Work has been performed under both a Voluntary Cleanup Agreement and Administrative Order. Investigation includes: onsite and offsite soil, soil gas, groundwater, stormwater, and sediment investigations; geophysical surveys; aquifer tests; and coordination with NYSDEC and NYSDOH. Primary constituents of concern include heavy metals, chlorinated solvents, and BTEX compounds.

- Project Manger responsible for onsite and offsite investigation at multiple dry cleaning facilities located in Nassau County, New York. Soil, soil gas, indoor air, and groundwater investigations negotiated with NYSDEC and NYSDOH. Primary constituents of concern include chlorinated solvents.

- Project Manger responsible for investigation at a dry cleaning facility located in Staten Island, New York under the NYSDEC Brownfield Cleanup Program. Primary constituents of concern include chlorinated solvents.

- Project Manager for the investigation and remediation of a former industrial manufacturing facility in Connecticut under the CTDEP Property Transfer Program. The site has multiple areas of concern impacted by the historical use of degreasing solvents; land disposal of metal plating wastes; and releases from USTs, septic system leachfields, and drum storage areas. Included in the site assessment were overburden and bedrock groundwater investigations, aquifer pumping tests, geophysical surveys, development of remedial alternatives, a petition for the reclassification of groundwater, and development of site-specific surface-water protection criteria to facilitate remediation of the site.

- Project Manger for a soil and groundwater remedial investigation under NJDEP ISRA for a former textile dying facility in Haledon, New Jersey. Constituents of concern include volatile organic compounds and heavy metals.

- Project Manager for a remediation project at a BTEX-contaminated bus maintenance facility in New Jersey. Upon NJDEP RAWP approval, a natural attenuation monitoring program was implemented consisting of semiannual sampling and reporting. Additionally, the leading edge of the plume was treated with an oxygen-releasing compound (ORC) under a NJDEP Permit-by-Rule and several pumping wells were installed to pilot test dewatering the aquifer under the site to enhance product recovery.

- Project Manager for site investigation and remediation oversight at a proposed multi-unit residential facility in Brooklyn, New York to remove a use restriction put in place by the NYCDEP.

- Field Manager for underground storage tank removal and abandonment operations at a major airport servicing New York City. Project responsibilities included oversight of the removal, closure, or cleaning of 20 underground storage tanks.

- Coordinated, supervised, and performed quarterly and annual groundwater sampling at a Superfund site in Delaware City, Delaware. Performed well installation oversight, survey of installed wells and aquifer testing.

- Provided remediation and construction oversight of remedial actions in Pompey and Herkimer, New York. Remedial actions included construction of a slurry wall, groundwater collection trenches, groundwater treatment systems, and installation of geotextile liner over consolidated soils. Contaminants of concern included chlorinated solvents and PCBs.

- Field Manager responsible for implementation of a site investigation/remediation scope of work under NJDEP ISRA for a former manufacturing facility in Randolph, New Jersey. Project responsibilities have included implementation and management of monitoring well installations, and soil and groundwater sampling programs. Areas of Concern include underground storage tanks, dry wells, septic fields, and non-contact cooling water disposal fields.

- Performed over 35 Phase I Environmental Site Assessment reports for commercial property transfers and lease agreements for multiple clients with properties in New York and Pennsylvania.

- Performed unconsolidated and bedrock geotechnical investigations at over 20 locations in New York and Pennsylvania for support of construction design.

APPENDIX B

Data Validator's Resume

YIXIAN ZHANG, PH.D, SENIOR SCIENTIST, ROUX ASSOCIATES, INC.

Summary of Qualifications and Experience in Data Validation:

Yixian Zhang, Ph.D, is a Senior Scientist in Roux Associates' Woburn, MA office. A chemist by training, Dr. Zhang received a Ph.D in Environmental Sciences with a focus on environmental geochemistry from University of Massachusetts Boston. She has more than 10 years of experience in environmental chemistry with specialty in the assessment and remediation of sediments contaminated with PCBs, PAHs, and petroleum hydrocarbons. She has designed, implemented, and managed data collection programs including field, laboratory, and data interpretation components. She is specialized in environmental forensic techniques including advanced chemical fingerprinting for source identification and timing of releases. She also has significant experience in data validation and data quality assessment, as well as quality assurance/quality control (QA/QC) plan development and implementation.

Before joining Roux, Dr. Zhang worked at Tetra Tech ECI and Battelle where she gained extensive experience in assessment and remediation of contaminated sediments. She developed and implemented data collection programs for various Superfund programs and EPA- or Navy-led cleanup sites. Her role in many of these data collection programs included data validation tasks following EPA regional and national guidelines. For these projects, Dr. Zhang also prepared quality assurance project plans (QAPPs) and sampling and analysis plans (SAPs) in accordance with EPA regional requirements/formats. Since join Roux in 2009, Dr. Zhang has completed various data validation tasks for Roux's Massachusetts and New York offices following the state and national regulatory guidelines.

Education:

- Ph.D. Environmental Sciences (focus on Environmental Geochemistry), University of Massachusetts, Boston, 2003
- B.S. Environmental Sciences, East China Normal University, Shanghai, China, 1991

Experience in Data Validation:

<u>Senior Scientist, Roux Associates (2009 – present)</u>

- Performed data validation tasks and prepared data usability summary reports (DUSRs) for Roux's New York offices following NYSDEC requirements and EPA Region II and national guidelines for the following sites:
  - ExxonMobil Greenpoint Petroleum Remediation Project, Brooklyn, NY
  - TDC - One Fulton Square Site, Flushing, NY
  - Pfizer Site B, Brooklyn, NY
  - Oceanside Site, NY
  - Powers Chemco Site No. 130028 (Konica Site), NY

- Also conducted data usability assessments following requirements in the Massachusetts Contingency Plan (MCP) for the following sites:
  - Former Mobil Marlborough Terminal, MA
  - Former Exxon Pipeline Malden River Bank, MA

Principal Research Scientist, Battelle (2005 – 2009)

- Validated analytical data for over two thousand samples of various environmental matrices following EPA regional and national guidelines; major projects included:
  - New Bedford Harbor Superfund Site, MA
  - Sediment Innovative Treatment Demonstration Project, Long Island Sound, NY
  - Lake Hartwell Superfund Site, GA
  - Dredged Material Testing, various locations in New England States
  - Ashtabula River Contaminated Sediment Remediation Dredging, OH
  - Naval Station Sediment Total Maximum Daily Load (TMDL) Assessment, San Diego, CA

Environmental Scientist, Tetra Tech ECI (formerly Foster Wheeler Environmental Corp) (2001-2005)

- New Bedford Harbor Superfund Site, MA: performed Tiers I, II, and/or III data validation on analytical data for several thousand sediment, surface water, soil, and air samples following EPA Region 1 Data Validation Functional Guidelines; participated in developing criteria for the automatic data validation function in the New Bedford Harbor Environmental Database.
- US Navy Tank Farms 1, 2, 4 and 5, RI: validated analytical data for more than three hundred soil samples following EPA national guidelines.
- Navel Weapons Industrial Reserve Plant, MA: validated data for over two hundred soil and groundwater samples following EPA national guidelines.

SSDS Operations and Maintenance Manual

December 3, 2013

OPERATIONS, MAINTENANCE & MONITORING MANUAL

Durst Development L.L.C.
57 Sandwich LLC
57 Mini LLC
Mid Block #57 LLC
57th Avenues Developer LLC (f/k/a Nations Developer 57 LLC)
Devco Nations, LLC
Durst Pyramid LLC (f/k/a DFR 57 LLC)

Prepared for:

DURST DEVELOPMENT LLC
One Bryant Park
New York, New York 10036

Remedial Engineering, P.C.
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TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 OWNERS AND RESPONSIBILITIES 2

3.0 SITE DESCRIPTION AND SYSTEM DESIGN BACKGROUND 3
- 3.1 Site Description 3
- 3.2 SSDS System Design Background 3

4.0 SYSTEM PROCESS DESCRIPTION 5
- 4.1 SSDS Piping and Network 5

5.0 OPERATIONAL PROCEDURES 6
- 5.1 SSDS Performance Monitoring 6
- 5.2 SSDS Start-Up Procedures 6
- 5.3 SSDS Alarms 7
- 5.4 SSDS Shutdown Procedure 8
- 5.5 Contingent Soil Vapor Sampling and Analytical Protocol 8
  - 5.5.1 Review and Interpretation of Soil Vapor Sampling Results 9

6.0 MAINTENANCE AND INSPECTIONS 10
- 6.1 Routine Maintenance and Inspections 10
- 6.2 Non-Routine Equipment Maintenance 10
- 6.3 Routine Maintenance Reports 10
- 6.4 Non-Routine Maintenance Reports 11

7.0 MONITORING 12
- 7.1 Sampling Event Protocol 12
- 7.2 General Equipment Monitoring 12

8.0 RECORD KEEPING 13
- 8.1 Field Book 13
- 8.2 System Monitoring 13

9.0 HEALTH AND SAFETY 14
- 9.1 Emergency Response Overview 14

10.0 FIELD TEAM REVIEW/TRAINING SECTION 16

TABLES

1. Mid Block #57 SDSS Operations Log
2. Mid Block #57 SDSS System Non-Routine Maintenance Form

FIGURES

1. Site Location Map
2. Site Plan

APPENDIX

A. Regenerative Blower Information

PLATE

1. Sub-Slab Depressurization System

1.0 INTRODUCTION

On behalf of Durst Development L.L.C., 57 Sandwich LLC, 57 Mini LLC, Mid Block #57 LLC, 57th Avenues Developer LLC (formerly known as Nations Developer 57 LLC), Durst Pyramid LLC (formerly known as DFR 57 LLC), and Devco Nations, LLC (all entities collectively identified as "Applicants" hereafter), Remedial Engineering, P.C. (Remedial Engineering) and Roux Associates, Inc. (Roux Associates) collectively known as Roux Associates, have prepared this Operation, Maintenance and Monitoring (OM&M) manual for the sub-slab depressurization system (SSDS) at the Mid Block #57 Project (hereinafter referred to as the "Site" or the "BCP Site") under the New York State (NYS) Brownfield Cleanup Program (BCP) administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with Brownfield Cleanup Agreement (as amended, BCA) Index# A2-0611-1008, Site # C231062, which was executed on April 27, 2009 and amended on August 18, 2011, December 21, 2011 and June 18, 2012 to update entity names party to the BCA.

This OM&M manual is a reference for operating and maintaining the SSDS system in conformance with its design, and applicable regulations. This OM&M manual also presents the OM&M activities, which will occur from the time of SSDS start-up and throughout the operation of the system. Performance monitoring (i.e., vacuum monitoring) will also be performed as part of the OM&M activities. Should these activities be changed, modifications to this OM&M manual shall be documented through the preparation of manual revisions or addenda. The Applicants assume the overall responsibility for the operation and maintenance of the SSDS system. Equipment specific maintenance, or those activities which would not be considered routine, will be contracted out by the Applicants, as required.

2.0 OWNERS AND RESPONSIBILITIES

The designated owner of this OM&M manual described herein are the Applicants. Roux Associates, Inc. is the designated operator. Roux Associates will be responsible for the operation and maintenance of the SSDS described within this OM&M manual. The key personnel involved in the operations and maintenance are as follows:

- Jeffrey Jerman – Owner Representative
- Joshua B. Levine, P.E. – Engineer of Record
- John LoMeli – Senior Field Technician

Emergency contact numbers are provided in Section 9.0.

3.0 SITE DESCRIPTION AND SYSTEM DESIGN BACKGROUND

The following sections provide the Site description and background.

3.1 Site Description

The Site is located in the Borough of Manhattan, New York City, New York and is identified as Block 1105 and Lots 5 (part of), 14, 19, and 43 on the New York City Tax Map. The Site is an approximately 1.4-acre area bounded by 58th Street to the north, 57th Street to the south, the eastern limits of tax lot 43 to the east, and bisects tax lot 5 to the west with the western limits of the Site located 250 feet east of 12th Avenue (see Figures 1 and 2).

3.2 SSDS System Design Background

A SSDS was installed under the Site as a contingency measure to prevent soil vapor intrusion at the locations shown in Plate 1. The SSDS consists of two separate independent sub-slab piping networks; one piping network for the western portion of the site, known as the West Block #57 Project, and a second piping network for the eastern portion of the site known as the Mid Block #57 Project. The SSDS piping networks are comprised of perforated 4-inch diameter polyvinyl chloride (PVC) piping installed within a gravel encased filter fabric wrap underneath the first floor slab (See Plate 1, Detail 1).

The two independent sub-slab piping networks enter the building in the basement mechanical room where they are piped together and connected to two blowers. The two independent SSDS piping networks are connected to the blowers via valves in the mechanical room that can be opened or closed to actively remove sub-slab soil vapor from either the Mid Block or West Block SSDS piping networks or, collectively remove vapor from both piping networks (See Plate 1, Details 6 and 7).

The baseline operating conditions are to actively withdraw vapors from the West Block #57 Project SSDS piping network via the blowers in the basement mechanical room and to isolate the Mid Block #57 Project SSDS piping network by closing the Mid Block influent valves at the basement piping manifold. The Mid Block #57 Project SSDS piping network valves will be opened to actively withdraw soil vapor from the Mid Block site if deemed necessary based on the soil vapor monitoring performed in accordance with Section 5.1.

The SSDS will prevent the accumulation and lateral/vertical migration of soil vapors from below the slab if the piping networks are converted to active operation. The subsurface SSDS piping was constructed in accordance with Section 4.2 of NYSDOH Guidance including the following provisions:

- SSDS piping was designed by a professional engineer;
- An information package documenting the design of the SSDS piping will be provided to the building owner; and
- The collection pipe network is covered by a vapor barrier membrane, consisting of Grace Preprufe 300R and/or Floorprufe 120M.

If active vapor mitigation is necessary and the Mid Block SSDS piping needs to be converted to an active SSDS, the system will be converted to an active SSDS as discussed in Section 5.2.

The SSDS contains four soil vapor monitoring points (WB-1, WB-2, MB-1 and MB-2) that are available for sub-slab soil vapor sampling and sub-slab vacuum confirmation. The locations of the sub-slab vapor monitoring points are shown on Plate 1.

4.0 SYSTEM PROCESS DESCRIPTION

This section provides a description of the SSDS.

4.1 SSDS Piping and Network

The SSDS consists of 4-inch diameter perforated PVC piping installed in gravel trenches beneath the concrete slab in a lateral system as shown on Plate 1. The gravel trenches have been wrapped with a 10-ounce non-woven geo-textile fabric to prevent entry of fines into the piping. The perforated piping is connected to a solid 4-inch diameter pipe that connects to an influent manifold in the basement mechanical room. The influent manifold consists of the influent line for the Mid Block SSDS as well as two influent lines for the West Block SSDS. The influent manifold is connected to two 15-Hp regenerative blowers arranged in parallel in the basement mechanical room. Each blower has a knockout tank and dilution valve. The discharge from each blower connects to a common 6-inch diameter PVC discharge line.

5.0 OPERATIONAL PROCEDURES

The following sections describe operational procedures for the following activities:

- SSDS Performance Monitoring;
- SSDS Start-up Procedures;
- SSDS Alarms;
- SSDS Shutdown Procedure; and
- Contingent Soil vapor sampling.

Each of these is described below.

5.1 SSDS Performance Monitoring

Following SSDS installation and startup, system performance monitoring will be conducted to verify proper system operation. SSDS performance monitoring will include verification of:

- Blower inlet vacuum;
- Knockout tank inlet vacuum;
- Blower outlet discharge pressure;
- Knockout tank water level (confirm empty);
- Blower effluent PID reading; and
- Sub–slab vacuum monitoring point vacuum readings.

SSDS performance monitoring will be conducted on a monthly basis to verify system operation. The performance monitoring readings will be documented in the SSDS Operating Log (Table 1).

5.2 SSDS Start-Up Procedures

The SSDS will actively recover soil vapor from the sub slab piping network if the regenerative blower(s) is operational and the associated PVC valve located on the influent piping manifold is in the open position (handle parallel with the pipe). If the regenerative blowers are not running, the regenerative blower(s) will be started using the following sequence. The manufacturer's operating instructions should be reviewed prior to operating the system. The appropriate valves on the influent piping manifold should be opened or closed as necessary to recover vacuum from the Mid

Block or West Block SSDS piping network, as required by NYSDEC. The baseline operational assumption is that two valves associated with zones 1 and 2 of the West Block SSDS will remain open and the one valve associated with the Mid Block SSDS will remain in the closed position.

The system startup procedures are as follows:

1. Turn on circuit breaker to supply power to the control panel. The appropriate circuit breaker in the single phase panel should be turned on. This circuit breaker includes power running to the high level alarm switch, and control panel lights.

2. Verify the dilution valves on the blowers are in open position. Activate the blowers by turning the hand/off/auto switch on the control panel in the AUTO position. This will contact the motor starters and the green run light on the control panel should activate.

3. Monitor for the presence of vacuum in the vacuum monitoring points WB-1 and WB-2 for the West Block SSDS and in vacuum monitoring points MB-1 and MB-2 for the Mid Block SSDS piping network. The locations of these vacuum monitoring points are shown on Plate 1. The minimum vacuum should be 0.004 inches of water as measured using a digital micromanometer. If the minimum vacuum is not achieved, close the dilution valve(s) until the minimum vacuum is achieved in each vacuum monitoring point. Please note that the positioning of the dilution valve(s) and the operation of the blowers (parallel or in series) will be dependent on achieving the minimum vacuum and/or if the West Block SSDS system is in operation.

5.3 SSDS Alarms

The following devices and alarm conditions will shut down the entire SSDS and trigger a red alarm light on the control panel:

- Emergency E-stop Contact. There is an E-stop contact on the control panel.
- Power fail alarm (power relay contact).
- Float Switch High and Level Alarm High for the knock out tank(s) to indicate a high liquid level in the knock out tank.

If an alarm condition occurs, the red alarm light on the control panel will be activated. The cause of the alarm should be investigated and if corrected, the alarm reset button on the control panel should be pressed and the alarm acknowledged and cleared, if warranted.

5.4 SSDS Shutdown Procedure

The SSDS components should be shut down separately (one at a time) as follows:

- De-energize the regenerative blowers by turning each of the hand-off-auto switches on the control panel to "off".
- Turn the main disconnect on the control panel off.

5.5 Contingent Soil Vapor Sampling and Analytical Protocol

Contingent sub-slab soil vapor samples may be collected from soil vapor monitoring points, MB-1, MB-2, WB-1, and WB-2 (Plate 1) to demonstrate that SSDS operation is no longer necessary.

To sample the soil vapor monitoring points, six-liter SUMMA canisters fitted with eight-hour flow controllers and an in-line filter will be affixed to the soil vapor point tubing. Prior to collection of the samples, the vapor points will be purged of a minimum of one well volume. A tracer gas (i.e., laboratory grade helium) will be used to enrich the atmosphere in the immediate vicinity of the sampling location in order to test the efficacy of the seal and verify that ambient air is not being drawn into the sample. Following purging and verification with the tracer gas, the soil vapor sample will be directed to the laboratory supplied six-liter SUMMA canister. Upon opening the SUMMA canister valve, the vacuum present within the canister will extract the soil vapor from the subsurface into the canister. Based on a volume of six liters and a sample time of eight hours, soil vapor will be extracted at a flow rate of approximately 0.01 liters per minute.

Indoor air quality samples and an outdoor ambient sample may be collected concurrent with the sub-slab samples and in accordance with procedures specified by NYSDOH guidance. This will include the use of six liter, lab-certified clean, SUMMA canisters fitted with an eight-hour flow controller. The canister will be placed four to five feet above the ground in the normal breathing zone.

Following collection of the soil vapor and indoor air quality samples, the samples will be shipped following proper chain-of-custody procedures to a NELAP certified laboratory for analysis of VOCs in accordance with EPA Method TO-15.

5.5.1 Review and Interpretation of Soil Vapor Sampling Results

All soil vapor monitoring results will be submitted to NYSDEC and NYSDOH. The sample results will be compared to the NYSDOH guidance to determine if active operation of the SSDS is required.

If mitigation is determined to be necessary, the SSDS will become active by opening the valve at the influent manifold piping header in the basement mechanical room to tie-in to the two regenerative blowers installed as part of the West Block system. The active SSDS will, if needed, prevent the accumulation and lateral/vertical migration of soil vapors from below the slab. The start-up procedures for the active SSDS are discussed in Section 5.2.

If after one year of active SSDS operation and vapor intrusion monitoring, no actual impacts or potential soil vapor intrusion is demonstrated, discontinuing the soil vapor intrusion monitoring program will be recommended. Any decision to discontinue soil vapor monitoring at any location(s) will be subject to NYSDEC and NYSDOH approval.

6.0 MAINTENANCE AND INSPECTIONS

This section provides a brief description of the required equipment maintenance and inspections. Records of all maintenance and inspections should be maintained at the Site. The detailed maintenance manual, prepared by the equipment manufacturer, for the regenerative blowers is provided in Appendix A.

6.1 Routine Maintenance and Inspections

The routine maintenance activities will include general maintenance and visual inspections performed by system operator on a monthly basis, as well as intermittent spot checks by building maintenance staff. Visual inspection is the routine part of the system operator's activities. The system operator will note any conditions on the operations log which present a potential hazard or could cause future system shutdown. At the basement mechanical room, special attention should be given to any unusual or excessive noise or vibrations from the piping, and blowers. The piping and valves should be inspected for leaks.

Several system components require routine maintenance to ensure proper performance. All equipment maintenance will be performed in accordance with manufacturer's instructions. Specific routine maintenance tasks are outlined below:

- Check air filter on each blower for accumulation of particles and replace if needed.
- Check knock out tank (s) for presence of water and drain as appropriate.

6.2 Non-Routine Equipment Maintenance

Non-routine equipment maintenance consists of maintenance activities that will be performed with less frequency than the routine (i.e., semi-annually) on several system components. Non-routine equipment maintenance will be performed in accordance with manufacturer's instructions.

6.3 Routine Maintenance Reports

In addition to the Operations Log, a Sitewide Inspection checklist will be filled out for each routine maintenance event. A copy of the Inspection checklist is provided as Appendix H to the Site Management Plan. The checklist includes, but not limited, to the following information:

- Date;
- Name of person(s) conducting maintenance activities;

- Maintenance activities conducted;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist).

6.4 Non-Routine Maintenance Reports

During each non-routine maintenance event, a non-routine maintenance form (Table 2) will be completed which will include, but not be limited to, the following information:

- Date;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Presence of leaks;
- Date of leak repair;
- Other repairs or adjustments made to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Unscheduled inspections and/or sampling may take place when a suspected failure of the SSDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Monitoring deliverables for the SSDS are specified later in this OM&M manual.

7.0 MONITORING

To ensure that the active SSDS performs as designed and meets the performance objectives, a monitoring and sampling plan will be implemented. The system monitoring will be performed by collecting operating data such as flow rates, vacuums and influent vapor concentrations with a PID. The monitoring frequency may be adjusted based on system operational performance after the initial operation period of three months.

7.1 Sampling Event Protocol

All SSDS system sampling activities will be recorded in the dedicated field book for the Site. The sampling protocol will follow the procedures discussed in the Site Management Plan (SMP) (under separate cover).

7.2 General Equipment Monitoring

General equipment monitoring will be conducted during each routine O&M visit. SSDS components to be monitored include, but are not limited to, the following:

- Vacuum readings at the vacuum monitoring points;
- Vacuum and air flow at each blower; and
- PID readings of the influent of the blowers.

A complete list of components to be checked is provided in the SSDS Operations Log (Table 1). If any equipment readings are not within their typical range, any equipment is observed to be malfunctioning, or the system is not performing within specifications, maintenance and repair activities will be performed immediately (as per Section 6.0 of this OM&M manual), and the SSDS restarted.

8.0 RECORD KEEPING

Maintenance reports and any other information generated during regular operations at the BCP Site will be kept on-Site. All reports, forms, and other relevant information generated will be available upon request to the NYSDEC and submitted as part of the Periodic Review Report, as specified in the SMP.

In order to properly maintain the SSDS and minimize downtime, record keeping must be performed. Detailed records for the SSDS system will be recorded as per Tables 1 and 2 and filed electronically.

8.1 Field Book

A daily field book will be kept in the mechanical room for a time-specific daily record of maintenance and operations of the SSDS. The field book will be kept by the Roux Associates' technicians whenever personnel are on-Site.

8.2 System Monitoring

System monitoring will be achieved through system trend monitoring and the operations log. The SSDS operations log will be completed each day work is performed.

9.0 HEALTH AND SAFETY

As a result of the hazards at the Site and the conditions under which operations are conducted, the possibility of an emergency exists. A Health and Safety Plan (HASP) is required by OSHA (29 CFR 1910.120) to be available for use. The HASP for the BCP Site is available and a copy is kept in the mechanical room. The HASP identifies and assesses potential hazards associated with work in the BCP Site, and outlines steps and procedures to mitigate such hazards. Further, the HASP contains Job Safety Analyses (JSAs) of specific work tasks that are expected to be completed. JSAs identify existing or potential hazards associated with each step of a work task, and determine the best actions to follow in order to avoid those hazards.

Within the HASP is a detailed Emergency Plan, which outlines the critical actions that should be followed in the event of an emergency, such as a fire, explosion, or a spill or release to the environment. In the event of an emergency, the procedures described in the Emergency Plan should be followed.

9.1 Emergency Response Overview

In the case of an emergency (i.e., spill or release, fire or immediate threat to personal or public health), immediately contact the police and fire authorities to inform them of the possible or immediate need for assistance and if there is a need for an evacuation. If a significant release (above the reportable quantity as described in 40 CFR 302) has occurred, the National Response Center and other appropriate groups (such as NYSDEC) should be contacted. Those groups will alert National or Regional Response Teams as necessary. Below is a list of personnel that shall be notified as necessary.

Emergency Telephone Numbers

Type	Name	Telephone #
Fire Department / HazMat Emergency Response / Ambulance	New York City Fire Department	**911** 718-965-8283
Law Enforcement	New York City Police Department	**911**
Hospital	Roosevelt Hospital 1000 Tenth Avenue, New York, NY	**911** 718-932-1000
National Response Center (Release or Spill)		800-424-8802

Type	Name	Telephone #
NYSDEC Spills Hotline		800-457-7362
NYSDEC Case Manager	Dana Kaplan	Office: 718-482-7541
Roux Project Manager	Joshua B. Levine, P.E.	Office: 631-232-2600 Cell: 516-250-0372
Roux Senior Field Technician	John LoMeli	Office: 631-232-2600 Cell: 631-445-8643
Roux Corporate Health and Safety Manager	Joseph Gentile, CIH	Office: 856-423-8800 Cell: 610-844-6911
Roux Office Health and Safety Officer	Ray Fitzpatrick	Office: 631-232-2600 Cell: 631-445-4498

10.0 FIELD TEAM REVIEW/TRAINING SECTION

Each person performing work or visiting at the BCP Site shall sign this section before being permitted to access the BCP Site.

I have read and understand this Operations, Monitoring and Maintenance manual. I will comply with the provision contained therein.

Site / Project: BCP Site SSDS

Name Printed	Signature	Date

TABLES

Table 1. Mid Block #57 SDSS Operations Log, New York City, NY

Source of Reading	Units	Values	Comments
Vacuum Monitoring Point WB-1	Inches of Water		
Vacuum Monitoring Point WB-2	Inches of Water		
Knock-Out Tank #1 Vacuum	Inches of Water		
Blower #1 Inlet Vacuum	Inches of Water		
Knock-Out Tank #2 Vacuum	Inches of Water		
Blower #2 Inlet Vacuum	Inches of Water		
Discharge Pressure from Blower(s)	Inches of Water		
Blower(s) Effluent PID Reading	PPMV		

Was the System functioning upon arrival? Yes ____ No ____

Is the System functioning upon departure? Yes ____ No ____

Influent Valve Manifold Position West Block On/Off Mid Block On/Off

Check Influent Air Filter and Clean/Replace as necessary Performed ____

Is the System operating within the acceptable conditions? Yes ____ No ____

If no, was the condition corrected and how? _____

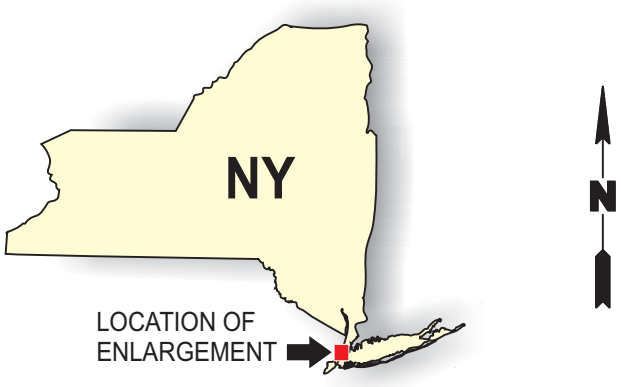
List Maintenance Activities Conducted: _____

Form Completed By: _____ Signature: _____ Date & Time: _____

Table 2. Mid Block #57 SDSS System Non-Routine Maintenance Form, New York, NY

DATE	DESCRIPTION OF WORK DONE	CAUSE (Use as many lines as required to define the problem)	Completed By

FIGURES



Title:

SITE LOCATION MAP

MID BLOCK #57 PROJECT

Prepared for:

DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: J.L.	Date: 16JUL13	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	1
Project Mgr.: J.L.	Project No.: 1338.0003Y002	
File: 1338.0003Y206.01.CDR		

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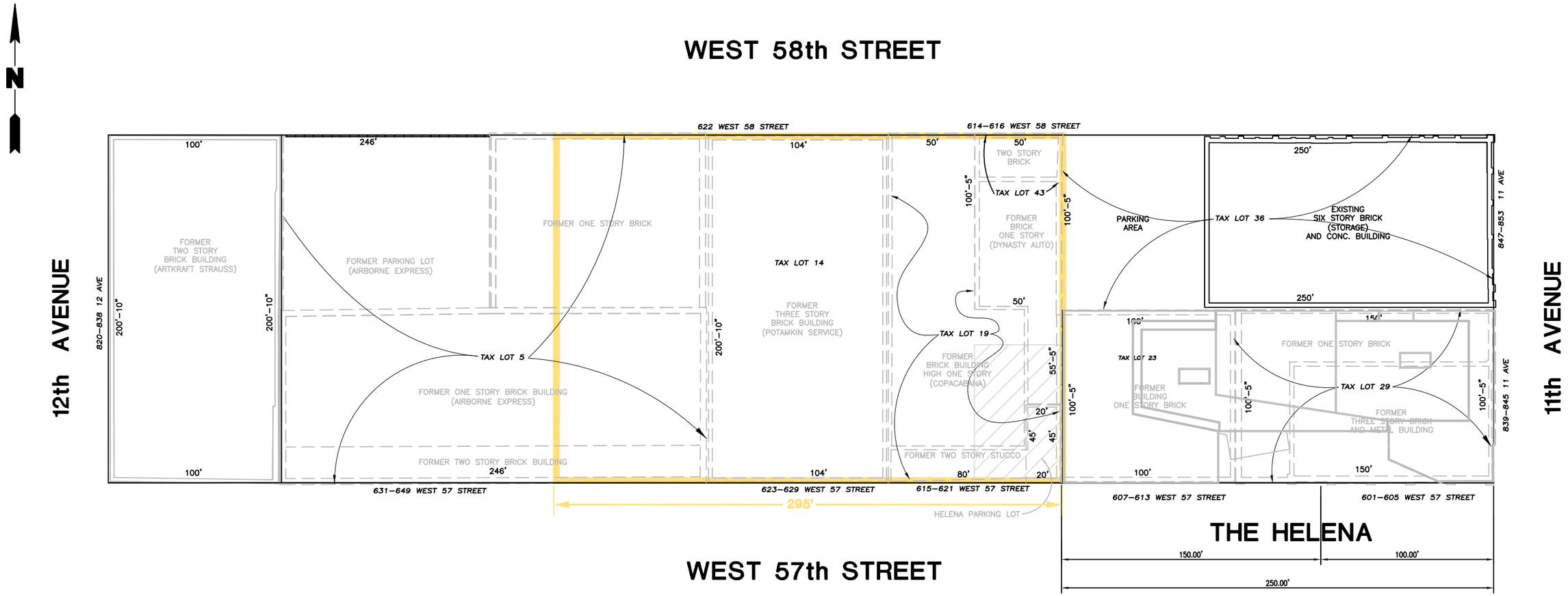

BLOCK 1105

LEGEND

LIMITS OF MID BLOCK #57 PROJECT

60' 0 60'

Title:

SITE PLAN

MID BLOCK #57 PROJECT

Prepared For:

DURST DEVELOPMENT L.L.C.

