840 5TH AVENUE

KINGS COUNTY

BROOKLYN, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C224271

Prepared for:

New York City School Construction Authority
30-30 Thomson Avenue
Long Island City, NY 11101-3045

Prepared by:

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

OCTOBER 2022

CERTIFICATION STATEMENT

I, Kevin Boger, P.E., 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).



NYS PROFESSIONAL ENGINEER #096717

DATE: 10/7/2022

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List of Acronyms

BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulation
COC	Certificate of Completion
CP	Commissioner Policy
DCE	Cis-1,2-dichloroethene
DER	Division of Environmental Remediation
DOE	New York City Department of Education
EC	Engineering Control
EHS	Environmental Health and Safety Division
EWP	Excavation Work Plan
HASP	Health and Safety Plan
IC	Institutional Control
MTBE	Methyl tert-butyl ether
NYCDHMH	New York City Department of Health and Mental Hygiene
NYCSCA	New York City School Construction Authority
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PRR	Periodic Review Report
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SCO	Soil Cleanup Objective
SCL	Soil Cleanup Level
SMP	Site Management Plan
SSDS	Sub-slab Depressurization System
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCA	1,1,1-Trichloroethane
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification:	C224271 840 5th Avenue, Brooklyn, New York
Institutional Controls:	1. The property may be used for restricted residential, commercial, or industrial use;
	2. All Engineering Controls (ECs) must be operated and maintained as specified in this Site Management Plan (SMP).
	3. All ECs 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 New York State Department of Health (NYSDOH) or the New York City Department of Health and Mental Hygiene (NYCDHMH) 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. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP.
	6. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP.
	7. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP.
	8. 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 the Environmental Easement.

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	9. The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on the Environmental Easement Survey and any potential impacts that are identified must be monitored or mitigated.
	10. Vegetable gardens and farming on the site are prohibited.
	11. An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.
Engineering Controls:	1. Cover system: comprised impervious surfaces (e.g., concrete building slab, asphalt-pavement, etc.).
	2. Gas Vapor Barrier: comprised of 60 mil Liquid Boot membrane applied below the concrete floor slabs, below grade walls and bottom slabs and walls of pits and sumps with continuous waterstops within required construction joints.
	3. Sub-Slab Depressurization System (SSDS): installed below the gas vapor barrier. The principal components of the SSDS include: suction pits beneath the floor slab; vertical risers, at least 6 inches in diameter, from each of the common headers discharging above the building roof; exterior suction fans; monitoring points at selected locations throughout the building, installed through the lowest level floor slab; and, a warning device (alarm) when the vacuum drops below a set point.

Inspections:	Frequency
1. Cover inspection	Annually
2. SSDS/GVB inspections	Per O&M Plan Requirements
Maintenance:	
1. Gas Vapor Barrier maintenance	As needed

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2. SSDS maintenance	Semi-annually and as needed
Reporting:	
1. Periodic Review Report	Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the "840 5th Avenue" Site located in Brooklyn, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C224271, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

The New York City School Construction Authority (NYCSCA) entered into a Brownfield Cleanup Agreement (BCA) on June 19, 2018 with the NYSDEC to remediate the Site. A figure showing the Site location and boundaries of this 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 provided in Appendix C.

After completion of the remedial work, some contamination was left at this Site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the New York City Department of Finance, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan 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.

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); and,
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 New York Codes, Rules and Regulations (NYCRR) Part 375 and the BCA (Index #C224271-05-18; Site #C224271) for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in Appendix A of this SMP.

This SMP was prepared by TRC Engineers, Inc (TRC), on behalf of the NYCSCA, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the Site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: upgrades to or shutdown of the SSDS, post-remedial removal of contaminated soil, or other significant change to the Site conditions. In accordance with the Environmental Easement for the Site, the NYSDEC project manager will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

1. 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.

2. 7-day advance notice of any field activity associated with the remedial program.

3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.

4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.

5. Notice within 48 hours of any non-routine maintenance activities.

6. 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 ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

8. 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/Remedial Party has been provided with a copy of the BCA, and all approved work plans and reports, including this SMP.

9. Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 below includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix A.

Table 1: Notifications*

Name	**Contact Information**	**Required Notification****
NYSDEC Project Manager: Michael Sollecito	518-402-2198 Michael.Sollecito@dec.ny.gov	All Notifications
Property Owner: New York City School Construction Authority: Lee Guterman	718-472-8502 DGuterman@nycsca.org	All Notifications
NYSDEC Public Participation Specialist: Thomas Panzone	718-482-4953 Thomas.panzone@dec.ny.gov	Notifications 1 and 8
NYSDOH Project Manager: Sara Bogardus	518-402-7860 BEEI@health.ny.gov	Notifications 4, 6, and 7
Remedial Engineer: Kevin Boger	631-617-0087 KBoger@trccompanies.com	All Notifications

* Note: Contact information is subject to change and will be updated as necessary.

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in Brooklyn, Kings County, New York and is identified as Block 693 and Lot 39 on the New York City Department of Finance (NYCDOF) Tax Map (see Figure 2). The Site was formerly known as 836-841 5th Avenue and 471 36th Street (Block 693, Lots 39 and 48). In March 2018, Lots 39 and 48 were merged and the new property identification is 840 5th Avenue (Block 693, Lot 39). The Site is approximately 0.45-acres and is bounded by Greenwood Cemetery's maintenance facility to the north and northwest, 5th Avenue followed by Greenwood Cemetery to the northeast and east, 5th Avenue followed by the MTA Jackie Gleason Bus Depot to the southeast and south, 36th Street followed by a gasoline station, car wash, and commercial offices to the south and southwest, and a three-story residential building with a first floor church occupant to the west (see Figure 2 – Site Plan). The boundaries of the Site are more fully Described in Appendix C – Environmental Easement. The owner and operator of the Site parcel at the time of issuance of this SMP is the NYCSCA.

2.2 Physical Setting

2.2.1 Land Use

The Site consists of a 4 to 5-story primary school building with a basement and a playground area. The main entrance is located on 5th Avenue. The facility will be used as a primary school for kindergarten through fifth-grade students. According to the New York City Department of City Planning (NYCDCP) Zoning Map 16B, the Site is zoned for manufacturing use (M1-2). Use of the Site as a community facility (i.e., a school facility) is permitted by a special permit in M1 districts. NYCSCA is seeking and anticipates issuance of a special permit for the proposed use of the Site as a public school facility.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial, residential, and institutional properties. The property immediately northeast and east of the Site includes 5th Avenue followed by a cemetery which includes walkways, landscaped areas and a pond; the properties immediately south of the Site include commercial and residential properties; the property to the southwest, southeast and south includes 5th Avenue/36th Street followed by a commercial bus depot; the property to the west of the Site includes a residential/institutional building; and, the property immediately north and northwest of the Site includes the cemetery maintenance facility .

2.2.2 Geology

A geologic cross section is shown in Figures 3 and 4. Brooklyn is located within the Atlantic Coastal lowlands physiographic province of New York State. The subsurface geology of Kings County (Brooklyn) is characterized by bedrock consisting of gneiss and schist of Precambrian age. Present day surface features and topography in New York City are primarily attributable to the most recent glaciation event. Beneath the area of the Site are deposits of glacial outwash sediments, typically comprised of sand and gravel. Soil and bedrock stratigraphy throughout Brooklyn typically consists of a layer of fill material that overlies glacial outwash sediments, decomposed unconsolidated bedrock, and bedrock. The depth to bedrock in the area is estimated to be approximately 225 feet bgs.

2.2.3 Hydrogeology

Groundwater surface elevation contour maps are provided as Figures 5 and 6. Regional groundwater is expected to flow to the northwest. Two rounds of synoptic water level measurements were collected from four surveyed permanent monitoring wells (TRC-MW-1 through TRC-MW-4) as part of the RI. These monitoring wells (TRC-MW-1 through TRC-MW-4) were located on the eastern portion of the Site or the adjacent sidewalk and were decommissioned during Site development. Depth to water ranged from approximately 49.4 to 52.5 feet bgs. Note that the groundwater surface elevation is

approximately 3.5 feet lower on the northern portion of the Site in comparison to the southern portion of the Site. Based on the two rounds of groundwater surface elevation measurements, the apparent predominant groundwater flow direction in the eastern portion of the Site is towards the northeast.

There is a small pond approximately 0.2 miles east of the Site within Greenwood Cemetery. The nearest major surface water body is Gowanus Bay, located approximately 0.8 miles to the northwest.

2.3 Investigation and Remedial History

Phase I Environmental Site Assessments (ESAs) completed for the Site dated 2000, 2016, and 2017 indicate the eastern portion of the Site was first known to be developed in 1903 with elevated train tracks and an elevated train car repair shop. By 1926, the train car repair shop was demolished and this area was vacant with the exception of the elevated train tracks (on a platform). The former Site building was constructed in approximately 1953, and used for manufacturing purposes including jewelry fabrication. By 1997, the second floor was utilized as a garment assembly facility and by 1998, the first floor was used as a nightclub. From at least 2004 through 2017, the building was used as a church. The western portion of the Site was developed with a four-story residential building from at least 1903 until 1951, when it was razed.

The property was purchased by the NYCSCA in February 2018 for construction and development of a public school facility, which consists of a four to five-story school building with a basement and a playground. Note that prior to March 2018, the Site consisted of two separate lots: Block 693, Lot 39 located at 836-841 5th Avenue and Block 693, Lot 48 located at 471 36th Street.

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site and adjacent properties. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

Quarterly Monitoring Report & Remedial Investigation Work Plan, 842 5th Avenue, Impact Environmental

A Quarterly Monitoring Report & Remedial Investigation (RI) Work Plan (4th Quarter 2015 Monitoring Event) was prepared for the south-adjacent property (842 Fifth Avenue), by Impact Environmental on January 28, 2016 on behalf of the property owner (Bill Wolf Petroleum Corporation). Information provided in this report indicates that the south-adjacent property has been utilized as a gasoline station since at least the late 1950s. NYSDEC Spill No. 9406838 was assigned to the Site on August 19, 1994 following the discovery of impacted soil during underground storage tank (UST) removal activities. The quarterly monitoring report summarizes the corrective action procedures performed at the property, which consist of gauging and sampling of four on-Site groundwater monitoring wells.

The laboratory analytical results indicate that target volatile organic compounds (VOCs) were not detected in four groundwater samples above corresponding NYSDEC ambient water quality standards (Class GA Values) with the exception of methyl tert-butyl ether (MTBE). Concentrations of MTBE in groundwater ranged from 5.0 micrograms per liter (µg/L) to 13,000 µg/L. Benzene, toluene, ethylbenzene, and total xylenes (BTEX) were reported below reporting limits in all four samples. Water level measurements in surveyed monitoring wells at the property indicate that groundwater flow on the south-adjacent property is toward the northwest.

Remedial Investigation, 836-841 5th Avenue and 471 36th Street, TRC

Following the initial due diligence work, a RI was performed at the Site between December 2016 and March 2017 to characterize the nature and extent of contamination at the Site. The RI consisted of the installation of soil vapor and sub-slab vapor points; advancement of soil borings; installation of temporary groundwater monitoring wells; installation, development, and survey of monitoring wells; and, collection and laboratory analysis of soil vapor, sub-slab vapor, ambient air, soil, and groundwater samples.

Based on the RI results, the primary contaminants of concern included SVOCs, metals (arsenic, copper, lead, and mercury), including hazardous concentrations of leachable lead, in soil; VOCs (TCA, chloroform, cis-1,2-DCE, formaldehyde, MTBE, and

toluene), SVOCs, and metals (in filtered samples) in groundwater; and, CVOCs (TCA, vinyl chloride, and 1,1-DCE) in sub-slab vapor/soil vapor.

SVOCs and metals in soil and groundwater were attributed to characteristics of historic fill at the Site and the historic operations and use of the Site as a train car repair shop with elevated tracks. Fill material was found from the ground surface to depths ranging from 11.5 feet bgs to 48 feet bgs. Hazardous levels of leachable lead in soil in the northeast portion of the Site are not impacting groundwater based on results of analysis of filtered groundwater samples.

VOCs (TCA, chloroform, cis-1,2-DCE, formaldehyde, MTBE, and toluene) were detected in groundwater at concentrations above Class GA Values. The primary contaminant of concern in groundwater associated with a potential on-Site source was TCA. The source of chloroform was unknown, but may be attributable to an on-Site source. A common source of chloroform in groundwater is the discharge of chlorinated water (chloroform is a disinfection byproduct of chlorinating water) from leaking potable water distribution pipes or sanitary sewers. Cis-1,2-DCE, detected marginally above the Class GA Value, was likely attributable to an off-Site source since this compound was only detected in a cross-gradient well and was not detected in Site soils.

Formaldehyde was detected above the Class GA Value in groundwater samples collected from three on-Site locations and two upgradient locations. Formaldehyde was also detected in soil. The highest concentrations of formaldehyde in soil were detected near the northern property boundary, adjacent to the Greenwood Cemetery Maintenance Facility. The source of formaldehyde in groundwater is unknown, but may be attributable to the breakdown of MTBE associated with the open Spill Case on the adjacent and upgradient gasoline station or on-Site fill material (i.e., filling activities may have been impacted by operations at the adjoining Greenwood Cemetery Maintenance Facility).

Two petroleum related VOCs, toluene (in one on-Site groundwater sample) and MTBE (in two on-Site groundwater samples and one upgradient groundwater sample), were detected in groundwater at concentrations above the Class GA Values. The petroleum related VOCs are attributed to an off-Site and upgradient gasoline station with documented releases of MTBE and other gasoline constituents to the soil and groundwater.

Petroleum-related impacts were identified in groundwater and soil vapor at the Site. The documented petroleum-related impacts to groundwater appeared to be migrating from the south-adjacent gasoline station property onto the Site.

Based on the presence of TCA in on-Site monitoring well TRC-MW-3 at a concentration marginally above the Class GA Value and absence of TCA in the upgradient monitoring well TRC-MW-1, the TCA in sub-slab and soil vapor is likely attributable to an on-Site source.

Supplemental Remedial Investigation, 840 5th Avenue, TRC

A draft RI Report and a draft Remedial Action Work Plan (RAWP), both dated February 2018, were submitted to the NYSDEC for review and approval with the BCP Application following Site acquisition by NYCSCA. Based on review of the RIR, NYSDEC and NYSDOH required the collection of additional surface soil samples in the wooded area on the northern portion of the Site for laboratory analysis and the collection of groundwater samples for analysis for emerging contaminants (1,4-dioxane and per- and polyfluoroalkyl substances [PFAS]).

A Supplemental RI was conducted by TRC in May 2018 and consisted of the collection of surface soil samples and groundwater samples. The findings of the supplemental RI indicate the following:

The results of the analysis of surface soil samples revealed seven SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) and two metals (lead and arsenic) were detected at concentrations above the Restricted-Residential Use SCOs. The concentrations of SVOCs and metals in surface soil were attributable to the presence of fill material at the Site. All surface soil samples were analyzed for toxicity characteristic leaching procedure (TCLP) lead and the results were below the Resource Conservation and Recovery Act (RCRA) regulatory limit. Higher concentrations of SVOCs and metals (up to two orders of magnitude above the Restricted-Residential Use SCOs) were documented

in soil samples collected from borings previously advanced in the asphalt-paved area south of the wooded area.

The results of the analysis of groundwater samples revealed the combined concentrations of PFOA and PFOS were above the USEPA Health Advisory Level in one cross gradient groundwater sample and its duplicate groundwater sample. The concentrations of PFAS in groundwater were relatively consistent across the Site. 1,4-Dioxane was not detected in the groundwater samples.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the RAWP dated September 2018 are as follows:

1. Reduce the contaminant mass by removing contaminated soil.
2. Protect on-Site workers and the surrounding community from exposure to Site-related contaminants during remedial construction and development.
3. Establish engineering and institutional controls for the Site to protect future occupants, maintenance personnel, and the surrounding community from potential exposure to Site-related contaminants that will remain after Site redevelopment.

The RAOs for specific media consist of the following:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

- Prevent the discharge of contaminants to surface water.
- Remove the source of groundwater or surface water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the Site.

2.5 Summary of Remedial Actions

The Site was remediated in general accordance with the NYSDEC-approved RAWP dated September 2018.

The following is a summary of the Remedial Actions performed at the Site:

1. The 1,500-gallon UST and associated piping were closed and removed in accordance with applicable Federal, State, and local regulations;

2. Groundwater monitoring wells located within the Site boundary were decommissioned (abandoned-in-place) in accordance with NYSDEC requirements during the demolition work;

3. Soil that exhibited the hazardous waste characteristics of toxicity for lead in the northeast part of the Site in one hot spot area delineated to an approximately 16-foot by 35-foot area, extending to approximately 18 feet in depth, was excavated and disposed of off-Site;

4. Post-excavation end-point samples were collected from the area of the hazardous lead hot spot, in the area of the UST, and across the remainder of the Site where non-hazardous soil was removed for off-Site disposal to document post-excavation soil conditions;

5. All material removed from the Site related to soil remediation was disposed of off-Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;

6. Construction, operation, and maintenance of a gas vapor barrier and an active sub-slab depressurization system (SSDS) for the new school building;

7. Construction and maintenance of an engineered composite cover system on the Site consisting of impervious surfaces (i.e., building, paved surfaces, rubber safety surface over asphalt binder course and imported clean fill material on the playground areas etc.) to prevent human exposure to contaminated soil/fill remaining at the Site;

8. Import of materials used for backfill and cover complied with: (1) NYSDEC requirements, (2) all Federal, State and local rules and regulations for handling and transport of material, and (3) the NYCSCA's specifications;

9. Execution and recording of an Environmental Easement to restrict land use and prevent future exposure to any contamination remaining at the Site; and,

10. Development and implementation of a SMP for long term management of remaining contamination as required by the Environmental Easement,

which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance, and (4) reporting.

2.6 Removal of Contaminated Materials from the Site

Remedial excavation was performed in areas exhibiting hazardous waste characteristics for lead toxicity and in the area of the 1,500-gallon UST. Additionally, soil across the remainder of the Site was excavated in support of construction. A summary of the remedial excavation activities is presented below.

Remedial Excavation – Hazardous Lead Area

The remedial excavation at the approximately 16 by 35-foot area containing hazardous lead was conducted between February and March 2019. Approximately 623 tons of hazardous lead contaminated soil was loaded onto trucks and transported off-Site to Stericycle Environmental Solutions of Hatfield, Pennsylvania for treatment and disposal. The remedial excavations included post-remediation soil sampling for laboratory analysis.

Underground Storage Tank Removal

One 1,500-gallon UST was closed and removed from the Site on December 16, 2018 in accordance with applicable local, State, and Federal regulations, as well as standard industry practices. Prior to UST removal, contents of the UST and fill lines had been removed via a vacuum truck and the interior of the UST/fill line had been cleaned. Approximately 1,465 gallons of non-hazardous waste liquid were removed from the tank and transported to Clean Water of New York, Inc. in Staten Island, New York for disposal as non-hazardous liquid waste. Upon removal, the UST was found to be intact, in good condition, and free of pitting and perforations. The steel was disposed of at an off-site recycling facility. There was no evidence of soil contamination identified following removal of the UST. A figure showing areas where excavation was performed is shown in Figure 7.

Remedial Excavation – Non-Hazardous Soil

In support of Site development, soil was excavated across the entire limits of the Site (up to the Site boundary) to a minimum depth of four feet bgs. Site development depths

were approximately 17 to 18 feet bgs beneath the footprint of the proposed building and cellar-level playground area, and approximately 4 to 16 feet bgs at the ground level playground area on the western portion of the Site. The remedial excavation included post-remediation soil sampling for laboratory analysis. After the completion of soil removal prior to backfilling, a land survey was performed by a New York State licensed surveyor to define the top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow fencing material or equivalent material was placed on this surface to provide a visual reference. This demarcation layer constitutes the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in this SMP.

2.7 Remaining Contamination

2.7.1 Soil

Post-excavation soil samples were collected following the excavation of the 1,500-gallon UST (for analysis of Target Compounds List [TCL]/CP-51 VOCs and SVOCs), following excavation of soils containing hazardous lead (for analysis of TCLP lead), and across the Site to document post-excavation soil conditions. Two samples collected following excavation of hazardous lead, TRC-LEAD-S-E and TRC-LEAD-B, were also analyzed for the post-excavation documentation analyses (VOCs, SVOCs, metals, pesticides, herbicides, and PCBs) to satisfy post-excavation endpoint sampling frequency requirements. The locations of post-excavation soil samples are shown on Figure 7.

The results of the post-excavation soil samples collected for analysis for TCLP lead were below the RCRA regulatory limit.

The results of analyses of the post-excavation samples collected from the UST excavation were below the Unrestricted Use SCOs, Restricted Residential Use SCOs, and CP-51 Tables 2 and 3 SCLs.

The results of analyses of the post-excavation documentation samples collected across the Site where non-hazardous soils were removed for off-Site disposal and in two locations where hazardous lead was excavated indicate one VOC (acetone); nine SVOCs;

six metals; and, three (3) pesticides were detected at concentrations above the corresponding Unrestricted Use SCOs and/or Restricted-Residential Use SCOs.

The tables shown below and Figure 7 summarize the laboratory analytical results for all post-excavation soil samples collected that exceed the Unrestricted Use SCOs and the Restricted Residential Use SCOs at the Site after completion of remedial action.

Table 2 – Remaining Contamination
VOC Detected in Soil at Concentration Above Restricted-Residential and/or Unrestricted Use SCO

Sample ID Units	TRC-B-1 mg/kg		
Approx. Sample Depth Elevation (Feet)	34.40	UUSCO	RRUSCO
Acetone	**0.051**	0.05	100

Notes:
Bold values exceed Unrestricted Use Soil Cleanup Objective (UUSCO)
Shaded values exceed Restricted-Residential Use Soil Cleanup Objective (RRUSCO)
mg/kg – Milligrams per kilogram
Sample depth elevation refers to North American Vertical Datum of 1988 (NAVD 88)

One VOC, acetone, was detected in one soil sample at a concentration slightly above the Unrestricted Use SCO, but below the Restricted-Residential Use SCO.

Table 3 – Remaining Contamination
SVOCs Detected in Soil at Concentrations Above Restricted-Residential and/or Unrestricted Use SCOs

Sample ID Units	TRC-B-1 mg/kg	TRC-S-1W mg/kg	TRC-B-2 mg/kg		
Approx. Sample Depth Elevation (Feet)	34.40	34.40	31.40	UUSCO	RRUSCO
2-Methylphenol	< SCOs	< SCOs	**0.54 J**	0.33	100
Benzo(a)anthracene	**1.2**	**5.1**	**35**	1	1
Benzo(a)pyrene	**1.3 J**	**6.2**	**33**	1	1
Benzo(b)fluoranthene	**1.4**	**6.7**	**42**	1	1
Benzo(k)fluoranthene	< SCOs	**2.7**	**17**	0.8	3.9
Chrysene	**1.1**	**4.9**	**34**	1	3.9
Dibenzo(a,h)anthracene	< SCOs	**0.91**	**3.6**	0.33	0.33
Dibenzofuran	< SCOs	< SCOs	**8.3**	7	59
Indeno[1,2,3-cd]pyrene	**0.73**	**4.1**	**17**	0.5	0.5

Sample ID Units	TRC-S-3N mg/kg	TRC-S-4W mg/kg		
			UUSCO	RRUSCO

Approx. Sample Depth Elevation (Feet)	31.97	34.40		
Benzo(a)anthracene	**3.1**	**9.3**	1	1
Benzo(a)pyrene	**2.7**	**11**	1	1
Benzo(b)fluoranthene	**3.5**	**12**	1	1
Benzo(k)fluoranthene	**1.4**	**4.2**	0.8	3.9
Chrysene	**3.1**	**8.1**	1	3.9
Dibenzo(a,h)anthracene	**0.48**	**1.5**	0.33	0.33
Indeno[1,2,3-cd]pyrene	**1.6**	**7.1 J**	0.5	0.5

Notes:
Bold values exceed Unrestricted Use Soil Cleanup Objective (UUSCO)
Shaded values exceed Restricted-Residential Use Soil Cleanup Objective (RRUSCO)
mg/kg – Milligrams per kilogram
J – Estimated value
Sample depth elevation refers to North American Vertical Datum of 1988 (NAVD 88)

As shown above, nine (9) SVOCs were detected in post-excavation soil samples collected from the northern and eastern portions of the Site at concentrations exceeding the Unrestricted Use and/or Restricted-Residential Use SCOs.

Table 4 – Metals Detected in Soil at Concentrations Above Restricted-Residential and/or Unrestricted Use SCOs

Sample ID Units	TRC-B-1 mg/kg	TRC-S-1W mg/kg	TRC-B-2 mg/kg	TRC-S-2N mg/kg		
Approx. Sample Depth Elevation (Feet)	34.40	34.40	31.40	31.51	UUSCO	RRUSCO
Arsenic	**13.1**	**59.7**	< SCOs	< SCOs	13	16
Copper	**76.5**	< SCOs	**239 J**	**54.2 J**	50	270
Lead	**285 J**	**230 J**	**934**	**118**	63	400
Mercury	**0.26**	< SCOs	**1.2**	**1.1**	0.18	0.81
Zinc	**140**	**132**	**371**	< SCOs	109	10,000

Sample ID Units	TRC-S-3N mg/kg	TRC-S-4W mg/kg	TRC-B-6 mg/kg	TRC-B-7 mg/kg		
Approx. Sample Depth Elevation (Feet)	31.97	34.40	31.35	42.38	UUSCO	RRUSCO
Arsenic	**15.6**	< SCOs	**28.7 J**	< SCOs	13	16
Copper	**67.5 J**	**89.5**	**56 J**	< SCOs	50	270
Lead	**270**	**211 J**	**65.0**	**96.1**	63	400
Mercury	**0.25**	< SCOs	**0.27**	< SCOs	0.18	0.81
Zinc	**539**	< SCOs	< SCOs	< SCOs	109	10,000

Sample ID Units	TRC-DUP-09212021 mg/kg	TRC-S-7W mg/kg	TRC-B-8 mg/kg	TRC-S-11W mg/kg	UUSCO	RRUSCO

Approx. Sample Depth (Elevation)	42.38	42.38	34.56	42.38		
Lead	**85.5**	**70.2**	**139**	**719**	63	400

Sample ID Units	TRC-B-19 mg/kg	TRC-LEAD-S-E mg/kg		
Approx. Sample Depth Elevation (Feet)	39.91	31.88	UUSCO	RRUSCO
Copper	**142**	< SCOs	50	270
Nickel	< SCOs	**30.9**	30	310

Notes:
Bold values exceed Unrestricted Use Soil Cleanup Objective (UUSCO)
Shaded values exceed Restricted-Residential Use Soil Cleanup Objective (RRUSCO)
mg/kg – Milligrams per kilogram
J – Estimated value
TRC-DUP-09212021 is a duplicate of TRC-B-7.
Sample depth elevation refers to North American Vertical Datum of 1988 (NAVD 88)

As shown above, six (6) metals were detected in post-excavation soil samples collected from the northern and eastern portions of the Site at concentrations exceeding the Unrestricted Use and/or Restricted-Residential Use SCOs.

Table 5 – Remaining Contamination
Pesticides Detected in Soil at Concentrations Above Restricted-Residential and/or Unrestricted Use SCOs

Sample ID Units	TRC-B-1 mg/kg	TRC-S-1W mg/kg	TRC-S-2N mg/kg		
Approx. Sample Depth Elevation (Feet)	34.40	34.40	31.51	UUSCO	RRUSCO
4,4'-DDD	< SCOs	**0.023 J**	< SCOs	0.0033	13
4,4'-DDE	< SCOs	**0.028**	< SCOs	0.0033	8.9
4,4'-DDT	**0.0044 J**	**0.050**	**0.0064 J**	0.0033	7.9

Sample ID Units	TRC-S-3N mg/kg	TRC-B-7 mg/kg	TRC-DUP-09212021 mg/kg		
Approx. Sample Depth Elevation (Feet)	31.97	42.38	42.38	UUSCO	RRUSCO
4,4'-DDD	**0.012 p**	< SCOs	< SCOs	0.0033	13
4,4'-DDE	**0.0075**	< SCOs	**0.0046 J**	0.0033	8.9
4,4'-DDT	**0.033**	**0.0040 J**	**0.0097**	0.0033	7.9

Sample ID Units	TRC-S-7W mg/kg	TRC-S-11W mg/kg	TRC-B-11 mg/kg		
Approx. Sample Depth Elevation (Feet)	42.38	42.38	42.38	UUSCO	RRUSCO
4,4'-DDD	< SCOs	< SCOs	< SCOs	0.0033	13
4,4'-DDE	< SCOs	< SCOs	< SCOs	0.0033	8.9
4,4'-DDT	**0.0069 J**	**0.0083**	**0.0034 J**	0.0033	7.9

Sample ID Units	TRC-B-12 mg/kg	TRC-S-15W mg/kg	TRC-B-19 mg/kg		
Approx. Sample Depth Elevation (Feet)	39.67	43.32	39.91	UUSCO	RRUSCO
4,4'-DDD	< SCOs	< SCOs	< SCOs	0.0033	13
4,4'-DDE	< SCOs	< SCOs	< SCOs	0.0033	8.9
4,4'-DDT	**0.0053 J**	**0.0050 J**	**0.0046 J**	0.0033	7.9

Notes:
TRC-DUP-09212021 is a duplicate of TRC-B-7.
Bold values exceed Unrestricted Use Soil Cleanup Objective (UUSCO)
Shaded values exceed Restricted-Residential Use Soil Cleanup Objective (RRUSCO)
mg/kg – Milligrams per kilogram
J – Estimated value
p - The % RPD between the primary & confirmation column/detector is >40%. The lower value has been reported.
Sample depth elevation refers to North American Vertical Datum of 1988 (NAVD 88)

As shown above, three (3) pesticides were detected in post-excavation soil samples collected from the northern, western, and eastern portions of the Site at concentrations exceeding the Unrestricted Use SCOs.

Although the remedial actions completed under the RAWP successfully achieved the remedial objectives, some soil, groundwater, and soil vapor with residual contamination remain beneath the Site after completion of the remedial actions. As a result, a number of engineering and institutional controls are required to protect human health and the environment, as anticipated in the RAWP. These ECs/ICs are described in Section 3.0. Long-term management of ECs/ICs and of residual contamination will be performed under this SMP.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the Site, ICs and ECs are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC project manager.

This plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix B) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and,
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the Site remedy, as determined by the NYSDEC project manager.

3.2 Institutional Controls

A series of ICs is required by the RAWP to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the Site to Restricted Residential, Commercial, and Industrial uses only. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental

Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on the Environmental Easement Survey in Appendix C These ICs are:

- The property may be used for: Restricted Residential, Commercial, or Industrial use;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the NYCDHMH 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;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- 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 the Environmental Easement;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on the Environmental Easement Survey in Appendix C, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the site are prohibited; and
- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 Engineering Controls

3.3.1 Cover System

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system is comprised of the concrete building slab, paved surfaces, and rubber safety surface over asphalt binder course on the playground areas, underlain by a gas permeable aggregate layer and/or approximately 2 to 10 feet of imported backfill material . Imported material used to backfill below the building and paved surfaces meets the lower of the protection of groundwater or the protection of public health soil cleanup objectives for Restricted-Residential Use. Figure 8 presents the location of the cover system. The demarcation layer is show in the post-excavation survey provided in Figure 9. The EWP provided in Appendix B outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed. Procedures for the inspection of this cover are provided in the Monitoring Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) prepared by the Contractor and associated Community Air Monitoring Plan (CAMP) prepared for the Site and provided in Appendix D. Any disturbance beneath the Site's cover system, to the residual contamination zone, must be overseen by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

3.3.2 Gas Vapor Barrier

The school building is constructed with a gas vapor barrier below the concrete floor slabs, below grade walls and bottom slabs and walls of pits and sumps with continuous waterstops within required construction joints. The gas vapor barrier consists of a 60-mil Liquid Boot membrane. Note that the fluid applied gas vapor barrier was installed to work in tandem with the SSDS to prevent soil vapor from entering the building. The gas vapor

barrier was installed and inspected in accordance with NYCSCA and manufacturer requirements.

Procedures for ongoing inspection and repair of the gas vapor barrier are presented in Appendix F. The Environmental Easement Survey in Appendix C shows the location of the ECs for the Site.

3.3.3 Sub-Slab Depressurization System

The school building is constructed with an active SSDS below the gas vapor barrier, which is designed and installed to minimize the potential for vapor intrusion. The principal components of the SSDS include:

- Two (2) suction pits beneath the floor slab;
- Two (2) vertical risers, at least 6 inches in diameter, from each of the common headers discharging above the building roof;
- Two (2) exterior suction fans mounted on the school building roof;
- Four (4) monitoring points at selected locations throughout the building, installed through the lowest level floor slab; and,
- A warning device (alarm) when the vacuum drops below a set point.

The layout and installed components of the SSDS are presented in Appendix F. The operations, maintenance, and monitoring ("OM&M") requirements for the SSDS consists of initial start-up testing, routine maintenance and monitoring activities, and non-routine maintenance activities. Procedures for operating and maintaining the SSDS are documented in the Operation and Maintenance Plan (Section 5.0 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. The Environmental Easement Survey in Appendix C shows the location of the ECs for the Site.

Operation and maintenance of the active SSDS and GVB will not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the active SSDS may be submitted by the property owner (NYCSCA) based on confirmatory data that justifies such request.

3.3.4 Criteria for Termination of Engineering Controls

Generally, remedial processes are considered completed when 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 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

The remedial party will also conduct any needed Site restoration activities, such as asphalt patching. In addition, the remedial party will conduct any necessary restoration of vegetation coverage, trees and wetlands (as applicable), and will comply with NYSDEC and United States Army Corps of Engineers regulations and guidance. Also, the remedial party will ensure that no ongoing erosion is occurring on the Site.

3.3.4.1 – Cover System

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.3.3.2 – Gas Vapor Barrier

The gas vapor barrier is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in perpetuity. Maintenance (i.e.,

repair) of the gas vapor barrier, performed as needed when potential future construction activities penetrate the floor slab, will not be discontinued unless prior written approval is granted by the NYSDEC and NYSDOH. In the event that monitoring data indicates that the vapor intrusion mitigation is no longer required, a proposal to discontinue the inspection/maintenance of the gas vapor barrier will be submitted by the property owner to the NYSDEC and NYSDOH.

3.3.4.2 - Sub-Slab Depressurization System (SSDS)

The active SSDS will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH project managers. If monitoring data indicates that the SSDS may no longer be required, a proposal to discontinue the SSDS will be submitted by the remedial party to the NYSDEC and NYSDOH project managers.

4.0 MONITORING PLAN

4.1 General

This Monitoring Plan describes the measures for evaluating the overall 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 Section 5, Operation and Maintenance Plan. This Monitoring Plan may only be revised with the approval of the NYSDEC project manager.

This Monitoring Plan describes the methods to be used for evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

To adequately address these issues, this Monitoring Plan provides information on:

- All designed monitoring systems; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site – Wide Inspection

Site-wide inspections will be performed at a minimum of once per year. These periodic inspections must be conducted when the ground surface is visible (i.e., no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix E – Site Management Forms. The 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;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report (PRR). The inspections will determine and document the following:

- Whether ECs 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;
- If site records are complete and up to date; and
- Changes, or needed changes, to the remedial or monitoring system.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC project manager must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as defined in 6 NYCCR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor, and maintain the mechanical components of the remedy selected for the site. This Operation and Maintenance Plan:

- Includes the procedures 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 is operated and maintained.

Information on non-mechanical Engineering Controls (i.e., Site cover system) is provided in Section 3 - Engineering and Institutional Control Plan. Further detail regarding the Operation and Maintenance of the SSDS and gas vapor barrier is provided in Appendix F - Operation and Maintenance Manual. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Operation and Maintenance of SSDS

The following sections provide a description of the operations and maintenance of the SSDS.

5.2.1 SSDS Start-Up and Testing

This subsection outlines the procedures for confirming the effectiveness and proper installation of the SSDS prior to building occupancy and complies with the post mitigation/confirmation testing requirements of NYSDOH's Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006. The following actions will be performed following start-up of the SSDS:

1. Negative Pressure of the sub-slab area relative to indoor air will be measured at each monitoring point utilizing an appropriate hand-held instrument. A negative differential pressure will be confirmed between the indoor and the sub-slab vapor spaces.

2. The operation of the warning device for low or no suction will be confirmed.

The system testing described above will be conducted if, in the course of the SSDS lifetime, significant changes are made to the system, and the system must be restarted. Additionally, start-up testing will be required if there is a change in building use or occupancy. NYSDEC and NYSDOH must be notified of any changes in the building use or occupancy. The school's Building Management System (BMS) will be programmed to monitor the status of the SSDS on a continuous basis. In the interim, alarm indication stations (AIS) monitor the SSDS pressure switches installed in SSDS riser piping and provide an audible alarm when there is a low suction condition. In the event of alarm activation at the BMS, the school custodian will be notified via email. If unacknowledged for more than 10 minutes, an email will be sent to the Regional Facilities Manager (Deputy Director of Facilities) and the Borough Maintenance Planner simultaneously. Subsequent to the initial start-up testing, annual inspection and monitoring of the SSDS will be performed, as described below.

5.2.2 Routine System Operation and Maintenance

Routine maintenance and inspection will be conducted to ensure that the SSDS is operating properly and will continue in accordance with the schedule contained in this SMP.

The following tasks will be performed by the Custodial Engineer (unless noted otherwise) on the first week of each month and after a severe condition (e.g., major flooding, power outage, etc.).

- Inspect the roof top piping, suction fans, and accessories for evidence of damage. In the event of a change from previous conditions, log the information in the logbook and monthly inspection form and immediately request an inspection from New York City Department of Education Environmental Health and Safety Division (DOE EHS). The DOE EHS's report will include a drawing with the locations and type of damage.
- In the event that a fan component fails, the component will be replaced by DOE EHS. DOE EHS will make appropriate arrangements in advance with suppliers to provide SSDS replacement parts within 12 hours notice. In the event that a fan unit fails, the fan unit will be replaced by DOE EHS. A spare fan will be available on-Site for immediate replacement in case of fan failure.
- Identify any maintenance or repair activity that could affect the lowest level slabs, subgrade walls, SSDS piping, or rooftop components.
- Log the information in the logbook and monthly inspection form.

Additionally, an annual inspection performed by the DOE EHS's independent Professional Engineer will consist of, at a minimum, an inspection of the school grounds, lowest level floor slabs, monitoring points, exhaust fan(s) (including presence of spare fan), and fan exhaust stack(s). Appendix E contains a routine maintenance SSDS checklist.

The SSDS fans require routine and preventative maintenance for efficient operation. This maintenance shall be performed by qualified building personnel (i.e., the Custodial Engineer) semi-annually and as required. NYSDOH and NYSDEC must be notified of any maintenance required as a result of the routine inspections. Appendix E contains a routine maintenance SSDS checklists and a manual for the SSDS suctions fans.

5.2.3 Non-Routine Operation and Maintenance

Non-routine maintenance would typically occur when the warning device indicates that the SSDS is not working properly, or the system becomes damaged. The scope of non-routine maintenance will vary depending upon the situation and the severity of the condition. A severe condition is defined as a condition where the system cannot be repaired by the Custodial Engineer and will then be reported to DOE EHS.

If an emergency occurs, such as a natural disaster or an unforeseen failure of the ECs, which results in a severe condition, an inspection of the Site will be conducted by DOE EHS immediately following the event and reported to NYSDEC and NYSDOH by noon the following day. If a severe condition is observed during a monthly inspection, DOE EHS will notify NYSDEC and NYSDOH within 48 hours of the inspection. NYSDOH and NYSDEC must be notified of any maintenance required as a result of the routine inspections.

5.2.4 System Monitoring Devices and Alarms

The SSDS has a warning device to indicate that the system is not generating suction. In the event that warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSDS will be restarted. Operational problems will be noted in the PRR to be prepared for that reporting period.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated ECs/remedial systems. Vulnerability assessments provide information so that the site and associated ECs/remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or ECs to severe storms/weather events and associated flooding.

The Site is not located in a flood plain, low-lying, or low-groundwater recharge area. In addition, depth to groundwater at the Site is approximately 50 feet bgs. Since the site is fully covered with impervious surfaces, there are no areas of the site which may be susceptible to erosion or damage during periods of severe rain or high wind events.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the PRR.

There is no active remediation system installed at the Site. Although not a remediation system, efforts will be made to reduce energy consumption associated with the SSDS. Variable Frequency Drives (VFDs) were included in the SSDS design which will allow SSDS power usage to be throttled back while confirming that adequate sub-slab suction is maintained. Methods proposed to reduce energy consumption, resource usage, waste generation, etc. will be included in the PRR.

6.2.1 Timing of Green Remediation Evaluations

There is no active remediation system installed at the Site. For major engineering control components, green remediation evaluations and corresponding modifications will be undertaken at any time that the NYSDEC project manager feels appropriate, e.g., during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.2 Engineering Controls

ECs will be operated properly considering the current site conditions to conserve materials and resources to the greatest extent possible. Consideration will be given to operating rates.

6.2.3 Building Operations

Structures including buildings and sheds will be operated and maintained to provide for the most efficient operation of the remedy, while minimizing energy, waste generation and water consumption. The NYC Green Schools Guide and Rating System, which was developed to guide the sustainable design, construction and operation of new schools, modernization projects and school renovations, and achieve compliance with Local Law

86 of 2005 (New York City's Green Building Law), will be utilized for operation and maintenance of the school building.

6.2.4 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site and use of consumables in relation to visiting the Site in order to conduct system checks. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix E. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 6 and summarized in the Periodic Review Report.

Table 6: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Inspection Report	Monthly
Periodic Review Report	Annually, or as otherwise determined by the NYSDEC

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC project manager. Monthly inspection reports will be provided to NYSDEC annually in the Periodic Review Report.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;

- 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);
- Copies of all field forms completed; and
- Any observations, conclusions, or recommendations.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- 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).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- 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).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link:
http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

A PRR will be submitted to the NYSDEC project manager beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial PRR, the next PRR shall be submitted annually to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that the site is subdivided into separate parcels with different ownership, a single PRR will be prepared that addresses the site described in Appendix C – Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. 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, fire inspections and severe condition inspections, if applicable.
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- A summary of any information generated during the reporting period, with comments and conclusions.
- A site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the site-specific RAWP;
  - The operation and the effectiveness of the SSDS., 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.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice and registered in New York State will prepare, and include in the PRR, the following certification as per the requirements of NYSDEC DER-10:

"*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;*
- *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, [name], of [business address], am certifying as [Owner/Remedial Party or Owner's/Remedial Party's Designated Site Representative [I have been authorized and designated by all site owners/remedial parties to sign this certification] for the site."

"I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report."

At the end of each certifying period, as determined by the NYSDEC project manager, the following certification will be provided to the NYSDEC project manager:

"For each institutional control identified for the site, I certify that all of the following statements are true:

- *The institutional 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;*
- *Use of the site is compliant with the environmental easement.*
- *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, [name], of [business address], am

certifying as [Owner or Owner's Designated Site Representative [and I have been authorized and designated by all site owners to sign this certification] for the site."
No new information has come to my attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid; and

Every five years the following certification will be added:

- *The assumptions made in the qualitative exposure assessment remain valid.*

The signed certification will be included in the PRR.

The PRR will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager. The PRR may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

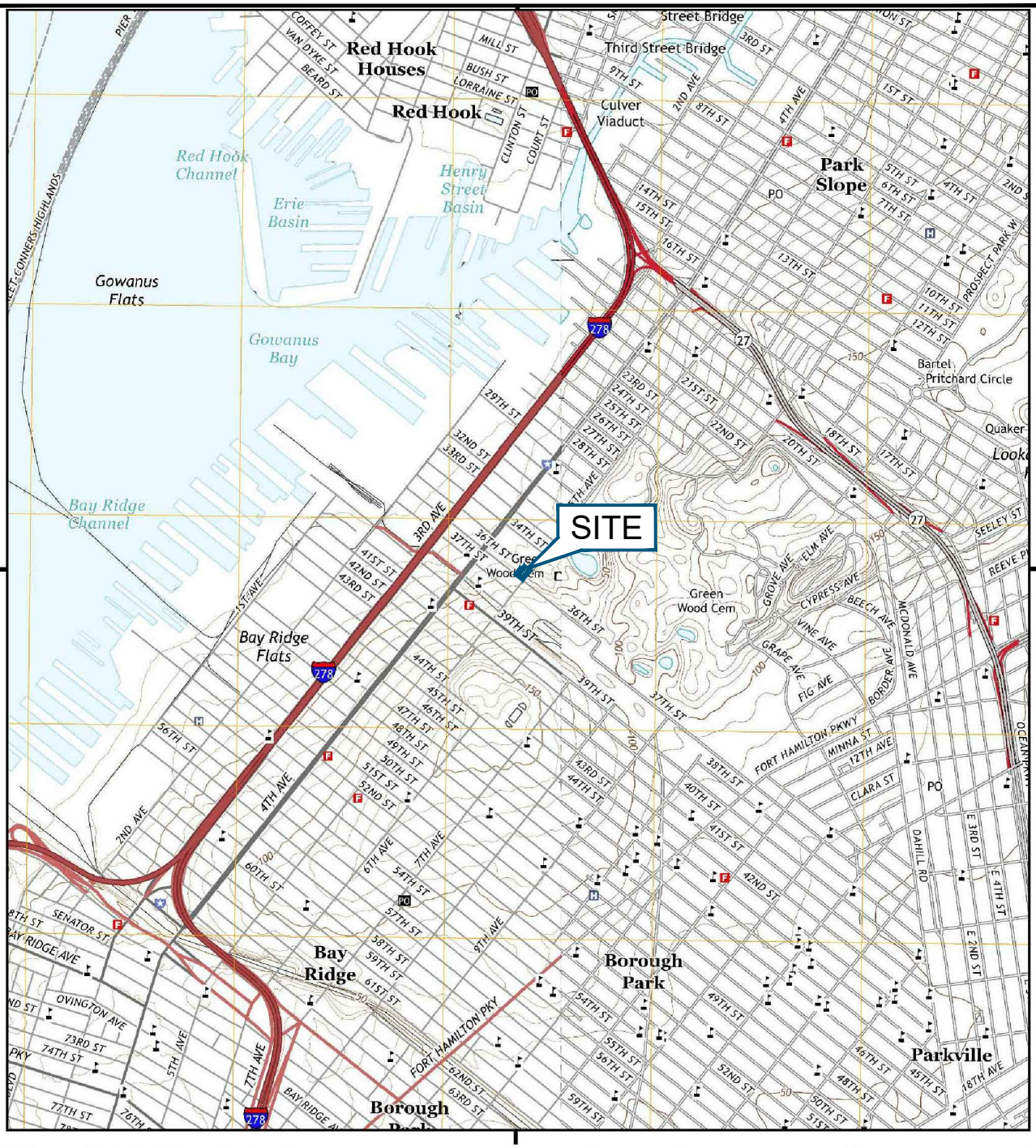
7.3 Corrective Measures Work Plan

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 or failure to conduct site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager 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 Work Plan until it has been approved by the NYSDEC project manager.

8.0 REFERENCES

1. 6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.
2. ASTM E 2600-15 "Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions."
3. D&B Engineers and Architects, P.C., Phase I Environmental Site Assessment of Proposed Public School, 836-841 5th Avenue, Brooklyn, New York 11232, December 2, 2016.
4. D&B Engineers and Architects, P.C., Phase II Environmental Site Investigation of Proposed Public School, 836-841 5th Avenue, Brooklyn, New York 11232, March 15, 2017.
5. Impact Environmental, Quarterly Monitoring Report & Remedial Investigation Work Plan, 4th Quarter 2015 Monitoring Event, NYSDEC Spill# 94-06838 at 842 Fifth Avenue, Brooklyn, NY, January 28, 2016.
6. Middleton Environmental, Phase I Environmental Site Assessment of 836 to 841 5th Avenue (Block 693, Lot 39), Brooklyn, New York, December 2000.
7. NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".
8. NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).
9. NYSDOH, "Guidance for Evaluating Soil Vapor Intrusion in the State of New York", October 2006, as amended in May 2017.
10. TRC Engineers, Inc., Phase I Environmental Site Assessment of 471 36th Street (Block 693, Lot 48), Brooklyn, New York, July 27, 2017.
11. TRC Engineers, Inc., Supplemental Phase II Environmental Site Investigation for 836-841 5th Avenue (Block 693, Lot 39), Brooklyn, New York, March 31, 2017.
12. TRC Engineers, Inc., Remedial Investigation Report for 840 5th Avenue (Block 693, Lot 39), Brooklyn, New York, May 2018.
13. TRC Engineers, Inc., Supplemental Remedial Investigation Report for 840 5th Avenue (Block 693, Lot 39), Brooklyn, New York, July 17, 2018.
14. TRC Engineers, Inc., Remedial Action Work Plan for 840 5th Avenue (Block 693, Lot 39), Brooklyn, New York, September 2018.
15. USGS Hydraulic Conditions Maps for Long Island, NY 2006 (Long Island Depth to Water Viewer and Groundwater Conditions on Long Island, New York in 2006).

FIGURES



This report includes information from the following map sheet(s).

NW N NE
W E
SW S SE

TP, Jersey City, 2014, 7.5-minute
NE, Brooklyn, 2013, 7.5-minute

SITE NAME: 840 5th Avenue
ADDRESS: 840 5th Avenue
Brooklyn, NY 11232

N

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PROJECT: **NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY**
SITE MANAGEMENT PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

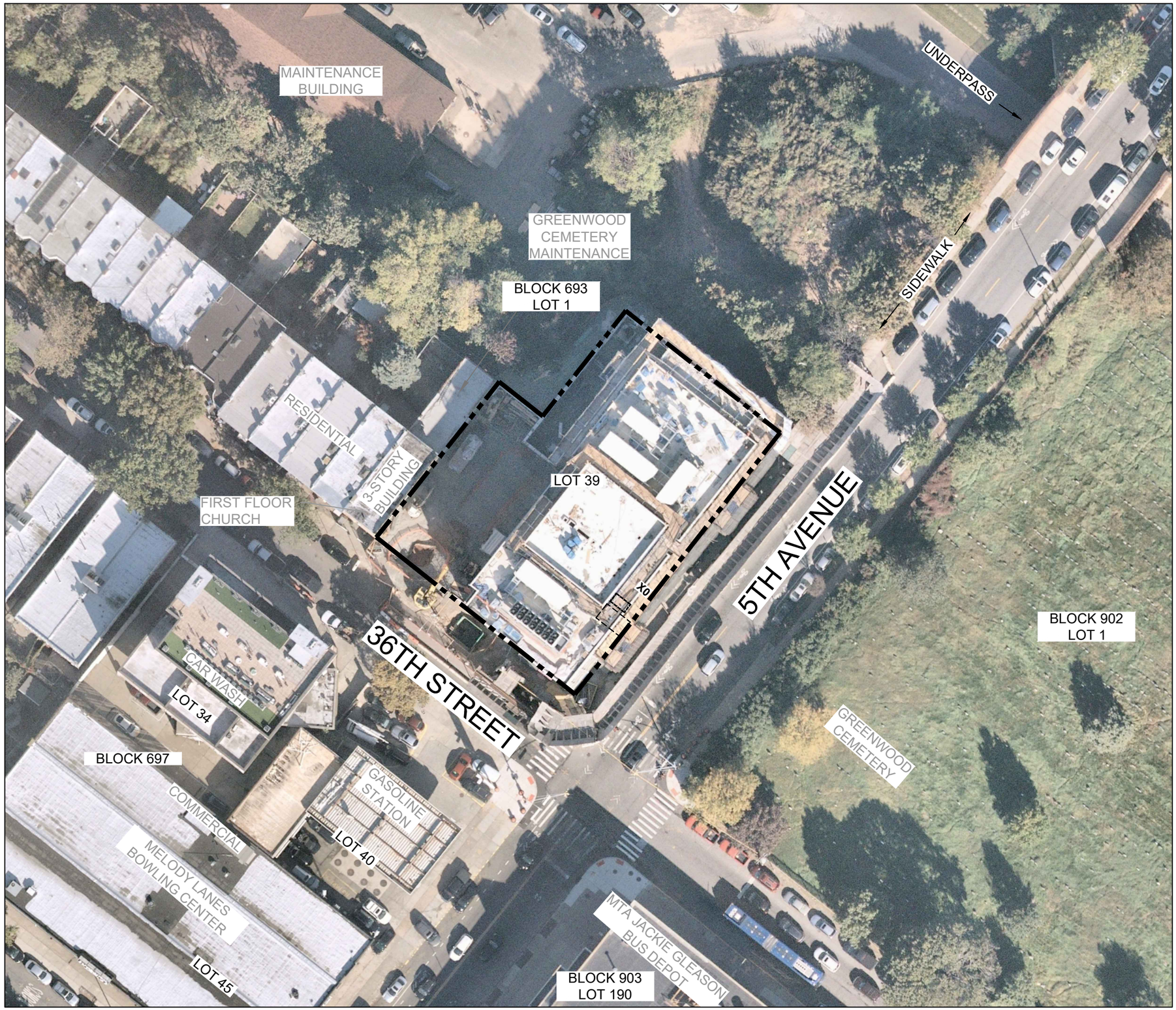
TITLE:

SITE LOCATION MAP

DRAWN BY:	H. DELGADO
CHECKED BY:	L. O'HARA
APPROVED BY:	K. BOGER
DATE:	MARCH 2022
PROJ. NO.:	356549
FILE:	Fig 1 - Site Loc. Map.dwg

FIGURE 1

8.5x11 --- ATTACHED IMAGES: --- ATTACHED XREFS: ---
DRAWING NAME: \\nyc-fp1\environmental\Shared\Projects\NYCSCA Contract C000014345\K671 - 840 5th Avenue\Site Management Plan\Figures\TRC Working Drawings\ Fig 1 - Site Loc. Map.dwg --- PLOT DATE: March 21, 2022 - 10:39PM --- LAYOUT: 8.5x11P
EDR 2013-14 Hist. Topo. Map:



LEGEND (SYMBOLS NOT TO SCALE):

- SITE BOUNDARY
- LOCATION OF FORMER 1,500-GALLON UST
- LOCATION OF FORMER BOILER ROOM

W – N – E

NOTES:

1. LOCATIONS AND DIMENSIONS OF PHYSICAL FEATURES AND PROPERTY BOUNDARIES ARE APPROXIMATE.
2. AERIAL IMAGE SOURCED FROM NEARMAP DATED OCTOBER 19, 2021..

0 50' 100'

SCALE: 1" = 50'
SHEET SIZE: 11" BY 17"

PROJECT: **NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY**
SITE MANAGEMENT PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE:

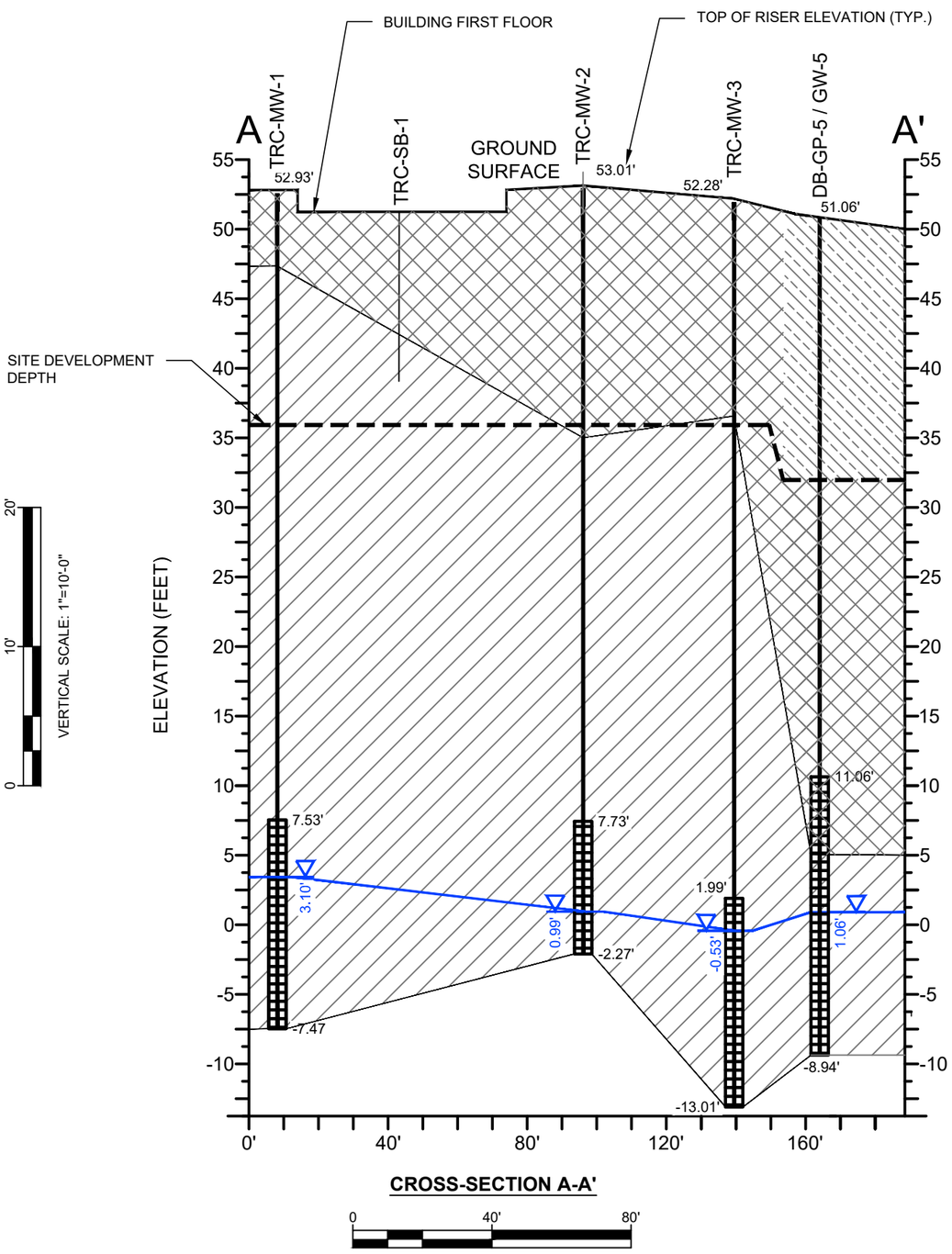
SITE PLAN

DRAWN BY:	H. DELGADO	PROJ NO.:	356549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		**FIGURE 2**
DATE:	MARCH 2022		

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FILE NO.: Fig 2 - Site Plan.dwg

11x17 — ATTACHED XREFS: Brooklyn; K000(K671) - ITP025; B 69B-39-ENVI EASEMENT; 840 5TH AVE (NY83-LF) — ATTACHED IMAGES: 838-841 5th avenue map; image; EPSG2263; 20211019; K671 AE Project Meeting No. 5 - 10-10-17 (002).PLES;
DRAWING NAME: \\nyc-fp1\environmental\Shared\Projects\NYCSCA Contract C000143451\K671 - 840 5th Avenue\Site Management Plan\Figures\TRC Working Drawings\Fig 2 - Site Plan.dwg --- PLOT DATE: March 21, 2022 - 10:42PM --- LAYOUT: 11X17L



CROSS-SECTION A-A'

0 — 40' — 80'

HORIZONTAL SCALE: 1"=40'-0"

20' — 10' — 0

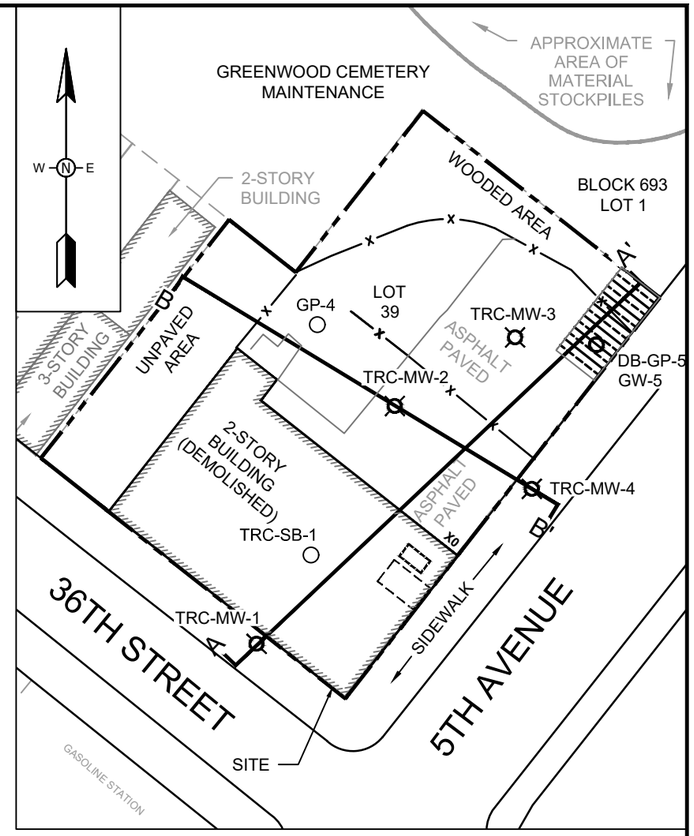
VERTICAL SCALE: 1"=10'-0"

LEGEND (SYMBOLS NOT TO SCALE):

- SITE BOUNDARY
- BUILDING FOOTPRINT
- FENCE
- DB-GP-5 / GW-5 — SOIL BORING / GROUNDWATER SAMPLE LOCATION AND IDENTIFICATION NUMBER
- TRC-MW-# — MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- LOCATION OF FORMER 1,500-GALLON UST
- LOCATION OF FORMER BOILER ROOM
- #.##' — WATER TABLE ELEVATION
- ##.##' — MONITORING WELL SCREEN AND ELEVATION
- FILL
- MOSTLY SAND, SILT, GRAVEL
- HAZARDOUS LEAD SOIL

NOTES:

1. FEATURES SHOWN REPRESENT SITE CONDITIONS PRIOR TO DEVELOPMENT AND CONSTRUCTION. LOCATIONS AND DIMENSIONS OF PHYSICAL FEATURES AND PROPERTY BOUNDARIES ARE APPROXIMATE.
2. MONITORING WELLS SURVEYED ON FEBRUARY 21, 2017 BY MEGA CONSTRUCTION MANAGEMENT, INC.
3. ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. GROUNDWATER SURFACE ELEVATIONS MEASURED ON MARCH 10, 2017.
5. SOIL BORING / GROUNDWATER SAMPLE LOCATION DB-GP-5 / GW-5 WAS SURVEYED ON SEPTEMBER 14, 2017 BY EWELL W. FINLEY, P.C. CONSULTING ENGINEERS & LAND SURVEYORS.



TRANSECT LOCATION MAP

0 — 50' — 100'

SCALE: 1" = 50'

PROJECT: **NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY**
SITE MANAGEMENT PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE:

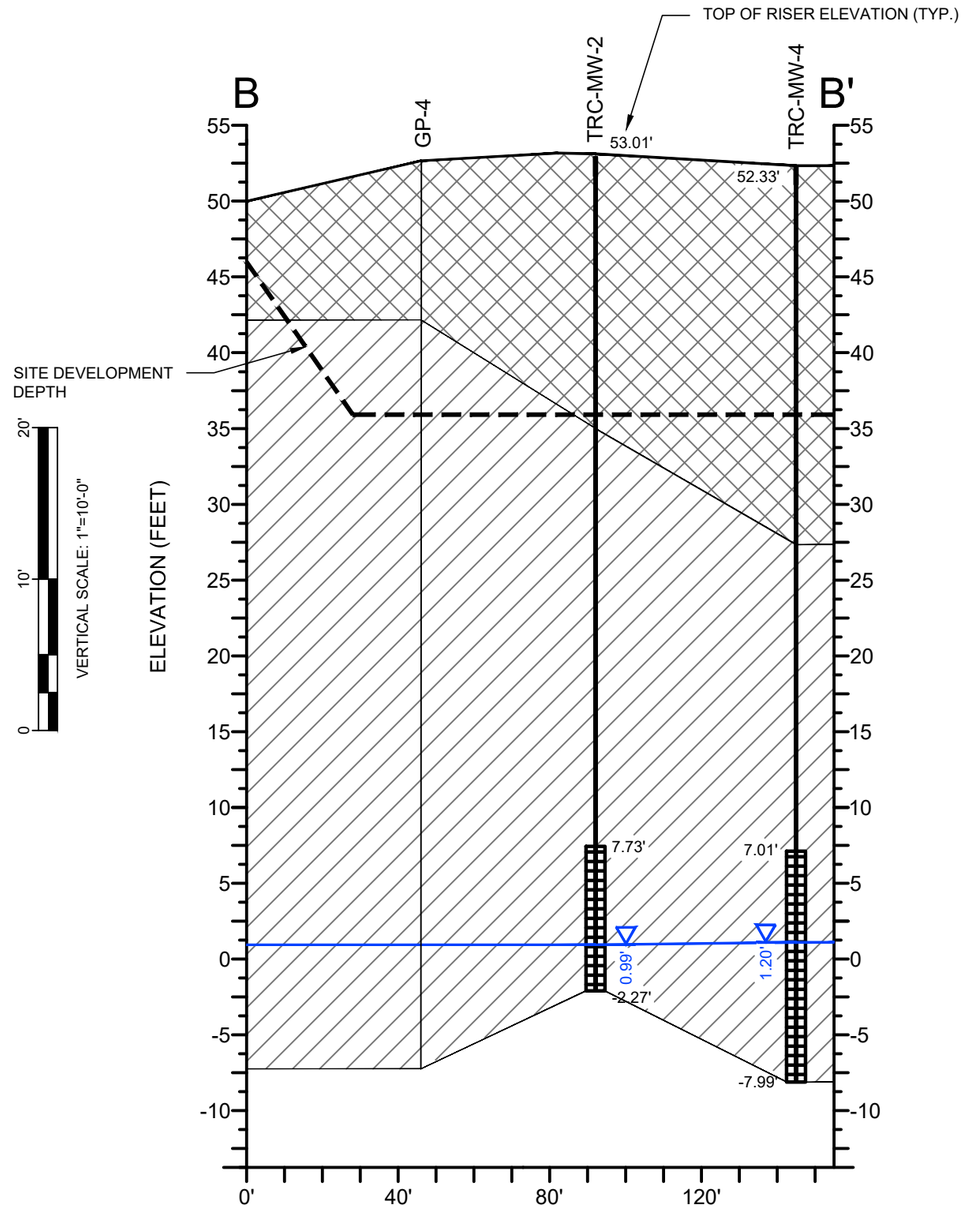
GEOLOGICAL CROSS-SECTION A-A'

DRAWN BY:	H. DELGADO	PROJ NO.:	356549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		**FIGURE 3**
DATE:	MARCH 2022		

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FILE NO.: Fig 3-4 - Geo. X-Sct A-A' & B-B'.dwg

11x17 --- ATTACHED XREFS: Brooklyn, K0000(671) - (TOPO)S, B 693-39-ENVI EASEMENT, 840 5TH AVE (NYS3-LIF) --- ATTACHED IMAGES:
DRAWING NAME: I:\Projects\NYCSCA Contract C000014345\K671 - 840 5th Avenue\Site Management Plan\Figures\TRC Working Drawings\ Fig 3-4 - Geo. X-Sct A-A' & B-B'.dwg --- PLOT DATE: March 18, 2022 - 11:53PM --- LAYOUT: 11X17L (A-A')



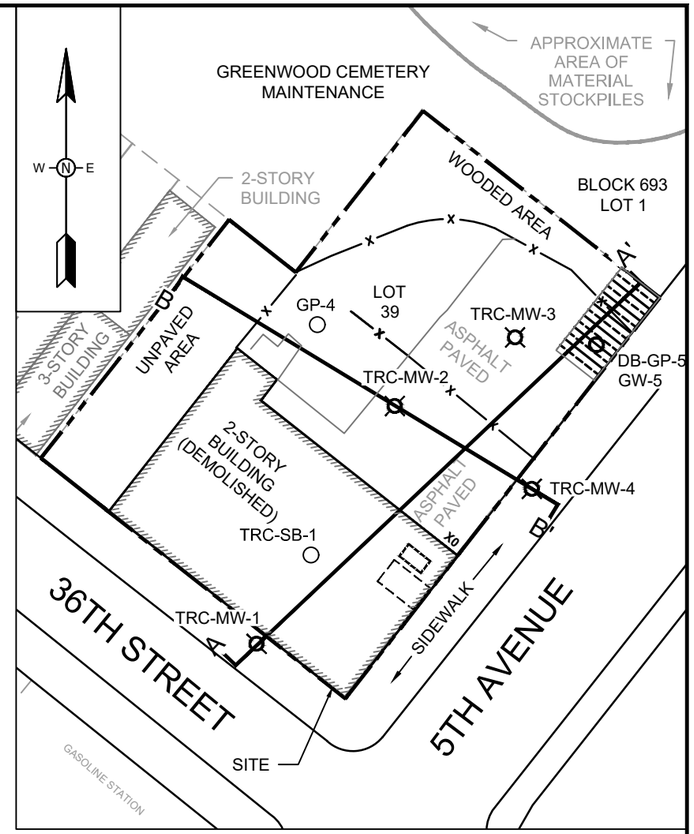
CROSS-SECTION B-B'

0 40' 80'

HORIZONTAL SCALE: 1"=40'-0"

LEGEND (SYMBOLS NOT TO SCALE):

- SITE BOUNDARY
- BUILDING FOOTPRINT
- FENCE
- DB-GP-5 / GW-5 — SOIL BORING / GROUNDWATER SAMPLE LOCATION AND IDENTIFICATION NUMBER
- TRC-MW-# — MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- FORMER LOCATION OF 1,500-GALLON UST
- FORMER LOCATION OF BOILER ROOM
- #.## — WATER TABLE ELEVATION
- ##.## — MONITORING WELL SCREEN AND ELEVATION
- FILL
- MOSTLY SAND, SILT, GRAVEL



TRANSECT LOCATION MAP

0 50' 100'

SCALE: 1" = 50'

NOTES:

1. FEATURES SHOWN REPRESENT SITE CONDITIONS PRIOR TO DEVELOPMENT AND CONSTRUCTION. LOCATIONS AND DIMENSIONS OF PHYSICAL FEATURES AND PROPERTY BOUNDARIES ARE APPROXIMATE.
2. MONITORING WELLS SURVEYED ON FEBRUARY 21, 2017 BY MEGA CONSTRUCTION MANAGEMENT, INC.
3. ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. GROUNDWATER SURFACE ELEVATIONS MEASURED ON MARCH 10, 2017.
5. SOIL BORING / GROUNDWATER SAMPLE LOCATION DB-GP-5 / GW-5 WAS SURVEYED ON SEPTEMBER 14, 2017 BY EWELL W. FINLEY, P.C. CONSULTING ENGINEERS & LAND SURVEYORS.

PROJECT: **NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY**
SITE MANAGEMENT PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE:

GEOLOGICAL CROSS-SECTION B-B'

DRAWN BY:	H. DELGADO	PROJ NO.:	356549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		**FIGURE 4**
DATE:	MARCH 2022		

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FILE NO.: Fig 3-4 - Geo. X-Sct A-A' & B-B'.dwg

11x17 — ATTACHED XREFS: Brooklyn, 6000(K671) -170925, B 693-39-ENVI EASEMENT, 840 5TH AVE (NYBULIF) — ATTACHED IMAGES:
DRAWING NAME: I:\Projects\NYCSCA Contract C000014345\K671 - 840 5th Avenue\Site Management Plan\Figures\TRC Working Drawings\Fig 3-4 - Geo. X-Sct A-A' & B-B'.dwg — PLOT DATE: March 18, 2022 - 11:55PM — LAYOUT: 11X17L (B-B')

MAINTENANCE BUILDING

UNDERPASS

APPROXIMATE AREA OF MATERIAL STOCKPILES

GREENWOOD CEMETERY MAINTENANCE

2-STORY BUILDING

SIDEWALK

WOODED AREA

BLOCK 693
LOT 1

LOT 39

TRC-MW-3
EL. -0.42 / 52.41 BGS

TRC-MW-2
EL. 1.30 / 51.43 BGS

TRC-MW-4
EL. 1.28 / 50.73 BGS

TRC-MW-1
EL. 3.10 / 49.43 BGS

0.00
0.50
1.00
1.50
2.00
2.50
3.00

ASPHALT PAVED

2-STORY BUILDING

RESIDENTIAL

3-STORY BUILDING

FIRST FLOOR CHURCH

5TH AVENUE

CAR WASH

GASOLINE STATION

COMMERCIAL

MELODY LANES BOWLING CENTER

36TH STREET

MTA JACKIE GLEASON BUS DEPOT

GREENWOOD CEMETERY

LEGEND (SYMBOLS NOT TO SCALE):

- SITE BOUNDARY
- BUILDING FOOTPRINT
- FENCE
- TRC-MW-# — MONITORING WELL AND IDENTIFICATION NUMBER
- EL. 49.43 — GROUNDWATER SURFACE ELEVATION (IN FEET)
- 49.00 — GROUNDWATER SURFACE ELEVATION CONTOUR (FEET)
- INFERRED ON-SITE GROUNDWATER FLOW DIRECTION (TRC 02.21.17)
- GROUNDWATER FLOW DIRECTION (IMPACT 01.09.16)

W – N – E

NOTES:

1. FEATURES SHOWN REPRESENT SITE CONDITIONS PRIOR TO DEVELOPMENT AND CONSTRUCTION. LOCATIONS AND DIMENSIONS OF PHYSICAL FEATURES AND PROPERTY BOUNDARIES ARE APPROXIMATE.
2. MONITORING WELLS SURVEYED ON FEBRUARY 21, 2017 BY MEGA CONSTRUCTION MANAGEMENT, INC.
3. ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. BGS - BELOW GROUND SURFACE.