ROUX ASSOCIATES, INC.
Environmental Consulting and Management

Compiled by: J.L.	Date: 25JUL13	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	2
Project Mgr: J.L.	Project: 1338.0003Y002	
File: 1338.0003Y206.02.DWG		

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APPENDIX A

Regenerative Blower Information

Gasho
SINCE 1982
The Leader in Blower & Vacuum Solutions

Submittal Documentation

For:
Roux Associates
209 Shafter Street
Islandia, NY 11749

SDS Pump Room

Equipment Description: Dual EN909BG72WL Blower Package with Dual GX-200 Skids

Supplier:
Gasho, Inc.
460 West Gay Street
West Chester, PA 19380

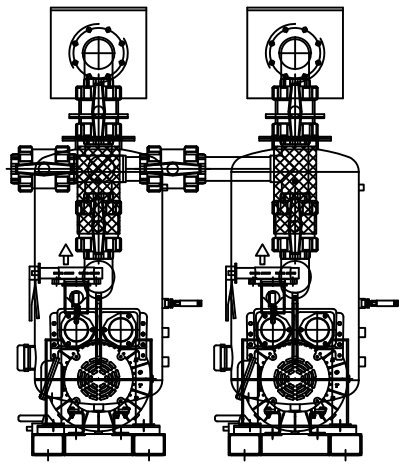
September 17, 2013

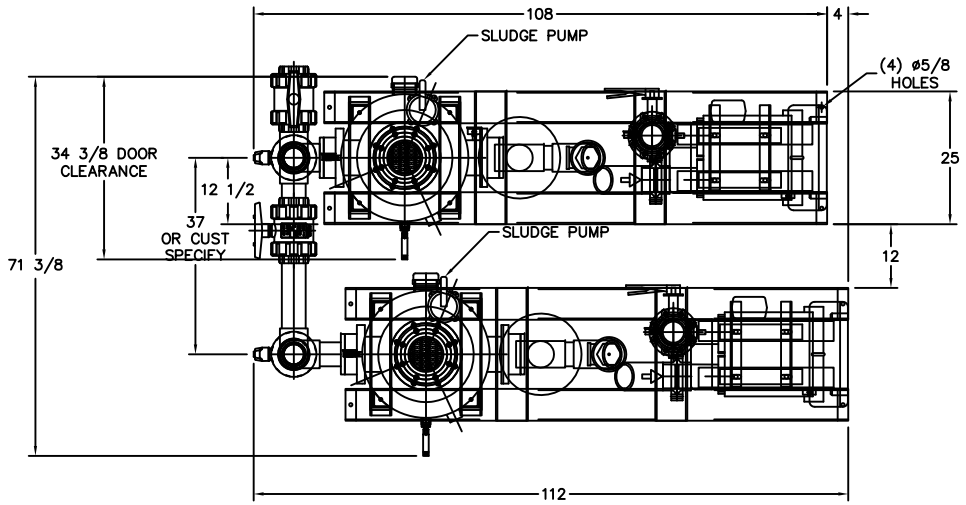
Gasho, Inc.

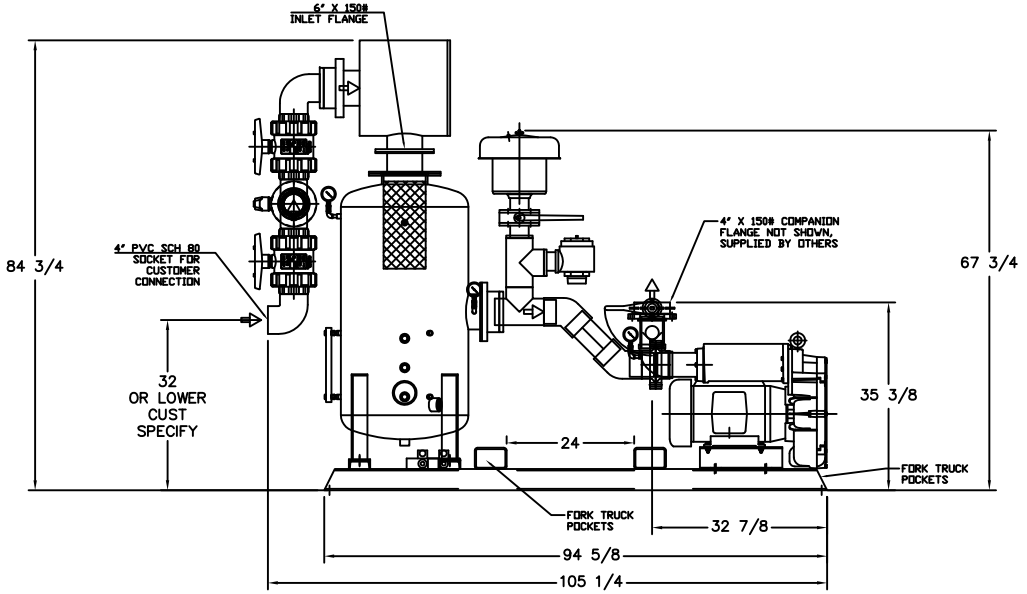
Blower Package

Description	Date	Revision

Item	Qty.	Supplier	Description	Part Number	Misc ID	Weight
1	1	Ametek Rotron	Regenerative Blower	EN909BG72WL	# 081741	524
2	1	Gasho	Base Weldment			
3	1	Universal	3" Dilution Valve	CCS-3		18
3.1	1	Mueller	3" Butterfly Valve	87INB65	with gear operator	10
4	1	Tuthill	2" Relief Valve	1362-8		19
5	2	Gasho	Vacuum Gauges	25.0.160.IWC.012.HG		1
6	1	Gasho	Pressure Gauge	25.0.160.IWC.006.PSI		1
7	3	SMC Specialties	Isolation Valves	VA BRS 025-4F4M-BT		1
8	4	Mueller	6" Wafer Butterfly Valve	87INB61	lever handle	21
9	2	Techno Corp	6" Wafer Check Valve	5118-6		
					Weight	595







NOTES:
1. CUSTOMER PIPING TO BE INDEPENDENTLY SUPPORTED
2. TOLERANCE ± 1/2"
3. REFER TO QUOTE 22889

REV.	DATE	DESCRIPTION

DRAWN BY: JJH | DATE: 3/11/13
APPROVED BY: | DATE:
DIMENSIONS IN INCHES
SCALE: NA
TOLERANCE: ±1/2" | ANGULAR TOLERANCE:
MATERIAL: | WEIGHT:
SHEET 1 OF 1

J.E.GASHO & Assoc., Inc.
460 W. GAY ST.
WEST CHESTER, PENNSYLVANIA 19380

QUOTE 22889
EN909 BLOWERS WITH
GX 200 MS

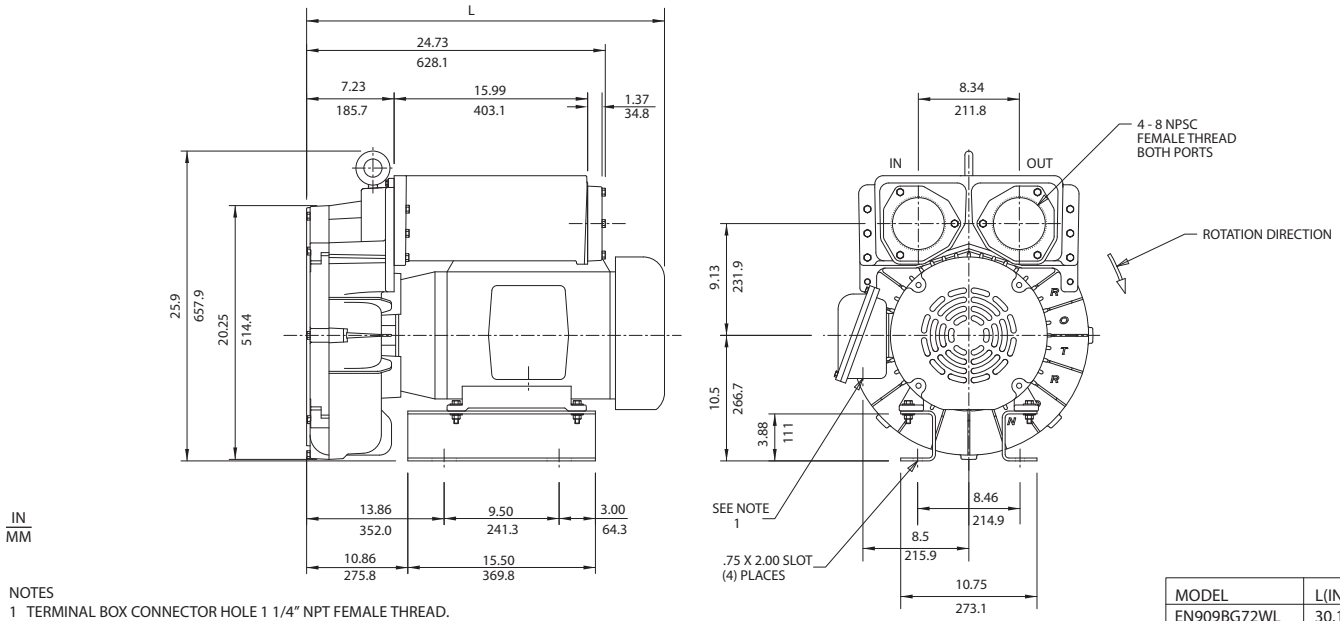
QT-A-26XX | B

Environmental / Chemical Processing Blowers

ROTRON®

EN 909 & CP 909

10.0 / 15.0 HP Sealed Regenerative w/Explosion-Proof Motor



NOTES
1 TERMINAL BOX CONNECTOR HOLE 1 1/4" NPT FEMALE THREAD.
2 DRAWING NOT TO SCALE, CONTACT FACTORY FOR SCALE CAD DRAWING.
3 CONTACT FACTORY FOR BLOWER MODEL LENGTHS NOT SHOWN.

MODEL	L(IN/MM)
EN909BG72WL	30.17/766.3
EN909DB72WL	23.66/601.0

		Part/Model Number			
		EN909BG72WL	EN909BG86WL	EN909BD72WL	CP909GA72WLR
Specification	Units	081741	081736	081743	038982
Motor Enclosure - Shaft Mtl.	-	Explosion-proof-CS	Explosion-proof-CS	Explosion-proof-CS	Chem XP-SS
Horsepower	-	15	15	10	15
Phase - Frequency	-	Three-60 hz	Three-60 hz	Three-60 hz	Three-60 hz
Voltage	AC	230/460	575	230/460	230/460
Motor Nameplate Amps	Amps (A)	36/18	14.4	24/12	36/18
Max. Blower Amps	Amps (A)	48/24	18	32/16	48/24
Inrush Amps	Amps (A)	240/120	100	234/117	240/120
Service Factor	-	1.0	1.0	1.0	1.0
Starter Size	-	2/2	2	2/1	2/2
Thermal Protection	-	Class B - Pilot Duty	Class B - Pilot Duty	Class B - Pilot Duty	Class B - Pilot Duty
XP Motor Class - Group	-	I-D, II-F&G	I-D, II-F&G	I-D, II-F&G	I-D, II-F&G
Shipping Weight	Lbs	524	524	504	524
	Kg	237.7	237.7	228.6	237.7

Voltage - ROTRON motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

Operating Temperatures - Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

Maximum Blower Amps - Corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

XP Motor Class - Group - See Explosive Atmosphere Classification Chart in Section I

This document is for informational purposes only and should not be considered as a binding description of the products or their performance in all applications. The performance data on this page depicts typical performance under controlled laboratory conditions. AMETEK is not responsible for blowers driven beyond factory specified speed, temperature, pressure, flow or without proper alignment. Actual performance will vary depending on the operating environment and application. AMETEK products are not designed for and should not be used in medical life support applications. AMETEK reserves the right to revise its products without notification. The above characteristics represent standard products. For product designed to meet specific applications, contact AMETEK Technical & Industrial Products Sales department.

AMETEK TECHNICAL & INDUSTRIAL PRODUCTS
75 North Street, Saugerties, NY 12477
USA: +1 215-256-6601 - Europe: +44 (0) 845 366 9664 - Asia: +86 21 5763 1258
Customer Service Fax: +1 215.256.1338
www.ametektip.com

AMETEK® TECHNICAL & INDUSTRIAL PRODUCTS

Environmental / Chemical Processing Blowers

EN 909 & CP 909

ROTRON®

10.0 / 15.0 HP Sealed Regenerative w/Explosion-Proof Motor

FEATURES

- Manufactured in the USA - ISO 9001 and NAFTA compliant
- Maximum flow: 615 SCFM
- Maximum pressure: 140 IWG
- Maximum vacuum: 112 IWG
- Standard motor: 15 HP, explosion-proof
- Cast aluminum blower housing, impeller , cover & manifold; cast iron flanges (threaded); teflon® lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS

- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS

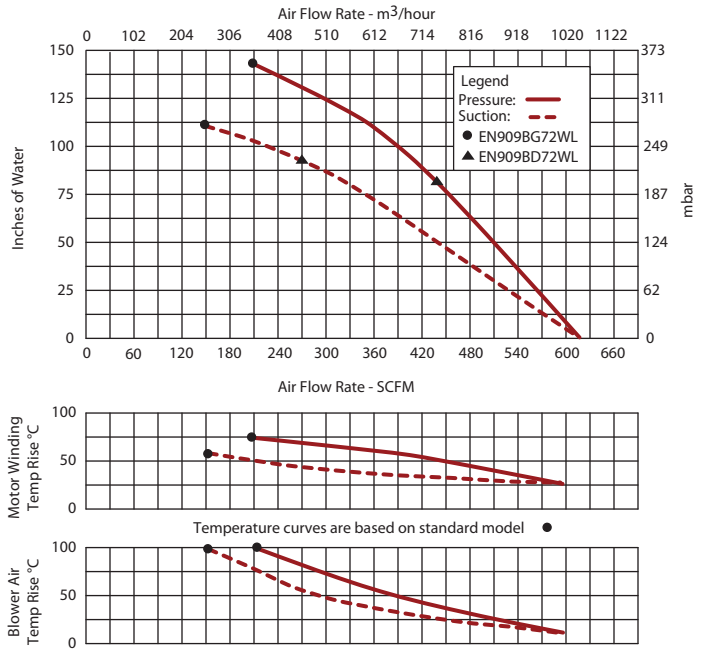
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES

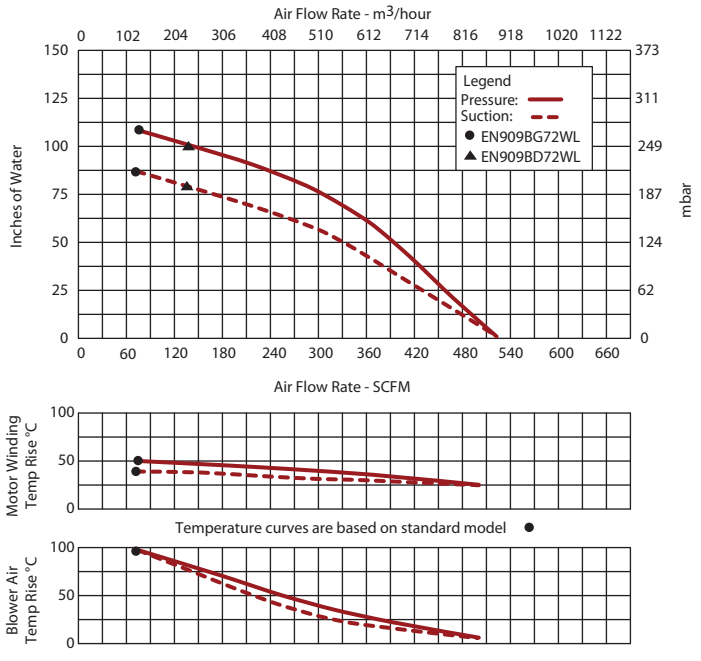
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges, & relief valves
- Switches - air flow, pressure, vacuum, or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

Blower Performance at Standard Conditions

60 Hz



50 Hz



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AMETEK®
TECHNICAL & INDUSTRIAL PRODUCTS

SERVICE AND PARTS MANUAL
FOR
BLOWER MODEL

EN6, EN858, EN909, EN979, EN14

DIRECT DRIVE REGENERATIVE BLOWER

Technical & Industrial Products
627 Lake Street, Kent, Ohio 44240 U.S.A.
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com
internet: www.ametektip.com

Your Choice. Our Commitment.™

WARRANTY, INSTALLATION, MAINTENANCE AND TROUBLESHOOTING INSTRUCTIONS

TECHNICAL AND INDUSTRIAL PRODUCTS
627 Lake Street, Kent, Ohio 44240 USA
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com web site: www.ametektip.com

1. AMETEK Rotron DR, EN and HiE regenerative direct drive blowers are guaranteed for one full year from the date of installation (limited to 18 months from the date of shipment) to the original purchaser only. Should the blower fail we will evaluate the failure If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

2. AMETEK Rotron Minispiral, Revaflow, Multiflow, Nautilair, remote drive blowers, moisture separators, packaged units, CP blowers, Nasty Gas™ models and special built (EO) products are guaranteed for one full year from date of shipment for workmanship and material defect to the original purchaser only. Should the blower fail, If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

3. **Parts Policy** - AMETEK Rotron spare parts and accessories are guaranteed for three months from date of shipment for workmanship and material defect to the original purchaser only. If failure is determined to be workmanship or material defect related we will at our option repair or replace the part.

Corrective Action - A written report will be provided indicating reason(s) for failure, with suggestions for corrective action. Subsequent customer failures due to abuse, misuse, misapplication or repeat offense will not be covered. AMETEK Rotron will then notify you of your options. Any failed unit that is tampered with by attempting repair or diagnosis will void the warranty, unless authorized by the factory.

Terms and Conditions - Our warranty covers repairs or replacement of regenerative blowers only, and will not cover labor for installation, outbound and inbound shipping costs, accessories or other items not considered integral blower parts. Charges may be incurred on products returned for reasons other than failures covered by their appropriate warranty. Out-of-warranty product and in warranty product returned for failures determined to be caused by abuse, misuse, or repeat offense will be subject to an evaluation charge. Maximum liability will in no case exceed the value of the product purchased. Damage resulting from mishandling during shipment is not covered by this warranty. It is the responsibility of the purchaser to file claims with the carrier. Other terms and conditions of sale are stated on the back of the order acknowledgement.

Installation Instructions for SL, DR, EN, CP, and HiE Series Blowers

1. **Bolt It Down** - Any blower must be secured against movement prior to starting or testing to prevent injury or damage. The blower does not vibrate much more than a standard electric motor.

2. **Filtration** - All blowers should be filtered prior to starting. Care must be taken so that no foreign material enters the blower. If foreign material does enter the blower, it could cause internal damage or may exit at extremely high velocity.

   Should excessive amounts of material pass through the blower, it is suggested that the cover(s) and impeller(s) be removed periodically and cleaned to avoid impeller imbalance. Impeller

imbalance greatly speeds bearing wear, thus reducing blower life. Disassembling the blower will void warranty, so contact the factory for cleaning authorization.

3. **Support the Piping** - The blower flanges and nozzles are designed as connection points only and are not designed to be support members.

   Caution: Plastic piping should not be used on blowers larger than 1 HP that are operating near their maximum pressure or suction point. Blower housing and nearby piping temperatures can exceed 200ºF. Access by personnel to the blower or nearby piping should be limited, guarded, or marked, to prevent danger of burns.

4. **Wiring** - Blowers must be wired and protected/fused in accordance with local and national electrical codes. All blowers must be grounded to prevent electrical shock. Slo-Blo or time delay fuses should be used to bypass the first second of start-up amperage.

5. **Pressure/Suction Maximums** - The maximum pressure and/or suction listed on the model label should not be exceeded. This can be monitored by means of a pressure or suction gage (available from Rotron), installed in the piping at the blower outlet or inlet. Also, if problems do arise, the Rotron Field representative will need to know the operating pressure/suction to properly diagnose the problem.

6. **Excess Air** - Bleed excess air off. DO NOT throttle to reduce flow. When bleeding off excess air, the blower draws less power and runs cooler.

   Note: Remote Drive (Motorless) Blowers - Properly designed and installed guards should be used on all belts, pulleys, couplings, etc. Observe maximum remote drive speed allowable. Due to the range of uses, drive guards are the responsibility of the customer or user. Belts should be tensioned using belt gauge.

Maintenance Procedure

When properly piped, filtered, and applied, little or no routine maintenance is required. Keep the filter clean. Also, all standard models in the DR, EN, CP, and HiE series have sealed bearings that require no maintenance. Bearing should be changed after 15,000 to 20,000 hours, on average. Replacement bearing information is specified on the chart below.

Bearing Part Number	Size	Seal Material	Grease	Heat Stabilized
510217 510218 510219	205 206 207	Polyacrylic	Nye Rheotemp 500 30% +/- 5% Fill	Yes – 325 F
510449 516440 516648	203 202 307	Buna N	Exxon Polyrex Grease	NO
516840 516841 516842 516843 516844 516845 516846 516847	206 207 208 210 309 310 311 313	Buna N	Exxon Polyrex Grease	NO

Troubleshooting

		POSSIBLE CAUSE	OUT OF WARRANTY REMEDY ***
IMPELLER DOES NOT TURN	Humming Sound	1. * One phase of power line not connected 2. * One phase of stator winding open 3. Bearings defective 4. Impeller jammed by foreign material 5. Impeller jammed against housing or cover 6. ** Capacitor open	1. Connect 2. Rewind or buy new motor 3. Change bearings 4. Clean and add filter 5. Adjust 6. Change capacitor
	No Sound	1. * Two phases of power line not connected 2. * Two phases of stator winding open	1. Connect 2. Rewind or buy new motor
IMPELLER TURNS	Blown Fuse	1. Insufficient fuse capacity 2. Short circuit	1. Use time delay fuse of proper rating 2. Repair
	Motor Overheated Or Protector Trips	1. High or low voltage 2. * Operating in single phase condition 3. Bearings defective 4. Impeller rubbing against housing or cover 5. Impeller or air passage clogged by foreign material 6. Unit operating beyond performance range 7. Capacitor shorted 8. * One phase of stator winding short circuited	1. Check input voltage 2. Check connections 3. Check bearings 4. Adjust 5. Clean and add filter 6. Reduce system pressure/vacuum 7. Change capacitor 8. Rewind or buy new motor
	Abnormal Sound	1. Impeller rubbing against housing or cover 2. Impeller or air passages clogged by foreign material 3. Bearings defective	1. Adjust 2. Clean and add filter 3. Change bearings
	Performance Below Standard	1. Leak in piping 2. Piping and air passages clogged 3. Impeller rotation reversed 4. Leak in blower 5. Low voltage	1. Tighten 2. Clean 3. Check wiring 4. Tighten cover, flange 5. Check input voltage

*** 3 phase units**

**** 1 phase units**

***** Disassembly and repair of new blowers or motors will void the Rotron warranty. Factory should be contacted prior to any attempt to field repair an in-warranty unit.**

Blower Disassembly:

WARNING: Attempting to repair or diagnose a blower may void Rotron's warranty. It may also be difficult to successfully disassemble and reassemble the unit.

1) Disconnect the power leads. **CAUTION:** Be sure the power is disconnected before doing any work whatsoever on the unit.

2) Remove or separate piping and/or mufflers and filters from the unit.

3) Remove the cover bolts and then the cover. **NOTE:** Some units are equipped with seals. It is mandatory that these seals be replaced once the unit has been opened.

4) Remove the impeller bolt and washers and then remove the impeller. **NOTE:** Never pry on the edges of the impeller. Use a puller as necessary.

5) Carefully note the number and location of the shims. Remove and set them aside. NOTE: If the disassembly was for inspection and cleaning the unit may now be reassembled by reversing the above steps. If motor servicing or replacement and/or impeller replacement is required the same shims may not be used. It will be necessary to re-shim the impeller according to the procedure explained under assembly.

6) Remove the housing bolts and remove the motor assembly (arbor/.housing on remote drive models).

7) Arbor disassembly (Applicable on remote drive models only):
   a) Slide the bearing retraining sleeve off the shaft at the blower end.
   b) Remove the four (4) screws and the bearing retaining plate from the blower end.
   c) Lift the shaft assembly far enough out of the arbor to allow removal of the blower end snap ring.
   d) Remove the shaft assembly from the arbor.
   e) If necessary, remove the shaft dust seal from the pulley end of the arbor.

Muffler Material Replacement:

1) Remove the manifold cover bolts and them manifold cover.

2) The muffler material can now be removed and replaced if necessary. On blowers with fiberglass acoustical wrap the tubular retaining screens with the fiberglass matting before sliding the muffler pads over the screens.

3) Reassemble by reversing the procedure.

NOTE: On DR068 models with tubular mufflers it is necessary to remove the cover and impeller accessing the muffler material from the housing cavity.

Blower Reassembly:

1) Place the assembled motor (assembled arbor assembly for remote drive models) against the rear of the housing and fasten with the bolts and washer.

2) To ensure the impeller is centered within the housing cavity re-shim the impeller according to the procedure outlined below.

3) If blower had a seal replace the seal with a new one.

4) Place the impeller onto the shaft making sure the shaft key is in place and fasten with the bolt, washer and spacer as applicable. Torque the impeller bolt per the table below. Once fastened carefully rotate the impeller to be sure it turns freely.

5) Replace the cover and fasten with bolts.

6) Reconnect the power leads to the motor per the motor nameplate.

Bolt Size	**Torque** **Pound-Force-Foot**
1/4-20	**6.25 +/- 0.25**
5/16-18	**11.5 +/- 0.25**
3/8-16	**20.0 +/- 0.5**
½-13	**49.0 +/- 1**
5/8 –11	**90.0 +/- 2**

Impeller Shimming Procedure:

WARNING: This unit may be difficult to shim. Extreme care may be exercised.

Tools Needed: Machinist's Parallel Bar
Vernier Caliper with depth measuring capability
Feeler gauges or depth gauge

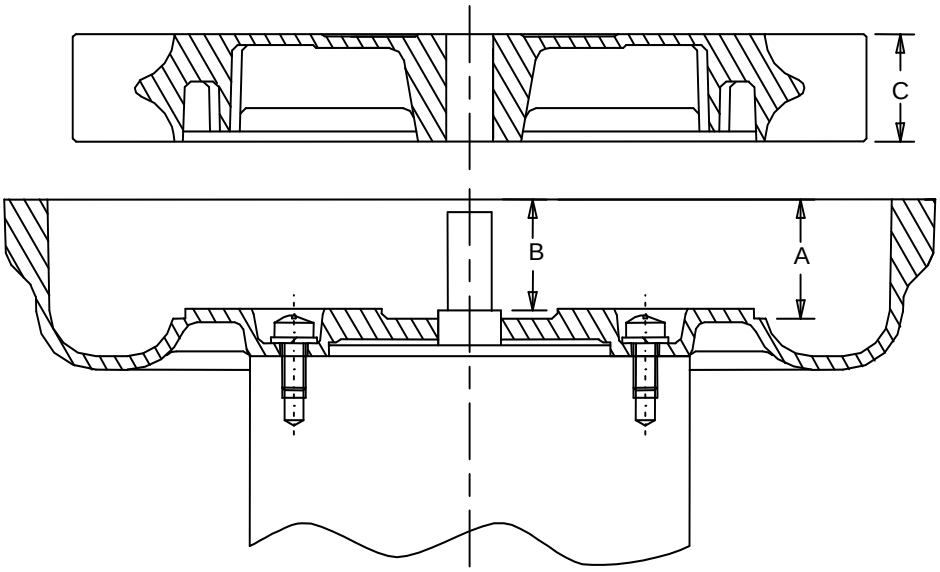
Measure the Following:

Distance from the flange face to the housing (A)
Distance from the flange face to the motor shaft shoulder (B)
Impeller Thickness (C)

Measurements (A) and (B) are made by laying the parallel bar across the housing flange face and measuring to the proper points. Each measurement should be made at three points, and the average of the readings should be used.

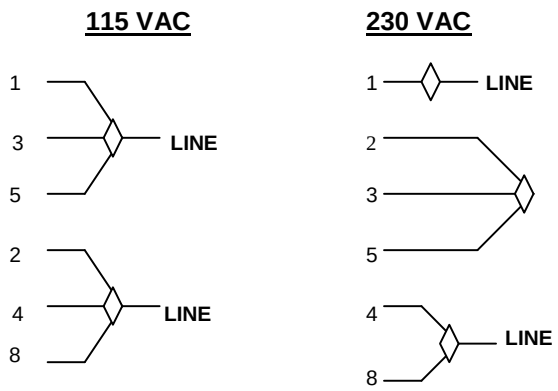
Shim Thickness = B – (A+C)/2

After the impeller installation (step #4 above) the impeller/cover clearance can be checked with feeler gauges, laying the parallel bar across the housing flange face. This clearance should nominally be (A-C)/2.