0 50' 100'

SCALE: 1" = 50'
SHEET SIZE: 11" BY 17"

PROJECT: **NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY**
SITE MANAGEMENT PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
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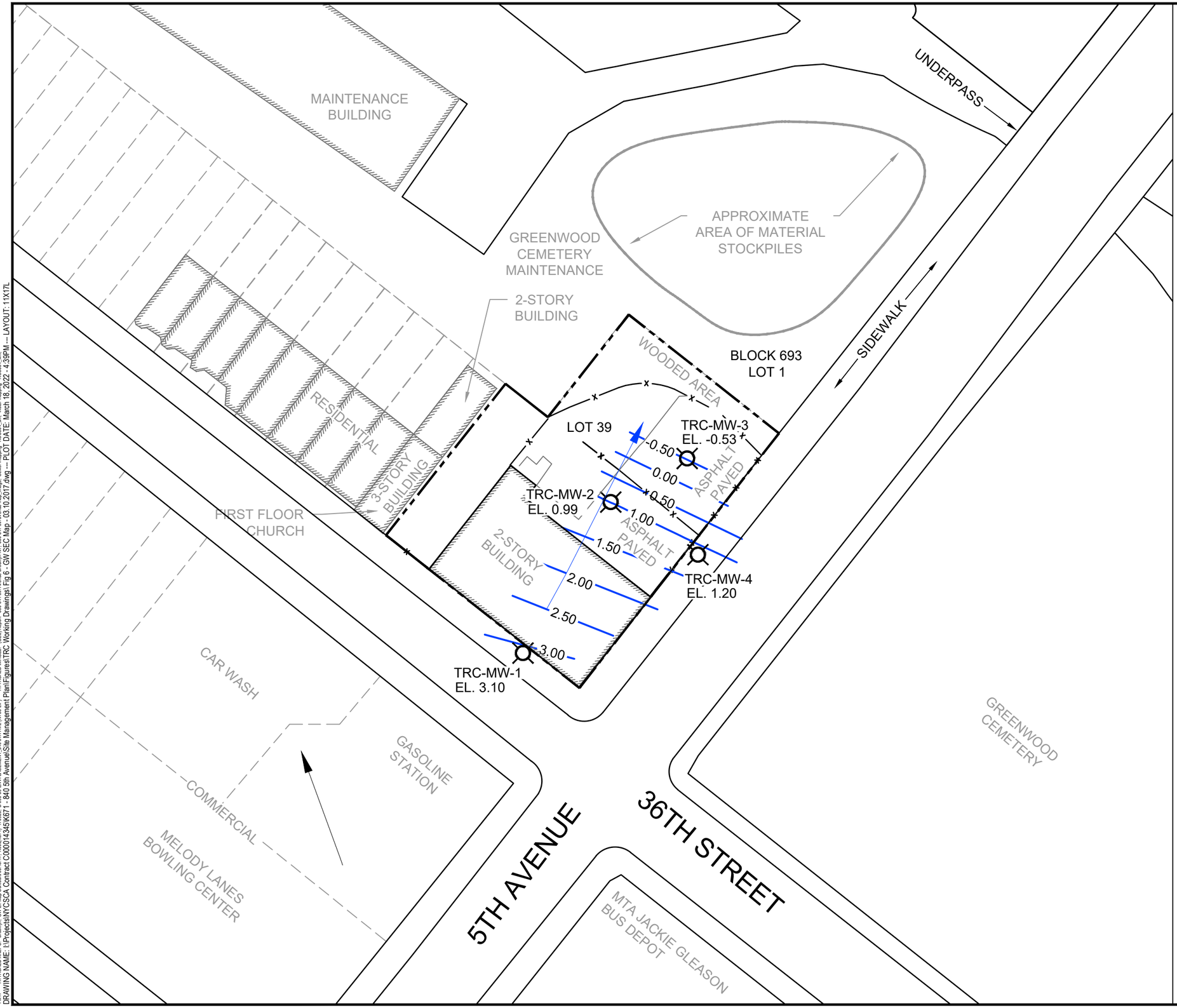
TITLE:
GROUNDWATER SURFACE ELEVATION CONTOUR MAP - FEBRUARY 21, 2017

DRAWN BY:	H. DELGADO	PROJ NO.:	356549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		**FIGURE 5**
DATE:	JULY 2022		

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FILE NO.: Fig 5 - GW SEC Map - 02.21.2017.dwg

11x17 -- ATTACHED XREFS: Border - GW SEC Map.dwg -- Xref Border - 8.5X11.dwg -- Xref Border - 8.5X11 (2).dwg -- Xref Border - 8.5X11 (3).dwg -- Xref Border - 8.5X11 (4).dwg -- Xref Border - 8.5X11 (5).dwg -- Xref Border - 8.5X11 (6).dwg -- Xref Border - 8.5X11 (7).dwg -- Xref Border - 8.5X11 (8).dwg -- Xref Border - 8.5X11 (9).dwg -- Xref Border - 8.5X11 (10).dwg -- Xref Border - 8.5X11 (11).dwg -- Xref Border - 8.5X11 (12).dwg -- Xref Border - 8.5X11 (13).dwg -- Xref Border - 8.5X11 (14).dwg -- Xref Border - 8.5X11 (15).dwg -- Xref Border - 8.5X11 (16).dwg -- Xref Border - 8.5X11 (17).dwg -- ATTACHED IMAGES: Xref Border - 8.5X11 (18).dwg -- Xref Border - 8.5X11 (19).dwg -- Xref Border - 8.5X11 (20).dwg -- Xref Border - 8.5X11 (21).dwg -- Xref Border - 8.5X11 (22).dwg -- Xref Border - 8.5X11 (23).dwg -- Xref Border - 8.5X11



LEGEND (SYMBOLS NOT TO SCALE):

- SITE BOUNDARY
- BUILDING FOOTPRINT
- FENCE
- TRC-MW-# — MONITORING WELL AND IDENTIFICATION NUMBER
- EL. 49.43 — GROUNDWATER SURFACE ELEVATION (IN FEET)
- 49.00 — GROUNDWATER SURFACE ELEVATION CONTOUR (FEET)
- INFERRED ON-SITE GROUNDWATER FLOW DIRECTION (TRC 03.10.17)
- GROUNDWATER FLOW DIRECTION (IMPACT 01.07.16)

W – N – E

NOTES:

1. FEATURES SHOWN REPRESENT SITE CONDITIONS PRIOR TO DEVELOPMENT AND CONSTRUCTION. LOCATIONS AND DIMENSIONS OF PHYSICAL FEATURES AND PROPERTY BOUNDARIES ARE APPROXIMATE.
2. MONITORING WELLS SURVEYED ON FEBRUARY 21, 2017 BY MEGA CONSTRUCTION MANAGEMENT, INC.
3. ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

0 50' 100'

SCALE: 1" = 50'
SHEET SIZE: 11" BY 17"

PROJECT: **NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY**
SITE MANAGEMENT PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

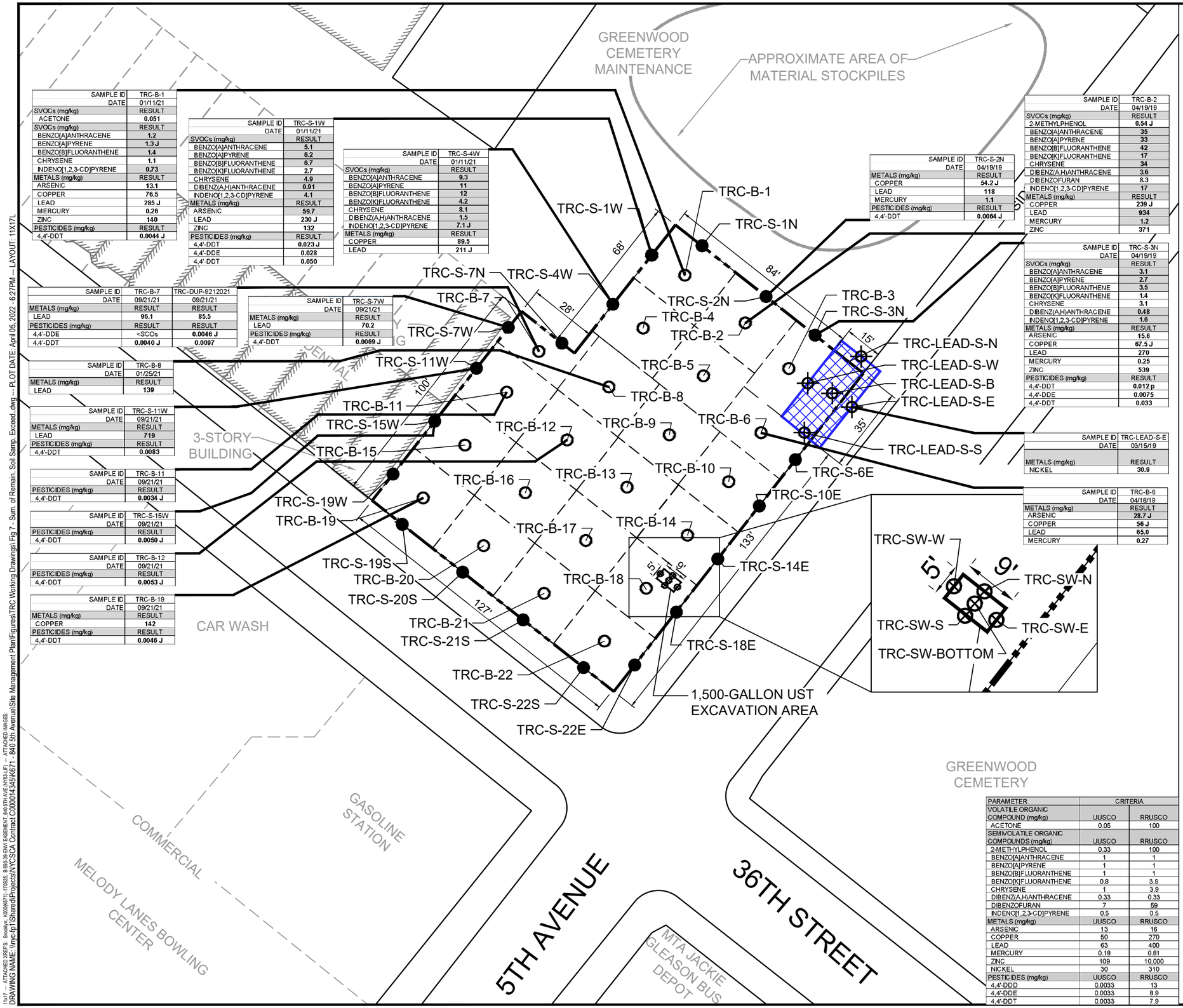
TITLE:
GROUNDWATER SURFACE ELEVATION CONTOUR MAP - MARCH 10, 2017

DRAWN BY:	H. DELGADO	PROJ NO.:	356549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		**FIGURE 6**
DATE:	MARCH 2022		

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New York, NY 10018
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FILE NO.: Fig 6 - GW SEC Map - 03.10.2017.dwg

11x17 --- ATTACHED XREFS: Brooklyn, GW El. Map Contours 03.13.17 - K0000607(1)-170925; B 693-39-BNVI EASEMENT_840 5TH AVE (NY83-LF) --- ATTACHED IMAGES: (GES) Report - 838-841 5th Avenue Brooklyn, NY; 838-841 5th avenue map_image; Sewer mapping - RCU854_wm; Water mapping - RCU854_wm;
DRAWING NAME: I:\Projects\NYCSCA Contract C000014345\K671 - 840 5th Avenue\Site Management Plan\Figures\TRC Working Drawings\Fig 6 - GW SEC Map - 03.10.2017.dwg --- PLOT DATE: March 18, 2022 - 4:39PM --- LAYOUT: 11X17L



SAMPLE ID	TRC-B-1
DATE	01/11/21
SVOCs (mg/kg)	RESULT
ACETONE	0.051
SVOCs (mg/kg)	RESULT
BENZO[A]ANTHRACENE	1.2
BENZO[A]PYRENE	1.3 J
BENZO[B]FLUORANTHENE	1.4
CHRYSENE	1.1
INDENO[1,2,3-CD]PYRENE	0.73
METALS (mg/kg)	RESULT
ARSENIC	13.1
COPPER	76.5
LEAD	285 J
MERCURY	0.26
ZINC	140
PESTICIDES (mg/kg)	RESULT
4,4'-DDT	0.0044 J

SAMPLE ID	TRC-S-1W
DATE	01/11/21
SVOCs (mg/kg)	RESULT
BENZO[A]ANTHRACENE	5.1
BENZO[A]PYRENE	6.2
BENZO[B]FLUORANTHENE	6.7
BENZO[K]FLUORANTHENE	2.7
CHRYSENE	4.9
DIBENZ(A,H)ANTHRACENE	0.91
INDENO(1,2,3-CD]PYRENE	4.1
METALS (mg/kg)	RESULT
ARSENIC	59.7
LEAD	230 J
ZINC	132
PESTICIDES (mg/kg)	RESULT
4,4'-DDT	0.023 J
4,4'-DDE	0.028
4,4'-DDT	0.050

SAMPLE ID	TRC-S-4W
DATE	01/11/21
SVOCs (mg/kg)	RESULT
BENZO[A]ANTHRACENE	9.3
BENZO[A]PYRENE	11
BENZO[B]FLUORANTHENE	12
BENZO[K]FLUORANTHENE	4.2
CHRYSENE	8.1
DIBENZ(A,H)ANTHRACENE	1.5
INDENO[1,2,3-CD]PYRENE	7.1 J
METALS (mg/kg)	RESULT
COPPER	89.5
LEAD	211 J

SAMPLE ID	TRC-B-7	TRC-DUP-9212021
DATE	09/21/21	09/21/21
METALS (mg/kg)	RESULT	RESULT
LEAD	96.1	85.5
PESTICIDES (mg/kg)	RESULT	RESULT
4,4'-DDE	<SCOs	0.0046 J
4,4'-DDT	0.0040 J	0.0097

SAMPLE ID	TRC-S-7W
DATE	09/21/21
METALS (mg/kg)	RESULT
LEAD	70.2
PESTICIDES (mg/kg)	RESULT
4,4'-DDT	0.0069 J

SAMPLE ID	TRC-B-8
DATE	01/25/21
METALS (mg/kg)	RESULT
LEAD	139

SAMPLE ID	TRC-S-11W
DATE	09/21/21
METALS (mg/kg)	RESULT
LEAD	719
PESTICIDES (mg/kg)	RESULT
4,4'-DDT	0.0083

SAMPLE ID	TRC-B-11
DATE	09/21/21
PESTICIDES (mg/kg)	RESULT
4,4'-DDT	0.0034 J

SAMPLE ID	TRC-S-15W
DATE	09/21/21
PESTICIDES (mg/kg)	RESULT
4,4'-DDT	0.0050 J

SAMPLE ID	TRC-B-12
DATE	09/21/21
PESTICIDES (mg/kg)	RESULT
4,4'-DDT	0.0053 J

SAMPLE ID	TRC-B-19
DATE	09/21/21
METALS (mg/kg)	RESULT
COPPER	142
PESTICIDES (mg/kg)	RESULT
4,4'-DDT	0.0046 J

SAMPLE ID	TRC-S-2N
DATE	04/19/19
METALS (mg/kg)	RESULT
COPPER	54.2 J
LEAD	118
MERCURY	1.1
PESTICIDES (mg/kg)	RESULT
4,4'-DDT	0.0084 J

SAMPLE ID	TRC-B-2
DATE	04/19/19
SVOCs (mg/kg)	RESULT
2-METHYLPHENOL	0.54 J
BENZO[A]ANTHRACENE	35
BENZO[A]PYRENE	33
BENZO[B]FLUORANTHENE	42
BENZO[K]FLUORANTHENE	17
CHRYSENE	34
DIBENZ(A,H)ANTHRACENE	3.6
DIBENZOFURAN	8.3
INDENO[1,2,3-CD]PYRENE	17
METALS (mg/kg)	RESULT
COPPER	239 J
LEAD	934
MERCURY	1.2
ZINC	371

SAMPLE ID	TRC-S-3N
DATE	04/19/19
SVOCs (mg/kg)	RESULT
BENZO[A]ANTHRACENE	3.1
BENZO[A]PYRENE	2.7
BENZO[B]FLUORANTHENE	3.5
BENZO[K]FLUORANTHENE	1.4
CHRYSENE	3.1
DIBENZ(A,H)ANTHRACENE	0.48
INDENO[1,2,3-CD]PYRENE	1.6
METALS (mg/kg)	RESULT
ARSENIC	15.6
COPPER	67.5 J
LEAD	270
MERCURY	0.25
ZINC	539
PESTICIDES (mg/kg)	RESULT
4,4'-DDT	0.012 p
4,4'-DDE	0.0075
4,4'-DDT	0.033

SAMPLE ID	TRC-LEAD-S-E
DATE	03/15/19
METALS (mg/kg)	RESULT
NICKEL	30.9

SAMPLE ID	TRC-B-6
DATE	04/19/19
METALS (mg/kg)	RESULT
ARSENIC	28.7 J
COPPER	56 J
LEAD	65.0
MERCURY	0.27

PARAMETER	CRITERIA	
VOLATILE ORGANIC COMPOUND (mg/kg)	UUSCO	RRUSCO
ACETONE	0.05	100
SEMIVOLATILE ORGANIC COMPOUNDS (mg/kg)	UUSCO	RRUSCO
2-METHYLPHENOL	0.33	100
BENZO[A]ANTHRACENE	1	1
BENZO[A]PYRENE	1	1
BENZO[B]FLUORANTHENE	1	1
BENZO[K]FLUORANTHENE	0.8	3.9
CHRYSENE	1	3.9
DIBENZ(A,H)ANTHRACENE	0.33	0.33
DIBENZOFURAN	7	59
INDENO[1,2,3-CD]PYRENE	0.5	0.5
METALS (mg/kg)	UUSCO	RRUSCO
ARSENIC	13	16
COPPER	50	270
LEAD	63	400
MERCURY	0.18	0.81
ZINC	109	10,000
NICKEL	30	310
PESTICIDES (mg/kg)	UUSCO	RRUSCO
4,4'-DDD	0.0033	13
4,4'-DDE	0.0033	8.9
4,4'-DDT	0.0033	7.9

LEGEND (SYMBOLS NOT TO SCALE):

- SITE BOUNDARY
- BUILDING FOOTPRINT
- FENCE
- **TRC-B-#** — NON-HAZARDOUS SOIL REMOVAL POST-EXCAVATION SAMPLE LOCATION
- **TRC-S-##** — NON-HAZARDOUS SOIL REMOVAL POST-EXCAVATION SIDEWALL SAMPLE LOCATION
- **TRC-LEAD-#-#** — HAZARDOUS LEAD SOIL REMOVAL POST-EXCAVATION SAMPLE LOCATION
- **TRC-SW-#** — UST EXCAVATION AREA POST-EXCAVATION SAMPLE LOCATION
- HAZARDOUS LEAD EXCAVATION AREA (18' BELOW GROUND SURFACE)
- EXCAVATION AREA REPRESENTING APPROXIMATELY 900 SQUARE FEET OF NON-HAZARDOUS MATERIAL.

W – N – E

NOTES:

1. LOCATIONS AND DIMENSIONS OF PHYSICAL FEATURES AND PROPERTY BOUNDARIES ARE APPROXIMATE.
2. BASEMAP SOURCE FROM NYC DEPARTMENT OF FINANCE TAX MAP.
3. J - ESTIMATED VALUE.
4. mg/kg - MILLIGRAMS PER KILOGRAM.
5. P - THE % RPD BETWEEN THE PRIMARY & CONFIRMATION COLUMN/DETECTOR IS >40%. THE LOWER VALUE HAS BEEN REPORTED.
6. UUSCO - 6 NYCRR PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVE.
7. RRUSCO - 6 NYCRR PART 375 RESTRICTED RESIDENTIAL USE SOIL CLEANUP OBJECTIVE.
8. BOLD VALUES EXCEED UUSCOS
9. SHADED VALUES EXCEED RRUSCOS.
10. TRC-DUP-9212021 IS A DUPLICATE OF TRC-B-7.
11. UST - UNDERGROUND STORAGE TANK.

0 40' 80'

SCALE: 1" = 40'
SHEET SIZE: 11" BY 17"

PROJECT: **NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY**
SITE MANAGEMENT PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

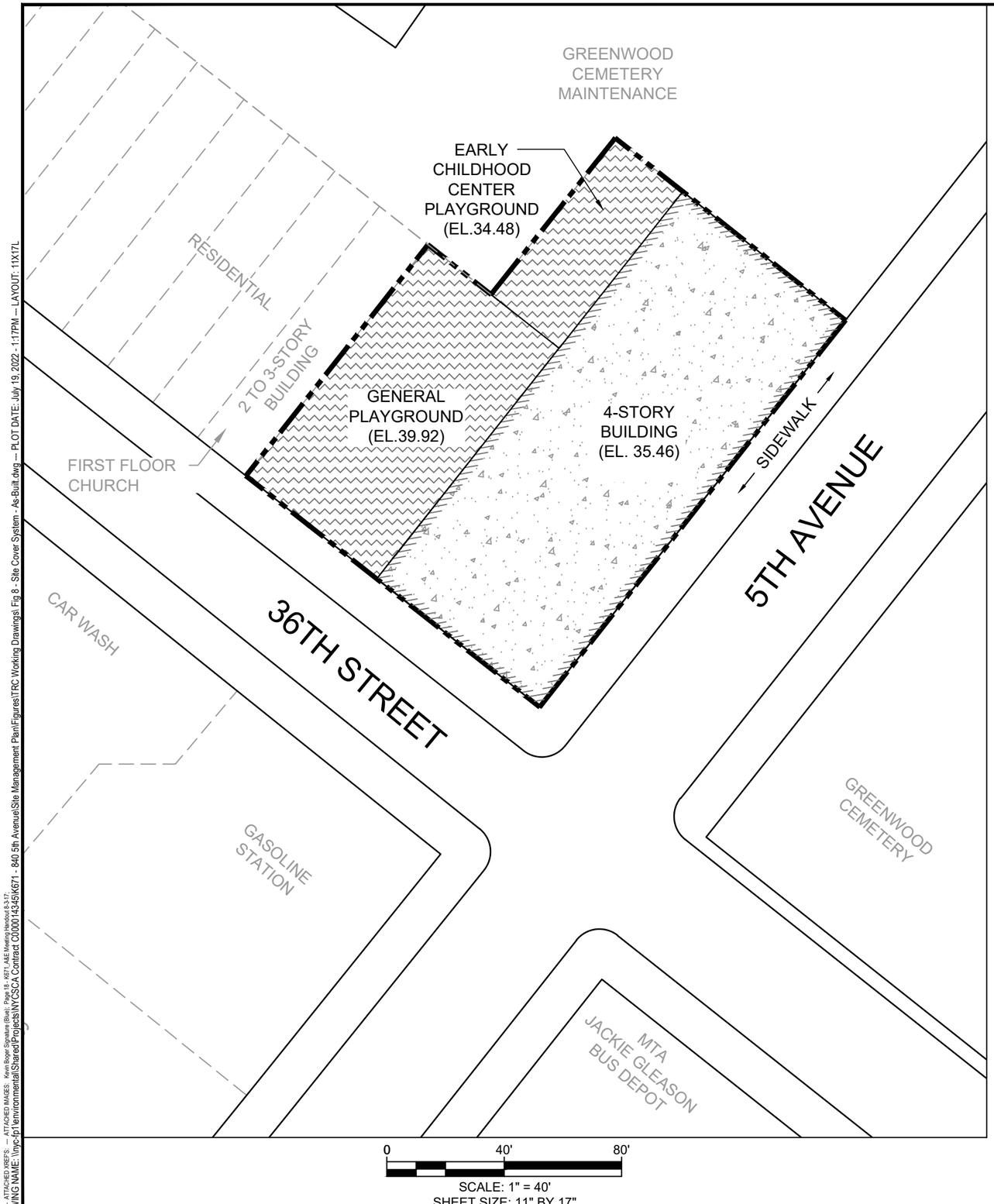
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SUMMARY OF REMAINING SOIL SAMPLE EXCEEDANCES

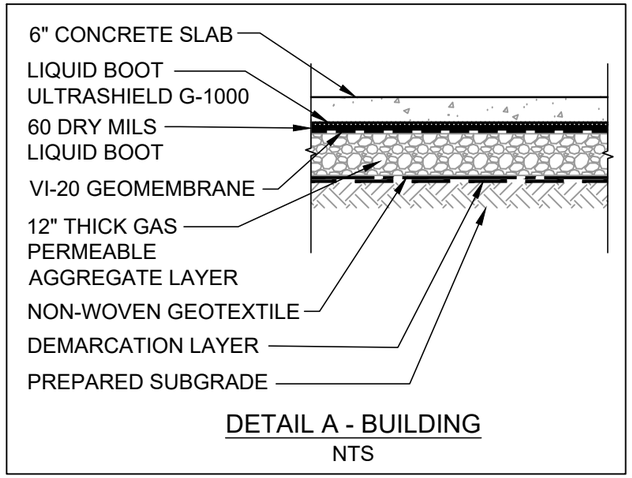
DRAWN BY:	H. DELGADO	PROJ NO.:	356549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		**FIGURE 7**
DATE:	MARCH 2022		

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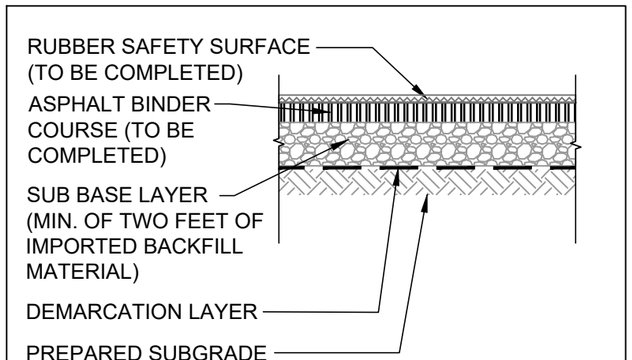
FILE NO.: Fig 7 - Sum. of Remain. Soil Samp. Exceed..dwg

11x17 -- ATTACHED VIEWER; Publish: 1/20/2022 11:17:05; $:693,39,EAS EASEMENT 840 5TH AVE (NYCSLA); -- ATTACHED IMAGES
DRAWING NAME: \\nyc-fp1\Shared\Projects\NYCSCA Contract C000014345\K671 - 840 5th Avenue\Site Management Plan\Figures\TRC Working Drawings\ Fig 7 - Sum. of Remain. Soil Samp. Exceed..dwg -- PLOT DATE: April 05, 2022 - 6:27PM -- LAYOUT: 11X17L





DETAIL A - BUILDING
NTS



DETAIL B - PLAYGROUND
NTS

LEGEND (SYMBOLS NOT TO SCALE):

- BROWNFIELD CLEANUP PROGRAM SITE BOUNDARY
- BUILDING FOOTPRINT
- LOT BOUNDARY
- STREET AND SIDEWALK BOUNDARIES
- CONCRETE BUILDING SLAB (REFER TO DETAIL A)
- RUBBER SAFETY SURFACE OVER ASPHALT (REFER TO DETAIL B)

W N E

NOTES:

1. DIMENSIONS AND LOCATIONS OF PHYSICAL FEATURES ARE APPROXIMATE.
2. SUB BASE LAYER OF PLAYGROUND COVER SYSTEM RANGES IN THICKNESS FROM APPROXIMATLEY 2 TO 10 FEET.
3. TRC CONDUCTED PERIODIC PROGRESS INSPECTIONS DURING THE CONSTRUCTION OF THE COVER SYSTEM. TRC DID NOT PERFORM FULL TIME INSPECTION DURING CONSTRUCTION. THE LOCATIONS OF COVER SYSTEM COMPONENTS SHOWN ARE APPROXIMATE, AND BASED ON THE CONTRACT DRAWINGS AND OBSERVATIONS DURING PERIODIC FIELD INSPECTIONS PERFORMED BY TRC
4. ELEVATIONS NOTED ON DRAWING ARE AVERAGED DEMARCATION LAYER ELEVATIONS AT EACH SITE AREA, WHICH ARE SOURCED FROM "ADDITIONAL DEMARCATION ELEVATIONS" SURVEY, PREPARED BY FEHRINGER SURVEYING, P.C., DATED MAY 6, 2022. DEMARCATION LAYER ELEVATIONS ARE RELATIVE TO NAVD88 DATUM.

IT IS A VIOLATION OF THE STATE EDUCATION LAW SECTION 7209 (2) FOR ANY PERSON TO ALTER AN ITEM IN ANY WAY UNLESS SUCH PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, AND THE ENGINEER STAMPS THE CHANGES.

STATE OF NEW YORK
KEVIN R. BOGER
096717
LICENSED PROFESSIONAL ENGINEER

KEVIN R. BOGER, PE
NY PE # 096717
DATE JULY 19, 2022

PROJECT: **NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY**
SITE MANAGEMENT PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

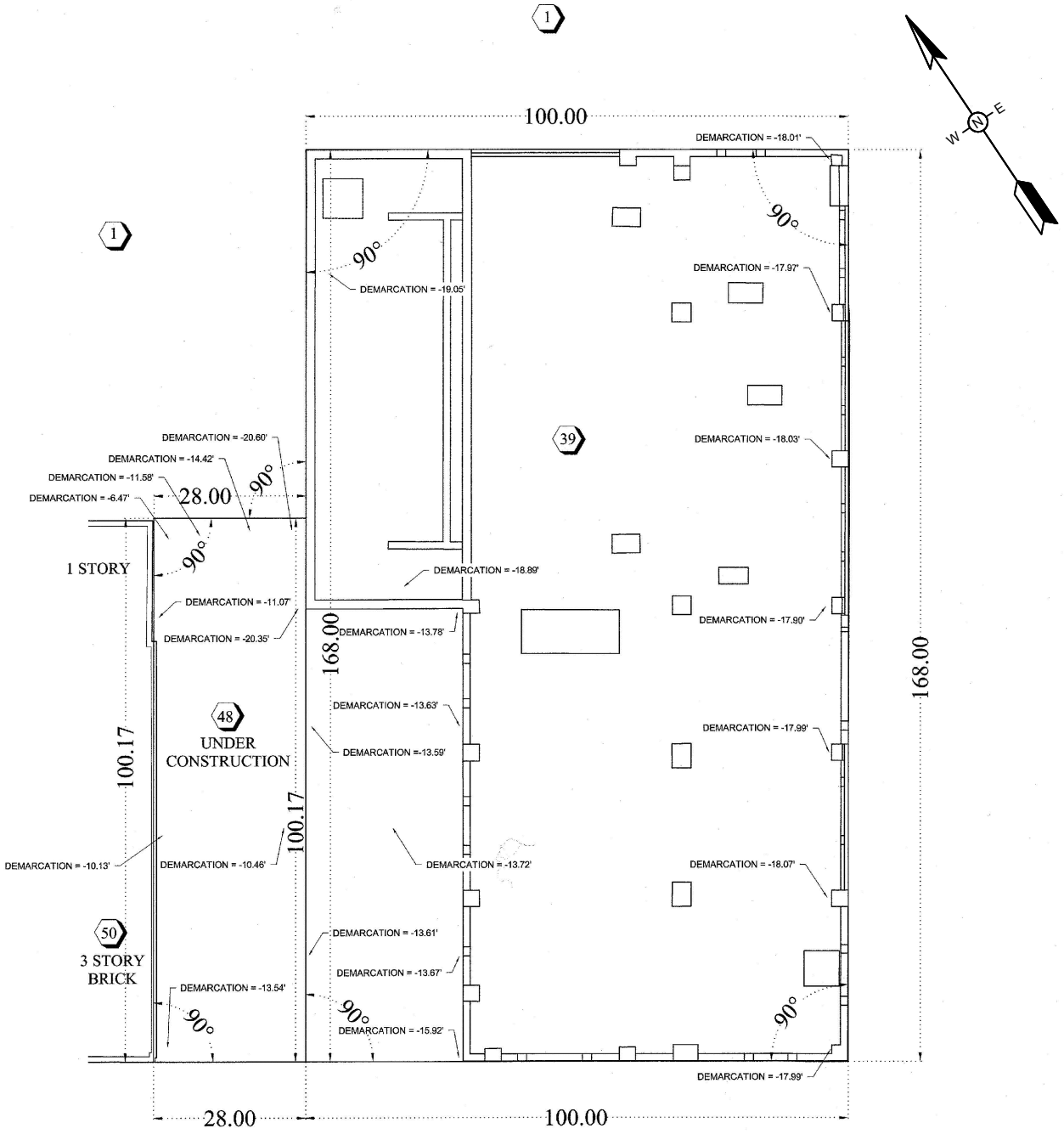
TITLE:
SITE COVER SYSTEM AS-BUILT DRAWING

DRAWN BY:	H. DELGADO	PROJ NO.:	356549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		**FIGURE 8**
DATE:	JULY 2022		

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FILE NO.: Fig 8 - Site Cover System - As-Built.dwg

11:17 -- ATTACHED XREFS: -- ATTACHED IMAGES: Kevin Boger Standard Blue1.ctb, Page:10 - XEF1, ABE Metric Vertical 8.3.17.
DRAWING NAME: \\nyc-fp1\environmental\Shared Projects\NYCSCA Contract C0000143451K671 - 840 5th Avenue\Site Management Plan\Figures\TRC Working Drawings\ Fig 8 - Site Cover System - As-Built.dwg -- PLOT DATE: July 19, 2022 - 1:17PM -- LAYOUT: 11X17L



NOTES:

1. SOURCED FROM DRAWING TITLED "DEMARCATION ELEVATIONS FEHRINGER SURVEYING" BY FEHRINGER SURVEYING, P.C. SURVEYED ON JANUARY 13, 2021. UPDATED ON MAY 6, 2022 - ADDITIONAL DEMARCATION ELEVATIONS. ELEVATIONS ARE IN JOB DATUM. TO CONVERT TO NAVD88, ADD 53.45' TO JOB DATUM

0 30' 60'

SCALE: 1" = 30'
SHEET SIZE: 8.5" BY 11"

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PROJECT: **NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY**
SITE MANAGEMENT PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE:

POST-EXCAVATION DEMARCATION LAYER SURVEY

DRAWN BY:	H. DELGADO
CHECKED BY:	L. O'HARA
APPROVED BY:	K. BOGER
DATE:	JULY 2022
PROJ. NO.:	356549
FILE:	Fig 9 - Post-Excv. DM Layer Survey.dwg

FIGURE 9

8.5x11 --- ATTACHED XREFS: --- ATTACHED IMAGES: PS671k_02200-037_DWG_Demarc-El.FehringerSurv._Subm._REV1;
DRAWING NAME: \\nyc-fp1\environmental\Shared\Projects\NYCSCA Contract C000014345\K671 - 840 5th Avenue\Site Management Plan\Figures\TRC Working Drawings\ Fig 9 - Post-Excv. DM Layer Survey.dwg --- PLOT DATE: July 12, 2022 - 2:11PM --- LAYOUT: 8.5x11P

APPENDIX A – LIST OF SITE CONTACTS

Name	Phone/Email Address
Site Owner: New York City School Construction Authority: Lee Guterman	718-472-8502 DGuterman@nycsca.org
Remedial Engineer: Kevin Boger	631-617-0087 KBoger@trccompanies.com
NYSDEC DER Project Manager: Michael Sollecito	518-402-2198 Michael.Sollecito@dec.ny.gov
NYSDEC Public Participation Specialist: Thomas Panzone	718-482-4953 Thomas.panzone@dec.ny.gov
NYSDOH Project Manager: Sara Bogardus	518-402-7860 BEEI@health.ny.gov
Remedial Party Attorney: Consuelo Alden Vasquez	718.472.8232 CVasquez2@nycsca.org

APPENDIX B – EXCAVATION WORK PLAN (EWP)

B-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's cover system including any underlying imported clean fill material, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix A.

Table 1: Notifications*

NYSDEC Project Manager: Michael Sollecito	518-402-2198 Michael.Sollecito@dec.ny.gov
Property Owner: New York City School Construction Authority: Lee Guterman	718-472-8502 DGuterman@nycsca.org
NYSDEC Public Participation Specialist: Thomas Panzone	718-482-4953 Thomas.panzone@dec.ny.gov
NYSDOH Project Manager: Sara Bogardus	518-402-7860 BEEI@health.ny.gov
Remedial Engineer: Kevin Boger	631-617.0087 KBoger@trccompanies.com

* Note: Contact information is subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location, depth, and lateral extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 Code of Federal Regulation (CFR) 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP. Excavations entirely within imported clean backfill and above the Residuals Management Zone will not require the submission of an EWP.

B-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and

registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will perform the screening. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing.

B-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered when not in use with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

B-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will oversee all invasive work within the Residuals Management Zone and the excavation and load-out of all excavated material.

The owner of the property and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are free of dirt and other materials derived from the site during intrusive excavation activities in the Residuals Management Zone. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

B-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes are as follows: truck will head southbound on 5th Avenue and then turn right onto 36th Street, heading westbound on 36th Street toward 3rd Avenue. The trucks will utilize 3rd Avenue to access the Brooklyn Queens Expressway, which they will travel along until they exit the area. A map of the truck transport route is as follows:



All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total

distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

B-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC project manager approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g., hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility) Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 360-15 registered or permitted facility).

B-7 MATERIALS REUSE ON-SITE

No excavated material beneath the demarcation layer will be reused on-Site.

B-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed off-site at a permitted facility in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e., a local pond, stream or river) will be performed under a SPDES permit.

B-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities, the cover system will be restored in a manner that complies with the RAWP. The existing cover system is comprised of a minimum of impervious surfaces (e.g., building, paved surfaces, rubber safety surface over asphalt binder course and imported backfill material on playground areas, etc.), underlain by a gas permeable aggregate layer and/or clean fill, followed by a demarcation layer. If the type of cover system changes from that which exists prior to the excavation, this will constitute a modification of the cover system element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

B-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review. A copy of the form is presented in Appendix G. Imported clean fill installed above the Residuals Management Zone during school construction will not require Department approval prior to reuse as documentation of clean fill sources and testing results will be provided in the Final Engineering Report (FER).

Material from industrial sites, spill sites, other environmental remediation sites, or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5, "Allowable Constituent Levels for Imported Fill or Soil" criteria depending on use:

- Cover material (top two feet): Material will meet Unrestricted Use SCOs.
- Backfill for use below cover material: Material will meet the lower of the protection of groundwater or the protection of public health SCOs for Restricted Residential Use.

Representative samples of the proposed backfill material will be collected at a frequency in accordance with Table 5.4(e)10 and analyzed for parameters listed in Appendix 5 of NYSDEC DER-10. Acceptable laboratory reporting limits (below the regulatory comparison criteria) have been achieved to demonstrate that the fill/backfill complies with the requirements for environmentally clean fill.

Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are the lower of the

protection of groundwater or the protection of public health SCOs for Restricted Residential Use . Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

B-11 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

B-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The NYSDEC project manager will be promptly notified of the discovery.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes [TAL metals, TCL volatiles and semi-volatiles (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within two hours to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

B-13 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) is provided in Appendix D of this SMP. A figure showing the location of air sampling stations based on generally prevailing wind conditions is shown in Figure 1 of Appendix D of the SMP. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

B-13A: Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 part-per-million, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 micrograms per cubic meter, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 micrograms per cubic meter or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

B-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

B-15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Section B-13. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved using a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

B-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX C – 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.

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RECORDING AND ENDORSEMENT COVER PAGE

Document ID: 2022100300805001 Document Date: 09-02-2022 Preparation Date: 10-04-2022
Document Type: EASEMENT
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PRESENTER:
LT SERVICE/PICKUP/ELTON (LT15020)
521 FIFTH AVENUE, 23RD FLOOR
NEW YORK, NY 10175
212-599-1300
NYCID@LEXTERRAE.COM

RETURN TO:
GAYLE MANDARO ESQ.
30-30 THOMASON AVENUE
LONG ISLAND CITY, NY 11101

PROPERTY DATA

Borough	Block	Lot	Unit	Address
BROOKLYN	693	39	Entire Lot	840 FIFTH AVENUE

Property Type: OTHER

CROSS REFERENCE DATA

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

PARTIES

GRANTOR/SELLER:
NYC SCHOOL CONSTRUCTION AUTHORITY
30-30 THOMSON AVENUE
LONG ISLAND CITY, NY 11101-3045

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

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:	$	82.00
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 10-05-2022 10:27
City Register File No.(CRFN): **2022000381450**

City Register Official Signature

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

THIS INDENTURE made this 2nd day of September, 2023 between Owner, The New York City School Construction Authority, having an office at 30-30 Thomson Ave, Long Island City, NY 11101 (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, is the owner of real property located at the address of 840 5th Avenue in the City of New York, County of Kings and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 693 Lot 39, being the same as that property conveyed to Grantor by deed dated February 16, 2018 and recorded in the City Register of the City of New York as CRFN #2018000083878 . The property subject to this Environmental Easement (the "Controlled Property") comprises approximately .45 +/- acres, and is hereinafter more fully described in the Land Title Survey dated February 9, 2022 prepared by Richard Tom, 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: C224271-05-18, 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:

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 City Department of Health and Mental Hygiene 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 Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), 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 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 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: C224271 Office of General Counsel NYSDEC 625 Broadway Albany New York 12233-5500
With a copy to:	Site Control Section 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.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

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

Enter Grantor's Name:

By: _____

Print Name: Gayle Mandelbaum

Title: Senior Attorney Senior Director Date: 8/30/2022

Grantor's Acknowledgment

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

On the 30th day of August, in the year 2022, before me, the undersigned, personally appeared Gayle Mandelbaum, 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

SHERLINE VICTOR
Notary Public, State of New York
No. 01VI6357469
Qualified in Nassau County 5
Commission Expires April 17, 2024

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: _____
Andrew O. Guglielmi, Director
Division of Environmental Remediation

Grantee's Acknowledgment

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

On the 2nd day of September in the year 2022 before me, the undersigned, personally appeared Andrew O. Guglielmi 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

JENNIFER ANDALORO
Notary Public, State of New York
No. 02AN6098246
Qualified in Albany County
Commission Expires January 14, 2024

SCHEDULE "A" PROPERTY DESCRIPTION

ALL THAT CERTAIN PLACE OR PARCEL OF LAND, SITUATE, LYING AND BEING IN THE BOROUGH OF BROOKLYN, COUNTY OF KINGS AND STATE OF NEW YORK BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT THE CORNER FORMED BY THE INTERSECTION OF THE NORTHEASTERLY SIDE OF 36TH STREET (60 FEET WIDE) AND THE NORTHWESTERLY SIDE OF 5TH AVENUE (80 FEET WIDE), ALSO KNOWN AS THE SOUTHEASTERLY CORNER OF NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY PUBLIC SCHOOL NUMBER K671;

RUNNING THENCE NORTHWESTERLY ALONG THE NORTHEASTERLY SIDE OF 36TH STREET A DISTANCE OF 128.00 FEET TO A POINT;

THENCE NORTHEASTERLY ALONG A LINE FORMING AT RIGHT ANGLE WITH THE NORTHEASTERLY SIDE OF 36TH STREET A DISTANCE OF 100.17 FEET TO A POINT ON THE SOUTHWESTERLY LINE OF LANDS NOW OR FORMERLY OF GREENWOOD CEMETERY;

THENCE ALONG THE SOUTHWESTERLY, NORTHWESTERLY AND AGAIN SOUTHWESTERLY LINES OF LANDS NOW OR FORMERLY OF GREENWOOD CEMETERY THE FOLLOWING COURSES AND DISTANCES:

1. SOUTHEASTERLY AT RIGHT ANGLES TO THE LAST MENTIONED COURSE, 28.00 FEET
2. NORTHEASTERLY AT RIGHT ANGLES TO THE LAST MENTIONED COURSE, 67.83 FEET
3. SOUTHEASTERLY AT RIGHT ANGLES TO THE LAST MENTIONED COURSE 100.00 FEET TO A POINT ON THE NORTHWESTERLY SIDE OF 5TH AVENUE;

THENCE SOUTHWESTERLY ALONG THE NORTHWESTERLY SIDE OF 5TH AVENUE AND AT RIGHT ANGLES TO THE LAST MENTIONED COURSE A DISTANCE OF 168.00 FEET TO THE CORNER FORMED BY THE INTERSECTION OF THE NORTHEASTERLY SIDE OF 36TH STREET AND THE NORTHWESTERLY SIDE OF 5TH AVENUE, THE POINT OR PLACE OF BEGINNING.

CONTAINING: 19,604.67 SQUARE FEET OR 0.45 ACRES OF LAND MORE OR LESS.

NYC Finance

NYC RPT

NEW YORK CITY DEPARTMENT OF FINANCE

REAL PROPERTY TRANSFER TAX RETURN

(Pursuant to Title 11, Chapter 21, NYC Administrative Code)

Instructions: If you are filing this form as part of a Non-Recorded Transfer, mail your completed RPT form to: **NYC Dept. of Finance, Non-Recorded RPTT Return Processing, 66 John Street, 13th Floor, New York, NY 10038.** See Instructions on page 17 of this form for further details.

GRANTOR

● Name
NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

● Grantor is a(n): (check one) ☐ individual ☐ partnership (must complete Schedule 3) ☒ corporation ☐ other _____ | Telephone Number

● Permanent mailing address after transfer (number and street)
30-30 THOMSON AVENUE

● City and State: LONG ISLAND CITY, NEW YORK | Zip Code: 11101-3045

● EMPLOYER IDENTIFICATION NUMBER: 13-3535408 OR ● SOCIAL SECURITY NUMBER: ___-___-___

GRANTEE

● Name COMMISSIONER OF THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

● Grantee is a(n): (check one) ☐ individual ☐ partnership (must complete Schedule 3) ☐ corporation ☒ other _____ | Telephone Number

● Permanent mailing address after transfer (number and street)
625 BROADWAY

● City and State: ALBANY, NEW YORK | Zip Code: 12233

● EMPLOYER IDENTIFICATION NUMBER: 14-6013200 OR ● SOCIAL SECURITY NUMBER: ___-___-___

▼ DO NOT WRITE IN THIS SPACE FOR OFFICE USE ONLY ▼

● RETURN NUMBER ▲

● DEED SERIAL NUMBER ▲

● NYS REAL ESTATE TRANSFER TAX PAID ▲

PROPERTY LOCATION

LIST EACH LOT SEPARATELY. ATTACH A RIDER IF ADDITIONAL SPACE IS REQUIRED

● Address (number and street)	Apt. No.	Borough	Block	Lot	# of Floors	Square Feet	● Assessed Value of Property
840 5TH AVENUE		BROOKLYN	693	39	4-5	60,377	$11,100,000

● DATE OF TRANSFER TO GRANTEE: _____ ● PERCENTAGE OF INTEREST TRANSFERRED: _____ %

CONDITION OF TRANSFER. See Instructions

● Check (✓) all of the conditions that apply and fill out the appropriate schedules on pages 5-11 of this return. Additionally, Schedules1 and 2 **must** be completed for all transfers.

a. ☐ .....Arms length transfer
b. ☐ .....Transfer in exercise of option to purchase
c. ☐ .....Transfer from cooperative sponsor to cooperative corporation
d. ☐ .....Transfer by referee or receiver (complete Schedule A, page 5)
e. ☐ .....Transfer pursuant to marital settlement agreement or divorce decree (complete Schedule I, page 9)
f. ☐ .....Deed in lieu of foreclosure (complete Schedule C, page 6)
g. ☐ .....Transfer pursuant to liquidation of an entity (complete Schedule D, page 6)
h. ☐ .....Transfer from principal to agent, dummy, strawman or conduit or vice-versa (complete Schedule E, page 7)
i. ☐ .....Transfer pursuant to trust agreement or will (attach a copy of trust agreement or will)
j. ☐ .....Gift transfer not subject to indebtedness
k. ☐ .....Gift transfer subject to indebtedness
l. ☐ .....Transfer to a business entity in exchange for an interest in the business entity (complete Schedule F, page 7)
m. ☒ .....Transfer to a governmental body
n. ☐ .....Correction deed
o. ☐ .....Transfer by or to a tax exempt organization (complete Schedule G, page 8).
p. ☐ .....Transfer of property partly within and partly without NYC
q. ☐ .....Transfer of successful bid pursuant to foreclosure
r. ☐ .....Transfer by borrower solely as security for a debt or a transfer by lender solely to return such security
s. ☐ .....Transfer wholly or partly exempt as a mere change of identity or form of ownership. Complete Schedule M, page 9)
t. ☐ .....Transfer to a REIT or to a corporation or partnership controlled by a REIT. (Complete Schedule R, pages 10 and 11)
u. ☐ .....Other transfer in connection with financing (describe): _____
v. ☐ .....A grant or assignment of a leasehold interest in a tax-free NY area
w. ☒ .....Other (describe): ENVIRONMENTAL EASEMENT

● TYPE OF PROPERTY (✓)

a. ☐ ..... 1-3 family house
b. ☐ ..... Individual residential condominium unit
c. ☐ ..... Individual cooperative apartment
d. ☐ ..... Commercial condominium unit
e. ☐ ..... Commercial cooperative
f. ☐ ..... Apartment building
g. ☐ ..... Office building
h. ☐ ..... Industrial building
i. ☐ ..... Utility
j. ☒ ..... OTHER. (describe): OTHER

● TYPE OF INTEREST (✓)

Check box at LEFT if you intend to record a document related to this transfer. Check box at RIGHT if you do not intend to record a document related to this transfer.

	REC.		NON REC.
a.	☐	Fee	☐
b.	☐	Leasehold Grant	☐
c.	☐	Leasehold Assignment or Surrender	☐
d.	☐	Easement	☒
e.	☐	Subterranean Rights	☐
f.	☐	Development Rights	☐
g.	☐	Stock	☐
h.	☐	Partnership Interest	☐
i.	☐	OTHER. (describe):	☐

SCHEDULE 1 - DETAILS OF CONSIDERATION

COMPLETE THIS SCHEDULE FOR ALL TRANSFERS AFTER COMPLETING THE APPROPRIATE SCHEDULES ON PAGES 5 THROUGH 11. ENTER "ZERO" ON LINE 11 IF THE TRANSFER REPORTED WAS WITHOUT CONSIDERATION.

1. Cash	1.	
2. Purchase money mortgage	2.	
3. Unpaid principal of pre-existing mortgage(s)	3.	
4. Accrued interest on pre-existing mortgage(s)	4.	
5. Accrued real estate taxes	5.	
6. Amounts of other liens on property	6.	
7. Value of shares of stock or of partnership interest received	7.	
8. Value of real or personal property received in exchange	8.	
9. Amount of Real Property Transfer Tax and/or other taxes or expenses of the grantor which are paid by the grantee	9.	
10. Other (describe):	10.	
11. **TOTAL CONSIDERATION** (add lines 1 through 10 - must equal amount entered on line 1 of Schedule 2) (see instructions)	11.	$

See instructions for special rules relating to transfers of cooperative units, liquidations, marital settlements and transfers of property to a business entity in return for an interest in the entity.

SCHEDULE 2 - COMPUTATION OF TAX

A. **Payment**	Pay amount shown on line 12 - *See Instructions*	Payment Enclosed

1. Total Consideration (from line 11, above)	1.		0 00
2. Excludable liens (see instructions)	2.		0 00
3. Consideration (Line 1 less line 2)	3.		0 00
4. Tax Rate (see instructions)	4.		0 %
5. Percentage change in beneficial ownership (see instructions)	5.		100 %
6. Taxable consideration (multiply line 3 by line 5)	6.		0 00
7. Tax (multiply line 6 by line 4)	7.		0 00
8. Credit (see instructions)	8.		0 00
9. Tax due (line 7 less line 8) (if the result is negative, enter zero)	9.		0 00
10. Interest (see instructions)	10.		0 00
11. Penalty (see instructions)	11.		0 00
12. **Total Tax Due** (add lines 9, 10 and 11)	12.	$	0 00

SCHEDULE 3 - TRANSFERS INVOLVING MULTIPLE GRANTORS AND/OR GRANTEES OR A PARTNERSHIP

NOTE If additional space is needed, attach copies of this schedule or an addendum listing all of the information required below.

GRANTOR(S)/PARTNER(S)

NAME / PERMANENT MAILING ADDRESS AFTER TRANSFER (NUMBER AND STREET) / CITY AND STATE / ZIP CODE	SOCIAL SECURITY NUMBER / OR / EMPLOYER IDENTIFICATION NUMBER
	13-3535408

GRANTEE(S)/PARTNER(S)

NAME / PERMANENT MAILING ADDRESS AFTER TRANSFER (NUMBER AND STREET) / CITY AND STATE / ZIP CODE	SOCIAL SECURITY NUMBER / OR / EMPLOYER IDENTIFICATION NUMBER

GRANTOR'S ATTORNEY

Name of Attorney		Telephone Number
GAYLE MANDARO, ESQ.		(718) 472-8308
Address (number and street)	**City and State**	**Zip Code**
30-30 THOMSON AVENUE	LONG ISLAND CITY	11101

EMPLOYER IDENTIFICATION NUMBER - OR - SOCIAL SECURITY NUMBER

GRANTEE'S ATTORNEY

Name of Attorney		Telephone Number
		( )
Address (number and street)	**City and State**	**Zip Code**

EMPLOYER IDENTIFICATION NUMBER - OR - SOCIAL SECURITY NUMBER

CERTIFICATION

I swear or affirm that this return, including any accompanying schedules, affidavits and attachments, has been examined by me and is, to the best of my knowledge, a true and complete return made in good faith, pursuant to Title 11, Chapter 21 of the Administrative Code and the regulations issued thereunder.

GRANTOR

Sworn to and subscribed to before me on this 6th day of September, 2022.

13-3535408
EMPLOYER IDENTIFICATION NUMBER OR SOCIAL SECURITY NUMBER

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
Name of Grantor

Signature of Notary

Signature of Grantor
NINA KUBOTA
CEO + PRES.

Notary's stamp or seal

SHERLINE VICTOR
Notary Public, State of New York
No. 01VI6357469
Qualified in Nassau County
Commission Expires April 17, 2025

GRANTEE

Sworn to and subscribed to before me on this 15th day of September, 2022.

14-6013200
EMPLOYER IDENTIFICATION NUMBER OR SOCIAL SECURITY NUMBER

COMMISSIONER OF DEPT. OF ENVIRONMENTAL CONSERVATION
Name of Grantee

Signature of Notary
JESSICA B. SHARP

Signature of Grantee

Notary's stamp or seal

JESSICA B. SHARP
NOTARY PUBLIC-STATE OF NEW YORK
No. 01SH6224668
Qualified in Fulton County
My Commission Expires 07-06-2026

GRANTEE: To ensure that your property and water/sewer tax bills are sent to the proper address, please visit the Finance website at nyc.gov/finance. If you do not have internet access, call 311.

SCHEDULE A - TRANSFER BY REFEREE OR RECEIVER

NOTE The consideration for a transfer by a referee or receiver under foreclosure or execution is the amount bid for the property or economic interest therein and the costs paid by the purchaser, plus the amount of any pre-existing mortgages, liens or other encumbrances remaining on the property after the transfer, whether or not the underlying indebtedness is assumed.

1. Was this transfer the result of a court ordered sale pursuant to foreclosure or execution? (✓) ☐ YES ☐ NO
If "YES," complete lines 2a through 2f below. If "NO," complete line 3 below.

2a. Status of grantee: (✓)
☐ Nominee of plaintiff ☐ Plaintiff in foreclosure action ☐ Assignee of plaintiff ☐ Transferee of successful bidder
☐ Other (describe): _____

2b. Priority of mortgage foreclosed upon: ☐ first ☐ second ☐ third or other

2c. Amount of foreclosure judgment .....2c. $ _____

2d. Price bid by grantee (enter here and on Schedule 1. See instructions) .....2d.	$	
2e. Costs paid by grantee (enter here and on line 10, Schedule 1).....2e.	$	
2f. Amount of remaining mortgages, liens or other encumbrances (enter here and on Schedule 1. See instructions) .....2f.	$	

3. If the answer to line 1 above is "NO", state the reason for this transfer: _____

SCHEDULE B - TRANSFER OF SHARES OF STOCK IN A COOPERATIVE HOUSING CORPORATION

A. Name and address of cooperative housing corporation: _____

_____ Zip Code: _____

B. 1) Is this an initial transfer of shares from either a cooperative housing corporation or a sponsor? (✓) ☐ YES ☐ NO

2) If "YES," enter the date the NYC Real Property Transfer Tax was paid on the transfer of land and/or building to the cooperative housing corporation ..... MONTH ____ DAY ____ YEAR ____

If this initial transfer is more than 2 years from the above date, enter the date the first of these initial transfers was made ..... MONTH ____ DAY ____ YEAR ____

C. Is this a transfer of an individual unit in a housing company organized and operating pursuant to the provisions of articles two, four, five, or eleven of the Private Housing Finance Law? (✓) ☐ YES ☐ NO

If "YES," you are not subject to the Real Property Transfer Tax. However, you must file a return.

NOTE If you answered "YES," to question B above, you may be entitled to a credit. Complete lines 1 through 4 below.
If you answered "NO," to question B above, you are not entitled to a credit.

CREDIT CALCULATION

1. Enter the amount of NYC Real Property Transfer Tax paid on conveyance of underlying real property to cooperative housing corporation .....1.	$	
2. Enter the number of shares transferred in this transaction .....2.		
3. Enter the total number of outstanding shares of the cooperative housing corporation including any shares held by the corporation .....3.		
4. Amount of credit (divide line 2 by line 3 and multiply the result by line 1. Enter here and on line 8, Schedule 2) .....4.	$	

SCHEDULE C - TRANSFER IN LIEU OF FORECLOSURE

NOTE A conveyance by a defaulting mortgagor to the mortgagee (or to a nominee or assignee of the mortgagee) in consideration of the cancellation of the mortgage debt is taxable. The consideration is the amount of the outstanding mortgage debt and unpaid accrued interest, plus the amount of any other mortgages, liens or encumbrances remaining on the property or economic interest or the underlying real property after the transfer, whether or not the underlying indebtedness is assumed and irrespective of whether the cancellation of the mortgage was recorded.

1. Status of grantee: (✓)

☐ Mortgagee ☐ Nominee of mortgagee ☐ Assignee of mortgagee

☐ Other (describe):_____

2. Priority of mortgage in default: ☐ first ☐ second ☐ third or other

3. Amount of debt owed by grantor to mortgagee at time of transfer:

a.	Outstanding principal (enter here and on line 3 of Schedule 1) ....3a.	$	
b.	Accrued interest (enter here and on line 4 of Schedule 1) ....3b.	$	
4.	Amount of mortgages, liens or other encumbrances remaining on the real property or economic interest therein after the transfer (enter here and on Schedule 1. See instructions)....4.	$	

SCHEDULE D - TRANSFER PURSUANT TO PARTIAL OR COMPLETE LIQUIDATION OF CORPORATION, PARTNERSHIP OR OTHER ENTITY

SEE INSTRUCTIONS AND SCHEDULE M.

NOTE A distribution of real property or an economic interest therein within 12 months of liquidation of the distributing entity is presumed to be a distribution in liquidation. *Attach a balance sheet reflecting the grantor's assets and liabilities at the time of the liquidation.*

COMPUTATION OF TAX BASE

1.	Fair market value of real property or economic interest therein at the time of liquidation ....1.	$	
2.	Amount of mortgages or other liens or encumbrances on real property or economic interest therein....2.	$	
3.	Tax base: Compare line 1 and line 2, enter the greater of the two here and on line 11, Schedule 1 ....3.	$	

IF, PURSUANT TO THE INSTRUCTIONS, YOU ARE FILING MORE THAN ONE SCHEDULE D, IDENTIFY THE PROPERTY THAT THIS SCHEDULE D REFERS TO.

BOROUGH	BLOCK	LOT	ADDRESS	FAIR MARKET VALUE

SCHEDULE E - TRANSFER BY OR TO AN AGENT, DUMMY, STRAWMAN OR CONDUIT

NOTE A transfer from an agent, dummy, strawman or conduit to a principal or from a principal to an agent, dummy, strawman or conduit is exempt from the Real Property Transfer Tax. Complete questions 1 through 8 below to establish the claim of exemption.

1. Name and address of party from whom the property or economic interest was acquired by grantor.

   Name: _____

   Address: _____
   NUMBER AND STREET CITY STATE ZIP CODE

2. Date of acquisition: ____ ____ ____

3. Is this conveyance either a transfer from an agent to a principal or from a principal to an agent? (✓) ☐ YES ☐ NO
   If "YES," attach a copy of agency agreement or affidavit of explanation.

4. Amount of Real Property Transfer Tax paid upon acquisition by grantor..... ____ ____

5. Is this transfer part of a transfer to and from a corporation for the sole purpose of acquiring mortgage financing? (✓) ☐ YES ☐ NO

6. Is this transfer to a dummy, strawman, or conduit from a principal or vice versa? (✓) ☐ YES ☐ NO

7. If this is a transfer to an agent, dummy, strawman, or conduit, is the grantee actively engaged in a business? (✓) ☐ YES ☐ NO

8. If the answers to questions 3, 5, 6 and 7 above are all "NO," describe the relationship of the grantor and the grantee and the purpose of the transfer:

   _____

   _____

   _____

   _____

SCHEDULE F - TRANSFER TO BUSINESS ENTITY IN RETURN FOR AN INTEREST IN THE BUSINESS ENTITY

SEE SCHEDULE M AND INSTRUCTIONS.

NOTE A transfer of property or an economic interest therein to a corporation in exchange for shares of its capital stock may be taxable, even where there is no simultaneous exchange of shares of stock for the real property or economic interest therein, if the transfer is part of a plan to form a corporation for the purpose of holding the property or economic interest therein. A transfer to a partnership as a contribution of partnership assets may be similarly taxable.

1. Relationship of grantee to grantor(s) immediately after the transfer: (✓)

   ☐ Corporation wholly owned by grantor(s)
   ☐ Partnership consisting wholly of grantor(s)
   ☐ Corporation owned by grantor(s) and other(s)
   ☐ Partnership consisting of grantor(s) and other(s)
   ☐ Other (describe): _____

2. If this transfer has more than one grantor, state the percentage of interest transferred by each grantor. (If the grantor is a partnership or limited partnership, state the percentage of interest transferred by each individual partner or limited partner.)

Name of Grantor/Partnership	Percentage of interest
	%
	%
	%

3. Date of formation of grantee business	3.	____ ____ ____
4. Fair market value of the real property or economic interest therein at time of transfer	4.	$
5. Basis used for depreciation of the real property on federal tax return by the grantor before this transfer	5.	
6. Basis to be used for depreciation of the real property on federal tax return by the grantee after this transfer	6.	
7. Amount of mortgages, liens or encumbrances on the real property transferred	7.	$
8. Other consideration received from the business entity (attach schedule)	8.	$
9. Value of shares of stock or partnership interest received in exchange for the real property or interest therein (line 4 less the sum of lines 7 and 8) (enter here and on line 7, Schedule 1)	9.	$

SCHEDULE G - TRANSFER BY OR TO A TAX EXEMPT ORGANIZATION

NONPROFIT ORGANIZATIONS PLEASE REFER TO THE INSTRUCTIONS "EXEMPTIONS FROM THE TRANSFER TAX"

NOTE A transfer by or to an eligible tax exempt organization is exempt from the Real Property Transfer Tax. To be eligible, an organization must be operated exclusively for religious, charitable or educational purposes and must provide proof of the organization's tax exempt status. If claiming tax exempt status, please answer questions 1 and 2. Additionally, the organization must provide copies of any letters granting an IRS or New York State sales tax exemption or New York City exemption and ATTACH AN AFFIDAVIT stating whether such an exemption remains in effect.

1. Is the grantor or grantee an organization exempt from taxation pursuant to IRS Code Section 501(c)(3)? (✓) ..... ☐ YES ☐ NO
   If "YES", attach a copy of of the letter from the U. S. Treasury Department granting the exemption.
2. Has the grantor or grantee received an exemption from sales tax from the NYS Department of Taxation and Finance? (✓)... ☐ YES ☐ NO
   If "YES", attach a copy of the letter from the NYS Department of Taxation and Finance granting the exemption.

SCHEDULE H - TRANSFER OF CONTROLLING ECONOMIC INTEREST

A. Indicate name, address and Employer Identification Number (EIN) of entity with respect to which a controlling economic interest has been transferred:

Name : _____

Address: _____
NUMBER AND STREET CITY STATE ZIP CODE

Employer Identification Number: ☐☐ - ☐☐☐☐☐☐☐

NOTE If the real property that is the subject of this transfer is owned by an entity other than the entity listed above, check (✓) the box and attach a schedule listing the name, address and Employer Identification Number of the entity. ..... ☐

B. Total percentage of economic interest transferred in this transaction	B.	%
C. Total percentage of economic interest transferred by this grantor(s) or others in related transfers or pursuant to plan (including this transaction)	C.	%
D. Total percentage of economic interest transferred by this grantor(s) or others within the preceding three years (including this transaction)	D.	%
E. Total percentage of economic interest acquired by this grantee(s) or others in related transfers or pursuant to plan (including this transaction)	E.	%
F. Total percentage of economic interest acquired by this grantee(s) or others within the preceding three years (including this transaction)	F.	%

NOTE If any of the above percentages is 50% or more, complete lines 1 and 2 below and Schedules 1 and 2. Attach a rider explaining apportionment of consideration.

COMPUTATION OF CONSIDERATION

1. Total consideration for this transfer	1.	$
2. Amount apportioned to item of NYC real property or interest therein (see instructions)	2.	$

SCHEDULE I - TRANSFERS PURSUANT TO A SEPARATION AGREEMENT, MARITAL SETTLEMENT AGREEMENT OR DIVORCE DECREE

NOTE The consideration for a transfer pursuant to a separation agreement, marital settlement agreement or divorce decree includes the value of any marital rights exchanged for the property or economic interest as well as any other types of consideration paid by the grantee for the transfer. The consideration **will be presumed to be equal to the fair market value of the portion of the property or interest transferred,** unless you establish the consideration to be a different amount.

1. What was the fair market value of property at the time of transfer? ..... $ _____

2. Is the property a 1, 2 or 3 family house, residential condominium or residential cooperative apartment? ..... ☐ YES ☐ NO

   If yes, was there a mortgage on the property at the time of transfer? ..... ☐ YES ☐ NO

   If yes, what was the balance due? (Enter also on Schedule 2, line 2) ..... $ _____

3. What was the Grantor's percentage of ownership at the time of the transfer? ..... %
   If the transfer was between husband and wife jointly as Grantor and either husband or wife individually as Grantee it is presumed that the percentage of ownership transferred will be 50% unless the deed specifies another percentage.

4. ***Rebuttable Presumption of Fair Market Value:*** if the marital settlement agreement, separation agreement or divorce decree specifies a value for the portion of the property or interest transferred that is different from fair market value, enter that value here. You may choose to submit relevant portions of your separation agreement, marital settlement agreement or divorce decree, or any other information in support of the value attributed to the transferred property if you have evidence that the consideration was other than fair market value ..... $ _____

PLEASE LIST AND ATTACH ANY ADDITIONAL INFORMATION SUBMITTED

SCHEDULE M - MERE CHANGE OF FORM TRANSFERS

For transfers occurring on or after June 9, 1994, a transfer that represents a mere change in identity or form of ownership or organization is not taxable to the extent the beneficial ownership of the real property or economic interest therein remains the same. *(See instructions)* ATTACH COPIES OF ALL RELEVANT DOCUMENTS.

- For each person or entity who, prior to the transaction being reported on this Schedule M, owned a beneficial interest in the property or economic interest therein transferred, report above the percentage of beneficial interest in that real property or economic interest therein owned by that owner before and after the transfer, and describe the relationship of each beneficial owner to the grantor and grantee. Attach additional pages, if necessary.
- If, for any owner, the amount reported in column D is less than the amount reported in column E, enter zero in column F.

A 1. NAME OF BENEFICIAL OWNER	B (attach rider if necessary) RELATIONSHIP TO GRANTOR	C RELATIONSHIP TO GRANTEE	D PERCENTAGE INTEREST BEFORE	E PERCENTAGE INTEREST AFTER	F CHANGE *D minus E*
			%	%	
2. TOTAL CHANGE *(total of column F) Enter here and on Schedule 2, line 5.*					

SCHEDULE R - REAL ESTATE INVESTMENT TRUST TRANSFERS

Real Estate Investment Trust Transfers ("REIT Transfers") are taxed at one-half of the otherwise applicable rate. (NYC Administrative Code Section 11-2102(e)) **Attach a copy of the prospectus to Form NYC-RPT and write "REIT Transfer" on the top of the first page of Form NYC-RPT.** If you are filing Form NYC-RPT reporting a REIT Transfer that qualifies as a mere change in identity or form of ownership or organization, you must also complete Schedule M.

General Information

REIT TRANSFER

A REIT Transfer is any deed or other instrument or transaction conveying or transferring real property or an economic interest in real property to a Real Estate Investment Trust as defined in Section 856 of the Internal Revenue Code (a 'REIT"), or to a partnership or corporation in which a REIT owns a controlling interest immediately following the transaction and any issuance or transfer of an interest in a REIT or in such a partnership or corporation in connection with such a transaction, provided either:

1. the transaction occurs on or after June 9, 1994 in connection with the initial formation of the REIT and conditions 1(a), 2 and 3 below are met, or

2. the transaction occurs on or after July 13, 1996 and before September 1, 2002 (or after August 30, 2002 if the transfer is made pursuant to a binding written contract entered into before September 1, 2002, with a REIT or a partnership or corporation in which the REIT owns a controlling interest, and the date of execution of that contract is confirmed by independent evidence satisfactory to the Department), and conditions 1 (b) and 2 below are met.

For a definition of "controlling interest", see General Information for Form NYC-RPT, "Imposition of Tax."

CONDITIONS

1a. The value of the ownership interests in the REIT or in the partnership or corporation controlled by the REIT received by the grantor as consideration for the transaction must be equal to 40 percent or more of the excess of the value of the total consideration received over the amount of mortgages and other liens and encumbrances on the property or on the grantor's economic interest in the property, other than mortgages and other liens and encumbrances created in contemplation of the formation of the REIT.

b. This condition is the same as Condition 1(a), except that the value of the ownership interests received as consideration must be equal to at least 50 percent rather than 40 percent of the excess of the total consideration received over mortgages and other liens and encumbrances on the property or economic interest transferred excluding mortgages and other liens or encumbrances created in contemplation of the transaction reported on this Schedule R.

Use the worksheet on the following page of this Schedule to make this determination.

2. The interests in the REIT or in the partnership or corporation controlled by the REIT may not be transferred by the grantor or owners of the grantor within two years following the date of the transaction other than transfers within the two-year period resulting from the death of an individual grantor or owner of a grantor.

3. At least 75 percent of the cash proceeds of the initial public offering of REIT shares must be used for the following:

   a. payments on loans secured by an interest in the real property or an economic interest therein owned directly or indirectly by the REIT, or payments into reserves therefor;

   b. capital improvements to real property owned directly or indirectly by the REIT, or payments into reserves therefor;

   c. brokerage fees and commissions, professional fees and payments to or on behalf of a tenant as an inducement to enter into a lease or sublease of real property owned directly or indirectly by the REIT, or payments into reserves therefor; or

   d. payments to acquire real property or an economic interest therein other than an acquisition that would qualify as a REIT Transfer without regard to this condition 3.

If condition 2 or 3, where applicable, ceases to be met after this Schedule R is filed, an amended Form NYC-RPT must be filed and any additional tax due must be paid.

WORKSHEET FOR CONDITIONS 1(a) and 1(b)

1.	Add lines 1, 2, 7, 8, 9 and 10 from Form NYC-RPT, Schedule 1 and enter total here	1.	$
2a.	Enter total number of REIT shares received	a.	
b.	Enter maximum number of REIT shares into which ownership interests may be converted	b.	
c.	Add lines a and b	c.	
d.	Enter offering price per share of REIT shares on the date of the transaction reported	d.	
e.	Multiply line 2c by line 2d	e.	
f.	Enter value of ownership interests received not convertible into REIT shares	f.	
g.	Add lines e and f	2g.	
3.	Multiply line 1 by .40 for condition 1(a) or .50 for condition 1(b)	3.	

- If line 3 is greater than line 2g, the transaction does not qualify as a REIT transfer. DO NOT FILE THIS SCHEDULE. You must file Form NYC-RPT and compute your tax due on Schedule 2.
- If line 3 is less than or equal to line 2g, the transaction will qualify as a REIT Transfer, provided the other conditions are met. You should complete Form NYC-RPT substituting on line 4 of Schedule 2:
  - **.5%** instead of 1%;
  - **.7125%** instead of 1.425%;
  - **1.3125%** instead of 2.625%

SEE INSTRUCTIONS TO DETERMINE WHICH TAX RATE APPLIES

Instructions for Completing Worksheet

LINE 1

Where the value of the underlying property transferred or interest therein is used in determining the consideration for a REIT Transfer, you may, but are not required to, report as the value of the real property or interest therein (Form NYC-RPT, Schedule 1, line 7), the estimated market value as determined by the Department of Finance as reflected on the most recent Notice of Assessment issued by the Department. *(See Statements of Audit Procedure 93-2-GCT/RPTT, 3/1/93 and 95-1-GCT/RPTT, 7/28/95)* Add to the amount reported on line 1 the amount of any mortgages and other liens and encumbrances created in contemplation of the formation of the REIT in the case of condition 1(a) or in contemplation of the transaction reported on this Schedule R in the case of condition 1(b).

LINE 2

If the grantor received REIT shares as consideration for the transfer, enter on line 2a the number of REIT shares received. If the grantor received interests in a partnership or corporation controlled by the REIT that may be converted into REIT shares, enter on line 2b the maximum number of REIT shares into which such interests may be converted and attach an explanation of the terms of the conversion. If the grantor received interests that may be converted into REIT shares but you believe that the offering price for the REIT shares into which such interests may be converted is not a proper measurement of the value of the interests received, do not complete line 2b. Instead, attach an explanation of the terms of the conversion and enter on line 2f the fair market value of the interests received. If the grantor received interests in a partnership or corporation controlled by the REIT that cannot be converted into REIT shares at any time, enter on line 2f the fair market value of the interests received. If you enter an amount on line 2f, attach an explanation of the method used for determining the value of the interests received.

Certification

I swear or affirm under penalties of perjury that the grantor has no present intention to transfer or convey the REIT shares or interests in a partnership or corporation controlled by the REIT received by the grantor as consideration in the transaction reported on this Schedule R within two years of the date of the transfer, other than a distribution of such shares or interests to the partners or shareholders of the grantor, and that, to the best of my knowledge, condition 3 above regarding the use of the cash proceeds of the REIT offering will be satisfied, if applicable. I further swear or affirm that I will file an amended Form NYC-RPT and pay any additional tax due if any such transfer or conveyance occurs within such two-year period or if condition 3 above, if applicable, ceases to be met.

GRANTOR

Sworn to and subscribed to before me on this 6th day of September, 2022

Signature of Notary

NYC School Construction Authority
Name of Grantor

Signature of Grantor
NINA KUBOTA, CEO Pres

Notary's stamp or seal
SHERLINE VICTOR
Notary Public, State of New York
No. 01VI6357469
Qualified in Nassau County
Commission Expires April 17, 2025

GRANTEE

Sworn to and subscribed to before me on this 15th day of September, 2022

Signature of Notary
JESSICA B. Sharp

Name of Grantee

NYS DEC, Attorney
Signature of Grantee

Notary's stamp or seal
JESSICA B. SHARP
NOTARY PUBLIC-STATE OF NEW YORK
No. 01SH6224668
Qualified in Fulton County
My Commission Expires 07-06-2026

AFFIDAVIT OF COMPLIANCE
WITH SMOKE DETECTOR REQUIREMENT FOR ONE- AND TWO-FAMILY DWELLINGS

State of New York }
County of } **SS.:**

The undersigned, being duly sworn, depose and say under penalty of perjury that they are the grantor and grantee of the real property or of the cooperative shares in a cooperative corporation owning real property located at

_____, _____,
Street Address Unit/Apt.

_____ New York, _____ _____ (the "Premises");
Borough **Block** **Lot**

That the Premises is a one or two family dwelling, or a cooperative apartment or condominium unit in a one- or two-family dwelling, and that installed in the Premises is an approved and operational smoke detecting device in compliance with the provisions of Article 6 of Subchapter 17 of Chapter 1 of Title 27 of the Administrative Code of the City of New York concerning smoke detecting devices;

That they make affidavit in compliance with New York City Administrative Code Section 11-2105 (g). (The signatures of at least one grantor and one grantee are required, and must be notarized).

_____ **Name of Grantor** (Type or Print)	_____ **Name of Grantee** (Type or Print)
_____ **Signature of Grantor**	_____ **Signature of Grantee**
Sworn to before me this _____ **date of** _____ **20**_____	**Sworn to before me this** _____ **date of** _____ **20** _____

These statements are made with the knowledge that a willfully false representation is unlawful and is punishable as a crime of perjury under Article 210 of the Penal Law.

NEW YORK CITY REAL PROPERTY TRANSFER TAX RETURNS FILED ON OR AFTER FEBRUARY 6th, 1990, WITH RESPECT TO THE CONVEYANCE OF A ONE- OR TWO-FAMILY DWELLING, OR A COOPERATIVE APARTMENT OR A CONDOMINIUM UNIT IN A ONE- OR TWO-FAMILY DWELLING, WILL NOT BE ACCEPTED FOR FILING UNLESS ACCOMPANIED BY THIS AFFIDAVIT.

For conveyances of real property, or interest therein, located in New York City, you must use Form TP-584-NYC.