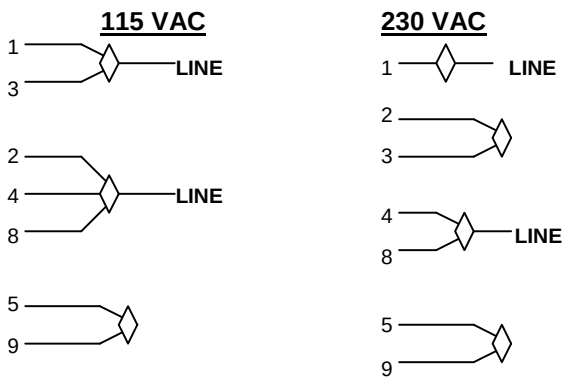
WIRING DIAGRAMS, XP MOTORS

H. 1Ø, 6 WIRE



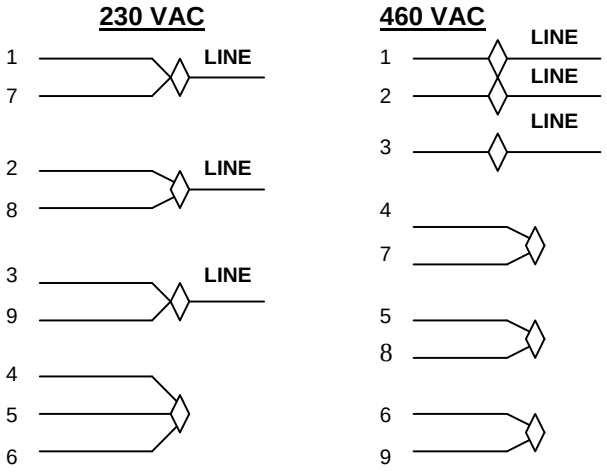
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

I. 1Ø, 7 WIRE



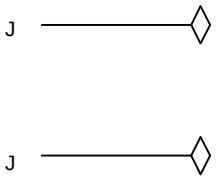
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

K. 3Ø, 9 WIRE



INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

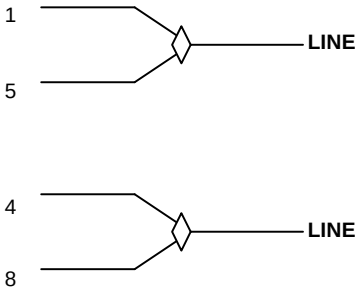
L. PILOT DUTY THERMAL OVERLOADS



HOOK J LEADS TO CONTROL CIRCUITRY

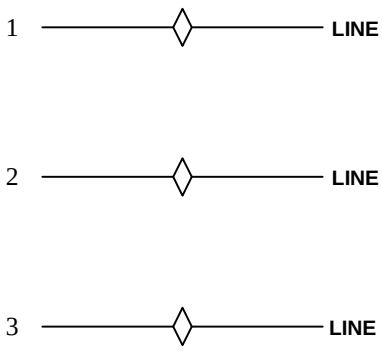
M. 1Ø 230 VAC

SINGLE VOLTAGE



INTERCHANGE LEADWIRES 5 & 8 TO REVERSE ROTATION

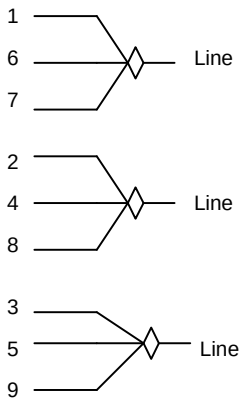
N. 3Ø 575 VAC



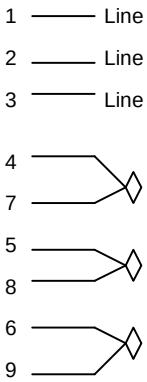
INTERCHAGE ANY TWO LEAD LINES TO REVERSE ROTATION

P 3∅, 9 WIRE

230 VAC



460 VAC



INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

ROTRON TECHNICAL MOTOR DIVISION
REGENERATIVE BLOWER GROUP

75 North Street
Saugerties, New York 12477
Phone: (845) 246-3401
Fax: (845) 246-3802

EXPLOSION-PROOF BLOWERS

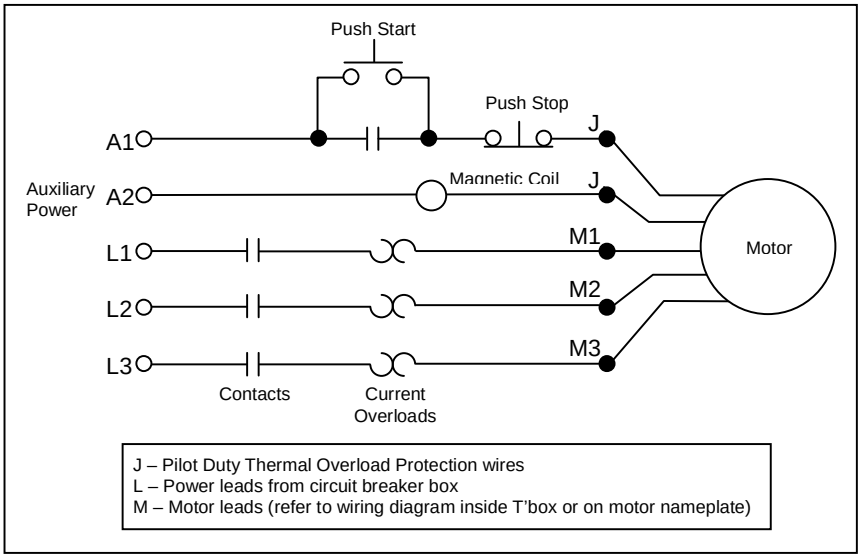
IMPORTANT: Read before wiring this Explosion-proof Blower

This AMETEK Rotron Explosion-proof Regenerative Blower may be equipped with Pilot Duty Thermal Overload (PDTO) or Automatic Thermal Overload (ATO) protection. When properly wired to a motor starter, this protection limits the motor winding temperature rise per the National Electric Code (NEC) article 500. Failure to properly wire this blower is an NEC violation and could cause an explosion. AMETEK Rotron assumes no responsibilities for damages incurred by negligent use of this product, and will not warranty a blower on which the PDTO is not properly connected. Some blowers 1 HP and under do not require PDTO and have built in ATO. Consult the factory if verification of wiring connections is required.

In all cases, follow the motor controller manufacturer's instructions. The following schematic is for conceptual understanding only, and may not apply to all motor/controller combinations.

The manufacturer's wiring diagram found on the motor takes precedent over reference diagrams supplied by AMETEK Rotron Technical Motor Division.

Schematic



The schematic is shown for a three phase motor. For a single phase motor disregard L3 and M3. Pushing the START button completes the auxiliary control circuit, allowing current to flow through the magnetic coil. The contacts are magnetically closed, starting the motor and latching the auxiliary circuit. The motor will continue to run until the STOP push button is depressed, the motor reaches the overload temperature, or the current sensing overloads trip out.

If you have any questions, contact AMETEK Rotron at 914-246-3401 for the location of your area representative.

POLICY REGARDING INSTALLATION OF AMETEK ROTRON REGENERATIVE BLOWERS IN HAZARDOUS LOCATIONS

AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, explosive location without the proper NEMA motor enclosure. AMETEK Rotron does not recognize sealed blowers as a substitute for explosion-proof motors. Sealed units with standard TEFC motors should never be utilized where local, state, and/or federal codes specify the use of explosion-proof equipment.

AMETEK Rotron has a complete line of regenerative blowers with explosion-proof motors. Division 1 & 2, Class I, Group D; Class II, Groups F & G requirements are met with these standard explosion-proof blowers.

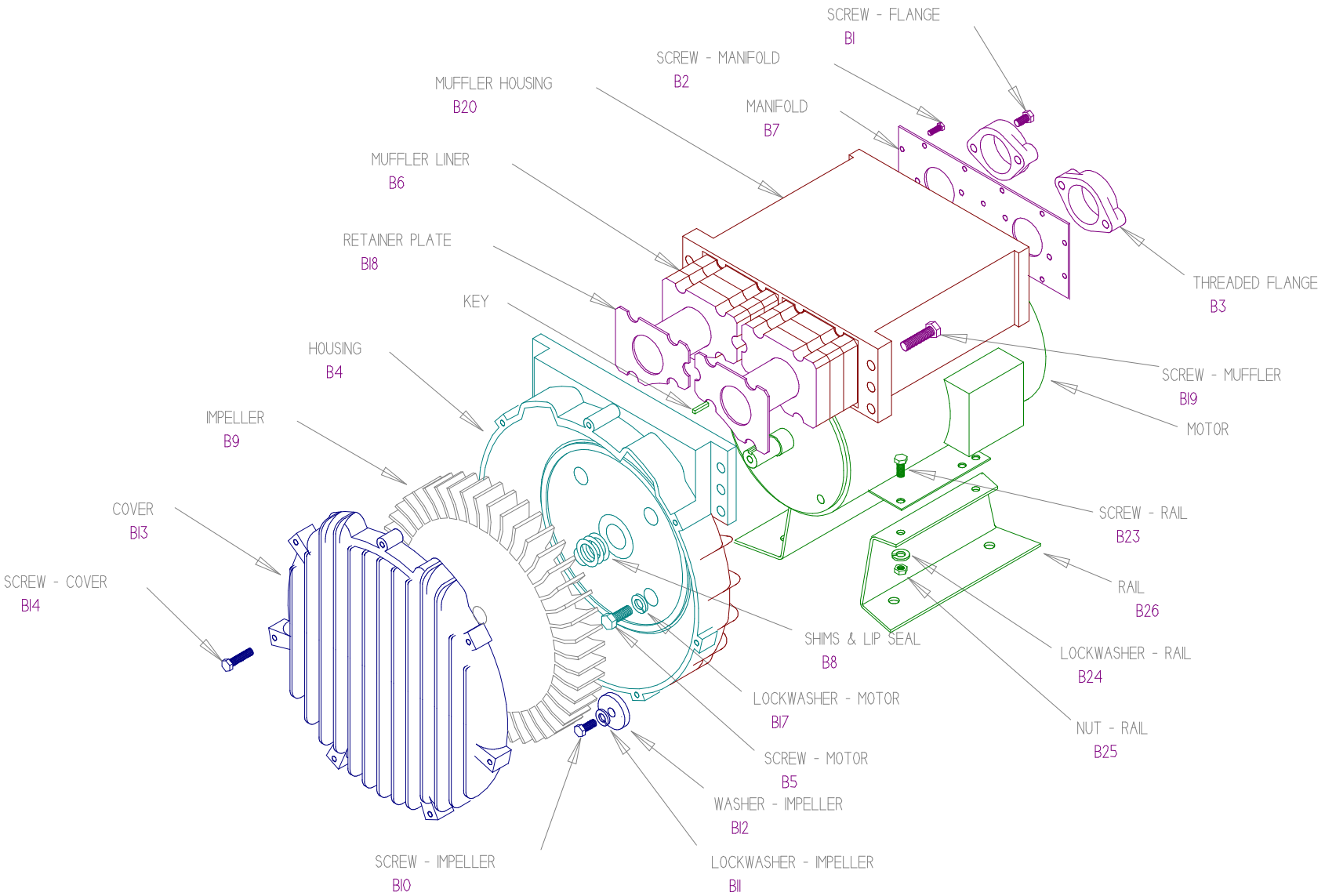
AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, corrosive environment without the proper surface treatment and sealing options.

AMETEK Rotron has a complete line of Chemical Processing and Nasty Gas™ regenerative blowers with Chem-Tough™, stainless steel parts, and seals.

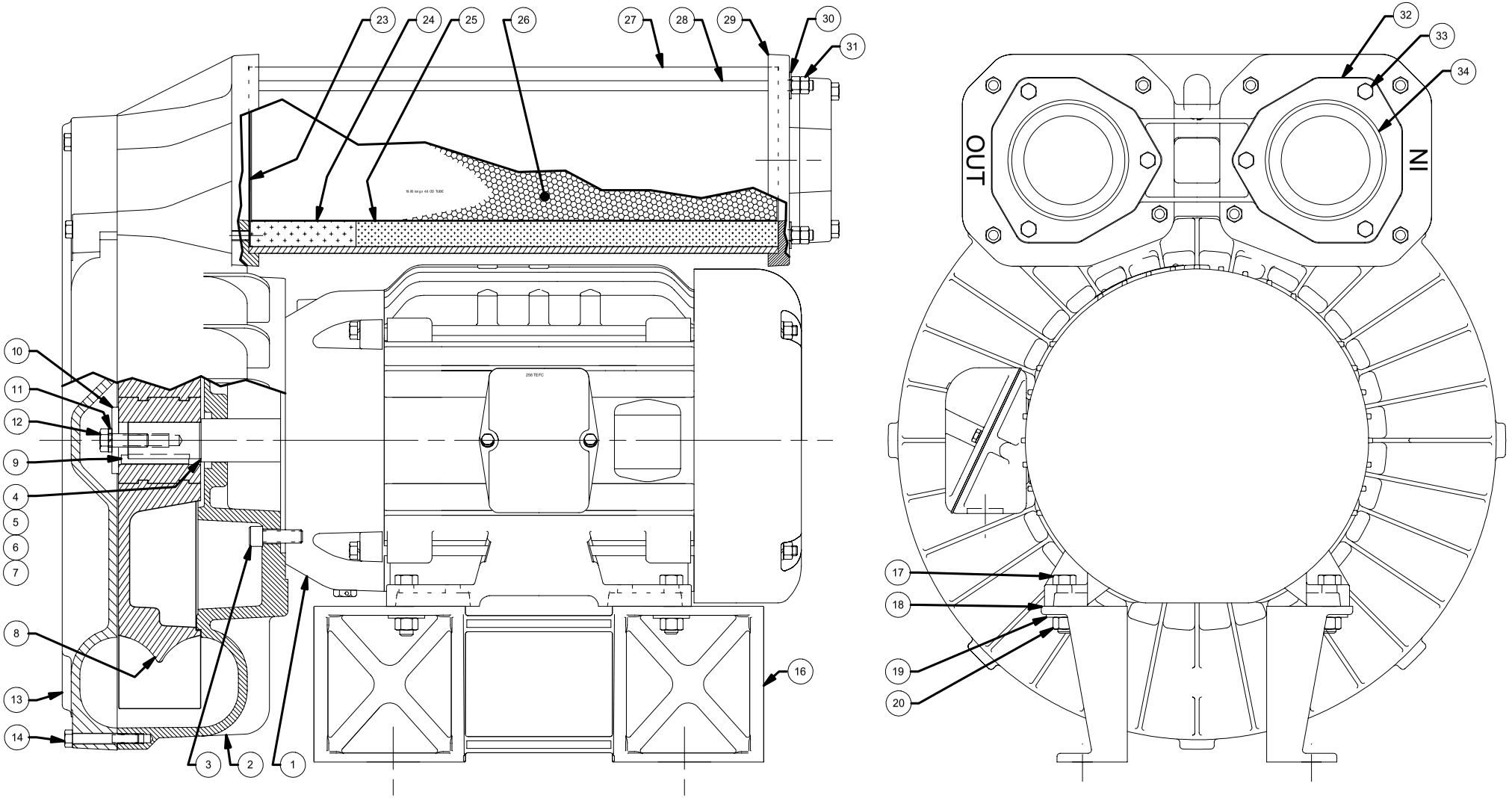
AMETEK Rotron offers general application guidance; however, suitability of the particular blower selection is ultimately the responsibility of the purchaser, not the manufacturer of the blower.

FS2 Rev B 3/10/98

ASSEMBLY DIAGRAM
EN6 EN808 EN909 EN14



ASSEMBLY DIAGRAM "B"



EN 6/858/909/14

Service and Parts Manual

Parts Breakdown

Item No.	Qty. Req'd	Description	EN6	EN858	EN909	EN909	EN14	EN14	EN979
		Model:	**EN6**	**EN858**	**EN909**	**EN909**	**EN14**	**EN14**	**EN979**
		Part No.:	**038361**	**038744**	**038629**	**081741**	**038762**	**038760**	80724
			038180	**038745**	**038634**	**081736**	**038761**		
			038438	**080070**	**080071**	**081743**			
					OBSOLETE				
M3	1	Key Motor Shaft	510212	511532	511532	511532	155066	511532	551570
B1	6	Screw, Flange	(4 pcs) 120065	(4 pcs) 155067	140016	140016	140016	140016	140016
B2		Screw, Manifold	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B3	2	Flange	See Next Page	511614	529912	529912	529912	529912	529912
	2	O-ring	Not Used	Not Used	155377	155377	155377	155377	155377
		Elbow 90º	See Next Page	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B4	1	Housing	516747	516764	515356	552409	516799	516797	551560
B5	4	Screw, Hsg /Motor	251792	155034	140014	see below	120205	120205	120205
B6	7	Muffler Material (Gray)	Not Used	551736	(10 pcs) 551738	(2 pcs) 552477	(12)551740	(12)551740	(8) 551571
	2	Muffler Material (White)	Not Used	551737	551739	552483	551741	551741	Not Used
	2	Finger Guard	Not Used	Not Used	551730	Not Used	551744	551744	Not Used
B8	*	Shim .002"	272703	511547	511547	511547	515991	511547	511547
	*	Shim .005"	272704	511548	511548	511548	515992	511548	511548
	*	Shim .010"	272705	511549	511549	511549	515993	511549	511549
	*	Shim .020"	272706	511550	511550	511550	515994	511550	511550
	*	Shim .030"	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B9	1	Impeller	515484	515249	552544	552431	515509	515683	551566
B10	1	Bolt, Impeller	251791	120210	140015	140015	155068	120251	140015
B11	1	Lockwasher, Impeller	251787	251788	251788	251788	251788	251788	251788
B12	1	Washer, Impeller	Not Used	511529	Not Used	Not Used	Not Used	Not Used	Not Used
B13	1	Cover	515488	515247	515359	515359	515910	515910	551409
B14	8	Screw, Cover	155170	140016	140016	140016	155069	155069	155512
B15	1	Eye Bolt	Not Used	140019	140019	Not Used	140019	140019	Not Used
B16	1	Spacer, Impeller Bolt	478336	515555	511529	511529	515990	515990	511529
		Shaft Sleeve	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B17		Lockwasher, Housing	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B18	2	Screen, Muffler Retaining,	Not Used	551723	551725	552479	551727	551727	551611
B19	6	Bolt, Muffler Hsg/Hsg	Not Used	155025	155025	(4 pcs) 155025	155067	155067	155512
B19A	4	Bolt, Muffler/Housing	Not Used	120214	120214	120210	120214	120214	Not Used
B20	1	Muffler Housing	Not Used	550019	529932	552428	550039	550039	551422
	1	Muffler Discrete	522948	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Bolt, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B21		Heat Slinger	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B22		Guard Heat slinger	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B23	4	Bolt, Rail	251791	120007	140016	120205	120256	155025	120256
B24	4	Lockwasher Rail	251787	251787	251787	251787	251788	251788	Not Used
B24A	8	Washer, Rail/Motor	Not Used	Not Used	155091	see below	Not Used	Not Used	(4) 155091

*As needed **Viewed looking at inlet/outlet ports

B25	6	Nut, Rail	251789	251789	251789	(4 pcs) 251789	(4 pcs)155070	(4 pcs)155070	155070
B26	2	Rail Mounting	478338	595301	551584	see below	551658	551658	551658
	1	Lip Seal	516691	516693	516693	516693	516694	516693	516693

Model	Part No.	Motor	Wiring Diagram	Specific Parts	Bearing, Rear (M1)	Impeller End (M2)
EN6F5L	038361	529475	M + L	B3 Flange 511480 (2 pcs) Elbow 120153 (2 pcs)		
EN6F72L	038180	500297	K + L	B3 Flange 478341 (2 pcs) Elbow Not Used, Screen Guard, Flange 511479 (2 pcs)	510217	510218
EN6F86L	038438	529634	N + L	B3 Flange 478341 (2 pcs) , Elbow Not Used Screen Guard, Flange 511479 (2 pcs)		
EN858BD72WL	038744	515556	K + L			
EN858BD86WL	038745	529627	N + L		516840	516844
EN858BA72W	080070	515558	K + L			
EN909BG72WL	038629	511512	K + L			
EN909BG86WL	038634	529631	N + L		516842	516844
EN909BD72WL	080071	515556	K + L			
EN909BG72WL	081741	511512	K + L	B5 140016 B26 551584,B24A not used		
EN909BG86WL	081736	529631	N + L	B5 140016 B26 551584,B24A not used		
EN909BD72WL	081743	515556	K + L	B5 155092 B26 595301,B24A 155091 (20 pcs)	516842	516844
EN14DX86MWL	038762	529632	N + L		516844	516846
EN14DX72MWL	038761	516095	P +L			
EN14BK72MWL	038760	511513	K + L		516842	516844
EN979BK72WL	080724	551637	K + L		516842	516844

*As needed **Viewed looking at inlet/outlet ports

Use Assembly Diagram "B"

EN/CP 14

Service and Parts Manual

Parts Breakdown

Model:	**EN14**	**EN14**
Part No.:	**081486**	**081485**
	081487	

REF #	QTY	Description		
1	1	Motor	See below	See below
2	1	Housing	552373	552375
3	4	Housing to mtr bolts	120256	155025
4	*	Shim	515991	511547
5	*	Shim	515992	511548
6	*	Shim	515993	511549
7	*	Shim	515994	511550
8	1	Impeller	515509	515683
9	1	Mtr shaft Key	155066	511532
10	1	Impeller washer	515990	515990
11	1	Impeller lockwasher	251788	251788
12	1	Impeller bolt	155068	120251
13	1	Cover	515910	515910
14	8	Cover screws	155069	155069
15		Not used	Not used	Not used
16	2	Mounting Rails	551658	551658
17	4	Rail Bolts	120205	120205
18	4	Rail spacers	Not used	Not used
19	4	Rail lockwashers	251788	251788
20	4	Rail -Nuts	155070	155070
21	4	Rail washers	155091	155091
22		Not used	Not used	Not used
23	2	Finger guard screen	552322	552322
24	2	Muffler foam (hi temp)	552328	552328
25	2	Muffler foam (regular)	552327	552327
26	2	Retainer	552332	552332
27	2	Muffler tube	552324	552324
28	8	Muffler Tie Rod	552325	552325
29	1	Connector plate	552298	552298
30	8	Muffler washer	155091	155091

*As needed **Viewed looking at inlet/outlet ports

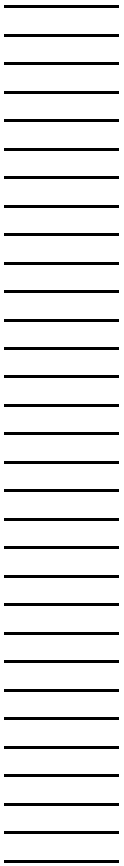
31	16	Muffler tie rod nuts	251789	251789
32	2	Flange	529912	529912
	2	Flange - O-Ring	155377	155377
33	6	Flange bolts	140016	140016
34		Flange Cap.	Not used	Not used
35		Not used	Not used	Not used
36		Nameplate- Blower	Not used	Not used
37		Rotation Sticker	Not used	Not used
38		Not used	Not used	Not used
39				
40		Lip Seal	516694	516693
41				
42				

Model	Part #	Motor	Wiring Diagram	Specific Parts	Bearing, Rear (M1)	Beari Impeller E
EN14DX86MWL	081487	529632	N + L		516844	5168
EN14DX72MWL	081486	516095	K + L			
EN14BK72MWL	081485	511513	K + L		516842	5168

*As needed **Viewed looking at inlet/outlet ports

*As needed **Viewed looking at inlet/outlet ports

*As needed **Viewed looking at inlet/outlet ports



*As needed **Viewed looking at inlet/outlet ports

ng, nd (M2)
46
44

*As needed **Viewed looking at inlet/outlet ports

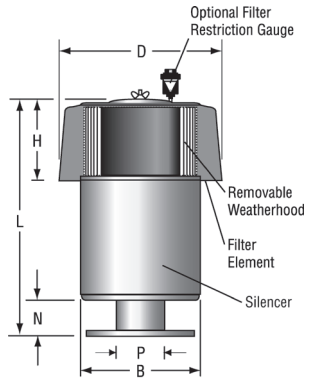
CCS/CS Series

Filter-Silencers

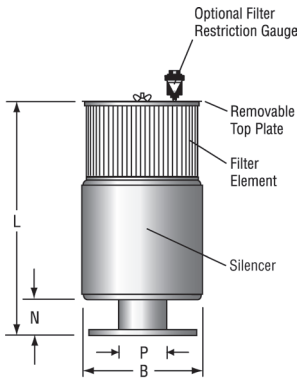
CCF/CF Series

Filters

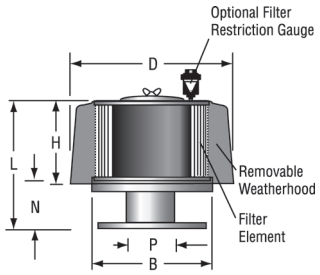
CCS Series (with weatherhood)



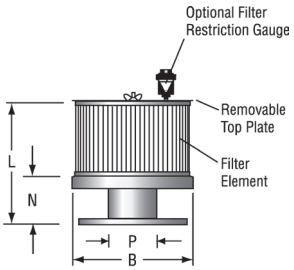
CS Series (with top plate)



CCF Series (with weatherhood)



CF Series (with top plate)



Part Numbers

Pipe Size	CCS	CS	CCF	CF
.5	34-K50-TT*	34-M50-TT*		
.75	34-K70-TT*	34-M70-TT*	*Sizes .5"–1" Use CCS or CS Series*	
1	34-K01-TT*	34-M01-TT*		
1.25	34-K21-TT*	34-M21-TT*	34-L21-TT*	34-N21-TT*
1.5	34-K15-TT*	34-M15-TT*	34-L15-TT*	34-N15-TT*
2	34-K02-TT*	34-M02-TT*	34-L02-TT*	34-N02-TT*
2.5	34-K25-TT*	34-M25-TT*	34-L25-TT*	34-N25-TT*
3	34-K03-TT*	34-M03-TT*	34-L03-TT*	34-N03-TT*
3.5	34-K35-TT*	34-M35-TT*	34-L35-TT*	34-N35-TT*
4	34-K04-TT*	34-M04-TT*	34-L04-TT*	34-N04-TT*
4	34-K04-AA*	34-M04-AA*	34-L04-AA*	34-N04-AA*
5	34-K05-TT*	34-M05-TT*	34-L05-TT*	34-N05-TT*
5	34-K05-AA*	34-M05-AA*	34-L05-AA*	34-N05-AA*
6	34-K06-AA*	34-M06-AA*	34-L06-AA*	34-N06-AA*
8	34-K08-AA*	34-M08-AA*	34-L08-AA*	34-N08-AA*
10	34-K10-AA*	34-M10-AA*	34-L10-AA*	34-N10-AA*
12	34-K12-AA*	34-M12-AA*	34-L12-AA*	34-N12-AA*
14	34-K14-AA*	34-M14-AA*	34-L14-AA*	34-N14-AA*
16	34-K16-AA*	34-M16-AA*	34-L16-AA*	34-N16-AA*

*Specify "P" at end of part number for unit with pleated paper elements, "F" for pleated felt or "W" for wire mesh.
Refer to page 11 for filter element details.

Universal's cartridge filters and filter-silencers offer high-performance filtration and silencing in a convenient, economical cartridge configuration. Choose from four standard models for pipe sizes ranging from .5" to 16" and for flow capacities ranging from 15 to 7,700 CFM. Three types of filter element media—pleated paper, pleated felt, or wire mesh—are available to suit your application.

The CCF and CF series filters are high-quality air filters without a silencing section. The CCF has a removable weatherhood, and the CF has a removable top plate. Our CCS and CS intake filter-silencers have a built-in silencing section. The CCS features a removable weatherhood, and the CS has a removable top plate for easy access to the filter element.

Performance Benefits

- **Durability**
  Weatherhoods for CCF and CCS sizes 2.5" through 5" are rugged blue ABS composite material that may be painted. All other components are carbon steel construction with a high-quality semi-gloss enamel finish.
- **High Performance**
  Unique design options, combined with the latest manufacturing techniques, ensure optimum performance and long life even under demanding conditions.
- **Functional**
  Choice of filter only or filter-silencer.
- **Easy to Maintain**
  Removable lightweight weatherhood (CCS and CCF) or removable top plate (CS and CF) for easy access to the filter element.
- **Versatile**
  Interchangeable element options for desired filtration characteristics in the same housing.

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CCS/CS Series

Filter-Silencers

CCF/CF Series

Filters

Noise Attenuation, CCS/CS

Attenuation, dB	Octave Band Center Frequency, Hz
5	63
8	125
10	250
12	500
14	1,000
14	2,000
14	4,000
14	8,000

Pressure Drop, All Models

Pressure Drop (in. of H_2O)	Percentage of Rated Flow
0.7	50%
1.6	75%
2.8	100%
4.4	125%
6.3	150%

P (size)	Rated Flow Cap. (CFM)	D	H	B	N				L				Approx. Weight with Paper Elements			
					CCF	CCS	CF	CS	CCF	CCS	CF	CS	CCF	CCS	CF	CS
.5	15	8.00	3.13	6.00	Use	—	Use	—	Use	6.50	Use	6.50	Use	7	Use	7
.75	22	8.00	3.13	6.00	CCS	—	CS	—	CCS	6.50	CS	6.50	CCS	7	CS	7
1	35	8.00	3.13	6.00	Series	—	Series	—	Series	6.50	Series	6.50	Series	7	Series	7
1.25	60	9.00	3.50	6.50	—	—	—	—	3.50	7.88	3.50	7.88	9	10	5	9
1.5	75	9.00	3.50	6.50	—	—	—	—	3.50	7.88	3.50	7.88	9	10	5	9
2	120	9.00	3.50	6.50	—	—	—	—	3.50	7.88	3.50	7.88	8	10	5	8
2.5	190	13.44	6.75	10.00	1.00	1.00	1.00	1.00	7.50	17.69	7.13	17.31	11	19	10	18
3	275	13.44	6.75	10.00	1.00	1.00	1.00	1.00	7.50	17.69	7.13	17.31	10	18	9	17
3.5	375	13.44	6.75	10.00	1.13	1.13	1.13	1.13	7.63	17.69	7.25	17.31	13	20	12	19
4 (NPT)	500	13.44	6.75	10.00	1.13	1.13	1.13	1.13	7.63	17.69	7.25	17.31	12	19	11	18
4 (flanged)	500	13.44	6.75	10.00	4.00	3.00	4.00	3.00	10.50	19.63	10.13	19.25	14	21	13	20
5 (NPT)	750	13.44	6.75	10.00	1.81	1.81	1.81	1.81	8.38	18.25	8.00	17.88	12	19	11	18
5 (flanged)	750	13.44	6.75	10.00	4.00	3.00	4.00	3.00	10.50	19.56	10.13	19.13	16	23	15	22
6	1,100	18.00	9.50	14.00	4.00	3.00	4.00	3.00	13.31	25.25	12.75	24.75	31	43	23	35
8	2,200	20.00	18.00	14.00	4.00	3.00	4.00	3.00	21.88	33.88	21.38	33.38	43	56	30	43
10	3,000	24.00	11.50	18.00	4.00	3.00	4.00	3.00	15.38	29.25	14.19	28.13	52	83	41	67
12	4,300	24.00	11.50	18.00	4.00	3.00	4.00	3.00	15.38	29.25	14.19	28.13	64	91	48	75
14	5,900	30.00	15.44	24.00	4.00	3.00	4.00	3.00	19.38	36.25	18.25	35.06	97	143	75	121
16	7,700	30.00	15.44	24.00	4.00	3.00	4.00	3.00	19.38	36.25	18.25	35.06	101	145	79	123

All models have a .125" FNPT tap for installation of a gauge or manometer to monitor pressure drop. Sizes **.5" through 3.5"** are standard with female pipe thread connection (FNPT). Sizes **4" and 5"** are available with female threads or flanges. Please specify "threaded" or "flanged" when you order 4" and 5" sizes. Sizes **6" through 16"** are standard with 150# ANSI drilled plate flanges. Rated capacity is based upon exit velocity of approximately 5,500 ft/min. If pressure drop allowance permits, capacity may be increased by as much as 50%.

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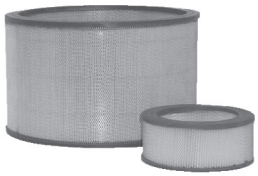
CCS/CS/CCF/CF Filter Elements

Three types of filter elements are available for Universal's cartridge filters and filter-silencers. Pleated paper elements provide the highest efficiency and are considered standard. Pleated felt and wire mesh elements are available for less demanding service with respect to efficiency. The three types of elements are completely interchangeable and will fit all CCS, CS, CF or CCF filter housings.



Pleated Paper Element

Specifications

- High-quality industrial grade filter paper—pleated and oven-cured during production.
- Oven-cured plastisol end caps with molded sealing beads.
- Media efficiency: 99.5% on 2 microns; 97% on 1 micron.
- Maximum operating temperature: 200°F for units with .5" through 16" pipe sizes.
- Collapse Strength: 25" WC

Service Instructions

Because of the low cost of the paper element, it is generally treated as a consumable and replaced when dirty. However, depending on customer preference, the paper element may be cleaned with compressed air and reused.

Compressed Air Cleaning

Carefully direct compressed air (100 PSI maximum) through the dry element, opposite the normal direction of flow. After cleaning, inspect carefully for holes or cracks. If damaged, replace element.

Pleated Felt Element

Specifications

- Durable polyester felt media—pleated.
- Oven-cured plastisol end caps with molded sealing beads (larger elements for pipe sizes 10", 12", 14", and 16" have metal end caps with closed cell rubber gaskets).
- Media efficiency: 99% on 10 microns.
- Maximum operating temperature: 200°F for units with .5" through 8" pipe sizes, 250°F for units with 10" through 18" pipe sizes using elements with metal end caps.
- Collapse Strength: 25" WC

Service Instructions

Pleated felt elements may be cleaned with compressed air (as described for paper elements) or water and reused.

Water Cleaning

Rap gently to dislodge accumulated dirt, soak thoroughly approximately 15 minutes in warm water and mild detergent. Rinse thoroughly under low pressure water. Air dry—do not dry with compressed air. After cleaning, inspect carefully for holes or cracks. If damaged, replace element.

Wire Mesh Element

Specifications

- Galvanized wire-mesh media—corrugated construction.
- May be cleaned and reused indefinitely.
- Wire mesh elements are considered "roughing" filters and are not recommended for applications which require efficient filtration of fine particles.
- Approximate efficiency: 93% on 10 microns. Efficiency will vary with element oil or adhesive coverage.
- Maximum operating temperature: 200°F for .5" through 16" with oil-free adhesive (flash point of adhesive is 235°F) and 300°F for .5" through 16" without adhesive.

Service Instructions

New elements are delivered pre-treated with Universal's oil-free adhesive. See the back page for details. For best efficiency, wire mesh elements must be retreated after each cleaning. Spray the element on both sides with Universal Oil-Free Adhesive, P/N 81-0323, following the directions on the container. For oil treatment, dip the element in SAE 30–50 motor oil and drain thoroughly before using.

Cleaning

To clean wire mesh elements, wash in solvent or warm water and detergent in a container large enough for complete immersion of element. Rinse completely, drain, and either air dry or use compressed air. After cleaning and drying, retreat the element with oil-free adhesive or oil as described.

P (Nom.)	Replacement Element Part Number		
	Paper	Felt	Wire Mesh
.5	81-0470	81-1202	81-1035
.75	81-0470	81-1202	81-1035
1	81-0470	81-1202	81-1035
1.25	81-0471	81-1203	81-1036
1.5	81-0471	81-1203	81-1036
2	81-0471	81-1203	81-1036
2.5	81-1063, 81-0472 (old)	81-1205, 81-1204 (old)	81-1038, 81-1037 (old)
3	81-1063, 81-0472 (old)	81-1205, 81-1204 (old)	81-1038, 81-1037 (old)
3.5	81-1063	81-1205	81-1038
4	81-1063	81-1205	81-1038
5	81-1063, 81-0474 (old)	81-1205, 81-1206 (old)	81-1038, 81-1039 (old)
6	81-0475	81-1207	81-1040
8	81-0475 (2)	81-1207 (2)	81-1040, (2) 81-1199 (old)
10	81-1163	81-1209	81-1200
12	81-1163	81-1209	81-1200
14	81-1164	81-1210	81-1201
16	81-1164	81-1210	81-1201

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Installation, Operation and Maintenance Instructions for CF, CCF, CS & CCS Series Filter Silencers

2Description

The CS and CCS series of combination filter silencers is a reactive design that includes a cartridge filter element. The CF and CCF series provide filtration only. They provide effective filtration and, for the CS, CCS versions, moderate noise reduction for a wide range of operating conditions. The standard unit of this series is designed for applications where the temperature does not exceed 225 °F, the pressure does not exceed 10 psig and/or vacuum does not exceed 10"Hg. There are no moving parts in the operation of the filter silencer units.

Receiving Inspection

- Upon receipt of the unit, check the nameplate against the packing list to verify the correct part numbers are received.
- Keep the shipping container to protect the unit until installation.
- Prior to unpacking check for shipping damage.
- Advise Universal Silencer of shipping damage within three days.

Storage

- Leave any cardboard boxing, plywood covering, crating, and/or plastic covering intact until ready to install.
- Be sure that all openings are closed so that no debris, vermin, rain, snow and/or ice can get into unit.
- Store unit on blocks, a minimum of 4" high so that air can freely circulate around unit.
- Do not store in contact with the ground or in a wet or flooded area.
- Indoor ambient temperature storage is essential as these units contain filtration media. If this is not possible, keep the unit covered and protected from the weather.
- Clean unit prior to installation. Remove any minor corrosion and refinish per paint manufacturer's recommendations. If major corrosion has occurred such that the integrity of the unit is in question, contact Universal Silencer.

Mounting and alignment

- Insure that the necessary equipment to install the unit, including anchor and/or support bolts, flange bolts, and expansion joints, are available before beginning installation.
- Anchor and/or support bolting and grouting is not included with the unit.
- Place the unit on a level, structurally adequate support. These units are often supported by their outlet flange. Insure that the supporting duct or piping is properly designed and does not induce vibrations into the unit.

+ ***IMPORTANT:*** The unit is not designed to serve as a support for any piping, additional mounting pads or loads on the inlet or outlet other than those stated in the Universal Silencer drawing or product bulletin.

- Use thread lubricant on all bolted joints.
- Use all gaskets provided with the unit.
- If you replace or add bolts or gaskets, use the same size and material as the originals.
- Ensure that the unit is firmly mounted immediately prior to startup of the equipment, and again 24 hours after startup to verify that supports and/or flange bolts have not vibrated loose from the supporting surface.

Inspection and maintenance

- Components are either complete weldments or permanently assembled having no replaceable parts except for filter elements.
- Cartridge filter elements are the only replaceable part.
- Periodically inspect paint finish for damage or deterioration. **NOTE**: Minor localized damage may be touched up using touch-up paint. Areas with extensive damage or deterioration may require spot blasting and recoating. Consult paint manufacturer's recommendations.
- Examine connecting flanges and support/ anchor bolting at least annually. Retighten loose nuts as required.

Safety Issues

- If performing any work internal to the filter silencer or adjacent components, ensure that all confined space requirements are met and that all tools and other materials are removed once work is completed.

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Installation, Operation and Maintenance Instructions for CF, CCF, CS & CCS Series Filter Silencers

Care and Cleaning of Filter Elements

- Felt and paper filter elements should be cleaned or replaced when the pressure drop increases 4" w.g. above the clean condition. Wire mesh elements should be cleaned on an annual or semi-annual basis depending on the air quality. While the filter element can withstand greater pressure drops, failure to replace or clean the element at this time may result in dirt carry-over into the system being protected.
- Filter elements are accessed by removing the wingnut on top of the cover or weatherhood and removing it.
- Do not remove any other hardware, nuts or bolts.
- Remove the element by lifting it away from the base plate.
- Periodically inspect paint finish for damage or deterioration. Minor localized damage may be touched up using touch-up paint. Areas with extensive damage or deterioration may require spot blasting and recoating. Consult paint manufacturer's recommendations.
- Examine connecting flange and support/anchor bolting yearly. Retighten loose nuts as required.

Paper and Felt Filter Elements

- These elements are dry type elements. Do not use oil or adhesive on these elements. Although both paper and felt elements can be cleaned and re-used, paper elements are inexpensive and are generally considered to be replaceable.
- Water Cleaning (Felt only): Rap gently to dislodge accumulated dirt. Soak thoroughly approximately 15 minutes in warm water and mild detergent. Rinse thoroughly under low-pressure water. Air dry (do not dry with compressed air).
- Compressed Air Cleaning (Paper only): carefully direct compressed air (100 PSI maximum) through element, opposite normal direction of flow.
- After cleaning, inspect element carefully for holes or cracks. Replace element if it is damaged.

Wire Mesh Filter Elements

- For best efficiency, wire mesh elements must be treated when new and after each cleaning.
- For oil free adhesive, spray the element on both sides with Universal Oil-Free Adhesive, P/N 81-0323, following directions on container.
- For oil treatment, dip the element in SAE 30-50 motor oil and drain thoroughly before replacing.
- To clean wire mesh elements, wash in solvent or warm water and detergent in a container large enough for complete immersion of element. Rinse completely, drain and either air dry or use compressed air.
- After cleaning, inspect element carefully for holes or cracks. Replace element if it is damaged. Re-treat element with oil-free adhesive or oil as described above.

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Form No. 94-1341, 11/07

Models: 87, 88

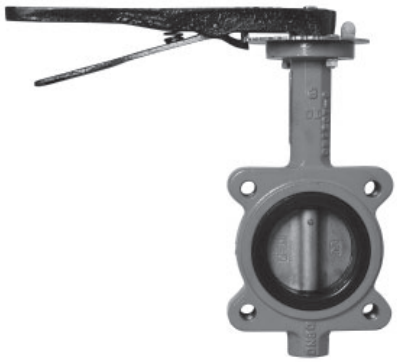
Ductile Iron Wafer and Full Lug Butterfly Valves Sizes: 2" – 24" (25 – 60mm)

Pressure/Temperature–Non-Shock			
Model	Size	Material	Rating
87	2"-12"	Ductile Iron	200psi @ 100° F
87	14"-24"	Ductile Iron	150psi @ 100° F
87	2"-12"	Ductile Iron	200psi @ 100° F
87	14"-24"	Ductile Iron	150psi @ 100° F

Max. temp. can be limited by seat material. Consult Factory.

Not Recommended for Steam Service.

Model 87M (Wafer)



Model 88M (Lug)

Typical Service

These soft-seated butterfly valves are designed for a variety of general applications in the control of water, air, oil, gases, and corrosive media. They are equally effective for on-off, throttling, or isolation service requirements. Lug style valves are designed for dead-end service to the full pressure rating of the valve. Models 87 and 88 butterfly valves are especially well suited for higher velocity service and vacuum service.

Features

- Phenolic backed (2" – 14"), aluminum backed (16" – 24"),
- non-collapsible, resilient elastomer seat. Available in EPDM or Buna-N.
- ISO 5211 mount is standard. Double D shaft is standard 2" – 10" while keyway design is supplied 12" – 24"
- Stem is a one-piece design for maximum strength and is retained in valve body for blowout proof operation. 416SS stem is standard with aluminum bronze or ductile iron discs. 316SS is standard for 316SS discs (2" – 12") and 431SS is standard for 316SS discs (14" – 24")
- Stem bushings provide shaft support for proper stem alignment and minimize stem deflection. Duralon bushings are standard material in 2" – 12" sizes. Bronze bushings are standard in 14" – 24" sizes.
- Stem seals prevent external contamination of stem area and provide backup for the primary shaft seal formed by the disc/seat interface.
- ASTM-A563 ductile iron body available in full lug (Model 88) or wafer (Model 87) designed for use between ANSI 125 and 150 flanges. Face-to-face dimension comply with API 609 and MSS-SP-67.
- Available in standard 10-position locking handle or optional infinite positioning locking handle. Also gear operators are available 2" – 24". Contact the factory for electric or pneumatic actuation.

Performance Guidelines

Guidelines for throttling service:

Liquids – Line velocity should not exceed 20ft./sec.

Gases – Line velocity should not exceed 15,000 ft./sec.

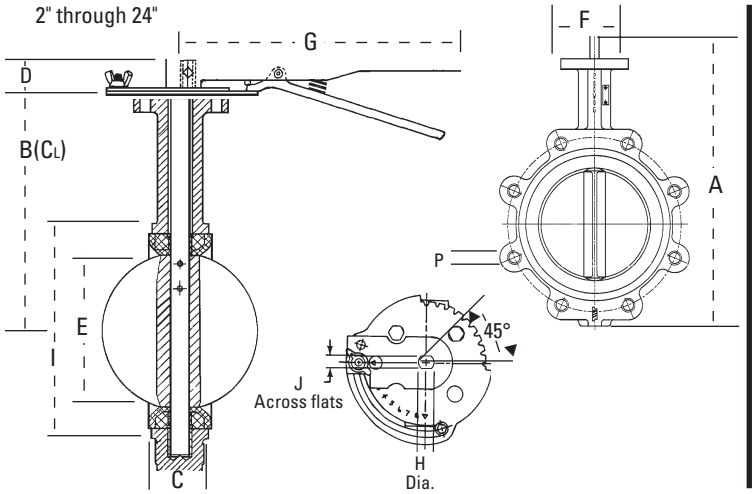
Materials

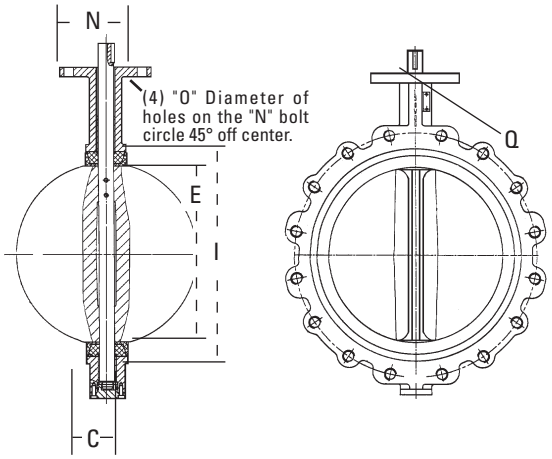
	MODEL 87, MODEL 88
Body	Ductile Iron
Stem	416SS, 316SS, 431SS
Disc	Ductile Iron, Aluminum Bronze, 316SS
Seat	EPDM - 5°F to 248°F (-15°C to +120°C)
	Buna-N - 14°F to 176°F (-10°C to +80°C)

Note: Do not use EPDM when hydrocarbons are present

Dimensions and Weights

2" through 24"





Size	A in.	A mm	B in.	B mm	C in.	C mm	D in.	D mm	E in.	E mm	F in.	F mm	G in.	G mm	H in.	H mm	I in.	I mm	J in.	J mm
2"	10¾	273	6⅜	161	1⅝	42	1¼	32	2½	54	3 1/16	77	10½	267	½	13	3¾	95	⅜	9
2½"	11⅝	295	6⅞	175	1¾	45	1¼	32	2½	64	3 1/16	77	10½	267	½	13	4¼	108	⅜	9
3"	12⅛	308	7⅛	181	1¾	45	1¼	32	3⅛	79	3 1/16	77	10½	267	½	13	4¾	120	⅜	9
4"	13⅝	346	7⅞	200	2	52	1¼	32	4⅛	105	3⅝	92	10½	267	⅝	16	6 1/16	154	7/16	11
5"	14⅝	372	8⅜	213	2 3/16	56	1¼	32	4⅞	124	3⅝	92	10½	267	¾	19	7⅛	181	½	13
6"	15⅝	397	8⅞	226	2 3/16	56	1¼	32	6⅛	156	3⅝	92	10½	267	¾	19	8 3/16	208	½	13
8"	18⅞	479	10¼	260	2⅜	60	1¾	45	8	202	5	125	14	356	⅞	22	10¼	260	⅝	16
10"	21¼	540	11½	292	2⅝	66	1¾	45	9⅛	251	5	125	14	356	1⅛	29	12⅝	320	13/16	21
12"	24⅝	626	13¼	337	3	76	1¾	45	11⅞	301	6	150	14	356	1¼	32	14¾	375	–	–
14"	26¾	679	14½	368	3	76	1¾	45	13⅛	333	6	150	–	–	1¼	32	15 15/16	405	–	–
16"	30	762	15¾	400	3⅜	87	2	50	15⅜	391	6⅞	175	–	–	1 5/16	33	18½	470	–	–
18"	31½	800	16⅝	422	4⅛	105	2	50	17⅜	442	6⅞	175	–	–	1½	38	20 1/16	525	–	–
20"	35 5/16	897	18⅞	480	5⅛	130	2⅛	53	19⅜	493	8¼	210	–	–	1⅝	41	22¼	565	–	–
24"	42⅛	1088	22⅛	562	6	152	2¼	58	23⅜	594	8¼	210	–	–	2	50	27 5/16	693	–	–

Size	TOP PLATE DRILLING N in.	N mm	O in.	O mm	TAPPED LUG DATA BOLT CIRCLE in.	BOLT CIRCLE mm	NO. Holes	BOLT P	KEY WAY Q in.	Q mm	WEIGHT (LBS.)† 88	87
2"	2	50	¼	7	4¾	121	4	5/8"-11UNC x 1⅝"	–	–	8	6
2½"	2	50	¼	7	5½	140	4	5/8"-11UNC x 1¾"	–	–	10	7
3"	2	50	¼	7	6	150	4	5/8"-11UNC x 1¾"	–	–	10	7
4"	2¾	70	⅜	10	7½	191	8	5/8"-11UNC x 2"	–	–	17	12
5"	2¾	70	⅜	10	8½	216	8	¾"-10UNC x 2 3/16"	–	–	25	16
6"	2¾	70	⅜	10	9½	241	8	¾"-10UNC x 2 3/16"	–	–	27	20
8"	4	102	½	13	11¾	298	8	¾"-10UNC x 2⅜"	–	–	40	29
10"	4	102	½	13	14¼	362	12	⅞"-9UNC x 2⅝"	–	–	63	48
12"	5	125	½	13	17	432	12	⅞"-9UNC x 3"	¼ x 1¼	6 x 32	107	78
14"	5	125	½	13	18¾	476	12	1"-8UNC x 3"	¼ x 1¼	6 x 32	156	99
16"	5½	140	1/16	18	21¼	540	16	1"-8UNC x 3⅜"	5/16 x 1 13/16	8 x 46	203	140
18"	5½	140	1/16	18	22¾	578	16	1⅛"-7UNC x 4⅛"	⅜ x 1 5/16	10 x 40	269	188
20"	6½	165	⅞	22	25	635	20	1⅛"-7UNC x 5⅛"	⅜ x 1 5/16	10 x 40	392	248
24"	6½	165	⅞	22	29½	750	20	1¼"-7UNC x 6"	½ x 2⅜	13 x 60	593	450

†Weights are for valves with ductile iron or aluminum bronze discs. 2" – 12" have levers; 14" – 24" have bare shafts.
Refer to Watts F-CDBF for gear operator weights.

Size	Buna-N, EPDM (in./lbs.) NormalConditions WET/DRY
2"	134/214
2½"	190/289
3"	250/387
4"	390/644
5"	600/959
6"	907/1,542
8"	1,697/2,919
10"	2,500/4,857
12"	3,300/7,071
14"	3,500/7,305
16"	5,500/10,027
18"	8,200/13,437
20"	10,000/17,925
24"	18,680/28,020

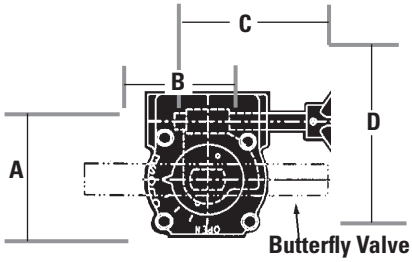
SEATING TORQUE

Size	Cv Rating (Full Open)
2"	135
2½"	220
3"	302
4"	600
5"	1,022
6"	1,579
8"	3,136
10"	5,340
12"	8,250
14"	11,917
16"	16,388
18"	21,705
20"	27,908
24"	43,116

Cv RATING

GEAR DIMENSIONS: STD. WEATHERPROOF W/ HANDWHEEL

Valve Size	A Depth	B Width	C CL to HW	D HW Dia.	E Height	F CL to MT Pad	#Turns Open - Close	Unit Weight (lbs)
2", 2½", 3"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
4"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
5", 6"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
8"	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5
10"	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5
12", 14"	7.8	6.4	9.5	12.0	3.0	2.0	12.5	33.0
16"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
18"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
20"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
24"	12.6	9.1	15.0	24.0	4.5	2.0	20.0	80.0



Butterfly Valve

Adjustable Stops (Set Screws)

Mueller Steam Specialty™

Mueller Steam Specialty product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Mueller Steam Specialty Technical Service. Mueller Steam Specialty reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Mueller Steam Specialty products previously or subsequently sold.

A Division of Watts Water Technologies, Inc.

USA: 1491 NC Hwy 20 West St. Pauls, NC 28384; www.muellersteam.com
Tel: 910-865-8241 Fax: 910-865-6220
Toll Free Phone 1-800-334-6259 Toll Free Fax: 1-800-421-6772

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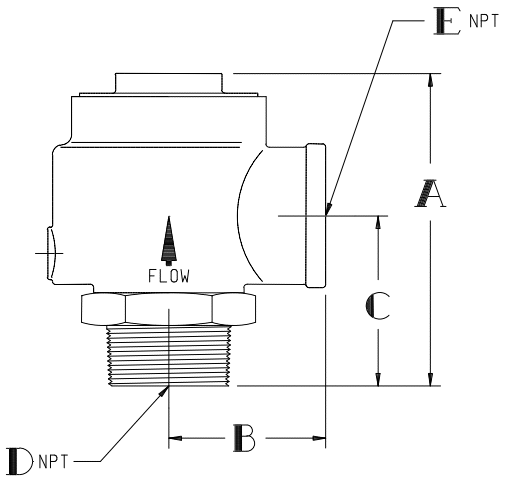
LTR	REVISION	DATE	DR	CH
A	REDRAWN WITH REVISIONS (ECN 2665)	8-22-97	SM	NF

M-D PART NUMBER	SEAT DIAMETER	VALVE SIZE	A ± 1/4	B ± 3/32	C ± 3/32	D NPT	E NPT	WEIGHT LBS
1362-6	2	2	7 1/4	3 1/4	3 1/4	2" MALE	2" FEMALE	8
1362-7	2 1/2	2 1/2	8	3 3/4	3 3/4	2 1/2" MALE	2 1/2" FEMALE	12
1362-8	3	3	9 1/2	4 1/4	4 1/4	3" MALE	3" FEMALE	19



NOTE:
SERVICE RECOMMENDATONS: AIR OR GAS. 22" HG AT 300°F

MATERIALS OF CONSTRUCTION:
BRONZE NOZZLE. DISC. GUIDE & SEAT.
SST SPRING.

INSTRUCTIONS:
1. AVOID OVERTIGHTENING OF VALVE DURING INSTALLATION.
2. VACUUM SETTING MAY BE VARIED APPROXIMATELY ± 10% OF ORIGINAL SETTING BY REMOVING AND LOOSENING THE FILLISTER HEAD MACHINE SCREW AND THEN RUNNING SCREW IN OR OUT AS DESIRED.
3. VALVE MAY BE CLEANED BY REMOVING DISC AND CLEANING SEAT SURFACE WITH A SOFT CLOTH. SEATING SURFACE MAY BE LAPPED IN CASE OF LEAKAGE BY USING A FINE GRIT COMPOUND.
4. REFER TO M-D SPRING DRAWING 1352S SERIES FOR VACUUMS FROM 1" HG TO 30" HG.
5. VALVE PRE-SET TO RECOMMENDED SPECIFICATIONS OF PURCHASE ORDER AT M-D PRIOR TO SHIPMENT.

VACUUM SET AT " HG

TOLERANCES
.XX ± .
.XXX ± .
.XXXX ± .
ANGULAR ±
FRACTIONAL ±
CHAMFERS ± 2°

BREAK ALL SHARP EDGES AND CORNERS

DR SM 8-21-97
CH NF 9-12-97

FIRST USED ON

MATL P/N:
MATL:

TUTHILL Pneumatics Group Springfield, Missouri USA

VACUUM RELIEF VALVE

SIZE: B | 1362

SCALE: NONE | WT LBS | SHEET OF

PRESSURE AND VACUUM RELIEF VALVE 1351-1352-1361-1362 MAINTENANCE

TUTHILL CORPORATION | M-D Pneumatics
A Tuthill Subsidary

P.O. Box 2877, Springfield, MO 65801-0877 • (417) 865-8715 • TWX 910-775-4704 • FAX 417-865-2950

10/88/500

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MAINTENANCE:

1. Check pop off pressure every 2 to 6 months.
2. Inspect for dirt build up in bodies frequently.
3. Remove yearly for testing, inspection, and overhaul.

Valve failure may be caused by seizing of parts, scored or wire drawn seats and corroded or eroded springs. The first case may be corrected by careful cleaning followed by light sanding of the seating surfaces. For correction of the second, the seating surface may be remachined or carefully hand lapped if damage is less severe. Springs rarely required replacement, but may be purchased from manufacturer should replacement be necessary.

DISASSEMBLY

1351 & 1361 Series - Refer to Relief Valve Assembly Drgs. 1351 & 1361.

1. Remove Regulator Ring Set Screw.
2. Remove hood and mark relative positions of pressure screws, lockn t and cap.
3. Loosen pressure screw locknut and pressure screw to release pressure of spring.
4. Remove Cap.
5. Remove spring and spring plates, spindle and spindle retainer.
6. Mark location of regulator ring and remove.

1352 Series - Refer to Pressure Relief Valve Assembly Drg. 1352.

1. Remove fillister head machine screw.
2. Remove roll pin, washer, lever and pressure screw.
3. Remove the spring and disc assembly.
4. Disassemble the disc assembly.

1362 Series - Refer to Vacuum Relief Valve Assembly Drg. 1362

1. Remove fillister head machine screw.
2. Remove pressure screw.
3. Remove the spring and disc assembly.
4. Disassemble the disc assembly.

To Reassemble: Reverse the above procedures - being careful to return parts to their marked positions.
After reassembly, reset valves according to instructions under adjustment, setting and testing.

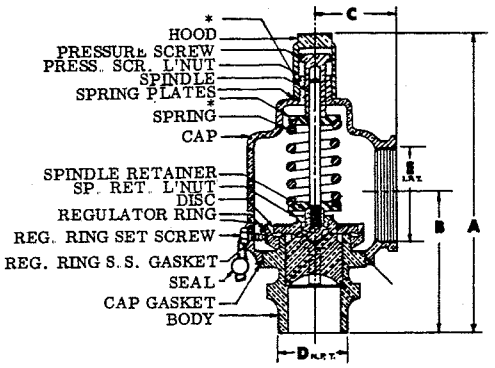
ADJUSTMENT, SETTING AND TESTING

Popping Pressure: 1351 & 1361 Series
Refer to Relief Valve Test Set Ups.
Make sure of gauge accuracy before beginning. Remove hood - exposing pressure screw and locknut, Loosen locknut and raise pressure or vacuum until valve opens or pops. If opening pressure or vacuum is too low, turn down on pressure screw. If pressure or vacuum is too high, back-off pressure screw. After proper pressure has been reached, securely tighten locknut and replace hood.

1352 & 1362 Series
Refer to Relief Valve Test Set Ups.
Make sure of gauge accuracy before beginning. Remove filister head machine screws. Raise pressure or vacuum until valve opens or pops. If opening pressure or vacuum is too low, turn down on pressure screw. If pressure or vacuum is too high, back-off pressure screw. After proper setting has been reached, replace filister head screws, making sure they align with slots provided in pressure screw.

BLOWDOWN ADJUSTMENT

1351 & 1361 Series
When popping pressure is changed, a slight adjustment in blow down may be required. Raising the popping pressure or vacuum lengthens the blow down, and lowering the popping pressure or vacuum shortens the blow down. Raising the regulator ring - towards the disc - will increase blowdown and should be made a notch at a time as the adjustment is sensitive. The normal position would be three or four notches down from touching the disc, but this figure will vary with conditions.
CAUTION: Retighten regulator ring set screw.



1351 & 1361 RELIEF VALVE

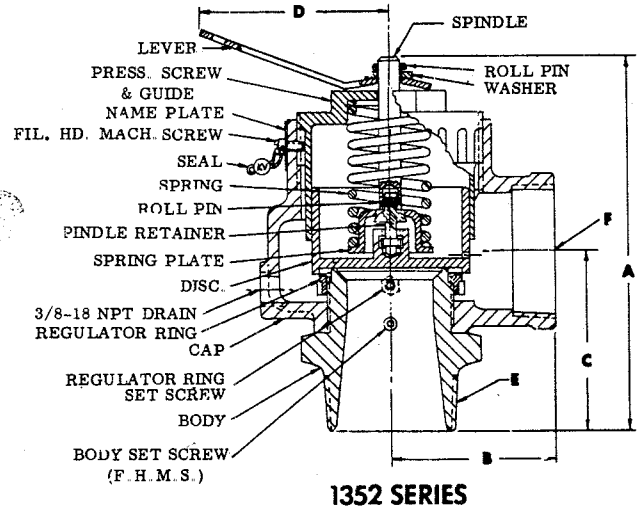
1351 Denotes Pressure Valve
1361 Denotes Vacuum Valve
*Joints sealed on 1361 Vacuum Valves with Crane Pipe Compound or equiv.

PART NO.	SEAT DIA.	VALVE SIZE	WT. LBS.	A	B	C	D	E
1351-1	1/2	1/2	1-3/8	4.63	2.38	1.12	1/2	3/4
1351-2	3/4	3/4	2-1/4	6.66	2.53	1.50	3/4	1-1/4
1351-3	1	1	3	6.97	2.75	1.81	1	1-1/2
1351-4	1-1/4	1-1/4	5-1/2	8.59	3.97	2.18	1-1/4	2
1351-5	1-1/2	1-1/2	7-3/4	9.59	4.31	2.31	1-1/2	2-1/2
1351-6	2	2	11-1/2	10.91	4.88	2.62	2	3
1351-7	2-1/2	2-1/2	20-1/2	13.75	6.09	3.50	2-1/2	3
1351-8	3	3	29	14.75	7.06	4.12	3	4

NOTE: SERVICE RECOMMENDATIONS
AIR OR GAS MAX. 60 PSIG AT 450° F.

INSTRUCTIONS:

1. AVOID OVERTIGHTENING OF VALVE DURING INSTALLATION.
2. VACUUM SETTING MAY BE VARIED APPROX. ± 10% OF ORIGINAL SETTING BY REMOVING HOOD AND RUNNING PRESSURE SCREW IN OR OUT AS DESIRED. (CAUTION: RETIGHTEN LOCKNUT AFTER EACH ADJUSTMENT)
3. VALVE MAY BE CLEANED BY REMOVING DISC AND CLEANI NG SEAT SURFACE WITH A SOFT CLOTH. SEATING SURFACE MAY BE LAPPED IN CASE OF LEAKAGE BY USING A FINE GRIT COMPOUND.



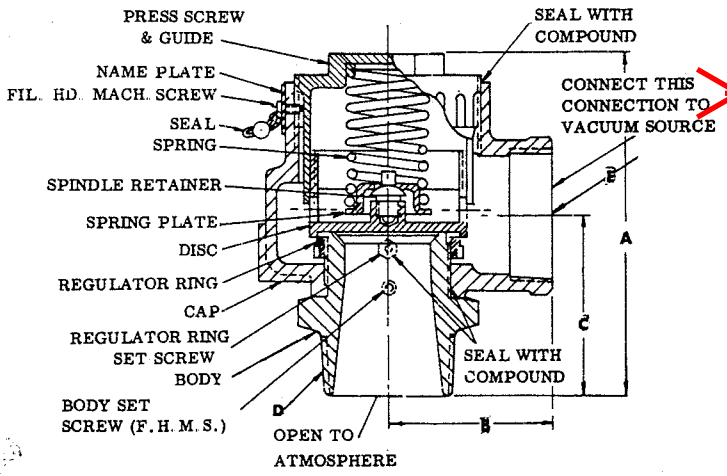
1352 SERIES

PART NO.	SEAT DIA	VALVE SIZE	Wt. LBS.	A	B	C	D	E	F
1352-6	2	2	7-1/2	7.18	2.94	3.18	3.38	2	2
1352-7	2 -1/2	2-1/2	12-1/4	8.00	3.50	3.75	4.12	2-1/2	2-1/2
1352-8	3	3	18-3/4	9.00	4.0	4.18	4.18	3	3

NOTE: SERVICE RECOMMENDATIONS
AIR OR GAS MAX. 60 PSIG AT 450° F.

INSTRUCTIONS:

1. AVOID OVERTIGHTENING OF VALVE DURING INSTALLATION.
2. VACUUM SETTING MAY BE VARIED APPROX. ± 10% OF ORIGINAL SETTING BY REMOVING HOOD AND RUNNING PRESSURE SCREW IN OR OUT AS DESIRED. (CAUTION: RETIGHTEN LOCKNUT AFTER EACH ADJUSTMENT)
3. VALVE MAY BE CLEANED BY REMOVING DISC AND CLEANING SEAT SURFACE WITH A SOFT CLOTH. SEATING SURFACE MAY BE LAPPED IN CASE OF LEAKAGE BY USING A FINE GRIT COMPOUND.



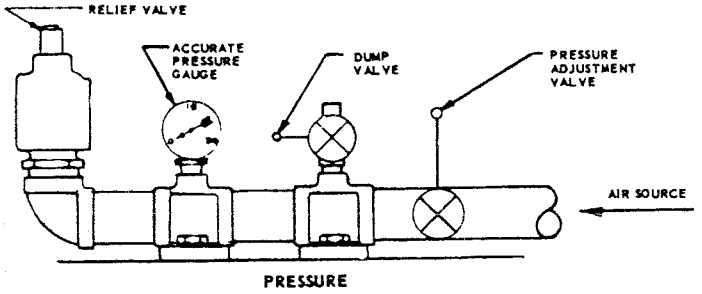
1362 SERIES

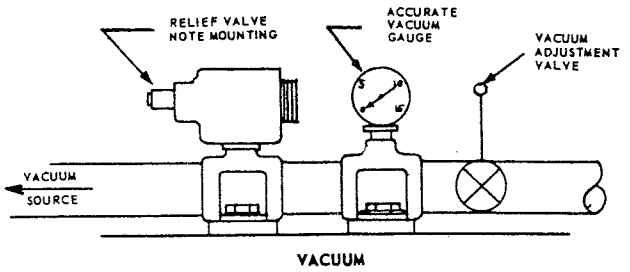
PART NO.	SEAT DIA.	VALVE SIZE	WT. LBS.	A	B	C	D	E
1362-6	2	2	7	5.88	3.18	2.94	2	2
1362-7	2-1/2	2-1/2	11-3/4	6.94	3.50	3.75	2-1/2	2-1/2
1362-8	3	3	18-1/2	7.88	4.00	4.18	3	3

NOTE: SERVICE RECOMMENDATIONS
AIR OR GAS MAX. - 30 HG AT 450° F.