TP-584 (9/19)

Department of Taxation and Finance

Combined Real Estate Transfer Tax Return, Credit Line Mortgage Certificate, and Certification of Exemption from the Payment of Estimated Personal Income Tax

Recording office time stamp

See Form TP-584-I, Instructions for Form TP-584, *before completing this form. Print or type.*

Schedule A – Information relating to conveyance

Grantor/Transferor

☐ Individual
☒ Corporation
☐ Partnership
☐ Estate/Trust
☐ Single member LLC
☐ Multi-member LLC
☐ Other

Name *(if individual, last, first, middle initial)* (☐ *mark an X if more than one grantor*): NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

Social Security number (SSN):

Mailing address:

SSN:

City: LONG ISLAND CITY | State: NY | ZIP code: 11101-3045

Employer Identification Number (EIN): 13-3535408

Single member's name if grantor is a single member LLC *(see instructions)*:

Single member EIN or SSN:

Grantee/Transferee

☐ Individual
☐ Corporation
☐ Partnership
☐ Estate/Trust
☐ Single member LLC
☐ Multi-member LLC
☒ Other

Name *(if individual, last, first, middle initial)* (☐ *mark an X if more than one grantee*): COMMISSIONER OF THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SSN:

Mailing address: 625 BROADWAY

SSN:

City: ALBANY | State: NY | ZIP code: 12233

EIN: 14-6013200

Single member's name if grantee is a single member LLC *(see instructions)*:

Single member EIN or SSN:

Location and description of property conveyed

Tax map designation – Section, block & lot *(include dots and dashes)*	SWIS code (six digits)	Street address	City, town, or village	County
3-0693-39	610100	840 5th Avenue	Brooklyn	Kings

Type of property conveyed *(mark an X in applicable box)*

1 ☐ One- to three-family house
2 ☐ Residential cooperative
3 ☐ Residential condominium
4 ☐ Vacant land
5 ☐ Commercial/industrial
6 ☐ Apartment building
7 ☐ Office building
8 ☐ Four-family dwelling
9 ☒ Other OTHER

Date of conveyance: ____ / ____ / 2022 (month / day / year)

Percentage of real property conveyed which is residential real property 100 % *(see instructions)*

Condition of conveyance *(mark an X in all that apply)*

a. ☐ Conveyance of fee interest
b. ☐ Acquisition of a controlling interest (state percentage acquired _____ %)
c. ☐ Transfer of a controlling interest (state percentage transferred _____ %)
d. ☐ Conveyance to cooperative housing corporation
e. ☐ Conveyance pursuant to or in lieu of foreclosure or enforcement of security interest *(attach Form TP-584.1, Schedule E)*
f. ☐ Conveyance which consists of a mere change of identity or form of ownership or organization *(attach Form TP-584.1, Schedule F)*
g. ☐ Conveyance for which credit for tax previously paid will be claimed *(attach Form TP-584.1, Schedule G)*
h. ☐ Conveyance of cooperative apartment(s)
i. ☐ Syndication
j. ☐ Conveyance of air rights or development rights
k. ☐ Contract assignment
l. ☐ Option assignment or surrender
m. ☐ Leasehold assignment or surrender
n. ☐ Leasehold grant
o. ☒ Conveyance of an easement
p. ☒ Conveyance for which exemption from transfer tax claimed *(complete Schedule B, Part 3)*
q. ☐ Conveyance of property partly within and partly outside the state
r. ☐ Conveyance pursuant to divorce or separation
s. ☐ Other *(describe)* _____

For recording officer's use	Amount received	Date received	Transaction number
	Schedule B, Part 1 $ _____ Schedule B, Part 2 $		

Schedule B – Real estate transfer tax return (Tax Law Article 31)

Part 1 – Computation of tax due

1	Enter amount of consideration for the conveyance *(if you are claiming a total exemption from tax, mark an **X** in the Exemption claimed box, enter consideration and proceed to Part 3)* ☒ **Exemption claimed**	1.	0 00
2	Continuing lien deduction *(see instructions if property is taken subject to mortgage or lien)*	2.	0 00
3	Taxable consideration *(subtract line 2 from line 1)*	3.	0 00
4	Tax: $2 for each $500, or fractional part thereof, of consideration on line 3	4.	0 00
5	Amount of credit claimed for tax previously paid *(see instructions and attach Form TP-584.1, Schedule G)*	5.	0 00
6	Total tax due* *(subtract line 5 from line 4)*	6.	0 00

Part 2 – Computation of additional tax due on the conveyance of residential real property for $1 million or more

1	Enter amount of consideration for conveyance *(from Part 1, line 1)*	1.	0 00
2	Taxable consideration *(multiply line 1 by the percentage of the premises which is residential real property, as shown in Schedule A)*	2.	0 00
3	Total additional transfer tax due* *(multiply line 2 by 1% (.01))*	3.	0 00

Part 3 – Explanation of exemption claimed on Part 1, line 1 *(mark an **X** in all boxes that apply)*

The conveyance of real property is exempt from the real estate transfer tax for the following reason:

a. Conveyance is to the United Nations, the United States of America, New York State, or any of their instrumentalities, agencies, or political subdivisions (or any public corporation, including a public corporation created pursuant to agreement or compact with another state or Canada) ..... a ☒

b. Conveyance is to secure a debt or other obligation ..... b ☐

c. Conveyance is without additional consideration to confirm, correct, modify, or supplement a prior conveyance ..... c ☐

d. Conveyance of real property is without consideration and not in connection with a sale, including conveyances conveying realty as bona fide gifts ..... d ☐

e. Conveyance is given in connection with a tax sale ..... e ☐

f. Conveyance is a mere change of identity or form of ownership or organization where there is no change in beneficial ownership. (This exemption cannot be claimed for a conveyance to a cooperative housing corporation of real property comprising the cooperative dwelling or dwellings.) Attach Form TP-584.1, Schedule F ..... f ☐

g. Conveyance consists of deed of partition ..... g ☐

h. Conveyance is given pursuant to the federal Bankruptcy Act ..... h ☐

i. Conveyance consists of the execution of a contract to sell real property, without the use or occupancy of such property, or the granting of an option to purchase real property, without the use or occupancy of such property ..... i ☐

j. Conveyance of an option or contract to purchase real property with the use or occupancy of such property where the consideration is less than $200,000 and such property was used solely by the grantor as the grantor's personal residence and consists of a one-, two-, or three-family house, an individual residential condominium unit, or the sale of stock in a cooperative housing corporation in connection with the grant or transfer of a proprietary leasehold covering an individual residential cooperative apartment ..... j ☐

k. Conveyance is not a conveyance within the meaning of Tax Law, Article 31, § 1401(e) *(attach documents supporting such claim)* ..... k ☐

* The total tax (from Part 1, line 6 and Part 2, line 3 above) is due within 15 days from the date of conveyance. Make check(s) payable to the county clerk where the recording is to take place. For conveyances of real property within New York City, use Form TP-584-NYC. If a recording is not required, send this return and your check(s) made payable to the ***NYS Department of Taxation and Finance***, directly to the NYS Tax Department, RETT Return Processing, PO Box 5045, Albany NY 12205-0045. If not using U.S. Mail, see Publication 55, *Designated Private Delivery Services*.

Schedule C – Credit Line Mortgage Certificate (Tax Law Article 11)

Complete the following only if the interest being transferred is a fee simple interest.
This is to certify that: *(mark an **X** in the appropriate box)*

1. ☒ The real property being sold or transferred is not subject to an outstanding credit line mortgage.

2. ☐ The real property being sold or transferred is subject to an outstanding credit line mortgage. However, an exemption from the tax is claimed for the following reason:

   a ☐ The transfer of real property is a transfer of a fee simple interest to a person or persons who held a fee simple interest in the real property (whether as a joint tenant, a tenant in common or otherwise) immediately before the transfer.

   b ☐ The transfer of real property is (A) to a person or persons related by blood, marriage or adoption to the original obligor or to one or more of the original obligors or (B) to a person or entity where 50% or more of the beneficial interest in such real property after the transfer is held by the transferor or such related person or persons (as in the case of a transfer to a trustee for the benefit of a minor or the transfer to a trust for the benefit of the transferor).

   c ☐ The transfer of real property is a transfer to a trustee in bankruptcy, a receiver, assignee, or other officer of a court.

   d ☐ The maximum principal amount secured by the credit line mortgage is $3 million or more, and the real property being sold or transferred is **not** principally improved nor will it be improved by a one- to six-family owner-occupied residence or dwelling.

   Note: for purposes of determining whether the maximum principal amount secured is $3 million or more as described above, the amounts secured by two or more credit line mortgages may be aggregated under certain circumstances. See TSB-M-96(6)-R for more information regarding these aggregation requirements.

   e ☐ Other *(attach detailed explanation)*.

3. ☐ The real property being transferred is presently subject to an outstanding credit line mortgage. However, no tax is due for the following reason:

   a ☐ A certificate of discharge of the credit line mortgage is being offered at the time of recording the deed.

   b ☐ A check has been drawn payable for transmission to the credit line mortgagee or mortgagee's agent for the balance due, and a satisfaction of such mortgage will be recorded as soon as it is available.

4. ☐ The real property being transferred is subject to an outstanding credit line mortgage recorded in _____ (insert liber and page or reel or other identification of the mortgage). The maximum principal amount of debt or obligation secured by the mortgage is _____. No exemption from tax is claimed and the tax of _____ is being paid herewith. *(Make check payable to county clerk where deed will be recorded.)*

Signature (both the grantors and grantees must sign)

The undersigned certify that the above information contained in Schedules A, B, and C, including any return, certification, schedule, or attachment, is to the best of their knowledge, true and complete, and authorize the person(s) submitting such form on their behalf to receive a copy for purposes of recording the deed or other instrument effecting the conveyance.

Grantor signature	Title	Grantee signature	Title
[signature]	PRES + CEO	[signature]	NYSDEC Attorney
Grantor signature	Title	Grantee signature	Title

Reminder: Did you complete all of the required information in Schedules A, B, and C? Are you required to complete Schedule D? If you marked *e*, *f*, or *g* in Schedule A, did you complete Form TP-584.1? Have you attached your check(s) made payable to the county clerk where recording will take place? If no recording is required, send this return and your check(s), made payable to the ***NYS Department of Taxation and Finance,*** directly to the NYS Tax Department, RETT Return Processing, PO Box 5045, Albany NY 12205-0045. If not using U.S. Mail, see Publication 55, *Designated Private Delivery Services*.

Schedule D – Certification of exemption from the payment of estimated personal income tax (Tax Law, Article 22, § 663)

Complete the following only if a fee simple interest or a cooperative unit is being transferred by an individual or estate or trust.

If the property is being conveyed by a referee pursuant to a foreclosure proceeding, proceed to Part 2, mark an *X* in the second box under *Exemption for nonresident transferors/sellers*, and sign at bottom.

Part 1 – New York State residents

If you are a New York State resident transferor/seller listed in Form TP-584, Schedule A (or an attachment to Form TP-584), you must sign the certification below. If one or more transferor/seller of the real property or cooperative unit is a resident of New York State, **each** resident transferor/seller must sign in the space provided. If more space is needed, photocopy this Schedule D and submit as many schedules as necessary to accommodate all resident transferors/sellers.

Certification of resident transferors/sellers

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor/seller as signed below was a resident of New York State, and therefore is not required to pay estimated personal income tax under Tax Law § 663(a) upon the sale or transfer of this real property or cooperative unit.

Signature	Print full name	Date
	NINA KUBOTA	9/6/2022
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

Note: A resident of New York State may still be required to pay estimated tax under Tax Law § 685(c), but not as a condition of recording a deed.

Part 2 – Nonresidents of New York State

If you are a nonresident of New York State listed as a transferor/seller in Form TP-584, Schedule A (or an attachment to Form TP-584) but are not required to pay estimated personal income tax because one of the exemptions below applies under Tax Law § 663(c), mark an ***X*** in the box of the appropriate exemption below. If any one of the exemptions below applies to the transferor/seller, that transferor/seller is not required to pay estimated personal income tax to New York State under Tax Law § 663. **Each** nonresident transferor/seller who qualifies under one of the exemptions below must sign in the space provided. If more space is needed, photocopy this Schedule D and submit as many schedules as necessary to accommodate all nonresident transferors/sellers.

If none of these exemption statements apply, you must complete Form IT-2663, *Nonresident Real Property Estimated Income Tax Payment Form*, or Form IT-2664, *Nonresident Cooperative Unit Estimated Income Tax Payment Form.* For more information, see *Payment of estimated personal income tax,* on Form TP-584-I, page 1.

Exemption for nonresident transferors/sellers

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor/seller (grantor) of this real property or cooperative unit was a nonresident of New York State, but is not required to pay estimated personal income tax under Tax Law § 663 due to one of the following exemptions:

☐ The real property or cooperative unit being sold or transferred qualifies in total as the transferor's/seller's principal residence (within the meaning of Internal Revenue Code, section 121) from _____ (Date) to _____ (Date) *(see instructions)*.

☐ The transferor/seller is a mortgagor conveying the mortgaged property to a mortgagee in foreclosure, or in lieu of foreclosure with no additional consideration.

☒ The transferor or transferee is an agency or authority of the United States of America, an agency or authority of New York State, the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, the Government National Mortgage Association, or a private mortgage insurance company.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

APPENDIX D – HEALTH AND SAFETY PLAN OUTLINE AND COMMUNITY AIR MONITORING PLAN

SAMPLE
HEALTH AND SAFETY PLAN OUTLINE
(TO BE PREPARED BY CONTRACTORS PERFORMING WORK BELOW THE FINAL SITE DEVELOPMENT COVERS)

1.0 Introduction
- 1.1 Objectives and Applicability
- 1.2 General Site Description

2.0 Hazard Evaluation

3.0 Health and Safety Personnel
- 3.1 Organizational Structure
- 3.2 Key Personnel/Responsibilities
  - 3.2.1 Health and Safety Director/Manager
  - 3.2.2 Project Manager
  - 3.2.3 On-Site Health and Safety Coordinator
  - 3.2.4 Subcontractors

4.0 Training Requirements

5.0 Site Control Measures
- 5.1 Work Zone Definition
- 5.2 Nearest Medical Assistance
- 5.3 Safe Work Practices
- 5.4 Response Actions

6.0 Personnel Protective Equipment
- 6.1 Overview of Levels of Protection
- 6.2 Personal Protective Equipment
  - 6.2.1 Equipment Overview
  - 6.2.2 Monitoring Requirements
  - 6.2.3 Action Levels

7.0 Emergency Response/Contingency Plan
- 7.1 Pre-Emergency Planning
- 7.2 Evacuation Routes and Procedures
- 7.3 Site Security and Control
- 7.4 Emergency Contact/Notification System
- 7.5 Emergency Equipment

8.0 Air Monitoring
- 8.1 Instrumentation
- 8.2 Air Monitoring Frequency
- 8.3 Perimeter Air Monitoring

COMMUNITY AIR MONITORING PLAN

840 5TH AVENUE

BROOKLYN, NEW YORK

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APPENDIX A MANUFACTURERS' OWNER'S MANUALS

FIGURE 1D MONITORING STATION LOCATIONS

INTRODUCTION

In accordance with the Remedial Action Work Plan, this Community Air Monitoring Plan (CAMP) is developed for utilization during ground intrusive work activities at 840 5th Avenue, Brooklyn, New York (referred to as the Site"). The Site is approximately 0.45 acres (19,605 square feet) and is proposed for development as a public school facility.

TRC Engineers, Inc. (TRC) developed this CAMP to describe the procedures for real-time air monitoring for volatile organic compounds (VOCs) and particulate levels which will be completed during ground intrusive activities. Continuous monitoring and observations will be required during ground intrusive activities. This CAMP was developed based on the requirements of New York State Department of Health (NYSDOH) Generic CAMP, Appendix 1A and Fugitive Dust and Particulate Monitoring, Appendix 1B, of NYSDEC DER-10.

2.0 PURPOSE

The Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of the work area at the Site. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of ground intrusive work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities do not spread contamination off-site through the air.

3.0 AIR MONITORING PROTOCOL

A qualified environmental monitor with "stop work authority" will be responsible for the air monitoring and daily calibration and maintenance of the equipment in accordance with the manufacturer's specifications. All instrumentation and equipment will be maintained at all times in proper operating condition. The qualified environmental monitor will be responsible for documenting in the dedicated project log book each calibration event, any equipment and instrument malfunctions, unusual conditions, air monitoring station locations, and any exceedances of action levels and countermeasures implemented. Copies of the manufacturers' owner's manuals for monitoring instrumentation to be used is included as *Appendix A*. The downwind CAMP station with alternative locations is shown on the attached *Figure 1D*.

3.1 VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the downwind perimeter of the work area on a continuous basis. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present (i.e., photoionization detector MiniRae 2000). The equipment will be calibrated daily and will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring. Note that odor complaints from any owner of an adjacent or nearby property will be managed by the Contractor in a manner equivalent to an exceedance of an action level in the CAMP.
- If total organic vapor levels at the downwind perimeter of the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the work area or half the distance to the

nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.
- All 15-minute readings will be recorded and will be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

3.2 Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind locations of the perimeter of the Site at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level (i.e., TSI DustTrak Model 8520). The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area. Note dust complaints from any owner of an adjacent or nearby property will be managed by the Contractor in a manner equivalent to an exceedance of an action level in the CAMP.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work will be stopped and a re-evaluation of activities will be initiated. Work will be able to be resumed provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.
- All readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review.

4.0 REPORTING

Any exceedance of a CAMP threshold or action level will be reported to the NYCSCA, NYSDEC, and NYSDOH immediately and additionally via email within 4 hours of the time it is recorded. The report will include the instrument readings; location of the monitoring station where the exceedance was recorded; readings at upwind locations; date, time, and duration of elevated readings (i.e., number of 15 minute time-weighted exceedances); activities being performed at the time of the exceedances; and descriptions of countermeasures implemented to control the exceedance and prevent future occurrences.

At the completion of each work day, the data recorded from each air monitoring station will be downloaded onto a dedicated field computer and evaluated by the qualified environmental monitor. All readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review.

APPENDIX A

MANUFACTURERS' OWNER'S MANUALS

MiniRAE 2000

Portable VOC Monitor
PGM-7600



OPERATION AND MAINTENANCE MANUAL

(Document No.: 011-4001-000)
Revision E, May 2005

RAE SYSTEMS

ISO 9001 CERTIFIED

ATTENTION!

For European Applications

A. CE 0575 ⟨Ex⟩ II 1G/2G
   DEMKO 03 ATEX 0204759X
   Eex ia IIC T4
B. Recharge batteries only in non-hazardous locations.
C. Do not connect external cable to serial interface jack in hazardous locations.
D. Use RAE Systems Adapter P/N 500-0072 for connection to communication port and charging jack only in a non-hazardous area.

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Data Analysis Software

TRAKPRO™

Data Analysis Software

User's Guide

1980581, Revision D
July 2009

TRUST. SCIENCE. INNOVATION.

Part Number
1980581 / Revision D / July 2009

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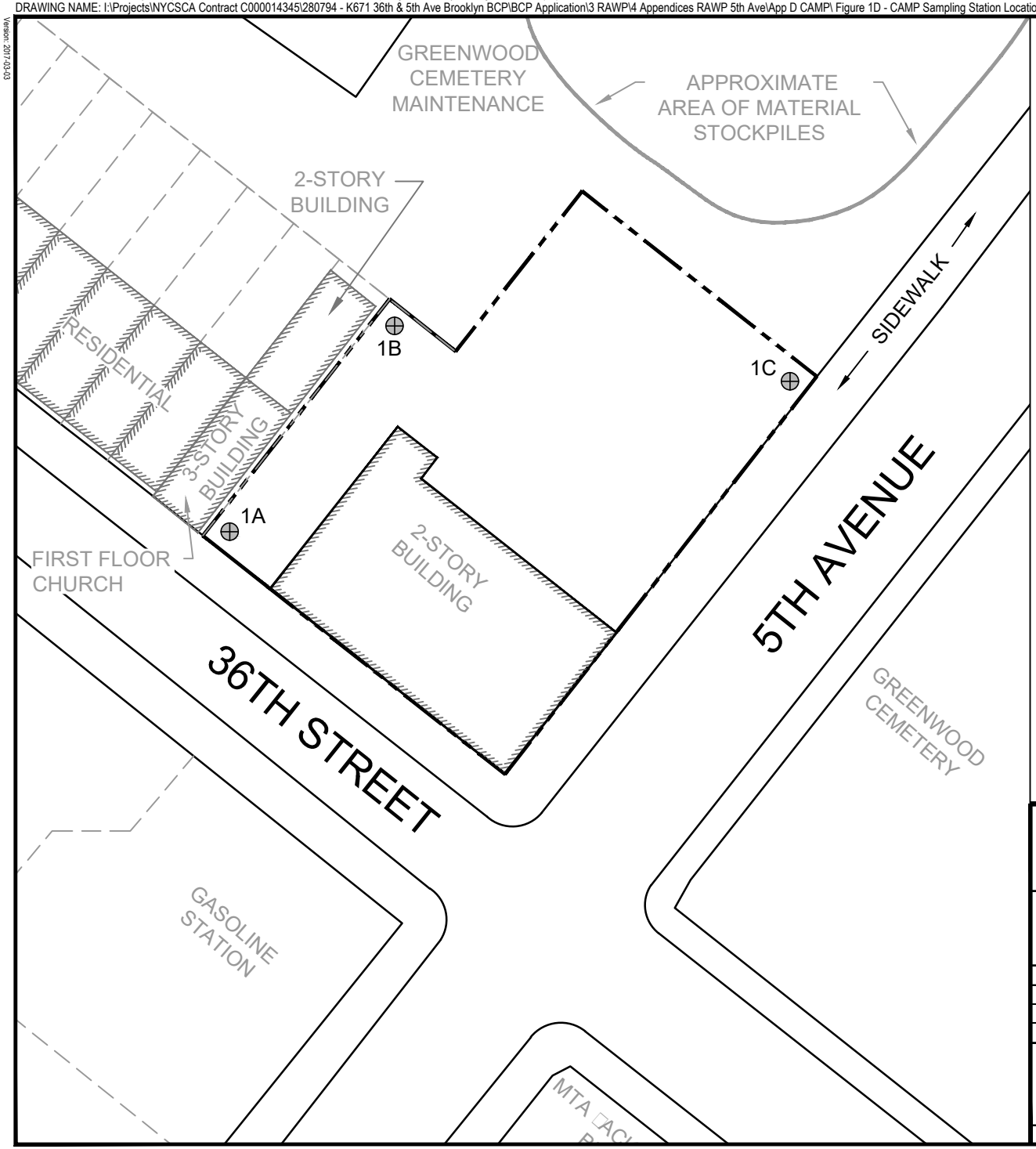
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FIGURE 1D

MONITORING STATION LOCATIONS

8.5x11 --- ATTACHED XREF'S: Brooklyn; K000(K671) -170925 --- ATTACHED IMAGES: 836-841 5th avenue map_image; K671 AE Project Meeting No. 5 - 10-10-17 (002) PILES;
DRAWING NAME: I:\Projects\NYCSCA Contract C000014345\280794 - K671 36th & 5th Ave Brooklyn BCP\BCP Application\3 RAWP\4 Appendices RAWP 5th Ave\App D CAMP\ Figure 1D - CAMP Sampling Station Locations.dwg --- PLOT DATE: September 14, 2018 - 9:58AM --- LAYOUT: 8.5X11L
Version: 2017-03-03



LEGEND (SYMBOLS NOT TO SCALE):

- SITE BOUNDARY
- BUILDING FOOTPRINT
- ⊕ 1X — PROPOSED ALTERNATIVE LOCATIONS OF DOWNWIND CAMP STATION

W – N – E

NOTES:

1. LOCATIONS AND DIMENSIONS OF PHYSICAL FEATURES AND PROPERTY BOUNDARIES ARE APPROXIMATE.
2. ONE (1) DOWNWIND CAMP AIR MONITORING STATION WILL BE UTILIZED DURING REMEDIAL ACTIVITIES. LOCATION WILL BE ALTERED DUE TO CHANGES IN WIND DIRECTION.

SOURCE:
BLOCK AND LOT BOUNDARIES FROM WWW.PROPERTYSHARK.COM

0 50' 100'

SCALE: 1" □ 50'
SHEET SIZE: 8.5" BY 11"

PROJECT: **NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY**
COMMUNITY AIR MONITORING PLAN
840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE:

MONITORING STATION LOCATIONS

DRAWN BY:	H. DELGADO	PROJ NO.:	280794
CHECKED BY:	D. SCHMIDT		
APPROVED BY:	D. GLASS		**FIGURE 1D**
DATE:	SEPTEMBER 2018		

TRC
1430 Broadway
10th Floor
New York, NY 10018
Phone: 212.221.7822

FILE NO.: F□□r□ 1D - CAMP S□□ □□□□ S□□□□ L□□□□□□d□□

SPECIAL REQUIREMENTS COMMUNITY AIR MONITORING PLAN (FOR GROUND INTRUSIVE WORK WITHIN 20 FEET OF POTENTIALLY EXPOSED INDIVIDUALS OR STRUCTURES)

840 5TH AVENUE
BROOKLYN, NEW YORK

The Special Requirements Community Monitoring Plan (CAMP) will be implemented when ground intrusive work activities are performed within 20 feet of potentially exposed populations or occupied structures. For the 840 5th Avenue Site, the Special CAMP will pertain to ground intrusive work activities performed within 20 feet of the west-adjacent structure located at 467 36th Street.

Details regarding the Special CAMP are presented below. Continuous on-Site monitoring locations included as part of the CAMP for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures.

- If total VOC concentrations adjacent to the exterior walls of occupied structures (i.e., at the western perimeter of the Site) exceed 1 parts per million (ppm), monitoring should occur within the occupied structure(s), if access is granted. Background readings in the occupied spaces will be recorded prior to commencement of the planned work if access is granted. Any unusual background readings will be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations adjacent to the exterior walls of occupied structures (i.e., at the western perimeter of the Site) exceed 150 micrograms per cubic meter ($\mu g/m^3$), work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 $\mu g/m^3$ or less at the monitoring point.

The use of engineering controls such as vapor/dust barriers, temporary negative pressure enclosures, or special ventilation devices may be considered to prevent exposures related to the work activities and to control dust and odors. Since the west-adjacent building is primarily residential, it is anticipated that work will be performed on weekdays during normal working hours and not on weekends or during evening/overnight hours.

There is no indoor work expected at co-located residences or facilities. Therefore, special requirements for indoor work at co-located residences or facilities is not included in the Special CAMP.

APPENDIX E
SITE MANAGEMENT FORMS

Summary of Green Remediation Metrics for Site Management

Site Name: 840 5th Avenue Site Code: C224271
Address: 840 5th Avenue City: Brooklyn
State: New York Zip Code: 11232 County: Kings

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g., natural gas (cf))		
Fuel Type 2 (e.g., fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g., solar, wind)		
Other energy sources (e.g., geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e., Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application. _____ **Date** **Contractor**

Annual Inspection Form
Cover System
P.S. K671

Inspector's Name:	Weather Conditions:
Inspection Date:	Air Temperature (^{o}F):
Inspection Time:	
Comments:	

A. COVER SYSTEM BUILDING INTERIOR - LOWEST LEVEL (CELLAR) INSPECTION

Inquire with Custodian whether any ground intrusive activities have taken place within the lowest level (cellar) since the last cover system inspection (typically annually).

Walk the entire lowest level (cellar) and report the following:

* Any penetrations not sealed in the cellar floors/walls.
* Any visible cracks or settlement in the cellar floors/walls.
* Any other visible openings (unintended) in the ground floors.
* Draw approximate location of floor cracks/openings on site map.
* Note the length of the crack/opening.
* Note the width of the crack/opening.

Comments:

B. COVER SYSTEM - EXTERIOR INSPECTION

Inquire with Custodian whether any ground intrusive activities have taken place since the last cover system inspection (typically annually).

Walk and inspect the entire perimeter and courtyard of the Site.

Walk and inspect all of the paved areas (concrete and asphalt) of the Site.

Walk and inspect all of the unpaved areas of the Site including areas with pavers, synthetic turf, and landscaping, and report the following:

* Any penetrations not sealed in the paved areas.
* Any signs of significant cracks, settlement, or deterioration of the paved areas.
* Any of the pavement material removed.
* Any indicators of vehicular use on the unpaved areas (tire tracks, rutting, etc.).
* Any structures that have been constructed on the unpaved areas or through paved areas.
* Inspect synthetic turf/concrete pavers/landscaped area. Any problems identified?
* Any indicators of soil washing or erosion (gullies, soil washed out onto the pavement).
* Any indicators of intrusive activities (drilling, digging, trenching, grading, excavating, etc.).

Comments:

C. Repair

Summarize needed/completed repairs to Engineering Controls:

Inspector's Signature: _____

Custodian Monthly or Severe Condition Inspection Form

Vapor Barrier and SSDS

Inspector's Name:

Inspection Date/Time:

Purpose: (circle one) **Monthly Inspection** **Severe Condition Inspection (describe)**

		Yes / No *	Notified Person / Date
A. VAPOR BARRIER INSPECTION	**1. Walk the entire cellar floor**		
	* Any visible cracks in the floor?		
	* Any other visible openings (unintended) in the floor?		
	* Any construction activities affecting the floor?		
	* Any visible cracks in any accessible pits?		
	** Notification of DOE EHS is required if cracks are noted. Include the following information: - Draw approximate location of floor cracks/openings on site map. - Note the length of the crack/opening. Note the width of the crack/opening.		
B. SSDS INSPECTION	**1. Walk the entire roof surface.**		
	* Any rust or other debris (bird nest, etc.) in or on SSDS Exhaust Stacks?		
	* Are the SSDS fan units functioning at a lower vacuum than the previous inspection?		
	* Is the spare fan unit missing from the school?		
	* Are any lights out on the SSDS Monitoring System (Light panel)? Which one(s)?		
C. ACTIONS TAKEN			
	Inspector's Signature:		

Annual Inspection Form
Gas Vapor Barrier and Sub-Slab Depressurization System
P.S. K671

Inspector's Name:	Weather Conditions:
Inspection Date:	Air Temperature (^{o}F):
Inspection Time:	

Comments:

A. PRE INSPECTION CHECKLIST

* Schedule Annual Inspection when school is not occupied by students.
* Review 12 Previous Monthly Inspection Checklists.
* Meet with Custodial Engineer and Principal to solicit comments/concerns regarding the operation of the Engineering Controls over the last 12 months.
* Conduct Annual Refresher Training with DOE EHS.
* Follow proper safety protocols including lockout/tagout.
* Comments:

B. SSDS SYSTEM INSPECTION

Walk the entire roof surface of school building.

* Inspect fan stack guy wires.
* Inspect monitoring points.
* Record vacuum gauge reading.
* Ensure all SSDS accessories listed in section 15880 are functioning properly.
* Inspect bolts and set screws for tightness and rusty condition.
* Inspect SSDS fan for cleanliness. Clean exterior surfaces only. Remove dust and grease on motor housing.
* Are the indicator lights on the Building Management System functioning properly?
* Is the spare fan unit missing from the school?
* Comments (see or hear anything unusual?):

C. VAPOR BARRIER INSPECTION

Walk all of the cellar floor.

* Review all cracks or other openings indentified in cellar floor during previous inspections.
* Any new visible cracks in the cellar floor?
* Any new visible opening (unintended) in the floor?
* Any new visible cracks in accessible pits?
* Note the length of any new cracks/openings in the cellar floor.
* Draw approximate location of floor cracks/openings that appear to have potential leak through vapor barrier.

Comments:

D. Repair

Summarize needed/completed repairs to Engineering Controls:

Inspector's Signature: _____

Routine and Preventative Maintenance Checklist

SSDS Fans

Inspector's Name:

Inspection Date/Time:

Purpose: (circle one) **Biannual Inspection** **Fan Malfunction (describe)**

SSDS Fan Maintenance Checklist

Preform the steps below for every SSDS fan during a biannual inspection, or for any SSDS fan experiencing issues	Completed Y/N	List Any Issues or Unusual Behavior
1. Disconnect, lock out, and tag fan electrical power source		
2. Check all SSDS fan bearings		
3. Inspect SSDS fan drive belt for tightness and wear. Adjust/replace if required		
4. Clean/blow down centrifugal fan wheel, inlet, fan, and motor housing		
5. Grease fan shaft bearing pillow blocks		
6. Inspect fan inlet and outlet ductwork flex joints		
7. Inspect damper for proper orientation		
8. Inspect fan stack guy wires		
9. Inspect fan mounting and vibration isolators		

*Notify the DOE EHS of any fan unit/component failure. In the event that a fan component fails, the component will be replaced by DOE EHS. DOE EHS will make appropriate arrangements in advance with suppliers to provide SSDS replacement parts within 12 hours notice. In the event that a fan unit fails, the fan unit will be replaced by DOE EHS. A spare fan will be available on-site for immediate replacement in case of fan failure.

Inspector's Signature:

PS K671

Semi-Annual Monitoring Point Inspection Checklist

Inspect all monitoring point locations for obstructions; check the manhole covers (and bolts) along with the quick connections inside the manhole.

Monitoring Point ID	Room Number	Any obstructions over MP	Manhole cover secure and bolts in tact	Comments (status of quick-connect fitting, etc.)
		Y / N	Y / N	
		Y / N	Y / N	
		Y / N	Y / N	
		Y / N	Y / N	
		Y / N	Y / N	
		Y / N	Y / N	

APPENDIX F

MITIGATION SYSTEM INSTALLATION RECORD AND O&M MANUAL

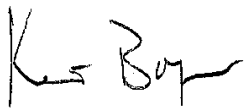
1430 Broadway, 10th Floor
New York, NY 10018
T 212.221.7822
TRCcompanies.com

Sub-Slab Depressurization System Monitoring Point Vacuum Testing
840 5th Avenue
Brooklyn, New York
NYSDEC Site No. C224271

As part of the installation of the building's sub-slab depressurization system (SSDS), a network of four (4) SSDS monitoring points were installed at the ground floor of the new school building. Pressure testing was performed following the installation and initial start-up of the active SSDS. Measurable vacuum influence was observed in all four (4) SSDS monitoring points, proving adequate influence at all monitoring point locations. Vacuum pressure readings ranged from -0.019 inches H_2O to -0.040 inches H_2O. The vacuum pressure testing results are presented in the attached table. SSDS monitoring point locations can be found on Figure 8A included in this report.

Should you have any questions, please feel free to contact me at (917) 983-3166, or at my email kboger@trccompanies.com, at your convenience.

Very Truly Yours,



Kevin Boger, PE
TRC Engineers, Inc.

Enclosures:

Mitigation System Installation Record

Mitigation System Installation Record

☐ Structure was sampled previously

System Information

Site No: C224271

System ID: K671 SSDS

Site Name: 840 5th Avenue

Owner Name: New York City School Construction Authority ☒ Owner Occupied

System Address: 840 5th Avenue Telephone: (718) 472-8620

City: Brooklyn Zip: 11232 Alt. Telephone: 718-752-5211

Contractor Information

Installer Name: Multiple tradesmen Company: WDF Inc.

Telephone: (914) 776-8000

Building Conditions

Building Type: School

Slab Integrity: ○ Poor ○ Average ○ Good ◉ Excellent

Slab Penetrations: ☒ Sump ☒ Floor drain ☐ Perimeter drain ☐ Other

Describe:

6 floor drains present in cellar, 1 sump present in elevator pit, 1 grinder pump and 1 sump present in cellar-level mechanical room. All penetrations sealed with GVB prior to pouring of concrete floor slab.

Observed Water: ○ Dry ○ Damp ◉ Sump only ○ Standing

Describe:

Water observed in sumps, but cellar is otherwise dry.

System Installation

Installation Type: Sub-Slab Depressurization (Active) Date Installed: May 31, 2022

Slab Thickess (inches): >5 in.

Subslab Material: Gravel Subslab Moisture: Dry

Number of Suction Points: 4 Number of Fans Installed: 2

	☒ Fan #1 Operating	☒ Fan #2 Operating	☐ Fan #3 Operating
Fan Model No(s):	NYB - 140606	NYB - 140606	
Fan Serial No(s):	2019-13900-01 1	2019-13900-01 2	
Final U-Tube Levels:	-13 in. H2O	-11 in. H2O	

Additional Mitigation Elements (check all that apply):

☐ Drainjer ☒ Membrane ☐ Sealed cracks ☒ New floor ☐ Rain cap ☐ Other

Comments:

A Liquid Boot Plus gas vapor barrier (GVB) membrane was installed in conjunction with the SSDS. Additionally, this is a new construction and the slab/floor are newly installed.

Communication Testing

Test Method: Micromanometer Meter Type/Manufacturer: Dwyer Manometer Series 475

Location	Reading/Result	Dist. From Suction Point (ft)	Passed?
MP-1	-0.019	33	☒
MP-2	-0.033	30	☒
MP-3	-0.038	35	☒
MP-4	-0.040	40	☒
			☐

System Sketch
(indicate notable features, location of extraction points, and communication test holes)

NORTH

Refer to Figures 8A-8G of the Final Engineering Report and Figures 1-7 of the OM&M Manual.

ENGINEERING CONTROLS
OPERATION AND MAINTENANCE PLAN

for

PUBLIC SCHOOL K671
840 5th AVENUE
BROOKLYN, NEW YORK 11232

SCA LLW NO.: 106889
SCHOOL DISTRICT: 15
SCA SERVICE ID.: 73094
BUILDING NO.: K671

TRC ENGINEERS, INC. PROJECT NO. 356549.0000.0000

AUGUST 2022

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1.0 INTRODUCTION

This Operation and Maintenance Plan (O&M Plan) outlines the responsibilities of all parties to ensure proper operation and maintenance of the engineering controls installed at the PS K671 school building. The O&M Plan provides protocols for inspection, routine and preventative maintenance, and contingency measures for the engineering controls.

Engineering controls consisting of a sub-slab depressurization system (SSDS) and a gas vapor barrier have been incorporated into the school building. The purpose of the SSDS and gas vapor barrier (GVB) is to prevent contaminants in the soil vapor beneath the building from entering the school by a process known as vapor intrusion. The SSDS includes two (2) pits constructed beneath the lowest level slab of the school, associated piping, and risers which connect to two (2) roof top suction fans. One (1) spare fan in manufacturer's original packaging will be kept on-site. The SSDS suction fans are connected to alarm indication stations in the Custodial Engineer's Office that are set to alarm when there is a no vacuum condition in the SSDS. Four (4) monitoring points have been installed in the concrete slab above the gas permeable aggregate layer at the lowest level as part of the SSDS to allow for additional system monitoring. The monitoring points are located below 4-inch diameter, flush-mounted cleanout covers. The rooms where the monitoring points are located are described in the Annual Monitoring Point Inspection Checklist, presented in ***Appendix B*** of this O&M Plan. Their locations are also provided on ***Figure 1*** at the end of this Plan.

The GVB consists of an impermeable membrane placed under the building foundation.

The SSDS and GVB require regular inspections and maintenance to ensure that they are functioning as designed. It is the responsibility of the school custodial engineer to inspect the SSDS and GVB on a monthly basis and after a severe condition (e.g., major storm event, power outage, etc.), as well as to notify the New York City Department of Education Environmental Health and Safety Division (DOE EHS) of any problems with the system. The DOE Division of School Facilities (DSF), represented by the Custodial Engineer and DSF trained personnel, is responsible for routine and preventative maintenance of the SSDS to ensure that the system operates properly. Monthly and annual inspection checklists are included in this operation and maintenance plan. In addition, DOE EHS must retain an independent Professional Engineer to conduct a more detailed annual inspection of the SSDS and GVB, inspections after severe weather events or emergencies and for annual training. The DOE EHS independent Professional Engineer will be responsible for presenting a report of annual inspection findings to DOE EHS. Monthly or severe condition, routine and preventative maintenance and annual inspection forms are included in ***Appendix B***.

This O&M Plan outlines the responsibilities of all parties to ensure continuous operation and proper maintenance of the SSDS and GVB. The inspections and contingency measures for the SSDS and GVB are also provided in this O&M Plan.

1.1 Notes to User

The school Custodial Engineer, Fireman, DSF and the DOE EHS are responsible for implementing this O&M Plan. The personnel responsible for implementing this O&M plan are known as the Engineering Controls (ECs) Team and are identified in Sections 1.2 and 1.3. Please note that this O&M Plan is subject to change based on changes to the building, changes to the EC team, DOE EHS policies, etc., and it will be updated periodically in order to remain current. Updated information will be provided through an addendum issued by DOE EHS and inserted in the appropriate section of this O&M Plan. Any modification will be noted in this document by providing the date of re-issuance at the bottom of the appropriate page.

1.2 The Engineering Controls (ECs) Team

The individuals identified below and in Section 1.3 currently constitute the EC Team. The signatures and dates provided below indicate the date on which O&M training was provided to each member in accordance with Section 4.4.

Any staffing changes to the EC Team must be brought to the attention of DOE EHS to ensure adequate training for the execution of tasks and responsibilities detailed in this O&M plan. Staffing changes will be addressed as an addendum to this document.

Custodial Engineer:

Name (Print)_____ Signature_____Date_____

Fireman:

Name (Print)_____ Signature_____Date_____

Deputy Director of Facilities:

Name (Print)_____ Signature_____Date_____

DOE Environmental Health and Safety (EHS) Representative:

Name (Print)_____ Signature_____Date_____

1.3 Independent Professional Engineer

The following individual retained by the DOE EHS shall hold a New York State Professional Engineer License and will perform annual training of the EC Team members, annual certifications of the ECs, and emergency inspections (as needed):

Name (Print) _____ License No. _____

Signature _____ Date _____

2.0 FREQUENTLY ASKED QUESTIONS

This section presents answers to frequently asked questions about ECs and the O&M Plan.

- **What is the purpose of this O&M Plan?** To ensure proper training of all members of the ECs Team and the implementation of standard procedures for operating and maintaining the Engineering Controls. The O&M Plan also serves as an inspection records repository.

- **What Are Engineering Controls (ECs)?** Engineering Controls are physical barriers and mechanical systems that eliminate potential for exposure from contaminated media (i.e., groundwater, soil or contaminated vapors). The following Engineering Controls have been installed at the PS K671 Site:

  --Sub-Slab Depressurization System (SSDS) – A network of pits and piping installed below the vapor barrier and connected to two suction fans on the roof. Additional information on the SSDS is provided in **Appendices C through E**.

  --Gas Vapor Barrier (fluid applied) – A continuous synthetic fluid applied membrane, which is impermeable to vapors, installed below the school building, as shown on the H-series Drawings (**Figures 1 through 7** provided at the end of this Plan) and approved shop drawings found in **Appendix D** of this plan. Additional information on the GVB is provided in **Appendices C through F**.

  The purpose of the ECs is to prevent potential sub-slab vapors from entering interior spaces.

- **Why Are Engineering Controls Important?** They provide long-term protection of school occupants from exposure to subsurface contaminants.

- **What Is the Nature of Contamination Being Addressed by the Engineering Controls?**
  A Remedial Investigation was performed at the Site. The results of the soil gas sampling indicated the presence of volatile organic compounds (VOCs) in soil vapor above corresponding New York State Department of Health (NYSDOH) air guidance values. The engineering controls were installed as a preventative measure and in accordance with NYSDOH Vapor Intrusion Guidance and the requirements of the Site's Remedial Action Work Plan (RAWP).

- **How Long Will the Engineering Controls be Operated and Maintained (O&M)?** The Engineering Controls will be operated and maintained for the life of the school.

- **Who Constitutes the ECs Team?** The ECs team members are responsible for implementing the Engineering Controls described in this O&M Plan. The current ECs team members are listed in Sections 1.2 and 1.3 above.

- **Who Is Responsible for the Monthly and Routine O&M Specified in this O&M Plan?** The Custodial Engineer is responsible for the monthly O&M specified in this O&M Plan. Support will be provided by DOE EHS if the Custodial Engineer is not able to repair the SSDS within eight (8) hours of observing any deficiency during a monthly inspection.

- **What Steps Should be Taken If a Problem is Encountered with the Engineering Controls?** The Custodial Engineer should immediately inspect and investigate the source of the problem. In the event that the Custodial Engineer cannot correct the problem (such as a temporary power outage) within eight (8) hours, the Custodial Engineer shall notify DOE EHS for appropriate follow-up. Table 1 summarizes the ECs Team members' responsibilities. Table B-1 provides the sequence of action required in the event a problem is encountered.

- **Where Are Copies of this O&M Plan Maintained?** Copies are maintained in the Custodial Engineer's office at all times and with DOE EHS. Copies of all inspection forms and correspondence must be maintained with this Plan.

- **What is required if future construction is required below the floor slab?** Standard details for repairs to the GVB are provided in ***Appendix F***. Repairs to the GVB must be completed by an approved GVB installer and the independent Professional Engineer must supervise the work.

3.0 DESCRIPTION OF ENGINEERING CONTROLS

The following Engineering Controls (ECs) have been implemented at the school building:

- Sub-Slab Depressurization System.
- Fluid Applied GVB.

3.1 Sub-Slab Depressurization System (SSDS)

An SSDS was installed in the school as an added safeguard to prevent soil vapor from entering the school building in the future. The specifications and drawings used for construction of the SSDS are provided in ***Appendix C***. Contractor submittals related to the SSDS are provided in ***Appendix D***. The primary components of the SSDS are as follows:

- Two (2) sub-slab pits (P-1 and P-2) located beneath the lowest level slab of the school building;
- Two (2) SSDS vertical risers (VR-1 and VR-2) connecting the SSDS pits to two (2) roof top fans. Additionally, one (1) spare fan in manufacturer's original packaging will be kept on-site.
- Two (2) pressure switches installed in SSDS piping that will signal an alarm to Alarm Indication Stations if a low vacuum condition occurs; and,
- Four (4) monitoring points (MP-1, MP-2, MP-3, and MP-4) located in the lowest level slab of the school building**.**

3.2 Gas Vapor Barrier

The fluid applied GVB was installed beneath the building floor slab, on subgrade walls, and around pits of the school building as a precautionary measure to prevent soil vapor from entering the school building in the future. It is the standard practice of New York City School Construction Authority (NYCSCA) to require a GVB for all new school construction projects beginning in 2007. The specifications and drawings used for construction of the GVB are provided in ***Appendix C.*** Contractor submittals related to the GVB are provided in ***Appendix D***. The vapor barrier is applied beneath the lowest floor slab and around the subsurface foundation walls of the school building.

4.0 ROLES AND RESPONSIBILITIES OF THE EC TEAM

4.1 The Engineering Controls Team

Effective implementation of this Plan requires routine training for all members of the ECs team. The ECs team members are listed below:

- Custodial Engineer;
- Fireman;
- Deputy Director of Facilities;
- Department of School Facilities (DSF) Trained Personnel;
- DOE EHS Staff; and,
- Independent Professional Engineer hired by the DOE EHS.

4.2 Monitoring and Maintenance Personnel

The following table identifies the appropriate personnel responsible for maintenance and monitoring of the Engineering Controls at the prescribed frequencies. **Note that NYSDOH and NYSDEC must be notified of any maintenance required as a result of the routine inspections.**

Table 1 – Summary of Responsibilities

Engineering or Administrative Control	Monitoring Frequency	Monitoring Personnel	Responsible Agency for Repairs/Actions
Gas Vapor Barrier	Monthly and after severe condition	Custodial Engineer	DOE EHS (custodial engineer to report any problems with the gas vapor barrier to DOE EHS)
Sub-Slab Depressurization System	24/7 Alarm Indication Station notification Monthly and after severe conditions	Custodial Engineer	DOE EHS (custodial engineer to report any problems with the SSDS to DOE EHS)
Sub-Slab Depressurization System Routine and Preventative Maintenance	Semi-annually and as required	DOE DSF Trained Personnel	DOE EHS

Engineering or Administrative Control	Monitoring Frequency	Monitoring Personnel	Responsible Agency for Repairs/Actions
Annual Inspection and Annual Reporting	Annually	Independent Professional Engineer	DOE EHS
Emergency Inspections Following Notification by the Custodial Engineer	As needed	Independent Professional Engineer	DOE EHS

4.3 Order of Responsibilities

In the event that the Custodial Engineer cannot perform the routine O&M measures for any reason (e.g., vacation, illness, etc.), the Fireman shall perform the routine O&M. If the Fireman is unable to perform the routine O&M measures, the Deputy Director of Facilities shall identify a trained individual to execute the Custodial Engineer's responsibilities.

4.4 Frequency of Team Training

The independent Professional Engineer retained by DOE EHS and will be responsible for training of the ECs Team members prior to school opening and on an annual basis. Annual follow-up training of the ECs Team will be provided by DOE's independent Professional Engineer responsible for preparation of the Annual Certification Report.

5.0 OPERATION AND MAINTENANCE OF THE SUB-SLAB DEPRESSURIZATION SYSTEM

The only moving parts in the SSDS are the suction fans at the termination of each of the SSDS risers (pipes). The pressure switches in the SSDS piping are connected to the Alarm Indication Stations (refer to Section 7.0). The SSDS suction fans should be running at all times. A spare SSDS suction fan will be kept on-site in the event that the suction fan units fails. If such an event should occur, the backup fan should be installed, and the component or fan that is no longer functioning properly should be repaired or replaced and documented for inclusion in the Annual Report. SSDS fan operation and maintenance manuals are provided in ***Appendix D***.

The following tasks will be performed by the Custodial Engineer (unless noted otherwise) on the first week of each month and after a severe condition (e.g., major erosion, flooding, power outage, etc.).

- Inspect the roof top piping, suction fans, and accessories for evidence of damage on the roof. In the event of a change from previous conditions, log the information in the logbook and monthly inspection form and immediately request an inspection from DOE EHS. The DOE EHS's report will include a mark-up of the design drawing(s) (***Figures 1 through 7)*** with the locations and type of damage.

  In the event that a fan component or gauge fails, it will be replaced by DOE EHS. DOE EHS will make appropriate arrangements in advance with suppliers to provide SSDS replacement parts within 12 hours notice. In the event that a fan unit fails, the fan unit will be replaced by DOE EHS. A spare fan will be available on-site for immediate replacement in case of fan failure.

- Log the vacuum gauge readings at each SSDS riser and vacuum gauge reading at the SSDS fan. Contact DOE EHS in the event that the vacuum reading in any of the vertical risers differ by more than 25% relative to the previous inspection so that the independent Professional Engineer can re-balance the system, if necessary.

- Identify any maintenance or repair activity that could affect the lowest level slabs on grade, SSDS piping, or rooftop components. **Note that NYSDOH and NYSDEC must be notified of any maintenance required as a result of the routine inspections.**

- Corrective actions will be taken in the event that cracks, new utilities, pits, etc. are identified in the lowest level slab. If the observed damage is minor, it is likely that the Custodial Engineer can perform necessary repair work (e.g., troweled on concrete, grout, etc.). If the damage is more extensive, DOE EHS will retain the services of the certified waterproofing installer and associated contractor(s) to perform any required repairs.

- Log the information in the logbook and monthly inspection form.

5.1 SSDS Fans

Fan No.	SF-1
Model No.	New York Blower 140606 Compact Pressure Blower
Year Installed	2022

Fan No.	SF-2
Model No.	New York Blower 140606 Compact Pressure Blower
Year Installed	2022

Fan No.	Spare
Model No.	New York Blower 140606 Compact Pressure Blower
Year Delivered to Site	2022

5.2 Routine and Preventative Maintenance

The SSDS fans require routine and preventative maintenance for efficient operation. A maintenance checklist is presented in ***Appendix B***. This maintenance shall be performed by DSF Trained Personnel as required and at a minimum of twice a year and a copy of each completed checklist must be filed in this report for review by the independent Professional Engineer on an annual basis. **Note that NYSDOH and NYSDEC must be notified of any maintenance required as a result of the routine inspections.**

5.3 Scheduled Replacement

In addition to routine maintenance, scheduled replacement of the SSDS fan is required. The following table presents the year scheduled replacement should be performed.

Year	Scheduled Replacement
2052	Complete fan replacement. *

Notes:

* When fans reaches the end of their design life, the fan type and model will be re-evaluated based on its prior performance/maintenance requirements.

6.0 OPERATION AND MAINTENANCE OF THE GAS VAPOR BARRIER

The following tasks will be performed by the Custodial Engineer (unless noted otherwise) monthly and after a severe condition (defined as major erosion or flooding).

- Prior to start of work near electrical and mechanical equipment, confirm proper safety precautions, such as "lock-out/tag-out" are in place.

- Inspect the first-floor level floor slabs (including walls of accessible pits and sumps) and sub-grade walls of the building for evidence of cracks, penetrations, construction work (e.g., utility or pit installation), etc.

- Identify any maintenance or repair activity that could affect the GVB. Repairs to the GVB must be performed by a licensed installer and supervised by the DOE's Professional Engineer.

- Log the information in the logbook and monthly inspection form.

- Note any changes from previous conditions in the logbook and on the monthly inspection form, and immediately request an inspection from DOE. Ensure DOE EHS performs a follow-up inspection to investigate the changed condition and that a copy of the findings and recommendations are provided to the independent Professional Engineer. DOE EHS's report will include a mark-up of the applicable attached drawing(s) (***Figures 1 through 7***) indicating the locations, orientations, and size of any cracks, new sub-slab utilities, pits, or other openings in the first-floor slab or foundation walls. Copies of all inspections and correspondence must be maintained with this Plan.

- Corrective actions will be taken in the event that cracks, new utilities, pits, etc. are identified in the foundation walls or lowest level slab. If the observed damage is minor, it is likely that the Custodial Engineer can perform necessary repair work (e.g., troweled on concrete, grout, etc.). If the damage is more extensive, DOE EHS will retain the services of the manufacturer-approved vapor barrier installer and associated contractor(s) to perform any required repairs.

6.1 Gas Vapor Barrier Repair

- The GVB, located below the concrete floor slabs will not be accessible under normal conditions. The GVB will be accessible if construction activities at the facility will require cutting/excavation through the floor slab, or excavation at the exterior of the building adjacent to the foundation. In the event any work is planned as described above, repair of the GVB shall be in accordance with the details included in ***Appendix F*** and must be performed by a licensed installer and supervised by the DOE's Professional Engineer.

7.0 ALARM INDICATION STATIONS (AIS)

7.1 Role of AIS in Monitoring the SSDS

The alarm indication stations (AISs) monitor the SSDS pressure switches situated in the SSDS riser piping, as depicted on Detail No. 1 in ***Figure 5*** of this Plan.

During any loss of vacuum, the AISs in the Custodian's office will be triggered. The AIS is both audible and visible and is required to be reset manually by the Custodial Engineer after an alarm condition. In the event of an alarm, Custodial Engineer should follow-up on the alarm condition as outlined below in 7.2.

7.2 Alarm Follow-up

The following task is to be performed by the custodial engineer:

- In the event of an alarm, clear immediately.
- Upon clearing the alarm, investigate the problem immediately following the steps outlined in the Routine/Preventative Maintenance Checklist, in ***Appendix B.***
- If system restart or repair is expected to require more than 8 hours, notify DOE EHS.

8.0 INSPECTIONS AND NOTIFICATIONS

8.1 Inspections

Inspections of the ECs will be conducted at the frequencies specified in Section 4.2. A comprehensive site-wide inspection will be conducted on an annual basis. The inspections will determine and document the following:

- If the ECs continues to perform as designed.
- If the ECs continues to be protective of human health and the environment.
- If site records are complete and up-to-date.
- Any changes or modifications made to the ECs.
- Preparation of an annual inspection report in accordance with Section 10 of this Plan.

If an emergency, such as a natural disaster or an unforeseen failure of the ECs occurs, an inspection of the Site will be conducted by an independent Professional Engineer to verify the effectiveness of the ECs.

The annual inspection performed by the independent Professional Engineer will consist of, at a minimum, an inspection of the school grounds, lowest level floor slabs, monitoring points, exhaust fans, fan exhaust stacks, and AISs. An annual inspection checklist is presented in ***Appendix B***.

8.2 Notifications

Notifications are to be submitted to the DOE EHS as follows:

- Immediate notice of potential damage or defect to the foundation structures that reduces or has the potential to reduce the effectiveness of the EC. Within 48 hours, actions will be taken to evaluate the observed damage and determine what further actions must be taken to mitigate the damage or defect.
- 14-day notice prior to any proposed ground intrusive activities to verify that ground intrusive activities will not affect the GVB.
- Immediate notice of any emergency, such as fire or flood that reduces or has the potential to reduce the effectiveness of the EC, including a summary of action taken.
- Follow-up status reports on actions taken to respond to any emergency event will be forwarded to DOE EHS within seven days after the event.

8.3 Training

The independent Professional Engineer must conduct annual refresher training for the EC team as noted in Section 4.4 of this Plan.

9.0 RECORD KEEPING

Custodial staff must maintain logbooks in order to document continual monitoring and maintenance of the EC. The logbook must contain for each entry, as applicable, the following information:

- Inspector's Name and Title
- Date/Time of Inspection (may or may not be precipitated AIS alarm)
- Description of Inspections (e.g. floor inspection)
- Observations of Inspected Areas
- Recommendations
- Actions Taken/Problems Corrected (Date, by whom)
- Inspector's Signature

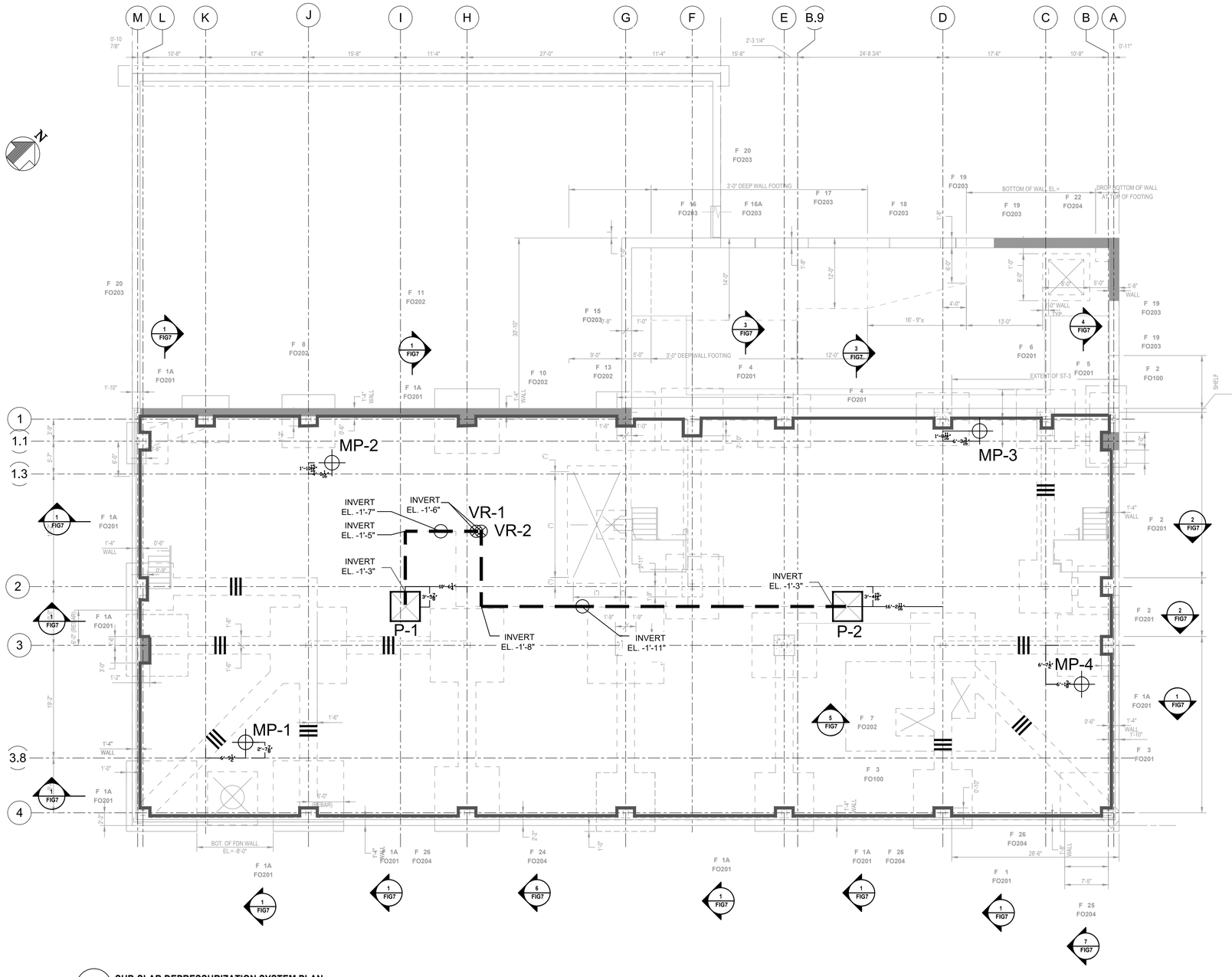
All AIS notifications and site inspections must be recorded in the logbook. A sample monthly inspection form is provided in ***Appendix B***. The logbook and all pertinent records including, but not limited to, annual inspection reports, preventative maintenance logs, training logs, repairs and emergency work documentation must be maintained with this O&M Plan and readily accessible for inspection at the school.

10.0 ANNUAL REPORT

The independent Professional Engineer will prepare an annual report for submission to the DOE EHS every year, at a minimum. The report will be organized as follows and include:

- **Introduction** – presenting a description of the school and the purpose of the report.
- **Engineering Controls** – presenting a summary of the engineering controls installed at the school, what modifications or enhancements to the engineering controls were made, if any, and an evaluation of the engineering controls and monitoring plan.
- **Site Inspections and SSDS Repairs** – presenting a summary of the information included in the logbook and inspection reports, as well as a discussion of any repairs made to the Engineering Controls.
- **Certification, Conclusions and Recommendations** – including a conclusion regarding whether the ECs continue to perform as designed and continue to be protective of human health and the environment.
- **Signature / Seal of Professional Engineer**
- **Appendices**
    - Copies of logbook entries
    - Copies of inspection reports and reoccupancy letters
    - Copies of any emergency work documentation
    - Training log with attendance sheet and appropriate signatures of the EC team

FIGURE 1
SUB-SLAB DEPRESSURIZATION SYSTEM UNDERGOUND PLAN
AS-BUILT DRAWING



1 FIG1 SUB-SLAB DEPRESSURIZATION SYSTEM PLAN

1/8" = 1'-0"

0 2' 4' 8' 16'

SCALE IN FEET

LEGEND (SYMBOLS NOT TO SCALE):

- 6"Ø CAST IRON PIPE BENEATH FLOOR SLAB
- VR-X — 6"Ø VERTICAL RISER AND IDENTIFICATION NUMBER (REFER TO DETAIL 5 ON DWG. NO. H204)
- MP-X — SUB-SLAB MONITORING POINT AND IDENTIFICATION NUMBER (REFER TO DETAIL 4 ON FIGURE 4)
- P-X — SUB-SLAB DEPRESSURIZATION SYSTEM PIT AND IDENTIFICATION NUMBER (REFER TO DETAIL 1 ON FIGURE 4)
- HORIZONTAL EXTENT OF GAS VAPOR BARRIER AND MINIMUM 12-INCH THICK GAS PERMEABLE AGGREGATE LAYER
- CONDENSATE DRAIN (REFER TO DETAIL 2 ON FIGURE 4)
- THREE 4" Ø C.I. PIPE SLEEVES OVER GRADE BEAM. ENVELOP THESE GRADE BEAMS IN GAS PERMEABLE AGGREGATE. (REFER TO DETAIL 3 ON FIGURE 4)

NOTES:

1. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTUAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM AND GAS VAPOR BARRIER.
2. THE EXTENTS OF BUILDING CONSTRUCTION BENEATH THE FLOOR SLABS SHALL BE LINED WITH GAS VAPOR BARRIER. AS PART OF BUILDING CONSTRUCTION, GAS VAPOR BARRIER SHALL ALSO BE APPLIED TO BELOW GRADE WALLS AND PITS.
3. SLOPE HORIZONTAL PIPE A MINIMUM OF 1% UNIFORMLY TOWARDS SUB-SLAB DEPRESSURIZATION SYSTEM PITS OR TO CONDENSATE DRAINS WHEN PIPING CANNOT BE SLOPED TO PITS.
4. REFER TO SPECIFICATION SECTION 02220 FOR ADDITIONAL GAS VAPOR BARRIER REQUIREMENTS.
5. REFER TO SPECIFICATION SECTION 02221 FOR ADDITIONAL SUB-SLAB DEPRESSURIZATION SYSTEM REQUIREMENTS.
6. INSTALL WARNING BARRIER (1-FOOT WIDE STRIP OF SAFETY ORANGE PLASTIC FENCE) ABOVE ALL SUB-SLAB PIPING.
7. INVERT ELEVATIONS SHOWN ARE RELATIVE TO THE TOP OF THE FLOOR SLAB.

CODE COMPLIANCE NOTES:

1. THE SUB-SLAB DEPRESSURIZATION SYSTEM COMPLIES WITH THE REQUIREMENTS OF THE 2014 NYC MECHANICAL CODE SECTION 512, "SUB-SLAB SOIL EXHAUST SYSTEMS".
2. THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT A "HAZARDOUS EXHAUST SYSTEM", AS DEFINED IN THE 2014 NYC MECHANICAL CODE SECTION 510.
3. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 601.4, "CONTAMINATION PREVENTION", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
4. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 607.5.5.2, "LIMITATIONS", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
5. THE INTENT OF THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT TO VENT METHANE OR RADON.

MONITORING POINT ID	LOCATION
MP-1	C04 - WATER
MP-2	C13A - WC
MP-3	C01 - STUD DINING
MP-4	C14H - F-LOCKER

DRAWING MAY BE PRINTED AT REDUCED SIZE
SHEET SIZE: 30"X42"

PROJECT: NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
ENGINEERING CONTROLS O&M PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE: SUB-SLAB DEPRESSURIZATION SYSTEM AND GAS VAPOR BARRIER PLAN AS-BUILT DRAWING

DRAWN BY:	H. DELGADO	PROJ. NO.:	346549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		FIGURE 1
DATE:	JULY 2022		

IT IS A VIOLATION OF THE STATE EDUCATION LAW SECTION 7209 (2) FOR ANY PERSON, UNLESS HE OR SHE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, AND THE ORIGINAL SEAL IS AFFIXED.

STATE OF NEW YORK · KEVIN R. BOGER · LICENSED PROFESSIONAL ENGINEER · 096717

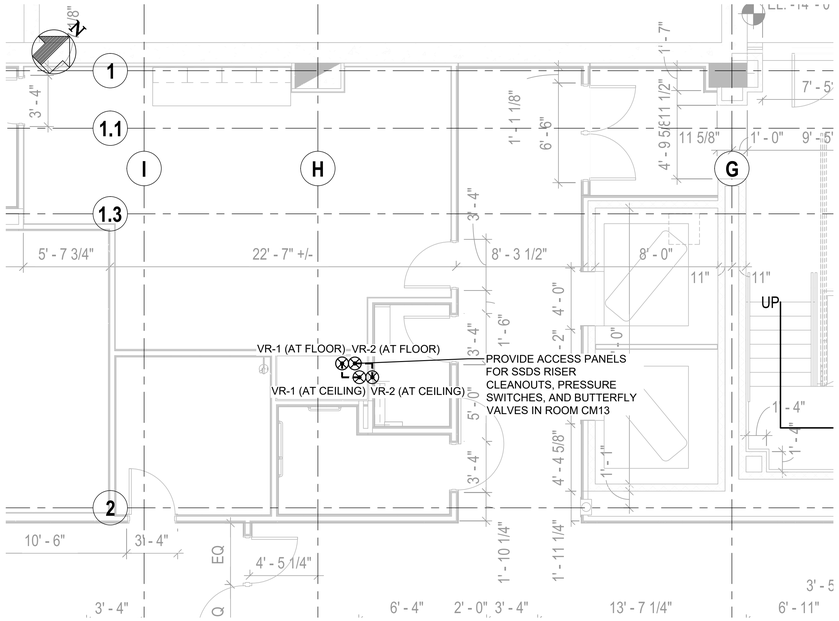
KEVIN R. BOGER, PE
NY PE # 096717
DATE: JULY 25, 2022

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New York, NY 10018
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FILE NO.: Fig 1 - SSDS and GVB Plan As-Built Drawing.dwg

30x42 -- USER: RBeyden -- ATTACHED XREFS: FD100 -- ATTACHED IMAGES: RS signature, Kevin-Boger Signature (Real)
DRAWING NAME: \\nyc-fp1\environmental\Shared\Projects\NYCSCA Contract C000015348\356549 - K671 Construction Phase Services 840 5th Ave\O&M Plan\Figures\TRC Working Drawings\ Fig 1 - SSDS and GVB Plan As-Built Drawing.dwg -- PLOT DATE: July 25, 2022 - 3:27PM -- LAYOUT: 30x42L
Version: 2017-10-21

FIGURE 2
SUB-SLAB DEPRESSURIZATION SYSTEM RISER PLAN I
AS-BUILT DRAWING

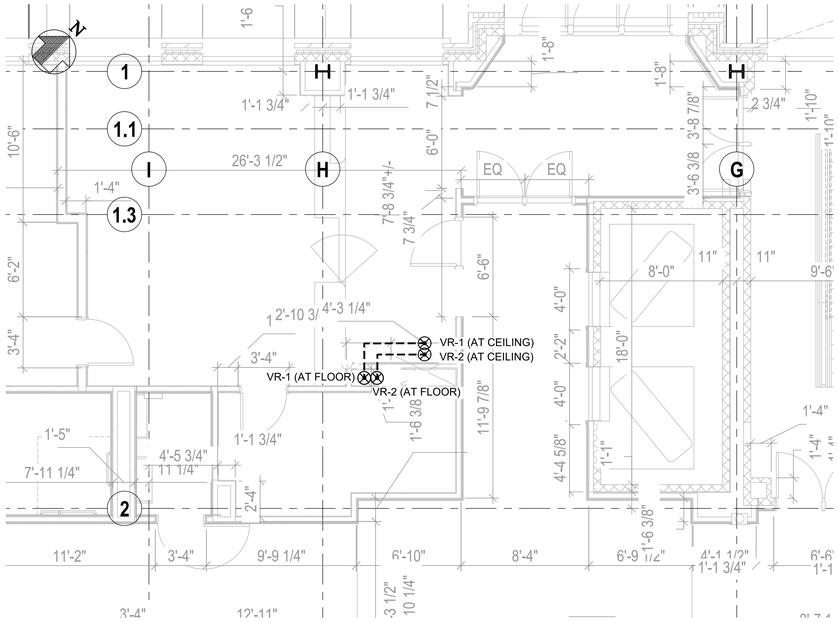


CELLAR RISER PENETRATION POINTS AND MONITORING POINTS - A100 (1 FIG2)

SCALE: 1:4

0 4 8

SCALE IN FEET

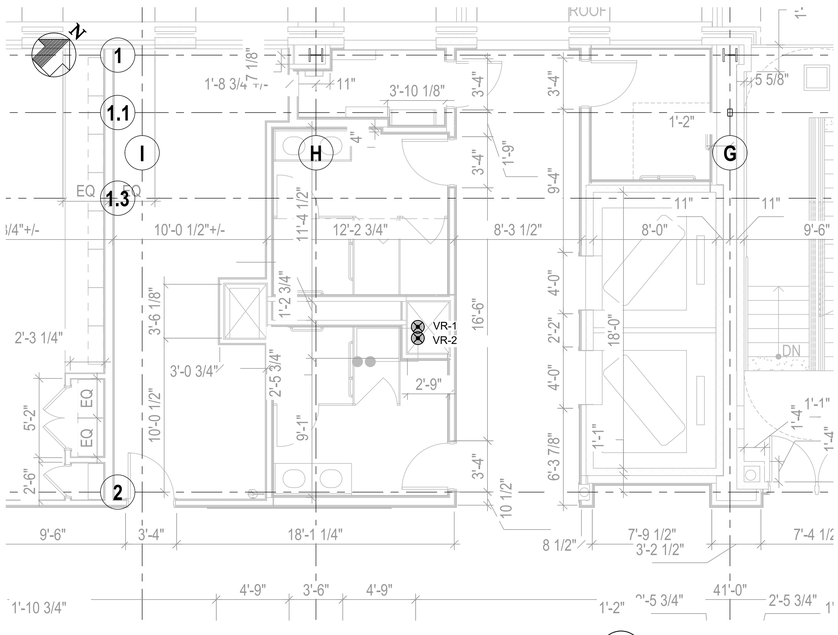


FIRST FLOOR RISER PENETRATION POINTS - A101 (2 FIG2)

SCALE: 1:4

0 4 8

SCALE IN FEET

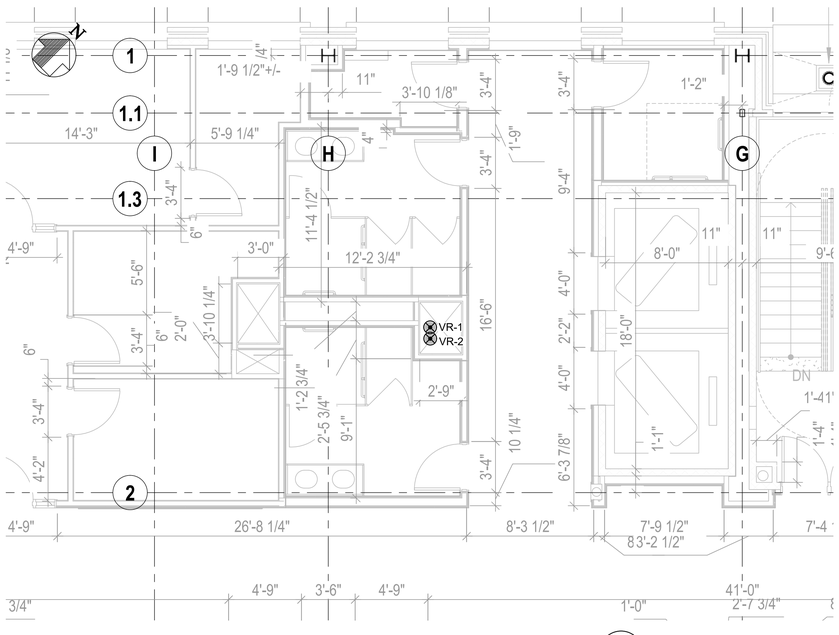


SECOND FLOOR RISER PENETRATION POINTS - A102 (3 FIG2)

SCALE: 1:4

0 4 8

SCALE IN FEET



THIRD FLOOR RISER PENETRATION POINTS - A103 (4 FIG2)

SCALE: 1:4

0 4 8

SCALE IN FEET

LEGEND (SYMBOLS NOT TO SCALE):

- 6" Ø GALVANIZED STEEL PIPING
- VR-X — VERTICAL RISER AND IDENTIFICATION NUMBER
- MP-X — SUB-SLAB MONITORING POINT AND IDENTIFICATION NUMBER (REFER TO DETAIL 4 ON DWG. NO. H204)

NOTES:

1. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM.
2. COORDINATE ALL WORK FOR SSDS SYSTEM AND ROOF PENETRATIONS WITH OTHER TRADES PRIOR TO INSTALLATION.
3. COMPLY WITH PIPE SUPPORT SPECIFICATIONS AND DRAWINGS.
4. SSDS VERTICAL RISERS SHALL NOT BE INSTALLED IN SHAFTS WITH DUCTS THAT CONTAIN ENVIRONMENTAL AIR.
5. SLOPE HORIZONTAL PIPE A MINIMUM OF 1% UNIFORMLY TOWARDS SUB-SLAB DEPRESSURIZATION SYSTEM PITS OR TO CONDENSATE DRAINS. ABOVESLAB PIPING SHALL NOT BE TRAPPED AND CONDENSATE DRAINS SHALL NOT BE INSTALLED IN ABOVE SLAB PIPING.
6. ALL PENETRATIONS THROUGH FLOORS AND WALLS SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE DETAILS AND SPECIFICATIONS
7. LABEL ALL SSDS RISER PIPE IN ACCORDANCE WITH SPECIFICATION SECTIONS 15431 AND 02221.

CODE COMPLIANCE NOTES:

1. THE SUB-SLAB DEPRESSURIZATION SYSTEM COMPLIES WITH THE REQUIREMENTS OF THE 2014 NYC MECHANICAL CODE SECTION 512, "SUB-SLAB SOIL EXHAUST SYSTEMS".
2. THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT A "HAZARDOUS EXHAUST SYSTEM", AS DEFINED IN THE 2014 NYC MECHANICAL CODE SECTION 510.
3. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 601.4, "CONTAMINATION PREVENTION", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
4. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 607.5.5.2, "LIMITATIONS", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
5. THE INTENT OF THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT TO VENT METHANE OR RADON.

MONITORING POINT ID	LOCATION
MP-1	C04 - WATER
MP-2	C13A - WC
MP-3	C01 - STUD DINING
MP-4	C14H - F-LOCKER

DRAWING MAY BE PRINTED AT REDUCED SIZE
SHEET SIZE: 30"X42"

PROJECT: NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
ENGINEERING CONTROLS O&M PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE: SUB-SLAB DEPRESSURIZATION SYSTEM RISER PLAN I
AS-BUILT DRAWING

DRAWN BY:	H. DELGADO	PROJ. NO.:	346549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		FIGURE 2
DATE:	JULY 2022		

I AM A DULY LICENSED PROFESSIONAL ENGINEER AS DEFINED PURSUANT TO ARTICLE 145 OF THE NEW YORK STATE EDUCATION LAW, AND THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION. I AM AWARE THAT IT IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT IN ANY WAY.

STATE OF NEW YORK
KEVIN R. BOGER
LICENSED PROFESSIONAL ENGINEER
096717

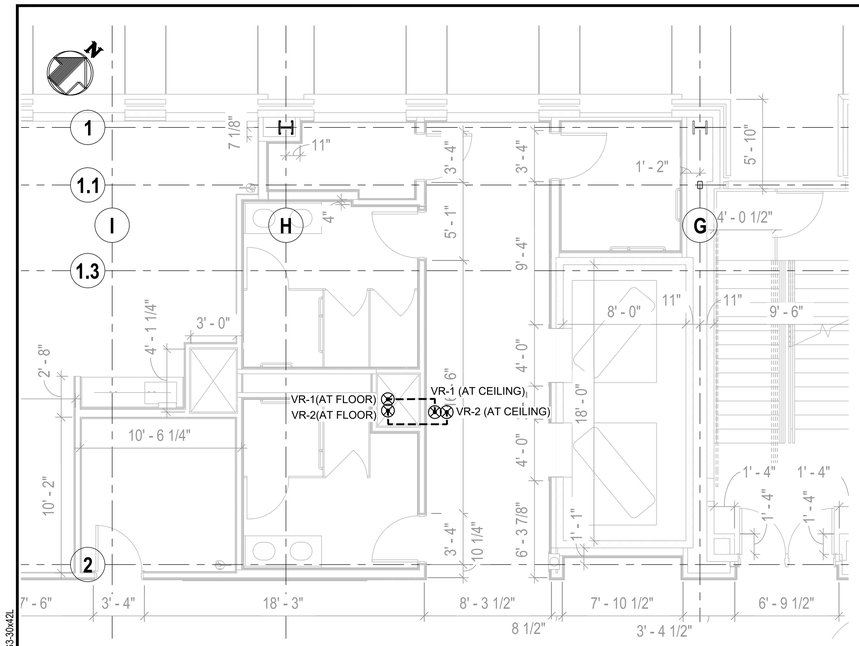
KEVIN R. BOGER, PE
NY PE # 096717
DATE JULY 25, 2022

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FILE NO.: Fig 2-3 - SSDS Riser Plans As-Built Drawing.dwg

30x42 -- LISER.RBowen -- ATTACHED XREFS: A100, A101, A102, A103, A104, A105, M103 -HVAC ROOF AND BULKHEAD PLAN -- ATTACHED IMAGES: Kevin Boger Signature (Blue)
DRAWING NAME: I:\nyc-fp1\environmental\Shared\Projects\NYCSCA Contract C000015346\356549 - K6Y1 Construction Phase Services 840 5th Ave\O&M Plan\Figures\TRC Working Drawings\ Fig 2-3 - SSDS Riser Plans As-Built Drawing.dwg -- PLOT DATE: July 25, 2022 - 3:29PM -- LAYOUT: FIG2-30x42L
Version: 2017-10-31

FIGURE 3
SUB-SLAB DEPRESSURIZATION SYSTEM RISER PLAN II AND ROOF PLAN
AS-BUILT DRAWING

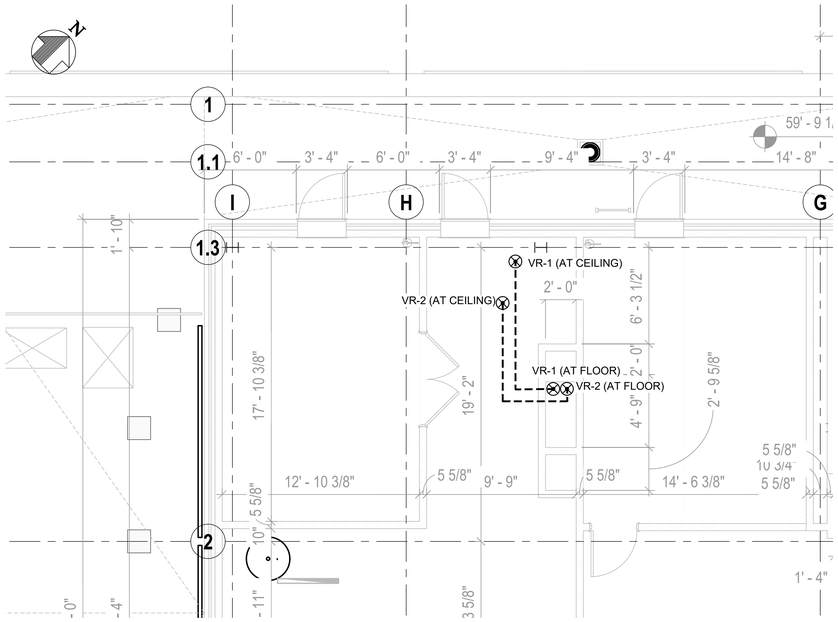


FOURTH FLOOR RISER PENETRATION POINTS - A104 (1 / FIG3)

SCALE: 1:4

0 4 8

SCALE IN FEET



ROOF RISER PENETRATION POINTS - A105 (2 / FIG3)

SCALE: 1:4

0 4 8

SCALE IN FEET

LEGEND (SYMBOLS NOT TO SCALE):

- 6"Ø GALVANIZED STEEL PIPE (INSTRUMENTATION NOT SHOWN)
- VR-X — VERTICAL RISER AND IDENTIFICATION NUMBER
- SF-X — SUB-SLAB DEPRESSURIZATION FAN AND IDENTIFICATION NUMBER (REFER TO DETAIL 8 ON DWG. NO. H203)

NOTES:

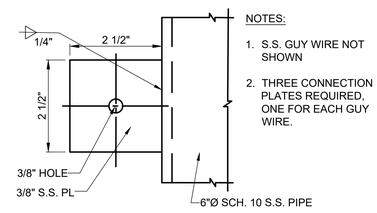
1. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM.
2. SUCTION FAN EXHAUST MUST BE A MINIMUM OF 25 FEET FROM ANY HVAC AIR INTAKES AND OPERABLE WINDOWS, 10 FEET FROM ANY COMBUSTION AIR INTAKES, AND A MINIMUM OF 6 FEET ABOVE THE BUILDING ROOF OR 6 INCHES ABOVE THE BUILDING BULKHEAD ROOF.
3. COORDINATE ALL WORK FOR SSDS SYSTEM AND ROOF PENETRATIONS WITH OTHER TRADES PRIOR TO INSTALLATION.
4. COMPLY WITH PIPE SUPPORT SPECIFICATIONS AND DRAWINGS.
5. SSDS VERTICAL RISERS SHALL NOT BE INSTALLED IN SHAFTS WITH DUCTS THAT CONTAIN ENVIRONMENTAL AIR.
6. SLOPE HORIZONTAL PIPE A MINIMUM OF 1% UNIFORMLY TOWARDS SUB-SLAB DEPRESSURIZATION SYSTEM PITS OR TO CONDENSATE DRAINS. ABOVESLAB PIPING SHALL NOT BE TRAPPED AND CONDENSATE DRAINS SHALL NOT BE INSTALLED IN ABOVE SLAB PIPING.
7. ALL PENETRATIONS THROUGH FLOORS AND WALLS SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE DETAILS AND SPECIFICATIONS
8. LABEL ALL SSDS RISER PIPE IN ACCORDANCE WITH SPECIFICATION SECTIONS 15431 AND 02221.
9. SUCTION FAN, SUCTION FAN SUPPORTS AND SSDS VERTICAL RISERS MUST BE LOCATED A MINIMUM OF 18" FROM THE STAIRWAY BULKHEAD AT ROOF.
10. SUCTION FAN VFDS MUST BE LOCATED IN ACCESSIBLE AREA OF ROOFTOP MECHANICAL ROOM. LOCAL DISCONNECT SWITCHES MUST BE LOCATED AT BULKHEAD ROOF NEAR SUCTION FANS.

CODE COMPLIANCE NOTES:

1. THE SUB-SLAB DEPRESSURIZATION SYSTEM COMPLIES WITH THE REQUIREMENTS OF THE 2014 NYC MECHANICAL CODE SECTION 512, "SUB-SLAB SOIL EXHAUST SYSTEMS".
2. THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT A "HAZARDOUS EXHAUST SYSTEM", AS DEFINED IN THE 2014NYC MECHANICAL CODE SECTION 510.
3. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 601.4, "CONTAMINATION PREVENTION", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
4. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 607.5.5.2, "LIMITATIONS", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
5. THE INTENT OF THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT TO VENT METHANE OR RADON.

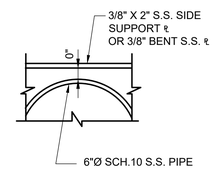
DETAIL 3 NOTES:

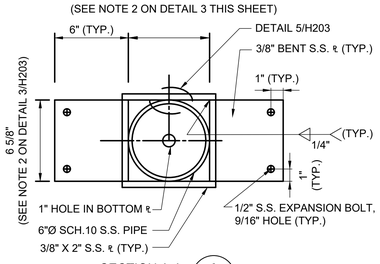
1. PROVIDE PITCH POCKET IN PLATE FOR DRAINAGE.
2. ADJUST DIMENSIONS TO PROVIDE A TIGHT FIT BETWEEN THE PIPE AND THE BENT PLATES.
3. 1/4" S.S. GUY WIRE SHALL BE LOOPED THROUGH THE 3/8" Ø HOLES AT THE TOP AND BOTTOM CONNECTION PLATES AND THROUGH THE EYE AT EACH END OF THE TURNBUCKLE. EACH CONNECTION SHALL BE SECURED BY TWO 1/4" S.S. WIRE ROPE CLAMPS.
4. ALL PLATES, PIPE, GUY WIRES, TURNBUCKLES AND CLIPS SHALL BE ASTM G304 STAINLESS STEEL.
5. THREE GUY WIRES/CONNECTION PLATES ARE TO BE USED SPACED EVENLY AROUND THE CIRCUMFERENCE OF THE PIPE (120° SPACING).
6. COORDINATE ALL ROOF PENETRATIONS WITH OTHER TRADES.



NOTES:

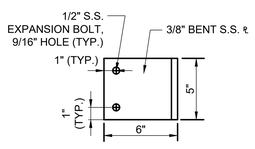
1. S.S. GUY WIRE NOT SHOWN
2. THREE CONNECTION PLATES REQUIRED, ONE FOR EACH GUY WIRE.





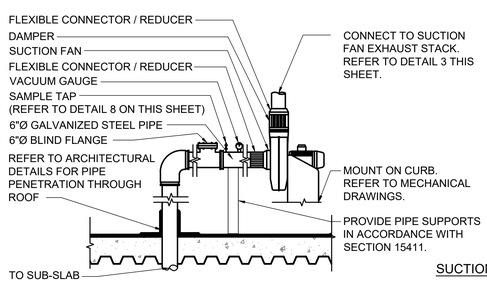
SECTION A-A (6 / FIG3)

NTS



SECTION B-B (7 / FIG3)

NTS

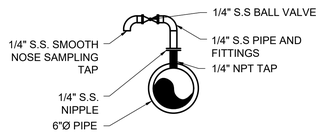


DETAIL 8 NOTES:

1. NOT ALL REQUIRED ACCESSORIES ARE SHOWN. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. ELECTRICAL WIRING AND EQUIPMENT NOT SHOWN. REFER TO ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR REQUIREMENTS.
3. PIPE AND EQUIPMENT ARRANGEMENT SHOWN FOR SCHEMATIC PURPOSES ONLY. SUBMIT TO SCALE DRAWING SHOWING PROPOSED ARRANGEMENT. CONTRACTOR IS REQUIRED TO OBTAIN APPROVAL OF ARRANGEMENT.

SUCTION FAN DETAIL (8 / FIG3)

NTS



SAMPLE TAP ASSEMBLY (9 / FIG3)

NTS

DRAWING MAY BE PRINTED AT REDUCED SIZE
SHEET SIZE: 30"X42"

PROJECT: NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
ENGINEERING CONTROLS O&M PLAN
BCP SITE NO. C224271 - 640 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE: SUB-SLAB DEPRESSURIZATION SYSTEM
RISER PLAN II AND ROOF PLAN
AS-BUILT DRAWING

DRAWN BY:	H. DELGADO	PROJ NO.	346549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		FIGURE 3
DATE:	JULY 2022		

FOR A VIOLATION OF THE STATE EDUCATION LAW SECTION 7209 (2) FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER AN ITEM IN ANY WAY IN ANY DOCUMENT BEARING THE SEAL OF A LICENSED PROFESSIONAL ENGINEER, HE OR SHE SHALL AFFIX TO THE ITEM HIS OR HER SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS OR HER SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

STATE OF NEW YORK
KEVIN R. BOGER
LICENSED PROFESSIONAL ENGINEER
090717

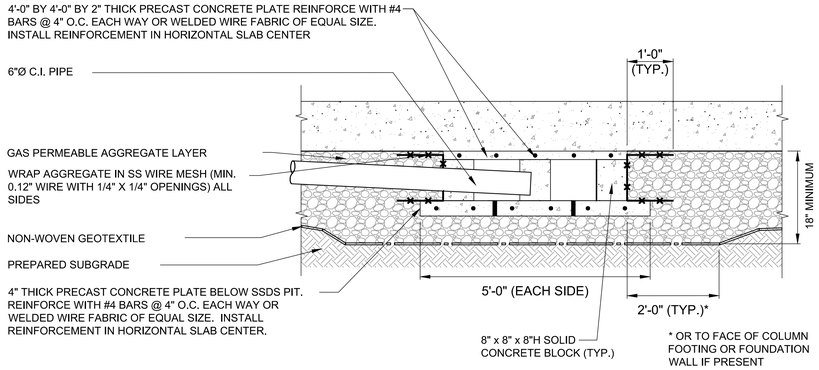
KEVIN R. BOGER, PE
NY PE # 090717
DATE JULY 25, 2022

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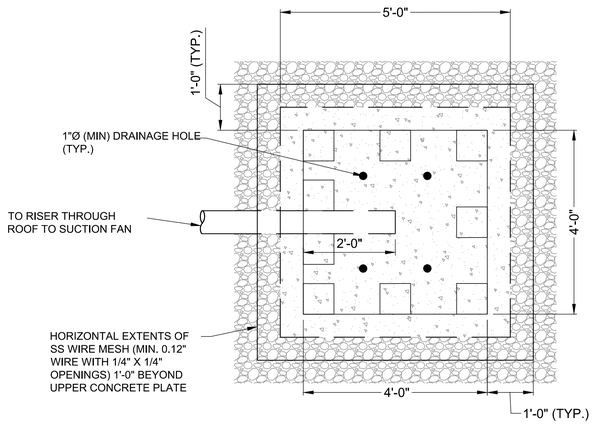
FILE NO.: Fig 2-3 - SSDS Riser Plans As-Built Drawing.dwg

20442 -- USER: RBoeder -- ATTACHED XREFS: A109, A101, A102, A103, A104, A105, M103 - HVAC ROOF AND BULKHEAD PLAN -- ATTACHED IMAGES: Kevin Boger Signature (Blue)
DRAWING NAME: \\nyc-fs1\environmental\Shared Projects\NYCSCA Contract CD0001\5465\356549 - H671 Construction Phase Services 640 5th Ave\O&M Plan\Figures\TRC Working Drawings\ Fig 2-3 - SSDS Riser Plans As-Built Drawing.dwg -- PLOT DATE: July 25, 2022 - 3:30PM -- LAYOUT: FIG3-30x42
version 2017-12-21

FIGURE 4
SUB-SLAB DEPRESSURIZATION SYSTEM DETAILS
AS-BUILT DRAWING

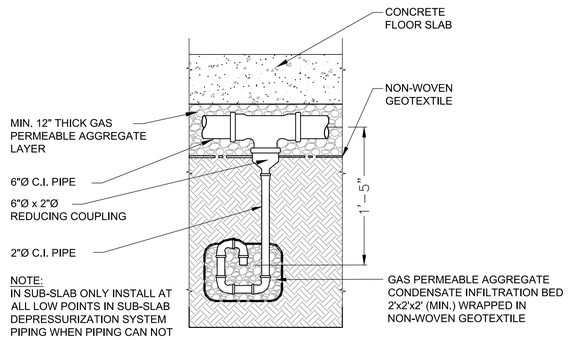


PROFILE VIEW

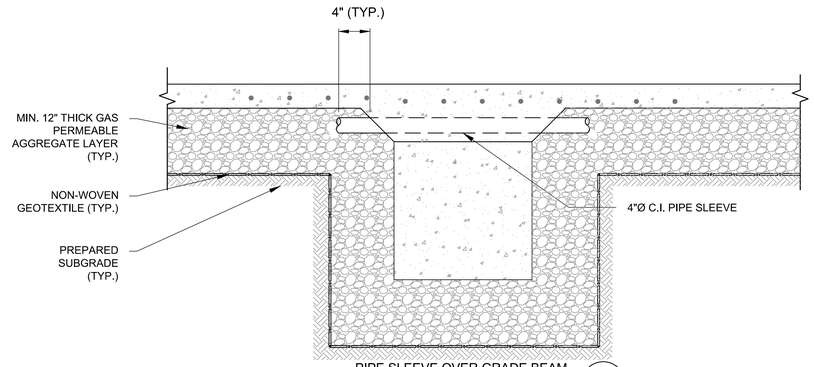


PLAN VIEW

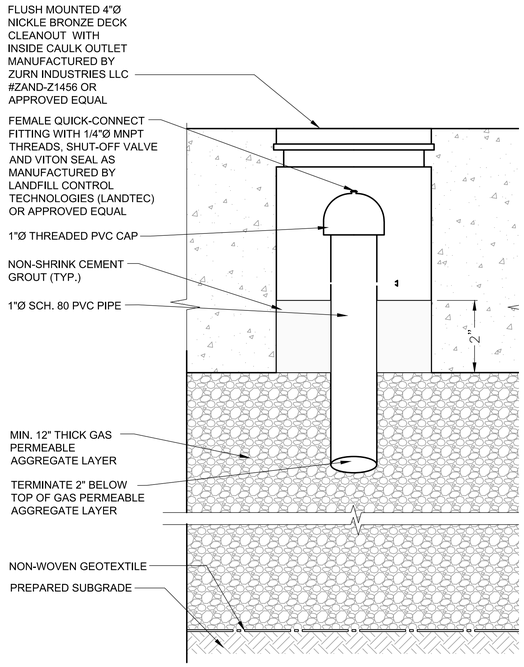
SUB-SLAB DEPRESSURIZATION PIT 1/FIG4
NTS



LOW POINT CONDENSATE DRAIN DETAIL 2/FIG4
NTS



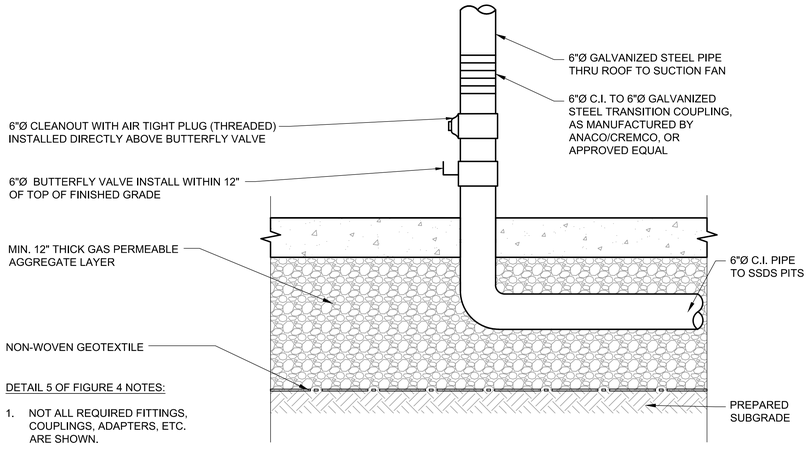
PIPE SLEEVE OVER GRADE BEAM AND GPA ENVELOPING GRADE BEAM 3/FIG4
NTS



NOTES:

1. ANY DEVIATION FROM THIS INSTALLATION MUST BE SUBMITTED TO THE AUTHORITY FOR APPROVAL.
2. NOT ALL REQUIRED ACCESSORIES ARE SHOWN. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

SUB-SLAB MONITORING POINT DETAIL 4/FIG4
NTS

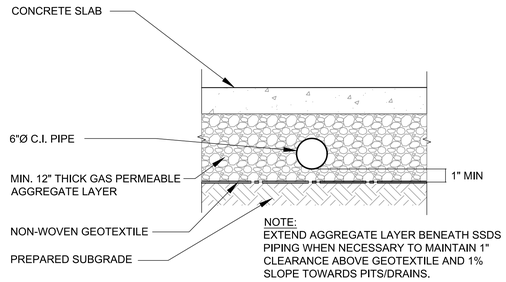


DETAIL 5 OF FIGURE 4 NOTES:

1. NOT ALL REQUIRED FITTINGS, COUPLINGS, ADAPTERS, ETC. ARE SHOWN.
2. FURNISH ESCUTCHEONS AS SPECIFIED.
3. PROVIDE ACCESS PANEL FOR PRESSURE SWITCHES, BUTTERFLY VALVES, AND CLEANOUTS AS SPECIFIED IN SECTION 02221.

NOTE:
COAT ANY PIPING IN DIRECT CONTACT TO CONCRETE IN ACCORDANCE WITH PLUMBING CODES

SSDS RISER DETAIL AT FLOOR SLAB (SCHEMATIC) 5/FIG4
NTS



SSDS PIPING WITHIN GAS PERMEABLE AGGREGATE 6/FIG4
NTS

GENERAL NOTES:

1. SLOPE HORIZONTAL PIPE A MINIMUM OF 1% UNIFORMLY TOWARDS SUB-SLAB DEPRESSURIZATION SYSTEM PITS OR TO CONDENSATE DRAINS. ABOVEGROUND PIPING SHALL NOT BE TRAPPED AND CONDENSATE DRAINS SHALL NOT BE INSTALLED IN ABOVE SLAB PIPING.
2. GAS VAPOR BARRIER NOT SHOWN. REFER TO FIGURE 6 FOR TYPICAL GAS VAPOR BARRIER DETAILS.

DRAWING MAY BE PRINTED AT REDUCED SIZE
SHEET SIZE: 30"X42"

PROJECT: NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
ENGINEERING CONTROLS O&M PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 893, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE: SUB-SLAB DEPRESSURIZATION SYSTEM DETAILS AS-BUILT DRAWING

DRAWN BY:	H. DELGADO	PROJ. NO.:	346549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		FIGURE 4
DATE:	JULY 2022		

IT IS A VIOLATION OF THE STATE EDUCATION LAW SECTION 7209 (2) FOR ANY PERSON TO ALTER THIS ITEM IN ANY WAY UNLESS ACTING PURSUANT TO THE DIRECTION OF THE LICENSED PROFESSIONAL ENGINEER. AND THE ORIGINAL LICENSED ITEM IS ALTERED PROFESSIONAL ENGINEER, AND THE ALTERATIONS MADE THEREIN.

STATE OF NEW YORK · KEVIN R. BOGER · 096717 · LICENSED PROFESSIONAL ENGINEER

KEVIN R. BOGER, PE
NY PE # 096717
DATE JULY 25, 2022

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New York, NY 10018
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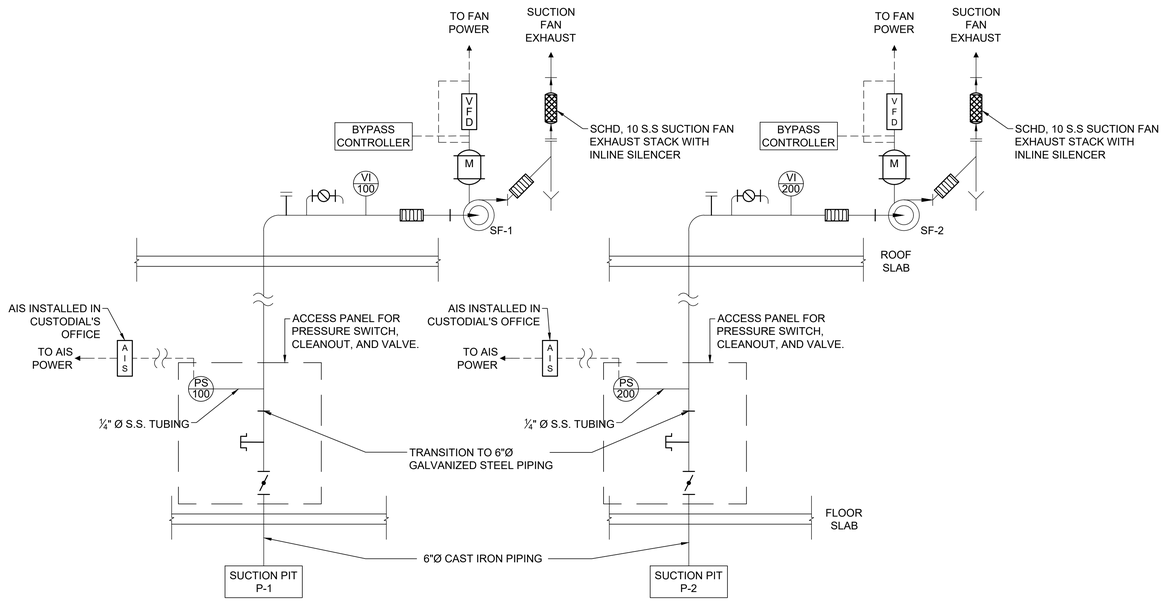
FILE NO.: Fig 4 - SSDS Det.As-Built Dwg.dwg

3042 – USER: RBowen – ATTACHED XREFS: – ATTACHED IMAGES: Kevin Boger Signature (Blue)
DRAWING NAME: \\nyc-fp1\environmental\Shared\Projects\NYCSCA Contract C000015348\8265549 - K671 Construction Phase Services 840 5th Ave\O&M Plan\Figures\TRC Working Drawings\ Fig 4 - SSDS Det.As-Built Dwg.dwg
Version: 2011-10-21

FIGURE 5
SUB-SLAB DEPRESSURIZATION SYSTEM EQUIPMENT AND INSTRUMENTATION DETAILS
AS-BUILT DRAWING

LEGEND (SYMBOLS NOT TO SCALE):

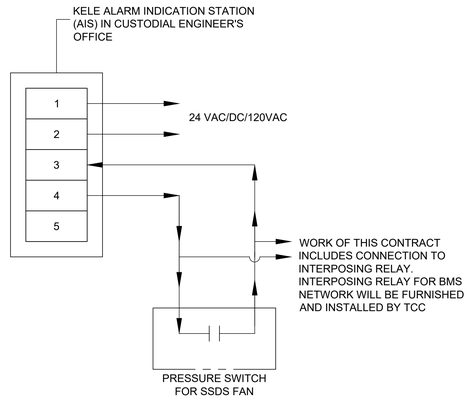
- ALARM INDICATION STATION (AIS)
- BALL VALVE
- BLIND FLANGE
- BUTTERFLY VALVE
- CENTRIFUGAL BLOWER
- DRAIN
- ELECTRICAL
- ELECTRIC MOTOR (M)
- FLANGED OR UNION CONNECTOR
- FLEXIBLE CONNECTOR
- PIPING
- PRESSURE SWITCH (PS #)
- SILENCER
- THREADED CLEANOUT
- VACUUM INDICATOR (VI #)
- VARIABLE FREQUENCY DRIVE (VFD)



PIPING AND INSTRUMENTATION DIAGRAM FOR SSDS — 1 / FIG5
NTS

GENERAL NOTES:

1. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM.
2. EACH SUCTION FAN EXHAUST MUST BE A MINIMUM OF 25 FEET FROM ANY HVAC AIR INTAKES AND OPERABLE WINDOWS, 10 FEET FROM ANY COMBUSTION AIR INTAKES, AND A MINIMUM OF 6 FEET ABOVE THE BUILDING ROOF OR 6 INCHES ABOVE THE BUILDING BULKHEAD ROOF.
3. COORDINATE ALL WORK FOR SSDS SYSTEM, BMS AND SSDS MONITORING PANEL CONNECTIONS AND ROOF PENETRATIONS WITH OTHER TRADES PRIOR TO INSTALLATION.
4. BMS CONNECTION FROM INTERPOSING RELAY SHALL BE COMPLETED BY THE TCC.



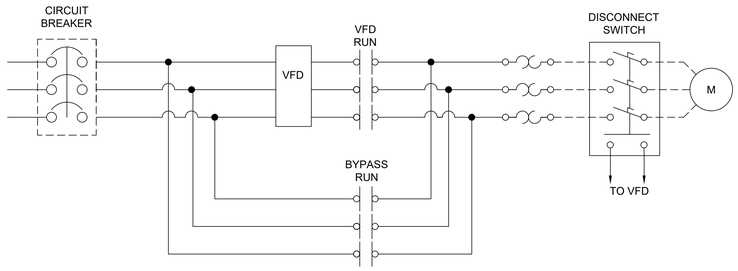
TYPICAL INTERCONNECTION SCHEMATIC OF PRESSURE SWITCH WITH AIS & BMS NETWORK — 2 / FIG5
NTS

INSTRUMENT AND EQUIPMENT SCHEDULE

ITEM	DESCRIPTION	SERVICE	LOCATION	ELECTRICAL REQUIREMENTS	RANGE	MANUFACTURER/MODEL	QUANTITY
VI	VACUUM INDICATOR	SSD SYSTEM	SUCTION FAN	N/A	0-30" WC	WIKA MODEL 612.20, PART 9747724	2
PS	DIFFERENTIAL PRESSURE SWITCH	SSD SYSTEM ALARM	SUCTION FAN	N/A	1.4-5.5" WC	DWYER INSTRUMENTS INC. SERIES 1900, MODEL 1910-5	2
ALARM INDICATION STATION	SSDS MONITORING PANEL	SSD SYSTEM	CUSTODIAL ENGINEER'S OFFICE	1 PHASE, 60HZ, 24/120VAC	N/A	KELE INC. MODEL AIS	2
FS	INLINE EXHAUST STACK FAN SILENCER	SSD SYSTEM	FAN OUTLET	N/A	N/A	UNIVERSAL ACOUSTIC & EMISSIONS TECHNOLOGIES MODEL US-6 PART 11-106-AA	2
BV	BUTTERFLY VALVE	SSD SYSTEM	RISER AT BASEMENT	N/A	N/A	APOLLO VALVES MODEL LD145	2
VFD	VARIABLE FREQUENCY DRIVE	SSD SYSTEM	ROOFTOP MECHANICAL ROOM	230VAC	N/A	WEG ELECTRIC CORP. EDP 11S 007DN3R10000	2

FAN SCHEDULE

UNIT NO.	SERVICE	LOCATION	SIZE	MIN. CFM	MIN. VACUUM (INCHES WC)	MOTOR REQUIREMENTS	MANUFACTURER/MODEL
SF-1	SSD SYSTEM	ROOF	2 HP	300	13.0	2-POLE, 3-60-208-, 230/460 VOLT, TEFC	NEW YORK BLOWER COMPANY/COMPACT PB MODEL 140606
SF-2	SSD SYSTEM	ROOF	2 HP	300	13.0	2-POLE, 3-60-208-, 230/460 VOLT, TEFC	NEW YORK BLOWER COMPANY/COMPACT PB MODEL 140606
SPARE	ATTIC STOCK	STORAGE	2 HP	300	13.0	2-POLE, 3-60-208-, 230/460 VOLT, TEFC	NEW YORK BLOWER COMPANY/COMPACT PB MODEL 140606



TYPICAL WIRING SCHEMATIC OF VARIABLE FREQUENCY DRIVE WITH BYPASS — 3 / FIG5
NTS

DRAWING MAY BE PRINTED AT REDUCED SIZE
SHEET SIZE: 30"X42"

F.E.N. VIOLATION OF THE STATE EDUCATION LAW SECTION 7209 (2) FOR ANY PERSON TO, TO USE FOR ANY WAY UNLESS SUCH PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, AND THE ORIGINAL LEGEND TEM OF ALTERATIONS.

STATE OF NEW YORK — KEVIN R. BOGER — 096717 — LICENSED PROFESSIONAL ENGINEER

KEVIN R. BOGER, PE
NY PE # 096717
DATE: APR 26, 2022

PROJECT: NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
ENGINEERING CONTROLS O&M PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 893, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE: SUB-SLAB DEPRESSURIZATION SYSTEM
EQUIPMENT AND INSTRUMENTATION DETAILS
AS-BUILT DRAWING

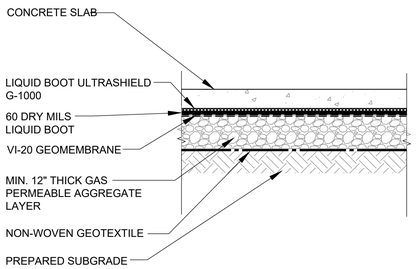
DRAWN BY:	H. DELGADO	PROJ NO.:	346549
CHECKED BY:	L. O'HARA	FIGURE 5	
APPROVED BY:	K. BOGER		
DATE:	JULY 2022		

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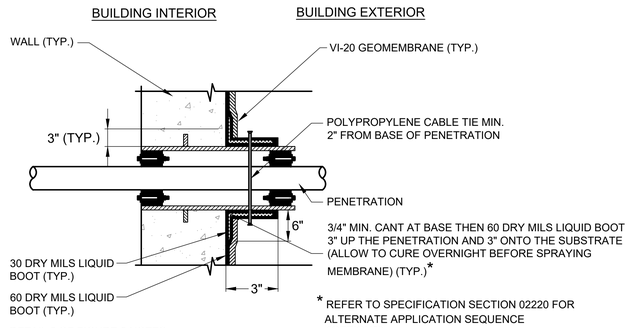
FILE NO.: Fig 5 - SSDS Det. Equip.& ID As-Built Dwg.dwg

30x42 -- USER: RBowen -- ATTACHED XREFS: -- ATTACHED IMAGES: Kevin Boger Signature (Real)
DRAWING NAME: \\nyc-fp1\environmental\Shared\Projects\NYCSCA Contract C000015348\336549 - K671 Construction Phase Services 840 5th Ave\O&M Plan\Figures\TRC Working Drawings\ Fig 5 - SSDS Det. Equip.& ID As-Built Dwg.dwg -- PLOT DATE: July 25, 2022 - 3:32PM -- LAYOUT: 30x42L
Version: 2017-10-21

FIGURE 6
GAS VAPOR BARRIER TYPICAL DETAILS
AS-BUILT DRAWING



SECTION THROUGH SUB-SLAB (1 / FIG6)
NTS

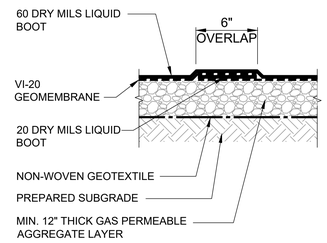


* REFER TO SPECIFICATION SECTION 02220 FOR ALTERNATE APPLICATION SEQUENCE ("OPTION2").

DETAIL 2 OF FIGURE 6 NOTES:

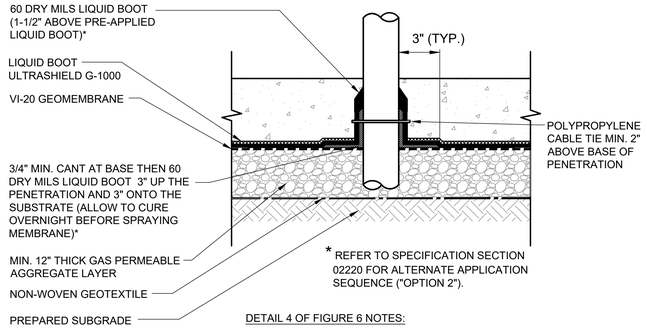
1. FURNISH ESCUTCHEONS AS SPECIFIED.
2. ANY DEVIATION FROM THIS INSTALLATION MUST BE SUBMITTED TO THE AUTHORITY FOR APPROVAL.
3. REFER TO MECHANICAL AND ARCHITECTURAL DRAWINGS FOR TYPICAL BELOW GRADE PENETRATION DETAILS.

GAS VAPOR BARRIER DETAIL FOR PENETRATION THROUGH WALL BELOW GRADE (2 / FIG6)
NTS



NOTE:
LIQUID BOOT ULTRASHIELD G-1000 LAYER NOT SHOWN.

DETAIL FOR OVERLAP OF LIQUID BOOT SYSTEM (3 / FIG6)



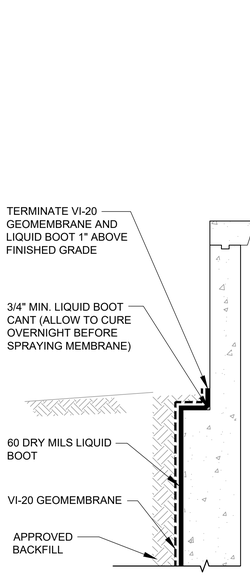
* REFER TO SPECIFICATION SECTION 02220 FOR ALTERNATE APPLICATION SEQUENCE ("OPTION 2").

NOTE:
COAT ANY PIPING IN DIRECT CONTACT TO CONCRETE IN ACCORDANCE WITH PLUMBING CODES

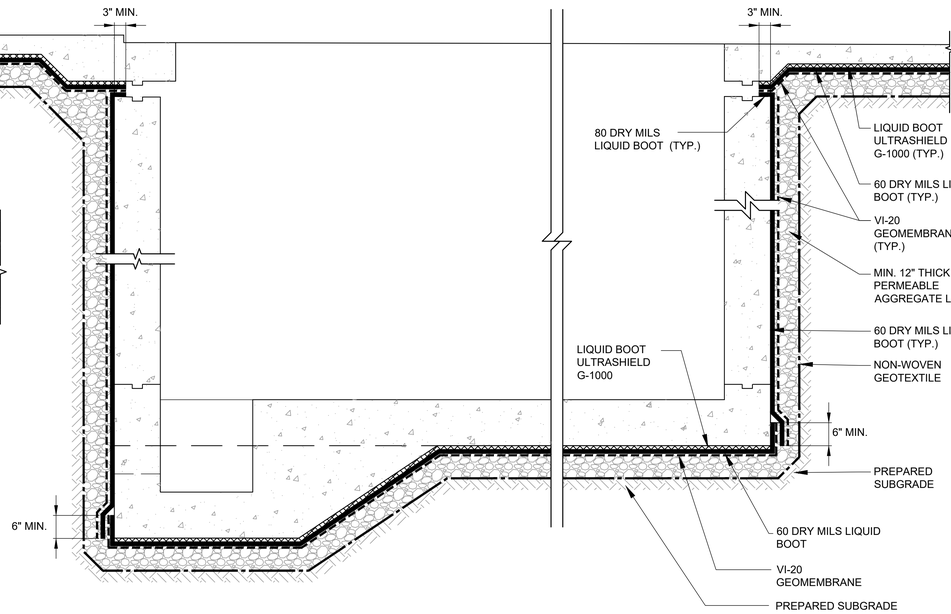
DETAIL 4 OF FIGURE 6 NOTES:

1. FURNISH ESCUTCHEONS AS SPECIFIED.
2. ANY DEVIATION FROM THIS INSTALLATION MUST BE SUBMITTED TO THE AUTHORITY FOR APPROVAL.
3. REFER TO MECHANICAL AND ARCHITECTURAL DRAWINGS FOR TYPICAL BELOW GRADE PENETRATION DETAILS.

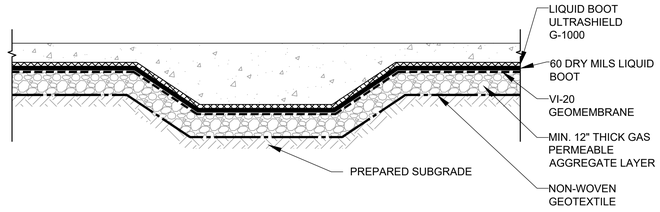
GAS VAPOR BARRIER DETAIL AT PENETRATION THRU FLOOR WITHOUT SLEEVE (4 / FIG6)
NTS



GAS VAPOR BARRIER DETAIL FOR VERTICAL TERMINATION AT GRADE (5 / FIG6)
NTS



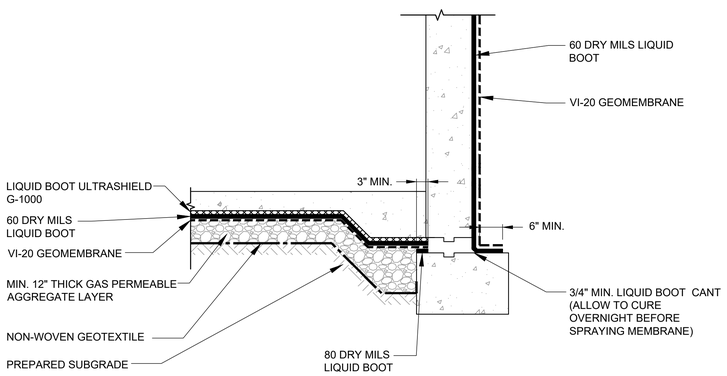
GAS VAPOR BARRIER DETAIL FOR PIT WITH PIT SUMP (6 / FIG6)
NTS



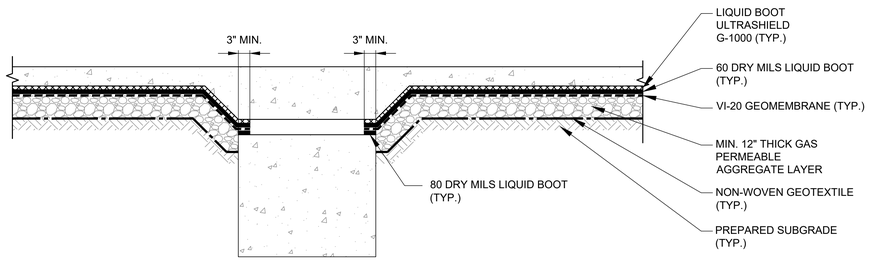
GAS VAPOR BARRIER DETAIL FOR SLAB ELEVATION CHANGE (7 / FIG6)
NTS

GENERAL NOTES:

1. RELATIVE THICKNESS OF GAS VAPOR BARRIER SHOWN IS EXAGGERATED FOR ILLUSTRATIVE PURPOSES.
2. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM AND GAS VAPOR BARRIER DETAILS.
3. SUBMIT DETAIL OF ANY VAPOR BARRIER PENETRATIONS NOT SHOWN TO THE AUTHORITY FOR APPROVAL.



GAS VAPOR BARRIER DETAIL FOR UNDER SLAB AND WALLS (8 / FIG6)
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GAS VAPOR BARRIER DETAIL FOR TERMINATION AT GRADE BEAM/FOOTING (9 / FIG6)
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SHEET SIZE: 30"X42"

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KEVIN R. BOGER, PE
NY PE # 096717
DATE JULY 25, 2022

PROJECT: NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
ENGINEERING CONTROLS O&M PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 893, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE: GAS VAPOR BARRIER TYPICAL DETAILS AS-BUILT DRAWING

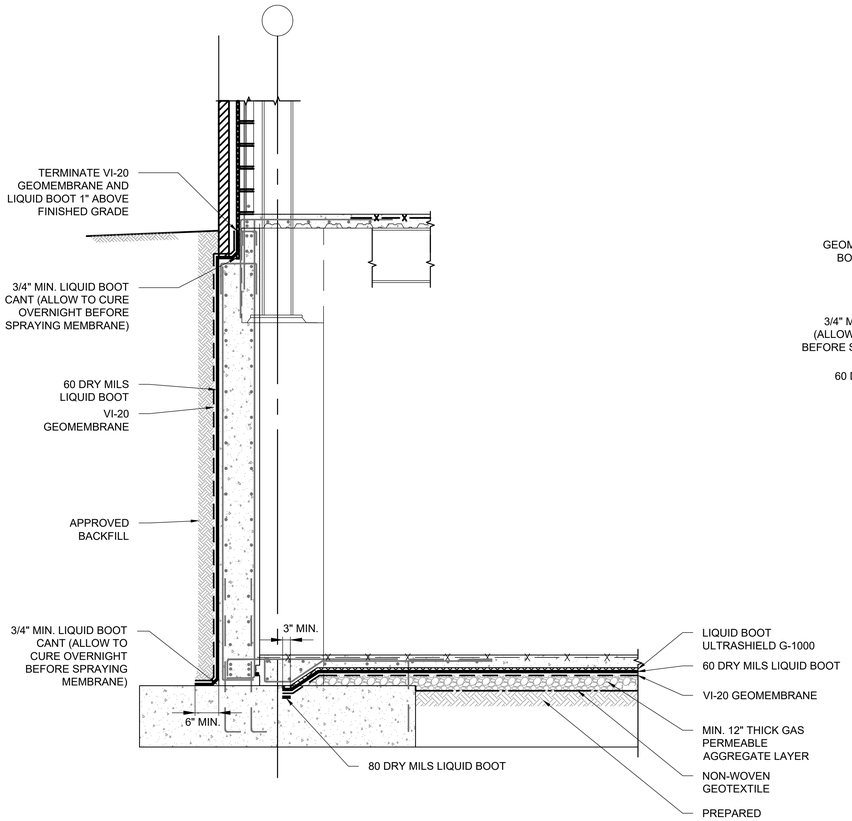
DRAWN BY:	H. DELGADO	PROJ. NO.:	346549
CHECKED BY:	L. O'HARA		
APPROVED BY:	K. BOGER		FIGURE 6
DATE:	JULY 2022		

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FILE NO.: Fig 6 - GVB Typ. Det.As-Built Drawing.dwg

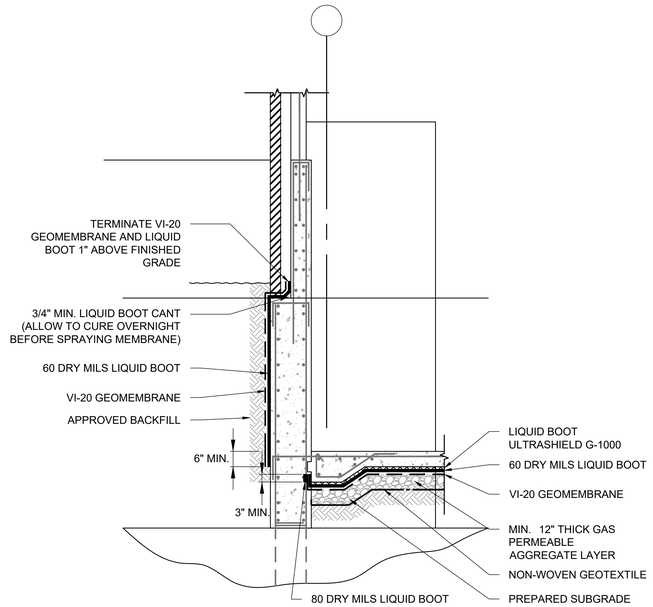
30x42 --- USER: RBowen --- ATTACHED XREFS: --- ATTACHED IMAGES: Kevin Roger Signature (Blue)
DRAWING NAME: I:\nyc-fp1\environmental\Shared\Projects\NYCSCA Contract C000015348\356549 - K671 Construction Phase Services 840 5th Ave\O&M Plan\Figures\TRC Working Drawings\ Fig 6 - GVB Typ. Det.As-Built Drawing.dwg --- PLOT DATE: July 25, 2022 - 3:34PM --- LAYOUT: 30x42L
Version: 2017-10-21

FIGURE 7
GAS VAPOR BARRIER DETAILS
AS-BUILT DRAWING



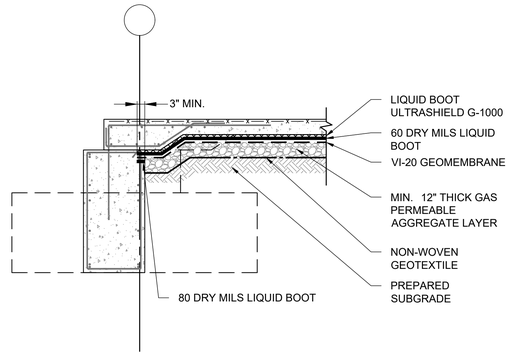
GAS VAPOR BARRIER DETAIL FOR SECTION 1 ON DRAWING FO201 — 1 / FIG7

NTS



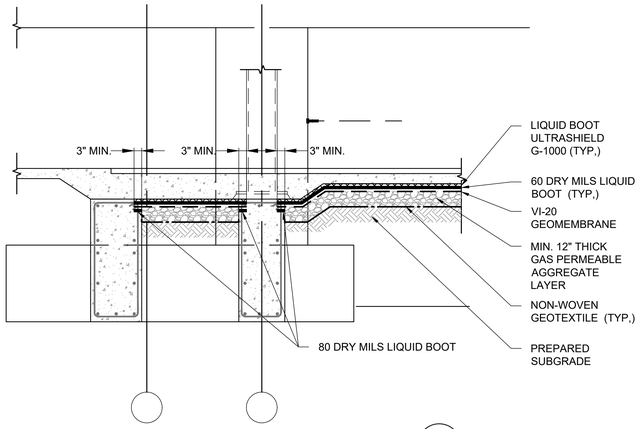
GAS VAPOR BARRIER DETAIL FOR SECTION 2 ON DRAWING FO201 — 2 / FIG7

NTS



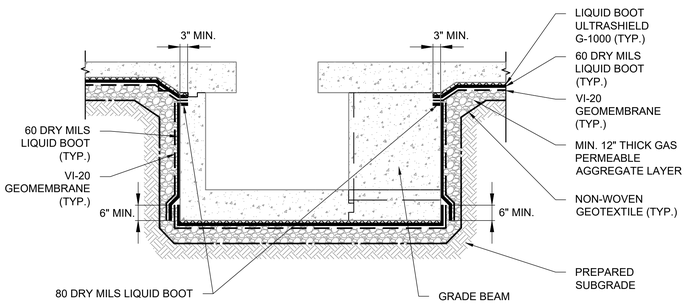
GAS VAPOR BARRIER DETAIL FOR SECTION 4 ON DRAWING FO201 — 3 / FIG7

NTS



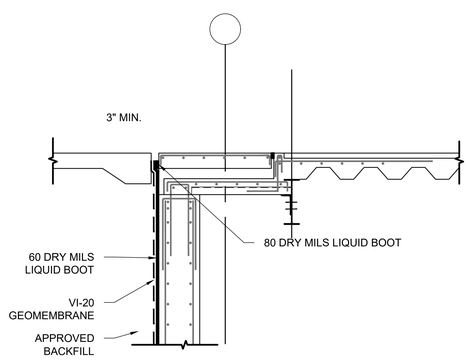
GAS VAPOR BARRIER DETAIL FOR SECTION 5 ON DRAWING FO201 — 4 / FIG7

NTS



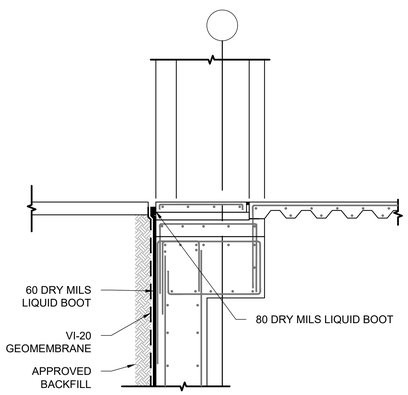
GAS VAPOR BARRIER DETAIL FOR SECTION 7 ON DRAWING FO202 — 5 / FIG7

NTS



GAS VAPOR BARRIER DETAIL FOR SECTION 24 AT ENTRANCE BY 4/H-G ON DRAWING FO204 — 6 / FIG7

NTS



GAS VAPOR BARRIER DETAIL FOR SECTION 25 AT ENTRANCE BY 4/B-C ON DRAWING FO204 — 7 / FIG7

NTS

GENERAL NOTES:

1. RELATIVE THICKNESS OF GAS VAPOR BARRIER SHOWN IS EXAGGERATED FOR ILLUSTRATIVE PURPOSES.
2. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM AND GAS VAPOR BARRIER DETAILS.
3. SUBMIT DETAIL OF ANY VAPOR BARRIER PENETRATIONS NOT SHOWN TO THE AUTHORITY FOR APPROVAL.

DRAWING MAY BE PRINTED AT REDUCED SIZE
SHEET SIZE: 30"X42"

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KEVIN R. BOGER, PE
NY PE # 096717
DATE JULY 25, 2022

PROJECT: NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
ENGINEERING CONTROLS O&M PLAN
BCP SITE NO. C224271 - 840 5TH AVENUE
BLOCK: 693, LOT: 39
BROOKLYN, NEW YORK 11232

TITLE: GAS VAPOR BARRIER DETAILS AS-BUILT DRAWING

DRAWN BY:	H. DELGADO	PROJ. NO.:	346549
CHECKED BY:	L. O'HARA		FIGURE 7
APPROVED BY:	K. BOGER		
DATE:	JULY 2022		

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FILE NO: Fig 7 - GVB Det As-Built Drawing.dwg

30x42 — USER: RBowden — ATTACHED XREFS: — ATTACHED IMAGES: Kevin Boger Signature (Blue)
DRAWING NAME: I:\nyc-tf\p1\env\mmetal\Shared\Projects\NYCSCA Contract C000015\346\356549 - K671 Construction Phase Services 840 5th Ave\O&M Plan\Figures\TRC Working Drawings\ Fig 7 - GVB Det As-Built Drawing.dwg — PLOT DATE: July 25, 2022 - 3:35PM — LAYOUT: 30x42L
Issued: 2017-10-31

APPENDIX A

CONTACT LIST

CONTACT LIST

NAME	TITLE	OFFICE TELEPHONE	MOBILE TELEPHONE	EMAIL
	Custodian			
	Fireman			
	Deputy Director of Facilities			
	DOE Contract Management			
	DOE Environmental Health & Safety			
	Independent Professional Engineer			

APPENDIX B

INSPECTION FORMS

Table B-1
Inspection Responsibilities

School Custodian's Responsibilities

Monthly or After Severe Condition

ROOF VENT SSDS INSPECTION (Follow proper safety protocols)	**VAPOR BARRIER INSPECTION (Follow proper safety protocols)**
Walk the entire roof surface, custodian's office, and applicable storage rooms	**Walk the entire slab level of basement and first floor**
*Any rust or other debris (bird nest, etc.) in or on SSDS Exhaust Stacks? *Are the SSDS fan units functioning at a lower vacuum than the last inspection? *Is the spare fan unit missing from the school? *Are the SSDS Alarm Indication Systems functioning properly? If not, which one(s)?	*Any visible cracks in the floor or subgrade walls? *Any other visible openings (unintended) in the floor or subgrade walls? *Any construction activities that are affecting the floor or subgrade walls? *Any visible cracks in any accessible pits? **Notification of DOE EHS is required if cracks are noted. Include the following information: 1. Draw approximate location of cracks/openings on site map. 2. Note the length of the crack/opening. Note the width of the crack/opening.
DOE EHS Notified of any "Yes" Answers	**DOE EHS Notified of any "Yes" Answers**
DOE EHS's Responsibilities	**DOE EHS's Responsibilities**
*Perform Follow Up Inspection *Prepare a report of findings and recommendations to be implemented. *DOE EHS to implement recommendations	*Perform Follow Up Inspection *Prepare a report of findings and recommendations to be implemented. *DOE EHS to implement recommendations

PS K671

Annual Monitoring Point Inspection Checklist

Inspect all monitoring point locations for obstructions; check the manhole covers (and bolts) along with the quick connections inside the manhole.

Monitoring Point ID	Room Number	Any obstructions over MP	Manhole cover secure and bolts in tact	Comments (status of quick-connect fitting, etc.)
MP-1	C04	Y / N	Y / N	
MP-2	C13A	Y / N	Y / N	
MP-3	C01	Y / N	Y / N	
MP-4	C14H	Y / N	Y / N	

Routine and Preventative Maintenance Checklist

SSDS Fans

Inspector's Name/Title:

Inspection Date/Time:

Purpose: (circle one) Semi-annual Inspection Fan Malfunction (describe)

SSDS Fan Maintenance Checklist	**Perform the steps below for every SSDS fan during a semi-annual inspection, or for any SSDS fan experiencing issues**	**Completed Y/N**	**List Any Issues or Unusual Behavior**
	1. Disconnect, lock out, and tag fan electrical power source		
	2. Clean/blow down centrifugal fan wheel, inlet, fan, and motor housing		
	3. Grease fan shaft bearing pillow blocks		
	4. Inspect fan inlet and outlet ductwork flex joints		
	5. Inspect damper for proper orientation		
	6. Inspect fan stack guy wires		
	7. Inspect fan mounting and vibration isolators		

*Notify the DOE EHS of any fan unit/component failure. In the event that a fan component fails, the component will be replaced by DOE EHS. DOE EHS will make appropriate arrangements in advance with suppliers to provide SSDS replacement parts within 12 hours notice. In the event that a fan unit fails, the backup fan will be switched on and the primary fan unit will be replaced by DOE EHS. Additionally, a spare fan will be available on-site for immediate replacement in case of fan failure.

Inspector's Signature:

Custodial Engineer Monthly or Severe Condition Inspection Form
PS K671

Inspector Name/Title:
Inspection Date/Time:

Purpose: (circle one) Monthly Inspection Severe Condition Inspection (describe)

		Yes / No *	Notified Person / Date
A. VAPOR BARRIER INSPECTION	**1. Walk the entire lowest level floor(s)**		
	* Any visible cracks in the building floor?		
	* Any other visible openings (unintended) in the building floor?		
	* Any construction activities affecting the building floor?		
	* Any visible cracks in any accessible pits (e.g., ejector pit)?		
	** Notification of DOE EHS is required if cracks are noted. Include the following information: - Draw approximate location of floor/wall cracks/openings on site map. - Note the length of the crack/opening. Note the width of the crack/opening.		
B. SSDS INSPECTION	**1. Walk the entire roof surface.**		
	* Any rust or other debris (bird nest, etc.) in or on SSDS Exhaust Stacks?		
	* Note reading on vacuum pressure gauge for the operating fans (SF-1 =) (SF-2 =)		
	* Are SSDS fan units functioning at a lower vacuum than the previous inspection?		
	* Is the spare fan unit missing from the school?		
	* Is the SSDS in alarm?		
C. ACTIONS TAKEN			
	Inspector's Signature:		

ANNUAL INSPECTION FORM
PS K671

Inspector's Name/Title:	Weather Conditions:
Inspection Date:	Air Temperature (°F):
Inspection Time:	
Comments:	

A. PRE INSPECTION CHECKLIST

_____ * Schedule Annual Inspection when school is not occupied by students.
_____ * Review Monthly Inspection Checklists from prior 12 months.
_____ * Meet with Custodial Engineer and Principal to solicit comments/concerns regarding the operation
_____ of the Engineering Controls over the last 12 months.
_____ * Conduct Annual Refresher Training with Engineering Controls team
_____ * Follow proper safety protocols including lockout/tagout.
* Comments:

B. SUB-SLAB DEPRESSURIZATION SYSTEM INSPECTION

_____ * Walk the entire roof surface, custodial office, and applicable storage rooms of school building
_____ * Inspect fan stack guy wires.
_____ * Record vacuum gauge reading on riser pipes or SSDS fan(s).
_____ * Ensure all SSDS accessories listed in section 15880 are functioning properly.
_____ * Inspect bolts and set screws for tightness and rusty condition.
_____ * Inspect SSDS fan(s) for cleanliness. Clean exterior surfaces only. Remove dust and grease on motor housing,
_____ * Are the indicator lights on the Alarm Indication Station functioning properly?
_____ * Is the spare fan unit present at the school?
_____ * Inspect monitoring points (look for obstructions, check manhole/bolts, quick connects).
* Comments (see or hear anything unusual?):

C. VAPOR BARRIER INSPECTION

Walk all of the lowest levels of the building

_____ * Review all cracks or other openings identified in lowest level slab during previous inspections. Confirm repairs have been made.
_____ * Any new visible cracks/penetrations/work in the floor?
_____ * Any new visible opening (unintended) in the floor?
_____ * Any new visible cracks in accessible pits?
_____ * Note the length of any new cracks/openings in the floor.
_____ * Draw approximate location of floor cracks/openings that appear to have potential leak through vapor barrier.
Comments:

D. Repair

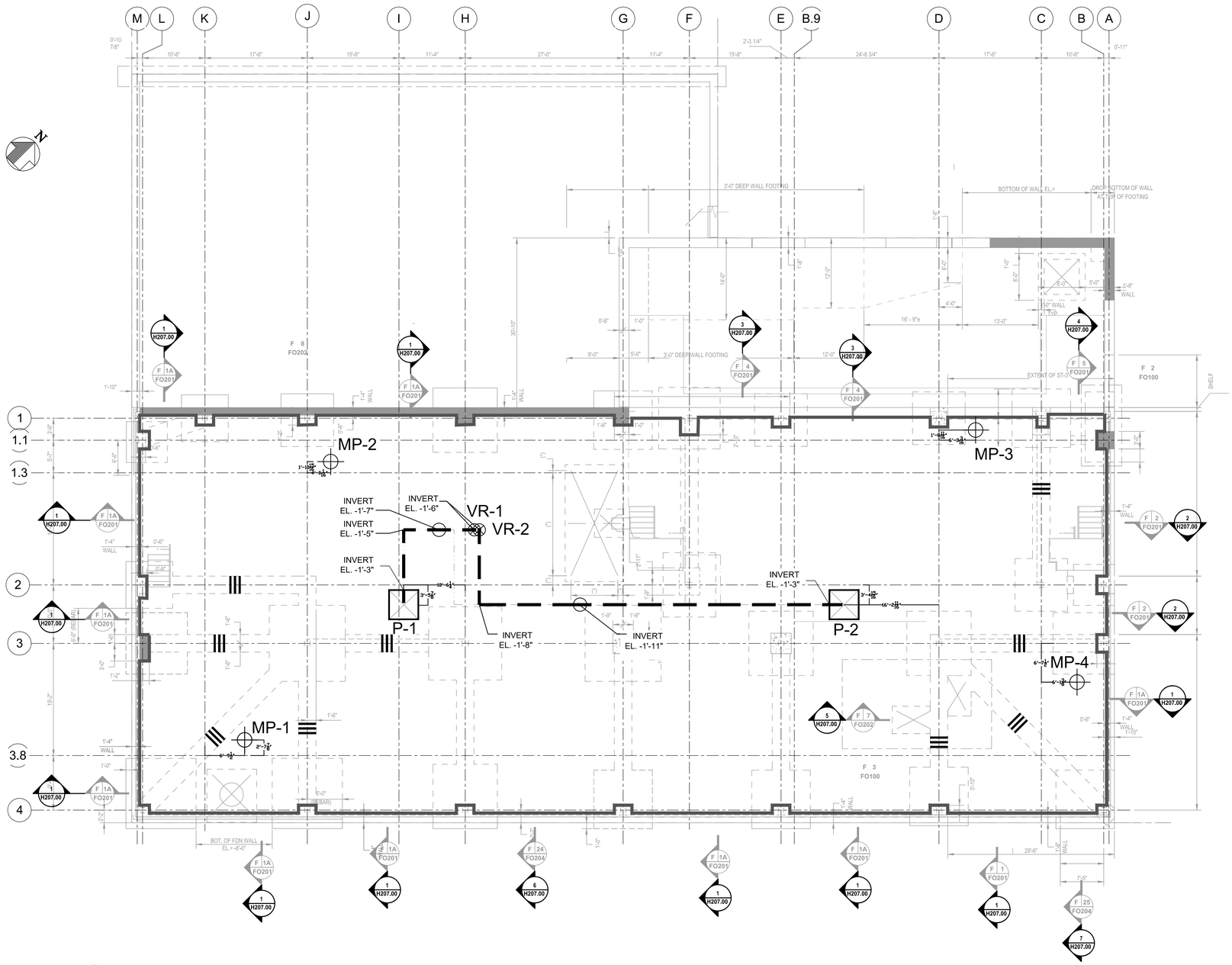
Summarize needed/completed repairs to Engineering Controls:

Inspector's Signature:

APPENDIX C

- **GAS VAPOR BARRIER DOCUMENTATION**
  - GAS VAPOR BARRIER SPECIFICATIONS
  - GAS VAPOR BARRIER DESIGN DRAWINGS

- **SUB-SLAB DEPRESSURIZATION SYSTEM DOCUMENTATION**
  - SSDS SPECIFICATIONS
  - SSDS DESIGN DRAWINGS



1 H201.00 **SUB-SLAB DEPRESSURIZATION SYSTEM PLAN**

1/8" = 1'-0"

0 2' 4' 8' 16'

SCALE IN FEET

LEGEND (SYMBOLS NOT TO SCALE):

- 6"Ø CAST IRON PIPE BENEATH FLOOR SLAB
- VR-X — 6"Ø VERTICAL RISER AND IDENTIFICATION NUMBER (REFER TO DETAIL 5 ON DWG. NO. H204)
- MP-X — SUB-SLAB MONITORING POINT AND IDENTIFICATION NUMBER (REFER TO DETAIL 4 ON DWG. NO. H204)
- P-X — SUB-SLAB DEPRESSURIZATION SYSTEM PIT AND IDENTIFICATION NUMBER (REFER TO DETAIL 1 ON DWG. NO. H204)
- HORIZONTAL EXTENT OF GAS VAPOR BARRIER AND MINIMUM 12-INCH THICK GAS PERMEABLE AGGREGATE LAYER
- CONDENSATE DRAIN (REFER TO DETAIL 2 ON DWG. NO. H204)
- THREE 4" Ø C.I. PIPE SLEEVES OVER GRADE BEAM. ENVELOP THESE GRADE BEAMS IN GAS PERMEABLE AGGREGATE. (REFER TO DETAIL 3 ON DWG. NO. H204

NOTES:

1. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM AND GAS VAPOR BARRIER.
2. THE EXTENTS OF BUILDING CONSTRUCTION BENEATH THE FLOOR SLABS SHALL BE LINED WITH GAS VAPOR BARRIER. AS PART OF BUILDING CONSTRUCTION, GAS VAPOR BARRIER SHALL ALSO BE APPLIED TO BELOW GRADE WALLS AND PITS.
3. SLOPE HORIZONTAL PIPE A MINIMUM OF 1% UNIFORMLY TOWARDS SUB-SLAB DEPRESSURIZATION SYSTEM PITS OR TO CONDENSATE DRAINS WHEN PIPING CANNOT BE SLOPED TO PITS.
4. REFER TO SPECIFICATION SECTION 02220 FOR ADDITIONAL GAS VAPOR BARRIER REQUIREMENTS.
5. REFER TO SPECIFICATION SECTION 02221 FOR ADDITIONAL SUB-SLAB DEPRESSURIZATION SYSTEM REQUIREMENTS.
6. INSTALL WARNING BARRIER (1-FOOT WIDE STRIP OF SAFETY ORANGE PLASTIC FENCE) ABOVE ALL SUB-SLAB PIPING.
7. INVERT ELEVATIONS SHOWN ARE RELATIVE TO THE TOP OF THE FLOOR SLAB.

CODE COMPLIANCE NOTES:

1. THE SUB-SLAB DEPRESSURIZATION SYSTEM COMPLIES WITH THE REQUIREMENTS OF THE 2014 NYC MECHANICAL CODE SECTION 512, "SUB-SLAB SOIL EXHAUST SYSTEMS".
2. THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT A "HAZARDOUS EXHAUST SYSTEM", AS DEFINED IN THE 2014 NYC MECHANICAL CODE SECTION 510.
3. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 601.4, "CONTAMINATION PREVENTION", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
4. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 607.5.5.2, "LIMITATIONS", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
5. THE INTENT OF THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT TO VENT METHANE OR RADON.

MONITORING POINT ID	LOCATION
MP-1	C04 - WATER
MP-2	C13A - WC
MP-3	C01 - STUD DINING
MP-4	C14H - F-LOCKER

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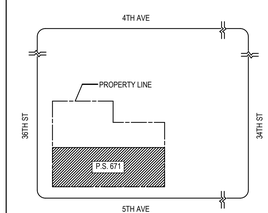
CONTRACT DOCUMENTS

NOTE: Drawing may be printed at reduced scale

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No.	Date	Description
-	09/14/2018	ISSUED FOR BID

Key Plan:



Block #693 Lot # 39

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Project Architect/Engineer:	GABRIEL MASSA, R.A.
Discipline Lead:	KEVIN BOGER. P.E. (TRC)
Designer:	PHILLIP CASTELLANO, P.E. (TRC)
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106889	K671	09/14/2018

Project:
P.S. 671, BROOKLYN
NEW BUILDING

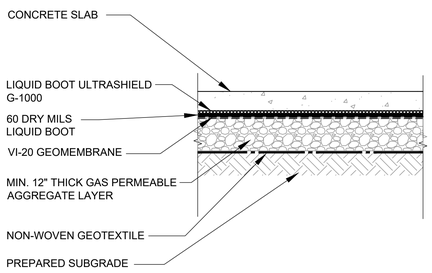
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BROOKLYN, NY 11232

Drawing Title:
SUB-SLAB DEPRESSURIZATION SYSTEM AND GAS VAPOR BARRIER PLAN

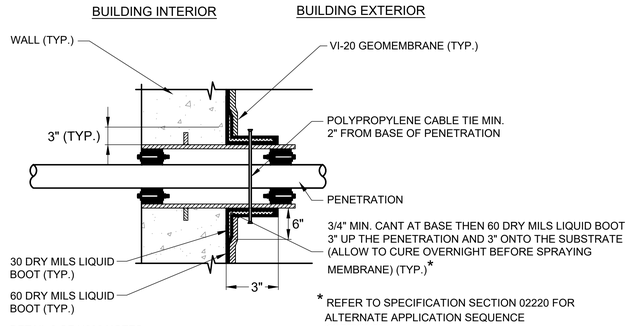
Drawing No.:
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Sheets in Contract Set:
53 of 420

Sheets in DOB Set:
45 of 333



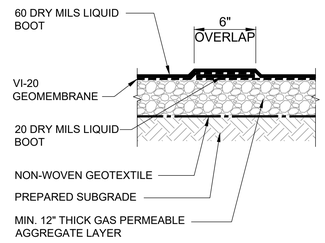
SECTION THROUGH SUB-SLAB (1 / H206)
NTS



DETAIL 2 OF H206 NOTES:

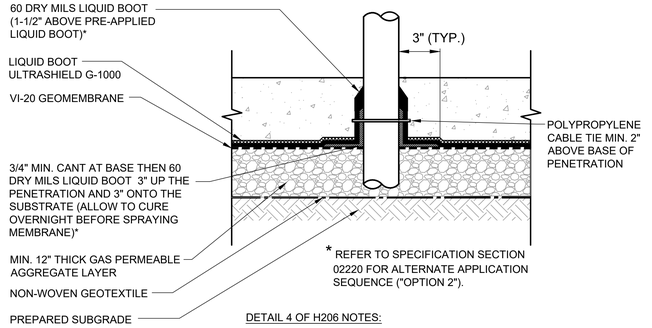
1. FURNISH ESCUTCHEONS AS SPECIFIED.
2. ANY DEVIATION FROM THIS INSTALLATION MUST BE SUBMITTED TO THE AUTHORITY FOR APPROVAL.
3. REFER TO MECHANICAL AND ARCHITECTURAL DRAWINGS FOR TYPICAL BELOW GRADE PENETRATION DETAILS.

* REFER TO SPECIFICATION SECTION 02220 FOR ALTERNATE APPLICATION SEQUENCE ("OPTION2").



NOTE:
LIQUID BOOT ULTRASHIELD G-1000 LAYER NOT SHOWN.

DETAIL FOR OVERLAP OF LIQUID BOOT SYSTEM (3 / H206)



* REFER TO SPECIFICATION SECTION 02220 FOR ALTERNATE APPLICATION SEQUENCE ("OPTION 2").

NOTE:
COAT ANY PIPING IN DIRECT CONTACT TO CONCRETE IN ACCORDANCE WITH PLUMBING CODES

DETAIL 4 OF H206 NOTES:

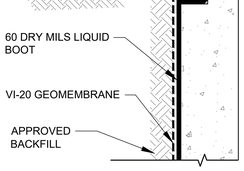
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GAS VAPOR BARRIER DETAIL AT PENETRATION THRU FLOOR WITHOUT SLEEVE (4 / H206)
NTS

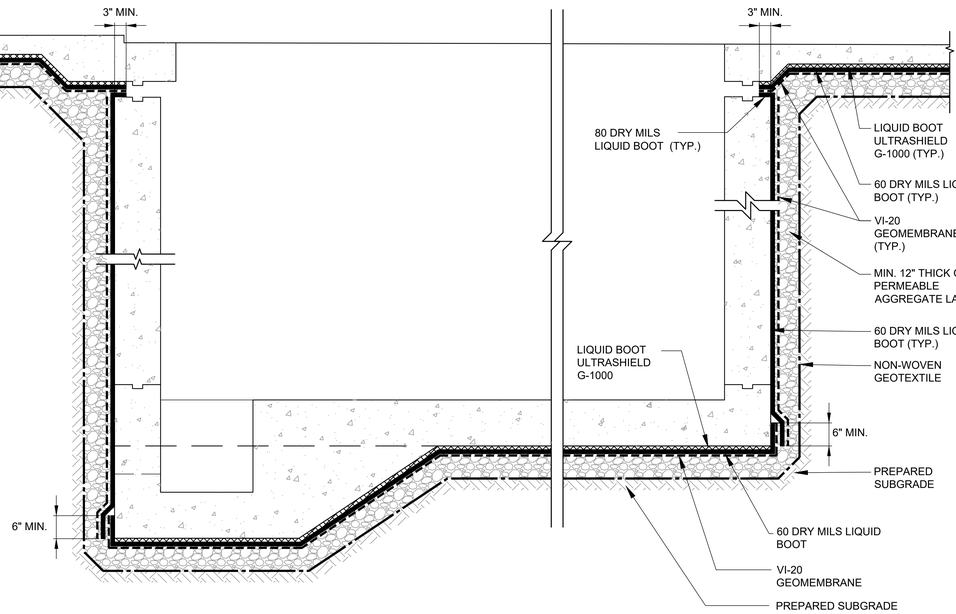
GAS VAPOR BARRIER DETAIL FOR PENETRATION THROUGH WALL BELOW GRADE (2 / H206)
NTS

GENERAL NOTES:

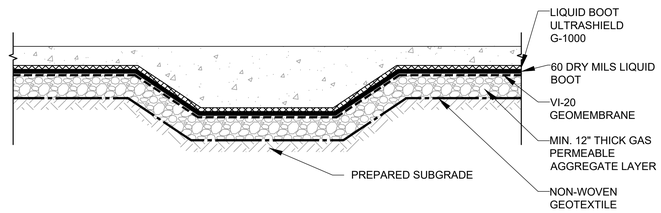
1. RELATIVE THICKNESS OF GAS VAPOR BARRIER SHOWN IS EXAGGERATED FOR ILLUSTRATIVE PURPOSES.
2. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM AND GAS VAPOR BARRIER DETAILS.
3. SUBMIT DETAIL OF ANY VAPOR BARRIER PENETRATIONS NOT SHOWN TO THE AUTHORITY FOR APPROVAL.