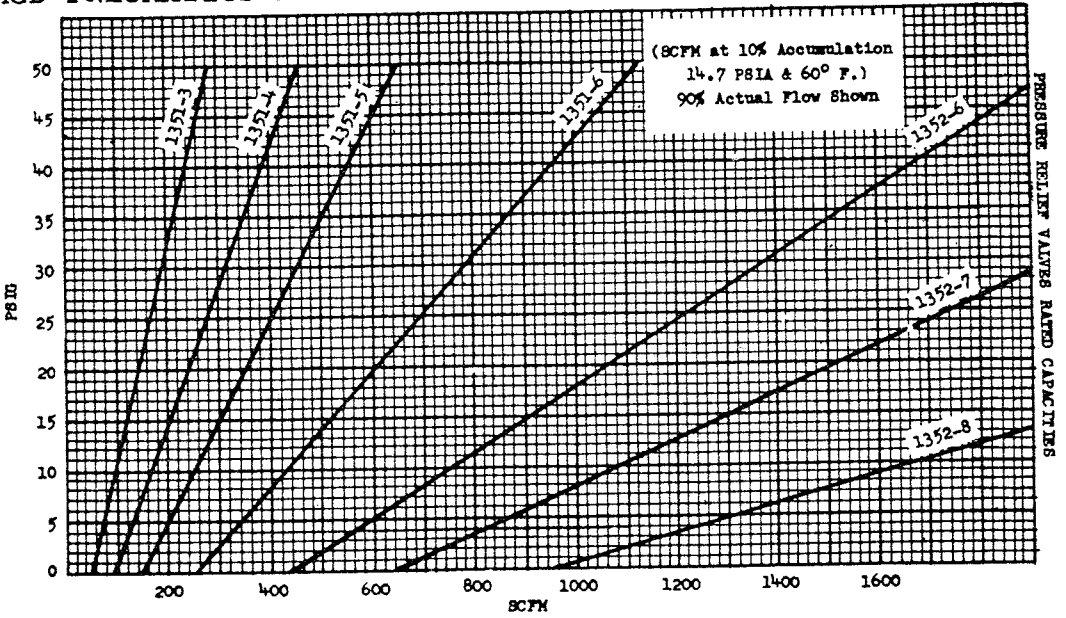
INSTRUCTIONS:

1. AVOID OVERTIGHTENING OF VALVE DURING INSTALLATION.
2. PRESSURE SETTING MAY BE VARIED APPROX. ± 10% OF ORIGINAL SETTING BY REMOVING AND LOOSENING THE FILLISTER HEAD MACHINE SCREW AND THEN RUNNING THE PRESSURE SCREW IN OR OUT AS DESIRED.
3. VALVE MAY BE CLEANED BY REMOVING DISC AND CLEANING SEAT SURFACE WITH A SOFT CLOTH. SEATING SURFACE MAY BE LAPPED IN CASE OF LEAKAGE BY USING A FINE GRIT COMPOUND.

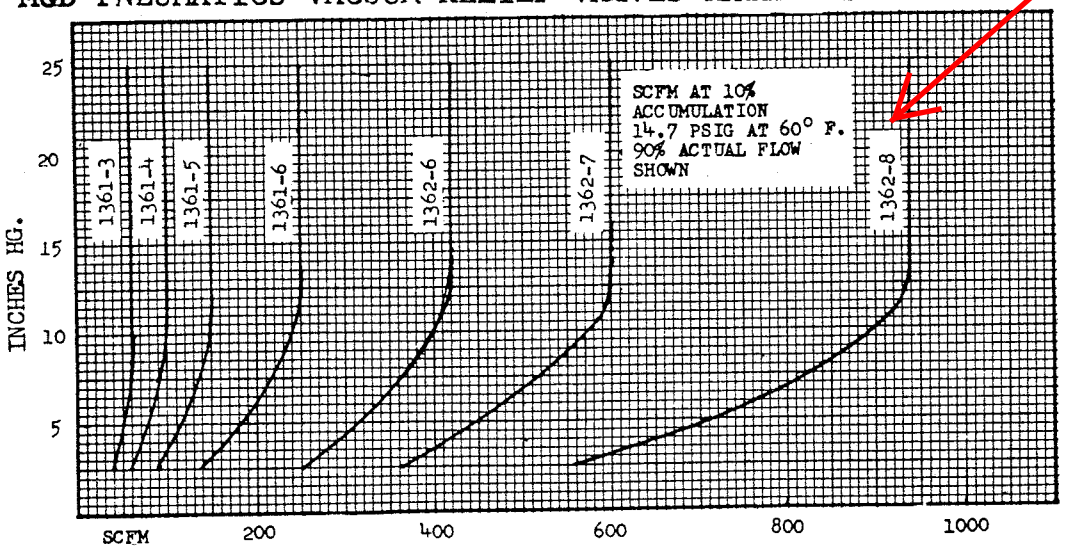




MGD PNEUMATICS PRESSURE RELIEF VALVES RATED AIR CAPACITIES



MGD PNEUMATICS VACUUM RELIEF VALVES RATED AIR CAPACITIES



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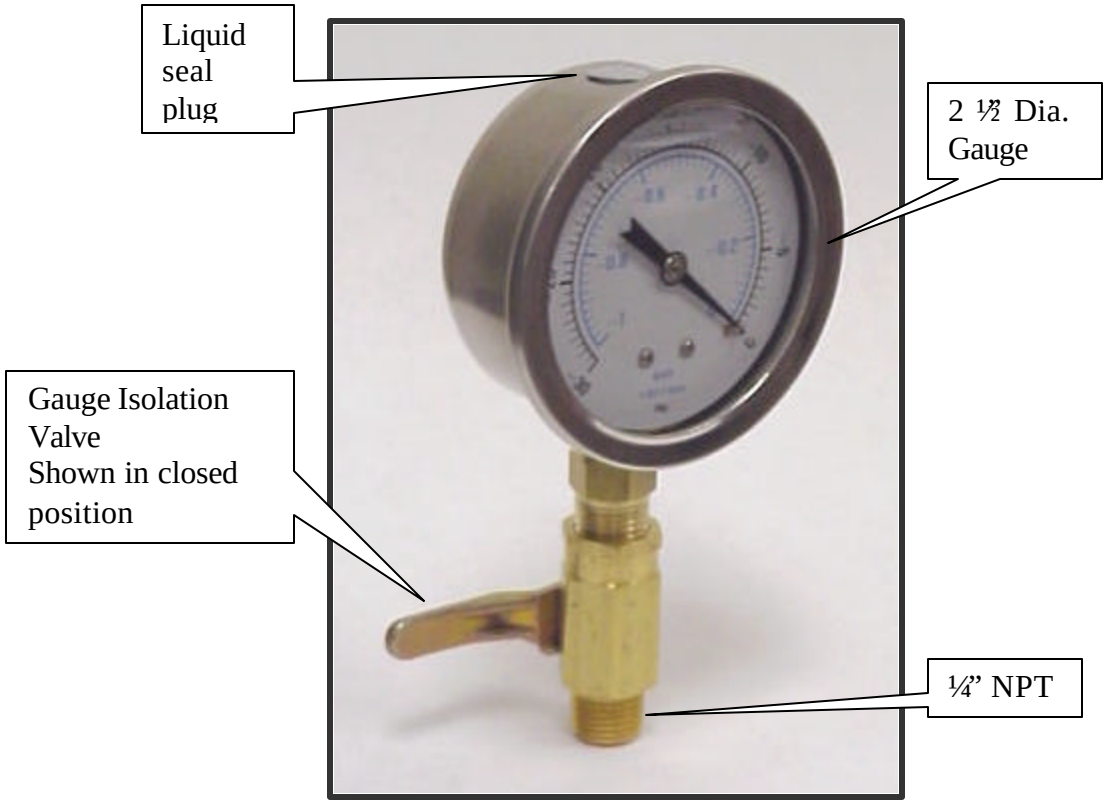
J. E. GASHO & ASSOCIATES, INC.

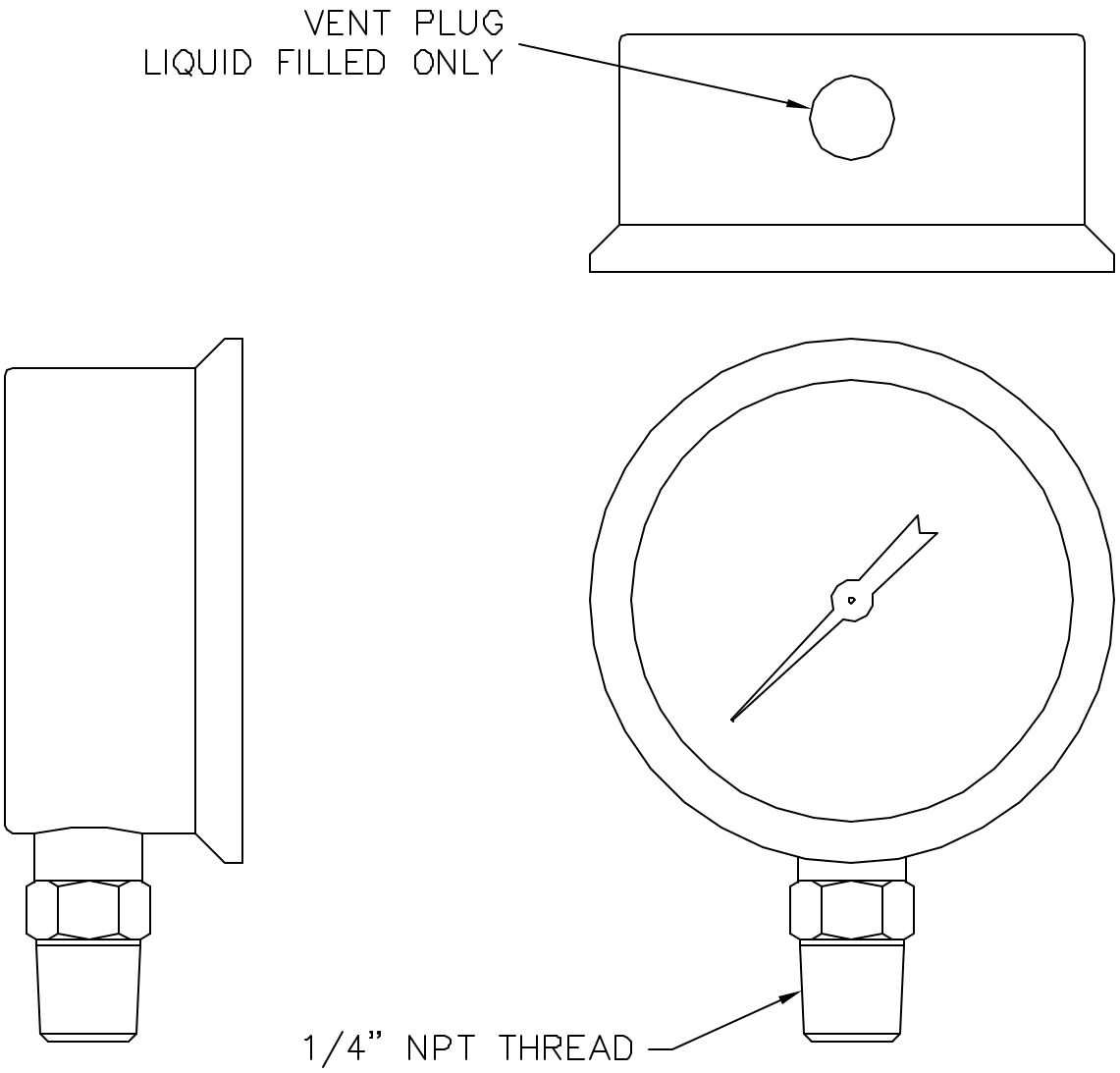
Authorized Manufacturer's Representative
Air / Gas Moving Equipment
460 W. GAY STREET
WEST CHESTER, PA 19380
PHONE: 610-692-5650 FAX: 610-692-5837

Pressure and Vacuum Gauges

We use both standard gauges and liquid filled gauges from a variety of manufacturers. Gauges are installed on our packages with gauge isolation valves (gauge cocks) part number BRS-VA-025-4F4M-BT. The gauge isolation valve can be used as a snubber while reading the gauge by opening it slightly. To protect gauges from damage due to shocks or pulsations in the system, gauge isolation valves should be closed except when the gauge is being read.

Liquid filled gauges may display incorrect readings due to variations in atmospheric pressure. To determine if a gauge is subject to this condition, the liquid filled cavity should be temporarily vented to atmosphere. Most liquid filled gauges have a seal plug in the liquid filled cavity. Remove this plug to allow the cavity to be vented to atmosphere. In some instances the case can be lightly squeezed to burp it. Replace the plug.





25.0.015PSI

NOMINAL SIZE
- 25 = 2.5in
- 40 = 4.0 in.

TYPE
- 0 = NON-FILLED
- 1 = LIQUID FILLED

RANGE

NOTES:
1. WE USE BOTH STANDARD GAUGES & LIQUID FILLED GAUGES FROM A VARIETY OF MANUFACTURERS
2. STANDARD RANGES:
   - PRESSURE: 0-6 PSI & 0-160 IWC
     0-15 PSI
     0-30 PSI
   - VACUUM: 0-12 IN. HG. & 0-160 IWC
     0-30 IN., HG.

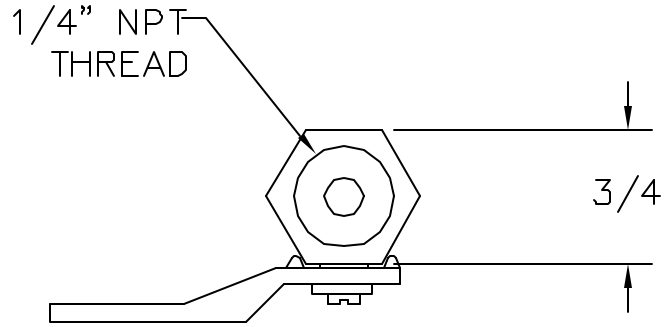
REV.	DATE	DESCRIPTION

DRAWN BY: M. WITTE	DATE 8-18-00
APPROVED BY:	DATE
DIMENSIONS IN INCHES	
SCALE	
TOLERANCE	ANGULAR TOLERANCE
MATERIAL	WEIGHT
SHEET 1 OF 1	

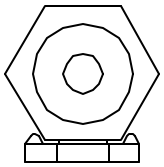
J. E. GASHO & Assoc., Inc.
460 W. GAY ST.
WEST CHESTER, PENNSYLVANIA 19380

PRESSURE GAUGE NUMBERING SYSTEM

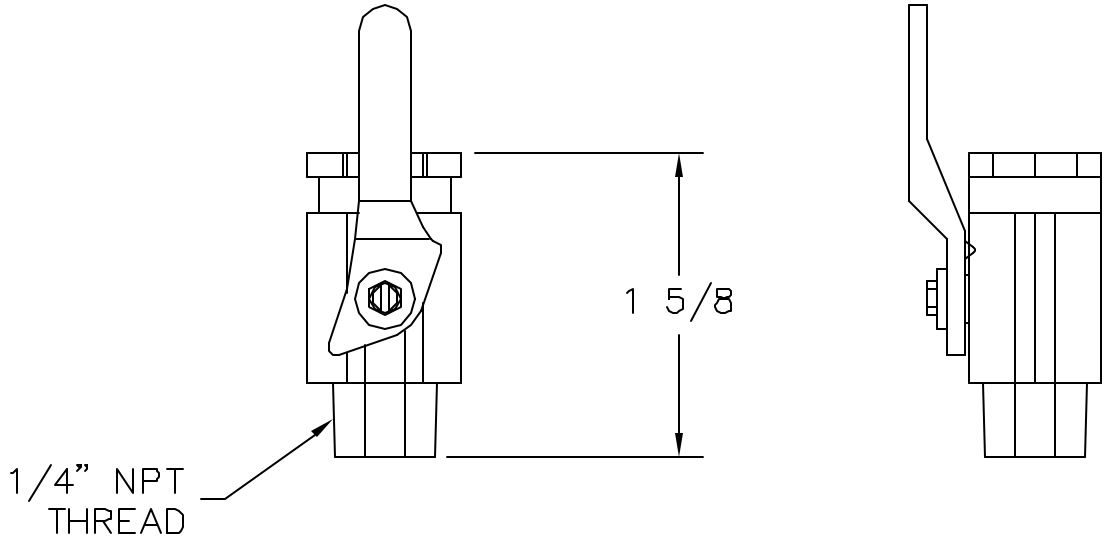
—



PLAN VIEW – CLOSED



PLAN VIEW – OPEN



			DRAWN BY: M. WITTE	DATE 8–17–00	J. E. GASHO & Assoc., Inc. 460 W. GAY ST. WEST CHESTER, PENNSYLVANIA 19380
			APPROVED BY:	DATE	
			DIMENSIONS IN INCHES		GAUGE ISOLATION VALVE SMC VA BRS 025–4F4M–BT
			SCALE		
			TOLERANCE	ANGULAR TOLERANCE	
			MATERIAL	WEIGHT	
REV.	DATE	DESCRIPTION	SHEET 1 OF 1		—

Maximum Operating Pressure - 500 psi
Maximum Operating Temperature - 180 Degrees F
Ball Through Hole Diameter - .218

025 SERIES BALL VALVE

025 One-Way Ball Valve Design Considerations

The 025 Series One-Way Ball Valve compact design promotes multiple configurations to fit the exact end use application. The 025 Ball Valve Series is rated to 500 psi and will support flow and pressure only in the flow direction. The 025 Series has a one-piece body construction, stamped with directional flow arrows, to cover 1/4" NPT end configuration applications. The Zinc Die Cast Lever Handle is standard. Handles can be ordered Reversed - to lie over the outlet when the valve is in the open position. UL configurations are available and rated to 250 psi. UR configurations are available and rated to 500 psi.

Example:	Inlet End	Outlet End	Seal	Handle	Plating
	1/4 FNPT	1/4 MNPT	Buna-N	Steel	ENP

SMC Part Number: 025-4F4M-B,SH,ENP

The handle will lie over the Inlet port when the valve is in the open position. SMC Part Numbers are a description of the valve as read left to right, Inlet to Outlet.
Example: 025-4F4M-B,SH,ENP = 1/4 FNPT Inlet x 1/4 MNPT Outlet

025 Series Options

Material Options Brass Body, Nickel Plated Brass Ball, Teflon® Seats, Stainless Handle Screw

Seal Options Buna-N, Ethylene Propylene, Fluoroelastomer (Viton®), Neoprene

Body Options

- 1/4 Female x 1/4 Female NPT
- 1/4 Female x 1/4 Male NPT
- 1/4 Female x 1/8 Female NPT
- 1/4 Female x 1/8 Male NPT
- 1/4 Female x 1/4 Hose Barb
- 1/4 Female x 11/16-16 Male
- 1/4 Female x 7/16-24 Female
- 1/4 Female x 1/4 Female Flare
- 1/4 Female x 3/8 Compression

Handle Options Zinc Die Cast Lever (Standard), Zinc Die Cast Lever with Red Vinyl Sleeve, Steel Lever, Steel Lever, Round Handle, Steel Lever, Steel Lever with Red Vinyl Sleeve, Round Zinc Die Cast Handle, Black Nylon T-Handle, Blue Nylon Knob, .312 x 1" Stem, Screw Slot Headed Ball

Plating Options Electroless Nickel, Black Zinc

SMC will quote alternate materials or customize our standard products when quantities ensure competitive pricing.
Contact Customer Service at (651) 653-0599, FAX - (651) 653-0989, E-Mail - info@specialtymfg.com

Models: 87, 88

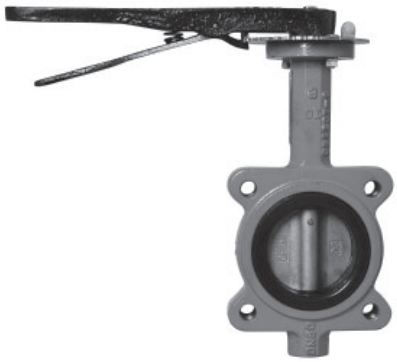
Ductile Iron Wafer and Full Lug Butterfly Valves Sizes: 2" – 24" (25 – 60mm)

Pressure/Temperature–Non-Shock			
Model	Size	Material	Rating
87	2"-12"	Ductile Iron	200psi @ 100° F
87	14"-24"	Ductile Iron	150psi @ 100° F
87	2"-12"	Ductile Iron	200psi @ 100° F
87	14"-24"	Ductile Iron	150psi @ 100° F

Max. temp. can be limited by seat material. Consult Factory.

Not Recommended for Steam Service.

Model 87M (Wafer)



Model 88M (Lug)

Typical Service

These soft-seated butterfly valves are designed for a variety of general applications in the control of water, air, oil, gases, and corrosive media. They are equally effective for on-off, throttling, or isolation service requirements. Lug style valves are designed for dead-end service to the full pressure rating of the valve. Models 87 and 88 butterfly valves are especially well suited for higher velocity service and vacuum service.

Features

- Phenolic backed (2" – 14"), aluminum backed (16" – 24"),
- non-collapsible, resilient elastomer seat. Available in EPDM or Buna-N.
- ISO 5211 mount is standard. Double D shaft is standard 2" – 10" while keyway design is supplied 12" – 24"
- Stem is a one-piece design for maximum strength and is retained in valve body for blowout proof operation. 416SS stem is standard with aluminum bronze or ductile iron discs. 316SS is standard for 316SS discs (2" – 12") and 431SS is standard for 316SS discs (14" – 24")
- Stem bushings provide shaft support for proper stem alignment and minimize stem deflection. Duralon bushings are standard material in 2" – 12" sizes. Bronze bushings are standard in 14" – 24" sizes.
- Stem seals prevent external contamination of stem area and provide backup for the primary shaft seal formed by the disc/seat interface.
- ASTM-A563 ductile iron body available in full lug (Model 88) or wafer (Model 87) designed for use between ANSI 125 and 150 flanges. Face-to-face dimension comply with API 609 and MSS-SP-67.
- Available in standard 10-position locking handle or optional infinite positioning locking handle. Also gear operators are available 2" – 24". Contact the factory for electric or pneumatic actuation.

Performance Guidelines

Guidelines for throttling service:

Liquids – Line velocity should not exceed 20ft./sec.

Gases – Line velocity should not exceed 15,000 ft./sec.

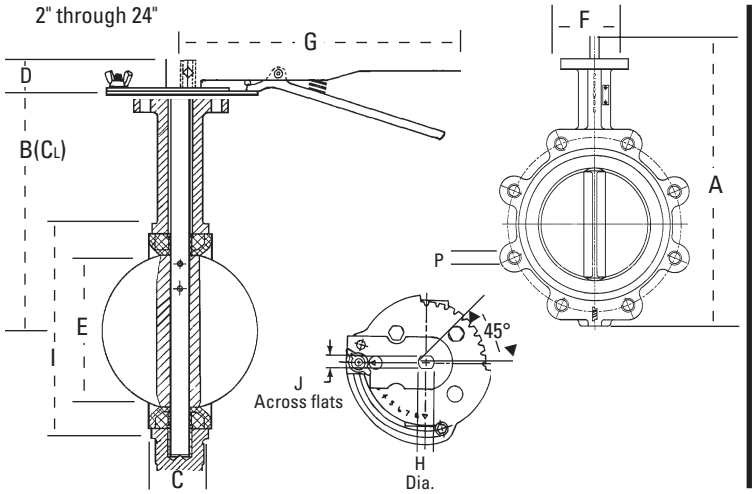
Materials

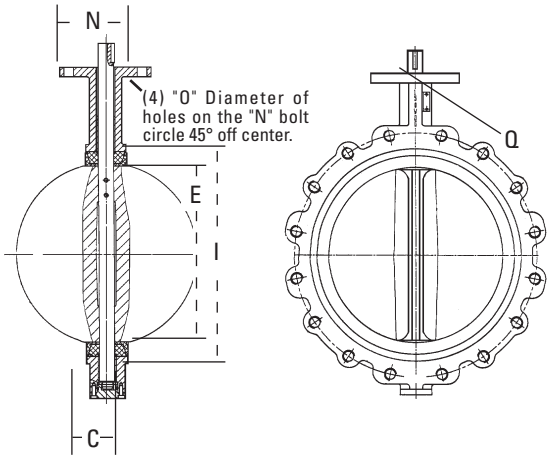
	MODEL 87, MODEL 88
Body	Ductile Iron
Stem	416SS, 316SS, 431SS
Disc	Ductile Iron, Aluminum Bronze, 316SS
Seat	EPDM - 5°F to 248°F (-15°C to +120°C)
	Buna-N - 14°F to 176°F (-10°C to +80°C)

Note: Do not use EPDM when hydrocarbons are present

Dimensions and Weights

2" through 24"





Size	A in.	A mm	B in.	B mm	C in.	C mm	D in.	D mm	E in.	E mm	F in.	F mm	G in.	G mm	H in.	H mm	I in.	I mm	J in.	J mm
2"	10¾	273	6⅜	161	1⅝	42	1¼	32	2½	54	3 1/16	77	10½	267	½	13	3¾	95	⅜	9
2½"	11⅝	295	6⅞	175	1¾	45	1¼	32	2½	64	3 1/16	77	10½	267	½	13	4¼	108	⅜	9
3"	12⅛	308	7⅛	181	1¾	45	1¼	32	3⅛	79	3 1/16	77	10½	267	½	13	4¾	120	⅜	9
4"	13⅝	346	7⅞	200	2	52	1¼	32	4⅛	105	3⅝	92	10½	267	⅝	16	6 1/16	154	7/16	11
5"	14⅝	372	8⅜	213	2 3/16	56	1¼	32	4⅞	124	3⅝	92	10½	267	¾	19	7⅛	181	½	13
6"	15⅝	397	8⅞	226	2 3/16	56	1¼	32	6⅛	156	3⅝	92	10½	267	¾	19	8 3/16	208	½	13
8"	18⅞	479	10¼	260	2⅜	60	1¾	45	8	202	5	125	14	356	⅞	22	10¼	260	⅝	16
10"	21¼	540	11½	292	2⅝	66	1¾	45	9⅛	251	5	125	14	356	1⅛	29	12⅝	320	13/16	21
12"	24⅝	626	13¼	337	3	76	1¾	45	11⅞	301	6	150	14	356	1¼	32	14¾	375	–	–
14"	26¾	679	14½	368	3	76	1¾	45	13⅛	333	6	150	–	–	1¼	32	15 15/16	405	–	–
16"	30	762	15¾	400	3⅜	87	2	50	15⅜	391	6⅞	175	–	–	1 5/16	33	18½	470	–	–
18"	31½	800	16⅝	422	4⅛	105	2	50	17⅜	442	6⅞	175	–	–	1½	38	20 1/16	525	–	–
20"	35 5/16	897	18⅞	480	5⅛	130	2⅛	53	19⅜	493	8¼	210	–	–	1⅝	41	22¼	565	–	–
24"	42⅛	1088	22⅛	562	6	152	2¼	58	23⅜	594	8¼	210	–	–	2	50	27 5/16	693	–	–

Size	TOP PLATE DRILLING N in.	N mm	O in.	O mm	TAPPED LUG DATA BOLT CIRCLE in.	BOLT CIRCLE mm	NO. Holes	BOLT P	KEY WAY Q in.	Q mm	WEIGHT (LBS.)† 88	87
2"	2	50	¼	7	4¾	121	4	5/8"-11UNC x 1⅝"	–	–	8	6
2½"	2	50	¼	7	5½	140	4	5/8"-11UNC x 1¾"	–	–	10	7
3"	2	50	¼	7	6	150	4	5/8"-11UNC x 1¾"	–	–	10	7
4"	2¾	70	⅜	10	7½	191	8	5/8"-11UNC x 2"	–	–	17	12
5"	2¾	70	⅜	10	8½	216	8	¾"-10UNC x 2 3/16"	–	–	25	16
6"	2¾	70	⅜	10	9½	241	8	¾"-10UNC x 2 3/16"	–	–	27	20
8"	4	102	½	13	11¾	298	8	¾"-10UNC x 2⅜"	–	–	40	29
10"	4	102	½	13	14¼	362	12	⅞"-9UNC x 2⅝"	–	–	63	48
12"	5	125	½	13	17	432	12	⅞"-9UNC x 3"	¼ x 1¼	6 x 32	107	78
14"	5	125	½	13	18¾	476	12	1"-8UNC x 3"	¼ x 1¼	6 x 32	156	99
16"	5½	140	1/16	18	21¼	540	16	1"-8UNC x 3⅜"	5/16 x 1 13/16	8 x 46	203	140
18"	5½	140	1/16	18	22¾	578	16	1⅛"-7UNC x 4⅛"	⅜ x 1 5/16	10 x 40	269	188
20"	6½	165	⅞	22	25	635	20	1⅛"-7UNC x 5⅛"	⅜ x 1 5/16	10 x 40	392	248
24"	6½	165	⅞	22	29½	750	20	1¼"-7UNC x 6"	½ x 2⅜	13 x 60	593	450

†Weights are for valves with ductile iron or aluminum bronze discs. 2" – 12" have levers; 14" – 24" have bare shafts.
Refer to Watts F-CDBF for gear operator weights.

Size	Buna-N, EPDM (in./lbs.) NormalConditions WET/DRY
2"	134/214
2½"	190/289
3"	250/387
4"	390/644
5"	600/959
6"	907/1,542
8"	1,697/2,919
10"	2,500/4,857
12"	3,300/7,071
14"	3,500/7,305
16"	5,500/10,027
18"	8,200/13,437
20"	10,000/17,925
24"	18,680/28,020

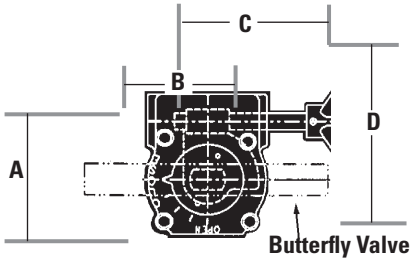
SEATING TORQUE

Size	Cv Rating (Full Open)
2"	135
2½"	220
3"	302
4"	600
5"	1,022
6"	1,579
8"	3,136
10"	5,340
12"	8,250
14"	11,917
16"	16,388
18"	21,705
20"	27,908
24"	43,116

Cv RATING

GEAR DIMENSIONS: STD. WEATHERPROOF W/ HANDWHEEL

Valve Size	A Depth	B Width	C CL to HW	D HW Dia.	E Height	F CL to MT Pad	#Turns Open - Close	Unit Weight (lbs)
2", 2½", 3"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
4"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
5", 6"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
8"	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5
10"	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5
12", 14"	7.8	6.4	9.5	12.0	3.0	2.0	12.5	33.0
16"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
18"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
20"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
24"	12.6	9.1	15.0	24.0	4.5	2.0	20.0	80.0



Butterfly Valve

Adjustable Stops (Set Screws)

Mueller Steam Specialty™

Mueller Steam Specialty product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Mueller Steam Specialty Technical Service. Mueller Steam Specialty reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Mueller Steam Specialty products previously or subsequently sold.

A Division of Watts Water Technologies, Inc.