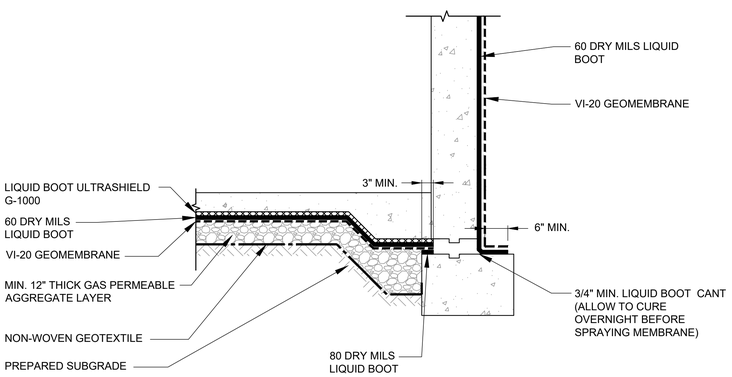
GAS VAPOR BARRIER DETAIL FOR VERTICAL TERMINATION AT GRADE (5 / H206)
NTS



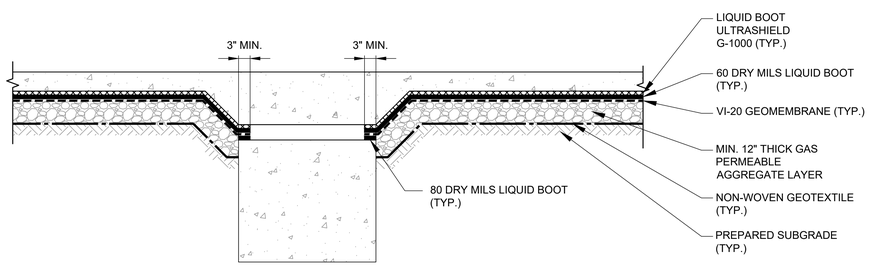
GAS VAPOR BARRIER DETAIL FOR PIT WITH PIT SUMP (6 / H206)
NTS



GAS VAPOR BARRIER DETAIL FOR SLAB ELEVATION CHANGE (7 / H206)
NTS



GAS VAPOR BARRIER DETAIL FOR UNDER SLAB AND WALLS (8 / H206)
NTS



GAS VAPOR BARRIER DETAIL FOR TERMINATION AT GRADE BEAM/FOOTING (9 / H206)
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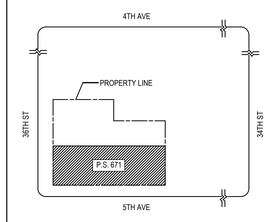
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No.	Date	Description
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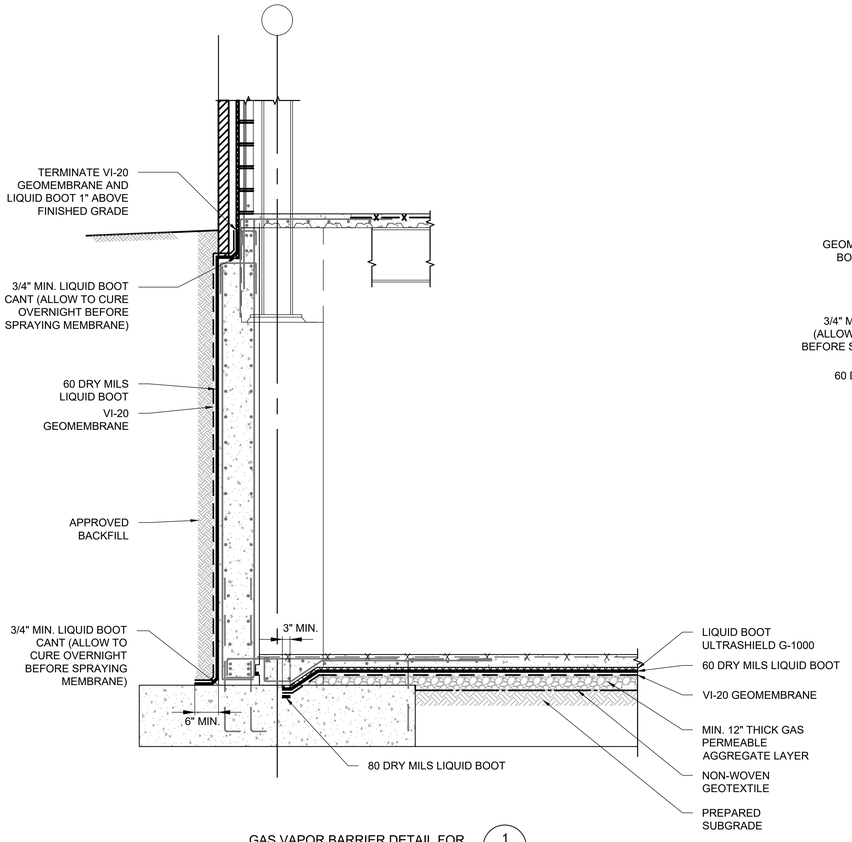
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Drawing Title:
GAS VAPOR BARRIER TYPICAL DETAILS

Drawing No.:
H206.00

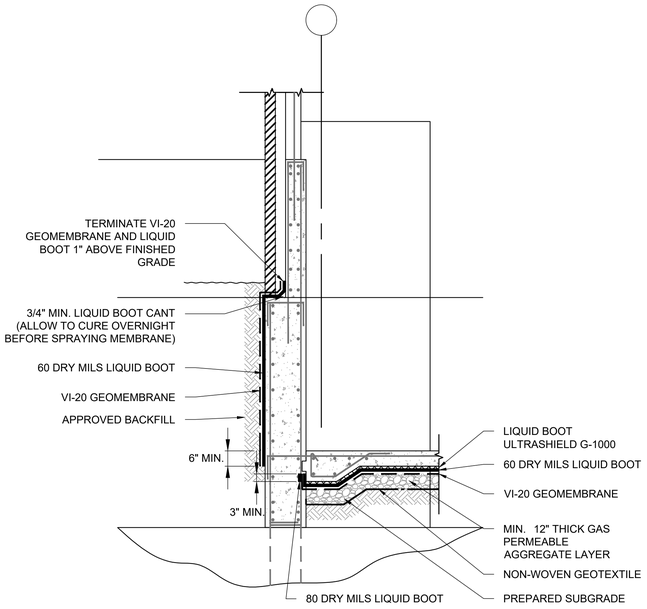
Sheets in Contract Set:
58 of 420

Sheets in DOB Set:
50 of 333



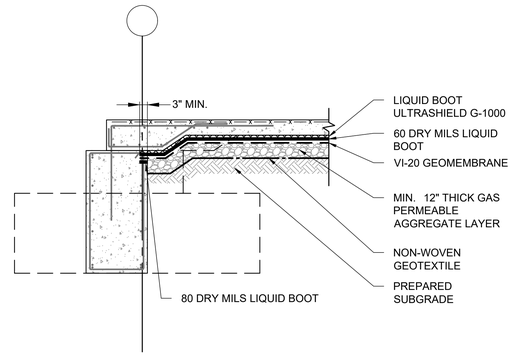
GAS VAPOR BARRIER DETAIL FOR SECTION 1 ON DRAWING FO201 — 1 / H207

NTS



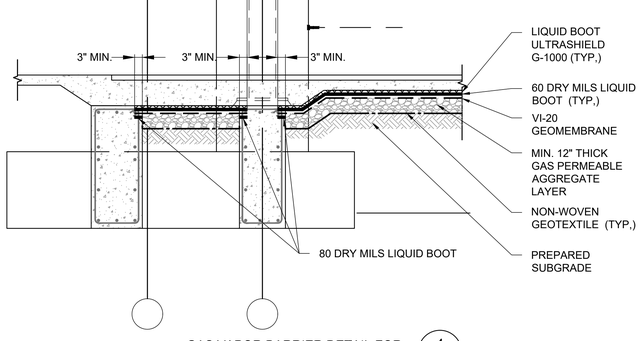
GAS VAPOR BARRIER DETAIL FOR SECTION 2 ON DRAWING FO201 — 2 / H207

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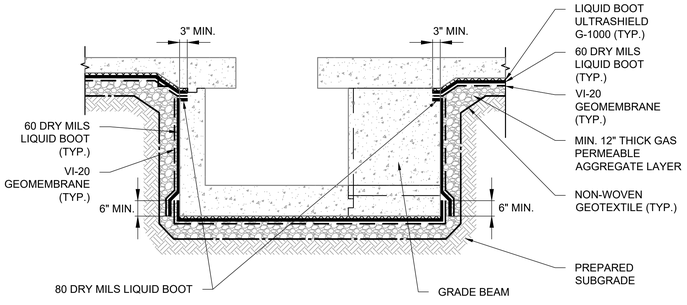
GAS VAPOR BARRIER DETAIL FOR SECTION 4 ON DRAWING FO201 — 3 / H207

NTS



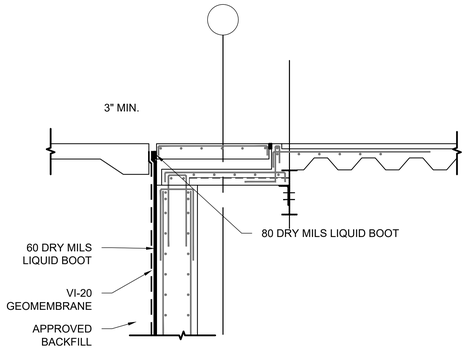
GAS VAPOR BARRIER DETAIL FOR SECTION 5 ON DRAWING FO201 — 4 / H207

NTS



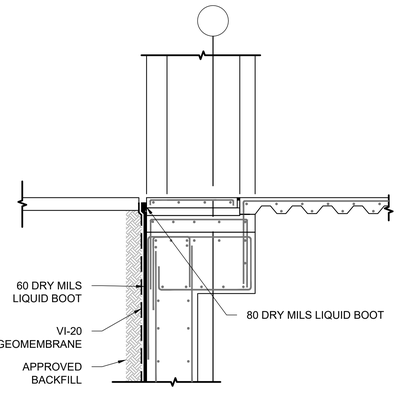
GAS VAPOR BARRIER DETAIL FOR SECTION 7 ON DRAWING FO202 — 5 / H207

NTS



GAS VAPOR BARRIER DETAIL FOR SECTION 24 AT ENTRANCE BY 4/H-G ON DRAWING FO204 — 6 / H207

NTS



GAS VAPOR BARRIER DETAIL FOR SECTION 25 AT ENTRANCE BY 4/B-C ON DRAWING FO204 — 7 / H207

NTS

GENERAL NOTES:

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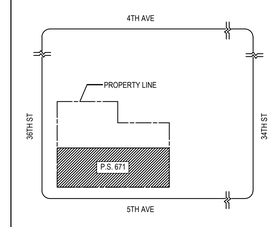
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No.	Date	Description
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Project:
P.S. 671, BROOKLYN
NEW BUILDING

Address:
840 5TH AVE
BROOKLYN, NY 11232

Drawing Title:
GAS VAPOR BARRIER DETAILS

Drawing No.:
H207.00

Sheets in Contract Set:
59 of 420

Sheets in DOB Set:
51 of 333

SECTION 02220
GAS VAPOR BARRIER (FLUID APPLIED)

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Install a fluid applied gas vapor barrier, under concrete slabs and on vertical sub-surface walls as indicated, specified and required in the Contract Documents and shown on the Drawings. The entire extent of new construction beneath finished grade, including floor slabs and vertical walls of subsurface pits and sumps, shall be lined with gas vapor barrier materials.

B. This section specifically references products manufactured by CETCO Liquid Boot Company (Liquid Boot Plus) and Land Science Technologies (Geo-Seal). Another Authority approved product may be substituted provided it satisfies the project requirements, the Drawings and Specifications, and the material properties, test and application procedures defined in Part 2 and Part 3 of this section. For bidding purposes Liquid Boot Plus is specified on the Contract Drawings. If the Contractor proposes to use Geo-Seal or another equal product, the Contractor shall prepare and submit shop drawings showing all site-specific details and application conditions, including, but not limited to, details for each and every condition shown on the H-Series Contract Drawings. The shop drawings must be signed and sealed by a Professional Engineer licensed to practice in the State of New York. Approval of the shop drawings by the IEH Division of the Authority shall be required prior to start of the on-site work of this section.

C. The gas vapor barrier shall be applied to create a continuous vapor tight barrier beneath the entire new construction, with durable seals to every wall, beam, footing, and penetration to ensure a single, contiguous, impermeable membrane layer. The gas vapor barrier shall be installed on top of the prepared subgrade layer and immediately below the poured concrete floor slabs and directly on vertical sub-surface concrete walls as specified and shown on the

Drawings. The gas vapor barrier shall be applied horizontally and vertically to all subsurface pits and sumps forming a barrier on all sides and bottoms of pits and sumps as specified and shown on the Drawings.

D. The Contractor shall be responsible for performance of all specified inspections and certify and submit all results of inspections and tests as specified.

E. The intent of this section is to specify materials and installation procedures for a gas vapor barrier and not a water-proofing material. If water-proofing is required in addition to a gas vapor barrier, comply with special requirements at transitions from gas vapor barrier to water-proofing material as to not void the warranty of either material. Notify Authority immediately upon discovery of any conflict between these barrier materials.

F. Do not combine products from different manufacturers. All gas vapor barrier products furnished and installed shall be from one single manufacturer and installed by one single approved installer.

1.02 RELATED SECTIONS

A. Environmental Site Assessment Reports. . Section 02010

B. Earthwork . . . . . .Section 02200

C. Sub-Slab Depressurization System . . . . .Section 02221

D. Foundation and Other Change Adjustments. . . . . Section 02250

E. Concrete Work. . . . . Section 03005

F. Thermal and Moisture Protection. . . . . .Division 7

G. Mechanical. . . . . .Division 15

H. Electrical. . . . . Division 16

1.03 STANDARDS AND REGULATIONS

A. American Society for Testing and Materials (ASTM) D882 – Standard Test Method for Tensile Properties of Thin

Plastic Sheeting

B. ASTM D1709 – Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method

C. ASTM D2582 – Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting

D. ASTM D3776 – Standard Test Methods for Mass per Unit Area (Weight) of Fabric

E. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating

F. ASTM D4833 – Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products

G. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials

H. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials

I. ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

J. ASTM E1745 – Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs

K. National Fire Protection Association (NFPA) 701 – Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

1.04 RESTRICTIONS AND QUALITY CONTROL

A. Pre-installation Meeting: The Contractor shall arrange for and convene a pre-installation meeting prior to the start of work of this section to review installation procedures, protection, and coordination with other work. Attendance of parties directly affecting work of this section, including representatives of the Construction Inspection

Division (CID), the Industrial and Environmental Hygiene Division (IEH), designer of the gas vapor barrier, Contractor, Contractor's Professional Engineer, and Contractor's installer shall be required. The Contractor shall schedule the pre-installation meeting at a time and at a location that is agreeable to CID, the Architect/Engineer and IEH Division. The meeting shall be held on a date which is a minimum of ten (10) business days prior to start of the work of this section.

B. General Performance Requirements: It is required that the gas vapor barrier be vapor tight for twenty (20) years. Failure to comply with this requirement will be considered a failure of materials and workmanship. The Contractor shall be required to demonstrate and certify that the gas vapor barrier passes all applicable tests specified in Article 3.04 of this section.

C. This section specifies requirements for vapor intrusion barriers not water-proofing. If water-proofing is required for portions of the construction and waterproofing products will contact vapor barrier products, installation of vapor barrier and water-proofing materials must be coordinated at all transitions so that the warranties for both products are not voided.

D. Installer: Gas vapor barrier installer shall be trained and approved by gas vapor barrier manufacturer, CETCO Liquid Boot Company, Land Science Technologies or Authority approved equal. If Contractor elects to employ an installer who is not listed below, submit proposed installer's qualifications for Authority approval.

E. The following is a list of approved installers:

Liquid Boot Plus	**Geo-Seal**
Debrino Caulking Contact: Al Poole Phone: 518-732-7234	**Debrino Caulking** Contact: Al Poole Phone: 518-732-7234
EAI Contact: Jessica Telano Phone: 201-395-0010	**Remcon Services, LLC** Contact: Josh Jackson Phone: 888-457-2368

Liquid Boot Plus	Geo-Seal
Edgeboro International Contact: Jack Whitman, Jr. Phone: 732-227-1356	**Edgeboro International** Contact: Jack Whitman, Jr. Phone: 732-227-1356
RESTOR Technologies Contact: Frank Morisco, Jr Phone: 631-385-8400	**The Jobin Organization** Contact: Dwayne Grant Phone: 631-694-2111
Terrafix Environmental Contact: Blu Alexander Phone: 416-674-0363	**Contractors Waterproofing** Contact: Mike Downey Phone: 316-650-1999

F. Inspection: Contractor shall provide a New York State licensed Professional Engineer (Contractor's Professional Engineer) with experience and qualifications to approve the work, independent of the installer, to conduct the inspection of the gas vapor barrier installation. This is not the Authority's responsibility. Authority approval of qualifications of licensed Professional Engineer shall be required prior to the inspections. Approval of the work by an engineer does not relieve the manufacturer and/or the installer of their responsibility to produce and install the vapor protection system to achieve the performance requirements stated above.

G. The installer shall perform tests in accordance with Article 3.04 of this section and shall document successful completion of the tests. A representative of CID must be present during the tests.

1.05 SUBMITTALS

A. Approval of submittals of this section by the IEH Division of the Authority shall be required prior to start of the related work, as applicable.

B. The Contractor shall submit to the Authority, within ten (10) business days of Notice to Proceed, a submittals schedule showing the following for each submittal of this section: date of delivery of submittal to the Authority, anticipated time period for Authority review (5 business days, minimum), and required date of Authority approval in order to maintain project schedule. Approval by the IEH Division of the submittal schedule shall be required. The IEH Division must be notified of any changes in the schedule at least 24 hours prior to the change.

C. The Contractor shall submit to the Authority a schedule showing dates for each inspection specified in Article 3.01(B) of this section.

D. Product Data and Shop Drawings: Submit manufacturer's product data, including installation instructions, termination shop drawings, and shop drawings for each of Contractor's proposed alternate vapor barrier penetration detail or construction/installation detail. The shop drawings must be product and project specific and show each and every condition of the project. Liquid Boot Plus is specified on the Contract Drawings. If the Contractor proposes to use Geo-Seal or another equal product, the Contractor shall prepare and submit shop drawings showing all site-specific details and application conditions, including, but not limited to, details for each and every condition shown on the H-Series Contract Drawings. The shop drawings must be signed and sealed by a Professional Engineer licensed to practice in the State of New York. Included with the submittal shall be a certification from the Contractor's Professional Engineer stating that the proposed vapor barrier design is consistent with the requirements and intent of the Contract Drawings and Specifications. Approval of the shop drawings by the IEH Division of the Authority shall be required prior to start of the on-site work of this section. (The IEH Division of the Authority will make available to the Contractor AutoCAD files of the H-Series Contract Drawings upon request.)

E. Samples: Submit representative samples of the following for approval:

Liquid Boot Plus	**Geo-Seal**
1. Gas vapor barrier membrane material	1. Vapor intrusion barrier system sample
2.Protection materials – Ultrasheild G-1000	2. Geo-Seal Bond layer
3. VI-20 Geomembrane	3. Geo-Seal FILM-16
	4. Geo-Seal Base layer

F. Material Test Reports: Indicate and interpret test results for compliance of gas vapor barrier with requirements specified, as applicable.

G. Certification: Submit manufacturer's Certification of Compliance indicating that materials delivered and used in the work are in strict compliance with specified requirements (see Articles 1.06 and 2.01 in this section).

H. Resume of Contractor’s Professional Engineer, licensed to practice in the State of New York, to perform milestone inspections, and certify proper installation of gas vapor barrier. The Contractor’s Professional Engineer shall perform each of the milestone inspections identified in 3.01(A) of this section.

I. Report on Contractor Professional Engineer’s inspection and approval of the work of this section. The Contractor’s Professional Engineer shall provide a certification, signed and sealed, stating that all work was performed in accordance with the requirements of this section and the Contract Drawings. The certification shall explicitly state that the Professional Engineer supervised inspections of tests which demonstrated installation of a gas-tight barrier for preventing intrusion of vapors into the entire new construction. The report must include documentation of successful test completion as required in Article 3.04 of this section.

J. Manufacturer’s and Installer’s Warranties as required in Article 1.08 of this section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in original unbroken packages bearing manufacturer’s label showing brand, weight, volume, and batch number. Deliver materials to the site only after the Authority has reviewed and approved the required submittals.

B. Store materials at the site in strict compliance with manufacturer’s instructions. Store materials in a clean, dry area on-site. Do not allow materials to freeze in containers.

C. Protect materials during handling and installation to prevent damage. Replace any damaged materials at no cost to the Authority unless the damaged material can be repaired in accordance with the manufacturer's requirements and to the satisfaction of the Authority and such that vapor protection is not compromised.

1.07 PROJECT/SITE CONDITIONS

A. Protect all adjacent areas not to receive gas vapor barrier. Apply temporary masking to prevent staining of surfaces to remain exposed wherever membrane abuts other finished surfaces.

B. Perform work only when existing and forecasted weather conditions are within manufacturer’s recommendations for the material and product used.

C. Minimum clearance (separation between _applicator and surface) required for application of product:

Liquid Boot	Geo-Seal
90 degree spray wand – 2 feet.	All applications minimum of 2 feet.
Conventional spray wand – 4 feet.	

D. Ambient temperature shall be within manufacturer’s specifications.

1. Liquid Boot

   a. For Liquid Boot applications during winter conditions, the Contractor shall use space heaters and necessary cover (i.e., visqueen) to bring the ambient temperature to 45°F prior to applying product.

   b. Do not apply Liquid Boot Plus system in snow, rain, fog or mist, or when adverse weather conditions are imminent during the application or curing periods.

2. Geo-Seal may be installed in ambient temperatures lower than 45°F. At such temperatures,

Contractor shall contact Land Science Technologies, gain applicator approval for cold weather applications, and comply with proprietary application techniques.

E. The Contractor shall coordinate with all trades involved in the scheduling of excavation, formwork, concrete placement, and backfill to ensure that all necessary components of work, due to be buried, are installed, inspected, tested, and approved prior to being covered and thus avoiding duplication of excavation work unless otherwise shown on the Contract Drawings or noted in other sections of the Contract Documents. No other work shall be performed in areas above an installed vapor barrier section until the vapor barrier protection layer has been inspected, tested, and approved in accordance with this section. The Contractor shall verify that there are no interferences with other existing or proposed subsurface systems. Subgrade must be rolled flat and non-angular.

F. All plumbing, electrical, mechanical and structural items to be under or passing through the gas vapor barrier shall be positively secured in their proper positions and appropriately protected prior to membrane application.

G. Gas vapor barrier shall be installed before placement of reinforcing steel. When not possible, all exposed reinforcing steel shall be masked by Contractor prior to membrane application.

H. Expansion joints must be filled with a conventional waterproof expansion joint material.

I. Surface preparation shall be per manufacturer’s specification.

1.08 EXTENDED WARRANTIES

A. Submit a warranty, signed by the manufacturer of the gas vapor barrier system, agreeing to replace/repair defective materials including all work required to correct leakage of vapors within the warranty period. The warranty period is 20 years after date of acceptance by the Authority.

B. Submit a separate warranty, signed by the installer of the gas vapor barrier system, agreeing to replace/repair defective materials and workmanship, including corrective actions for leakage of vapor within warranty period. The installer’s warranty period is 5 years after date of acceptance by the Authority. For the Authority to accept the 5-year warranty from the installer, the following shall be performed:

1. The installer shall comply with the Contract Documents (this Specification Section and the Drawings) for installation requirements.

2. All Field Quality Control as specified and required under Article 3.04 of this section, including, but not limited to submission of final testing certification by Contractor’s Professional Engineer.

C. Refer to Article 1.04(C) for restrictions/limitations for joining gas vapor barrier with water-proofing materials to protect the warranties of each product.

PART 2 - PRODUCTS

2.01 MATERIALS

Material product requirements are specified for both Authority approved products (i.e., products manufactured by CETCO Liquid Boot Company [Liquid Boot Plus] and Land Science Technologies [Geo-Seal]). The Contractor shall comply with the requirements specified for the product used.

A. Liquid Boot Plus

1. VI-20 Geomembrane – Base Layer

a. VI-20 Geomembrane shall be installed as a cushion layer on base aggregate, unless otherwise specified and approved by membrane manufacturer and the Authority.

b. VI-20 is a seven-layer co-extruded membrane made from ethylene vinyl alcohol (EVOH) and polyethylene to provide strength as well as resistance to volatile organic compound (VOC) vapor transmission. VI-20 membrane is an under-slab barrier which, when used in conjunction with Liquid Boot, will inhibit VOC vapor migration through the concrete.

c. VI-20 geomembrane barrier physical properties:

Properties	Test Method	Value
Thickness, nominal	ASTM D5199	0.51 mm
Weight	ASTM D5261	498 g/m^2
Tensile Strength	ASTM E154	258 N/cm (58 lb/in)
Methane Permeability	ASTM D1434	$<5 \times 10^{-10}$ $m^2/d*atm$
Radon Diffusion Coefficient		$<0.25 \times 10^{-12}$ m^2/s
Water Vapor Transmission	ASTM E154 & E96	0.0025 US Perms

2. Liquid Boot

a. Fluid applied gas vapor barrier system - Liquid Boot or approved equivalent; a single course, high build, polymer modified asphaltic emulsion. Water borne and spray applied at ambient temperatures within manufacturer’s recommended range. A minimum thickness of 60 dry mils is required, unless otherwise shown or specified. Non-toxic and odorless. Liquid Boot Trowel Grade has similar properties with greater viscosity and is trowel applied. Manufactured by CETCO Liquid Boot Company, Santa Ana, CA (714) 384-0111.

b. Liquid Boot physical properties:

GAS VAPOR MEMBRANE	TEST METHOD	VALUE
Acid Exposure (10% H_2SO_4 for 90 days)	ASTM D543	Less than 1% weight change
Diesel (1000 mg/l), Ethylbenzene (1000 mg/l), Naphthalene (5000 mg/l) and Acetone (500 mg/l) Exposure for 7	ASTM D543	Less than 1% weight change, Less than 1% tensile strength change
Radon Permeability	Tested by US Dept. of Energy	Zero permeability to Radon (222Rn)
Bonded Seam Strength	ASTM D6392	Passed*
Micro Organism Resistance (Soil Burial)- average weight change	ASTM D4068-88	Passed*
Methane Permeability	ASTM 1434-82	Passed*
Oil Resistance Test- average weight change, average tensile strength change, average tensile stress change, average elongation change, bonded seams, methane permeability	ASTM D543-87	Passed*
Heat Aging- average tensile strength change, average tensile stress change, average elongation change, bonded seams	ASTM D4068-88	Passed*
Dead Load Seam Strength	City of Los Angeles	Passed*
Environmental Stress-Cracking	ASTM D1693-78	Passed*
PCE Diffusion Coefficient	Tested at 120 mg/L	1.32×10^{-13} m^2/sec
TCE Diffusion Coefficient	Tested at 524 mg/L	9.07×10^{-13} m^2/sec
Soil Burial	ASTM E154-88	Passed
Water Vapor Permeability	ASTM E96	0.069 US Perms

GAS VAPOR MEMBRANE	**TEST METHOD**	**VALUE**
Water Penetration Rate	ASTM D2434	$<7.75 \times 10^{-9}$ cm/sec
POTABLE WATER	**TEST METHOD**	**VALUE**
Toxicity Test	22 CCR 66696	Passed. CCR Bioassay—Flathead Minnow
Potable Water Containment	ANSI/NSF 61	NSF Certified for tanks >300,000 gal**
Hydrostatic Head Resistance	ASTM D751	Tested to 138 feet or 60 p.s.i
GENERAL INFORMATION	**TEST METHOD**	**VALUE**
Freeze-Thaw Resistance (100 Cycles)	ASTM A742	Meets criteria. No spalling or disbondment
Accelerated Weathering & Ultraviolet Exposure	ASTM D822	No adverse effect after 500 hours
Elongation	ASTM D412	1,332% - Ø reinforcement, 90% recovery
Tensile Strength	ASTM D412	58 p.s.i. without reinforcement
Tensile Bond Strength to Concrete	ASTM D413	2,707 lbs/ft^2 uplift force

* per City of Los Angeles approval for 60-mil dry Liquid Boot

** per NSF approval for 80-mil Liquid Boot potable water containment membrane

3. Protection - On vertical surfaces, use: VI-20® Geomembrane or other protections as approved by the Authority.

4. Protection - On horizontal surfaces, use: Liquid Boot UltraShield G-1000 above the 60 mil Liquid Boot vapor barrier or other protections as approved by the Authority.

5. All protection materials must be approved by the membrane manufacturer, including the use of the Liquid Boot UltraShield products.

6. Adhesive system for Liquid Boot UltraShield: Use Liquid Boot UltraGrip.

7. Cold Joints, Cracks, Form Tie Holes: Covered with Hardcast CRT 1602 Tape 3" wide.

8. General: Provide additional installation accessories as necessary. Ensure accessories are from same manufacturer as vapor barrier.

B. Geo-Seal

1. Vapor intrusion barrier is comprised of the following items:

a. HDPE/Geotextile Sheet: Geo-Seal Base layer

b. Spray applied membrane: Geo-Seal Core spray layer and Geo-Seal Core Detail

c. HDPE/Geotextile Sheet: Geo-Seal Bond protection layer

d. HDPE Sheet: Geo-Seal FILM-16 protection layer

e. Fluid applied vapor intrusion barrier system - Geo-Seal or approved equivalent; a single course, high build, polymer modified asphaltic emulsion encapsulated by two HDPE/geotextile membranes. Spray membrane is water borne and applied at ambient temperatures within manufacturer’s recommended range. A minimum thickness of 60 dry mils of Geo-Seal Core is required, unless otherwise shown or specified. Non-toxic and odorless. Manufactured by Land Science Technologies, San Clemente, CA (949) 481.8118.

f. Vapor intrusion spray membrane physical properties:

PROPERTIES	TEST METHOD	RESULTS
Geo-Seal Core – TYPICAL CURED PROPERTIES		
Tensile Strength - Core only	ASTM 412	32 psi
Tensile Strength - Geo-Seal System	ASTM 412	662 psi
Elongation	ASTM 412	4140%
Resistance to Decay	ASTM E 154 Section 13	4% Perm Loss
Accelerated Aging	ASTM G 23	No Effect
Moisture Vapor Transmission	ASTM E 96	0.026 g/ft2/hr
Hydrostatic Water Pressure	ASTM D 751	26 psi
Perm Rating	ASTM E 96 (US Perms)	0.21
Methane Transmission Rate	ASTM D 1434	Passed
Adhesion to Concrete & Masonry	ASTM C 836 & ASTM C 704	11 lbf./inch
Hardness	ASTM C 836	80
Crack Bridging	ASTM C 836	No Cracking
Heat Aging	ASTM D 4068	Passed
Environmental Stress Cracking	ASTM D 1693	Passed
Oil Resistance	ASTM D543	Passed
Soil Burial	ASTM D 4068	Passed
Low Temp. Flexibility	ASTM C 836-00	No Cracking at –20°C
Resistance to Acids:		
Acetic		30%
Sulfuric and Hydrochloric		13%
Temperature Effect:		
Stable		248°F
Flexible		13°F
Geo-Seal Core Detail – Typical Cured Properties		
Tensile Strength	ASTM 412	32 psi
Elongation	ASTM 412	3860%
Resistance to Decay	ASTM E 154 Section 13	9% Perm Loss
Accelerated Aging	ASTM G 23	No Effect
Moisture Vapor Transmission	ASTM E 96	0.026 g/ft^2/hr
Hydrostatic Water Pressure	ASTM D 751	28 psi
Perm rating (US Perms)	ASTM E 96	0.17
Methane transmission rate	ASTM D 1434	Passed
Adhesion to Concrete & Masonry	ASTM C 836	7 lbf./inch
Hardness	ASTM C 836	85

PROPERTIES	TEST METHOD	RESULTS
Crack Bridging	ASTM C 836	No Cracking
Low Temp. Flexibility	ASTM C 836-00	No Cracking at –20ºC
Resistance to Acids:		
Acetic		30%
Sulfuric and Hydrochloric		13%
Temperature Effect:		
Stable		248°F
Flexible		13°F

2. Vapor Intrusion Barrier Sheet Materials

   c. Geo-Seal Base layer and Geo-Seal Bond layers are chemically resistant sheets comprised of a 5 mil high density polyethylene sheet thermally bonded to a 3 ounce non-woven geotextile.

   d. Geo-Seal FILM-16 protective layer is comprised of a high strength, cross laminated HDPE membrane 16 mils thick.

3. Sheet Course Usage

   a. As foundation base layer, use Geo-Seal Base course. The HDPE side shall be used as application surface.

   b. Protection - On vertical surfaces, use: Geo-Seal FILM-16, or other protections as approved by the Authority.

   c. Protection - On horizontal surfaces, use: Geo-Seal Bond or other protections as approved by the Authority.

4. Geo-Seal Bond and Geo-Seal Base physical properties.

PROPERTIES	TEST METHOD	RESULTS
Film Thickness		5 mil
Composite Thickness		18 mil
Water Vapor Permeability	ASTM E 96	0.214

PROPERTIES	TEST METHOD	RESULTS
Adhesion to Concrete	ASTM D 1970	9.2 lbs/inch^2
Dart Impact	ASTM D 1790	>1070 gms, method A
		594 gms, method B
Puncture Properties Tear	ASTM B 2582 MD	11,290 gms
Puncture Properties Tear	ASTM B 2582 TD	13,150 gms

5. Geo-Seal FILM-16 physical properties.

PROPERTIES	TEST METHOD	GEO-SEAL FILM-16
Film Thickness		16 mil
Classification	ASTM E 1745-09	Exceed Class A,B and C
Tensile	ASTM E 154-93	63 lbf / in
Puncture Resistance	ASTM D 1709	2750 grams
Water Vapor Permeance	ASTM E 96	0.009 Perms
Life Expectancy	ASTM E 154-93	Indefinite
Chemical Resistance	ASTM E 154-93	Excellent

6. Adhesive system for the Geo-Seal system on cast in place walls: Use Stay-Put adhesive or other adhesives approved by the manufacturer

7. Reinforcing Strip: Manufacturer’s polyester fabric.

8. Cold Joints, Cracks, Form Tie Holes: Use Geo-Seal Core Detail with reinforcing strip (Geo-Seal Reinforcement fabric).

9. General: Provide additional installation accessories as necessary. Ensure all accessories are from same manufacturer as vapor barrier.

PART 3 - EXECUTION

3.01 EXAMINATION

A. The Contractor’s Professional Engineer shall perform all milestone inspections. Smoke testing as described in Article 3.04 must be performed in the presence of a representative of CID. Additional inspections, examinations and quality control measures may be

required in accordance with manufacturers' recommendations and are the responsibility of the Contractor. The Authority reserves the right to perform additional inspections or quality control tests as deemed necessary by the Authority at any point during the construction process. Contractor shall afford reasonable time for the Authority to conduct such inspections and tests, with no additional cost to the Authority.

B. INSPECTION SCHEDULE

#	**Inspection Schedule – Milestone Description**
1	The installer, with the Contractor's Professional Engineer present, shall examine conditions of substrates and other conditions under which this Section work is to be performed. Installer shall notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected and made to comply with manufacturer requirements. General substrate conditions acceptable for the gas vapor barrier installation are listed in section 3.02. For conditions not covered in this Section, comply with gas vapor barrier manufacturer's recommendations and guidance.
2	Completion of installation of VI-20 Geomembrane, Geoseal base layer, or approved equal above aggregate layer
3	Completion of all fluid applied gas vapor barrier appurtenances and seals following the specified curing time.
4	Application of fluid applied gas vapor barrier at all penetrations, base fabric overlaps and foundation contact points.
5	Coating thickness inspection and testing. At a minimum testing shall be performed as per Article 3.04.
6	Completion of installation of all subsurface components prior to installation of gas vapor barrier protection layer.
7	Completion of all components of gas vapor barrier prior to subsequent backfilling and concrete placement.

3.02 SURFACE PREPARATION

A. Provide 24-inch minimum clearance out from surfaces to receive the gas vapor barrier. Protect adjacent work areas and finish surfaces from damage or over spraying of gas vapor barrier during product applications. Remove dirt, debris, oil, grease, cement laitance, or other foreign matter which will impair or negatively affect the performance of the gas vapor barrier. The application surface shall be prepared and provided to the applicator in accordance with manufacturer's specifications listed below:

B. Liquid Boot Plus

1. Concrete/Shotcrete/Masonry

a. Concrete to be gas vapor proof shall be properly placed and consolidated. Reinforced structural slabs should be a minimum of 6" (150 mm) thick when placed on a working mud slab. Reinforced concrete slab(s) on compacted grade shall be a minimum of 4" (100 mm) thick.

b. Concrete surfaces shall be light broom finish or smoother, free of any dirt, debris, loose material, release agents or curing compounds. Fill voids more than 1/4 inch deep and 1/4 inch wide. Masonry joints, cold joints, and form joints shall be struck smooth.

c. All penetrations shall be prepared in accordance with manufacturer's specifications. Provide a 3/4-inch minimum cant of Liquid Boot, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120 degrees or less. Allow to cure overnight before the application of Liquid Boot.

d. All cracks or cold joints greater than 1/16 inch must be completely grouted with non-shrink grout as directed by the Authority.

e. Install Hardcast reinforcing tape over all cold joints, cracks and form tie holes (after holes and cracks are grouted).

2. Soil and Gravel

a. Moisture condition and compact sub-grade, in accordance with Section 02200. The surfaces to be lined shall be free of all other rocks, stones, sticks, roots, sharp objects, or construction debris of any kind. No standing water, excessive moisture or frozen ground shall be allowed. Remove all stones or dirt clods greater than ¼-inch. Aggregate sub-bases shall be compacted and rolled flat and free of any protruding sharp edges.

b. All penetrations shall be prepared in accordance with manufacturer's specifications. All form stakes that penetrate the membrane shall be of rebar, which shall be bent over and left in the slab. Approval shall be required from the Contractor's Professional Engineer of the subgrade on which the membrane is to be installed prior to commencing work.

c. Trenches shall be cut oversize to accommodate gas vapor barrier membrane and protection course with perpendicular to sloped sides and maximum obtainable compaction. Adjoining grade shall be finish graded and compacted. Excavated walls shall be vertical or sloped back, free of roots and protruding rocks. Specific sub-grade preparation shall be as specified.

3. Wood Timber Shoring

a. Install wood lagging shoring to the lowest level of the gas vapor membrane installation with any voids or cavities exterior of the lagging timbers filled with compacted soil or cementitious grout. Interior surface of lagging boards shall be planar and tight

together with gaps less than 1″. Gaps in excess of 1″ shall be filled with cementitious grout, compacted soil, wood, or extruded polystyrene (40 psi min.). Do not use plywood or other surface treatment over large lagging gaps that leave the cavity void.

4. Cut Rock Face or Auger Cast Caisson Shoring Walls

   a. Interior surface of cut rock and concrete auger pile retention walls shall be planar without irregular surface conditions, voids, and sharp transitions that would leave a void space to the outside of the gas vapor barrier installation. Irregular rock, void pockets, cracks, sharp concave transitions shall be completely filled or smoothed with cementitious grout, shotcrete, or other approved solid material

5. Mechanical or Other Penetrations

   a. Mechanical, structural, or architectural materials that will pass through the plane of the gas vapor membrane shall be properly installed and secured in their final position prior to installation of the Liquid Boot Plus system.

C. Geo-Seal

1. Concrete/Shotcrete/Masonry

   a. Clean and prepare concrete surface to manufacturer’s recommendations. Only apply the Geo-Seal Core material to dry, clean and uniform substrates. Concrete surfaces must be a light trowel, light broom or equivalent finish. Remove fins, ridges and other projections and fill honeycomb, aggregate pockets, grout joints and tie holes, and other voids with hydraulic cement or rapid-set grout. It is the applicator’s responsibility to point out unacceptable substrate conditions to the general contractor and ensure the proper repairs are

made.

b. All penetrations shall be prepared in accordance with manufacturer's specifications.

c. At all horizontal to vertical transitions, or corners 120° and less, apply two coats of Geo-Seal Core Detail (30 mil each) and embed a joint reinforcing polyester in preparation coat and apply a second coat over embedded joint reinforcing strip ensuring its complete saturation and covering.

d. Prepare, treat, grout, and fill joints and cracks in substrate. Remove dust and dirt from joints and cracks complying with ASTM D 4258 prior to coating surfaces.

e. Vertical Cold Joints - Apply two coats of Geo-Seal Core Detail (30-mil wet) membrane, 3-inches on each side of joint and embed a joint reinforcing strip in preparation coat and apply a second coat over embedded joint reinforcing strip ensuring to complete saturation and covering.

2. Soil and Gravel

a. The subgrade shall be moisture conditioned and compacted as specified (refer to Earthwork Section 02200). The surfaces to be lined shall be free of all other rocks, stones, sticks, roots, sharp objects, or construction debris of any kind. No standing water, excessive moisture or frozen ground shall be allowed. Remove all stones or dirt clods greater than ¼-inch. Aggregate sub-bases shall be compacted and rolled flat and free of any protruding sharp edges.

b. All penetrations shall be prepared in accordance with manufacturer's specifications. All form stakes that penetrate the membrane shall be of rebar, which shall be bent over and left in the

slab. Approval shall be required from the Contractor’s Professional Engineer of the subgrade on which the membrane is to be installed prior to commencing work.

c. Trenches shall be cut oversize to accommodate gas vapor barrier membrane and protection course with perpendicular to sloped sides and maximum obtainable compaction. Adjoining grade shall be finish graded and compacted. Excavated walls shall be vertical or sloped back, free of roots and protruding rocks. Specific sub-grade preparation shall be as specified.

d. If organic materials with potential for growth (i.e., seeds or grasses) exist within the subbase, spray apply soil sterilant at the sterilant manufacturer's recommended rate.

3. Wood Timber Shoring

a. Install wood lagging shoring to the lowest level of the gas vapor membrane installation with any voids or cavities exterior of the lagging timbers filled with compacted soil or cementitious grout. Interior surface of lagging boards shall be planar and tight together with gaps less than 1″. Gaps in excess of 1″ shall be filled with cementitious grout, compacted soil, wood, or extruded polystyrene (40 psi min.). Do not use plywood or other surface treatment over large lagging gaps that leave the cavity void.

4. Cut Rock Face or Auger Cast Caisson Shoring Walls

a. Interior surface of cut rock and concrete auger pile retention walls shall be planar without irregular surface conditions, voids, and sharp transitions that would leave a void space to the outside of the gas vapor barrier installation. Irregular rock, void pockets, cracks, sharp concave transitions shall be completely filled or smoothed with

cementitious grout, shotcrete, or other approved solid material

5. Mechanical or Other Penetrations

a. Mechanical, structural, or architectural materials that will pass through the plane of the gas vapor membrane shall be properly installed and secured in their final position prior to installation of the Geo-Seal Vapor Barrier system.

3.03 INSTALLATION

A. Liquid Boot Plus - Follow the procedures below carefully.

1. Installation on Concrete/Shotcrete/Masonry

a. Refer to Article 3.03.A.4, "Sealing Around Penetrations", for procedures to seal around penetrations.

b. Provide a 3/4 inch minimum cant of Liquid Boot, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120° or less. Allow to cure overnight before the application of Liquid Boot.

c. Delineate a test area on site with a minimum dimension of 10 feet by 10 feet (3m by 3m). Apply Liquid Boot to a thickness of 60 mils and let cure for 24 hours. Observe for blisters. If minor or no blistering occurs, proceed to the next step. (See note regarding blisters.) If significant blistering does occur, apply a thin (10 mil) tack coat of Liquid Boot “A” side without catalyst to the entire concrete surface and allow to cure before proceeding. (See also information regarding blister repair.)

d. Spray apply Liquid Boot to a 60 mil minimum dry thickness. Increase thickness to 100 dry mils if shotcrete is to be applied

directly to membrane. If a second coat is required, remove any standing water from the membrane before proceeding with the second application.

e. Non-horizontal surfaces: Spray on non-horizontal surfaces at the bottom and work towards the top.

f. Do not penetrate membrane. Keep membrane free of dirt and debris and traffic until a protective cover is in place. It is the responsibility of the Contractor to ensure that the membrane and the protection system are not penetrated.

g. After membrane has cured and has been checked and approved by the Contractor's Professional Engineer for proper thickness and flaws, install protection material pursuant to manufacturer's instructions.

1. Contractor shall perform all required testing and inspections prior to placing protection course.

h. Due to the nature of concrete as a substrate, it is normal for some blistering to occur. This is caused by either concrete's tendency to off-gas or water that is temporarily trapped between the concrete and the membrane. With time and the applied pressure of backfill, blisters will absorb into the concrete without detriment to the membrane.

i. Sample and check a small number of blister heads for proper membrane thickness. If the samples have the minimum required membrane thickness (60 mils), then the remaining blisters should not be punctured or cut. If the samples have less than the minimum 60 mil required membrane thickness, then the area can either be resprayed to obtain the proper thickness, or the blisters can be cut out and the area resprayed or patched with Liquid Boot Trowel Grade. Do not puncture

or damage the underlying VI-20 membrane while removing blisters. If the VI-20 membrane is punctured or damaged during blister removal the area must be repaired in accordance with manufacturer recommendations.

2. Installation on Soil and Gravel

a. After approval by the Contractor's Professional Engineer, roll out VI-20 geomembrane on sub-grade and overlap seams a minimum of 6 inches. Construct overlap seams in accordance with the Contract Drawings. Lay geomembrane tight at all inside corners and into construction joints as shown in the Contract Drawing details. Apply 20 mil thick Liquid Boot spray within the seam overlap. Line trenches with geomembrane extending at least six inches (6") onto adjoining sub-grade if slab and footings are to be sprayed separately.

b. Minimize the use of nails to secure the VI-20 geomembrane to the subgrade. Remove all nails before spraying membrane, if possible. Nails that cannot be removed from the subgrade are to be patched with Hardcast reinforcing tape overlapping the nail head by a minimum of two inches (2"). Apply a 20 mil coat of Liquid Boot under the VI-20 geomembrane patch, when patching with geomembrane.

c. Refer to Article 3.03.A.4 "Sealing Around Penetrations", for procedures to seal around penetrations.

d. Spray apply Liquid Boot onto VI-20 geomembrane to a 60 mil minimum dry thickness. Increase thickness to 100 dry mils if shotcrete is to be applied directly to membrane. If a second coat is required, remove any standing water from the membrane before proceeding with the second application.

e. Do not penetrate membrane. Keep membrane free of dirt, debris and traffic until a protective cover is in place. It is the responsibility of the Contractor to insure that the membrane and the protection system are not penetrated.

f. After membrane has cured and has been checked and approved by the Contractor's Professional Engineer for proper thickness and flaws, install protection material (Liquid Boot Ultrashield G-1000) pursuant to manufacturer's instructions.

g. All testing or inspection to be performed prior to placing protection course.

3. Blind Side Installation (If Necessary)

a. Attach subsurface drain mat or, securely nail VI-20 geomembrane over lagging and soldier piles keeping VI-20 geomembrane tight to lagging wall. Overlap seams a minimum of six inches (6").

b. Roll out specified VI-20 geomembrane vertically and staple to lagging using 3/8" long staples 12" on center. Overlap seams a minimum of six inches (6"). Spray Liquid Boot within the seam overlap to a thickness of 60 mils minimum. Do not staple top layer of VI-20 geomembrane at overlap.

c. Refer to Article 3.03.A.4 "Sealing Around Penetrations", for procedures to seal around penetrations.

d. Provide a 3/4 inch minimum cant of Liquid Boot, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120° or less. Allow to cure overnight before the application of Liquid Boot membrane.

e. Spray apply Liquid Boot to a minimum thickness of 60 mils (100 mils if installing

shotcrete walls). Remove any standing water.

f. Do not penetrate membrane. Keep membrane free of dirt and debris until concrete is in place. It is the responsibility of the Contractor to ensure that the membrane and the protection system are not penetrated.

4. Sealing Around Penetrations

a. Option 1

1. Clean all penetrations. All metal penetrations shall be sanded clean with emery cloth.

2. For applications requiring VI-20 geomembrane, roll out geomembrane on sub-grade, overlapping seams a minimum of six inches (6"). Cut the geomembrane around penetrations so that it lays flat on the sub-grade. Lay geomembrane tight at all inside corners. Apply a 20 mil tack coat of Liquid Boot within the seam overlap.

3. At the base of penetration install a minimum 3/4-inch thick membrane cant of Liquid Boot, or other suitable material as approved by manufacturer. Extend the membrane at a 60 mil thickness three inches (3") around the base of penetration and up the penetration a height of three inches (3"). Allow to cure overnight before the application of Liquid Boot membrane (Refer to Penetration Details on Contract Drawings).

4. Spray apply Liquid Boot to a 60 mils minimum dry thickness around the penetration, completely encapsulating the collar assembly and to a height of one and one half inches (1 1/2") minimum above the membrane as described in step “3” above. Spray apply Liquid

Boot to surrounding areas as specified for the particular application (Refer to Details on Contract Drawings).

5. Allow Liquid Boot to cure completely before proceeding to step "6".

6. Wrap penetration with polypropylene cable tie at a point two inches (2") above the base of the penetration. Tighten the cable tie firmly so as to squeeze, but not cut, the cured membrane collar.

b. Option 2

1. Clean all penetrations. All metal penetrations shall be sanded clean with emery cloth.

2. For applications requiring VI-20 geomembrane, roll out geomembrane on sub-grade overlapping seams a minimum of six inches (6"). Cut the geomembrane around penetrations so that it lays flat on the sub-grade. Lay geomembrane tight at all inside corners. Apply a thin (20 mil) of Liquid Boot within the seam overlap.

3. Spray apply Liquid Boot to surrounding areas as specified for the particular application to a 60 mil minimum dry thickness. At the base of penetration install a minimum 3/4-inch thick membrane cant of Liquid Boot, or other suitable material as approved by manufacturer. Extend the membrane at 60 mil thickness up the penetration a height of three inches (3"). Allow to cure overnight before proceeding to step “4” (Refer to details on Contract Drawings).

4. Spray apply Liquid Boot at a 60 mil thickness three inches (3") around the base of penetration and up the

penetration, completely encapsulating the collar assembly, to a height of one and one half inches (1 1/2") minimum above the membrane as described in step “3” above. (Refer to details on Contract Drawings).

5. Allow Liquid Boot to cure completely before proceeding to step "6".

6. Wrap penetration with polypropylene cable tie at a point two inches (2") above the base of the penetration. Tighten the cable tie firmly so as to squeeze, but not cut, the cured membrane collar.

B. Geo-Seal - Follow the procedures below carefully.

1. Installation on Concrete, Shotcrete, and Masonry

a. Refer to Article 3.03.B.4, "Sealing Around Penetrations", for procedures to seal around penetrations.

b. At all horizontal to vertical transitions, or corners 120° and less, apply two coats of Geo-Seal Core Detail (30 mil each) and embed a joint reinforcing polyester in preparation coat and apply a second coat over embedded joint reinforcing strip ensuring its complete saturation and covering.

c. Applying the Geo-Seal Core to “green” concrete (i.e. not fully cured) is acceptable and can be advantageous in creating a superior bond to the concrete surface. To help reduce blistering, apply a primer coat of only the asphalt component of the Geo-Seal Core system and allow to set, then apply 60 mils of Geo-Seal Core. Some blistering of the membrane will occur and may be more severe on walls exposed to direct sunlight. Blistering is normal and will subside over time. Using a needle nose depth gauge confirm that the specified mil thickness has been applied, and mark testing

area for repair.

d. Set up spray equipment according to manufacturer’s instructions. Mix and prepare materials according to manufacturer’s instructions. Spray apply Geo-Seal Core to a 60 mil minimum dry thickness. Verify thickness every 100 ft^2 on a vertical concrete surface.

e. Do not penetrate membrane. Keep membrane free of dirt and debris and traffic until a protective cover is in place. It is the responsibility of the Contractor to insure that the membrane and the protection system are not penetrated.

f. After membrane has cured and has been checked and approved by the Contractor’s Professional Engineer for proper thickness and flaws, install Geo-Seal Bond protection material pursuant to manufacturer’s instructions. All testing or inspection to be performed prior to placing protection course.

g. Vertical Surfaces: Spray on vertical surfaces shall begin at the bottom and work towards the top. This method allows the product to adhere to the surface before hitting catalyst runoff.

h. Due to the nature of concrete as a substrate, it is normal for some blistering to occur. This is caused by either concrete's tendency to off-gas or water that is temporarily trapped between the concrete and the membrane. With time and the applied pressure of backfill, blisters will absorb into the concrete without detriment to the membrane.

i. A small number of blister heads should be sampled and checked for proper membrane thickness. If the samples have the minimum required membrane thickness (60 dry mils), then the remaining blisters should not be

punctured or cut. If the samples have less than the minimum 60 dry mil required membrane thickness, then the area can either be resprayed to obtain the proper thickness, or the blisters can be cut out and the area resprayed or patched with Geo-Seal Core Detail.

j. Spray Geo-Seal Core to a 60 mil minimum dry thickness. After inspection, apply Geo-Seal Film-16.

2. Installation on Soil and Gravel

a. After approval, install the Geo-Seal Base layer over substrate material in one direction with six-inch overlaps and the geotextile (fabric side) facing down. Secure the Geo-Seal Base seams by applying 60 mils of Geo-Seal Core between the 6” overlapped sheets and pressing the geotextile down.

b. Visually verify there are no gaps/fish-mouths in seams.

Install an equal amount of Geo-Seal Base and Geo-Seal Core in one day. Leaving unsprayed Geo-Seal Base overnight might allow excess moisture to collect on the Geo-Seal Base. If moisture collects it shall be removed.

c. In windy conditions encapsulate the seam by spraying the Geo-Seal Core layer over the completed Geo-Seal Base seam.

d. Minimize the use of nails to secure the Geo-Seal Base Layer to the subgrade. Remove all nails before spraying membrane, if possible. Nails that cannot be removed from the subgrade are to be patched with Geo-Seal Base layer overlapping the nail head by a minimum of two inches (2"). Apply a thin tack coat of Geo-Seal Core under patch, when patching with Base Layer.

e. Refer to Article 3.03.B.4, "Sealing Around

Penetrations", for procedures to seal around penetrations.

f. Geo-Seal Core Application

1. Set up spray equipment according to manufacturer’s instructions.

2. Mix and prepare materials according to manufacturer’s instructions.

3. Apply one spray coat of Geo-Seal Core to obtain a seamless membrane free from pinholes or shadows, with a minimum dry film thickness of 60 mils (1.52 mm).

4. Apply the Geo-Seal Core layer in a spray pattern that is perpendicular to the application surface.

5. Verify film thickness of gas vapor barrier every 500 ft^2 (46.45 m^2). For information regarding Geo-Seal quality control measures, refer to the Geo-Seal Applicator Training Manual QA/QC developed by the manufacturer.

6. The membrane will generally cure in 24 to 48 hours. As a rule, when temperature decreases or humidity increases, the curing of the membrane will be prolonged. The membrane does not need to be fully cured prior to the placement of the Geo-Seal Bond layer, provided mil thickness has been verified and a smoke test has been completed.

7. Do not penetrate membrane after it has been installed. If membrane is penetrated after the membrane is installed, it is the responsibility of the Contractor to notify the certified installer to make repairs.

8. If applying to a vertical concrete wall, apply Geo-Seal Core directly to concrete surface and use manufacturer’s

recommended protection material based on site specific conditions. If applying Geo-Seal against shoring, contact manufacturer for site specific installation instructions

9. Care should be taken to not trap moisture between the layers of the spray applied membrane. Trapping moisture may occur from applying a second coat prior to the membrane curing. Repairs and detailing may be done over the Geo-Seal Core layer when not fully cured when using Geo-Seal Core Detail

10. After membrane has been checked and approved by the Contractor's Professional Engineer for proper thickness and flaws, install protection material pursuant to manufacturer's instructions

11. All testing and inspection to be performed prior to placing the Geo-Seal Bond.

3. Blind Side Installation (If Necessary)

a. If applying Geo-Seal against shoring (blindside), the Geo-Seal Drain must first be attached to the shoring surface using specialty nails, such as Delta Fasteners coupled with 1″ or ½″ galvanized or stainless steel nails, provided by the manufacturer. The Geo-Seal Core is then applied to a 60 mil minimum dry thickness. Shotcrete may be applied directly to the membrane or concrete may be cast in place. Job specific details are generally developed to address job specific conditions as shoring methods and conditions can vary.

4. Sealing Around Penetrations

a. All pipe penetrations shall be securely in place prior to the installation of the Geo-Seal system. Loose penetrations shall be

secured prior to Geo-Seal application, as loose penetrations could potentially exert pressure on the membrane and damage the membrane after installation.

b. To properly seal around penetrations, cut a piece of the Geo-Seal Base layer that will extend 6″ beyond the outside perimeter of the penetration. Cut a hole in the Geo-Seal Base layer just large enough to slide over the penetration, ensuring the Geo-Seal Base layer fits snug against the penetration, this can be done by cutting an “X” no larger than the inside diameter of the penetration. There shall not be a gap larger than a 1/8″ between the Geo-Seal Base layer and the penetration. Other methods can also be utilized, provided, there is not a gap larger than 1/8″ between the Geo-Seal Base layer and the penetration.

c. Seal the Geo-Seal Base layer using Geo-Seal Core or Geo-Seal Core Detail to the underlying Geo-Seal Base layer.

d. Apply one coat of Geo-Seal Core Detail or Geo-Seal Core spray to the Geo-Seal Base layer and around the penetration at a thickness of 30 mils. Penetrations should be treated in a 6-inch radius around penetration and 3 inches onto penetrating object.

e. Embed a Geo-Seal reinforcing fabric strip after the first application of the Geo-Seal Core spray or Geo-Seal Core Detail material and then apply a second 30 mil coat over the embedded joint reinforcing strip ensuring its complete saturation of the embedded strip and tight seal around the penetration.

f. After the placement of the Geo-Seal Bond layer, a cable tie should then be placed around the finished penetration. The cable tie should be snug, but not overly tight so as to slice into the finished seal.

g. A final application of Geo-Seal Core shall

be used to provide a finishing seal after the Geo-Seal Bond layer has been installed.

h. Use Geo-Seal FILM-16 for vertical applications.

i. Metal or other slick penetration surfaces may require treatment in order to achieve proper adhesion. For plastic pipes, sand paper may be used to achieve a profile, an emery cloth is more appropriate for metal surfaces. An emery cloth should also be used to remove any rust on metal surfaces.

5. PREPARATIONS AND TREATMENT OF TERMINATIONS

a. Prepare the substrate surface in accordance with Article 3.02.B of this section. Concrete surfaces that are not a light trowel, light broom or equivalent finish, shall be repaired to achieve the necessary light trowel, light broom or equivalent finish. A cementitous non-shrink grout or other concrete repair material approved by the manufacturer may be used to achieve specified concrete finish.

b. Terminations on horizontal and vertical surfaces shall extend 6″ onto the termination surface. Job specific conditions may prevent a 6″ termination. In these conditions, contact manufacturer for recommendations.

c. Apply 30 mils of Geo-Seal Core to the terminating surface and then embed the Geo-Seal Base layer by pressing it firmly into the Geo-Seal Core layer. Next, apply 60 mils of Geo-Seal Core to the Base layer. When complete, apply the Geo-Seal Bond layer. After the placement of the Geo-Seal Bond layer is complete, apply a final 30 mil seal of the Geo-Seal Core layer over the edge of the termination. For further clarification, refer to the termination detail provided by manufacturer.

d. The stated termination process is appropriate for terminating the membrane onto exterior footings, pile caps, interior footings and grade beams. When terminating the membrane to stem walls or vertical surfaces the same process should be used.

3.04 FIELD QUALITY CONTROL

A. All fluid applied gas vapor barrier systems must be installed by a certified installer as defined in Section 1.04.

B. For Liquid Boot applications, the membrane must be cured at least overnight before inspecting for dry-thickness, holes, shadow shrinkage, and any other membrane damage.

C. When thickness or integrity is in question the membrane should be tested in the proper manner as described below. However, over-sampling defeats the intent of inspections. Inspectors should always use visual and tactile measurement to guide them. Areas suspected of being too thin to the touch should be measured with the gauges to determine the exact thickness.

D. A minimum of one (1) sample per 500 ft^2 of applied material shall be collected and tested, and testing observed by the Contractor’s Professional Engineer.

E. Liquid Boot Plus

1. Concrete/Shotcrete/Masonry and Hard Substrate

a. Membrane shall be checked for proper thickness with a blunt-nose depth gauge, taking one reading every 500 square feet. Record the readings. Mark the test area for repair, if necessary.

b. Test areas are to be patched over with Liquid Boot to a 60 mils minimum dry thickness, extending a minimum of one inch (1") beyond the test perimeter.

2. Soil, Gravel, and Soft Substrate

a. Coupon samples may be cut from the membrane and geomembrane sandwich to a maximum area of 2 square inches. Measure the thickness with a mil-reading caliper, per 500 square feet. Deduct the geomembrane thickness of rolled membranes (20 mils for VI-20 geomembrane) to determine the thickness of Liquid Boot membrane. Mark the test area for repair. Readings shall be recorded on the Coupon Sampling and Smoke Testing Log by Contractor's Professional Engineer.

b. Patch voids left by sampling with Liquid Boot VI-20 geomembrane underlay beneath the existing membrane with HDPE side up and a minimum of 2 inches overlap. Apply a thin tack coat of Liquid Boot under the geomembrane patch. Then spray or trowel-apply Liquid Boot to a 60 mils minimum dry thickness, extending at least three inches (3") beyond geotextile patch.

3. Smoke Testing for Holes - All Gas Vapor Barriers shall be Smoke Tested in accordance with the following protocol:

a. The gas vapor membrane shall be visually inspected. Any apparent deficiencies and/or installation problems shall be corrected prior to Smoke Testing.

b. Smoke Testing of the Liquid Boot membrane shall be conducted by Approved Liquid Boot Installer and observed by the Contractor's Professional Engineer and by a representative of the CID.

c. The date, time, testing reference area, temperature, wind speed/direction, and cloud cover shall be recorded on the Smoke Testing Record. The ambient air temperature at the time of testing should be in excess of 45° F and the wind speed at ground level should be 15 mph or less. (Note: visual identification of leaks becomes more difficult with increasing wind speed.)

d. Delineate a smoke testing area of 2,000 to 5,000 square feet (maximum). Assemble and situate smoke testing system to inject smoke beneath membrane. Only inert, non-toxic smoke is to be utilized for membrane Smoke Test.

e. Designate testing control areas by cutting openings in an “X” pattern (min. 4” X 4”) in the membrane at selected locations. Mark testing control areas for identification prior to conducting the smoke test.

f. Activate smoke generator / blower system (nominal 150 – 950 cfm). Apply sufficient pressure as to ensure that smoke will permeate the designated testing area. For verification, ensure that smoke is leaking through testing control areas.

g. Pump smoke beneath the membrane (minimum 1 to 2 minutes). Observe for leaks in the membrane. Reduce pressure / flow rate if excessive lifting of the membrane occurs.

h. Thoroughly inspect entire membrane surface within area delineated for testing. Use marking device as approved by manufacturer to mark/label any leak locations. Mark/label leak locations on floor plan and corresponding testing reference area.

i. Repair leak locations marked in step h by spraying Liquid Boot or using trowel grade Liquid Boot.

j. Repeat steps g through i, as necessary to confirm integrity of the membrane.

k. Readings shall be recorded on the Coupon Sampling and Smoke Testing Log by the Contractor’s Professional Engineer. Once the membrane has passed the smoke test inspection, the successful completion shall be documented. Such documentation shall be signed and sealed by the Contractor’s Professional Engineer and shall be submitted

to the Authority. Approval by the Authority's CID shall also be required.

F. Geo-Seal

1. To expedite construction, the membrane may be inspected for thickness and smoke tested before the Core is fully cured.

2. Concrete/Shotcrete/Masonry and Hard Substrates

   a. Membrane shall be checked for proper thickness with a needle-nose depth gauge, taking one reading every 500 square feet. Record the readings. Mark the test area for repair.

   b. Test areas are to be patched over with Geo-Seal Core to a 60 mils minimum dry thickness, extending a minimum of two inches (2") beyond the test perimeter.

3. Soil, Gravel and Soft Substrates

   a. Coupon samples shall be cut from the membrane and geotextile sandwich to a maximum area of 3 square inches. Measure the thickness with a mil-reading caliper, minimum once per every 500 square feet. Deduct the Geo-Seal Base layer to determine the thickness of Geo-Seal Core layer. Mark the test area for repair. Readings shall be recorded on the Coupon Sampling and Smoke Testing Log by Contractor's Professional Engineer.

   b. Voids left by sampling are to be repaired by applying a Geo-Seal Core tack coat 9" around the void. Cut a square piece of Geo-Seal Base that extends 6" beyond the void and place Geo-Seal Base (fabric side down) into the tack coat of Geo-Seal Core by pressing firmly. Apply a minimum 60 mil dry thickness Geo-Seal Core layer to the Geo-Seal Base, thus encapsulating the Geo-Seal Base layer.

c. Thickness readings may be taken while the membrane is still wet and before fully cured. To obtain a proper wet mil thickness reading, take into account the up to 10 percent shrinkage that will occur as the membrane fully cures. Not taking into account the thickness of the sheet layers, a freshly sprayed membrane should have a minimum wet thickness of 66 (10%) mils.

d. Methods on how to properly conduct Geo-Seal Core thickness sampling can be obtained by reviewing literature prepared by Land Science Technologies.

4. Smoke Testing for Holes - All Gas Vapor Barriers shall be Smoke Tested in accordance with the following protocols:

a. Smoke testing should occur after the Geo-Seal Core layer has been installed and mil thickness verified. Smoke testing may occur after the Geo-Seal Bond layer is installed, if approved by the Authority.

b. Smoke Testing of the membrane to be observed by the Contractor’s Professional Engineer and by a representative of the CID.

c. One smoke test can cover between 2,000 and 5,000 square feet per test. However, coverage will greatly depend on the permeability of the subgrade under the membrane. Use the first couple of smoke tests to help determine how much area each smoke test will cover.

d. Visual verification of soundness of seams, terminations and penetrations should be performed. Identify/correct any apparent deficiencies and/or installation problems.

e. Note time, date, project name, inspector name, temperature and weather conditions on testing log. In addition, record humidity, barometric pressure, and wind speed/direction. Confirm wind speed is

below 15 mph. Visual identification of leaks becomes more difficult with increasing wind speed.

f. Assemble/connect smoke testing system directly to the membrane using a temporary boot collar or other method. Insert the smoke test hose into coupon sampling locations, creating a seal around the smoke test hose with a rag.

g. Activate the smoke generator/blower system and connect directly to the membrane.

h. To confirm the adequate flow of smoke under the membrane cut a 2″ vent in the membrane to facilitate the purging of air pockets under it. If working properly, smoke will consistently flow though the 2″ vent. If a low rate of smoke flow is observed it is an indication of poor smoke flow under the membrane. If low flow does occur, insert the smoke testing hose into the 2″ membrane vent.

i. Mark sampling locations with fluorescent paint or chalk for repair.

j. Maintain operation of smoke generator/blower system for at least 15 minutes following purging of membrane. Thoroughly inspect entire membrane surface. Use fluorescent paint or chalk to mark/label any leak locations. Mark/label leak locations on testing log. NOTE: The duration of the smoke test will vary depending on the size of the area being tested. To help determine the duration, monitor the pressure building up under the membrane. If excessive lifting of the membrane occurs, decrease the duration or pressure of the smoke test.

k. Prepare coupon sampling and smoke testing log. Identify the type of leak found, i.e. poor seal around penetration, fish-mouth, puncture, etc.

l. Repair leak locations marked in steps i and j.

m. Repeat steps d through l as necessary to confirm the integrity of the membrane.

n. Complete the coupon sampling and smoke testing log indicating the successful completion of the smoke test.

o. Readings shall be recorded on the Coupon Sampling and Smoke Testing Log by the Contractor’s Professional Engineer. Once the membrane has passed the smoke test inspection, the successful completion shall be documented. Such documentation shall be signed and sealed by the Contractor’s Professional Engineer and shall be submitted to the Authority. Approval by the Authority’s CID shall also be required.

4. Post Installation Inspection

g. After Contractor’s Professional Engineer completes the required inspections, and workers begin to install the reinforcing steel, subsequent visual inspections shall be conducted on a regular basis, based on the pace of the installation work., with a final visual inspection occurring immediately prior to the pouring of concrete. Damages are most likely to occur during this time and it is imperative that punctures are identified prior to the placement of the slab.

3.05 PROTECTION

A. Liquid Boot Plus

1. The gas vapor barrier shall be protected in accordance with manufacturer's recommendations to prevent disturbance, damage or deterioration by work of other trades or environmental conditions. Protect gas vapor barrier from damage during installation of reinforcing steel and utilities and during placement of concrete slab or granular

materials. Sharp angular backfill materials shall not be placed immediately against the vapor barrier.

2. Contractor’s Professional Engineer shall visually inspect the condition of the gas vapor barrier immediately prior to and during placement of the overlying protective layer (Liquid Boot Ultrashield G-1000, or Geo-Seal Bond, and/or Film-16 for Geo-Seal Vapor Barrier) or below-grade wall backfill. All damage to the installed gas vapor barrier shall be repaired and retested in accordance with the procedures specified herein, at the Contractor's expense prior to placement of concrete or backfill.

3. Ensure there is no moisture entrapment by vapor barrier due to rainfall or ground water intrusion. If moisture entrapment is present Contractor shall implement procedures for removal of moisture and to prevent re-occurrence. Contractor’s Professional Engineer’s approval of drying procedures shall be required prior to implementation.

3.06 WARRANTY

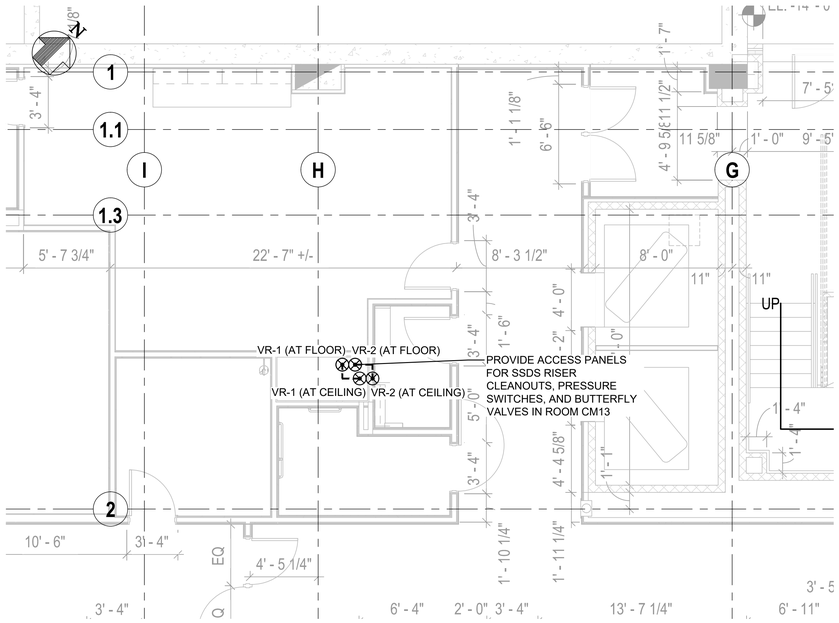
A. The manufacturer and installer shall provide separate written warranties to the Authority as specified in Article 1.08 of this section.

3.07 LIST OF SUBMITTALS

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
Submittal Schedule		
Inspection Schedule		
Product Data:		
Installation Instructions		
Shop Drawings		
PE Certification		
Samples:		
Liquid Boot Plus		
1. Gas Vapor Barrier Membrane Material		
2. Protection Materials		
3. VI-20 Geomembrane		
Geo-Seal		
1. Vapor Intrusion Barrier System Sample		
2. Geo-Seal Base Layer		
3. Geo-Seal Bond Layer		
4. Geo-Seal FILM-16		
Material Test Reports		
Certification of Compliance		
Resume of Contractor’s Professional Engineer		
Professional Engineer’s Report on Inspection and Approval of Work		
Warranties:		
Manufacturer’s Warranty		
Installer’s Warranty		

END OF SECTION

* * *

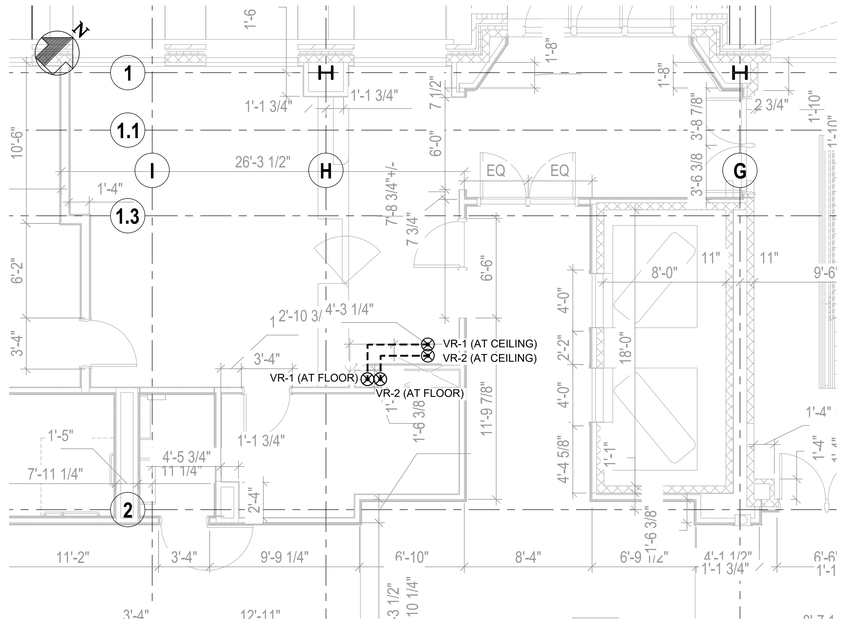


CELLAR RISER PENETRATION POINTS AND MONITORING POINTS - A100 (1 / H202)

SCALE: 1:4

0 4 8

SCALE IN FEET

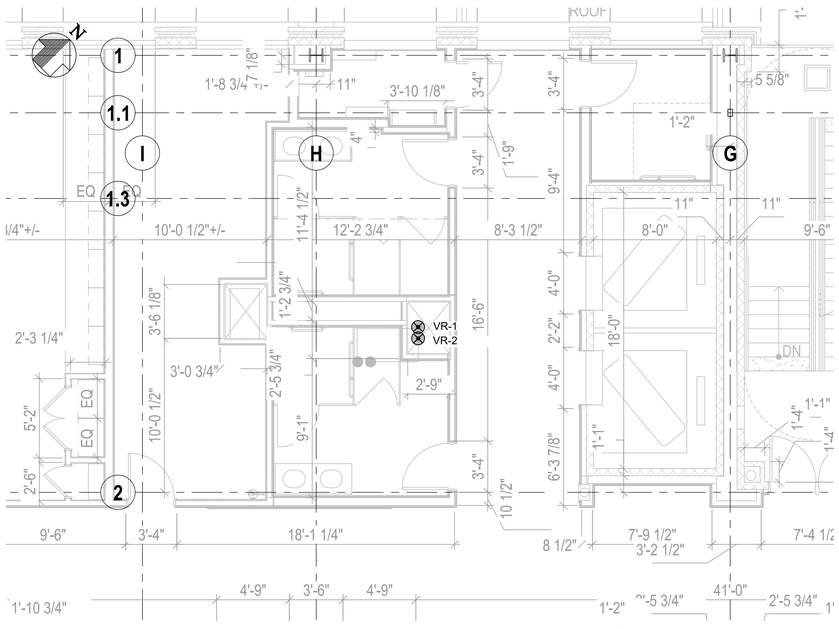


FIRST FLOOR RISER PENETRATION POINTS - A101 (2 / H202)

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SCALE IN FEET

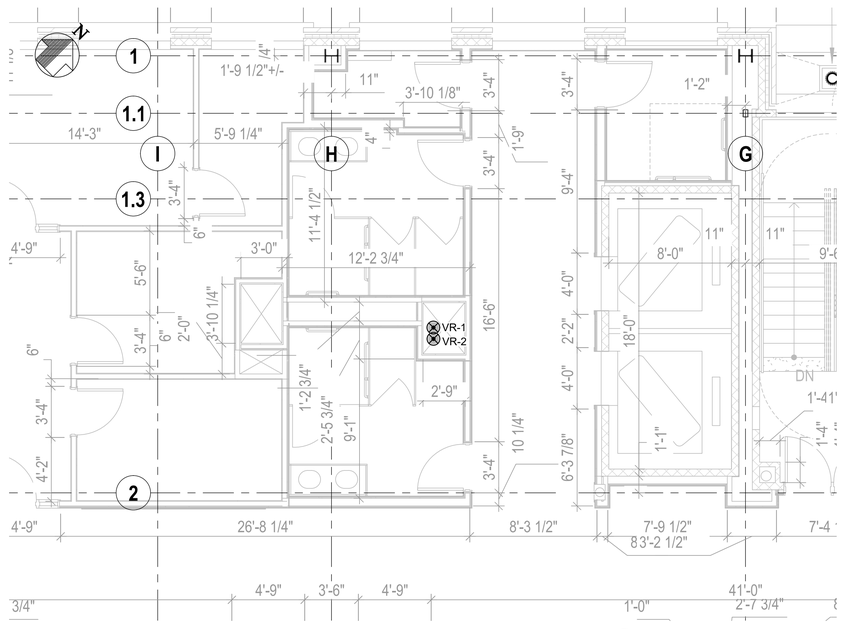


SECOND FLOOR RISER PENETRATION POINTS - A102 (3 / H202)

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0 4 8

SCALE IN FEET



THIRD FLOOR RISER PENETRATION POINTS - A103 (4 / H202)

SCALE: 1:4

0 4 8

SCALE IN FEET

LEGEND (SYMBOLS NOT TO SCALE):

- 6" Ø GALVANIZED STEEL PIPING
- VR-X — VERTICAL RISER AND IDENTIFICATION NUMBER
- MP-X — SUB-SLAB MONITORING POINT AND IDENTIFICATION NUMBER (REFER TO DETAIL 4 ON DWG. NO. H204)

NOTES:

1. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM.
2. COORDINATE ALL WORK FOR SSDS SYSTEM AND ROOF PENETRATIONS WITH OTHER TRADES PRIOR TO INSTALLATION.
3. COMPLY WITH PIPE SUPPORT SPECIFICATIONS AND DRAWINGS.
4. SSDS VERTICAL RISERS SHALL NOT BE INSTALLED IN SHAFTS WITH DUCTS THAT CONTAIN ENVIRONMENTAL AIR.
5. SLOPE HORIZONTAL PIPE A MINIMUM OF 1% UNIFORMLY TOWARDS SUB-SLAB DEPRESSURIZATION SYSTEM PITS OR TO CONDENSATE DRAINS. ABOVESLAB PIPING SHALL NOT BE TRAPPED AND CONDENSATE DRAINS SHALL NOT BE INSTALLED IN ABOVE SLAB PIPING.
6. ALL PENETRATIONS THROUGH FLOORS AND WALLS SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE DETAILS AND SPECIFICATIONS
7. LABEL ALL SSDS RISER PIPE IN ACCORDANCE WITH SPECIFICATION SECTIONS 15431 AND 02221.

CODE COMPLIANCE NOTES:

1. THE SUB-SLAB DEPRESSURIZATION SYSTEM COMPLIES WITH THE REQUIREMENTS OF THE 2014 NYC MECHANICAL CODE SECTION 512, "SUB-SLAB SOIL EXHAUST SYSTEMS".
2. THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT A "HAZARDOUS EXHAUST SYSTEM", AS DEFINED IN THE 2014 NYC MECHANICAL CODE SECTION 510.
3. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 601.4, "CONTAMINATION PREVENTION", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
4. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 607.5.5.2, "LIMITATIONS", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
5. THE INTENT OF THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT TO VENT METHANE OR RADON.

MONITORING POINT ID	LOCATION
MP-1	C04 - WATER
MP-2	C13A - WC
MP-3	C01 - STUD DINING
MP-4	C14H - F-LOCKER

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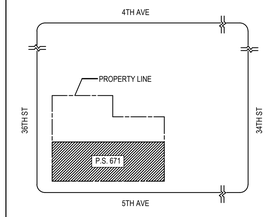
CONTRACT DOCUMENTS

NOTE: Drawing may be printed at reduced scale

IT IS A VIOLATION OF THE STATE EDUCATION LAW SECTION 7209 (2) FOR ANY PERSON TO ALTER AN ITEM IN ANY WAY UNLESS SUCH PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, AND THE ENGINEER STAMPS SUCH CHANGES

No.	Date	Description
-	09/14/2018	ISSUED FOR BID

Key Plan:



Block #693 Lot # 39

SCA Design Manager:	SELIM OZALP, R.A.
Project Architect/Engineer:	GABRIEL MASSA, R.A.
Discipline Lead:	KEVIN BOGER, P.E. (TRC)
Designer:	PHILLIP CASTELLANO, P.E. (TRC)
Drawn by:	HENRY DELGADO (TRC)
Checked by:	KEVIN BOGER, P.E. (TRC)

LLW No.:	Facility Code:	Date:
106889	K671	09/14/2018

Project:
P.S. 671, BROOKLYN
NEW BUILDING

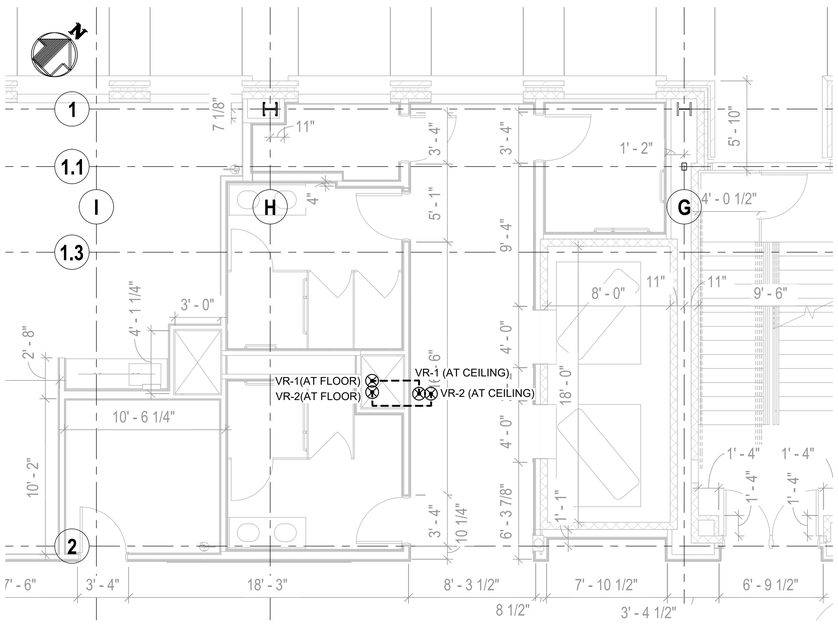
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840 5TH AVE
BROOKLYN, NY 11232

Drawing Title:
SUB-SLAB DEPRESSURIZATION SYSTEM RISER PLAN I

Drawing No.:
H202.00

Sheets in Contract Set: 54 of 420

Sheets in DOB Set: 46 of 333

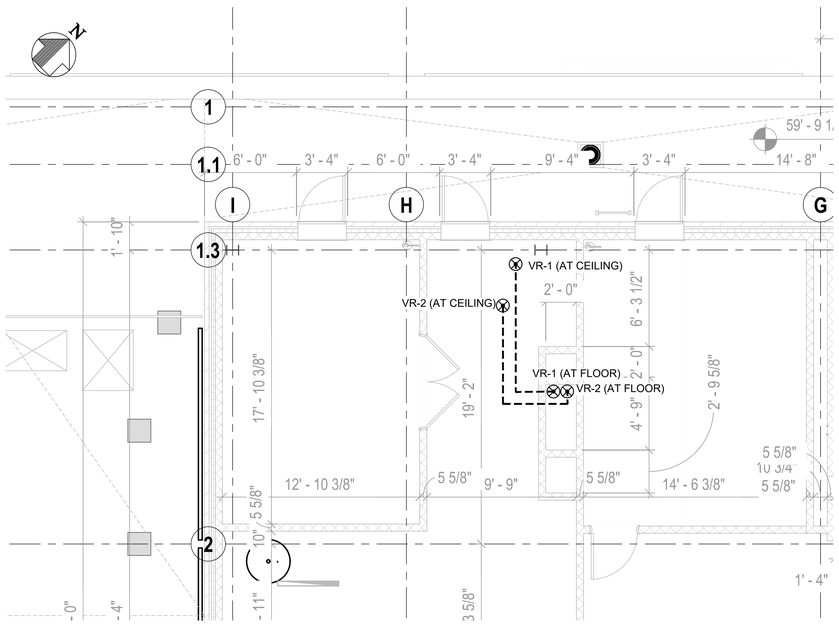


FOURTH FLOOR RISER PENETRATION POINTS - A104 (1 / H203)

SCALE: 1:4

0 4 8

SCALE IN FEET



ROOF RISER PENETRATION POINTS - A105 (2 / H203)

SCALE: 1:4

0 4 8

SCALE IN FEET

LEGEND (SYMBOLS NOT TO SCALE):

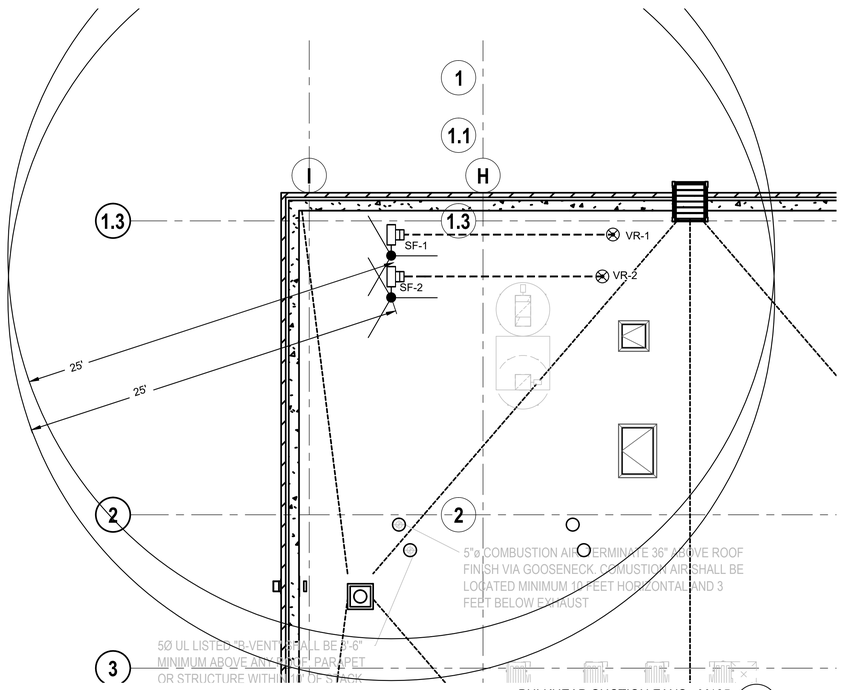
- 6"Ø GALVANIZED STEEL PIPE (INSTRUMENTATION NOT SHOWN)
- VR-X — VERTICAL RISER AND IDENTIFICATION NUMBER
- SF-X — SUB-SLAB DEPRESSURIZATION FAN AND IDENTIFICATION NUMBER (REFER TO DETAIL 8 ON DWG. NO. H203)

NOTES:

1. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM.
2. SUCTION FAN EXHAUST MUST BE A MINIMUM OF 25 FEET FROM ANY HVAC AIR INTAKES AND OPERABLE WINDOWS, 10 FEET FROM ANY COMBUSTION AIR INTAKES, AND A MINIMUM OF 6 FEET ABOVE THE BUILDING ROOF OR 6 INCHES ABOVE THE BUILDING BULKHEAD ROOF.
3. COORDINATE ALL WORK FOR SSDS SYSTEM AND ROOF PENETRATIONS WITH OTHER TRADES PRIOR TO INSTALLATION.
4. COMPLY WITH PIPE SUPPORT SPECIFICATIONS AND DRAWINGS.
5. SSDS VERTICAL RISERS SHALL NOT BE INSTALLED IN SHAFTS WITH DUCTS THAT CONTAIN ENVIRONMENTAL AIR.
6. SLOPE HORIZONTAL PIPE A MINIMUM OF 1% UNIFORMLY TOWARDS SUB-SLAB DEPRESSURIZATION SYSTEM PITS OR TO CONDENSATE DRAINS. ABOVESLAB PIPING SHALL NOT BE TRAPPED AND CONDENSATE DRAINS SHALL NOT BE INSTALLED IN ABOVE SLAB PIPING.
7. ALL PENETRATIONS THROUGH FLOORS AND WALLS SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE DETAILS AND SPECIFICATIONS
8. LABEL ALL SSDS RISER PIPE IN ACCORDANCE WITH SPECIFICATION SECTIONS 15431 AND 02221.
9. SUCTION FAN, SUCTION FAN SUPPORTS AND SSDS VERTICAL RISERS MUST BE LOCATED A MINIMUM OF 18" FROM THE STAIRWAY BULKHEAD AT ROOF.
10. SUCTION FAN VFDS MUST BE LOCATED IN ACCESSIBLE AREA OF ROOFTOP MECHANICAL ROOM. LOCAL DISCONNECT SWITCHES MUST BE LOCATED AT BULKHEAD ROOF NEAR SUCTION FANS.

CODE COMPLIANCE NOTES:

1. THE SUB-SLAB DEPRESSURIZATION SYSTEM COMPLIES WITH THE REQUIREMENTS OF THE 2014 NYC MECHANICAL CODE SECTION 512, "SUB-SLAB SOIL EXHAUST SYSTEMS".
2. THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT A "HAZARDOUS EXHAUST SYSTEM", AS DEFINED IN THE 2014NYC MECHANICAL CODE SECTION 510.
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4. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 607.5.5.2, "LIMITATIONS", OF THE 2014 NYC MECHANICAL CODE DOES NOT APPLY TO SUB-SLAB DEPRESSURIZATION SYSTEMS.
5. THE INTENT OF THE SUB-SLAB DEPRESSURIZATION SYSTEM IS NOT TO VENT METHANE OR RADON.



BULKHEAD SUCTION FANS - M105 (2A / H203)

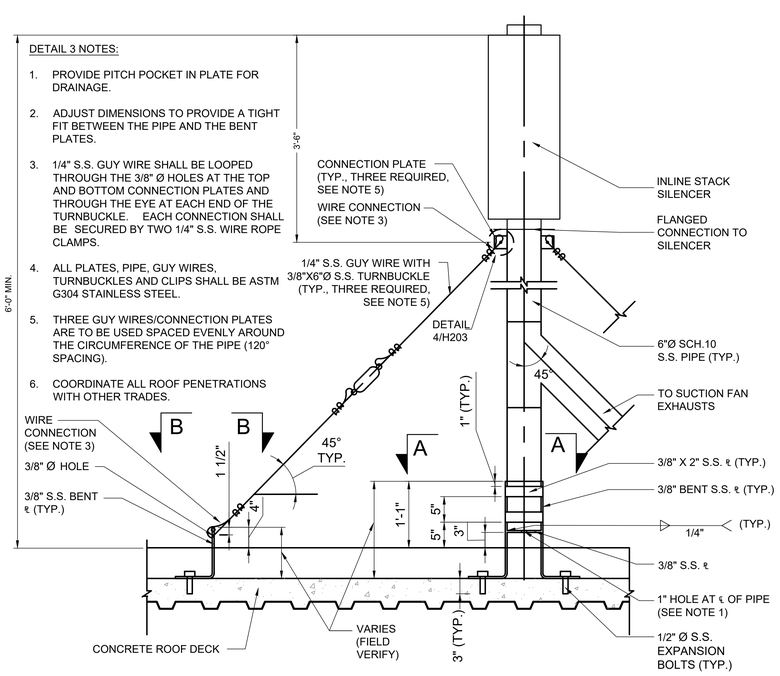
SCALE: 1:4

0 4 8

SCALE IN FEET

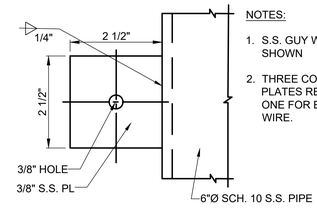
DETAIL 3 NOTES:

1. PROVIDE PITCH POCKET IN PLATE FOR DRAINAGE.
2. ADJUST DIMENSIONS TO PROVIDE A TIGHT FIT BETWEEN THE PIPE AND THE BENT PLATES.
3. 1/4" S.S. GUY WIRE SHALL BE LOOPED THROUGH THE 3/8" Ø HOLES AT THE TOP AND BOTTOM CONNECTION PLATES AND THROUGH THE EYE AT EACH END OF THE TURNBUCKLE. EACH CONNECTION SHALL BE SECURED BY TWO 1/4" S.S. WIRE ROPE CLAMPS.
4. ALL PLATES, PIPE, GUY WIRES, TURNBUCKLES AND CLIPS SHALL BE ASTM G304 STAINLESS STEEL.
5. THREE GUY WIRES/CONNECTION PLATES ARE TO BE USED SPACED EVENLY AROUND THE CIRCUMFERENCE OF THE PIPE (120° SPACING).
6. COORDINATE ALL ROOF PENETRATIONS WITH OTHER TRADES.



TYPICAL EXHAUST STACK MOUNTING DETAIL (3 / H203)

NTS

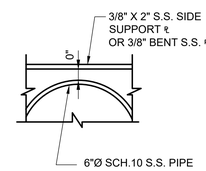


NOTES:

1. S.S. GUY WIRE NOT SHOWN
2. THREE CONNECTION PLATES REQUIRED, ONE FOR EACH GUY WIRE.

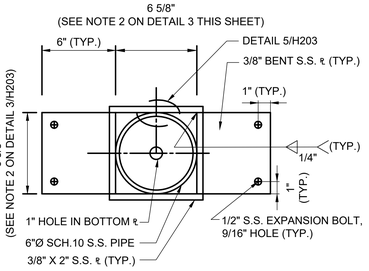
GUY WIRE CONNECTION POINT (4 / H203)

NTS



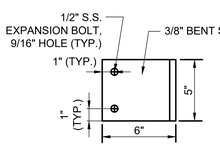
STACK SUPPORT (5 / H203)

NTS



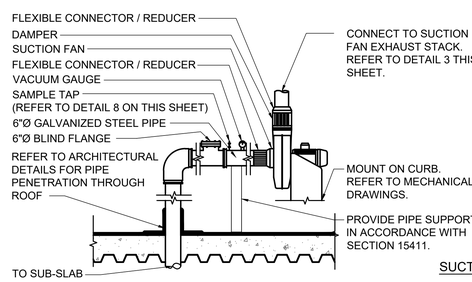
SECTION A-A (6 / H203)

NTS



SECTION B-B (7 / H203)

NTS

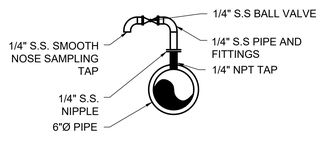


DETAIL 8 NOTES:

1. NOT ALL REQUIRED ACCESSORIES ARE SHOWN. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. ELECTRICAL WIRING AND EQUIPMENT NOT SHOWN. REFER TO ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR REQUIREMENTS.
3. PIPE AND EQUIPMENT ARRANGEMENT SHOWN FOR SCHEMATIC PURPOSES ONLY. SUBMIT TO SCALE DRAWING SHOWING PROPOSED ARRANGEMENT. CONTRACTOR IS REQUIRED TO OBTAIN APPROVAL OF ARRANGEMENT.

SUCTION FAN DETAIL (8 / H203)

NTS



SAMPLE TAP ASSEMBLY (9 / H203)

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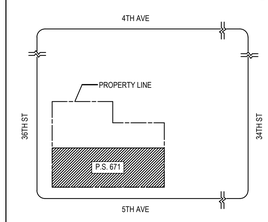
CONTRACT DOCUMENTS

NOTE: Drawing may be printed at reduced scale

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No.	Date	Description
-	09/14/2018	ISSUED FOR BID

Key Plan:



Block #693 Lot # 39

SCA Design Manager:	SELIM OZALP, R.A.
Project Architect/Engineer:	GABRIEL MASSA, R.A.
Discipline Lead:	KEVIN BOGER. P.E. (TRC)
Designer:	PHILLIP CASTELLANO, P.E. (TRC)
Drawn by:	HENRY DELGADO (TRC)
Checked by:	KEVIN BOGER, P.E. (TRC)

LLW No.:	Facility Code:	Date:
106889	K671	09/14/2018

Project:
P.S. 671, BROOKLYN
NEW BUILDING

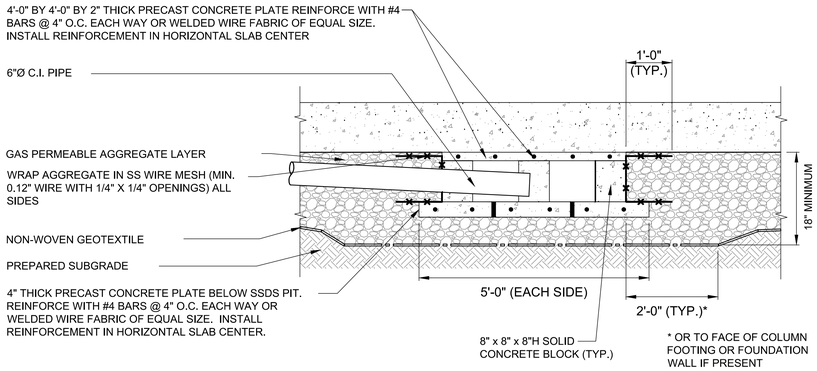
Address:
840 5TH AVE
BROOKLYN, NY 11232

Drawing Title:
SUB-SLAB DEPRESSURIZATION SYSTEM RISER PLAN II AND ROOF PLAN

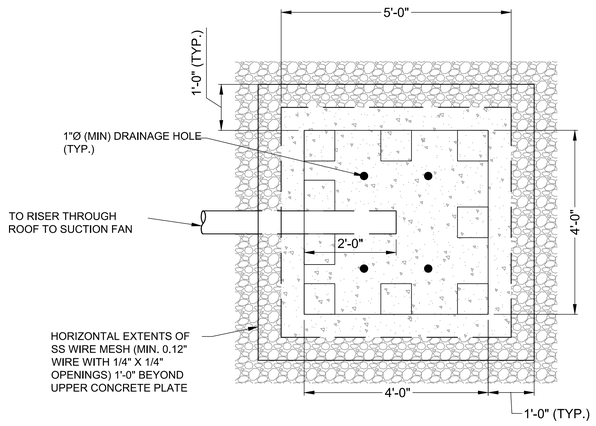
Drawing No.:
H203.00

Sheets in Contract Set: 55 of 420

Sheets in DOB Set: 47 of 333

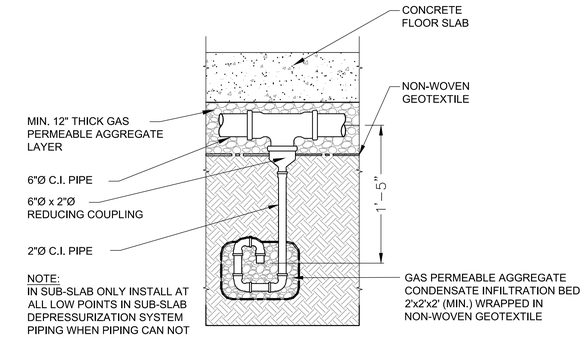


PROFILE VIEW

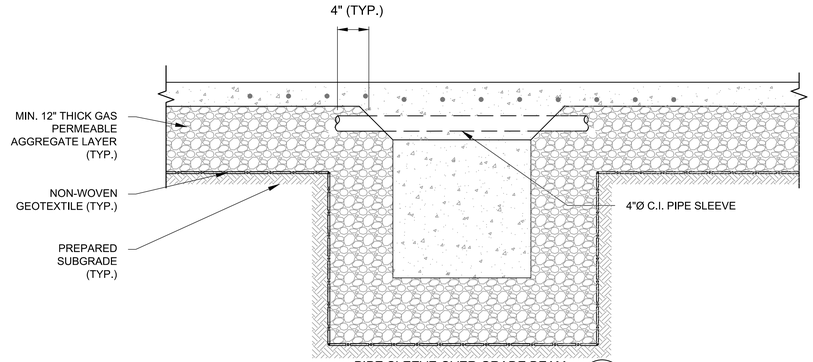


PLAN VIEW

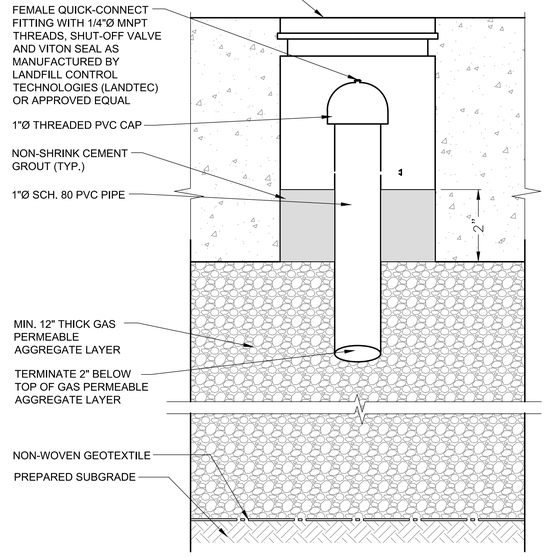
SUB-SLAB DEPRESSURIZATION PIT — 1/H204
NTS



LOW POINT CONDENSATE DRAIN DETAIL — 2/H204
NTS



PIPE SLEEVE OVER GRADE BEAM AND GPA ENVELOPING GRADE BEAM — 3/H204
NTS



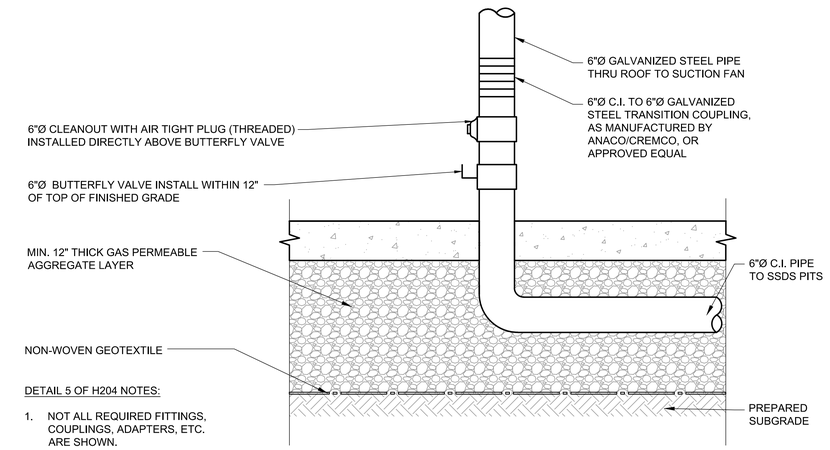
NOTES:

1. ANY DEVIATION FROM THIS INSTALLATION MUST BE SUBMITTED TO THE AUTHORITY FOR APPROVAL.
2. NOT ALL REQUIRED ACCESSORIES ARE SHOWN. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

SUB-SLAB MONITORING POINT DETAIL — 4/H204
NTS

GENERAL NOTES:

1. SLOPE HORIZONTAL PIPE A MINIMUM OF 1% UNIFORMLY TOWARDS SUB-SLAB DEPRESSURIZATION SYSTEM PITS OR TO CONDENSATE DRAINS. ABOVEGROUND PIPING SHALL NOT BE TRAPPED AND CONDENSATE DRAINS SHALL NOT BE INSTALLED IN ABOVE SLAB PIPING.
2. GAS VAPOR BARRIER NOT SHOWN. REFER TO H206.00 FOR TYPICAL GAS VAPOR BARRIER DETAILS.

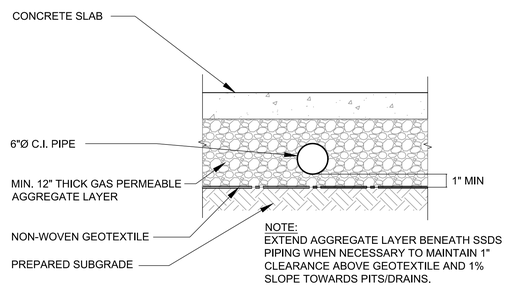


DETAIL 5 OF H204 NOTES:

1. NOT ALL REQUIRED FITTINGS, COUPLINGS, ADAPTERS, ETC. ARE SHOWN.
2. FURNISH ESCUTCHEONS AS SPECIFIED.
3. PROVIDE ACCESS PANEL FOR PRESSURE SWITCHES, BUTTERFLY VALVES, AND CLEANOUTS AS SPECIFIED IN SECTION 02221.

NOTE:
COAT ANY PIPING IN DIRECT CONTACT TO CONCRETE IN ACCORDANCE WITH PLUMBING CODES

SSDS RISER DETAIL AT FLOOR SLAB (SCHEMATIC) — 5/H204
NTS



SSDS PIPING WITHIN GAS PERMEABLE AGGREGATE — 6/H204
NTS

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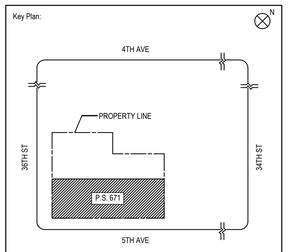
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106889	K671	09/14/2018

Project:
P.S. 671, BROOKLYN
NEW BUILDING

Address:
840 5TH AVE
BROOKLYN, NY 11232

Drawing Title:
SUB-SLAB DEPRESSURIZATION SYSTEM DETAILS

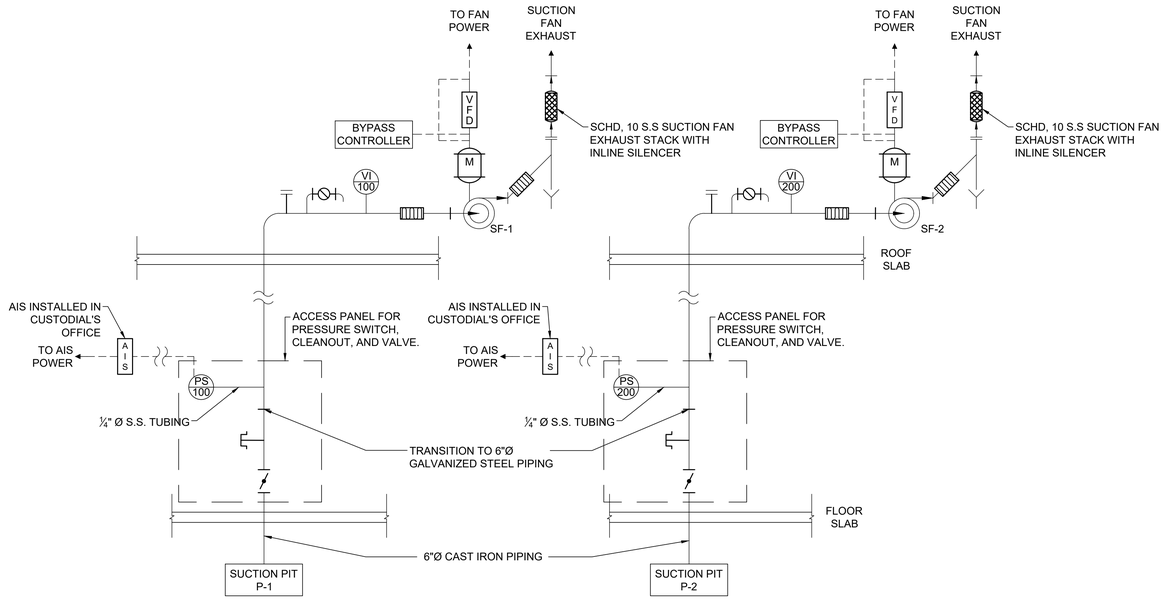
Drawing No.:
H204.00

Sheets in Contract Set:
56 of 420

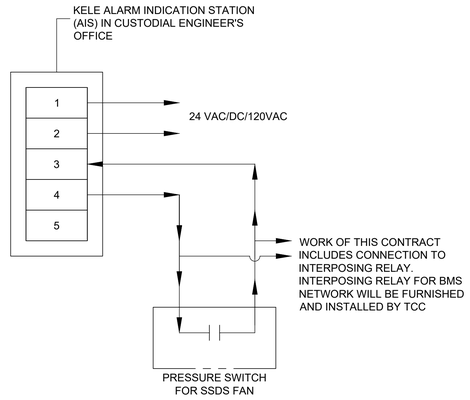
Sheets in DOB Set:
48 of 333

LEGEND (SYMBOLS NOT TO SCALE):

- ALARM INDICATION STATION (AIS)
- BALL VALVE
- BLIND FLANGE
- BUTTERFLY VALVE
- CENTRIFUGAL BLOWER
- DRAIN
- ELECTRICAL
- ELECTRIC MOTOR (M)
- FLANGED OR UNION CONNECTOR
- FLEXIBLE CONNECTOR
- PIPING
- PRESSURE SWITCH (PS #)
- SILENCER
- THREADED CLEANOUT
- VACUUM INDICATOR (VI #)
- VARIABLE FREQUENCY DRIVE (VFD)



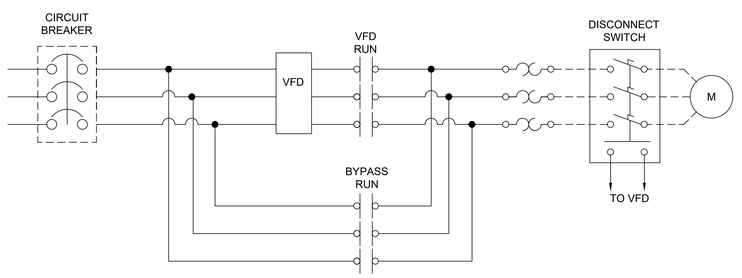
PIPING AND INSTRUMENTATION DIAGRAM FOR SSDS — 1 / H205
NTS



TYPICAL INTERCONNECTION SCHEMATIC OF PRESSURE SWITCH WITH AIS & BMS NETWORK — 2 / H205
NTS

INSTRUMENT AND EQUIPMENT SCHEDULE							
ITEM	DESCRIPTION	SERVICE	LOCATION	ELECTRICAL REQUIREMENTS	RANGE	MANUFACTURER/MODEL	QUANTITY
VI	VACUUM INDICATOR	SSD SYSTEM	SUCTION FAN	N/A	0-30" WC	WIKA MODEL 612.20, PART 9747724	2
PS	DIFFERENTIAL PRESSURE SWITCH	SSD SYSTEM ALARM	SUCTION FAN	N/A	1.4-5.5" WC	DWYER INSTRUMENTS INC. SERIES 1900, MODEL 1910-5	2
ALARM INDICATION STATION	SSDS MONITORING PANEL	SSD SYSTEM	CUSTODIAL ENGINEER'S OFFICE	1 PHASE, 60HZ, 24/120VAC	N/A	KELE INC. MODEL AIS	2
FS	INLINE EXHAUST STACK FAN SILENCER	SSD SYSTEM	FAN OUTLET	N/A	N/A	UNIVERSAL ACOUSTIC & EMISSIONS TECHNOLOGIES MODEL U5-6 PART 11-106-AA	2
BV	BUTTERFLY VALVE	SSD SYSTEM	RISER AT BASEMENT	N/A	N/A	APOLLO VALVES MODEL LD145	2
VFD	VARIABLE FREQUENCY DRIVE	SSD SYSTEM	ROOFTOP MECHANICAL ROOM	230VAC	N/A	WEG ELECTRIC CORP. EDP 11S 007DN3R10000	2

FAN SCHEDULE							
UNIT NO.	SERVICE	LOCATION	SIZE	MIN. CFM	MIN. VACUUM (INCHES WC)	MOTOR REQUIREMENTS	MANUFACTURER/MODEL
SF-1	SSD SYSTEM	ROOF	2 HP	300	13.0	2-POLE, 3-60-208-, 230/460 VOLT, TEFC	NEW YORK BLOWER COMPANY/COMPACT PB MODEL 140606
SF-2	SSD SYSTEM	ROOF	2 HP	300	13.0	2-POLE, 3-60-208-, 230/460 VOLT, TEFC	NEW YORK BLOWER COMPANY/COMPACT PB MODEL 140606
SPARE	ATTIC STOCK	STORAGE	2 HP	300	13.0	2-POLE, 3-60-208-, 230/460 VOLT, TEFC	NEW YORK BLOWER COMPANY/COMPACT PB MODEL 140606



TYPICAL WIRING SCHEMATIC OF VARIABLE FREQUENCY DRIVE WITH BYPASS — 3 / H205
NTS

GENERAL NOTES:

1. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM.
2. EACH SUCTION FAN EXHAUST MUST BE A MINIMUM OF 25 FEET FROM ANY HVAC AIR INTAKES AND OPERABLE WINDOWS, 10 FEET FROM ANY COMBUSTION AIR INTAKES, AND A MINIMUM OF 6 FEET ABOVE THE BUILDING ROOF OR 6 INCHES ABOVE THE BUILDING BULKHEAD ROOF.
3. COORDINATE ALL WORK FOR SSDS SYSTEM, BMS AND SSDS MONITORING PANEL CONNECTIONS AND ROOF PENETRATIONS WITH OTHER TRADES PRIOR TO INSTALLATION.
4. BMS CONNECTION FROM INTERPOSING RELAY SHALL BE COMPLETED BY THE TCC.

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SCA NYC School Construction Authority

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Stanley Dahir, R.A., Director, Quality Control & Construction Support
Maria A. Gómez, P.E., LEED A.P., Senior Director, A&E In-House Design
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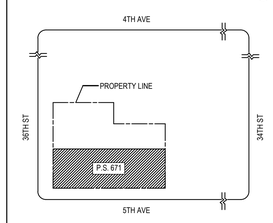
CONTRACT DOCUMENTS

NOTE: Drawing may be printed at reduced scale

IT IS A VIOLATION OF THE STATE EDUCATION LAW SECTION 7209 (2) FOR ANY PERSON TO ALTER AN ITEM IN ANY WAY UNLESS SUCH PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, AND THE ENGINEER STAMPS SUCH CHANGES

No.	Date	Description
-	09/14/2018	ISSUED FOR BID

Key Plan:



Block #693 Lot # 39

SCA Design Manager:	SELIM OZALP, R.A.
Project Architect/Engineer:	GABRIEL MASSA, R.A.
Discipline Lead:	KEVIN BOGER. P.E. (TRC)
Designer:	PHILLIP CASTELLANO, P.E. (TRC)
Drawn by:	HENRY DELGADO (TRC)
Checked by:	KEVIN BOGER, P.E. (TRC)

LLW No.:	Facility Code:	Date:
106889	K671	09/14/2018

Project:
P.S. 671, BROOKLYN
NEW BUILDING

Address:
840 5TH AVE
BROOKLYN, NY 11232

Drawing Title:
SUB-SLAB DEPRESSURIZATION SYSTEM EQUIPMENT AND INSTRUMENTATION DETAILS

Drawing No.:
H205.00

Sheets in Contract Set:
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Sheets in DOB Set:
49 of 333

SECTION 02221
SUB-SLAB DEPRESSURIZATION SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Furnish and install a sub-slab depressurization system (SSDS) as specified, as shown on the Drawings, and as directed by the Authority. The Contractor shall furnish and install an SSDS complete and ready for use. The SSDS shall depressurize the entire gas permeable aggregate-filled space beneath the building floor slabs (as shown on the Drawings), creating a differential pressure: lower pressure in the gas permeable aggregate layer below the floor slabs than in the building interior. The SSDS shall be connected to the SSDS Monitoring Panel and interposing relay in accordance with Specification Sections 15880, 15970 and the Electrical Drawings and Specifications.

B. Furnish and install a geotextile placed directly on the compacted subbase, and a minimum 12-inch thick gas permeable aggregate layer beneath the entire floor slab with two (2) sub-slab depressurization pits. Each sub-slab depressurization pit (“sub-slab pit”) shall connect to a 6-inch diameter vertical riser extending through the building and above the roof. One suction fan shall be installed above the roof at the termination of each vertical riser. (A total of two (2) vertical risers and two (2) suction fans shall be furnished and installed, and one (1) additional spare suction fan shall be delivered to the Authority for attic stock.)

C. The Contractor shall furnish and install as part of the SSDS, four (4) sub-slab monitoring points.

D. Furnish, install, and test all system components as indicated, specified and required in the Contract Documents, as shown on the Drawings and as directed by the Authority.

E. All materials and equipment furnished under this section shall be new, in first-class condition, supplied directly from original equipment manufacturers, and installed in accordance with the manufacturers’ recommendations.

F. Perform and certify results of inspections and tests as specified.

1.02 RELATED SECTIONS

A. Environmental Site Assessment Reports.....Section 02010

B. Site Preparation.....Section 02100

C. Earthwork.....Section 02200

D. Gas Vapor Barrier (Fluid Applied).....Section 02220

E. Tags, Charts and Identification.....Section 15431

F. Sub-Slab Depressurization System Accessories .....Section 15880

G. Temperature Control System (LonWorks BMS/DDC with School Operating Console) ..... Section 15970

H. Mechanical.....Division 15

I. Electrical.....Division 16

1.03 STANDARDS AND REGULATIONS

A. Comply with applicable portions of the Building Code of the City of New York. Where requirements for products, materials, equipment, methods and other portions of the work specified herein exceed minimum requirements of New York City Building Code, Contractor shall comply with such requirements specified herein, unless specifically approved otherwise by the Authority.

B. Standards issued by the organizations listed below may be referenced in this section.

1. American Society for Testing and Materials (ASTM)

2. American Standards Association (ASA)

3. American National Standards Institute (ANSI)

1.04 RESTRICTIONS AND QUALITY CONTROL

A. Pre-installation Meeting: The Contractor shall arrange for and convene a pre-installation meeting prior to the start of work of this section to review installation procedures, protection, and coordination with other work. Attendance of parties directly affecting work of this section, including representatives of the Construction

Inspection Division (CID), Industrial and Environmental Hygiene Division (IEH), designer of the SSDS, Contractor, Contractor's Professional Engineer, and Contractor's installer shall be required. The Contractor shall schedule the pre-installation meeting at a time and at a location that is agreeable to the Architect/Engineer, CID and IEH Division. The meeting shall be held on a date which is a minimum of ten (10) business days prior to start of the work of this section.

B. Inspection: Contractor shall provide a New York licensed Professional Engineer with experience and qualifications to approve the work, independent of the installer, to conduct the inspection of the SSDS installation. This is not the Authority's responsibility. Authority approval of qualifications of licensed Professional Engineer shall be required prior to the inspection.

C. Quality Control Inspections may be performed throughout the installation by the Authority or its authorized representative as deemed necessary or appropriate by the Authority.

D. Contractor to verify that all SSDS stack exhaust locations are a distance of 25 feet or more from any air intakes and operable windows (including those of adjoining properties). Final locations and heights of exhaust stacks shall be in accordance with NYC Building Code requirements and the requirements of the Contract Documents.

1.05 SUBMITTALS

A. Approval by the IEH Division of the Authority of submittals of this section shall be required prior to start of the related work of this section, as applicable.

B. The Contractor shall submit to the Authority within ten (10) business days of Notice to Proceed a schedule showing the following for each submittal of this section: date of delivery of submittal to the Authority, anticipated time for Authority review, and required date of Authority approval in order to maintain project schedule. Approval by the IEH Division of the submittal schedule shall be required. Any changes in the schedule must be provided to the IEH Division at least 24 hours prior to the change.

C. The Contractor shall submit to the Authority a schedule showing dates for each inspection specified in Article 3.01(A) of this section.

D. Product Data: Submit manufacturers' product data, including installation instructions for:

1. Cleanout Test Tee
2. Non-woven geotextile
3. Pipes and fittings
4. Pipe sleeve seals
5. SSDS pipe warning barrier

E. Samples - Submit representative samples of Non-woven Geotextile for approval.

F. Submit Shop Drawings for monitoring points and all piping installations. A to-scale plan showing locations of all sub-slab pits, condensate drains and piping, pipe, condensate drains and pit invert elevations shall be submitted. Materials of construction for all parts of monitoring points shall be shown on shop drawings. Details for installation of cleanout test tees shall be submitted.

G. Pipe Schedule: Itemize pipe and fitting materials for each specified application.

H. Resume of Professional Engineer, licensed to practice in the State of New York, to perform milestone inspections, and certify proper installation of SSDS. The Contractor's Professional Engineer shall perform each of the milestone inspections identified in 3.01(A) of this section.

I. Report on Professional Engineer's inspection and approval of the work of this Section. The Professional Engineer shall provide a certification, signed and sealed, stating that all work was performed in accordance with the requirements of this Section and the Contract Drawings. The certification shall explicitly state that the Professional Engineer:

1. Supervised inspections of tests which demonstrated installation of an SSDS for preventing intrusion of vapors into the existing building.
2. Confirmed that the pressure switches operate

properly and provide proper notification to the SSDS Monitoring Panel when the sub-slab depressurization system is not operating as designed.

3. Confirmed the connection of each alarm indication station to an interposing relay.
4. Confirmed that SSDS suction fan exhaust stacks have been installed a minimum of 25 feet away from any building air intake and operable window.
5. Confirmed that all SSDS suction fan risers are not located in a vertical shaft that also encloses ducts conveying environmental air.
6. The certification shall include photographs and field logs as attachments along with documentation of all milestone inspections.

J. Warranties from manufacturers for all products.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturers' original, unopened container and packaging, with labels clearly identifying product and manufacturer.

B. Store materials in a clean, dry area in accordance with manufacturers' instructions.

C. Protect materials during handling and installation to prevent damage.

D. Delivery, Storage and Handling of Pipe Materials:

1. Deliver pipe materials properly protected, and undamaged.

2. Properly protect all piping to prevent damage to the pipe and the introduction of foreign material into the pipe. For protecting piping from pre-installation contamination, all piping shall be shipped to job site with suitable caps, sheet metal covers or plugs. Pipe caps shall not be removed until just before installation.

3. Examine all pipe and fittings before laying pipe. Do not install any piece that is found to be defective. Protect all materials during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS AND ACCESSORIES

A. NON-WOVEN GEOTEXTILE

Geotextile material to be placed on prepared subgrade below the gas permeable aggregate layer shall be a non-woven polypropylene type, such as Mirafi N-Series product type 140NL or approved equal and having the following properties:

Property/Test Method	Units	Value
MECHANICAL PROPERTIES		
Grab Tensile Strength		
ASTM D 4632	kN (lbs)	0.40 (90)
Grab Tensile Elongation		
ASTM D 4632	%	50
Mullen Burst Strength		
ASTM D 3786	kPa (psi)	1205 (175)
Trapezoidal Tear Strength		
ASTM D 4533	kN (lbs)	0.18 (40)
Puncture Strength		
ASTM D 4833	kN (lbs)	0.2 (55)
UV Resistance at 500 hrs.		
ASTM D 4355	% Strength retained	70
HYDRAULIC PROPERTIES		
Apparent Opening Size (AOS)		
ASTM D 4751	mm (US Sieve)	0.25 (60)
Permittivity		
ASTM D 4491	sec-1	2.0
Flow Rate		
ASTM D 4491	L/min/m2 (Gal/min/ft2)	5907 (145)
NOTE: All Mechanical Properties and Hydraulic Properties shown are Minimum Average Roll Values (MARV).		

B. Cold Joints, Cracks, Form Tie Holes: Covered with Hardcast CRT 1602 Tape 3" wide.

C. GAS PERMEABLE AGGREGATE LAYER

Gas permeable aggregate layer shall be as specified in Section 02200.

D. SUB-SLAB PITS, PIPE, AND APPURTENANCES

1. Install sub-slab depressurization pits as shown on the Contract Drawings. The sub-slab depressurization pits shall be 4-foot by 4-foot in area. Pits shall be constructed with solid concrete blocks supporting and covered by 2-inch thick precast concrete plates reinforced with No. 4 rebar 4-inches on center each way, or an equivalent welded wire fabric of equal size, throughout the center of the plate.

2. Pits shall be constructed with 4-inch thick and 5-foot by 5-foot in area precast concrete base plates as shown on the Contract Drawings. Four (4) drainage holes, each 1-inch in diameter, shall be provided in each base plate. One drainage hole shall be near the inlet of each suction pipe. Each plate shall be reinforced with No. 4 rebar 4-inches on center each way, or an equivalent welded wire fabric of equal size, throughout the center of the plate.

3. Pipe shall be installed as shown on the Drawings and shall terminate in and slope a minimum of 1% uniformly to the sub-slab depressurization pits or condensate drains. Condensate drains must be installed at all low points in the sub-slab piping not sloped directly to sub-slab depressurization pits. Above-slab piping shall be sloped a minimum of 1% uniformly to the sub-slab and shall not be trapped.

E. MONITORING POINTS

1. Monitoring points shall be installed through the cellar floor slab and shall be constructed with 1-inch diameter solid-wall Schedule 80 PVC pipe as shown on the Drawings. Penetrations through floor slabs for monitoring points shall be air-tight and completed monitoring points shall be air-tight, preventing the potential for migration of gas from the sub-slab into the building.

2. Sub-slab monitoring points shall terminate two (2) inches below the top of the gas permeable aggregate layer.

3. Access cover shall be flush mounted 4-inch diameter nickel bronze deck cleanout with inside caulk

outlet manufactured by Zurn Industries LLC #ZAND-Z1456 or approved equal.

4. One-inch diameter PVC pipe shall be completed with 1-inch diameter threaded PVC cap with quick connect fitting as shown on the Drawings.

5. Quick-connect fitting with ¼-inch threads, shut off valve and viton seal as manufactured by Landfill Control Technologies (Landtec) or approved equal shall be installed in PVC caps.

6. Label each monitoring point with engraved metal tag on chain around PVC pipe with: “SSDS MONITORING POINT”. Letter height shall be 1/4-inch minimum.

F. GAS VAPOR BARRIER (FLUID APPLIED)

Fluid Applied Gas Vapor Barrier System shall be as specified in Section 02220 Gas Vapor Barrier (Fluid Applied).

G. PIPE AND RELATED ACCESSORIES

1. Pipe, fittings, unions, cleanouts, sleeves, supports, and related accessories shall be furnished in accordance with the requirements for plumbing sanitary vent piping in Division 15, unless otherwise specified.

2. SSDS pipe warning barrier shall be 1-foot wide strip of safety orange plastic fence.

H. SUCTION FANS

Refer to Section 15880 Sub-Slab Depressurization System Accessories for suction fan requirements. A total of two (2) suction fans and related accessories shall be furnished and installed. Additionally one (1) spare fan in manufacturer’s original packaging shall be delivered to the site as directed by the Authority.

I. GENERAL

Provide additional installation accessories as necessary for a complete SSDS, ready for use. Ensure accessories are from same manufacturers as specified products. Furnish all manufacturer recommended accessories.

J. CONDENSATE DRAINS

1. Condensate drains shall be installed at all low points in sub-slab piping not sloped to pits.

2. Condensate drains shall be of the same construction as SSDS piping and shall be constructed as shown on the Contract Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION/INSPECTION

At a minimum, inspection by and approval from the Contractor's Professional Engineer at all milestones identified on the following Inspection Schedule shall be required prior to commencing each subsequent phase of work. The interior riser pressure testing as described in Article 3.01(B) must be performed in the presence of a representative of the Authority's CID Department. Additional inspections, examinations and quality control measures may be required in accordance with manufacturers' recommendations and are the responsibility of the Contractor. The Authority reserves the right to perform additional inspections or quality control tests as deemed necessary by the Authority at any point during the construction process at no additional cost to the Authority.

A. INSPECTION SCHEDULE

#	**Inspection Schedule – Milestone Description**
1	Completion of Subbase preparation following foundation and footing installation and installation of geotextile.
2	Delivery to the site of gas permeable aggregate layer, prior to use.
3	Installation of sub-slab depressurization pits and riser "stub-outs" prior to completion of gas permeable aggregate layer.
4	Completion of installation of gas permeable aggregate layer.
5	Completion of all SSDS subsurface components prior to installation of base fabric above gas permeable aggregate layer.
6	Completion of installation of all portions of interior risers prior to enclosure within sheetrock/interior walls.
7	Implementation of pressure tests of completed interior riser pipes. See Article 3.01(B) regarding test requirements.

#	Inspection Schedule – Milestone Description
8	Installation of suction fans and accessories in accordance with Section 15880.
9	Start-up of completed system.
10	Confirmation of Alarm Indication Station installation and testing and connection of each alarm indication station to an interposing relay and testing.

MATERIALS COVERED WITHOUT CONTRACTOR'S PROFESSIONAL ENGINEER INSPECTION AND APPROVAL SHALL BE UNCOVERED FOR PROPER INSPECTION AT NO COST TO THE AUTHORITY. NOTE: DEPENDING ON CONSTRUCTION SEQUENCE, MULTIPLE SITE VISITS MAY BE REQUIRED FOR EACH INSPECTION.

B. INTERIOR RISER PRESSURE TESTING

1. The interior risers shall be subject to a pressure test to ensure all components of the SSDS that pass through the building interior are airtight at 5.0 psig air pressure.

2. A butterfly valve, refer to Specification Section 15880, shall be permanently installed on each riser pipe with the bottom of the valve housing 12-inches above finished floor and below the butterfly valve shall be an uninterrupted straight pipe run, without couplings, joints or fittings. The valve shall be closed during testing creating an airtight seal. A temporary airtight seal shall be placed at the riser termination. A static pressure of at least 5.0 psig shall be applied to the pipe and maintained for a minimum of 30 minutes. All materials, gauges and equipment for this test shall be provided by the Contractor. All test equipment provided must be certified in accordance with Section 15414 Article 2.01(B). Pressure testing must be witnessed by controlled inspection and the Authority.

3. If any pipe riser does not successfully maintain pressure, it is the responsibility of the Contractor to identify and seal all leaks. The test shall be performed until results satisfactory to the inspector are demonstrated.

4. Caution: Materials under pressure can explode, causing serious injury or death. Extreme care should be exercised in conducting any air test. Persons conducting an air test must exercise care to avoid application of pressure above 6 psig to

the system under test by using appropriate pressure regulation and relief devices. Persons conducting the test are cautioned to inspect for tightness of all system components prior to beginning the test and to avoid adjustment of the system while under pressure. Proper protective equipment should be worn by individuals in any area where an air test is being conducted.

C. SSDS ALARM TESTING

Prior to Authority acceptance of the SSDS the Contractor must demonstrate to the satisfaction of the Authority that the SSDS pressure switches are operating properly and properly connected to the SSDS Monitoring Panel in the Custodian's Office. In the presence of a representative of the Authority's IEH Division, each suction fan must be individually manually switched on and off and the SSDS Monitoring Panel must show that when each suction fan is switched off each pressure switch activates an alarm signal, corresponding to the appropriate vertical riser, on the SSDS Monitoring Panel. Each suction fan shall then be individually manually switched on and the SSDS Monitoring Panel must show that when each suction fan is switched on each pressure switch deactivates the alarm signal, corresponding to the appropriate vertical riser, on the SSDS Monitoring Panel.

3.02 SURFACE PREPARATION

Preparation of all surfaces prior to the installation of the SSDS shall be as specified in the Contract Documents and shown on the Drawings.

3.03 INSTALLATION

All components of the SSDS shall be installed as specified in the Contract Documents, as shown on the Drawings and as directed by the Authority.

A. INSTALLATION OF THE GEOTEXTILE ABOVE PREPARED SOIL SUBGRADE

Following the completion of the building foundation walls and footings, the subbase shall be excavated to the depth required to install the gas permeable aggregate layer below the elevation of the bottom of the floor slabs to the extent of the SSDS, as shown on the Contract Drawings. The non-woven geotextile shall be placed on

the subbase, overlapped and secured in accordance with the manufacturer's recommendations.

B. INSTALLATION OF THE GAS PERMEABLE AGGREGATE AND SUB-SLAB DEPRESSURIZATION SYSTEM PITS

1. The gas permeable aggregate layer shall be placed and compacted directly below the lowest level concrete slabs as shown on the Contract Drawings.

2. The sub-slab pits and pipe shall be assembled and installed as shown on the Contract Drawings.

3. Following inspection, gas permeable aggregate shall be placed and compacted to the bottom of the lowest level slabs, as shown on the Drawings.

C. APPLICATION OF THE FLUID APPLIED GAS VAPOR BARRIER

The fluid applied gas vapor barrier shall be installed as specified in Section 02220 Gas Vapor Barrier (Fluid Applied).

D. INSTALLATION OF PIPING, RISERS AND RELATED WORK

1. The risers shall be as identified in the Contract Documents and Drawings. The risers shall be installed, tested, labeled and enclosed in the interior wall cavities.

2. The installation of piping, fittings, joints, supports and related accessories shall be in accordance with the requirements of Division 15, unless specified otherwise.

3. Each suction fan exhaust shall be completed with a no-loss stack. The no-loss stacks shall be installed in accordance with the Contract Drawings.

4. Interior pipe shall be identified in accordance with the requirements of Section 15431. Background shall be safety blue with white lettering and shall be provided on all interior riser pipes beginning at the floor slab elevation and continuing to the installation of the suction fan above the roof. The lettering shall read:

CAUTION: DO NOT ALTER
SUBSURFACE VAPOR VENT PIPE

5. Piping (General)

   a. The run and arrangements of all pipes shall be approximately as shown on drawings or specified and as directed during installation, and shall be as straight and direct as possible, forming right angles or parallel lines with building walls and other pipes, and neatly spaced.

   b. Roughing underground or concealed in the floor or wall construction shall be properly installed and inspected before any of the roughing is covered up. Should any work be covered up before being inspected and tested as specified, it shall be uncovered and re-covered at the expense of the Contractor.

   c. SSDS pipe warning barrier shall be installed above all SSDS piping.

6. Butterfly Valve and Cleanout

   The butterfly valve and cleanout installed on each suction fan riser shall be equivalent size of the riser diameter. The cleanout shall be gas tight (threaded). Provide access panel for each butterfly valve, cleanout, and pressure switch.

7. Sleeves for Pipes and Escutcheon Plates

   Install pipe sleeves and escutcheon plates in accordance with requirements of Division 15.

8. Riser Piping

   Each riser pipe shall be equipped with a vacuum gauge, cleanout and pressure switch as indicated on the Drawings and installed in accordance with Section 15880. Connect pressure switches to SSDS Monitoring Panel in accordance with Sections 15880 and 15970.

3.04 PROTECTION

It is the responsibility of the Contractor to ensure that no damage occurs to components of the SSDS prior to, during or following installation of system, or during any subsequent performance of construction for the facility. This includes the installation of all subsurface utilities required for building systems. Contractor's Professional Engineer shall visually inspect the condition of the SSDS immediately prior to enclosing/covering. Any damages to the SSDS during performance of the Work shall be repaired and tested at no additional cost to the Authority.

3.05 PAYMENT

All labor, materials and equipment shall be furnished and installed by the Contractor. The Contractor shall include this work as part of the bid. No additional payment shall be made to the Contractor for the Work specified in this Section.

LIST OF SUBMITTALS

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
Submittal Schedule		
Inspection Schedule		
Product Data:		
1. Cleanout Test Tees		
2. Non-Woven Geotextile		
3. Pipes and Fittings		
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END OF SECTION

* * *

SECTION 15880
SUB-SLAB DEPRESSURIZATION SYSTEM ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Furnish and install suction fans, with all specified accessories and options, connecting to vertical risers, in order to create vacuum in the sub-slab gas permeable aggregate layer. Provide a fully-functional sub-slab depressurization system (SSDS) with specified and required accessories complete and ready for use. The specified pressure switches shall be connected to Alarm Indication Stations (AISs) at the SSDS Monitoring Panel. The AISs shall be connected to an interposing relay, provided by the Temperature Control Contractor (TCC), in accordance with Specification Section 15970. Connection to the Building Management System (BMS) will be made by others.

B. Furnish and install vacuum pressure gauges, differential pressure switches and butterfly valves in risers connecting to suction fans. Furnish and install all parts and materials necessary to connect the suction fan risers to the suction fans. A total of two (2) suction fan risers and two (2) suction fans (one for each riser) shall be furnished and installed. Additionally one (1) spare fan in manufacturer’s original packaging shall be delivered to the site for attic stock, as directed by the Authority.

C. Furnish and install fan silencers and stainless steel suction fan exhaust stacks as shown on Drawings.

D. Each suction fan shall be provided with a variable frequency drive and local power disconnect switch.

E. Furnish, install and test a “low-vacuum” alarm notification system as an integral part of the SSDS. One (1) pressure switch shall be installed in each riser (VR-1 and VR-2) at the slab level (a total of two (2) pressure switches). An SSDS Monitoring Panel consisting of two (2) AISs shall be installed in the Custodial Engineer’s Office to show separately for each pressure switch the following condition: low vacuum. The Contractor shall provide all accessories required to furnish a complete and functioning SSDS Monitoring Panel which indicates separate audible and visual alarms for each pressure switch on a low vacuum alarm condition.

F. Furnish, install, label, and test all system components as indicated, specified and required in the Contract Documents, as shown on the Drawings and as directed by the Authority.

G. All materials and equipment furnished under this section shall be new, in first-class condition, supplied directly from original equipment manufacturers and installed in accordance with manufacturers' recommendations.

1.02 RELATED SECTIONS

A. Sub-Slab Depressurization System . . . . Section 02221

B. Temperature Control System (LonWorks BMS/DDC with School Operating Console) . . . . . Section 15970

C. Mechanical. . . . . Division 15

D. Electrical . . . . . Division 16

1.03 STANDARDS AND REGULATIONS

A. Comply with applicable portions of the Building Code of the City of New York. Where requirements for products, materials, equipment, methods and other portions of the work specified herein exceed minimum requirements of New York City Building Code, Contractor shall comply with such requirements specified herein, unless specifically approved otherwise by the Authority.

B. Standards issued by the organizations listed below may be referenced in this section.

1. American Society for Testing and Materials (ASTM)

2. American Standards Association (ASA)

3. American National Standards Institute (ANSI)

4. National Fire Protection Association (NFPA)

1.04 RESTRICTIONS AND QUALITY CONTROL

A. Pre-installation Meeting: The Contractor shall arrange for and convene a pre-installation meeting prior to the start of work of this section to review installation procedures, protection, and coordination with other work. Attendance of parties directly affecting work of this

section, including representatives of the Construction Inspection Division (CID), Industrial and Environmental Hygiene Division (IEH), designer of the SSDS, Contractor, Contractor's Professional Engineer and Contractor's installer shall be required. The Contractor shall schedule the pre-installation meeting at a time and at a location that is agreeable to the Architect/Engineer, CID and IEH Division. The meeting shall be held on a date which is a minimum of ten (10) business days prior to start of the work of this section.

B. Inspection: Contractor shall provide a New York licensed Professional Engineer with experience and qualifications to approve the work, independent of the installer, to conduct the inspections of the SSDS installation. This is not the Authority's responsibility. Authority approval of qualifications of licensed Professional Engineer shall be required prior to start of inspections in accordance with the submittal requirements of Specification Section 02221.

C. Quality Control Inspections may be performed throughout the installation by the Authority or its authorized representative and as deemed necessary or appropriate by the Authority.

1.05 SUBMITTALS

A. Approval by the IEH Division of the Authority of submittals of this section shall be required prior to start of the related work of this section, as applicable.

B. The Contractor shall submit to the Authority within ten (10) business days of Notice to Proceed a schedule showing the following for each submittal of this section: date of delivery of submittal to the Authority, anticipated time period for Authority review, and required date of Authority approval in order to maintain project schedule. Approval by the IEH Division of the submittal schedule shall be required. The IEH Division must be notified at least 24 hours in advance of any change to the schedule.

C. Product Data: Submit manufacturer product data, including installation instructions and mounting details for the suction fans, fan silencers, variable frequency drives, pressure switches, valves, vacuum gauges, vibration isolators, flexible connectors, and SSDS Monitoring Panel Alarm Indication Stations (AIS). For suction fans submit manufacturer's performance curve, noise data and list of

accessories.

D. Submit complete shop drawings of all work related to installation of the suction fans, variable frequency drives, exhaust stacks, and fan silencers showing dimensions and locations of all items including clearance requirements. Submit elementary electric control schematic diagrams, interconnecting wiring diagrams, and electric motor data sheets.

E. Submit complete shop drawings of all work related to installation of the pressure switches and SSDS Monitoring Panel Alarm Indication Stations, showing dimensions and locations of all items. The shop drawings shall show details for mounting of pressure switches, access panel details, connection of pressure switches to suction fan risers and mounting of Alarm Indication Stations. Provide wiring diagrams showing connection of pressure switches to SSDS Monitoring Panel and to the interposing relay (specified in 15970). Provide drawings, showing in plan view and elevation, dimensions and location of SSDS Monitoring Panel and access panels.

F. Submit Professional Engineer’s Certification: Submit certification prepared, signed, and sealed by a New York State licensed Professional Engineer. Certification shall state that Professional Engineer certifies that all components installed are properly constructed and installed, and properly supported for anticipated loads, including wind loads for roof mounted equipment and piping.

G. Submit owner’s manuals/operations and maintenance manuals for suction fans, variable frequency drives, silencers, valves, pressure switches, pressure gauges and SSDS Monitoring Panel Alarm Indication Stations.

H. Submit name, address, and telephone number of manufacturer authorized service technician for suction fans.

I. Submit manufacturers’ warranties for all equipment and accessories.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in manufacturer’s original packaging, with labels clearly identifying product and manufacturer.

B. Store materials in a clean, dry area in accordance with manufacturers' instructions.

C. Protect materials during handling and installation to prevent damage.

D. Examine all equipment before installation. Do not install any unit that is found to be defective. Protect all materials during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.01 ACCESSORIES

A. SUCTION FANS

1. Suction fans shall be direct drive radial fans capable of: flow rate of 300 CFM at a static pressure of 13.0 inches water column.

2. The radial wheel shall be all-aluminum casting with radial blades and a backplate with hub keyed to the shaft with set screws. Wheel and inlet diameters and outlet areas shall be in accordance with the standard dimensions adopted by AMCA for industrial centrifugal fans.

3. Housing:

   a. Heavy-gauge steel, continuously welded construction. Housings of square design, lock seams, partially welded, or sheet metal panel construction are not permitted.

   b. All steel surfaces are to be coated with a polyester powder, baked until cured. Surfaces of bolted components not accessible after assembly shall be coated and allowed to dry prior to assembly. Primer only will not be accepted.

   c. Housings shall contain a drain at their low point.

4. Each suction fan shall be furnished with a stainless steel motor plate and base by the manufacturer, and shall be installed securely to roof on top of building.

5. The motors, supplied by the suction fan manufacturer, shall be 2 HP, 3-60-208-230/460 volt, TEFC, Inverter Duty, and EISA-compliant.

6. The suction fans shall be installed with flexible connectors on the fan inlets. Flexible connectors shall be as supplied by the suction fan manufacturer.

7. Install vibration isolators for the suction fans as manufactured by Vibration Eliminator Company or approved equivalent and pursuant to the recommendations of the suction fan manufacturer.

8. Provide local power disconnect switch for manual termination of each suction fan.

9. Suction fans shall be:

    a. Designed and manufactured for outdoor continuous service and shall be all-weather resistant.

    b. Fireproof, spark resistant, and corrosion resistant.

    c. Installed with a vacuum gauge at suction fan inlet. Vacuum gauge shall be Wika pressure indicator Model 612.20 Part 9747724 or approved equivalent with range of 0 to 30 inches water column vacuum and maximum minor division increments of one inch w.c.

10. Fan and motor shall be provided as one unit by the manufacturer with a minimum five (5) year warranty on parts and service.

11. Suction fan operating at full capacity shall not generate noise levels greater than 65 dB at 10 meters.

12. Each suction fan shall be provided with all manufacturer’s recommended spare parts. The recommended spare parts shall be delivered by the Contractor to the Authority.

13. Fan shall be affixed with a permanent weather resistant label bearing fan identification number, corresponding to the riser to which it is connected.

14. Each suction fan shall be powered by an individual point of connection.

B. VARIABLE FREQUENCY DRIVES

1. A Variable Frequency Drive (VFD) shall be connected to each fan motor and mounted in the vicinity of each SSDS suction fan at a height that is accessible for inspection.

2. Each VFD shall be labeled with a stainless steel plate, with the label corresponding with the riser/fan identification.

3. The VFDs make and model shall be selected and drive shall be installed in accordance with Section 16480, with the following exceptions:

   a. VFDs shall be installed with an automatic (not manual) bypass to allow uninterrupted operation of the SSDS fan in the event of VFD failure.

   b. LonWorks interface card and network connection for the VFDs are not required.

C. PRESSURE SWITCHES

1. A pressure switch shall be provided in the SSDS riser piping of each suction fan to detect low vacuum in each suction fan riser. Each pressure switch shall have a field adjustable set point, which can be adjusted before and after installation, within the range of 1.4 to 5.5 inches water column vacuum.

2. Pressure switches shall be UL listed.

3. Pressure switches shall be mounted in NEMA 12K enclosures at a height that is accessible for inspection and maintenance.

4. Pressure switch type shall be single-pole double-throw. Pressure switch operating limit shall be 45 inches w.c. continuous, 10 psig surge.

5. Furnish and install 1/4-inch O.D. stainless steel tubing from each switch to each corresponding suction fan riser.

6. Label each pressure switch with a stainless steel plate which identifies the suction fan connected to the riser and corresponds with the identification system used at the SSDS Monitoring Panel.

7. Each pressure switch shall be connected to an Alarm Indication Station at the SSDS Monitoring Panel and shall signal notification at the SSDS Monitoring Panel on low vacuum conditions in each corresponding suction fan riser.

D. SSDS Monitoring Panel Alarm Indication Stations

1. Two (2) Alarm Indication Stations shall be furnished, each connected to one pressure switch.

2. Each alarm indication device shall have an alarm indication light, alarm horn and an alarm horn silence switch. Indication light shall be red LED. Horn shall be 80 db.

3. Upon an alarm contact closure, activated by low vacuum at the corresponding suction fan riser via the pressure switch, the LED indicator shall light and the horn shall sound.

4. Horn silence switch push button shall silence audible alarm. The visual indicator (red LED) shall remain lit, and only reset after correction of low vacuum condition.

5. Enclosure case shall be polystyrene, impact resistant, and supplied with knockouts from the factory. Color of panel face shall be bright yellow.

6. Enclosure faces shall be labeled with corresponding suction fan identification numbers using weatherproof typed decals.

7. Each AIS shall be connected to an interposing relay in accordance with Specification Section 15970.

8. Supply with manufacturer’s one year warranty.

E. SSDS FAN SILENCERS

1. Each suction fan shall be provided with a silencer at the fan outlet before the exhaust stack.

2. Silencer inner diameter (I.D.) shall match the I.D. of the suction fan outlet piping.

3. The silencers shall be for outdoor continuous service and shall be all-weather resistant.

4. Silencers shall provide a minimum 11 dB insertion loss or better at 125 Hz and 25 dB insertion loss or better at 500 hz.

5. Silencers must be a straight-through design with no obstructions in the airstream.

6. Silencers construction shall be heavy welded steel casing filled with high density acoustical absorption material. All steel surfaces shall be coated with a polyester powder, baked until cured.

F. GENERAL

Provide additional installation accessories as necessary for a complete SSDS ready for use. Ensure accessories are from same manufacturers as products.

G. APPROVED MANUFACTURERS/EQUIPMENT

1. Suction fans shall be:

Compact Pressure Blower Model 140606, furnished and installed with the optional equipment, accessories, and additional and ancillary equipment specified above.

As manufactured by:
The New York Blower Company
7660 Quincy Street
Willowbrook, Il 60527
1-800-208-7918
www.nyb.com

or approved equal.

2. Fan Silencer shall be:

Universal Model U5-6 Part 11-106-AA

As manufactured by:
Universal Acoustic and Emissions Technologies
1925 Hwy 51 & 138
West Stoughton, WI
888-300-4272
www.universalAET.com

or approved equal.

3. Variable frequency drives shall be:

Model EDP11S007DN3R10000

As manufactured by:

WEG Electric Corp.
6655 Sugarloaf Parkway
Duluth, Georgia 30097
www.weg.net

or approved equal.

4. Pressure switches shall be:

Series 1900, Model 1910-5

As manufactured by:
Dwyer Instruments Inc.
102 Indiana Highway
Michigan City, IN 46361
219-879-8000
www.dwyer-inst.com

or approved equal.

5. Butterfly valves shall be:

Series LD145 Butterfly Valve

As manufactured by:

Apollo Valves
701 Matthews-Mint Hill Rd.
Matthews, NC 28105
704-841-6000
www.apollovalves.com

or approved equal.

6. Vacuum gauges shall be:

   Wika Model 612.20 Part 9747724

   As manufactured by:
   Wika Instrument Corporation
   1000 Wiegand Boulevard
   Lawrenceville, GA 30043
   770-513-8200
   www.wika.com

   or approved equal.

7. Vibration Isolators shall be:

   T22-3 RIS

   As manufactured by:
   Vibration Elimination Company, Inc.
   15 Dixon Avenue
   Copiague, NY 11726
   631-841-4000
   www.veco-ny.com

   or approved equal.

8. SSDS Monitoring Panel Alarm Indication Stations shall be:

   Alarm Indication Station (AIS Model)

   As manufactured by:
   Kele, Inc.
   3300 Brother Boulevard
   Bartlett, TN 38133
   888-397-5353
   www.kele.com

   or approved equal.

H. On discharge of exhaust stack, install a stainless steel no-loss stack as shown on the Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION/INSPECTION

The Contractor's Professional Engineer shall inspect all components of the suction fans and accessories and certify all

components of the suction fan systems have been properly constructed and installed and are properly secured and supported upon completion of installation. Additional inspections, examinations and quality control measures may be required in accordance with manufacturers' recommendations and are the responsibility of the Contractor. The Authority reserves the right to perform additional inspections or quality control tests as deemed necessary by the Authority at any point during the installation process at no additional cost to the Authority.

3.02 INSTALLATION

All components of the suction fan systems and accessories shall be installed in accordance with the manufacturers' recommendations and applicable Building Code requirements.

A. INSTALLATION OF SUCTION FANS AND ACCESSORIES

1. Suction fans, installed with all accessories, shall be connected to the suction fan risers on the roof of the building. Contractor shall start up SSDS, adjust set points on pressure switches, and demonstrate satisfactory operation, including operation of instrumentation, in the presence of Authority designated representative.

2. The suction fans shall be electrically grounded.

3. Contractor shall permanently support all system components in accordance with New York City Building Code requirements.