USA: 1491 NC Hwy 20 West St. Pauls, NC 28384; www.muellersteam.com
Tel: 910-865-8241 Fax: 910-865-6220
Toll Free Phone 1-800-334-6259 Toll Free Fax: 1-800-421-6772

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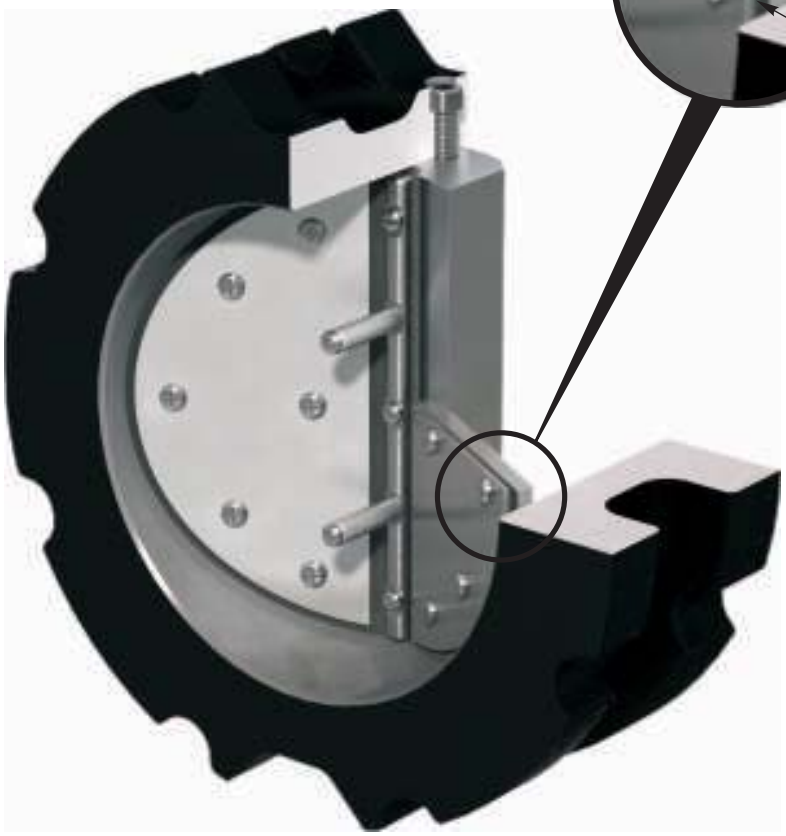
TECHNO™ Short Form Wafer Style Check Valves

TECHNO™

SHORT FORM WAFER STYLE CHECK VALVES

Technocheck Short Form (SF), Cost Efficient, Reliable, "Wafer Style" Check Valve



Non-Slam Quick Closure Feature
The Valve Plate Design offers Minimum Travel from Full Open to Full Closed Position and complete Metal-to-Metal Valve Plate Structural Support.

Unique Flexible Elastomer Seal
Continuous Elastomer Seal provides Final Closure around complete valve bore with the strength and durability to ensure prolonged cycle life.

Can Be Mounted In Any Position for the most efficient piping layout.

Unrestricted Full Port Seatless Design provides Free-Flow through Design with virtually no pressure loss.

Elimination of Metal-to-Metal Rotating Parts. The stationary Hinge Post and Hinge Clamp Design eliminates wear of Hinges, Pins, Valve Seats, Springs and the need for routine maintenance.

TECHNO has been a leading supplier of high quality check valves to all phases of industry for many years. Thousands of TECHNO products are presently in service demonstrating an outstanding performance record.

Exclusive Technocheck design combined with an extensive selection of materials result in exceptionally high performance and reliability for most liquid and gaseous applications.

The Short Form (SF) Technocheck split disc wafer style check valve offers compact design along with heavy duty construction.

TECHNO's scalloped body design assures proper and easy alignment between mating gaskets and line flanges. It offers strength and eliminates the need for expensive supports, expansion joints and foundations that may be necessary with a conventional check valve.

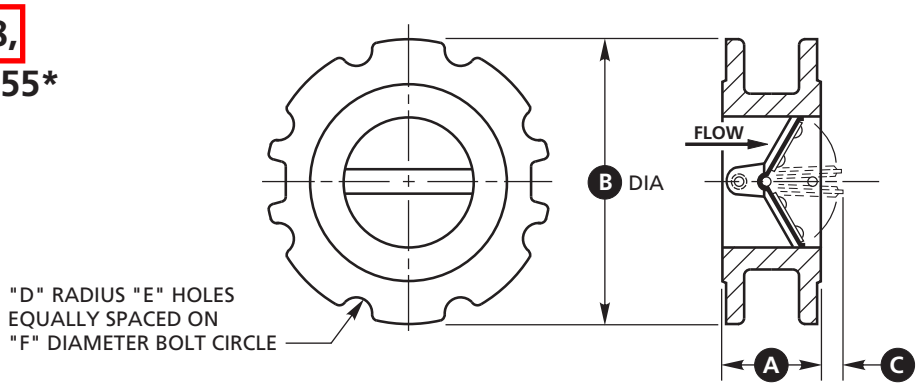
Our unique design combined with many years of experience allows us to satisfy the most difficult applications.

Specials available upon request.

CERTIFICATIONS		

TECHNO SHORT FORM WAFER STYLE CHECK VALVES

STYLES 5412, 5118, 5831-F, 5831-R, 5355* AND 5355-316



GENERAL DIMENSIONS FOR STYLES 5412, 5118, 5831-F, 5831-R, 5355* AND 5355-316

VALVE SIZE in.	A	B	C	D	E	F
2	1 3/8	4 3/4	1/2	3/8	4	4 3/4
2 1/2	1 5/8	5 1/2	9/16	3/8	4	5 1/2
3	1 7/8	6	11/16	3/8	4	6
4	2 3/8	7 1/2	7/8	3/8	8	7 1/2
5	2 7/8	8 1/2	1 1/8	7/16	8	8 1/2
6	3 3/8	9 1/2	1 1/2	7/16	8	9 1/2
8	4 3/8	11 3/4	2 1/4	7/16	8	11 3/4
10	5 3/8	14 1/4	2 1/2	1/2	12	14 1/4
12	6 3/8	17	3	1/2	12	17
14	7 3/8	18 3/4	3 1/4	9/16	12	18 3/4
16	8 3/8	21 1/4	3 3/4	9/16	16	21 1/4
18	9 3/8	22 3/4	4 1/4	5/8	16	22 3/4
20	10 3/8	25	4 3/4	5/8	20	25
24	12 3/8	29 1/2	5 3/4	11/16	20	29 1/2
30	15 3/8	36	7 3/4	11/16	28	36
36	18 3/8	42 3/4	8 1/2	13/16	32	42 3/4
42	21 3/8	49 1/2	9 1/2	13/16	36	49 1/2
48	24 3/8	56	11 1/2	13/16	44	56
54	27 3/8	62 3/4	13	15/16	44	62 3/4
60	30 3/8	69 1/4	14	15/16	52	69 1/4
66	33 3/8	76	15	15/16	52	76
72	36 3/8	82 1/2	16 1/2	15/16	60	82 1/2

*For sizes 2 inch - 8 inch see style 5296 on page 4.

STANDARD MODELS AND MATERIALS

STYLE	BODY	INTERNALS	FLANGE CLASS	CWP psi
5412	Aluminum	Aluminum	125 (FF)	125
5118	Cast Iron	Aluminum	125 (FF)	125
5831-F	Bronze	Brass	125 (FF)	150
5831-R	Bronze	Brass	150 (RF)	150
5355*	Steel	Plated Steel	150 (RF)	150
5355-316	316 Stainless Steel	316 Stainless Steel	150 (RF)	150
Standard Elastomer: Buna-N			(FF) = Flat Face, (RF) = Raised Face	

OPTIONAL MATERIAL SELECTION

Internal Materials

- Aluminum
- Brass
- 316 Stainless Steel
- Plated Steel

SEALING MEMBER MATERIALS

Material	Temperature Range*
• Buna-N	-60°F to 225°F
• Neoprene	-40°F to 225°F
• EPDM	-40°F to 300°F
• Viton	-20°F to 400°F
• Silicone	-100°F to 500°F

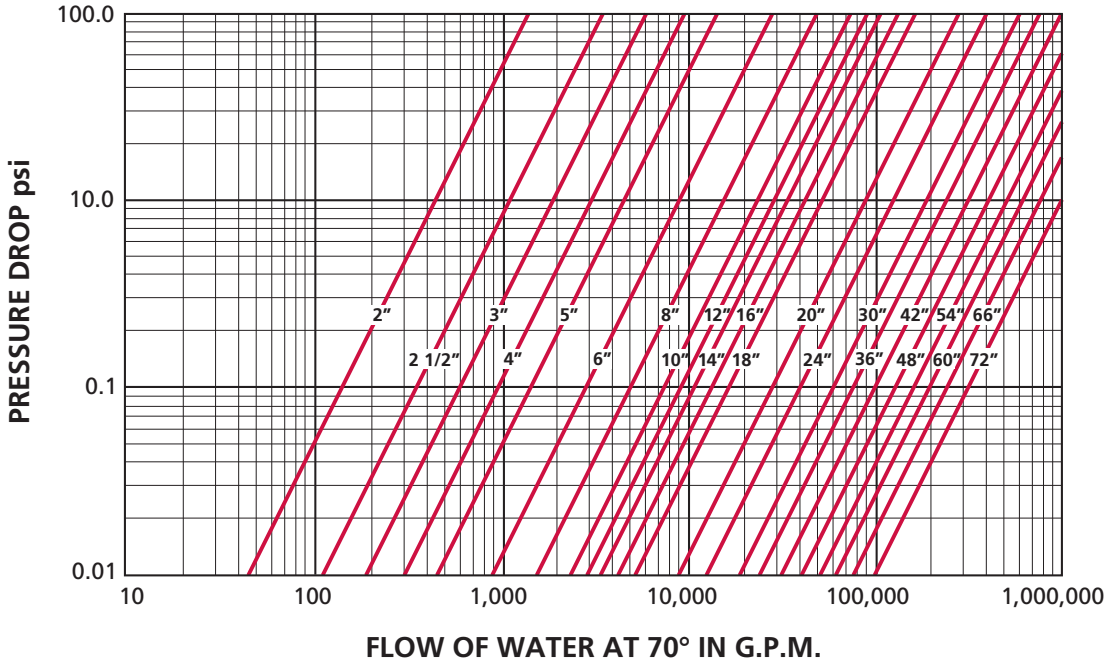
* This temperature range is for general guidance. The figures may vary with application.

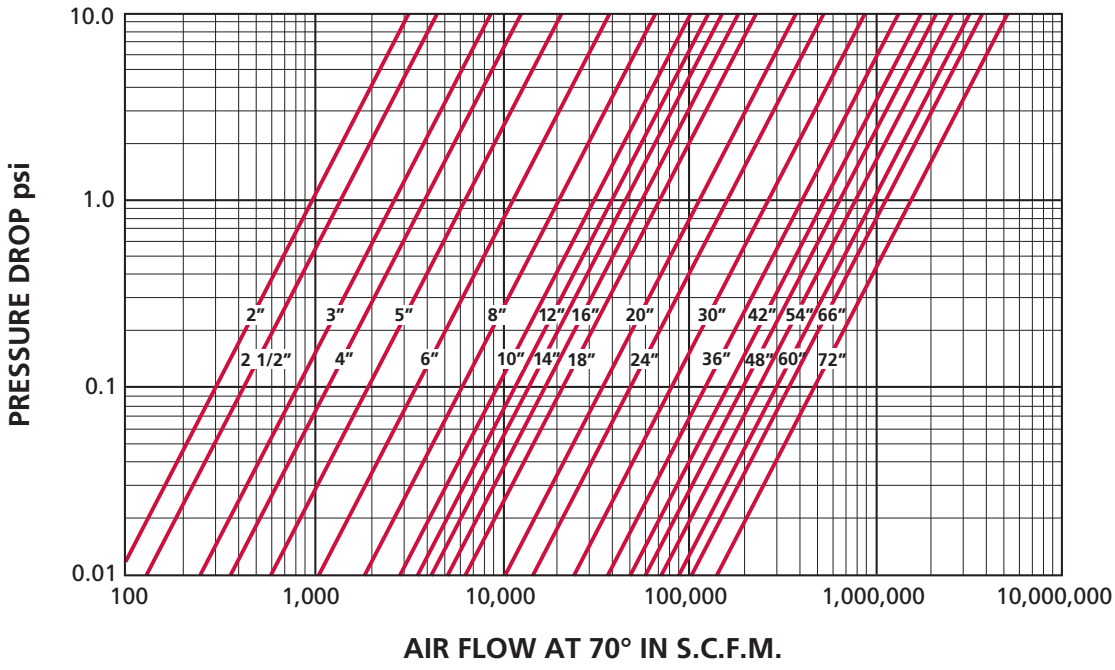
SPRING MATERIAL

- 302 Stainless Steel

TECHNO FULL FLANGED CHECK VALVES

PRESSURE DROP CHARTS FOR WATER AND AIR SERVICE





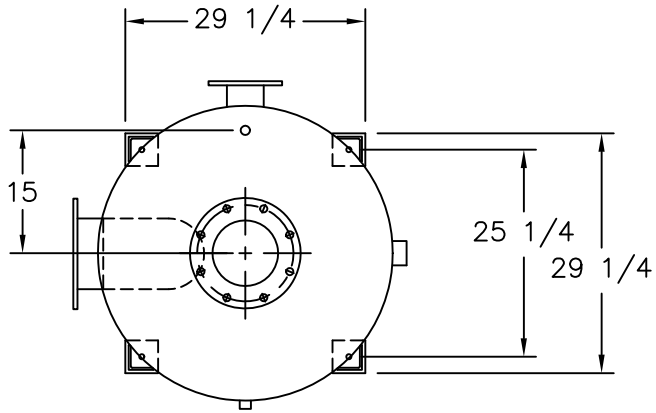
TRADEMARK INFORMATION

Gasho, Inc.

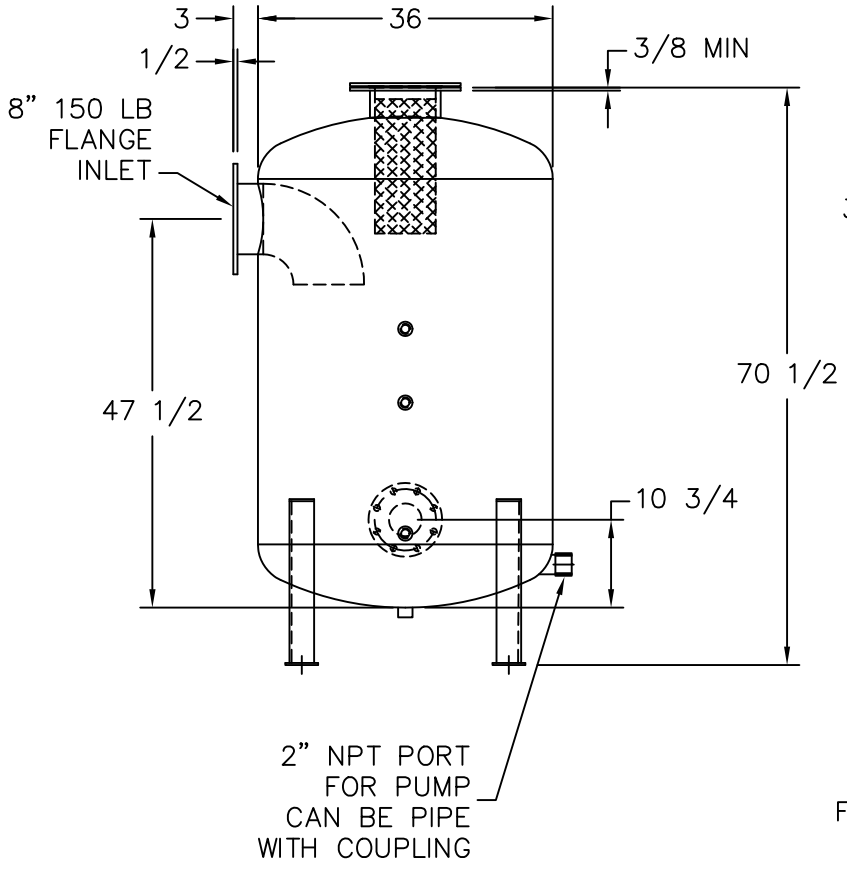
Moisture Separator

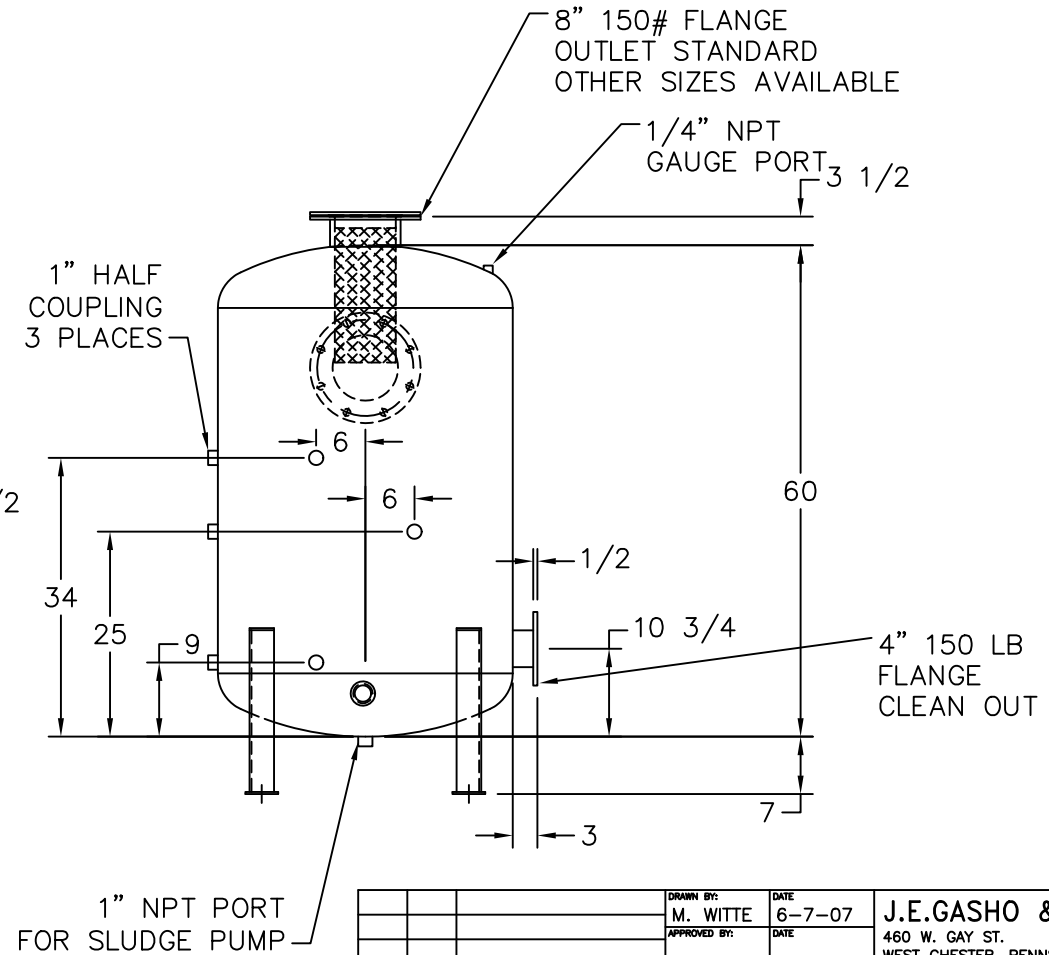
Description	Date	Revision

Item	Qty.	Supplier	Description	Part Number	Misc ID	Weight
10	1	Gasho	Moisture Separator	GX-200		275
10.1	1	Gasho	Basket			12
10.2	1	Gasho	Cover Plate	1500-C-0507-4	4" Female	14
10.3	1	Jaeger	Tri-packs®			1
10.4	1	Cooney	4" Clean out cap			2
11	1	Oil Rite	Sight Gauge	B1559-1-12		1
11.1	2	Oil Rite	Adapters			1
12	1	Grainger	Manual Sludge Pump	400H		2
13	1	Dwyer Instruments	Liquid Level Switch	L6-EPB-B-3-S-0		3
14	1	Apollo	Drain Valve	64-104-01		1
15	1	Universal	8" Inline Filter	ILFV-8		90
16	1	Gasho	Base Weldment			
					Weight	402



NOTES:
1. FINISH: GASHO GREEN ENAMEL
2. ALL PORTS ARE FEMALE UNLESS NOTED.
3. VOLUME= 4.4 GAL PER INCH HEIGHT.





REV.	DATE	DESCRIPTION

DRAWN BY: M. WITTE — DATE: 6-7-07
APPROVED BY: — DATE:
DIMENSIONS IN INCHES
SCALE:
TOLERANCE: — ANGULAR TOLERANCE:
MATERIAL: STEEL — WEIGHT: 275 LB
SHEET 1 OF

J.E.GASHO & Assoc., Inc.
460 W. GAY ST.
WEST CHESTER, PENNSYLVANIA 19380

MOISTURE SEPARATOR
200 GALLON
120 GALLON LIQUID

1500-C-0946

GX200 Customer.dwg 01/29/10 12:17

Gasho
SINCE 1982
The Leader in Blower & Vacuum Solutions

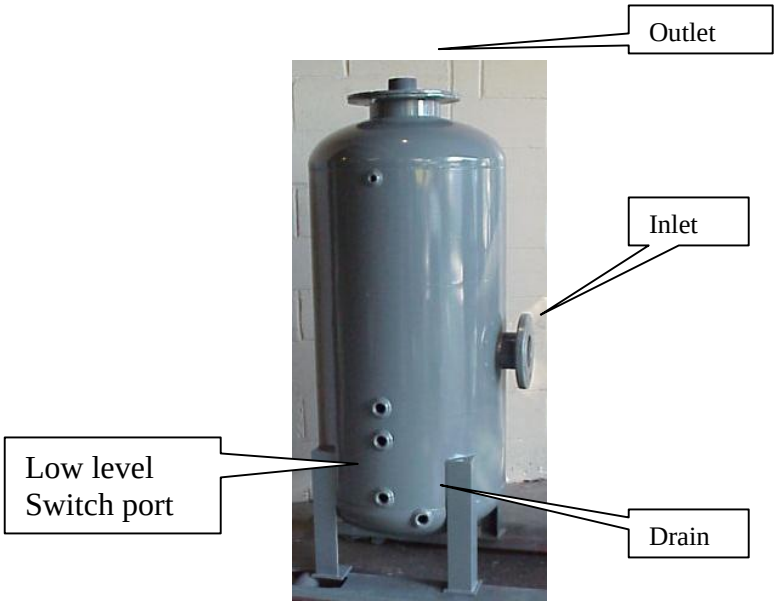
Moisture Separators

Moisture separators are used to remove water and other liquids from air streams. They are typically used on the inlet of vacuum systems to remove water and other contaminants before they enter the vacuum pump. The air volume of the moisture separator reduces the velocity of the air stream to allow liquids to precipitate. Up to 95% water removal is possible. The models GX-30 & GX-60 are rated for 29.9 in. Hg. vacuum. Other moisture separators are rated to 18 in. Hg. higher vacuum ratings available.

Standard accessories include a sight gauge, drain valve, and a hand operated sludge pump. Inside the top of the separator is a basket with “tri-packs®” demister material to promote condensation of vapors.

Options include: 1 to 3 level switches, automatic pump down systems, heat tracing, vacuum gauges, and thermometers.

Model Number	Nominal Flow Rate	Liquid Capacity	Diameter (inches)	Height (inches)	Inlet Size	Discharge Size	Cleanout Size	Weight
GX-30	250	8	16	47	3"	3"	4"	100
GX-60	500	22	20	57	4"	4"	4"	150
GX-90	1200	30	24	57	6" Flange	6" Flange	4"	240
GX-120	2000	40	24	70	8" Flange	8" Flange	4"	260
GX-200	2000	95	30	85	8" Flange	8" Flange	4"	350



Gasho SINCE 1982 The Leader in Blower & Vacuum Solutions

J. E. Gasho and Associates, Inc.
460 West Gay Street, West Chester, PA 19380
ph 610.692.5650 fax 610.692.5837

Moisture Separator
Operating and Maintenance Instructions

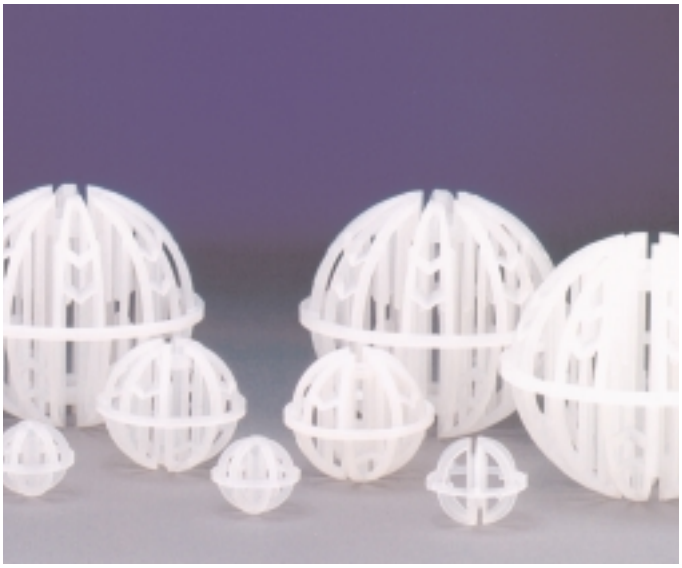
Operation:

The moisture separator is a static vessel with no moving parts. It removes moisture by reducing the flow rate of incoming air and allowing the entrained moisture to coalesce and precipitate.

Maintenance:

The moisture separator has been designed to require minimal maintenance.
During normal operation a layer of sludge may build up on the bottom of the separator. Open isolating ball valve to drain the sludge. If the unit is furnished with a sludge pump, operate pump until the sludge is removed and only liquid is being removed.
The moisture separator is provided with a clean out port that can be removed and the inside cleaned with water.
Check sight gauge, clean if needed.
Demister material is included in the throat of the moisture separator. It can be inspected and washed through the top opening of the moisture separator.

If there are accessories attached to the moisture separator follow the operating and maintenance instructions for those items



Jaeger Tri-Packs®

TABLE OF CONTENTS

Features & Benefits	1
Physical Properties Jaeger Tri-Packs®	2
Optimizing Your Design	3
Performance Comparisons	4-8
Pressure Drop Curves	9-12
Flooding Curves	13
Liquid Holdups	14
Jaeger Tri-Packs® vs AIRSTRIP®	15-16
HTU FOR CO_2 Desorption	17
Absorption/Scrubbing Data	18
Scaling, Fouling and Disinfection	19-20
Conversion Factors	21
Other Jaeger Packings	22

Features

- Jaeger Tri-Packs® are hollow, spherical packings made of injection molded plastic, available in four diameters: 1”, 1 ¼”, 2”, and 3 ½”.
- Symmetrical geometry made from a unique network of ribs, struts, and drip rods.
- High active surface areas.
- Extremely low pressure drops.
- Extremely high operating capacities.

Benefits

- High mass and heat transfer rates.
- Excellent gas and liquid dispersion characteristics.
- Resist nesting, making removal easy.
- Installs to packed position - no settling.
- Available in a wide variety of plastics.
- Predictable performance.

Jaeger Tri-Packs®-PP are NSF Certified to ANSI/NSF Standard 61 when made in polypropylene.

Specifications & Physical Properties

Materials.

Twelve standard, injection moldable plastics are available:

- Polypropylene (PP)
- Polyethylene (PE)
- Polypropylene Glass-Filled (PPG)
- Noryl® (PPO)
- Polyvinylchloride (PVC)
- Corzan™ (CPVC)
- TopEx® (LCP)
- Kynar® (PVDF)
- Halar® (ECTFE)
- Teflon® (PFA)
- Tefzel® (ETFE)
- Tefzel® Glass-Filled (ETFE-G)

Other plastics are available on request.

IMPORTANT NOTE:
Design data presented in this bulletin are for preliminary calculations only. Contact Jaeger before finalizing calculations.

JAEGER TRI-PACKS® is a Registered Trademark of JAEGER PRODUCTS, INC.

Properties Table

Size (in.)	1	1 1/4	2	3 1/2
Geometric Surface Area (ft^2/ft^3)	85	70	48	38
Packing Factor (1/ft)	28	25	16	12
Void Space (%)	90	92	93.5	95
Bulk Density (lb/ft^3) (PP)	6.2	5.6	4.2	3.3

Maximum Operating Temperatures for Plastic Jaeger Tri-Packs®

Jaeger Tri-Packs® are available in a variety of injection-molded plastics for different applications. The maximum operating temperatures for these different resins vary from material to material and are also affected by specific process variables. The data presented below correspond to maximum continuous operating temperatures at atmospheric pressure and systems that are essentially air and water. The presence of solvents, acids, free radicals, and oxidants needs to be considered. Furthermore, these temperatures correspond to the maximum recommended bed depth for each packing size and material. These maximum bed depths are different depending on the application. Consult with Jaeger in respect to the maximum bed depth for your particular application.

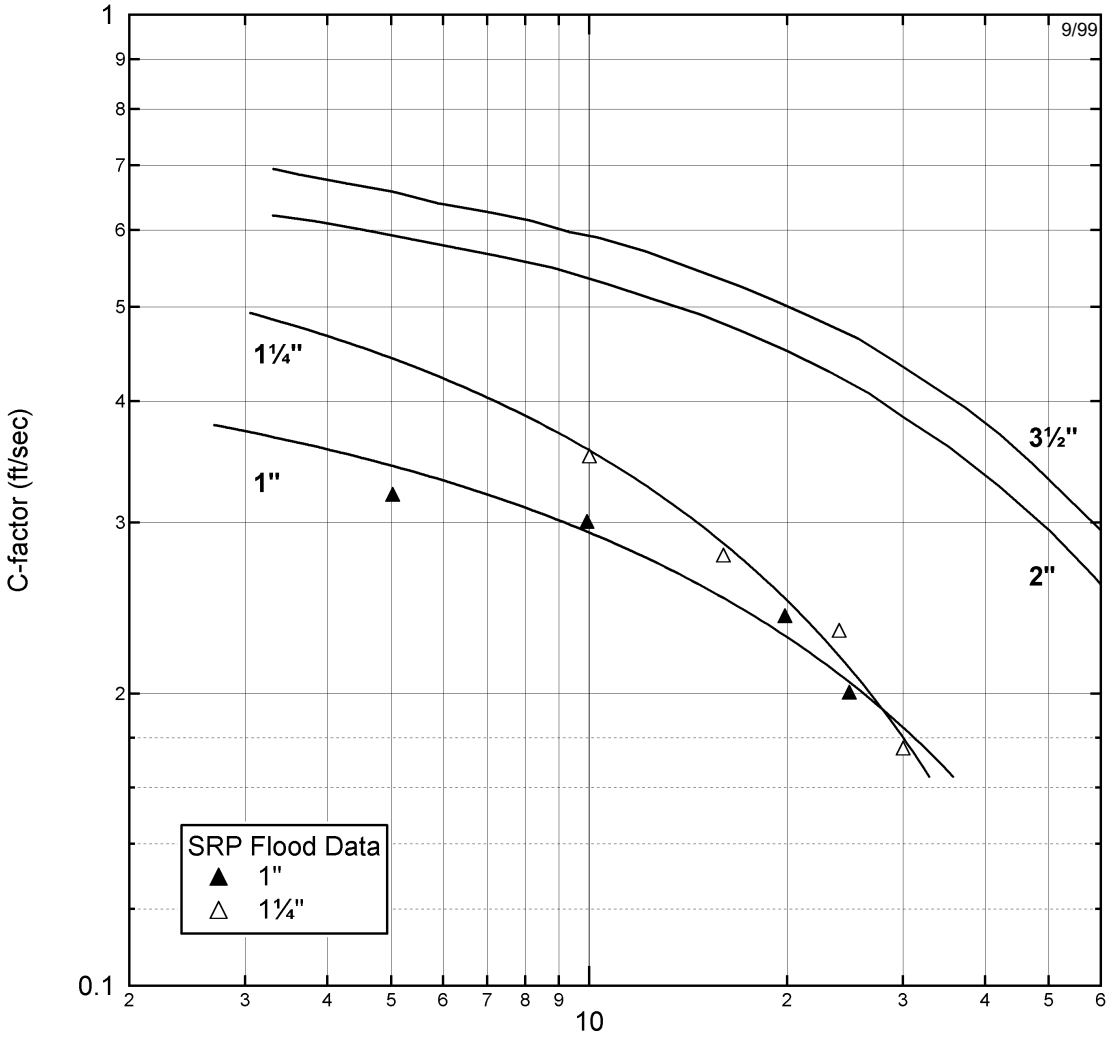
Material	Maximum Temperature (Deg. F) (1 atm, air/water, at max. recommended depth)	Bulk Density Factor
Polyvinyl Chloride (PVC)	140	1.50
Polyethylene (PE)	160	1.02
Polypropylene (PP)	180	1.00
Corzan™ (CPVC)	230	1.74
Chlorinated Polyvinyl Chloride (CPVC)	210	1.74
Polypropylene - Glass-Filled (10-30%) (PP-G)	210-230*	1.17-1.38*
Noryl® (PPO)	230	1.24
Kynar® (PVDF)	280	1.98
Halar® (ECTFE)	290	1.86
Tefzel® (ETFE)	350	1.93
Teflon® (PFA)	400	2.45
Tefzel® - Glass Filled (25% Glass) (ETFE-G)	410	2.2

*Depending on glass content.

Generalized Flooding Curves

Plastic Jaeger Tri-Packs®

Ambient Air-Water Systems at 1 atm, 70°F



C-Factor = $V_s[(\rho_V)/(\rho_L - \rho_V)]^{1/2}$ where
V_s = Superficial Vapor Velocity in ft/sec
ρ_L and ρ_V = Density of Liquid and Vapor in lb/ft³

For Air/Water systems at 70°F & 1 atm: C-Factor x 7776.2 = lb/hr-ft²; gpm/ft² x 499.7 = lb/hr-ft²

SRP - Separations Research Program, University of Texas at Austin.

JAEGER
1611 Peachleaf St., Houston, Texas 77039 800-678-0345 Phone: 281-449-9500 Fax: 281-449-9400 www.jaeger.com

Conversion Factors

FROM	TO	MULTIPLY BY	ADD OFFSET
mg/ml	ppm_W	1.0	
1/ft	1/m	3.2808	
atm	psia	14.696	
atm	psig	14.696	-14.696
atm	torr	760	
C	F	1.8	32
C	K	1	273.15
C-factor (air/water @70°F) ft/se	lb/hr ft^2	7776.2	
F	K	.5556	255.3722
ft	cm	30.48	
ft	m	.3048	
ft^2/ft^3	m^2/m^3	3.2808	
ft^3	gal (US)	7.4805	
ft^3	m^3	.0283	
g/cm^3	lb/ft^3	62.428	
gm/cm^3	kg/m^3	1000	
gpm/ft^2	lb/hr ft^2 (water @ 70°F)	499.7	
hr	sec	3600	
in	m	.0254	
in wc/ft	$dyne/cm^3$	81.5617	
in wc/ft	Pa/m	815.6168	
kg	gm	1000	
kg	lb	2.2046	
kg/m^2*sec	lb/ft^2*hr	737.3402	
kg/sec	lb/hr	7936.6829	
kg mole/m^2*sec	lbmole/ft^2*hr	737.3402	
kW	hp	1.341	
lb	gm	453.59	
m^2	cm^2	10000	
m^2	ft^2	10.7639	
m^2/m^3	cm^2/cm^3	.01	
m^3	liters	1000	
mg/l	ppm_W	1.0	
Millions of Gallons/Day	gpm	694.46	
min	sec	60	
ppm_W	ppb_W	1000	

Oil-Rite Corporation
4325 Clipper Drive, P.O. Box 1207, Manitowoc, WI. 54221-1207
Telephone: (920) 682-6173 Fax: (920) 682-7699
E-Mail: sales@oilrite.com Web site: www.oilrite.com

Item # B-1559-1, Level Gages Flush Channel - Steel

larger image

Level Gages Flush Channel - Steel

Level Gages Flush Channel - Steel can be mounted flush against the outside surface of a reservoir with only a small amount of protrusion. Liquid level gages for flush mounting are used for a multitude of applications, such as on tanks, reservoirs, packaged hydraulic equipment, large steel mill pumps, hydraulic presses, and for any other application where it is desirable to indicate fluid levels. These level gages are used to determine the liquid level inside a metal reservoir by visual observation of the level in a transparent sight. The clarity and condition of the liquid can also be checked. Models with a thermometer will show the temperature of the liquid as well. Extremely sturdy and rigid, these gages come with glass sights mounted inside the steel channel shield to provide maximum protection against breakage. Visibility of the liquid level is excellent through the large sight opening. A reflector enhances the visibility of the liquid level. Liquid level markings can be added on request. Back mounting gages are used on tanks permitting access to the inside, in order to fasten the nuts on the mounting studs inserted in drilled holes in reservoirs. Front mounting gages are used on reservoirs which do NOT permit access to the inside, therefore, the tanks must have two tapped holes, 1/2 - 20 N.F., to receive the mounting studs, which are fastened from the outside.

Specifications

Style	Plain
Pressure	125 P.S.I. Max.
Temperature	225° F. Max.
Centerline Distance Between Mtg. Holes	3" to 60"
Body	Steel, Plated (Optional Material Available)
Sight	Red Line Gage Glass
Seals	Buna-N
Mounting Shanks	Steel, Plated 1/2-20 N.F.

Print Back

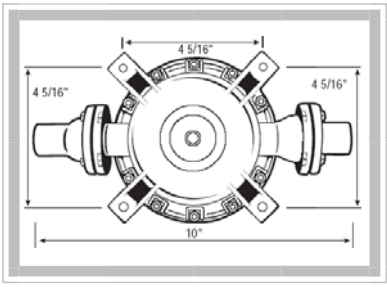
GUZZLER® 400 HAND PUMP

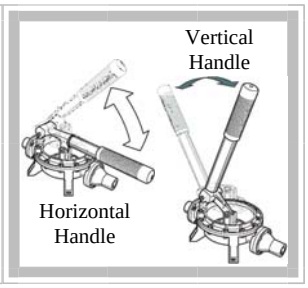
Model GH-400

Description Hand pump for use with 1/2" to 1 1/4" hose. Available with either horizontal or vertical handle.

Features

- Lightweight, economical
- Durable – tough Delrin® plastic
- Clamp ring adjusts to 12 different handle orientations
- Can be configured with either vertical or horizontal handle





Performance

	per Stroke	per Minute (@ 90 cycles/min)
Flow Rate	0.44 Qt 0.42 L	10 Gals 37.9 L
Max Pressure	20 psi	1.4 kg/cm^2
Max Head	12 ft	3.7 m
Max Lift	12 ft	3.7 m

Available Materials

Pump Body	Delrin (Gray)
Clamp Ring	Delrin, Epoxy-coated Aluminum
Diaphragm	Buna Nitrile (Buna N), Buna N Double Sided, Buna-N 3-Ply, Neoprene, Viton, EPDM, Urethane, Silicone
Valves	Buna N, Neoprene, Viton, EPDM, Silicone *(Silicone only available with umbrella valve)*

Dimensions

	Length			Width	Height	
	Body	incl. H. Handle	incl. V. Handle		incl. H. Handle Up	incl. V. Handle Up
in	10 1/4	12 3/4	12	5 1/2	12	13 5/8
cm	26.0	32.39	30.48	13.97	30.48	34.61

Mounting Holes	4		
Mounting Hole Diameter	1/4 in	0.64 cm	**Weight**
Bolt Circle Diameter	6 1/8 in	15.56 cm	1.70 lb 0.77 kg
Hole-to-Hole Distance	4 5/16 in	10.95 cm	

Inlet & Outlet Ends & Sizes

in	cm	Hose (Smooth)	N.P.T. Female (Tapped Inside)	N.P.T. Male (Threaded Outside)	Male (Threaded Outside) Garden Hose	Barbed
1/2	1.27		●			
3/4	1.91	●	●	●	●	●
1	2.54	S		●		
1 1/8	2.86	●				●
1 1/4	3.18	●				

(**S**: standard ●: optional)

Other Options

Item	Standard	Optional	
Valves	Flapper	Duckbill	Umbrella
Handle Style	Horizontal (H)	Vertical (V) (removable)	
Other		Thru Deck Mounting Kit *(only for vertical handle)*	
		Internal Spring	

Consult factory for other options.

930 Waterman Avenue East Providence, Rhode Island 02914
Ph: 888-438-1110 Fax: 401-438-2713 Web: www.thebosworthco.com

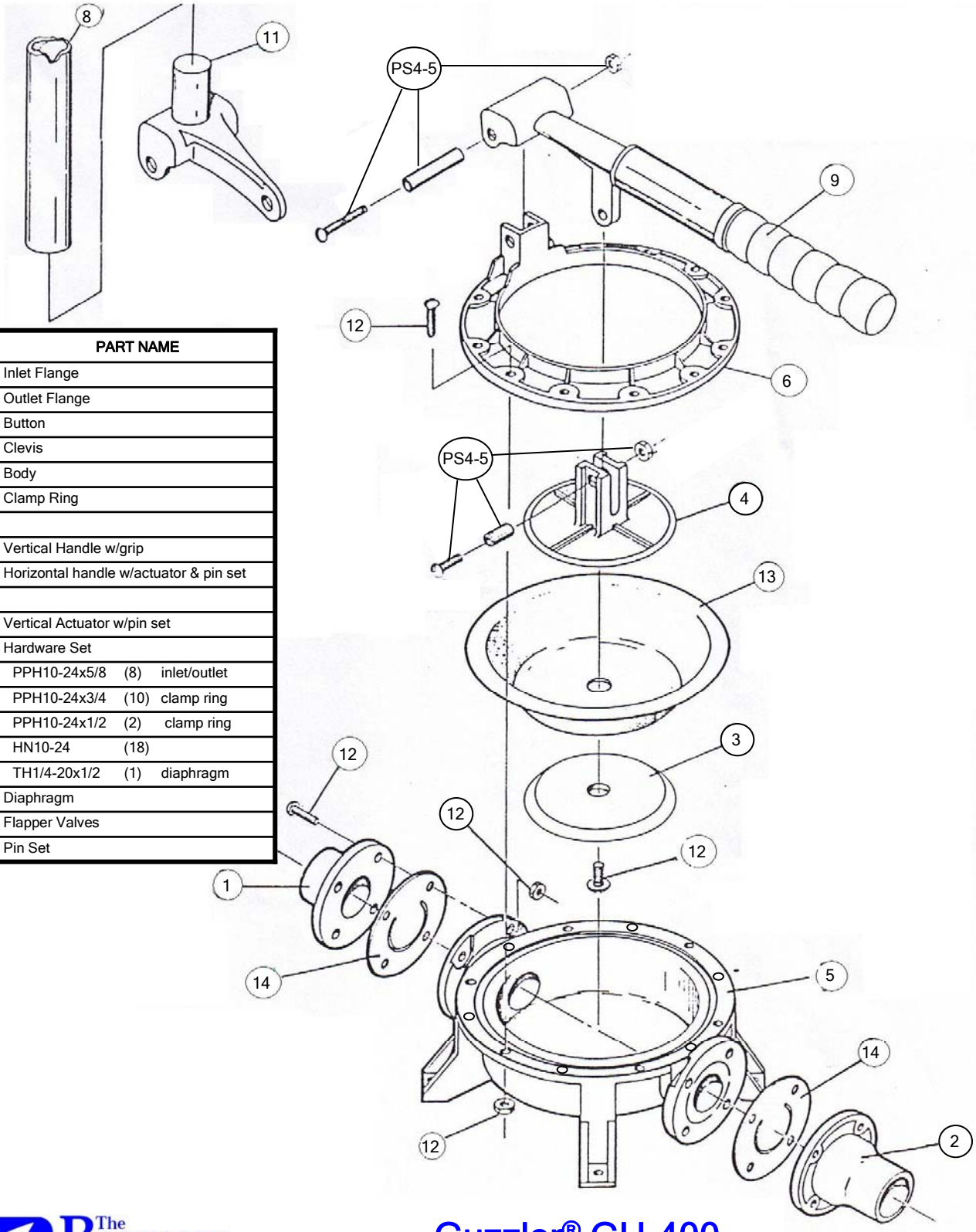
Hand-Operated Diaphragm Pumps

A little elbow grease is all these pumps need to do their job. All pumps have a Delrin housing. Intake and discharge connections are unthreaded male slip-on style. All pumps have check valves, are self-priming, and can be run dry. Not for use with solids. Maximum discharge pressure is 12 feet of head (5 psi). Maximum viscosity is 100,000 centipoise (similar to toothpaste). Temperature range is 33° to 140° F.

Common Compatible Chemicals

Deionized Water, Diesel Fuel, Glycol, Kerosene, Methanol, Mineral Spirits, Salt Water, Water

Diaphragm Material	Flow Rate, oz/stroke	For Hose ID	Overall Size, Ht. x Wd. x Dp.	
Buna-N	14.08	1"	4 1/2" x 5 1/2" x 12 3/4"	4**332K17**
Buna-N	21.44	1 1/2"	4 1/2" x 5 1/2" x 13 3/8"	4332K18
Silicone	14.08	1"	4 1/2" x 5 1/2" x 12 3/4"	4332K37



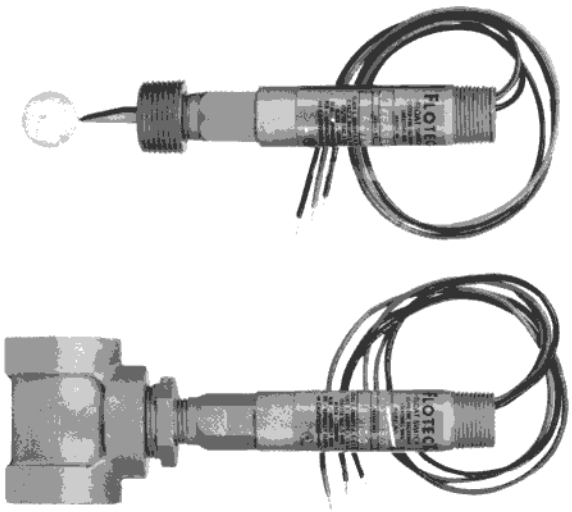
ITEM	PART NAME
1	Inlet Flange
2	Outlet Flange
3	Button
4	Clevis
5	Body
6	Clamp Ring
7	
8	Vertical Handle w/grip
9	Horizontal handle w/actuator & pin set
10	
11	Vertical Actuator w/pin set
12	Hardware Set
	PPH10-24x5/8 (8) inlet/outlet
	PPH10-24x3/4 (10) clamp ring
	PPH10-24x1/2 (2) clamp ring
	HN10-24 (18)
	TH1/4-20x1/2 (1) diaphragm
13	Diaphragm
14	Flapper Valves
PS4-5	Pin Set

Guzzler® GH-400

The Bosworth Company
930 Waterman Avenue East Providence, RI 02914
Ph: 401-438-1110 888-438-1110 Fax: 401-438-2713
www.thebosworthco.com

FLOTECT™ MODEL L-6 FLOAT SWITCH

Installation and Operating Instructions



Explosion-Proof; U.L. and C.S.A. Listed -
Class I, Groups *A, B, C & D
Class II, Groups E, F & G
CENELEC: EExd IIC T6 (T amb=75ºC)
*(Group A, stainless steel body only)

PHYSICAL DATA

Temperature Limit: 220ºF (105ºC) maximum
Maximum Pressure: See chart below
Switches: One or two SPDT snap switches
Electrical Rating: U.L.: 5A @ 125/250 VAC.
C.S.A. and CENELEC: 5A @ 125/250 VAC, 5A resistive, 3A inductive @ 30 VDC.
Optional ratings: MV option—Gold contacts for dry circuits. Rated 0.1A @ 125 VAC MT option: 400ºF (205ºC) 5A @ 125/250 VAC (not listed).
Wiring Connections: 3-18" (460mm) wire leads, 18 ga.
CENELEC models only: push-in type terminal blocks
Black = common, blue = N.O., red = N.C.
Minimum Specific Gravity:
Polypropylene float - 0.9
Round SS float - 0.7
Cylindrical SS float - 0.5
Switch Body: Brass 3/4" NPT conduit connection.
For SS switch body, change model no. to L6EPS.
Piping/Mounting Connection: 1" NPT
Installation: Horizontal, index arrow pointing down.
Weight: 1 lb. (.5 KG); w/external chamber 1-3/4 lb. (.8 KG)

WETTED MATERIALS CHART

Model	Brass	Bronze	Ceramic	Polypropylene	301SS	303SS	304SS
B-S-3-A	X		X		X		X
B-S-3-B	X	X	X	X	X		
B-S-3-C	X		X		X		X
B-S-3-H	X	X	X		X		X
B-S-3-O	X		X	X	X		
S-S-3-A			X	X	X		X
S-S-3-C			X		X	X	X
S-S-3-L			X		X	X	X
S-S-3-O			X	X	X	X	
S-S-3-S			X	X	X	X	

MAXIMUM PRESSURE CHART

Model Number	Float	Pressure Rating PSIG (KG/CM²)
L6EPB-B-S-3-A	Cylindrical SS	200 (14)
L6EPB-B-S-3-B	Polypropylene	250 (18)
L6EPB-B-S-3-C	Round SS	350 (25)
L6EPB-B-S-3-H	Round SS	250 (18)
L6EPB-B-S-3-O	Polypropylene	1000 (70)
L6EPB-S-S-3-A	Cylindrical SS	200 (14)
L6EPB-S-S-3-C	Round SS	350 (25)
L6EPB-S-S-3-L	Round SS	350 (25)
L6EPB-S-S-3-O	Polypropylene	2000 (140)
L6EPB-S-S-3-S	Polypropylene	2000 (140)

INSTALLATION:

Unpack switch and remove any packing material found inside lower housing or float chamber.

Switch must be installed with body in a horizontal plane and arrow on side pointing down.

If switch has an external float chamber (tee), connect it to vertical sections of 1" NPT pipe installed outside vessel walls at appropriate levels. If unit has no external float chamber, it must be mounted in a 1" NPT half coupling welded to the vessel wall. The coupling must extend through the wall.

Inspect and clean wetted parts at regular intervals.

ELECTRICAL CONNECTIONS:

Connect wire leads in accordance with local electrical codes and switch action required. N.O. contacts will close and N.C. contacts will open when liquid level causes float to rise. They will return to "normal" condition on decreasing liquid level. Black = common, Blue = N.O. and Red = N.C.

For units supplied with both internal and external grounds, the ground screw inside the housing must be used to ground the control. The external ground screw is for supplementary bonding when allowed or required by local code. Some CSA listed models are furnished with a separate green ground wire. Such units must be equipped with a junction box, not supplied but available on special order.

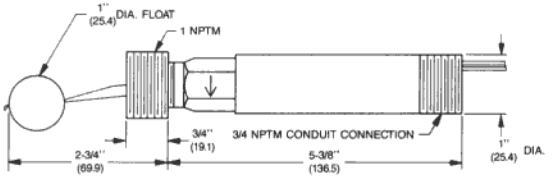
CENELEC certified models include a junction box. Cable should enter enclosure through an approved EX cable gland, not supplied. Push stripped and tinned leads into appropriate openings in terminal block(s). To connect fine stranded leads or to remove any wire, depress spring release with small screwdriver first.

All wiring, conduit and enclosures must meet applicable codes for hazardous areas. Conduits and enclosures must be properly sealed. For outdoor or other locations where temperatures vary widely, precautions should be taken to prevent condensation inside switch or enclosure. Electrical components must be kept dry at all times. **CAUTION:** To prevent ignition of hazardous atmospheres, disconnect the device from the supply circuit before opening. Keep assembly tightly closed when in use.

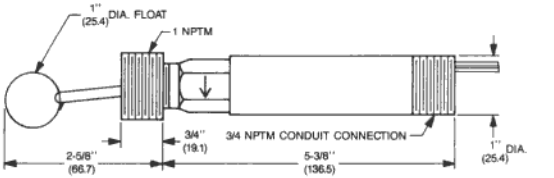
Dimensions on reverse

W.E. ANDERSON DIV., DWYER INSTRUMENTS, INC.
P. O. BOX 358 • MICHIGAN CITY, INDIANA 46360, U.S.A.
Telephone 219/879-8000
Fax 219/872-9057

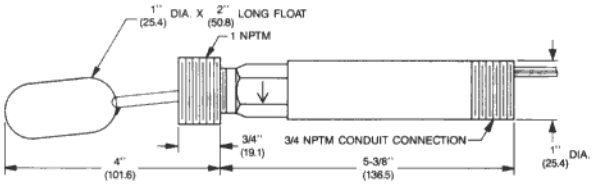
FLOTECT™ MODEL L-6 FLOAT SWITCH — DIMENSION DRAWINGS



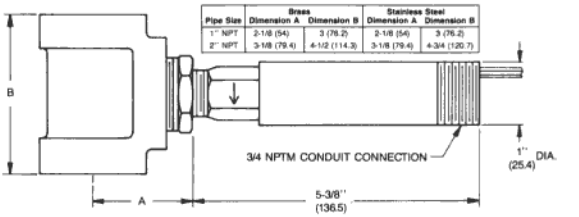
Polypropylene Float



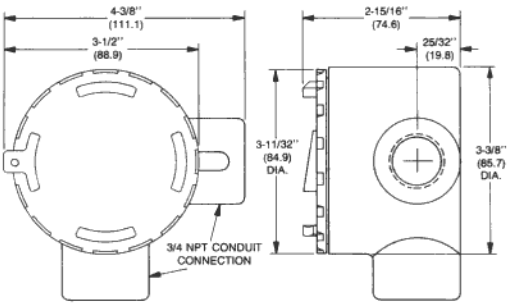
Round Stainless Steel Float



Cylindrical Stainless Steel Float



With External Float Chamber (Tee)



CSA, CENELEC Conduit Enclosure

Limited Warranty: The Seller warrants all Dwyer instruments and equipment to be free from defects in workmanship or material under normal use and service for a period of one year from date of shipment. Liability under this warranty is limited to repair or replacement F.O.B. factory of any parts which prove to be defective within that time or repayment of the purchase price at the Seller's opinion provided the instruments have been returned, transportation prepaid, within one year from the date of purchase. All technical advice, recommendations and services are based on technical data and information which the Seller believes to be reliable and are intended for use by persons having skill and knowledge of the business, at their own discretion. In no case is Seller liable beyond replacement of equipment F.O.B. factory or the full purchase price. This warranty does not apply if the maximum ratings label is removed or if the instrument or equipment is abused, altered, used at ratings above the maximum specified, or otherwise misused in any way.

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W.E. ANDERSON DIV., DWYER INSTRUMENTS, INC.
P.O. Box 358
Michigan City, IN 46360
Phone: 219/879-8000
Fax: 219/872-9057

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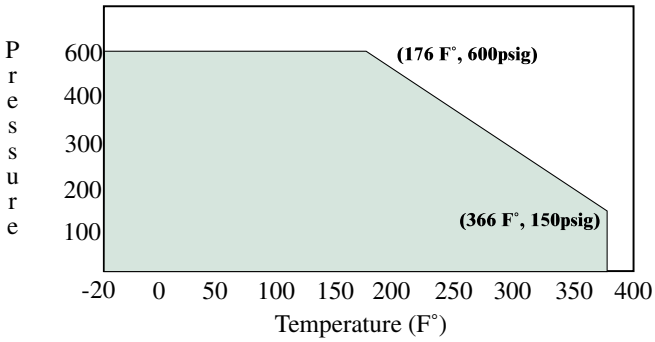
Standards Compliance

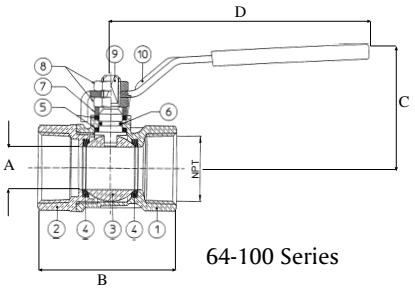
IPG's 64 series brass ball valves comply with the latest editions of these published standards:

- AGA Z21.15.CGA9.1
- AGA No. 3-88
- ANSI B1.20.1
- ANSI B16.18
- CAN/CGA-3.16-M88
- ASME/ANSI B16.33
- ASME/ANSI B16.38
- MSS SP-110
- UL Guide YSDT
- UL Guide YRPV
- UL Guide VQGU
- FM APPROVED

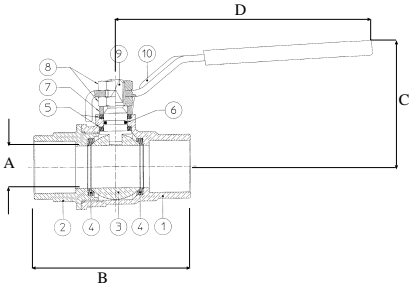


Materials of Construction

Description	Materials
1. Body	Brass UNI 5705-65
2. Retainer	Brass UNI 5705-65
3. Ball	Brass UNI 5705-65
4. Seats	PTFE
5. Stem Seals	PTFE
6. O-Ring	NBR 75 Shore A
7. Packing Gland	Brass UNI 5705-65
8. Nut	Plated Steel
9. Stem	Brass UNI 5705-65 Cr Plated
10. Lever Handle	Plated Steel 1/4" - 2" Models Aluminum 2 1/2" - 4" Models



64-100 Series



Optional Kits

Valve Size	Locking Handle	Stem Extensions	Balancing Stops
1/4", 3/8" & 1/2"	78-1659-01	78-1501-0	78-1506-01
3/4" & 1"	78-1660-01	78-1502-0	78-1507-01
1-1/4" & 1-1/2"	78-1661-01	78-1503-0	78-1508-01
2"	78-1662-01	78-1504-0	78-1509-01
2-1/2" & 3"	-	78-1505-0	78-1510-01

NOTE: Specify (-07) suffix for T-Handle i.e. 64-105-07.

64-100 Dimensional Data

Size	Part No.	A	B	C	D	(Cv)
1/4" NPT	64-101-01	0.39	2.02	1.75	3.85	6
3/8" NPT	64-102-01	0.39	2.02	1.75	3.85	7
1/2" NPT	64-103-01	0.59	2.44	1.88	3.85	19
3/4" NPT	64-104-01	0.78	2.71	2.28	4.80	34
1" NPT	64-105-01	0.98	3.07	2.44	4.80	50
1-1/4" NPT	64-106-01	1.25	3.42	3.07	6.02	104
1-1/2" NPT	64-107-01	1.57	3.89	3.34	6.02	268
2" NPT	64-108-01	1.96	4.33	3.79	6.37	309
2-1/2" NPT	64-109-01	2.56	5.59	5.02	8.07	629
3" NPT	64-100-01	3.15	6.45	5.45	8.07	1018
4" NPT	64-10A-01	3.94	7.60	6.34	10.23	1622

64-200 Dimensional Data

Size	Part No.	A	B	C	D	(Cv)
1/2"	64-203-01	0.59	2.53	1.88	3.85	19
3/4"	64-204-01	0.78	2.99	2.28	4.80	34
1"	64-205-01	0.98	3.58	2.44	4.80	50
1-1/4"	64-206-01	1.25	4.09	3.07	6.02	104
1-1/2"	64-207-01	1.57	4.56	3.34	6.02	268
2"	64-208-01	1.96	5.43	3.79	6.37	309
2-1/2"	64-209-01	2.56	6.93	5.02	8.07	629
3"	64-200-01	3.15	8.09	5.45	8.07	1018

APOLLO INTERNATIONAL
A Division of Conbraco Industires, Inc.

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Matthews, NC 28106

(704) 841-6000
Fax: (704) 841-6020
http://www.conbraco.com

Your local Conbraco distributor is:

PHFL64S 4/02
CG 7.5M

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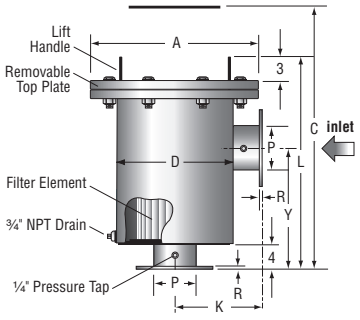
Universal's ILF and ILFS Series of in-line air filters are designed to withstand the demanding requirements of pressure and vacuum applications. Choose from ten standard sizes ranging from 3" to 18" and flow capacities ranging from 275 to 9,700 CFM. Three types of filter element media—pleated paper, pleated felt, or wire mesh—are available to suit your application.

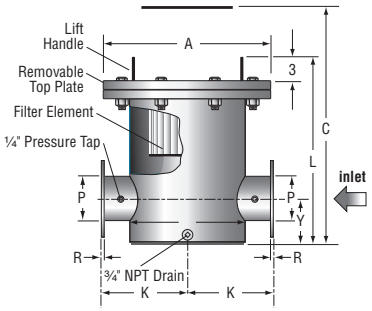
ILF/ILFS Series

In-line Filters

ILF Series



ILFS Series



Durable Construction

- Carbon steel construction with a high-quality blue enamel finish.
- Easily removable top plate for access to the filter element.
- ASME Code construction and special materials, such as stainless steel, are available.

Customize to Your Application

- Designed for application requirements.
- Optional design features for special production and assembly conditions are available.
- Choose an ILF model for an L-configuration or an ILFS for opposed connections.
- Interchangeable paper, felt, or wire mesh elements, for desired filtration characteristics in a single housing.
- Built-in taps for pressure gauges.

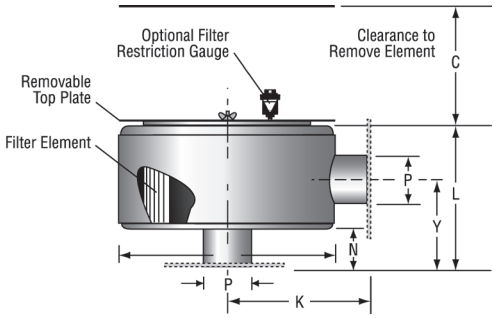
Model	Part Number	P (nom.)	D	L	R	Y	C	A	K	Weight (est.)	Rated Cap. (CFM)	Number of Bolts
ILF-3	34-A03-TT*	3	14	24.25	—	15.5	27	20	11	100	275	8
ILF-4	34-A04-AA*	4	14	24.25	.375	15.5	27	20	11	110	500	8
ILF-5	34-A05-AA*	5	14	25.25	.375	16	28	20	11	120	750	8
ILF-6	34-A06-AA*	6	16	28	.5	18.25	34	22	12	120	1,100	8
ILF-8	34-A08-AA*	8	18	39.5	.5	28.25	45	24	13	140	1,920	8
ILF-10	34-A10-AA*	10	22	35.5	.5	22	42	28	15	295	3,000	12
ILF-12	34-A12-AA*	12	22	37.5	.5	23	44	28	15	315	4,300	12
ILF-14	34-A14-AA*	14	28	41	.5	27	52	34	18	450	5,900	12
ILF-16	34-A16-AA*	16	30	43.75	.5	28	55	36	19	500	7,700	12
ILF-18	34-A18-AA*	18	30	43.75	.5	29	57	36	19	505	9,700	12
ILFS-3	34-B03-TT*	3	14	23	—	5	29	20	11	115	275	8
ILFS-4	34-B04-AA*	4	14	23	.375	5	29	20	11	125	500	8
ILFS-5	34-B05-AA*	5	14	23	.375	5.5	29	20	11	130	750	8
ILFS-6	34-B06-AA*	6	16	27	.5	6	36	22	12	170	1,100	8
ILFS-8	34-B08-AA*	8	20	35	.5	7	44	26	14	245	1,920	8
ILFS-10	34-B10-AA*	10	24	34	.5	8.5	44	30	16	365	3,000	12
ILFS-12	34-B12-AA*	12	24	37	.5	10	47	30	16	395	4,300	12
ILFS-14	34-B14-AA*	14	30	44	.5	11	58	36	19	605	5,900	12
ILFS-16	34-B16-AA*	16	36	48	.5	12.5	62	42	24	895	7,700	12
ILFS-18	34-B18-AA*	18	36	52	.5	13	66	42	24	945	9,700	12

The C dimension is clearance required to remove elements. Non-ASME code construction is suitable for 15" PSI maximum working pressure or 20" Hg operating vacuum. Estimated weight does not include elements. Size 3" is standard with male pipe thread connection (MNPT). Sizes 4" through 18" are standard with 125/150 lb ANSI drilled plate flanges. Rated capacity is based upon flow velocity of approximately 5,500 ft/min. If pressure drop allowance permits, capacity may be increased by as much as 50%. **Refer to page 8.14 for filter element details.**

*Specify "P" at end of part number for unit with pleated paper elements, "F" for pleated felt or "W" for wire mesh.