4. Perform all required mechanical work not explicitly specified in this section in accordance with Specification Section 02221 and Division 15. Perform all required wiring and electrical work for fully-functional system in accordance with Division 16.

5. Install quick-connect fittings on monitoring points as shown on Drawings.

6. Install in-line pressure gauges with threaded air-tight connections. The pressure gauges shall be installed in rooftop piping and such that gauges can be easily removed and replaced.

7. Install one (1) pressure switch with specified labeling for each suction fan riser. Connect

stainless steel tubing from suction fan riser piping to low pressure port on pressure switches with air-tight threaded connections as recommended by the pressure switch manufacturer. Connect each pressure switch to the SSDS Monitoring Panel in the Custodial Engineer's Office so that the following condition is indicated on each corresponding AIS at the set point: low vacuum. Furnish an access panel for access to each pressure switch, butterfly valve and clean-out test tee in the vertical risers. The access panels shall be of adequate size to facilitate use of the butterfly valves and test tees and maintenance and replacement of the pressure switches, and shall conform to the architectural details specified in the Contract Documents.

8. Install pressure switches in locations free from excessive vibration.

9. Each switch shall be calibrated by the Contractor and the set point of each switch shall be field adjusted after the SSDS is fully operational.

10. Install SSDS Monitoring Panel Alarm Indication Stations on wall in Custodial Engineer's office at location shown on Drawings, or if not shown on Drawings, at location directed by the Authority. Label Alarm Indication Stations as specified.

3.03 PROTECTION AND CLOSE OUT

A. It is the responsibility of the Contractor to ensure that no damage occurs to components of the SSDS or building prior to, during or following installation of suction fan systems, or during any subsequent performance of construction for the facility as identified on the Contract Documents and Drawings. Any damages to the SSDS or building during performance of the Work shall be repaired and tested at no additional cost to the Authority.

B. Provide service training by a qualified representative of the suction fan manufacturer. Four (4) hours of on-site training shall be provided at a time designated by the Authority up to one (1) year after the date of completion of installation of the suction fans.

C. Prior to Authority acceptance of the SSDS the Contractor must demonstrate to the satisfaction of the Authority

that the SSDS pressure switches are operating properly and are properly connected to the SSDS Monitoring Panel in the Custodial Engineer’s Office and shall also demonstrate that each Alarm Indication Station has been connected to an interposing relay. In the presence of a representative of the IEH Division of the Authority, each suction fan must be individually manually switched on and off and the SSDS Monitoring Panel must show that when the suction fan is switched off each pressure switch is indicating an alarm signal, corresponding to the appropriate suction fan, on the SSDS Monitoring Panel. The Contractor shall demonstrate both audible and visual alarms are activated on low vacuum, silencing of the audible alarms via the horn silence switch and reset of alarms when fans are restarted.

LIST OF SUBMITTALS

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
Submittal Schedule		
Product Data:		
1. Suction Fans		
2. Fan Silencers		
3. Variable Frequency Drives		
4. Pressure Switches		
5. Butterfly Valves		
6. Vacuum Gauges		
7. Vibration Isolators		
8. Alarm Indication Stations		
Shop Drawings:		
1. Suction Fans		
2. Silencers		
3. Exhaust Stacks		
4. Electrical Control Schematic		
5. Wiring Diagrams		
6. Pressure Switches		
7. Alarm Indication Stations/SSDS Monitoring Panel		
8. Access Panels		
9. Wiring Diagram for Pressure Switches and AISs		
Professional Engineer’s Report on Inspection and Approval of Work		
Owner’s Manuals/O&M Manuals		
Manufacturer Authorized Technician Info.		
Manufacturers’ Warranties		

END OF SECTION

* * *

APPENDIX D

File 1

- **GAS VAPOR BARRIER DOCUMENTATION**
  - GAS VAPOR BARRIER CONTRACTOR SUBMITTALS

- **SUB-SLAB DEPRESSURIZATION SYSTEM DOCUMENTATION**
  - SSDS CONTRACTOR SUBMITTALS

TRC
1430 Broadway, 10th Floor
New York, New York, 10018

Main 212.221.7822
Fax 212.221.7840

Transmittal

To:	Anna Ramirez IEH Division New York City School Construction Authority 30-30 Thomson Avenue Long Island City, NY 11101-3045 (718) 472-8620	**Date**:	September 10, 2019
		TRC No:	356549.0000.0000
		Project:	K671 840 5th Avenue Brooklyn, NY LLW#: 106889

We have enclosed:

☐	B/W Prints	☐	Reproducible	☐	Reports	☐	Letter
☐	Specifications	☐	Memorandum	X	Contractor Submittals		

Description

Gas Vapor Barrier Professional Engineer Resume (02220-005-000)
No Exceptions Taken

Sent Via:

☐	Messenger	☐	1st Class Mail	☐	FedEx [Type]	X	Email

Copy to: M. Sherwood (NYCSCA)

Very truly yours,
TRC

Phillip Castellano, PE

AMCC CORP.

50-18 VERNON BLVD

LONG ISLAND CITY, NY 11101

Phone: 718-472-9500
Fax: 718-472-2250

TRANSMITTAL

No. 00083

PROJECT: PS671k

DATE: 09/03/2019

TO: GRAVES-MMA JV Architects, PLLC
3297 Route 66, Studio B
Neptune, NJ 07753

REF: 02220 -Liquid Boot GasVaporBarrier(Fluid-Applied) Submittal Schedule + Inspection Schedule + Product Data + Shop Drawing + Resume Engineer

ATTN: Pete Larsen

WE ARE SENDING:		SUBMITTED FOR:		ACTION TAKEN:	
[√]	Shop Drawings	[√]	Approval	[ ]	Approved as Submitted
[ ]	Letter	[ ]	Your Use	[ ]	Approved as Noted
[ ]	Prints	[√]	As Required	[ ]	Returned After Loan
[ ]	Change Order	[ ]	Review and Comment	[ ]	Resubmit
[ ]	Plans			[√]	Submit
[ ]	Samples	**SENT VIA:**		[ ]	Returned
[ ]	Specifications	[√]	Attached	[ ]	Returned for Corrections
[ ]	Other:	[ ]	Separate Cover Via: Mail	[ ]	Due Date:

ITEM NO.	COPIES	DATE	ITEM	NUMBER	REV. NO.	DESCRIPTION	STATUS
001	1	09/03/2019	SUT	02220-001	000	Submittal Schedule - Liquid Boot Gas Vapor Barrier	NEW
002	1	09/03/2019	SUT	02220-002	000	Inspection Schedule - Liquid Boot Gas Vapor Barrier	NEW
003	1	09/03/2019	SUT	02220-003	000	Product Data - Liquid Boot Gas Vapor Barrier	NEW
004	1	09/03/2019	SUT	02220-004	000	Shop Drawing - Liquid Boot Gas Vapor Barrier	NEW
005	1	09/03/2019	SUT	02220-005	000	Resume Engineer - Liquid Boot Gas Vapor Barrier	NEW

Remarks:

CC: Main Office / Field Copy

Signed Bobby Kang
Bobby Kang

Primavera ®

Liquid Boot
Gas Vapor Barrier (Fluid-Applied)

Specification Section 02220

SUBMITTAL

Project:

PS 671K New Building

840 5th Avenue
Brooklyn, NY 11232

Submitted By:

EAI INC

50 Prescott Street • Jersey City, NJ 07304
Ph: (201) 395-0010 • F: (201) 395-0020

Submitted To:

AMCC Corp.

50-18 Vernon Blvd • Long Island City, NY 11101
Ph: (718) 472-9500 • F: (718) 472-2250

Date Submitted:

August 30th, 2019

AMCC - DIGITALLY RECEIVED 09/01/19

TABLE OF CONTENTS

1) SUBMITTAL SCHEDULE
2) INSPECTION SCHEDULE
3) PRODUCT DATA
4) SHOP DRAWINGS
5) RESUME OF PROFESSIONAL ENGINEER

AMCC - DIGITALLY RECEIVED 09/01/19

5) RESUME OF PROFESSIONAL ENGINEER

AMCC - DIGITALLY RECEIVED 09/01/19

EAI INC
ENVIRONMENTAL MANAGEMENT SERVICES
SPECIALTY CONTRACTING

50 Prescott Street
Jersey City, NJ 07304
Office: (201) 395-0010
Fax: (201) 395-0020
www.eaienviro.com

June 19, 2019

New York City School Construction Authority
30-30 Thomson Avenue
Long Island City, NY 11101
Tel: (718) 472-8000
Fax: (718) 472-0477

Re: Professional Engineer's Inspection for Gas Vapor Barrier and/or Sub-Slab Depressurization System for Various New York City School Construction Authority Projects

To Whom This May Concern,

Ariel Czemerinski, PE (NYS PE #076508) will be serving as the primary PE for the GVB and/or SSDS certification. Please see the attached statement from Ariel Czemerinski, PE to confirm.

If you have any questions, please do not hesitate to contact me at **(201) 395-0010 x229.** Thank you.

Sincerely,

Robert Carvalho, PG
President/CEO

TRC Engineers, Inc.		
☑ No Exceptions Taken	Exp. Proj. Name: K671	Reviewed By R. Bowden, P. Castellano
☐ Make Corrections Noted	Design/LLW No. 106889	Contract No. C000014345
☐ Rejected – Revise and Resubmit	Date Received 9/5/19	Date Returned 9/10/19
☐ Rejected – Not Acceptable for ☐ No Action Taken	Submittal No. 02220-005-000	
Submittal reviewed as: ☑ Per Spec/ Basis of Design ☐ "Or Equal Substitution"/Non-basis of Design ☐ "Alternate Substitution"		
CORRECTIONS OR COMMENTS MADE ON THE SUBMITTAL DURING THIS REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. SUBMITTAL APPROVAL IS ONLY FOR GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION, PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATING THE WORK WITH THAT OF ALL OTHER TRADES AND PERFORMING THE WORK IN A SAFE AND SATISFACTORY MANNER.		

AMCC - DIGITALLY RECEIVED 09/01/19

AMC Engineering, PLLC
18-36 42nd Street
Astoria, NY 11105
718-545-0474
Fax 516 706-3214

July 2, 2018

Rob Carvalho, President
EAI Inc.
50 Prescott Street
Jersey City, NJ 07304

Subject: Fluid-Applied Gas Vapor Barrier and/or Sub-Slab Depressurization System Certification for Various NYC SCA Projects

Dear Rob,

In the course of providing Professional Engineering inspections and certifications for the Fluid-Applied Gas Vapor Barrier and/or Sub-Slab Depressurization System installation, it is not uncommon that inspections be conducted by different professionals for the same project, while these PEs' are not directly affiliated with each other.

As long as the Professional Engineer is dully approved by the Authority, and I am acting in the capacity of primary Professional Engineer conducting the PE inspections and issuing certifications, I will take no exemption in providing a final signed/sealed certification while utilizing the other approved PE's reports in partial fulfillment of the Scope. The final certification will state that all work performed by me, or an SCA-approved engineer, was conducted in accordance with contract documents, so long the other PE's have a similar statement in their reports..

Thanks



Ariel Czemerinski, PE
AMC Engineering, PLLC

AMCC - DIGITALLY RECEIVED 09/01/19

ARIEL CZEMERINSKI, P.E.
99 Jericho Turnpike, Suite 300J
Jericho, NY 11753
Office (516) 417-8588
mobile (516) 987-1662
fax (516) 706-3214
Email: ariel@amc-engineering.com

SUMMARY:

New York State Professional Engineer. Results-oriented Chemical and Environmental Engineer, with 21 years of experience in the chemical and environmental areas. Areas of expertise include inspections and sign off on Large Scale Vapor Barrier Installations at Various NYC schools, Design and inspections of Sub Slab Depressurization Systems, wastewater treatment systems, process control and automation, process optimization, productivity improvement, quality systems, environmental compliance, Phase I Environmental Site Assessments, Phase II Environmental Investigations, Phase III: Remedial Activities, process and plant safety, and management of a production facility. Registered PE in NY.

PROFESSIONAL EXPERIENCE:

1997-present AMC Engineering, PLLC. Jericho, NY (Organized in 2000).
Principal.

- Inspections and sign off on Large Scale Vapor Barrier Installations at Various NYC schools including:

School	LLW No	Dates
PS-264K, Brooklyn	051328	3/21/10 – 1/7/11
Promise Academy, Manhattan		7/20/11 – 9/15/11
Spring Creek, Brooklyn	051408	6/23/10 – 8/17/11
Maspeth Campus	048599	5/1/10 – 8/18/11

- SSDS and Vapor Barrier Design and Inspection of the following schools:

Address	Project Agency / type: NYCDEP / NYCOER# / NYSDEC BCP#	Dates
2040 White Plains Rd., Bronx	BCP: C203031	2008-present
3035 White Plains Rd., Bronx	BCP: C203039	2009-present
129-09 Jamaica Ave, Richmond Hill	E-designation 11EH-NO22Q BCP: C241103	2010-present
462 Keap Street, Brooklyn	E-Designation 04DCP003K106DEPTECH192K (passive system)	2009-present
1800 Southern Boulevard, Bronx	BCP: C203046	
76 N. 4th Street, Brooklyn	E-Designation: 08DEPTECH168K	2008-2011
1121 Jerusalem Avenue, Uniondale (Shop Rite-Walmart)	DEC and NCDoH: Methane Abatement System	2009-2011

- Engineering Consulting Services.
- Design and Inspection of SubSlab Depressurization Systems
- Design of Subsurface Drainage Systems.
- Environmental Compliance.
- Phase I ESA, Phase II ESI. Remedial Investigations, Remediation of contaminated sites.
- Wastewater Treatment systems.
- Zoning regulations. Expediting Services. NYFD, NYC Buildings, NYSDEC, Suffolk County
- Permitting: NYSDoB, NYCDEP, NYFD, NYSDEC

1994-2001 Axel Plastics Research Laboratories, Woodside, NY
Plant Manager

- Responsible for all day-to-day operations.
- Implemented a Company-wide Quality Management system (ISO 9000).
- Successfully addressed all environmental-related issues with local authorities.
- Planned production for the two plants and more than 140 lines of products.
- Managed all shipping/receiving operations, equipment and process maintenance.

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1992-1994 Millennium Chemicals (SCM, Colors & Silica), Baltimore, MD.
Process Engineer and Project Manager.

- Process engineering, design, manufacturing and environmental control for the Silica Gel plant.
- Responsible for ISO 9000 certification. Wrote all procedures and instructions for the plant and maintenance.

1990-1992 CROMPTON (WITCO) CORPORATION, POLYMER ADDITIVES, Taft, LA.
Process Development Engineer.

- Routine responsibilities were to develop new processes and optimize existing ones.
- Designed, erected and operated a Pilot Plant. It successfully brought to the market a pesticide, patented by Dupont and commercialized by Witco (Seenox).
- Conducted process simulation to identify process and product optimization.
- Designed process equipment (reactors, heat exchangers, pumps)

1987-1988 VINISA S.A.I.C. - PVC COMPOUNDING, Buenos Aires, Argentina.
Production and Project Manager.

- Coordinated production in VINISA's 3 compounding plants. Routine responsibilities included: Technical assistance to PVC compounders, Production organization, planning and control, production management.

EDUCATION:
1988-1990 COLUMBIA UNIVERSITY, New York, NY
M.S. Chemical Engineering, Feb. 1990.
Awarded Fellowship as a Teaching Assistant. Thesis: Optimal Periodic Control.

1981-1987 UNIVERSITY OF BUENOS AIRES, Buenos Aires, Argentina.
Chemical Engineer (six year program).
Teaching Assistant Inorganic Chemistry.

Continuing Education Courses attended: (partial list)

- Building Inspections Course
- Environmental Regulation
- Design of Subsurface Drainage Systems
- Process Hazard Analysis
- Hazardous Materials Regulations
- Supervisors Training
- OSHA regulations
- ISO 9000
- Lead auditor training
- Wastewater Treatment System

ADDITIONAL INFORMATION
Speaker at Water Conferences: Long Island Water, wastewater and aquifers. Director, Metro New York Section, AIChE

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The attached resume and email correspondence is in reference to authorized field representative of SCA-approved Professional Engineer Inspector Ariel Czemerinski of AMC Engineering, PLLC. Mr. Czemerinski is approved to perform milestone inspections for Fluid-Applied Gas Vapor Barrier (specification section 02220) and Sub-Slab Depressurization System (specification sections 02221 & 15880).

We are submitting Andrew Sung and Nicholas Randazzo for approval as Ariel Czemerinski's field representative to periodically perform milestone inspections for the Fluid-Applied Gas Vapor Barrier (specification section 02220) and/or Sub-Slab Depressurization System (specification sections 02221 & 15880).

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AMC Engineering, PLLC
18-36 42nd Street
Astoria, NY 11105
718-545-0474
Fax 516-706-3214
Email: asung@amc-engineering.com

Andrew Sung, EIT

RELEVANT EXPERIENCE

AMC Engineering, PLLC – *Environmental Engineer* October 2014 – Present

- Environmental Engineering Consulting Services;
- Permitting, Design, and Report Generation for NYCDOB, NYCDEP, NYFD, NYSDEC:
  - Environmental Regulatory Compliance;
  - Groundwater/Stormwater Dewatering for Construction;
  - Dry cleaners Installation;
  - Autobody Spray Booth Installation;
  - Soil Removal and Disposal;
- Environmental remediation: Phase I ESA, Phase II ESI, Remedial Action Reports, Final Engineering Reports, and Site Management Plans;
- Field Activity Experience:
  - Soil waste characterization sampling;
  - In-situ chemical injections, groundwater sampling;
  - Respirable crystalline silica sampling;
  - Community air monitoring for trucking and soil excavation;
  - Vapor barrier inspections (VB) (NYCSCA, NYCOER, NYSDEC);
  - Sub-slab depressurization system inspections (SSDS);
  - Stormwater Pollution Prevention Plan inspections (erosion & sediment control)
- Supervised and trained new hires for: CAD design, report writing, and fieldwork activities;
- List of VB and SSDS inspections:

Site Name or Address	Project Agency / type NYCSCA / NYCOER / NYCDOH / NYSDEC	Project Number	Year
PS 66Q	NYC SCA	LLW: 095902	2018
PS 303Q	NYC SCA	LLW: 094753	2017-18
PS 144Q	NYC SCA	LLW: 101036	2018
PS 32K	NYC SCA	LLW: 091559	2018
38-11 31st Street, Queens	NYCOER: E-designation	15CVCP079Q / 14EHAN487Q	2017
103 North 10th Street, Brooklyn	NYCOER: E-designation	04DCP003K / 12EHAZ535K	2017
34-22 35th St, Queens	NYCOER: E-designation	15CVCP109Q / 10RHAZ062Q	2016-17
34-11 Beach Channel Drive, Queens	NYSDEC - Brownfield	C241141	2016-17
84 Sanford Street, Brooklyn	NYCDOH		2016-17
11 Jackson Street, Brooklyn	NYSDEC - Brownfield	C224178	2015
670 Pacific Street, Brooklyn	NYCOER: E-designation	14CVCP217K / 14EH-N227K	2015
871 Grand Street, Brooklyn	NYSDEC - Brownfield	C224165	2015

- Coordinated and scheduled drilling activities with clients and drillers (C Squared Environmental Corporation);
- Filled in as driller's apprentice on an as-needed basis for C Squared Environmental Corporation
  - Advancement and installation of soil borings, monitoring wells, soil-gas vapor implants, and performed in-situ chemical injections;

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CERTIFICATIONS / TRAINING / LICENSES

- OSHA 40 HOUR HAZWOPER (and 8-hour refreshers) — October 2014 – Present
- OSHA 10 HOUR CONSTRUCTION — March 2015 – Present
- CERTIFICATE OF EROSION & SEDIMENT CONTROL TRAINING — October 2014 – October 2017
- MTA NYC TRANSIT TRACK SAFETY CERTIFICATION — March 2016 – March 2018
- ENGINEER IN TRAINING (EIT) [ID: 14-944-15] — March 2014 – Present

TECHNICAL SKILLS

- *Computer Software*: TurboCAD, Microsoft Office—Word, Excel, PowerPoint
- *Programming*: C/C++, Wolfram Mathematica, Matrix Laboratory (MATLAB)

EDUCATION

Stony Brook University – SUNY: *B.E Chemical and Molecular Engineering* Graduated: May 2014

- Recipient of: Weinig Foundation Scholarship, and Presidential Scholarship
- University Scholar (Fall 2010 – May 2014)

PROFESSIONAL AFFILIATIONS

American Institute of Chemical Engineers (AIChE), *Metro New York Section* June 2013 – Present

- **Chapter Treasurer** September 2016 - Present
- **Student Outreach Coordinator** September 2015 – Present

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AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474
Email: nrandazzo@amc-engineering.com

Nicholas Randazzo, EIT

RELEVANT EXPERIENCE

AMC Engineering, PLLC – *Environmental Engineer* June 2018 - Present

- Environmental engineering consulting services
- Permitting, design, and report generation for NYCDEP and NYSDEC:
  - Groundwater/stormwater dewatering for construction
  - Soil removal and disposal
  - SPDES Permit modification filing
- Environmental Remediation: Final Engineering Reports, Site Management Plans
- Field activity experience:
  - Soils waste characterization sampling
  - In-situ chemical injections, groundwater sampling
  - Respirable crystalline silica sampling
  - Community air monitoring for trucking and soil excavation
  - Vapor barrier (VB) inspections
  - Sub-slab depressurization system (SSDS) inspection
  - Stormwater Pollution Prevention Plan inspections (erosion and sediment control)
- List of VB and SSDS inspections:

Site Name or Address	Project Agency / Type	Project Number	Year
PS 143Q	NYC SCA	LLW: 096533	2018
PS 128Q	NYC SCA	LLW: 104319	2018
PS 129Q	NYC SCA	LLW: 104739	2018
PS 256Q	NYC SCA	LLW: 104649	2019
PS 375Q	NYC SCA	LLW: 107399	2019
PS 667K	NYC SCA	LLW: 107936	2019
11-28 31st Drive, Queens, NY	NYSDEC - Brownfield	C241159	2018

CERTIFICATIONS / TRAINING / LICENSES

- OSHA 40 Hour HAZWOPER June 2018 - Present
- OSHA 10 Hour Construction August 2018 - Present
- Certificate of Erosion and Sediment Control Training August 2018 - Present
- Long Island Railroad Track Training July 2018 – Present
- MTA Track Training September 2018 – Present

TECHNICAL SKILLS

- *Computer Software*: TurboCAD, Microsoft Office – Word, Excel, PowerPoint

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AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474
Email: nrandazzo@amc-engineering.com

- *Programming*: C++

EDUCATION

Macaulay Honors College at the City College of New York:

B.E. Chemical Engineering, Minor in Mathematics Graduated: May 2018

- Awards: Grove School of Engineering Alumni Medal in Chemical Engineering, Honorary Zemansky Introductory Physics Prize
- Dean's List: Fall 2014 – May 2018

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Michael Li, P.E.

68 Jay Street
Brooklyn, NY 11201
Mobile (917) 273-7628

New York State Professional Engineer specializing in the estimating, design, and installation oversight of Vapor Intrusion Mitigation Systems as well as other CSI Divisions 2, 3, 7, & 15 specialties. Emphasis on oversight and inspection of Gas Vapor Barriers, Liquid Boot Fluid-Applied Membranes, and Sub-Slab Depressurization Systems (SSDS) with over 13 years' experience in the Vapor Intrusion Mitigation field. Over 15 years of system controls & HVAC experience.

PROFESSIONAL EXPERIENCE:

Perform Milestone Inspections with Albert DeLima NY PE #059653 & Provide Engineering Oversight on the Following NYSCA Projects:

- SSDS & Liquid Boot Fluid-Applied Gas Vapor Barrier Installations:
  - **PS 264K** Brooklyn, NY
  - **PS 170K** Brooklyn, NY
  - **Promise Academy** Manhattan, NY
- Liquid Boot Fluid-Applied Gas Vapor Barrier Installations:
  - **PS 585Q/Maspeth High School** Queens, NY (also worked with Ariel Czemerinski NY PE #076508 during Milestone Inspections)
  - **New Settlement Community Campus** Bronx, NY (also worked with Ariel Czemerinski NY PE #076508 during Milestone Inspections)
- SSDS Installations:
  - **Beacon High School** Manhattan, NY
  - **PS 340M** Manhattan, NY
  - **Harlem Village Academy High School** Manhattan, NY

Provide Engineering Oversight on the Following NYCSCA Projects:

- SSDS & Liquid Boot Fluid-Applied Gas Vapor Barrier Installations:
  - **PS 338K** Brooklyn, NY
  - **PK 444X** Bronx, NY
- Liquid Boot Fluid-Applied Gas Vapor Barrier Installations:
  - **PS 49Q** Queens, NY
  - **PS 332Q** Queens, NY
  - **IS 125Q** Queens, NY
  - **PS 329K** Brooklyn, NY
  - **PS 335Q** Queens, NY
  - **PS 339Q** Queens, NY
  - **PS 314Q** Queens, NY
  - **PS 315Q** Queens, NY
  - **PS 437K** Queens, NY
- SSDS Installations:
  - **D75X** Bronx, NY
  - **PS 343M** Manhattan, NY
  - **IS 868M** Manhattan, NY

Design of Vapor Intrusion Mitigation Systems:

- **Wine Distribution Center** Bayonne, NJ
  - Design a Passive GeoVent Venting System, Liquid Boot Gas Vapor Barrier, and Dual Monitoring System for new warehouse constructed on a former petroleum tank farm site.
- **Home Depot** Bronx, NY
  - Value engineer the vapor barrier system from Grace Sheet Waterproofing to Liquid Boot Gas Vapor Barrier. Required a new vapor barrier design to meet the requirements of the vapor barrier product and design requirements. Provided Engineering oversight during installation of Liquid Boot for conformance to engineering drawings.
- **Lowes** Seaview, NJ

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- Value engineer the methane monitoring system. Redesigned the Methane Monitoring System to use some of the existing components, provided all electrical schematics and tie-in to BMS. Provided Engineering oversight during installation of Methane Monitoring System for conformance to engineering drawings.

- **Lowes Kings Plaza** Brooklyn, NY
  - Designed a Passive Sub-Slab Depressurization System (with the option to convert to an Active system) and Liquid Boot Gas Vapor Barrier. Provided Engineering oversight during the installation of the SSDS.
- **Lutheran Medical Center** Brooklyn, NY
  - Design a Passive Venting System and Liquid Boot Gas Vapor Barrier System comprised of slotted PVC, cast iron riser pipe and wind-driven ventilator riser pipe termination for maximum system efficiency.
- **Target** Farmingdale, NY
  - Design drawings for existing SSDS & vapor barrier system due to freezer equipment retrofit. Design a complete personnel-monitoring program for the laborers due to potential exposure to methane. Prepare all work plans and health and safety plans. Provide Engineering oversight and monitoring of the work.
- **Apartment Buildings** West Caldwell, NJ
  - Design Active Sub-Slab Depressurizations System to mitigate TCE vapor intrusion into the living space. Three systems were custom designed and installed for each of the three existing buildings. Required building permits, meetings and Engineering oversight.
- **JP Morgan Chase Bank** Various Locations in FL
  - Design a Passive GeoVent Venting System and Liquid Boot Gas Vapor Barrier.
- **Xchange Place Buildings A, C, D, I, J, K** Secaucus, NJ
  - Construction of Sub-Slab Gas Collection and Innovative Sub-Slab Gas Monitoring Systems for Fraternity Meadows, a 60-acre residential complex developed on a former ash landfill. Work also included preparation of various shop drawings for coordination of Sub-Slab Gas Collection and Monitoring System integration with building plumbing, electrical and fire protection services. Provide resolutions to engineering issues arising from integration of system with other trades.

1/2009-Present RLC HVAC Controls LLC – Brooklyn, NY
Owner/Principal

11/2004-4/2018 EAI, Inc. – Jersey City, NJ
Engineer/Chief Estimator

9/2001-10/2004 Ice Cap, Inc. – Westbury, NY
Director of Engineering

EDUCATION:

8/1994-5/1999 Rochester Institute of Technology – Rochester, NY
B.S. Mechanical Engineering

PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS:

New York Professional Engineer #092668
New York Certificate of Authorization #0015686
New Jersey Professional Engineer #24GE05032200
New Jersey Master HVACR Contractor #19HC00093900
OSHA 40-hour HAZWOPER Certificate
OSHA 30-hour Construction Training Course

PROFESSIONAL REFERENCES:

Albert DeLima, P.E.
New York PE #059653
(973) 689-5495
adelima1942@gmail.com

Ariel Czemerinski, P.E.
New York PE #076508
(516) 417-8588
ariel@amc-engineering.com

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ALBERT DELIMA, PE

Professional Qualifications

With over 40 years of experience in the industry, Albert Delima relies on his vast profession experience to providing guidance and oversight in the construction industry. His experience includes technical design, review and construction management. As former Program Engineer for Macdel Engineering, Mr. DeLima provided guidance to the project engineers for over 20 years. His attention to customer service and commitment to quality has led to a portfolio of long term relationships with repeat clients. Mr. DeLima has more than 30 years in the land development and construction industry. His diverse project portfolio includes facilities in the educational, residential, office and commercial arenas.

Education
B.S., Civil Engineering, Worchester Polytechnic Institute, 1963

Professional Experience

Vapor Barrier and Sub-surface Depressurization System – NY & NJ - Design, cost estimates, construction and inspection of the Vapor intrusion mitigation systems. Responsible for certifying installation meets requirements of project plans and specifications. Design of systems in New Jersey and New York; designs for E-Designated site in NYC.

Gas Vapor Barrier Inspections NYCSCA projects

- PS 160, Fort Hamilton Pkwy and 52nd Street Brooklyn
- PS 277, 153 -27 88th Ave, Queens
- PS 287, 110-08 Northern Blvd, Queens
- PS 290, 55-20 Metropolitan Ave, Queens
- Middle College High School, 45-35 Van Dam Street, Queens
- Harlem RBI E. 103rd Street, Harlem, NY
- PS 437K, 701 Caton Ave, Brooklyn
- PS 314Q 88-08 164th Street, Queens
- PS 315Q 43-18 97th Place, Queens
- PS 585Q, Maspeth, Queens

Sub-Slab Depressurization System(SSDS) Inspections NYCSCA projects

- PS 314Q 88-08 164th Street, Queens (Milestone Inspections)
- PS 315Q 43-18 97th Place, Queens (Milestone Inspections)
- PS 437K Caton Ave., Brooklyn. (Milestone Inspections)
- PS 264K, 371 89th Street, Brooklyn (Milestone Inspections)
- PS 868M 10 E 15th Street, Manhattan (Milestone Inspections)
- Beacon High School, 521 W. 43rd Street, Manhattan (Milestone Inspections)
- Harlem RBI E. 103rd Street, Harlem, NY (Milestone Inspections and Final Certification)

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ALBERT DELIMA, PE

Vapor Intrusion Mitigation System Designs

- **18 Park Ave. Jersey City, NJ -** Design of Geovent Venting System/Liquid Boot Gas Vapor Barrier Design for the construction of mixed-use residential high rise located in Jersey City, NJ.
- **Staten Island Homeport Stapleton Waterfront, Staten Island, NY -** Design of passive Geovent Venting System with VI-20 Vapor Barrier for the development of E-Designated site under review of NYC Office of Environmental Remediation.
- **Miller's Ale House, Staten Island, NY -** Design of passive Geovent Venting System with Liquid Boot Gas Vapor Barrier and Methane Sensor System for the development of E-Designated site under review of NYC Office of Environmental Remediation.

Union City High School (Roosevelt Stadium) - responsible for the planning and feasibility studies with the redevelopment agency, architects, and others to develop a workable plan. Its services included: surveys, planning, feasibility studies, major utility relocation and extension, storm water management, site plans, and permits.

Eugenio Maria De Hostos Childhood Center, Union City, NJ - responsible for the demolition plan, grading and drainage plan, utility plan, landscaping plan, site lighting, construction details, soil erosion and sediment control plan, construction specifications, and surveying.

Jose Marti Middle School, Union City, NJ- responsible for Plans and specifications for diverting a sanitary sewer which would run through the proposed school; Plans and specifications for the school site which include: The driveways and parking, drainage and grading plans, sanitary sewer, stormwater management, lighting, landscaping, and soil sediment and erosion control. Plans and specification for the athletic fields which consist of: Surface and underground drainage system, artificial turf details,

Hudson County Culinary Institute, Jersey City, NJ-As part of the ongoing campus expansion Macdel provided surveying as well as other services for this new building. Property corners were set for the entire property.

Bloomfield College, Bloomfield, NJ-Subdivision of new building in college located in Bloomfield, NJ. Performed surveying and subdivision services for all the college properties. The properties total 20± acres.

Hudson County Community College, Jersey City, NJ-Hudson County Community College needed to expand their college campus in Journal Square. A density developed portion of Jersey City. The college purchased an under developed property on a triangular corner lot. Macdel prepared detailed topographic and boundary surveys. We also prepared

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documents for site plans, utility connections and local, county, and state permits.

Englewood Board of Education, Englewood, NJ -The improvements requiring civil engineering design plans and specifications were as follows: Addition and Renovation to Quarles Early Childhood Center (Building addition, Extend Parking). New School at Durie Park (New three story building, Site work, parking and athletic fields). Additions and Renovation to Cleveland Elementary School (New two-story addition, Addition and Renovation to Dismiss Middle School, Handicap Accessibility). Addition and Renovation to Dwight Morrow High School (North & South Building). Renovation to Winton White Stadium (Replace fencing, New soccer field, New illuminated basketball court, New playground equipment).

NJ Transit Hudson-Bergen Light Rail System – This storm water and sewer study included a hydraulic capacity analysis of the sewers along the H-BLRTS route from its start in Bayonne, New Jersey to its proposed northern limit in Tenafly, New Jersey. The route included 350 crossings along the proposed 35-mile rail alignment. We calculated the storm water runoff for each of the drainage basins in the 40 square mile upland watershed. The study included hydraulic capacity analysis for existing pipes and development of improvement alternatives. All sewer crossings and down stream segments were field surveyed.

Southern New Jersey Light Rail Transit System, Palmyra & Riverton, NJ – Design of utilities that cross the proposed Light Rail Line. Project included analysis of existing utilities and preparation of construction documents for utility relocations. Recommendations were made for replacement of lines found to be inadequate by the loading analysis.

PSE&G Underground Electric Systems Upgrade, Newark, NJ – New ramps, viaducts and realignment of Route 21 in Newark required relocation of existing underground electric manhole and conduit systems. Project consisted of survey and mapping of existing surface features and all known existing underground utilities, and included preparation of plans for replacement and upgrade of underground electric systems. Alignment was designed to ensure the existing system would remain operational until the new system was energized and compatible with the proposed NJDOT improvements.

Wal-mart/Sam's Club, Secaucus, NJ – An existing 20-acre vacant parcel in the New Jersey Meadowlands Commission District was developed for retail space. The two buildings total 130,000-sf plus a 1,400 car parking lot. Macdel provided surveying and site planning services. Our storm water management design included four water quality and quantity basins.

Benjamin Franklin Bridge Renovation, Philadelphia, PA – Surveys and comprehensive utility mapping for renovation of this historic bridge connecting Philadelphia and Camden, NJ. Project included location of all existing utility and drainage structures and required data collection and

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research based on historic utility mapping available from city and state agencies. Mapping covered a 1.5-mile corridor including toll plazas, approach ramps and local city streets proximate to the bridge.

Professional Registrations and Certifications

Professional Engineer, New Jersey, #23438, 1976
Professional Engineer, New York, #059653-1, 1982
Professional Engineer, Connecticut, #24709, 2005
NJDEP UST Certification, #0010243, 1995
OSHA Hazardous Waste Operations and Emergency Response; 40 Hours, October 2010
OSHA Hazardous Materials Health & Safety Training; 8-Hour, December 2010

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TRC
1430 Broadway, 10th Floor
New York, New York, 10018

Main 212.221.7822
Fax 212.221.7840

Transmittal

To: Anna Ramirez
IEH Division
New York City School Construction Authority
30-30 Thomson Avenue
Long Island City, NY 11101-3045
(718) 472-8620

Date: September 10, 2019

TRC No: 356549.0000.0000

Project: K671
840 5th Avenue
Brooklyn, NY
LLW#: 106889

We have enclosed:

☐	B/W Prints	☐	Reproducible	☐	Reports	☐	Letter
☐	Specifications	☐	Memorandum	X	Contractor Submittals		

Description

Gas Vapor Barrier Product Data (02220-003-000)
No Exceptions Taken

Sent Via:

☐	Messenger	☐	1st Class Mail	☐	FedEx [Type]	X	Email

Copy to: M. Sherwood (NYCSCA)

Very truly yours,
TRC

Phillip Castellano, PE

AMCC CORP.

50-18 VERNON BLVD

LONG ISLAND CITY, NY 11101

Phone: 718-472-9500
Fax: 718-472-2250

TRANSMITTAL

No. 00083

PROJECT: PS671k

DATE: 09/03/2019

TO: GRAVES-MMA JV Architects, PLLC
3297 Route 66, Studio B
Neptune, NJ 07753

REF: 02220 -Liquid Boot GasVaporBarrier(Fluid-Applied) Submittal Schedule + Inspection Schedule + Product Data + Shop Drawing + Resume Engineer

ATTN: Pete Larsen

WE ARE SENDING:		SUBMITTED FOR:		ACTION TAKEN:	
[√]	Shop Drawings	[√]	Approval	[ ]	Approved as Submitted
[ ]	Letter	[ ]	Your Use	[ ]	Approved as Noted
[ ]	Prints	[√]	As Required	[ ]	Returned After Loan
[ ]	Change Order	[ ]	Review and Comment	[ ]	Resubmit
[ ]	Plans			[√]	Submit
[ ]	Samples	**SENT VIA:**		[ ]	Returned
[ ]	Specifications	[√]	Attached	[ ]	Returned for Corrections
[ ]	Other:	[ ]	Separate Cover Via: Mail	[ ]	Due Date:

ITEM NO.	COPIES	DATE	ITEM	NUMBER	REV. NO.	DESCRIPTION	STATUS
001	1	09/03/2019	SUT	02220-001	000	Submittal Schedule - Liquid Boot Gas Vapor Barrier	NEW
002	1	09/03/2019	SUT	02220-002	000	Inspection Schedule - Liquid Boot Gas Vapor Barrier	NEW
003	1	09/03/2019	SUT	02220-003	000	Product Data - Liquid Boot Gas Vapor Barrier	NEW
004	1	09/03/2019	SUT	02220-004	000	Shop Drawing - Liquid Boot Gas Vapor Barrier	NEW
005	1	09/03/2019	SUT	02220-005	000	Resume Engineer - Liquid Boot Gas Vapor Barrier	NEW

Remarks:

CC: Main Office / Field Copy

Signed Bobby Kang
Bobby Kang

Liquid Boot
Gas Vapor Barrier (Fluid-Applied)

Specification Section 02220

SUBMITTAL

Project:

PS 671K New Building

840 5th Avenue
Brooklyn, NY 11232

Submitted By:

EAI INC

50 Prescott Street • Jersey City, NJ 07304
Ph: (201) 395-0010 • F: (201) 395-0020

Submitted To:

AMCC Corp.

50-18 Vernon Blvd • Long Island City, NY 11101
Ph: (718) 472-9500 • F: (718) 472-2250

Date Submitted:

August 30th, 2019

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TABLE OF CONTENTS

1) SUBMITTAL SCHEDULE
2) INSPECTION SCHEDULE
3) PRODUCT DATA
4) SHOP DRAWINGS
5) RESUME OF PROFESSIONAL ENGINEER

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3) PRODUCT DATA

TRC Engineers, Inc.		
☑ No Exceptions Taken	Exp. Proj. Name: K671	Reviewed By R. Bowden, P. Castellano
☐ Make Corrections Noted	Design/LLW No. 106889	Contract No. C000015348
☐ Rejected – Revise and Resubmit	Date Received 9/5/19	Date Returned 9/10/19
☐ Rejected – Not Acceptable for ☐ No Action Taken	Submittal No. 02220-003-000	

Submittal reviewed as:

☑ Per Spec/ Basis of Design ☐ "Or Equal Substitution"/Non-basis of Design ☐ "Alternate Substitution"

CORRECTIONS OR COMMENTS MADE ON THE SUBMITTAL DURING THIS REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. SUBMITTAL APPROVAL IS ONLY FOR GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION, PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATING THE WORK WITH THAT OF ALL OTHER TRADES AND PERFORMING THE WORK IN A SAFE AND SATISFACTORY MANNER.

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LIQUID BOOT®

SPRAY-APPLIED GAS VAPOR BARRIER

DESCRIPTION

LIQUID BOOT® is a seamless, spray-applied, water-based membrane containing no VOCs, which provides a barrier against vapor intrusion into structures. LIQUID BOOT® is installed under slab and on below grade vertical walls as a gas vapor barrier to minimize vapor and nuisance water migration into buildings. LIQUID BOOT® spray-application directly to penetrations, footings, grade beams, pile caps and other irregular surfaces, provides for a fully-adhered gas vapor barrier system.

APPLICATIONS

LIQUID BOOT® is used as an underslab and below-grade vertical wall gas vapor barrier, used to minimize vapor and nuisance water (non-hydrostatic conditions) migration into buildings. LIQUID BOOT® is ideal for methane migration control. LIQUID BOOT® is also NSF® certified for use as a potable water liner in concrete water reservoirs and tanks greater than 300,000 gallons to protect the concrete from water seepage.

BENEFITS

- Spray-application provides excellent sealing of penetrations, eliminating the need for mechanical fastening
- Seamless, monolithic membrane eliminates seaming-related membrane failures
- Unique formulation provides superior protection from methane gases and water vapor
- Fully adhered system reduces risk of gas migration
- Protection from methane gas, VOCs, chlorinated solvents and other contaminates

INSTALLATION

Protect all adjacent areas not to receive gas vapor barrier. Ambient temperature shall be within manufacturer's specifications. All plumbing, electrical, mechanical and structural items to be under or passing through the gas vapor barrier shall be secured in their proper positions and appropriately protected prior to membrane application. Gas vapor barrier shall be installed before placement of rein-forcing steel. Expansion joints must be filled with a conventional waterproof expansion joint material. Surface preparation shall be per manufacturer's specification. A minimum thickness of 60 dry mils, unless specified otherwise.

LIMITED WARRANTY

CETCO warrants its products to be free of defects. This warranty only applies when the product is applied by Approved Applicators trained by CETCO. As factors which affect the result obtained from this product, including weather, equipment, construction, workmanship and other variables are all beyond CETCO's control, we warrant only that the material herein conforms to our product specifications. Under this warranty we will replace at no charge any product proved to be defective within 12 months of manufacture, provided it has been applied in accordance with our written directions for uses we recommend as suitable for this product. This warranty is in lieu of any and all other warranties expressed or implied (including any implied warranty of merchantability or fitness for a particular use), and the Manufacturer shall have no further liability of any kind including liability for consequential or incidental damages resulting from any defects or any delays caused by replacement or otherwise. This warranty shall become valid only when the product has been paid for in full.



In addition to superior chemical resistance performance, LIQUID BOOT® spray-application effectively seals penetrations, footings, grade beams and other irregular surfaces that are considered critical vapor intrusion pathways.

EQUIPMENT

- COMPRESSOR: Minimum output of 155–185 cubic feet per minute (CFM)
- PUMPS: For "A" drum, an air-powered piston pump of 4:1 ratio (suggested model: Graco, 4:1 Bulldog). For "B" drum, an air-powered diaphragm pump (0–100 psi)
- HOSES: For "A" drum, ½" wire hose with a solvent resistant core (for diesel cleaning flush), hose rated for 500 psi minimum. For "B" drum, a 3/8" fluid hose rated at only 300 psi may be used.
- SPRAY WAND: Only the spray wand sold by CETCO is approved for the application of LIQUID BOOT®.
- SPRAY TIPS: Replacement tips can be purchased separately from CETCO.

PACKAGING

LIQUID BOOT® is available in the following packaging options:

- 55 Gallon Drum
- 275 Gallon Tote

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LIQUID BOOT®

SPRAY-APPLIED GAS VAPOR BARRIER

TESTING DATA

CHEMICAL & PHYSICAL PROPERTIES		
CHEMICAL PROPERTY	TEST METHOD	RESULT
Acid Exposure (10% H_2SO_4 for 90 days)	ASTM D543	Less than 1% weight change
Benzene Diffusion Test	Tested at 43,000 ppm	2.90 x 10^{-11} m^2/day
Chemical Resistance: VOCs, BTEXs (tested at 20,000 ppm)	ASTM D543	Less than 1% weight change
Chromate Exposure (10% Chromium6+ salt for 31 days)	ASTM E96	Less than 1% weight change
Diesel (1000 mg/l), Ethylbenzene (1000 mg/l), Naphthalene (5000 mg/l) and Acetone (500 mg/l) Exposure for 7 days	ASTM D543	Less than 1% weight change; Less than 1% tensile strength change
Hydrogen Sulfide Gas Permeability	ASTM D1434	None Detected
Methane Permeability	**ASTM 1434-82**	**Passed***
Microorganism Resistance	**ASTM D4068-88**	**Passed***
Oil Resistance	**ASTM D543-87**	**Passed***
PCE Diffusion Coefficient	Tested at 120 mg/L	1.32 x 10^{-13} m^2/sec
Radon Permeability	Tested by US Dept. of Energy	Zero permeability to Radon (222Rn)
TCE Diffusion Coefficient	Tested at 524 mg/L	9.07 x 10^{-13} m^2/sec

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LIQUID BOOT®

SPRAY-APPLIED GAS VAPOR BARRIER

TESTING DATA

CHEMICAL & PHYSICAL PROPERTIES		
PHYSICAL PROPERTY	TEST METHOD	RESULT
Accelerated Weathering and Ultraviolet Exposure	ASTM D822	No adverse effect after 500 hours
Air Infiltration	ASTM E283-91	0 cfm/sq. ft.
Bonded Seam Strength Tests	ASTM D6392	Passed*
Coefficient of Friction (with geotextile both sides)	ASTM D5321	0.72
Cold Bend Test	ASTM D146	Passed. Ø cracking at –25°F
Dead Load Seam Strength	City of Los Angeles	Passed*
Electric Volume Resistivity	ASTM D257	1.91 x 1010 ohms-cm
Elongation	ASTM D412	1,332% Ø reinforcement, 90% recovery
Elongation w/8 oz. non-woven geotextile both sides	ASTM D751	100% (same as geotextile tested separately)
Environmental Stress-Cracking	ASTM D1693-78	Passed*
Flame Spread	ASTM E108	Class A with top coat (comparable to UL790)
Freeze-Thaw Resistance (100 Cycles)	ASTM A742	Meets criteria. Ø spalling or disbondment
Heat Aging	ASTM D4068-88	Passed*
Hydrostatic Head Resistance	ASTM D751	Tested to 138 feet or 60 psi
Potable Water Containment	ANSI/NSF 61	NSF Certified for tanks >300,000 gal
Puncture Resistance w/8 oz. non-woven geotextile both sides	ASTM D4833	286 lbs. (travel of probe = 0.756 in)
Sodium Sulfate (2% water solution)	ASTM D543, D412, D1434	Less than 1% weight change
Soil Burial	ASTM E154-88	Passed
Tensile Bond Strength to Concrete	ASTM D413	2,556 lbs/ft² uplift force
Tensile Strength	ASTM D412	58 psi without reinforcement
Tensile Strength w/8 oz. non-woven geotextile both sides	ASTM D751	196 psi (same as geotextile tested separately)
Toxicity Test	22 CCR 66696	Passed
Water Penetration Rate	ASTM D2434	$<7.75 \times 10^{-9}$ cm/sec
Water Vapor Permeance	ASTM E96	0.069 perms

North America: 847.851.1800 | 800.527.9948 | www.cetco.com

UPDATED: DECEMBER 2017

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FORM: TDS_LIQUID_BOOT_AM_EN_201712_V3

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VI-20™ GEOMEMBRANE

HIGH-PERFORMANCE VAPOR INTRUSION BARRIER

DESCRIPTION

VI-20™ is a 7-layer co-extruded geomembrane made using high quality virgin-grade polyethylene and EVOH resins that provide unmatched impact strength as well as superior resistance to VOC vapor transmission. EVOH technology serves as a highly resilient underslab and vertical wall barrier designed to restrict methane, radon and other harmful chemicals. Applications for EVOH originated in the manufacturing of automotive fuel systems to control emissions of hydrocarbons, whose use was mandated by the US EPA and the CA Air Resources Board (CARB) to reduce VOC emissions.

APPLICATION

VI-20™ is a 20-mil, high performance polyethylene-EVOH copolymer geomembrane, specially designed for use as a VOC barrier when used in conjunction with Liquid Boot® spray-applied vapor intrusion membrane to minimize vapor intrusion and nuisance water (non-hydrostatic conditions) migration into buildings. VI-20™ is ideal for applications with chlorinated solvents, BTEX and other PAHs.

BENEFITS

- Polyethylene layers provide excellent chemical resistance and physical properties
- EVOH barrier technology provides superior protection against diffusion of chemicals when compared to typical HDPE geomembranes
- Manufactured at ISO 9001:2008 certified plant

INSTALLATION

For use as a component of the Liquid Boot® Plus system, VI-20™ geomembrane is rolled out on prepared sub-grade, overlapping seams a minimum of six inches (6”). The geomembrane is cut around penetrations so that it lays flat on the sub-grade and tight at all inside corners. A thin (20 mil) tack coat of Liquid Boot® (“A” side without catalyst) is sprayed within the seam overlap. Once the VI-20™ geomembrane is installed, penetrations are then treated with VI-20™ Detailing Fabric prior to installation of the Liquid Boot® spray-applied vapor intrusion membrane and UltraShield™ G-1000 protection course.



EVOH technology provided in VI-20™ geomembrane has been shown to have VOC diffusion coefficients 20 times lower than an 80 mil (2 mm) HDPE geomembrane.

PACKAGING

VI-20™ Geomembrane is available in the following packaging option:

- 10 ft. x 150 ft. (3 m x 45 m) Rolls

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VI-20™ GEOMEMBRANE

HIGH-PERFORMANCE VAPOR INTRUSION BARRIER

VI-20™ CHEMICAL & PHYSICAL PROPERTIES		
CHEMICAL PROPERTY	TEST METHOD	RESULT
Benzene Diffusion Coefficient	EPA Method 8260	4.5×10^{-15} m²/s
Ethylbenzene Diffusion Coefficient	EPA Method 8260	4.0×10^{-15} m²/s
m&p-Xylenes Diffusion Coefficient	EPA Method 8260	3.7×10^{-15} m²/s
Methane Permeance	ASTM D1434	$< 1.7 \times 10^{-10}$ m²/d•atm
o-Xylene Diffusion Coefficient	EPA Method 8260	3.7×10^{-15} m²/s
Radon Diffusion Coefficient	SP Test Method	$<0.25 \times 10^{-12}$ m²/s
Toluene Diffusion Coefficient	EPA Method 8260	4.2×10^{-15} m²/s
PHYSICAL PROPERTY	TEST METHOD	RESULT
Membrane Composite Thickness	ASTM D5199	20 mil (0.5 mm)
Impact Resistance	ASTM D1709	2,600 g
Tensile Strength	ASTM E154 Section. 9	58 lbf/in (1.0 N/m)
Water Vapor Transmission	ASTM E154 & E96	0.004 grains/hr-ft² (0.0028 g/hr-m²)
Water Vapor Retarder Classification	ASTM E1745	Class A, B & C

NOTE:
These are typical property values.

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FORM: TDS_VI-20_GEOMEMBRANE_AM_EN_201705_V2

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ULTRASHIELD™ G-1000

NON-WOVEN GEOTEXTILE FABRIC

DESCRIPTION

ULTRASHIELD™ G-1000 is a polypropylene, staple fiber, non-woven geotextile. The fibers are needled-punched, forming a stable network that retains dimensional stability relative to each other. The geotextile is resistant to ultraviolet degradation and biological and chemical environments found in soils. Manufacturing Quality Control tests have been performed and are accredited by the Geosynthetic Accreditation Institute's Laboratory Accreditation Program (GAI-LAP).

APPLICATION

ULTRASHIELD™ G-1000 is designed for use as a underslab adhesion protection course specially designed and required for underslab LIQUID BOOT® applications where the membrane must remain attached to the underslab of the building. This is to ensure the membrane remains in place despite soil settlement, which is common when building is on a landfill.

BENEFITS

ULTRASHIELD™ G-1000 is installed directly over the finished LIQUID BOOT® vapor intrusion barrier, providing superior protection from other trades.

PACKAGING

- 15 ft. x 180 ft. (4.5 m x 55 m) Rolls



ULTRASHIELD™ G-1000 is a needle-punched, non-woven geotextile with superior tensile strength and puncture resistance.

TESTING DATA

PHYSICAL PROPERTIES			
PROPERTY	TEST METHOD	RESULT (ENGLISH)	RESULT (METRIC)
Tensile Bond Strength to Concrete[3]	ASTM C 297-94	7 psi	
Mass/Unit Area	ASTM D 5261	10.0 oz/yd²	339 g/m²
Thickness	ASTM D 5199	105 mils	2.7 mm
Tensile Strength	ASTM D 4632	270 lbs.	1202 N
Elongation	ASTM D 4632	50%	50%
CBR Puncture Strength	ASTM D6241	725 lbs.	3226 N
Trapezoid Tear	ASTM D 4533	105 lbs.	467 N
UV Resistance	ASTM D 4355	70%	70%
A.O.S.	ASTM D 4751	100 U.S. Sieve	0.150 mm
Permittivity	ASTM D 4491	1.2 sec^{-1}	1.2 sec^{-1}
Permeability	ASTM D 4491	0.30 cm/sec	0.30 cm/sec
Water Flow Rate	ASTM D 4491	85 gal/min//ft²	3463 l/min/m²

NOTES:

1. The property values listed above are effective 04/2011 and are subject to change without notice.
2. All values shown are in weaker principal direction and are Minimum average roll values (MARV), except for AOS, which is a Maximum average roll value.
3. Historical value, based on past testing.

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FORM: TDS_ULTRASHIELD_G-1000_AM_EN_201705_V2

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LIQUID BOOT® LT
SPRAY-APPLIED GAS VAPOR BARRIER

PRODUCT DESCRIPTION

Liquid Boot® LT is specially formulated for use as a:

- Gas Vapor Barrier
- Damp Proofing Membrane

Damp proofing membrane is intended to provide a barrier to water in non-hydrostatic incidental water conditions. Liquid Boot® has been specially designed as an impermeable vapor membrane/barrier for proj-ects that are situated on sites with volatiles, gases or contaminants in the soil. Liquid Boot® is manufac-tured to meet or exceed the minimum average values listed in the chart below.

INSTALLATION

Protect all adjacent areas not to receive gas vapor barrier. Spraying temperature shall be 25 degree F or higher. All plumbing, electrical, mechanical and structural items to be under or passing through the gas vapor barrier shall be secured in their proper positions and appropriately protected prior to membrane application. Gas vapor barrier shall be installed before placement of rein-forcing steel. Expansion joints must be filled with a conventional waterproof expansion joint material. Surface preparation shall be per manufacturer's specification. A minimum thickness of 60 dry mils, unless specified otherwise.

BENEFITS

- Spray application provides excellent sealing of penetrations
- Seamless, monolithic membrane means no mechanical fastening required
- Protection from methane gas, VOCs, chlorinated solvents and other contaminates
- Also protects against water vapor

LIQUID BOOT LT

Chemical Property	**Test Method**	**Result**
Benzene Diffusion Coefficient	Tested at 450 ppm	3.1×10^{-13} m^2/s
TCE Diffusion Coefficient	Tested at 524 ppm	1.1×10^{-12} m^2/s
PCE Diffusion Coefficient	Tested at 120 ppm	3.1×10^{-13} m^2/s
Physical Property	**Test Method**	**Result**
Bonded Seam Strength	ASTM D6392	45.3 lbf (46.7 lbf w/o seam)
Cold Bend Test	ASTM D146	Ø cracking at 0°C
Elongation w/ 4oz non-woven geotextile	ASTM D751	113%
Puncture Resistance w/ 4oz non-woven geotextile	ASTM D4833	57 lbf (probe travel = 0.772 in)
Puncture Resistance w/ 4oz non-woven geotextile	ASTM E154	152 lbf (probe travel = 2.04 in)
Adhesion to Concrete	ASTM D903	13.2 lbf/in
Tensile Strength w/ 4oz non-woven geotextile	ASTM D751	197 lbf
Tensile Bond Strength to Concrete	ASTM D7234	60 psi (8,640 lbf/ft^2)

800.527.9948 Fax 847.577.5566 For the most up-to-date product information, please visit our website, www.cetco.com.
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LIMITED WARRANTY

CETCO warrants its products to be free of defects. This warranty only applies when the product is applied by Approved Applicators trained by CETCO. As factors which affect the result obtained from this product, including weather, equipment, construction, work-manship and other variables are all beyond CETCO's control, we warrant only that the material herein conforms to our product specifications. Under this warranty we will replace at no charge any product proved to be defective within 12 months of manufacture, provided it has been applied in accordance with our written directions for uses we recommend as suitable for this product. This warranty is in lieu of any and all other warranties expressed or implied (including any implied warranty of merchantability or fitness for a particular use), and the Manufacturer shall have no further liability of any kind including liability for consequential or incidental damages resulting from any defects or any delays caused by replacement or otherwise. This warranty shall become valid only when the product has been paid for in full.

PACKAGING

- 55 Gallon Drum
- 275 Gallon Tote

LIMITATIONS

- Do not allow materials to freeze in containers.
- Store Liquid Boot® at site in strict compliance with manufacturer's instructions.
- When applying material below 25°F, contact your local technical sales manager.

EQUIPMENT

Contact CETCO for complete equipment specifications

- COMPRESSOR: Minimum output of 155-185 cubic feet per minute (CFM)
- PUMPS: For "A" drum, an air-powered piston pump of 4:1 ratio (suggested model: Graco, 4:1 Bulldog). For "B" drum, an air-powered diaphragm pump (0 -100 psi)
- HOSES: For "A" drum, ½" wire hose with a solvent resistant core (for diesel cleaning flush), hose rated for 500 psi minimum. For "B" drum, a 3/8" fluid hose rated at only 300 psi may be used.
- SPRAY WAND: Only the spray wand sold by CETCO is approved for the application of Liquid Boot®.
- SPRAY TIPS: Replacement tips can be purchased separately from CETCO.

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TECHNICAL DATA

LIQUID BOOT® Trowel Grade

TROWEL-APPLIED GAS VAPOR BARRIER

DESCRIPTION

Liquid Boot® is a trowel-applied, water-based membrane containing no VOCs, which provides a barrier against vapor intrusion into structures. Liquid Boot® Trowel Grade is installed in conjunction with the Liquid Boot® gas vapor barrier to minimize vapor and nuisance water migration. Liquid Boot® Trowel Grade offers additional protection around penetrations, providing for a fully-adhered gas vapor barrier system.

APPLICATIONS

Liquid Boot® Trowel Grade is used for detailing around penetrations and for repairs in Liquid Boot® gas vapor barrier applications.

BENEFITS

- Trowel application provides excellent sealing of penetrations
- Seamless, monolithic membrane means no mechanical fastening required
- Protection from methane gas, VOCs, chlorinated solvents and other contaminates
- Also protects against water vapor



In addition to superior chemical resistance performance, Liquid Boot® Trowel Grade effectively seals penetrations, which are considered critical vapor intrusion pathways.

LIMITATIONS

- Do not allow materials to freeze in containers.
- Store Liquid Boot® Trowel Grade at site in strict compliance with manufacturer's instructions.
- When applying material below 45°F, contact your local technical sales manager.

PACKAGING

Liquid Boot® Trowel Grade is available in the following packaging options:

- 1 Gallon Bucket
- 8 oz. bottle of catalyst uncluded)

TESTING DATA

CHEMICAL & PHYSICAL PROPERTIES		
CHEMICAL PROPERTY	**TEST METHOD**	**RESULT**
Acid Exposure (10% H_2SO_4 for 90 days)	ASTM D543	Less than 1% weight change
Benzene Diffusion Test	Tested at 43,000 ppm	2.90 x 10^{-11} m^2/sec
Chemical Resistance: VOCs, BTEXs (tested at 20,000 ppm)	ASTM D543	Less than 1% weight change
Chromate Exposure (10% Chromium6+ salt for 31 days)	ASTM E96	Less than 1% weight change
Diesel (1000 mg/l), Ethylbenzene (1000 mg/l), Naphthalene (5000 mg/l) and Acetone (500 mg/l) Exposure for 7 days	ASTM D543	Less than 1% weight change; Less than 1% tensile strength change
Hydrogen Sulfide Gas Permeability	ASTM D1434	None Detected
Methane Permeability	**ASTM 1434-82**	**Passed***
Microorganism Resistance	**ASTM D4068-88**	**Passed***
Oil Resistance	**ASTM D543-87**	**Passed***
PCE Diffusion Coefficient	Tested at 6,000 mg/m^3	2.74 x 10^{-14} m^2/sec
Radon Permeability	Tested by US Dept. of Energy	Zero permeability to Radon (222Rn)
TCE Diffusion Coefficient	Tested at 20,000 mg/m^3	8.04 x 10^{-14} m^2/sec

2870 Forbs Avenue, Hoffman Estates, IL 60192
800.527.9948 | http://remediation.cetco.com

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LIQUID BOOT® Trowel Grade

TROWEL-APPLIED GAS VAPOR BARRIER

TESTING DATA cont'd.

PHYSICAL PROPERTY	TEST METHOD	RESULT
Accelerated Weathering and Ultraviolet Exposure	ASTM D822	No adverse effect after 500 hours
Air Infiltration	ASTM E283-91	0 cfm/sq. ft.
Bonded Seam Strength Tests	ASTM D6392	Passed*
Coefficient of Friction (with geotextile both sides)	ASTM D5321	0.72
Cold Bend Test	ASTM D146	Passed. Ø cracking at -25°F
Dead Load Seam Strength	City of Los Angeles	Passed*
Electric Volume Resistivity	ASTM D257	1.91 x 1010 ohms-cm
Elongation	ASTM D412	1,332% Ø reinforcement, 90% recovery
Elongation w/8 oz. non-woven geotextile both sides	ASTM D751	100% (same as geotextile tested separately)
Environmental Stress-Cracking	ASTM D1693-78	Passed*
Flame Spread	ASTM E108	Class A with top coat (comparable to UL790)
Freeze-Thaw Resistance (100 Cycles)	ASTM A742	Meets criteria. Ø spalling or disbondment
Heat Aging	ASTM D4068-88	Passed*
Hydrostatic Head Resistance	ASTM D751	Tested to 138 feet or 60 psi
Potable Water Containment	ANSI/NSF 61	NSF Certified for tanks >300,000 gal
Puncture Resistance w/8 oz. non-woven geotextile both sides	ASTM D4833	286 lbs. (travel of probe = 0.756 in)
Sodium Sulfate (2% water solution)	ASTM D543, D412, D1434	Less than 1% weight change
Soil Burial	ASTM E154-88	Passed
Tensile Bond Strength to Concrete	ASTM D413	2,556 lbs/ft^2 uplift force
Tensile Strength	ASTM D412	58 psi without reinforcement
Tensile Strength w/8 oz. non-woven geotextile both sides	ASTM D751	196 psi (same as geotextile tested separately)
Toxicity Test	22 CCR 66696	Passed
Water Penetration Rate	ASTM D2434	<7.75 x 10^{-9} cm/sec
Water Vapor Permeability	ASTM E96	0.24 perms
Water Vapor Transmission	ASTM E96	0.10 grains/h-ft^2

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TRC
1430 Broadway, 10th Floor
New York, New York, 10018

Main 212.221.7822
Fax 212.221.7840

Transmittal

To: Anna Ramirez
IEH Division
New York City School Construction Authority
30-30 Thomson Avenue
Long Island City, NY 11101-3045
(718) 472-8620

Date: December 2, 2020

TRC No: 356549.0000.0000

Project: K671
840 5th Avenue
Brooklyn, NY
LLW#: 106889

We have enclosed:

☐	B/W Prints	☐	Reproducible	☐	Reports	☐	Letter
☐	Specifications	☐	Memorandum	X	Contractor Submittals		

Description

Gas Vapor Barrier Shop Drawing (02220-004-002)
Make Corrections Noted

Sent Via:

☐	Messenger	☐	1st Class Mail	☐	FedEx [Type]	X	Email

Copy to: M. Sherwood (NYCSCA)

Very truly yours,
TRC

Phillip Castellano, PE

TRC Engineers, Inc. (TRC) has reviewed the Gas Vapor Barrier (GVB) Shop Drawing submittal provided for K671. The submittal was prepared by EAI, Inc., is dated November 23, 2020, and was received by TRC on December 1, 2020. Please find TRC's comments to the submittal below.

The submittal has been marked "**Make Corrections Noted".**

Resubmission is only required if the Contractor is unable to comply with the comments below.
TRC notes:

1. The following changes have been made to the labels of detail drawings on Shop Drawing SD002 to make the Section references consistent with those shown on Shop Drawing SD001:

    a. Detail 6 has been updated to state, "SECTION PER F24/ FO204."
    b. Detail 7 has been updated to state, "SECTION PER F25/ FO204."

TRC also notes:

A. The Contractor has updated Detail 1 on Drawing SD002 based on the Addendum 7 updates to foundation details F1/ FO201 and F1A/ FO201 and in accordance with TRC's response to Request for Information 182.

The comments should not be construed in any way as intent to limit the Contractor's responsibilities. The absence of a comment with respect to a specific Contract requirement should not be interpreted as a suggestion to change a Contract requirement.

AMCC CORP.

50-18 VERNON BLVD

LONG ISLAND CITY, NY 11101

Phone: 718-472-9500
Fax: 718-472-2250

TRANSMITTAL

No. 02031

PROJECT: PS671k

DATE: 11/30/2020

TO: GRAVES-MMA JV Architects, PLLC
3297 Route 66, Studio B
Neptune, NJ 07753

REF: 02220-004-002
Shop Drawing - Liquid Boot Gas Vapor Barrier (Flui
EAI rev1

ATTN: Pete Larsen

WE ARE SENDING:		SUBMITTED FOR:		ACTION TAKEN:	
☑	Shop Drawings	☑	Approval	☐	Approved as Submitted
☐	Letter	☐	Your Use	☐	Approved as Noted
☐	Prints	☑	As Required	☐	Returned After Loan
☐	Change Order	☐	Review and Comment	☑	Resubmit
☐	Plans			☐	Submit
☐	Samples	**SENT VIA:**		☐	Returned
☐	Specifications	☑	Attached	☐	Returned for Corrections
☐	Other:	☐	Separate Cover Via: Mail	☐	Due Date:

ITEM NO.	COPIES	DATE	ITEM	NUMBER	REV. NO.	DESCRIPTION	STATUS
004	1	11/30/2020	SUT	02220-004	002	Shop Drawing - Liquid Boot Gas Vapor Barrier (Fluid-Applied)	RESU

Remarks: REVISED SHOP DRAWING PER RFI00182/PC1902214

SD001, SD002, SD003

CC: Main Office / Field Copy
PC1902214

Signed Bobby Kang
Bobby Kang

Primavera ®

EAI INC
ENVIRONMENTAL MANAGEMENT SERVICES
SPECIALTY CONTRACTING

50 Prescott Street
Jersey City, NJ 07304
Office: (201) 395-0010
Fax: (201) 395-0020
www.eaienviro.com

TRANSMITTAL

PROJECT: PS 671K

DATE: 11/23/2020

TO: AMCC Corp.
50-18 Vernon Blvd
Long Island City, NY 11101

RE: 02220 Submittal

ATTN: Bobby Kang

WE ARE SENDING:	SUBMITTED:	SENT VIA:
☑ Shop Drawings	☑ For Approval	☐ Enclosed
☐ Samples	☐ Your Use	☐ Under Separate Cover
☐ Submittal Package(s)	☐ As Requested	☐ Mail – UPS
☐ Plans	☐ Returned After Loan	☐ Mail – USPS
☐ Closeout Documentation	☐ Review and Comment	☑ Email
☐ Other:	☐ Submit Copies for Distribution	☐ Fax

ITEM NO.	DOCUMENT TYPE	QTY	DATE	DESCRIPTION
02220-004-002	Shop Drawings	1	11/23/2020	Revised Shop Drawings per RFI 182

REMARKS:

Please find attached the revised 02220 submittal as requested.

Should you have any questions please do not hesitate to contact me at zaraht@eaienviro.com or (201) 395-0010 ext 259. Thank you!

Sincerely,
Zarah Thanasides

TRC Engineers, Inc.

☐ No Exceptions Taken	Exp. Proj. Name: K671	Reviewed By R. Bowden, P. Castellano
☑ Make Corrections Noted	Design/LLW No. 106889	Contract No. C000015348
☐ Rejected – Revise and Resubmit	Date Received 12/1/20	Date Returned 12/2/20
☐ Rejected – Not Acceptable for	Submittal No. 02220-004-002	
☐ No Action Taken		

Submittal reviewed as:
☑ Per Spec/ Basis of Design ☐ "Or Equal Substitution"/Non-basis of Design ☐ "Alternate Substitution"

CORRECTIONS OR COMMENTS MADE ON THE SUBMITTAL DURING THIS REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. SUBMITTAL APPROVAL IS ONLY FOR GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION, PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATING THE WORK WITH THAT OF ALL OTHER TRADES AND PERFORMING THE WORK IN A SAFE AND SATISFACTORY MANNER.

AMCC - DIGITALLY RECEIVED 11/20/202

Liquid Boot
Gas Vapor Barrier (Fluid-Applied)

Specification Section 02220

SUBMITTAL

Project:

PS 671K New Building

840 5th Avenue
Brooklyn, NY 11232

Submitted By:

EAI INC

50 Prescott Street • Jersey City, NJ 07304
Ph: (201) 395-0010 • F: (201) 395-0020

Submitted To:

AMCC Corp.

50-18 Vernon Blvd • Long Island City, NY 11101
Ph: (718) 472-9500 • F: (718) 472-2250

Date Submitted:

November 23, 2020

AMCC - DIGITALLY RECEIVED 11/20/202

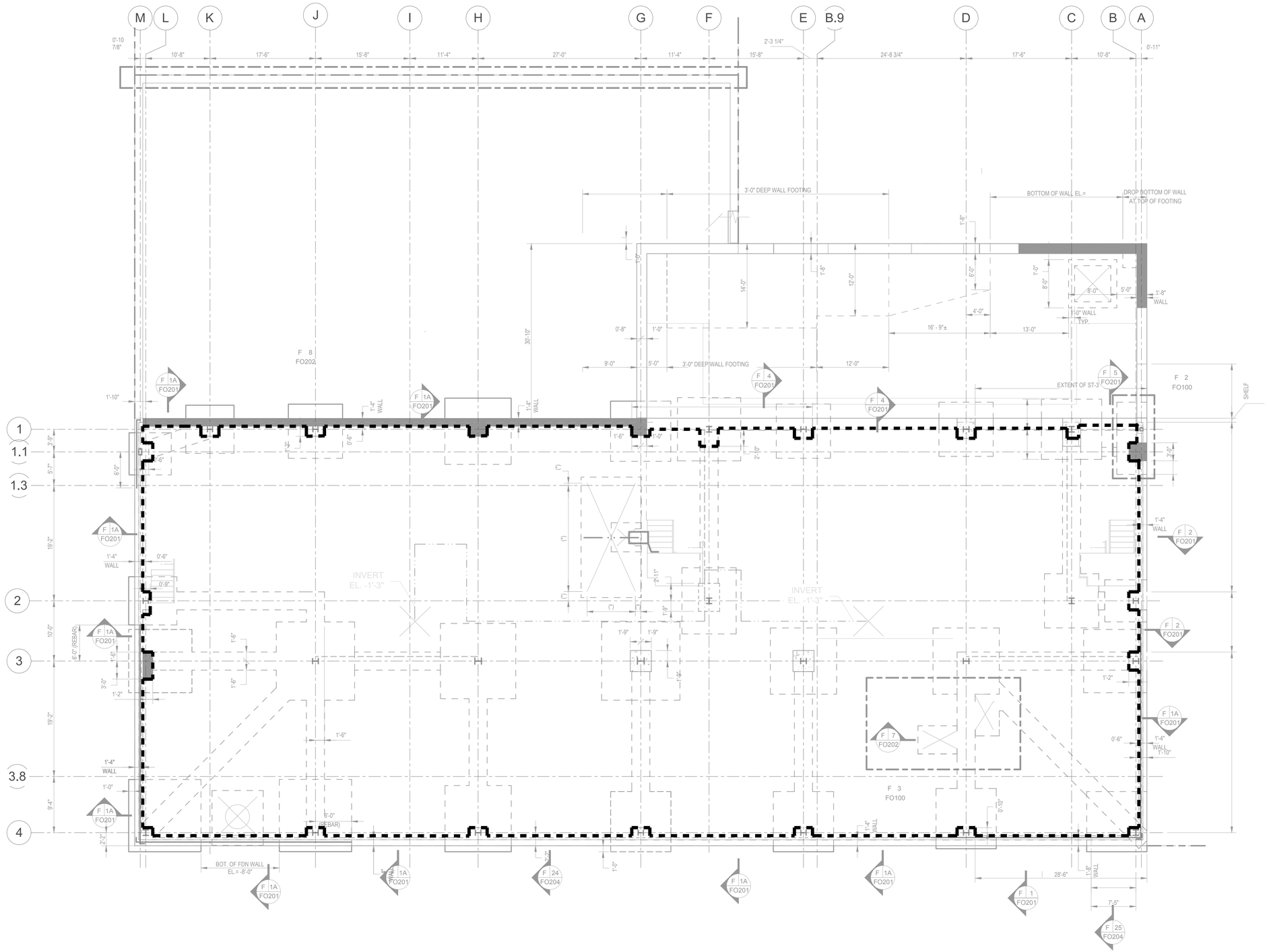
TABLE OF CONTENTS

1) SHOP DRAWINGS

AMCC - DIGITALLY RECEIVED 11/20/202

1) SHOP DRAWINGS

AMCC - DIGITALLY RECEIVED 11/20/202



LEGEND:

HORIZONTAL EXTENT OF LIQUID BOOT GAS VAPOR BARRIER

NOTES:

1. DRAWING NOT TO BE USED FOR ARCHITECTURAL, STRUCTURAL, OR ANY PURPOSE OTHER THAN GAS VAPOR BARRIER.
2. SURFACE PREPARATION BY OTHERS.
3. GAS PERMEABLE AGGREGATE LAYER AND SUBGRADE BY OTHERS.