ILFV Series

Vacuum Service In-line Air Filters



Universal's new ILFV Series of in-line air filters are designed especially for vacuum applications as an economical alternative to our ILF Series. Choose from ten standard pipe sizes ranging from 2" to 14" and flow capacities ranging from 120 to 5,900 CFM. Two choices of filter element media—pleated paper or pleated felt—are available to suit your specific application.

Universal's Filter Restriction Gauge provides a convenient, accurate means of monitoring filter pressure drop as the filter element becomes increasingly loaded with dirt. In-line air filters are standard with threaded connections for directly mounting the gauge. See p. 9.15 for a complete description.

Filter Elements

Pleated paper elements offer the highest efficiency and are considered "standard" for the ILFV series units. Pleated felt elements are also available for less demanding service. Both element types
are completely interchangeable and will
fit in any ILFV housing.

Model	Part Number	P (nom.)	D	L	N	Y	C	K	Weight (est.)	Rated Cap. (CFM)
ILFV-2	34-D02-TT*	2	14	9.5	3.5	6.5	7	10	18	120
ILFV-2½	34-D25-TT*	2.5	14	9.5	3.5	6.5	7	10	19	190
ILFV-3	34-D03-TT*	3	14	9.5	3.5	6.5	7	10	20	275
ILFV-4	34-D04-TT*	4	14	9.5	3.5	6.5	7	10	21	500
ILFV-5	34-D05-AA*	5	18	12	3.5	7.75	10	12	50	750
ILFV-6	34-D06-AA*	6	18	20.5	3.5	12	10	12	65	1,100
ILFV-8	34-D08-AA*	8	24	13.25	3.5	8.25	11	15	90	2,200
ILFV-10	34-D10-AA*	10	24	22.75	3.5	13	11	15	125	3,000
ILFV-12	34-D12-AA*	12	30	17.25	3.5	10.25	15	18	160	4,300
ILFV-14	34-D14-AA*	14	30	30.75	3.5	17	15	18	205	5,900

All models have a .125" FNPT tap for installation of a gauge or manometer to monitor pressure drop. The C dimension is clearance required to remove elements. Non-ASME code construction is suitable for 15" Hg vacuum. Not applicable for pressure applications. Rated capacity is based upon flow velocity of approximately 5500 ft/min.
If pressure drop allowance permits, capacity may be increased by as much as 50%. Flange connections are drilled per ANSI standard for each size. Sizes 2" through 4" are standard with male pipe threaded inlet and outlet fitting (MNPT). Sizes 5" through 14" are standard with plate flanges drilled to ANSI standards (dashed lines on sketch). Weight does not include filter elements. **Refer to page 14 for filter element details.**

*Specify "P" at the end of part number for paper element or "F" for synthetic felt.

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Toll-Free: 1-888-300-4272
www.universalAET.com
94-1553 Rev 0

ILF/ILFS Series

P (nom.)	Replacement Element Part Number		
	Paper	Felt	Wire Mesh
3	81-1063	81-1205	81-1038
4	81-1063	81-1205	81-1038
5	81-1063	81-1205	81-1038
6	81-0475	81-1207	81-1040
8	81-0475 (2)	81-1207 (2)	81-1040 (2)
10	81-1163	81-1209	81-1200
12	81-1163	81-1209	81-1200
14	81-1164	81-1210	81-1201
16	81-1164	81-1210	81-1201
18	81-1164	81-1210	81-1201

ILFV Series

P (nom.)	Replacement Element Part Number		
	Paper	Felt	Wire Mesh
2	81-1063	81-1205	—
2½	81-1063	81-1205	—
3	81-1063	81-1205	—
4	81-1063	81-1205	—
5	81-0475	81-1207	—
6	81-0475 (2)	81-1207 (2)	—
8	81-1163	81-1209	—
10	81-1163 (2)	81-1209 (2)	—
12	81-1164	81-1210	—
14	81-1164 (2)	81-1210 (2)	—

81-0323

Oil Free Adhesive

This is an oil-free product developed for use on viscous impingement type filters. It is a substitute for applications that do not permit oil wetting of the filter elements, such as oil-free compressors. Universal Oil-Free Adhesive is available in 13 oz. aerosol spray cans.

81-1234

Filter Restriction Gauge

The Filter Restriction Gauge provides a convenient, accurate means of monitoring filter pressure drops as the filter element becomes increasingly loaded with dirt. Cartridge Filters and Filter silencers are standard with threaded connections for direct mounting of the gauge.

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94-1553 Rev 0

UNIVERSAL SILENCER
A FLEETGUARD/NELSON COMPANY
P. O. Box 411, Stoughton, Wisconsin 53589
608-873-4272 Fax 608-873-4298

Installation, Operation and Maintenance Instructions for > ILFV Series Filters

Description

The ILFV series of filters are inline configurations designed specifically for vacuum applications as an economical alternative to our premium ILF series. The ILFV series(non-ASME code construction) is a 90 degree inlet/outlet arrangement. The series is suitable for vacuum applications that do not exceed 15"Hg and 200 degrees F. There are no moving parts in the operation of the filter units.

Receiving Inspection

- Upon receipt of the unit, check the nameplate against the packing list to verify the correct part numbers are received.
- Keep the shipping container to protect the unit until installation.
- Prior to unpacking check for shipping damage.
- Advise Universal Silencer of shipping damage within three days.

Storage

- Leave any cardboard boxing, plywood covering, crating, and/or plastic covering intact until ready to install.
- Be sure that all openings are closed so that no debris, vermin, rain, snow and/or ice can get into unit.
- Store unit on blocks, a minimum of 4" high so that air can freely circulate around unit.
- Do not store in contact with the ground or in a wet or flooded area.
- Indoor ambient temperature storage is preferable as these units contain filtration material. If this is not possible, keep the unit covered and protected from the weather.
- Clean unit prior to installation. Remove any minor corrosion and refinish per paint manufacturer's recommendations. If major corrosion has occurred such that the integrity of the unit is in question, contact Universal Silencer.

Mounting and alignment

- Insure that the necessary equipment to install the unit, including anchor and/or support bolts, flange bolts, and expansion joints, are available before beginning installation.
- Anchor and/or support bolting and grouting is not included with the unit.
- Place the unit on a level, structurally adequate surface. These units are often supported by their outlet flange. Insure that the supporting duct or piping is properly designed and does not induce vibrations into the unit.

+ ***IMPORTANT:*** The unit is not designed to serve as a support for any piping, additional mounting pads or loads other than those stated in the Universal Silencer drawing or product bulletin.

- Use thread lubricant on all bolted joints.
- Use all gaskets provided with the unit.
- If you replace or add bolts or gaskets, use the same size and material as the originals.
- Ensure that the unit is firmly mounted immediately prior to startup of the equipment, and again 24 hours after startup to verify that supports and/or flange bolts have not vibrated loose from the foundation or structure.

Inspection and maintenance

- Components are either complete weldments or permanently assembled having no replaceable parts except filter elements and retainers.
- Spare parts other than filter elements are not required.
- Periodically inspect paint finish for damage or deterioration. **NOTE**: Minor localized damage may be touched up using touch-up paint. Areas with extensive damage or deterioration may
- require spot blasting and recoating. Consult paint manufacturer's recommendations.
- Examine connecting flanges and support/ anchor bolting at least annually. Retighten loose nuts as required.

Safety Issues

- If performing any work internal to the filter/silencer or adjacent components, ensure that all confined space requirements are met and that all tools and other materials are removed once work is completed.

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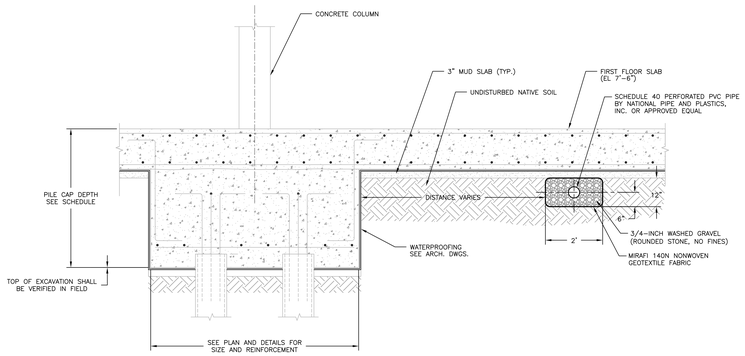
PLATE

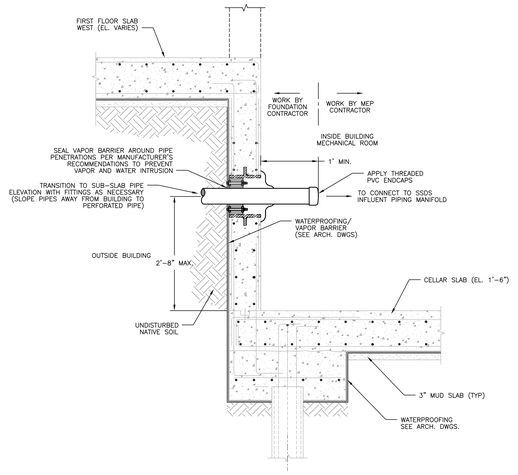


NOTE

SUB-SLAB PIPING SHALL BE INSTALLED IN 2' BY 1' WASHED GRAVEL TRENCH SURROUNDED BY FILTER FABRIC ENVELOPE.

1 SUB-SLAB DEPRESSURIZATION SYSTEM PIPE DETAIL

SCALE: NOT TO SCALE

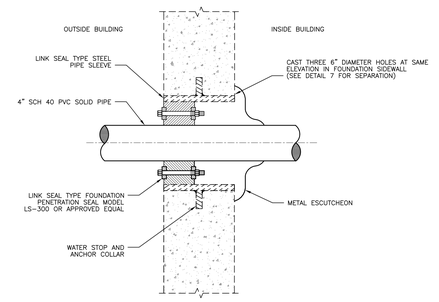


NOTES

1. INTERIOR PIPING AND MECHANICAL EQUIPMENT INSTALLED BY MEP CONTRACTOR. CAP PVC PIPES INSIDE BUILDING.
2. USE PVC FITTINGS AS NECESSARY FOR PIPE ELEVATION CHANGES.

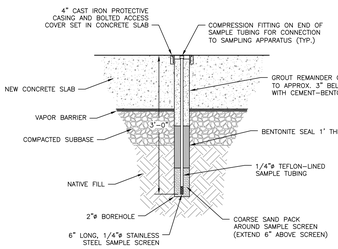
2 CELLAR FOUNDATION SIDEWALL PIPE PENETRATION SECTION

SCALE: NOT TO SCALE



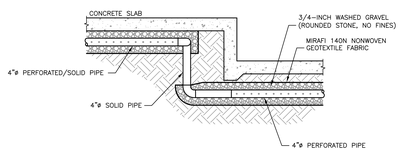
3 FOUNDATION WALL PIPE PENETRATION DETAIL BELOW GRADE

SCALE: NOT TO SCALE



4 VACUUM MONITORING POINT DETAIL

SCALE: NOT TO SCALE

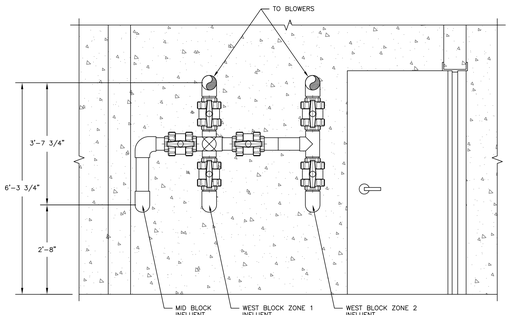


NOTE

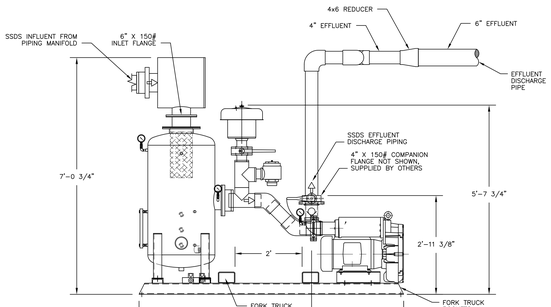
REFER TO DETAIL 1 FOR PIPE TRENCH DETAILS. SLAB REINFORCEMENT NOT SHOWN.

5 SUB-SLAB PIPING ELEVATION CHANGE DETAIL (TYPICAL)

SCALE: NOT TO SCALE



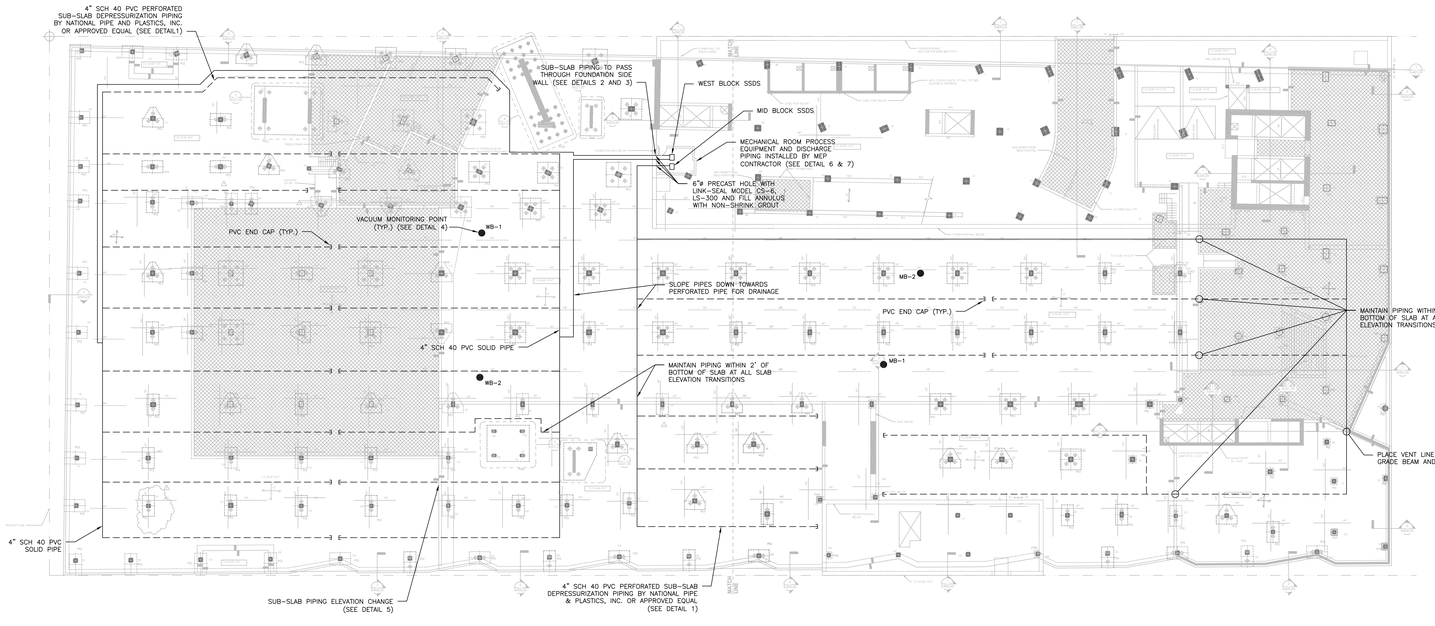
INFLUENT MANIFOLD SECTION B-B'



BLOWER SECTION A-A'

6 SSDS INFLUENT PIPING MANIFOLD AND BLOWER SECTION

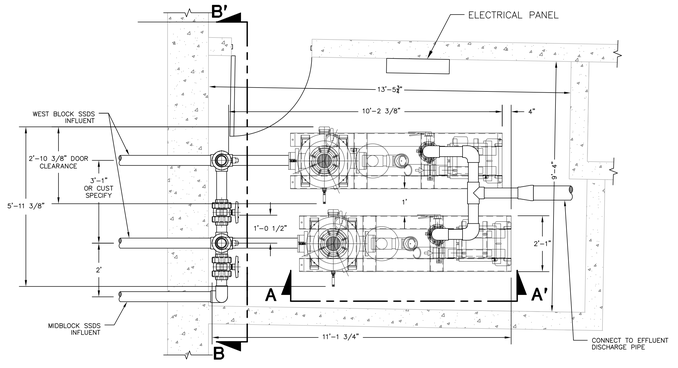
SCALE: NOT TO SCALE



SUB-SLAB DEPRESSURIZATION SYSTEM PIPING PLAN FIRST FLOOR

SCALE: 1"=20'

20' 0 20'



NOTE

1. ELECTRICAL PANEL SHIPPED SEPARATELY AND SHOULD BE MOUNTED IN ACCORDANCE WITH NEC.
2. SUPPORT PIPING ON WALL AND FROM FLOOR AS NECESSARY.

7 EQUIPMENT ROOM DETAIL

SCALE: 1/2"=1'

PROJECT:

625 WEST 57TH STREET

RESIDENTIAL / MIXED USE DEVELOPMENT
WEST 57th STREET & 12th AVENUE
NEW YORK, NEW YORK

OWNER/DEVELOPER:

Durst Pyramid LLC
One Bryant Park
New York, NY 10036

ARCHITECT:

SLCE*Architects, LLP*
841 BROADWAY
NEW YORK, NY 10003
TEL.: (212) 979-8400

DESIGN ARCHITECT:

BIG
601 W. 26th St. Suite 1255
New York, NY 10001
USA
347 964 3666
www.big.dk

STRUCTURAL ENGINEER:

Thornton Tomasetti
Thornton Tomasetti, Inc.
51 Madison Avenue
New York, NY 10010-1603
T 917.661.7800 F 917.661.7801

M.E.P.FP. ENGINEER:

DAGHER ENGINEERING, PLLC
29 Broadway, New York, NY 10006
T. 212.480.2591
F. 212.480.2654

LANDSCAPE ARCHITECT:

STARR WHITEHOUSE Landscape Architects and Planners PLLC
80 Maiden Lane, Suite 1901
New York, New York 10038
T 212.487.3272
F 212.487.3273

GEOTECHNICAL AND ENGINEERING:

Langan Engineering & Environmental Services
Phone: 212.479.5400 Fax: 212.479.5444
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, NY

CONSTRUCTION MANAGER:

Hunter Roberts Construction Group
2 World Financial Center
New York, NY 10281

TRAFFIC CONSULTANT:

PHILIP HABIB & ASSOCIATES
226 WEST 26TH STREET
NEW YORK, NEW YORK 10001

BUILDING ENVELOPE CONSULTANT:

IBA
Israel Berger and Associates, LLC
232 MADISON AVENUE
New York, NY 10016
TEL.: (212) 689-5389
FAX.: (212) 689-6449

LIGHTING DESIGNER:

bpi Brandston Partnership Inc.
302 Fifth Avenue, New York, NY 10001
main: 212.924.4050

ENERGY / ENVIRONMENTAL CONSULTANT:

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting and Management
209 SHAFTER STREET
ISLANDIA, NY 11749

No.:	DATE:	REVISION:

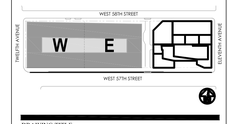
D.O.B. NUMBER:

NB#

NORTH

SCALE: 0 SC-05 SC1 SCX15 SCX25

KEY PLAN:



DRAWING TITLE:

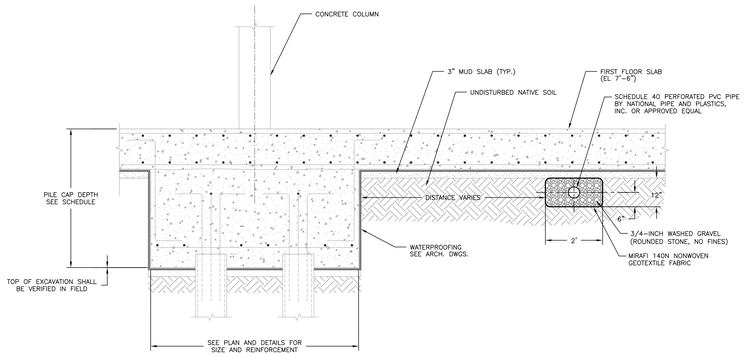
SUB-SLAB DEPRESSURIZATION SYSTEM

SEAL & SIGNATURE:

DATE:	7/16/2013
PROJECT No:	2010-18
DRAWN BY:	J.A.D.
CHECKED BY:	J.L.
DWG. No.:	P1
SHEET. No.:	1 OF 1

FILE No: 1338.0003V206.06.DWG

SSDS Design Drawing

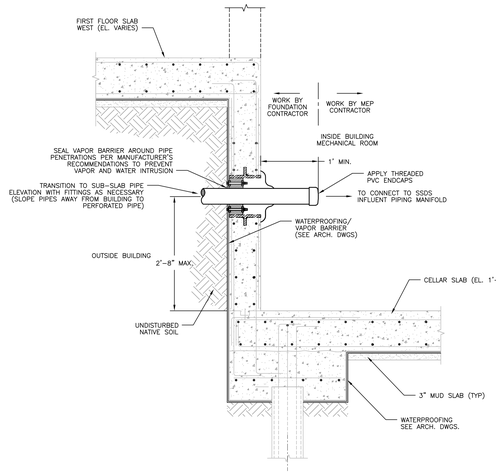


NOTE

SUB-SLAB PIPING SHALL BE INSTALLED IN 2' BY 1' WASHED GRAVEL TRENCH SURROUNDED BY FILTER FABRIC ENVELOPE.

1 SUB-SLAB DEPRESSURIZATION SYSTEM PIPE DETAIL

SCALE: NOT TO SCALE



NOTES

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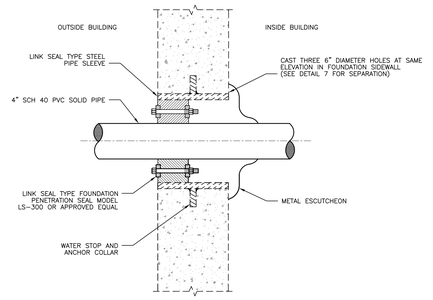
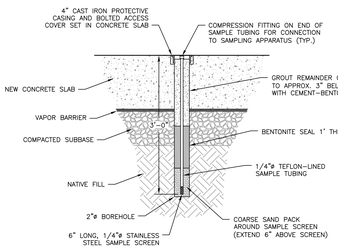
2 CELLAR FOUNDATION SIDEWALL PIPE PENETRATION SECTION

SCALE: NOT TO SCALE



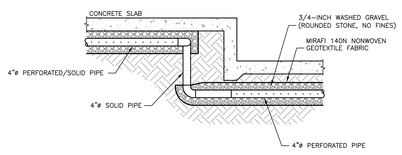
3 FOUNDATION WALL PIPE PENETRATION DETAIL BELOW GRADE

SCALE: NOT TO SCALE



4 VACUUM MONITORING POINT DETAIL

SCALE: NOT TO SCALE

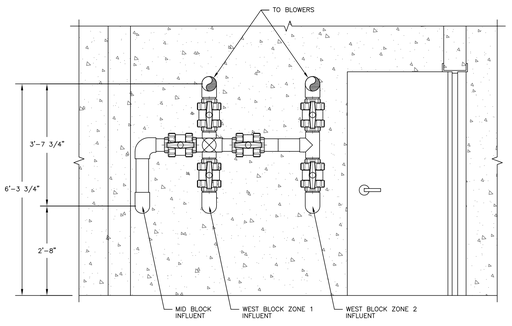


NOTE

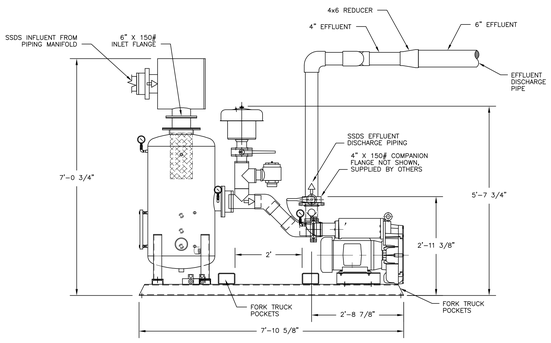
REFER TO DETAIL 1 FOR PIPE TRENCH DETAILS. SLAB REINFORCEMENT NOT SHOWN.

5 SUB-SLAB PIPING ELEVATION CHANGE DETAIL (TYPICAL)

SCALE: NOT TO SCALE



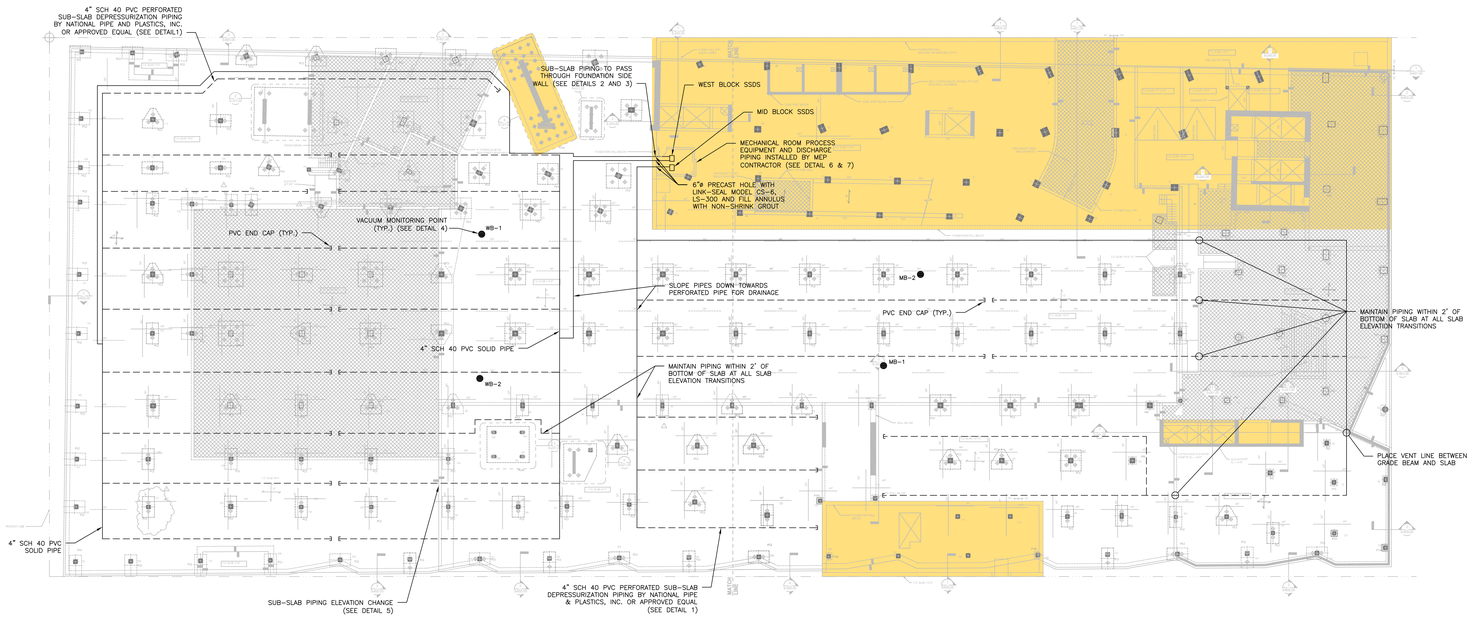
INFLUENT MANIFOLD SECTION B-B'



BLOWER SECTION A-A'

6 SSDS INFLUENT PIPING MANIFOLD AND BLOWER SECTION

SCALE: NOT TO SCALE

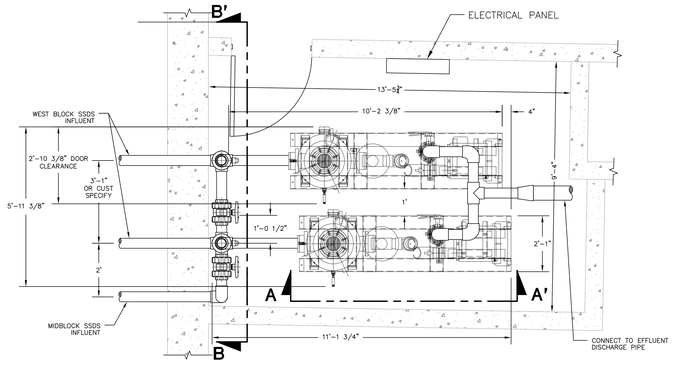


SUB-SLAB DEPRESSURIZATION SYSTEM PIPING PLAN FIRST FLOOR

SCALE: 1"=20'

20' 0 20'

AREA WHERE CELLAR/FOUNDATION EXTENDS BELOW WATER TABLE, NO SSDS PIPING



NOTE

1. ELECTRICAL PANEL SHIPPED SEPARATELY AND SHOULD BE MOUNTED IN ACCORDANCE WITH NEC.
2. SUPPORT PIPING ON WALL AND FROM FLOOR AS NECESSARY.

7 EQUIPMENT ROOM DETAIL

SCALE: 1/2"=1'

PROJECT:

625 WEST 57TH STREET

RESIDENTIAL / MIXED USE DEVELOPMENT
WEST 57th STREET & 12th AVENUE
NEW YORK, NEW YORK

OWNER/DEVELOPER:

Durst Pyramid LLC
One Bryant Park
New York, NY 10036

ARCHITECT:

SLCE*Architects, LLP*
841 BROADWAY
NEW YORK, NY 10003
TEL.: (212) 979-8400

DESIGN ARCHITECT:

BIG
601 W. 26th St. Suite 1255
New York, NY 10001
USA
347 964 3666
www.big.dk

STRUCTURAL ENGINEER:

Thornton Tomasetti
Thornton Tomasetti, Inc.
51 Madison Avenue
New York, NY 10010-1603
T 917.661.7800 F 917.661.7801

M.E.P.FP. ENGINEER:

DAGHER ENGINEERING, PLLC
29 Broadway, New York, NY 10006
T. 212.480.2591
F. 212.480.2654

LANDSCAPE ARCHITECT:

STARR WHITEHOUSE Landscape Architects and Planners PLLC
80 Maiden Lane, Suite 1901
New York, New York 10038
T 212.487.3272
F 212.487.3273

GEOTECHNICAL AND ENGINEERING:

Langan Engineering & Environmental Services
Phone: 212.479.5400 Fax: 212.479.5444
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, NY

CONSTRUCTION MANAGER:

Hunter Roberts Construction Group
2 World Financial Center
New York, NY 10281

TRAFFIC CONSULTANT:

PHILIP HABIB & ASSOCIATES
226 WEST 26TH STREET
NEW YORK, NEW YORK 10001

BUILDING ENVELOPE CONSULTANT:

IBA
Israel Berger and Associates, LLC
232 MADISON AVENUE
New York, NY 10016
TEL.: (212) 689-5389
FAX.: (212) 689-6449

LIGHTING DESIGNER:

bpi Brandston Partnership Inc.
302 Fifth Avenue, New York, NY 10001
main: 212.924.4050

ENERGY / ENVIRONMENTAL CONSULTANT:

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting and Management
209 SHAFTER STREET
ISLANDIA, NY 11749

No.:	DATE:	REVISION:
1	9/13/13	REVISED TO SHOW DEEP FOUNDATION AREAS

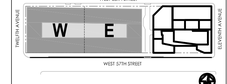
D.O.B. NUMBER:

NB#

NORTH

SCALE: 0 SC-05 SC1 SCX15 SCX25

KEY PLAN:



DRAWING TITLE:

SUB-SLAB DEPRESSURIZATION SYSTEM

SEAL & SIGNATURE:

DATE:	9/13/2013
PROJECT No:	2010-18
DRAWN BY:	J.A.D.
CHECKED BY:	J.L.
DWG. No.:	P1
SHEET. No.:	1 OF 1

FILE No: 1338.0003\V206.06R.DWG