ISSUED FOR APPROVAL

EAI INC
ENVIRONMENTAL MANAGEMENT SERVICES
SPECIALTY CONTRACTING

50 PRESCOTT STREET
JERSEY CITY, NJ 07304

TEL: (201) 395-0010
FAX: (201) 395-0020

No.	Date	Description
2	11/23/2020	REVISED PER RFI 182
1	8/30/2019	ISSUED FOR REVIEW

Scale:	Date:	
1/8" = 1'-0"	8/30/2019	
Designer:	Drawn by: TS	Checked by: TS

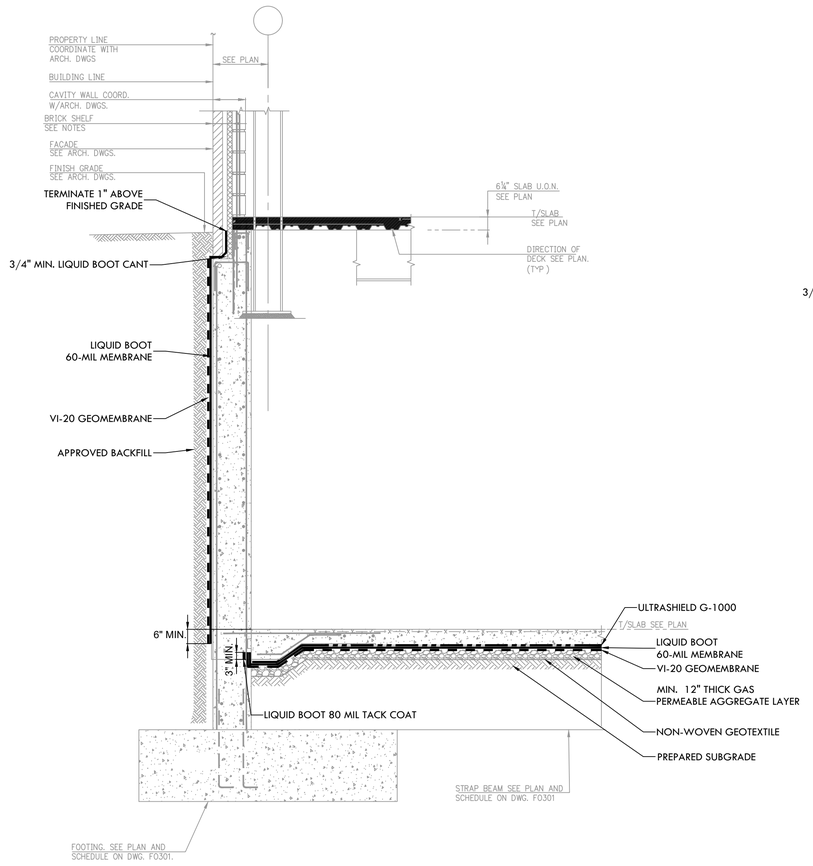
Project:
P.S. 671K
NEW BUILDING

Address:
840 5TH AVENUE
BROOKLYN, NY 11232

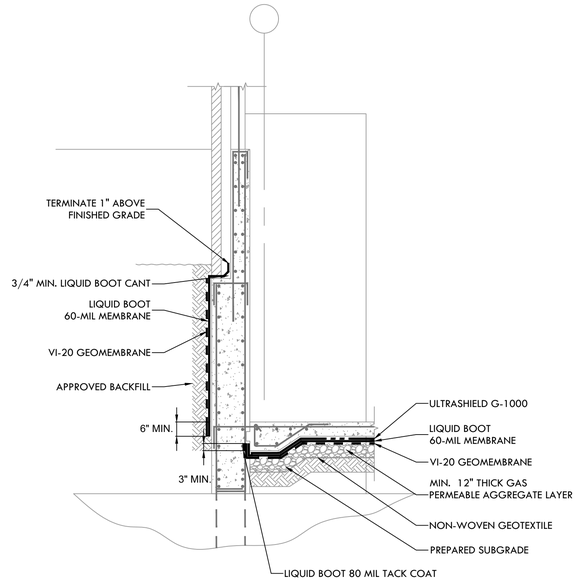
Drawing Title:
GAS VAPOR BARRIER
FOUNDATION LAYOUT

Drawing Title: SD001

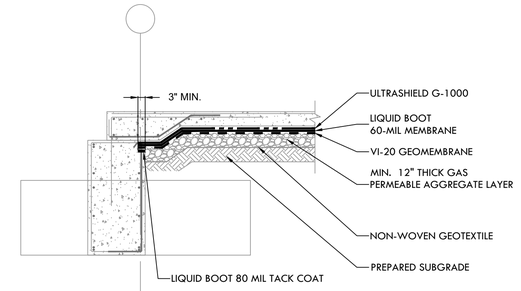
Sheets In Drawing Set:
01 of 03



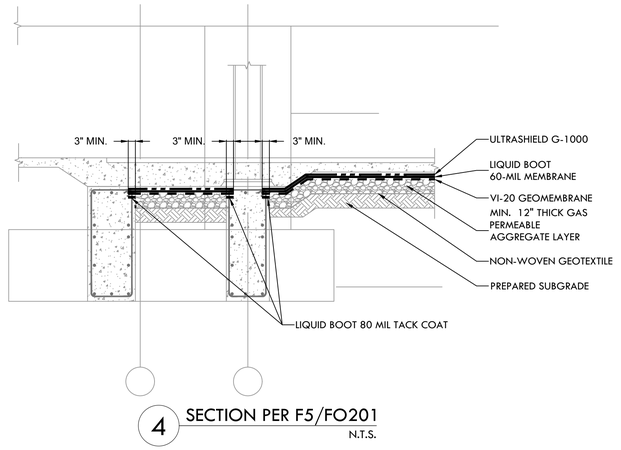
1 SECTION PER F1&F1A/FO201
N.T.S.



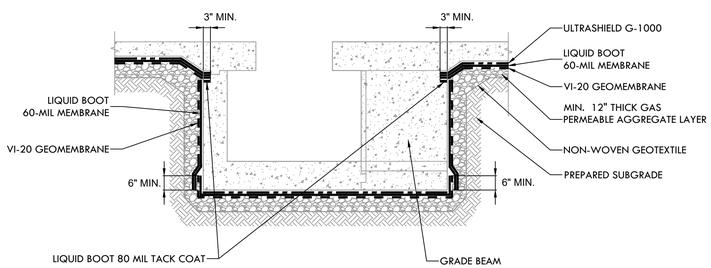
2 SECTION PER F2/FO201
N.T.S.



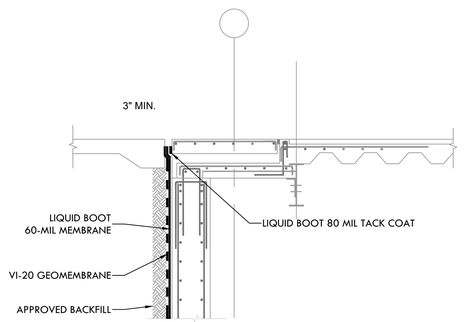
3 SECTION PER F4/FO201
N.T.S.



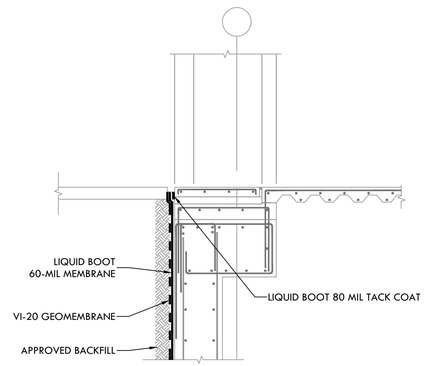
4 SECTION PER F5/FO201
N.T.S.



5 SECTION PER F7/FO202
N.T.S.



6 SECTION PER F24/~~FO202~~ FO204
N.T.S.



7 SECTION PER F25/~~FO202~~ FO204
N.T.S.

NOTES:

1. DRAWING NOT TO BE USED FOR ARCHITECTURAL, STRUCTURAL, OR ANY PURPOSE OTHER THAN GAS VAPOR BARRIER.
2. SURFACE PREPARATION BY OTHERS.
3. GAS PERMEABLE AGGREGATE LAYER AND SUBGRADE BY OTHERS.
4. DETAILS ARE NOT TO SCALE AND ARE EXAGGERATED FOR CLARITY.

ISSUED FOR APPROVAL

EAI INC
ENVIRONMENTAL MANAGEMENT SERVICES
SPECIALTY CONTRACTING

50 PRESCOTT STREET
JERSEY CITY, NJ 07304

TEL: (201) 395-0010
FAX: (201) 395-0020

No.	Date	Description
2	11/23/2020	REVISED PER RFI 182
1	8/30/2019	ISSUED FOR REVIEW

Scale:	Date:
N.T.S.	8/30/2019

Designer:	Drawn by:	Checked by:
	TS	TS

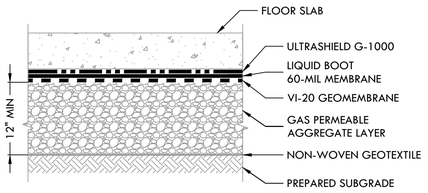
Project:
P.S. 671K
NEW BUILDING

Address:
840 5TH AVENUE
BROOKLYN, NY 11232

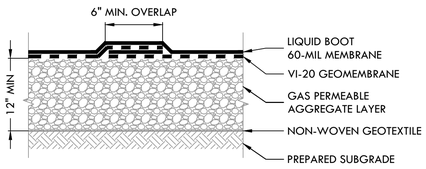
Drawing Title:
GAS VAPOR BARRIER
DETAILS

Drawing Title: SD002

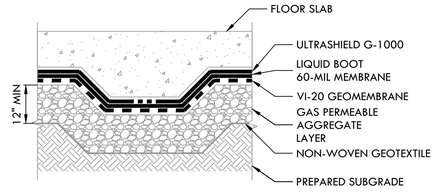
Sheets In Drawing Set:
02 of 03



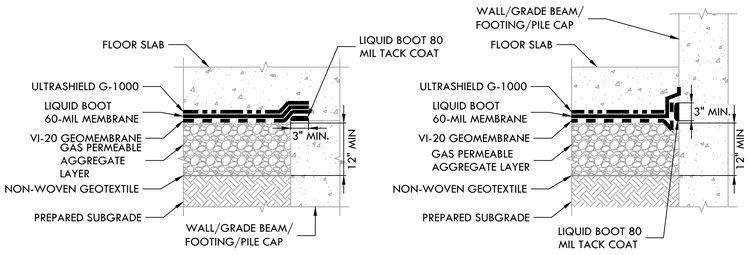
1 TYPICAL LIQUID BOOT SECTION
N.T.S.



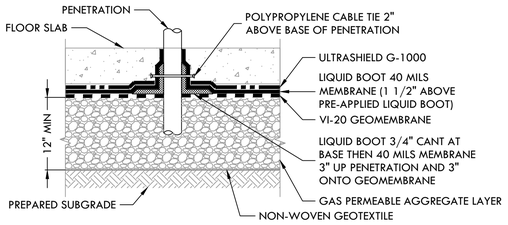
2 TYPICAL LIQUID BOOT OVERLAP DETAIL
N.T.S.



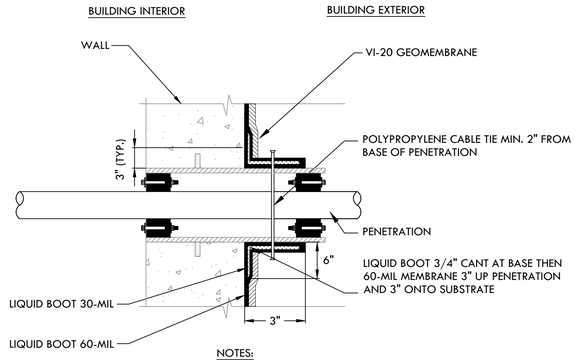
3 TYPICAL THICKENED SLAB DETAIL
N.T.S.



4 TYPICAL TERMINATION DETAILS
N.T.S.



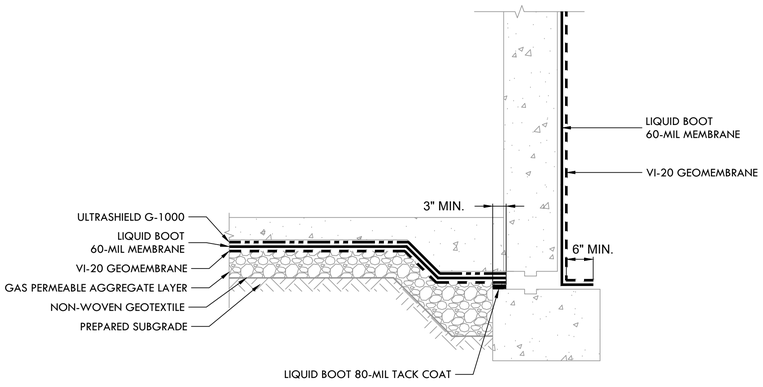
5 TYPICAL PENETRATION DETAIL
N.T.S.



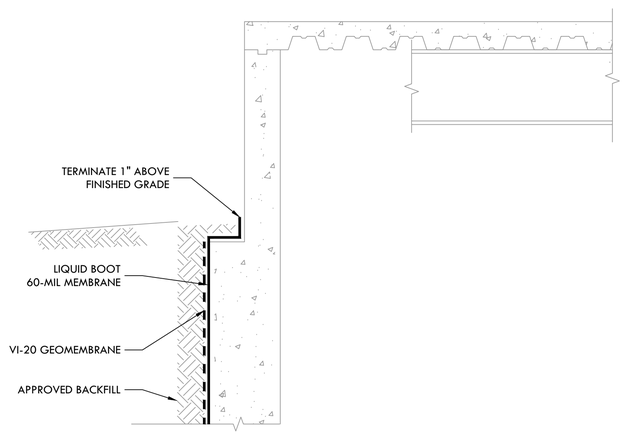
NOTES:

1. ESCUTCHEONS IF REQUIRED, BY OTHERS.

6 TYPICAL THROUGH WALL PENETRATION DETAIL
N.T.S.



7 GAS VAPOR BARRIER DETAIL FOR UNDER SLAB AND WALLS
N.T.S.



8 GAS VAPOR BARRIER DETAIL FOR VERTICAL TERMINATION AT GRADE
N.T.S.

NOTES:

1. DRAWING NOT TO BE USED FOR ARCHITECTURAL, STRUCTURAL, OR ANY PURPOSE OTHER THAN GAS VAPOR BARRIER.
2. SURFACE PREPARATION BY OTHERS.
3. GAS PERMEABLE AGGREGATE LAYER AND SUBGRADE BY OTHERS.
4. DETAILS ARE NOT TO SCALE AND ARE EXAGGERATED FOR CLARITY.

ISSUED FOR APPROVAL

EAI INC
ENVIRONMENTAL MANAGEMENT SERVICES
SPECIALTY CONTRACTING

50 PRESCOTT STREET
JERSEY CITY, NJ 07304

TEL: (201) 395-0010
FAX: (201) 395-0020

No.	Date	Description
2	11/23/2020	REVISED PER RFI 182
1	8/30/2019	ISSUED FOR REVIEW

Scale:	Date:
N.T.S.	8/30/2019

Designer:	Drawn by:	Checked by:
	TS	TS

Project:
P.S. 671K
NEW BUILDING

Address:
840 5TH AVENUE
BROOKLYN, NY 11232

Drawing Title:
GAS VAPOR BARRIER
TYPICAL DETAILS

Drawing Title: SD003

Sheets in Drawing Set:
03 of 03

New York City School Construction Authority
K671, 836-841 5th Avenue, Brooklyn, NY 11232
Response to Request for Information No. 182
November 16, 2020

Presented below is the response to Request for Information (RFI) No. 182 from AMCC Corp. RFI No. 182 was received by TRC on November 13, 2020.

Question from AMCC Corp.

REFERENCE: Contract Drawing FO201.00 and Submittal 02220-004-001

Our subcontractor, EAI, asks the following:

Per Addendum 7 dated 2/21/2019, foundation detail F1/FO201 and F1A/FO201 was altered to adjust footing depth so that the slab edge no longer sits on top of the footing. Please confirm GVB (Liquid Boot) termination at the exterior side of the foundation wall should now terminate 6" below the top of the interior slab on grade elevation in lieu of at the footing similar to the condition illustrated in detail 2/SD002 of EAI's shop drawings dated 8/30/2019 (02220-004-001).

Please see the attached detail from EAI's shop drawings and current field condition photos.

Please advise.

TRC Response

TRC takes no exception to the proposed Liquid Boot termination depicted in this RFI; however, the Contractor should submit updated shop drawings for NYCSCA review that show the updated gas vapor barrier (GVB) plan and installation details associated with the foundation changes.

30-30 Thomson Avenue
Long Island City, NY 11101-3045

General Contractor RFI

REQUEST FOR INFORMATION

RFI 00182

11/13/20

PROJECT: PS671K02 - New 4 Story School with Celler

TITLE: Ext Fdn Wall GVB elevation EAI

CONTRACT: C000015274

TO: Peter Larsen
Graves-MMA JV Architects, PLLC
3297 Route 66

Neptune, NJ 07753

Email: PLarsen@mma-architects.com

REQUIRED: 11/20/20
STATUS: New
ISSUE:
COST IMPACT:

REQUEST:

REFERENCE: Contract Drawing FO201.00 and Submittal 02220-004-001

Our subcontractor, EAI, asks the following:

Per Addendum 7 dated 2/21/2019, foundation detail F1/FO201 and F1A/FO201 was altered to adjust footing depth so that the slab edge no longer sits on top of the footing.

Please confirm GVB (Liquid Boot) termination at the exterior side of the foundation wall should now terminate 6” below the top of the interior slab on grade elevation in lieu of at the footing similar to the condition illustrated in detail 2/SD002 of EAI’s shop drawings dated 8/30/2019 (02220-004-001).

Please see the attached detail from EAI’s shop drawings and current field condition photos.

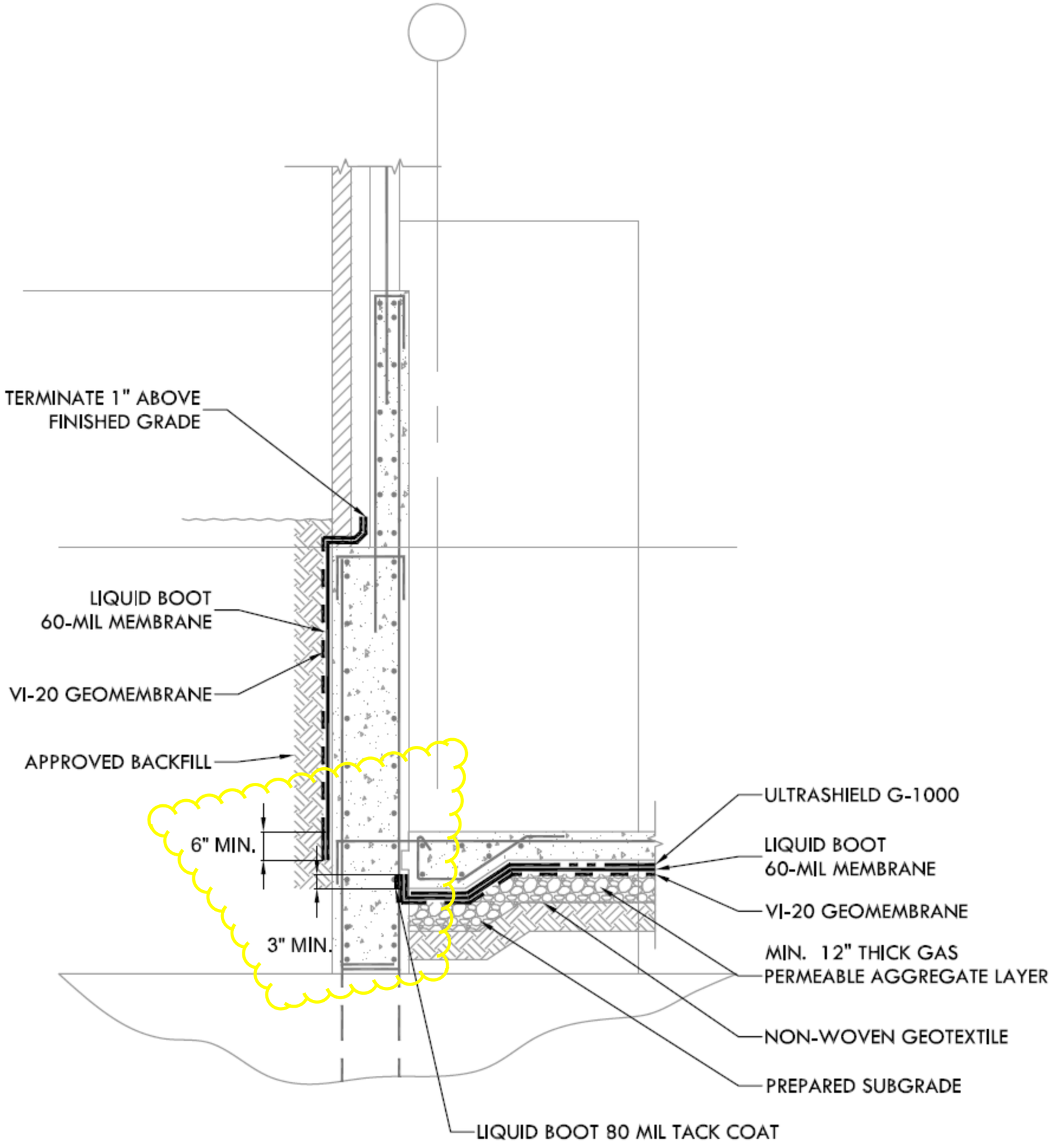
Please advise.

PC1902214

Requested By: Bobby Kang **Date:** 11/13/20
AMCC Corp

ANSWER:

Answered By: Peter Larsen **Date:**
Graves-MMA JV Architects, PLLC



2 SECTION PER F2/FO201

N.T.S.

RFI00182/PC1902214
EAI DWG SD002
F2/FO201
1 OF 1

AMCC Comment: exterior side of foundation wall

rough elevation of SOG at interior side of wall

RFI00182/PC1902214
CURRENT FIELD CONDITION PHOTOS
1 OF 2

AMCC Comment: interior side of foundation wall

Slab on grade key way

RFI00182/PC1902214
CURRENT FIELD CONDITION PHOTOS
2 OF 2

TRC
1430 Broadway, 10th Floor
New York, New York, 10018

Main 212.221.7822
Fax 212.221.7840

Transmittal

To: Anna Ramirez
IEH Division
New York City School Construction Authority
30-30 Thomson Avenue
Long Island City, NY 11101-3045
(718) 472-8620

Date: September 27, 2019

TRC No: 356549.0000.0000

Project: K671
840 5th Avenue
Brooklyn, NY
LLW#: 106889

We have enclosed:

☐ B/W Prints ☐ Reproducible ☐ Reports ☐ Letter
☐ Specifications ☐ Memorandum X Contractor Submittals

Description

GPA Gradation Data (02200-013-001)
No Exceptions Taken

Sent Via:

☐ Messenger ☐ 1st Class Mail ☐ FedEx [Type] X Email

Copy to: M. Sherwood (NYCSCA)

Very truly yours,
TRC

Phillip Castellano, PE

AMCC CORP.

50-18 VERNON BLVD

LONG ISLAND CITY, NY 11101

Phone: 718-472-9500
Fax: 718-472-2250

TRANSMITTAL

No. 00180

PROJECT: PS671k

DATE: 09/25/2019

TO: GRAVES-MMA JV Architects, PLLC
3297 Route 66, Studio B
Neptune, NJ 07753

REF: 02200 - Rev1 Gas Permeable Aggregate - Tilcon - West Nyack - LA Abrasion Test + Sieve Analysis

ATTN: Pete Larsen

WE ARE SENDING:		SUBMITTED FOR:		ACTION TAKEN:	
[√]	Shop Drawings	[√]	Approval	[ ]	Approved as Submitted
[ ]	Letter	[ ]	Your Use	[ ]	Approved as Noted
[ ]	Prints	[√]	As Required	[ ]	Returned After Loan
[ ]	Change Order	[ ]	Review and Comment	[√]	Resubmit
[ ]	Plans			[ ]	Submit
[ ]	Samples	**SENT VIA:**		[ ]	Returned
[ ]	Specifications	[√]	Attached	[ ]	Returned for Corrections
[ ]	Other:	[ ]	Separate Cover Via: Mail	[ ]	Due Date:

ITEM NO.	COPIES	DATE	ITEM	NUMBER	REV. NO.	DESCRIPTION	STATUS
012	1	09/25/2019	SUT	02200-012	001	Gas Permeable Aggregate - Tilcon - West Nyack - LA Abrasion Test	RESU
013	1	09/25/2019	SUT	02200-013	001	Gas Permeable Aggregate - Tilcon - West Nyack - Sieve Analysis	RESU

Remarks:

CC: Main Office / Field Copy

Signed Bobby Kang
Bobby Kang

Primavera ®

Darcon Construction, Inc.

SUBMITTAL

No. 48rev

360 Meacham Avenue
Elmont, NY 11003

Phone: 516-358-2533
Fax: 516-488-6467

PROJECT: PS 671K
Foundation & Site Work

DATE: 09/19/2019

TITLE: Gas Permeable Aggregate - Tilcon - West Nyack

TO: AMCC
50-18 Vernon Blvd
Long Island City, NY 11101
Phone:(718) 472-9500 Fax:(718) 472-2250

DIVISION: 02200

TRADE: Earthwork

ATTN: Justin Johnson

SECTION: 2.01G

RE-SUBMITTAL: ☑

☐ Shop Drawings	☐ Samples
☐ Letter	☐ Specifications
☑ Prints	☐ Other:
☐ Plans	☐ Other:

COPIES	SECTION	DESCRIPTION
1		Gas Permeable Aggregate - Tilcon - West Nyack - LA Abrasion Test
1		Gas Permeable Aggregate - Tilcon - West Nyack - Sieve Analysis
1		Gas Permeable Aggregate - Tilcon - West Nyack - Material Certification
1		Gas Permeable Aggregate - Tilcon - West Nyack - LEED Report
1		Tilcon Letter

REMARKS:

Please see attached for approval.

TRC Engineers, Inc.

☑ No Exceptions Taken	Exp. Proj. Name: K671	Reviewed By P. Castellano
☐ Make Corrections Noted	Design/LLW No. 106889	Contract No. C000015348
☐ Rejected – Revise and Resubmit	Date Received 9/26/19	Date Returned 9/27/19
☐ Rejected – Not Acceptable for	Submittal No. 02200-013-001	
☐ No Action Taken		

Submittal reviewed as:

☑ Per Spec/ Basis of Design ☐ "Or Equal Substitution"/Non-basis of Design ☐ "Alternate Substitution"

CORRECTIONS OR COMMENTS MADE ON THE SUBMITTAL DURING THIS REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. SUBMITTAL APPROVAL IS ONLY FOR GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION, PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATING THE WORK WITH THAT OF ALL OTHER TRADES AND PERFORMING THE WORK IN A SAFE AND SATISFACTORY MANNER.

AMCC - DIGITALLY RECEIVED 09/25/19

TILCON
an Oldcastle® company

Quality Test Report

Plant 060_00209-West Nyack Aggregate
Product NY 2 (ASTM 5)-3/4"
Specification GPA



Sample Information

Sample No 1748000132
Date Sampled 09/19/2019 16:07
Sampled By Donald Brice
Type Production
Method Belt Stream

Split Sample ☐
Resample ☐

Gradation Results

Date Completed 09/19/2019 16:07
Tested By Donald Brice

Unit	Moist Mass	Dry Mass	Wash Mass	Moisture %	Wash Loss %	Procedure
g		10835.00				

Sieve	Mass Retained	Cum Mass Retained	Ind % Retained	% Retained	% Passing	Target	Specification	Comment
1 1/2" (37.5mm)	0.00	0.00	0.0	0.0	100.0	100-100\100	100-100	
1" (25mm)	290.00	290.00	2.7	2.7	97.3		95-100	
3/4" (19mm)	5595.00	5885.00	51.6	54.3	45.7		30-60	
1/2" (12.5mm)	4635.00	10520.00	42.8	97.1	2.9	1.4-6.8\4.1	0-5	
3/8" (9.5mm)	165.00	10685.00	1.5	98.6	1.4			
#4 (4.75mm)	15.00	10700.00	0.1	98.8	1.2			
Pan	135.00	10835.00	1.25	100.00	0.00			

Other Test Results

Test Name	Date	Result	Unit	Target	Specification	Comment
	Procedure	Lab			Tested By	
Wash Loss (#200/75um)	09/19/2019 16:07	0.2	%			
					Donald Brice	

AMCC - DIGITALLY RECEIVED 09/25/19

TRC
1430 Broadway, 10th Floor
New York, New York, 10018

Main 212.221.7822
Fax 212.221.7840

Transmittal

To:	Anna Ramirez IEH Division New York City School Construction Authority 30-30 Thomson Avenue Long Island City, NY 11101-3045 (718) 472-8620	**Date**:	February 19, 2020
		TRC No:	356549.0000.0000
		Project:	K671 840 5th Avenue Brooklyn, NY LLW#: 106889

We have enclosed:

☐	B/W Prints	☐	Reproducible	☐	Reports	☐	Letter
☐	Specifications	☐	Memorandum	X	Contractor Submittals		

Description

SSDS Professional Engineer Resume (02221-006-001)
No Exceptions Taken

Sent Via:

☐	Messenger	☐	1st Class Mail	☐	FedEx [Type]	X	Email

Copy to: M. Sherwood (NYCSCA)

Very truly yours,
TRC

Phillip Castellano, PE

TRC Engineers, Inc. (TRC) has reviewed the Resume of Professional Engineers submitted for K671. The Resume Submission was prepared by AMC Engineering, PLLC., for AMCC Corp., is dated February 13, 2020, and was received by TRC on February 18, 2020. Please find TRC's comments to the submittal below.

The submittal has been marked "**No Exceptions Taken**".

TRC notes:

A. Resumes for all Professional Engineers (PEs) or inspectors working under the submitted PEs must be provided to the IEH division for review and approval prior to them performing milestone inspections or quality control testing.

The comments should not be construed in any way as intent to limit the Contractor's responsibilities. The absence of a comment with respect to a specific Contract requirement should not be interpreted as a suggestion to change a Contract requirement.

AMCC CORP.

50-18 VERNON BLVD

LONG ISLAND CITY, NY 11101

Phone: 718-472-9500
Fax: 718-472-2250

TRANSMITTAL

No. 01032

PROJECT: PS671k

DATE: 02/13/2020

TO: GRAVES-MMA JV Architects, PLLC
3297 Route 66, Studio B
Neptune, NJ 07753

REF: 02221-006 - 1.05.H QUAL & CERT & REPORT:
AMC Engineering Qualif SCA MBE Certification,
Field Inspection Report SSDS - AMC Engineering

ATTN: Pete Larsen

WE ARE SENDING:		SUBMITTED FOR:		ACTION TAKEN:	
[√]	Shop Drawings	[√]	Approval	[ ]	Approved as Submitted
[ ]	Letter	[ ]	Your Use	[ ]	Approved as Noted
[ ]	Prints	[√]	As Required	[ ]	Returned After Loan
[ ]	Change Order	[ ]	Review and Comment	[ ]	Resubmit
[ ]	Plans			[√]	Submit
[ ]	Samples	**SENT VIA:**		[ ]	Returned
[ ]	Specifications	[√]	Attached	[ ]	Returned for Corrections
[ ]	Other:	[ ]	Separate Cover Via: Mail	[ ]	Due Date:

ITEM NO.	COPIES	DATE	ITEM	NUMBER	REV. NO.	DESCRIPTION	STATUS
006	1	02/13/2020	SUT	02221-006	000	QUAL&CERT&REPORT: AMC Engineering Qualifications, SCA MBE Certification, Field Inspection Report SSDS	NEW

Remarks: Ariel Czemerinski CV-SCA projects
SCA-MBEcertification
Field inspection Report for SSDS-blank

TRC Engineers, Inc.

☑ No Exceptions Taken	Exp. Proj. Name: K671	Reviewed By R. Bowden, P. Castellano
☐ Make Corrections Noted	Design/LLW No. 106889	Contract No. C000015348
☐ Rejected – Revise and Resubmit	Date Received 2/18/20	Date Returned 2/19/20
☐ Rejected – Not Acceptable for ☐ No Action Taken	Submittal No. 02221-006-001	

Submittal reviewed as:
☑ Per Spec/ Basis of Design ☐ "Or Equal Substitution"/Non-basis of Design ☐ "Alternate Substitution"

CORRECTIONS OR COMMENTS MADE ON THE SUBMITTAL DURING THIS REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. SUBMITTAL APPROVAL IS ONLY FOR GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION, PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATING THE WORK WITH THAT OF ALL OTHER TRADES AND PERFORMING THE WORK IN A SAFE AND SATISFACTORY MANNER.

CC: Main Office / Field Copy

Signed Bobby Kang
Bobby Kang

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474

ARIEL CZEMERINSKI, P.E.
Email: Ariel@AMC-Engineering.com

SUMMARY:

New York State Professional Engineer. Chemical and Environmental Engineer, with 29 years of experience in the chemical and environmental areas. Areas of expertise include inspections and sign off on Large Scale Vapor Barrier Installations at Various NYC schools, Design and inspections of Sub Slab Depressurization Systems, wastewater treatment systems, Large scale dewatering system design for construction, process control and automation, process optimization, productivity improvement, quality systems, environmental compliance, Phase I Environmental Site Assessments, Phase II Environmental Investigations, Phase III: Remedial Activities, process and plant safety, and management of a production facility. Special Inspector with New York City Department of Buildings. Registered PE in NY.

Professional Experience:

AMC: 18 Years
Prior: 6 years

Education

Master of Science in Chemical Engineering, Columbia University, New York, NY, Feb. 1990.
Bachelor of Science in Chemical Engineering, University Of Buenos Aires, Buenos Aires, Argentina, May 1987

Areas of Expertise

- Vapor Intrusion - Barrier and Sub Slab Venting System Design
- Environmental Assessment Statements under CEQR, ULURP
- Remedial Program Design and Management
- Environmental Compliance, Clean Water Act, Clean Air Act, Hazardous Materials
- Dewatering & Treatment System Design
- SWPPP design and implementation. Preparation and Submittal of NOIs.
- NYCDEP Sewer Discharge Permitting
- Transfer Station Permitting and Compliance
- Wastewater Treatment Systems and Permitting, SPDES, LI Well permit, Water Withdrawal Permit.
- Air Permits and Registration
- Zoning Regulations and Permitting
- Safety and Environmental Training
- Waste Management Plans
- Professional Certifications
- OSHA 40-hr HAZWOPER
- OSHA 10-hr Construction Safety and Health

AMCC - DIGITALLY RECEIVED 02/13/20

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474

Project Experience (Cont.)

School Construction Authority Projects:

School	Yr	Spec	Scope 1	Scope 2	Scope 3
PS-6M	14	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-251K	14	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-163Q	15	2221	SSDS Inspections		
PS-287Q	17	2221	SSDS Inspections		
PS-54Q	18	2200	Excavated Material Disposal Plan	Sampling	Data Interpretation
PK-42K	16	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PK-63K	17	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-37Q	18	2200/2201	Excavated Material Disposal Plan		
PS-85X	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-90R	19	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-91R	19	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-94R	19	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-315X	16	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-321K	17	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-389Q	15	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-397Q	17	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
Susan Wagner HS	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PK-422Q	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
IS-424X	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-45X	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-97K	19	2221	SSDS Inspections		
PS-313Q	17	2221	SSDS Inspections		
PS-170K	16	2221	SSDS Inspections	Certification of Exhaust Fan	
IS-297Q	16	2221	SSDS Inspections		
Harlem Dream-M	16	2221	SSDS Inspections		
PS-219K	16	2200/2201	Excavated Material Disposal Plan	Data Interpretation	
PS-73K	16	2200/2201	Excavated Material Disposal Plan	Data Interpretation	
PS-36X	17	2200/2201	Excavated Material Disposal Plan	Data Interpretation	
PS-73X	18	2200/2201	Excavated Material Disposal Plan	Data Interpretation	
PS-236K	18	2200/2201	Excavated Material Disposal Plan	Data Interpretation	
PS-132Q	18	2200/2201	Excavated Material Disposal Plan	Data Interpretation	
PS-133Q	18	2200/2201	Excavated Material Disposal Plan	Data Interpretation	
PS-721X	18	2200/2201	Excavated Material Disposal Plan	Data Interpretation	
PS-29X	18	2200/2201	Excavated Material Disposal Plan	Data Interpretation	
PS-81Q	18	2200/2201	Excavated Material Disposal Plan	Data Interpretation	
PS-450X	19	2200/2201	Excavated Material Disposal Plan	Data Interpretation	

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AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474

PS-468Q	19	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-335K	19	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-101K	17	2200/2201	Excavated Material Disposal Plan		
PS-256Q	18	2200/2201	Excavated Material Disposal Plan		
Powerhouse	18	26100	Hazardous Health and Safety		
PS-129Q	18	2200/2201	Excavated Material Disposal Plan	Sampling Plan	
PS-19X	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-419Q	18	2200/2201	Excavated Material Disposal Plan		
PS-128Q	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-323M	16	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-667K	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-46X	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-14X	16	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-24Q	17	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-613K	16	2200/2201	Excavated Material Disposal Plan		
PS-557K	18	2200/2201	Excavated Material Disposal Plan		
PS-131Q	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-49Q	16	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-303Q	17	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-375Q	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-32K	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-599K	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-575Q	18	2200/2201	Excavated Material Disposal Plan	Sampling	Data Interpretation
PS-312	14	2221	SSDS Inspections		
PS-89R	18	2221	SSDS Inspections		
PS-29Q	17	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS264K	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-290Q	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
Beacon HS	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
Harlem Village	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-613K	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-11Q	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-14X	17	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-19Q	17	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-19X	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		

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AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474

PS-24Q	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-32K	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-62R	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-66Q	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-70Q	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-71R	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-87Q	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-96X	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-101K	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-125Q	16	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-128Q	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-143Q	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-144Q	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-160K	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-163Q	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-170K	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-176Q	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-226X	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-281M	17	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-287Q	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-303Q	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-311Q	17	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-313Q	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-314Q	15	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-316Q	17	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-331K	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		

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18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474

PS-338K	16	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-339Q	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-340M	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-343M	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-398Q	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-437K	214	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-667K	219	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-746K	18	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-464M	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-892Q	17	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-315Q	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-422Q	14	2220/2221	Gas Vpaor Barrier/SSDS Inspections		
PS-14X	17	2200/2201	Excavated Material Disposal Plan		Data Interpretation
PS43X	17	2200/2201	Excavated Material Disposal Plan		Data Interpretation
PS-112K	17	2200/2201	Excavated Material Disposal Plan		Data Interpretation
PS-151K	14	2200/2201	Excavated Material Disposal Plan		Data Interpretation
PS-167M	14	2200/2201	Excavated Material Disposal Plan		Data Interpretation
PS-620K HS	15	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-329K	15	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-4Q	17	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-158K	17	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-272Q	18	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-128Q	18	2221	SSDS Inspections		
PS-799Q	15	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-46X	17	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-176Q	18	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-503K	18	2200/2201	Excavated Material Disposal Plan	Waste Management Plan	Data Interpretation
PS-613K	17	2221	SSDS Inspections		
JFK HS	19	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-93X	17	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
Bard HS	16	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
IS-54M	16	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-52R	16	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-83M	17	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation

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AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474

PS-104K	17	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-152M	18	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-199Q	15	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
Washington HS	17	2200/2201	Excavated Material Disposal Plan	sampling	Data Interpretation
PS-661K	17	2221	SSDS Inspections		
PS-18K	19	2221	SSDS Inspections		

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SCA
NYC School Construction Authority

NYC Department of Education

www.nycsca.org

November 10, 2016

AMC Engineering, PLLC
38-20 32 Street
Long Island City, NY 11101

Attn: Ariel Czemerinski, Engineer

Re: Prequalification Approval
Federal Tax ID# 11-3593267

Dear Mr. Czemerinski:

Based upon the information furnished on your Prequalification Application, the New York City School Construction Authority (SCA) has requalified your firm to submit bids/proposals for SCA projects for a period of three years until **November 10, 2019** for the following: **Professional Services – Non Construction (Sub-Slab Depressurization System)** (86009) and **Environmental Consulting Services** (86030). Please be advised that Environmental Consultants to the SCA shall provide such service subject to possession of all necessary regulatory permits and approvals, as well as all required regulatory certifications and licenses (for individuals and firms).

Requalification does not mean that your firm will automatically receive a contract for work with the SCA. Your prequalification status allows you to compete for business on SCA projects as a prime and/or sub-consultant within your approved disciplines(s).

Although your firm is qualified to submit proposals for the aforementioned discipline(s), it also must meet the specific technical requirements, if applicable, for each SCA project. You are to refer to the SCA project specifications for additional required experience and certifications. In that regard, we encourage you to visit the SCA's website on a regular basis. Using the following link to our "Competing for Business" page, you can stay informed about upcoming projects and learn of opportunities for your firm to receive SCA Requests for Proposals:
http://www.nycsca.org/Business/CompetingforBusiness/Pages/default.aspx

In addition, we note that your firm will be subject to a full responsibility determination at the time of consideration for any specific contract award.

Furthermore, we remind you that your firm's status as a "Requalified firm" is always subject to review. You must submit in writing to the NYCSCA any substantive changes to your prequalification application as soon as possible, but no later than (30) days of said change(s). Substantive changes include, but not limited to, key people, ownership, court proceedings, investigations, bankruptcies, etc.

If you have questions regarding your status, please call the Contractor Qualification Unit at (718) 472-8777.

Very truly yours,

Sarah L. Sinclair
Deputy Director
Contractor Qualification Unit

SLS: ab
cc: Qualification File

30-30 Thomson Avenue
Long Island City, NY 11101

718 472 8777 T
718 472 8083 F

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AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474
Info@AMC-Engineering.com

Field inspection Report SSDS

Project Location _____ _____
Inspection Location: _____
Date_____
Weather: _____

Inspection Schedule – Milestone Description		Partial	Complete
SUBSLAB COMPONENTS	1. Completion of Subbase preparation following foundation and footing installation and installation of geotextile		
	2. Delivery to the site of gas permeable aggregate layer, prior to use		
	3. Installation of sub-slab depressurization pits and riser “stub-outs” prior to completion of gas permeable aggregate layer		
	4. Completion of installation of gas permeable aggregate layer. Verify slope of piping is in accordance with Contract drawings and sloped to a condensate drain or SSDS suction pit..		
	5. Completion of all SSDS subsurface components prior to installation of base farbic above gas permeable aggregate layer		
ABOVE-SLAB COMPONENTS	6. Completion of installation of all portions of manifolds, labels, and interior risers prior to enclosure within sheetrock/interior walls. Ensure that SSDS risers are not in a shaft with other ducts conveying environmental air.		
	7. Implementation of pressure test of completed interior riser pipes. See Article 3.01.B regarding test requirements.		
	8. Installation of suction fans and accessories in accordance with Section 15880		
	9. Start-up of completed system		
	10. Confirmation of Alarm Indication Station installation and testing and connection of the alarm indication station to an autodialer and testing		

Comments:

Inspection by _____

AMCC - DIGITALLY RECEIVED 02/13/20

TRC
1430 Broadway, 10th Floor
New York, New York, 10018

Main 212.221.7822
Fax 212.221.7840

Transmittal

To: Anna Ramirez
IEH Division
New York City School Construction Authority
30-30 Thomson Avenue
Long Island City, NY 11101-3045
(718) 472-8620

Date: September 27, 2019

TRC No: 356549.0000.0000

Project: K671
840 5th Avenue
Brooklyn, NY
LLW#: 106889

We have enclosed:

☐ B/W Prints ☐ Reproducible ☐ Reports ☐ Letter
☐ Specifications ☐ Memorandum X Contractor Submittals

Description

SSDS Pit (02221-003-000)
Make Corrections Noted

Sent Via:

☐ Messenger ☐ 1st Class Mail ☐ FedEx [Type] X Email

Copy to: M. Sherwood (NYCSCA)

Very truly yours,
TRC

Phillip Castellano, PE

TRC Engineers, Inc. (TRC) has reviewed the sub-slab depressurization system (SSDS) pit drawing and product data submitted for K671. The submittal was prepared by Darcon Construction, Inc., is dated September 25, 2019, and was received by TRC on September 26, 2019. Please find TRC's comments to the submittal below.

The submittal has been marked "**Make Corrections Noted**".

Resubmittal is only required if the Contractor is unable to comply with the comments below.

TRC notes:

1. The SSDS Pit drawing notes "waterproofing by others" beneath the building slab. Please note that waterproofing is not specified for installation beneath the building slab, and the note should be changed to "gas vapor barrier" on the pit detail.

The comments should not be construed in any way as intent to limit the Contractor's responsibilities. The absence of a comment with respect to a specific Contract requirement should not be interpreted as a suggestion to change a Contract requirement.

AMCC CORP.

TRANSMITTAL

50-18 VERNON BLVD

LONG ISLAND CITY, NY 11101

Phone: 718-472-9500
Fax: 718-472-2250

No. 00183

PROJECT: PS671k

DATE: 09/25/2019

TO: GRAVES-MMA JV Architects, PLLC
3297 Route 66, Studio B
Neptune, NJ 07753

REF: 02221 - DWG+PD+PD: Typical SSDS Pit

ATTN: Pete Larsen

WE ARE SENDING:		SUBMITTED FOR:		ACTION TAKEN:	
[√]	Shop Drawings	[√]	Approval	[ ]	Approved as Submitted
[ ]	Letter	[ ]	Your Use	[ ]	Approved as Noted
[ ]	Prints	[√]	As Required	[ ]	Returned After Loan
[ ]	Change Order	[ ]	Review and Comment	[ ]	Resubmit
[ ]	Plans			[√]	Submit
[ ]	Samples	**SENT VIA:**		[ ]	Returned
[ ]	Specifications	[√]	Attached	[ ]	Returned for Corrections
[ ]	Other:	[ ]	Separate Cover Via: Mail	[ ]	Due Date:

ITEM NO.	COPIES	DATE	ITEM	NUMBER	REV. NO.	DESCRIPTION	STATUS
003	1	09/25/2019	SUT	02221-003	000	DWG+PD+PD: Typical SSDS Pit	NEW

Remarks:

CC: Main Office / Field Copy

Signed Bobby Kang
Bobby Kang

Primavera ®

Darcon Construction, Inc.

SUBMITTAL

No. 53

360 Meacham Avenue
Elmont, NY 11003

Phone: 516-358-2533
Fax: 516-488-6467

PROJECT: PS 671K
Foundation & Site Work

DATE: 09/25/2019

TITLE: Typical SSDS Pit

TO: AMCC
50-18 Vernon Blvd
Long Island City, NY 11101
Phone:(718) 472-9500 Fax:(718) 472-2250

CONTRACT/PO: C000015274

DIVISION: 02221

TRADE: Sub-Slab Depressurizat

ATTN: Justin Johnson

RE-SUBMITTAL: ☐

☑ Shop Drawings	☐ Samples
☐ Letter	☐ Specifications
☑ Prints	☐ Other:
☐ Plans	☐ Other:

COPIES	SECTION	DESCRIPTION
1		Typical SSDS Pit Shop Drawing
1		Product Data of 8"x8"x16 CMU by Glenwood Mason Supply
1		Product Data of 1/4" Square Opening Wire Mesh 0.12" Wire, Square Weave SS by McNichols

REMARKS:

Please see attached for approval.

TRC Engineers, Inc.

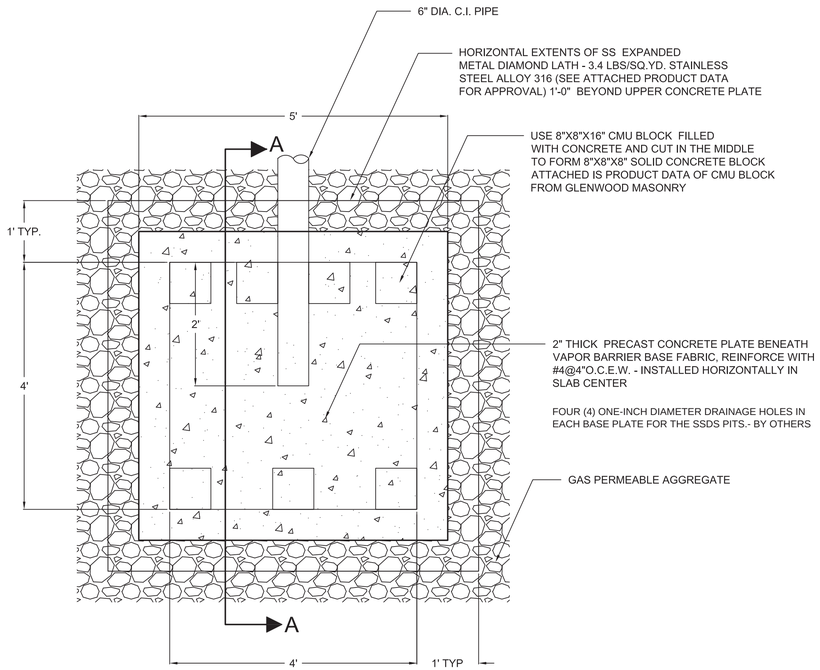
☐ No Exceptions Taken	Exp. Proj. Name: K671	Reviewed By P. Castellano
☑ Make Corrections Noted	Design/LLW No. 106889	Contract No. C000015348
☐ Rejected – Revise and Resubmit	Date Received 9/26/19	Date Returned 9/27/19
☐ Rejected – Not Acceptable for ☐ No Action Taken	Submittal No. 02221-003-000	

Submittal reviewed as:

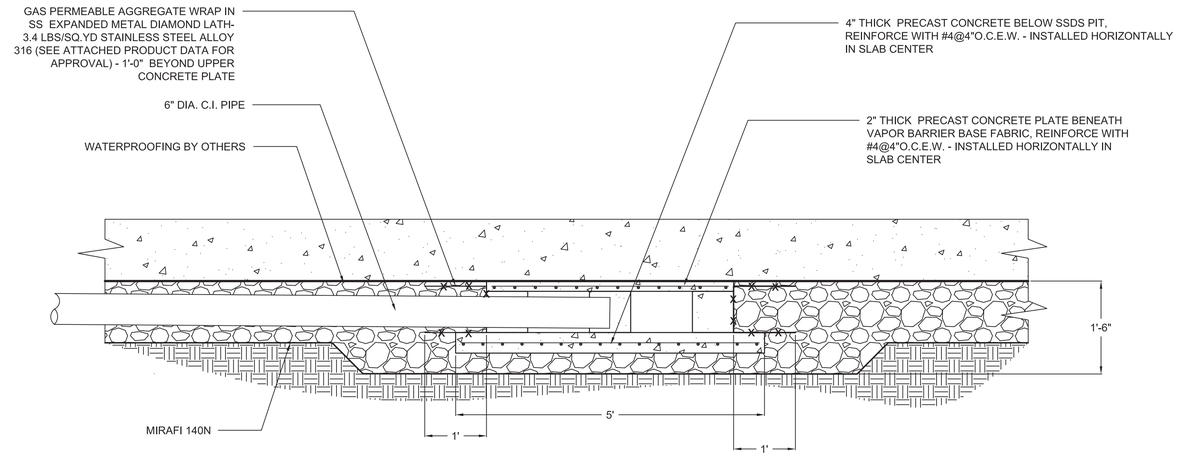
☑ Per Spec/ Basis of Design ☐ "Or Equal Substitution"/Non-basis of Design ☐ "Alternate Substitution"

CORRECTIONS OR COMMENTS MADE ON THE SUBMITTAL DURING THIS REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. SUBMITTAL APPROVAL IS ONLY FOR GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION, PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATING THE WORK WITH THAT OF ALL OTHER TRADES AND PERFORMING THE WORK IN A SAFE AND SATISFACTORY MANNER.

AMCC - DIGITALLY RECEIVED 09/25/19



PLAN VIEW



SECTION A-A

NOTE: FOR LOCATIONS AND LAYOUT OF SSDS PITS, COORDINATE WITH MEP SHOP DRAWINGS

TYPICAL SUB-SLAB DEPRESSURIZATION PIT

N.T.S.

NO.	DATE	DESCRIPTION

DARCON CONSTRUCTION, INC.
360 MEACHAM AVENUE ELMONT, NY 11003

JOB	IS 419Q
LOCATION	111-12 ASTORIA BLVD. FLUSHING, NY 11369
ARCHITECT	

MADE BY	DATE	CONTRACT NO.
APM	10.03.18	

DRAWING COVERS	DRAWING NO.
TYPICAL SSDS PIT	SSDS-1

Quality
Building
Materials

GLENWOOD MASON SUPPLY COMPANY, INC.
4100 Glenwood Road, Brooklyn, New York 11210
Telephone: (718) 859-6500 Facsimile: (718) 859-0989
www.Glenwoodmason.com

To: Darcon Construction

RE: #125 l.b Normal Weight Masonry Units 2000psi MEA# 291-03M

8x8x16 75% Solid 3 HR FIRE RATING

To Whom It May Concern:

This is to certify the normal weight masonry units mentioned above by Glenwood Mason Supply conforms to the normal weight classification #125l.b. The concrete masonry units are manufactured to the parameters of ASTM C90 -05A "Standard Specification for Load Bearing Concrete MASONRY UNITS" for a normal weight designation having a net compressive strength at 28 days of 2000psi. All cmu to be type 1 grade N.

The Fire ratings listed above are based on ASTM E-119 "Equivalent thickness method"

If I can be of any further assistance please do not hesitate to call me at 718-859-6500

Sincerely
Salvatore Morreale
Glenwood Mason Supply
12/17/13

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McNICHOLS since 1952

McNICHOLS Quality 1/4" Square Opening Wire Mesh 0.1200" Wire, Square Weave, Stainless Steel, 48.0000" x 120.0000"

Visit us online at http://www.mcnichols.com
Order Now: 1-877-884-4653 or email sales@mcnichols.com

Print

Item Specifications:

Item Number :	3825120041
Product Line :	Wire Mesh
Product Type :	Square Opening
Weight :	2.62 #/SF
Class :	Square Weave
Trade Name :	McNICHOLS
Major Material :	Stainless Steel
Minor Material :	Type 304
Construction Type :	Woven
Opening Size1 :	0.2500
Opening Size 2 :	0.2500
Wire Diameter Parallel Width :	0.1200
Percent Open Area :	46
Width :	48.0000
Length (Span for Grating) :	120.0000
SKU Type :	Sheet
Wire Diameter Parallel Length :	0.1200
HS Item Number :	3825120041



Accessories:

Angle	U Edging

Options:

Angle Cutting	Straight line cutting to produce an angle other than 90 degrees
Calendering	A rolling operation which flattens the knuckles of Wire Cloth giving it a smoother surface.
Circle Cutting	Shearing or sawing material in a circular path to a specified dimension.
Coating	A material applied as a covering to another material such as vinyl coating applied to steel.
Coiling	A relatively long, continuous piece of material rolled to form a coil.
Cut to Size	This describes the option of cutting a standard size into pieces of specified size with typically 90 degree corners. Used to describe this process regardless of what tool or machine is used to do the cutting.
Drawings Required	Drawings required to confirm material specifications, sizes or to aid in erection of the finished materials.
Electro-galvanizing	The process of electrolytically applying a thin coating of zinc to a base material. The result is a much thinner zinc coating than hot dip galvanizing.

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Forming	A variety of processes that change the shape of material to a specific form through cutting, bending, molding, stamping, etc.
Framing	An option where a secondary product, usually U-edging or angle is cut and welded to form a frame around the edge of the material.
Hot Dip Galvanizing	The process of applying a zinc rich coating to steel to prevent corrosion by submerging the material in a tank of molten zinc for a period of time.
Painting	The process of applying paint to material.
Plating	The application of a thin layer of a secondary metal to a primary metal through an electrolytic process.
Polishing	The process of changing the surface appearance of a material through the repeated application of an abrasive media (brushing, grinding, sanding, etc.)
Powder Coating	The process of applying powdered paint to an item then placing it in an oven where the powder particles melt and coalesce to form a continuous coating.
Random Cutting	The process of cutting when material is cut to size without regard to any finidhed pattern or stub length.
Slitting	A cutting process which is used to cut a coil into a series of strips of considerable length. Typically these strips are recoiled during this process.
Stamping	The process by which small pieces are produced by punching a specific size and shaped die through the material.
Straight Cutting	Straight line cutting at a 90 degree angle to the edge of the material.
Vibrating Screens - Wire Mesh	A product made of wire mesh to which hook flanges are attached. The resulting product is then installed into a machine designed to sort material to size.

Applications:

Architectural/Decorative	Applications where the appearance of the finished item is as important as the function of the item.
Catwalk/Walkway	Material used as flooring on a raised pathway enabling movement from one area to another.
Container/Enclosure	Products used as components of a container. The container may be to keep objects in or as a secrity device to keep people or things out.
Filter/Screen	Material used to reduce the flow of a liquid or gas, to limit the size of a particulate or to reduce the amount of light allowed to pass.
Fixture/Furniture	Material used as a component in a fixture or furniture.
Grille/Guard	Material used in some way to restrict access to an area.
Panel/Partition	Material used as the means to stop the passage of something from one place to another.
Part/Equipment	Products used as parts on equipment or machinery.
Platform/Deck/Mezzanine	Materials used in the construction of a mezzanine or platform up above the existing level.
Railings	Products used to form a physical barrier around an area or platform, typically a handrail.

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TRC
1430 Broadway, 10th Floor
New York, New York, 10018

Main 212.221.7822
Fax 212.221.7840

Transmittal

To: Anna Ramirez
IEH Division
New York City School Construction Authority
30-30 Thomson Avenue
Long Island City, NY 11101-3045
(718) 472-8620

Date: September 19, 2019

TRC No: 356549.0000.0000

Project: K671
840 5th Avenue
Brooklyn, NY
LLW#: 106889

We have enclosed:

☐ B/W Prints ☐ Reproducible ☐ Reports ☐ Letter
☐ Specifications ☐ Memorandum X Contractor Submittals

Description

SSDS Product Data (02221-001-000)
Make Corrections Noted

Sent Via:

☐ Messenger ☐ 1st Class Mail ☐ FedEx [Type] X Email

Copy to: M. Sherwood (NYCSCA)

Very truly yours,
TRC



Phillip Castellano, PE

TRC Engineers, Inc. (TRC) has reviewed the sub-slab depressurization system (SSDS) accessory product data submitted for K671. The submittal was prepared by AMCC Corp., is dated September 12, 2019, and was received by TRC on September 13, 2019. An alternate variable frequency drive (VFD) to the specified make and model has been proposed by the Contractor. Please find TRC's comments to the submittal below.

The submittal has been marked "**Make Corrections Noted**".

TRC notes:

A. The product data provided for Wika vacuum gauges does not indicate the part number for the proposed vacuum gauge. Please note that the approved vacuum gauge is Wika Model 612.20 Part 9747724. Refer to Specification Section 15990, Article 2.01(G)(6).

The comments should not be construed in any way as intent to limit the Contractor's responsibilities. The absence of a comment with respect to a specific Contract requirement should not be interpreted as a suggestion to change a Contract requirement.

AMCC CORP.

TRANSMITTAL

50-18 VERNON BLVD

LONG ISLAND CITY, NY 11101

Phone: 718-472-9500
Fax: 718-472-2250

No. 00125

PROJECT: PS671k

DATE: 09/12/2019

TO: GRAVES-MMA JV Architects, PLLC
3297 Route 66, Studio B
Neptune, NJ 07753

REF: 02221 - PD: SSDS Fans and Equipment

ATTN: Pete Larsen

WE ARE SENDING:		SUBMITTED FOR:		ACTION TAKEN:	
√	Shop Drawings	√	Approval		Approved as Submitted
	Letter		Your Use		Approved as Noted
	Prints	√	As Required		Returned After Loan
	Change Order		Review and Comment		Resubmit
	Plans			√	Submit
	Samples	**SENT VIA:**			Returned
	Specifications	√	Attached		Returned for Corrections
	Other:		Separate Cover Via: Mail		Due Date:

ITEM NO.	COPIES	DATE	ITEM	NUMBER	REV. NO.	DESCRIPTION	STATUS
001	1	09/12/2019	SUT	02221-001	000	PD: SSDS Fans and Equipment	NEW

Remarks:

TRC Engineers, Inc.

☐ No Exceptions Taken	Exp. Proj. Name: K671	Reviewed By R. Bowden, P. Castellano
☑ Make Corrections Noted	Design/LLW No. 106889	Contract No. C000015348
☐ Rejected – Revise and Resubmit	Date Received 9/13/19	Date Returned 9/19/19
☐ Rejected – Not Acceptable for	Submittal No. 02221-001-000	
☐ No Action Taken		

Submittal reviewed as:
☑ Per Spec/ Basis of Design ☐ "Or Equal Substitution"/Non-basis of Design ☐ "Alternate Substitution"

CORRECTIONS OR COMMENTS MADE ON THE SUBMITTAL DURING THIS REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. SUBMITTAL APPROVAL IS ONLY FOR GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION, PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATING THE WORK WITH THAT OF ALL OTHER TRADES AND PERFORMING THE WORK IN A SAFE AND SATISFACTORY MANNER.

CC: Main Office / Field Copy

Signed Bobby Kang
Bobby Kang

Primavera ®

TRANSMITTAL LETTER

WDF, Inc.
30 North MacQuesten Pkwy.
Mount Vernon, NY 10550

Phone: (914)-776-8000
Fax: (914)-776-8033

Date:	7/15/19
School:	PS 671K
Project:	
CM13 Name:	
Contract No:	
Design/ LLW No:	LLW 106889

To: AMCC Corp.
50-18 Vernon Blvd
Long Island City, NY 11101

Attn: Charles Marino

We are sending by : Via Hand Delivery the following items.

LIST OF ITEMS SUBMITTED

# of Items	Type	Submittal #	Description	Previous Submittal No.	Per Spec section	"or Equal" Substitution	"Alternate Substitution"
1	Product Data	02221	SSDS Fans and Equipment		X		

Comments:

Submitted by: WDF, Inc. Ernest Martinez Date: 4/23/2019

Received by: _____ _____

Print Name: _____

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SUBMITTAL DATA

Submittal Date	7/15/19
Project	PS 671K
Description	SSDS Fans and Equipment
Spec. Section Paragraph	02221
Submission #	
Drawing Reference:	
Deviation:	N/A

Reviewed by: Ernest Martinez

X_____

30 North Macquesten Parkway Mount Vernon, New York 10550
T: 914-776-8000 F: 914-664-1287

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SUBMITTAL

PROJECT: P.S. 671 – Brooklyn
New Building
840 5th Avenue
Brooklyn, NY 11232
Sub-Slab Depressurization System

OWNER: nyc School Construction Authority

CONTRACTOR: WDF Inc.
30 North MacQuesten Parkway
Mount Vernon, NY 10550

PREPARED BY: Phil Ritola
ACFM Dynamics, LLC
PO Box 386
Marion, CT 06444-0386

DATE: 12 July 2019

REVISION: 0

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SUBMITTAL INDEX

Section 15880 – Sub-Slab Depressurization System Accessories

1. Cover
2. Index

3–11. SF-1, SF-2: New York Blower 140606 Arrangement 4 Compact Pressure Blower
4. Details
5. Selection Data
6. Performance Curve
7. Fan Drawing
8. Inlet and Outlet Flexible Connector
9. Silencer
10. No-Loss Stack

11–20. SF-Spare: New York Blower 1400606 Arrangement 4 Compact Pressure Blower
12. Details
13. Selection Data
14. Performance Curve
15. Fan Drawing

16–48. Instrumentation and Devices
17-24. Weg 00236ET3E145T-W22 Inverter Duty Motor
25-49. ABB ACH550 variable Speed Drive
50. EEControls 25A-3P-RG-4X Non-Fused Motor Disconnect Switch
51-52. Dwyer 1910-5 Differential Pressure Switch
53-55. DPS Enclosure
56. DPS tubing
57. Kele AIS-120A SSDS Monitoring Panel
58-59. WIKA Model 612.20, P/N 9747724, vacuum indicator
60-61. Apollo LD145 butterfly valve

62-80. Installation, Maintenance & Operating Instructions
63-68. IM-170 Compact Pressure Blower
69. Weg LV Motor
70-163. ABB ACH550 VFD
164. EEControls disconnect switch
165-168. Dwyer 1910-5 Differential Pressure Switch
169. Kele Alarm Indicating Station
170. Wika Pressure Gauges
171-183. Apollo LD145/WD145 Series Butterfly Valve

184-190. Warranty
185. The New York Blower Company
186. Weg S/A (motor)
187. ABB ACH550 (vfd)
188. EEControls (disconnect switch)
189. Dwyer Instruments
190. Kele
191. Wika
195. Apollo

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SSDS Suction Fans

SF-1 & SF-2

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The New York Blower Company

Date: 7.10.2019
File: 2019-13900
Sequence: 1
Revision:

Control: 1
Chg Order:
Processor: JPR

Customer: **WDF Inc.**

Purchase Order:
Tagging: Suction Fan SF-1, Suction Fan SF-2

Office Reference: C.8380.1.200.0119

FAN INFORMATION

Quantity: Two (2)
Product Line: Compact Pressure Blower (CPB)
Size: 140606
Class/Wheel Type: NA/0966
Rotation: CCW
Arrangement: 4
Discharge: BAU

Motor By: Weg S/A
Mounting By: **nyb**

Total fan wt. With accessories: 174 lbs

FAN PERFORMANCE DATA

Capacity	CFM	SP	RPM	BHP	TEMP	DENS	ALT	MAX SS
STANDARD	300	13	3476	1.78	70*F.	0.075	0	3900

SALES MEMO INFORMATION

QTY	DESCRIPTION	Drawing#
2	**nyb** 140606 Arrangement 4 Compact Pressure Blower, CCW-BAU, 0966 wheel	124293
2	Weg 00236ET3E145T-W22 motors: 2 HP, 3600 RPM, 3-60-208-230/460V., TEFC, premium efficiency, 145T frame, inverter-duty	
2	Factory-mounting of the motor	
2	Factory-testing of the fan assembly	
2	Drilled inlet and outlet flanges; 6-inch, 150# pattern	
2	Stainless steel motor mounting platform	
2	AMCA Type B Spark-Resistant Contruction	
2	Housing drain	
2	Housing access door; flush-bolted @ 10:00 o'clock	
2	Motor weather cover	
2	**nyb** Size 6 outlet silencer: DIL = 14 dB @ 125 Hz., 32 dB @ 500 Hz.	2019-13900
2	Size 6 No-Loss stack head, stainless steel	
2	ABB ACH550 variable speed drive	
2	EEControls 25A-3P-RG-4X non-fused motor disconnect switch	
2	Dwyer Instruments 1910-5 Differential Pressure Switch with NEMA 12 enclosure	
2	Kele AIS-120VAC alarm indicating station	
2	Sets of four (4) VECO T22-3 RIS isolators	
2	Wika 612.20 vacuum indicators (9747724)	
2	Apollo LD145 butterfly valve with manual control arm; 6-inch	

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The New York Blower Company

Fan-to-Size
Fan Selection Data

Project:	nycSCA P.S. 671
Location:	Brooklyn, NY
Contact:	WDF - John Duval

Fan Tagging: Suction Fan SF-1, SF-2

Fan Design

Product:	Compact Pressure Blower	Arrangement:	4
Size/Model:	140606	Drive type:	Direct
Wheel Type:	0966		
Wheel Material:	Aluminum		
Wheel Width:	100 %	Wheel Diameter:	100.0 %

Operating Conditions

Volume Flow Rate:	300 CFM	Fan Speed:	3476 rpm
Fan Static Pressure:	13.0 in wg	Fan Input Power:	1.78 bhp
Outlet Velocity:	1667 ft/min	VP/SP ratio:	0.0133
Altitude (above mean sea level):	0. m	Operating Temperature:	70 Deg F
Operating Inlet Airstream Density:	0.0750 lb/ft3		
Static Efficiency:	34.45%	Mechanical Efficiency:	34.91%
Maximum Operating Temperature:	70 Deg F	Maximum Safe Operating Speed:	3900 rpm

Sound Power Level Ratings

Sound **Power** and sound **Pressure** levels are shown in decibels. (Power levels reference 10^{-12} watts and pressure levels reference $2x10^{-7}$ microbar.) Sound power ratings are calculated per AMCA Standard 301. Ratings do not include the effects of duct end correction. Sound levels do not include motors or drives. Pressure levels are estimated. A-weighting is per ANSI S.1.42-2001 (R2011).

Octave Bands:	1	2	3	4	5	6	7	8	
Center Frequency (Hz):	63	125	250	500	1000	2000	4000	8000	Overall
Total Fan Power Levels (dB)	85.4	85.4	93.1	91.4	91.	90.5	84.4	88.4	100.
Inlet Ducted	-3.	-3.	-3.	-3.	-3.	-3.	-3.	-3.	
A-Weighting	-26.2	-16.1	-8.6	-3.2	0.	1.2	1.	-1.1	
Convert to Pressure	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	
Inlet Sound Pressure Levels (dBA)	**28.**	**38.**	**54.**	**57.**	**60.**	**61.**	**55.**	**57.**	**66.**
Total Fan Power Levels (dB)	85.4	85.4	93.1	91.4	91.	90.5	84.4	88.4	100.
Outlet Ducted	-3.	-3.	-3.	-3.	-3.	-3.	-3.	-3.	
Silencer, Outlet, Custom	-2.	-14.	-23.	-32.	-34.	-29.	-25.	-23.	
A-Weighting	-26.2	-16.1	-8.6	-3.2	0.	1.2	1.	-1.1	
Convert to Pressure	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	
Outlet Sound Pressure Levels (dBA)	**26.**	**25.**	**31.**	**25.**	**26.**	**32.**	**30.**	**34.**	**39.**
Total Fan Power Levels (dB)	85.4	85.4	93.1	91.4	91.	90.5	84.4	88.4	100.
Housing-Radiated Adjustment	-6.	-10.	-14.	-16.	-13.	-14.	-15.	-16.	
A-Weighting	-26.2	-16.1	-8.6	-3.2	0.	1.2	1.	-1.1	
Convert to Pressure	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	
Housing-Radiated Sound Pressure Levels (dBA)	**25.**	**32.**	**43.**	**44.**	**50.**	**50.**	**43.**	**44.**	**55.**

Directivity/Reflection is hemispherical radiation (Q = 2); Distance is 10 m.
At 10 m, the estimated sound pressure level:

1. outside the fan due to an open inlet is 66 dBA.
2. at silencer outlet is 39 dBA (silencer attenuated).
3. housing radiated noise when inlet and outlet are ducted away from listening point is 55 dBA.

Your Representative:
ACFM Dynamics; P.O. Box 386; Marion, CT 06444-0386; USA; Phone: 203-395-3227; Fax: 203-271-0141; E-Mail: philritola@acfmdynamics.net

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The New York Blower Company

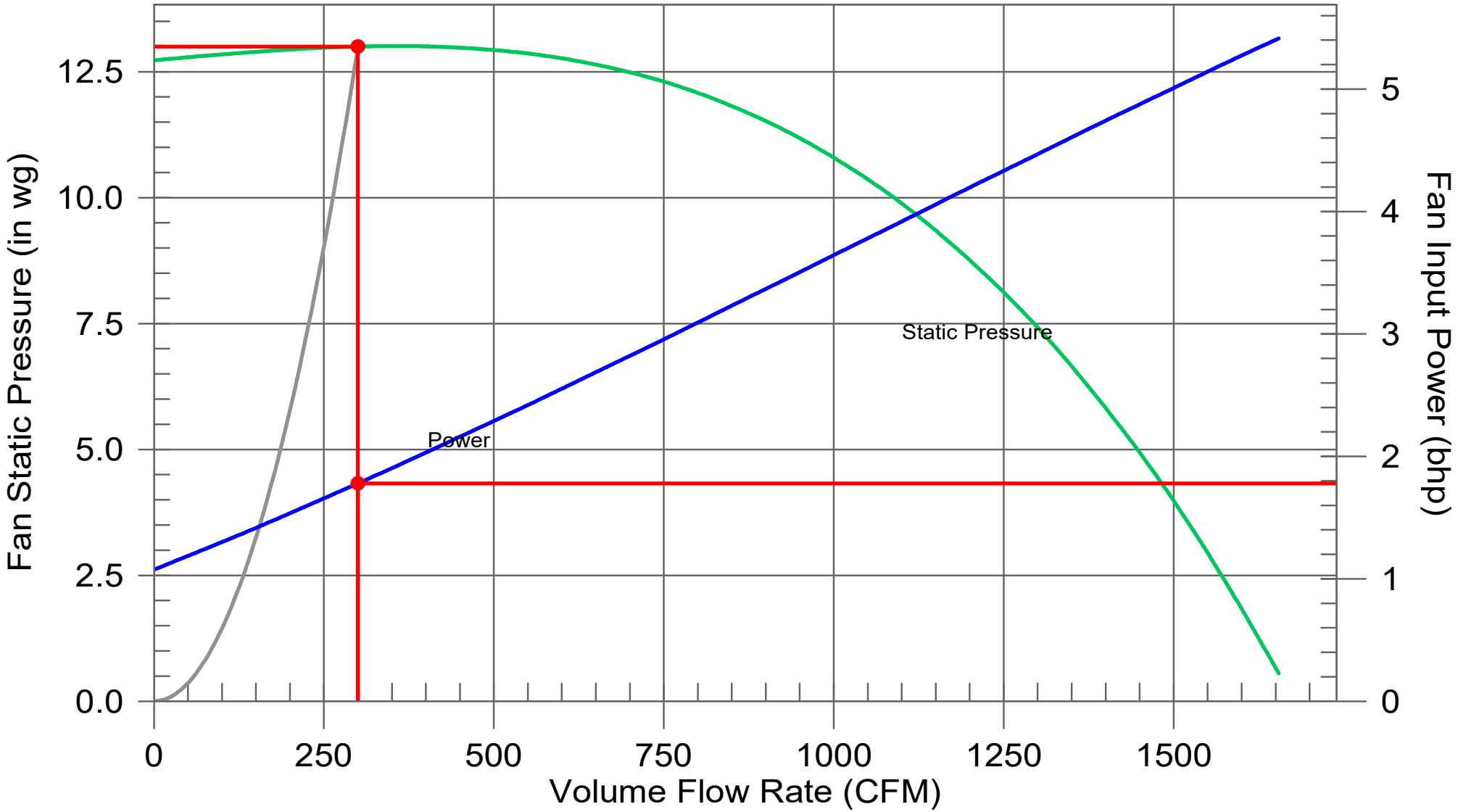
Fan-to-Size

Compact Pressure Blower
140606 0966
Arr.: 4

Volume Flow Rate: 300 CFM
Fan Static Press.: 13.0 in wg
Speed: 3476 rpm
Power: 1.78 bhp

Temp.: 70 Deg F
Altitude: 0. m
Density: 0.0750 lb/ft3
Outlet Velocity: 1667 ft/min

Tag: Suction Fan SF-1, SF-2



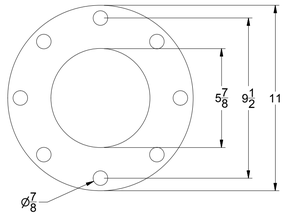
Customer:
WDF Inc.

[v1.86.35-R -- February 2015] Date Printed: 7/8/2019

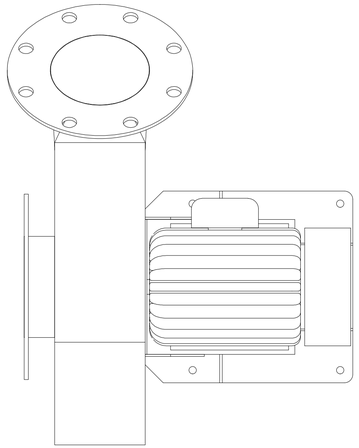
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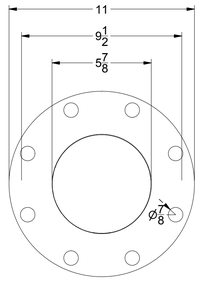
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Your Sales Representative:
ACFM Dynamics
Phone: 203-395-3227

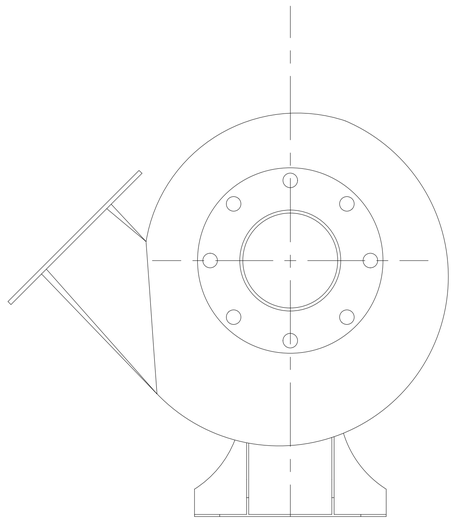


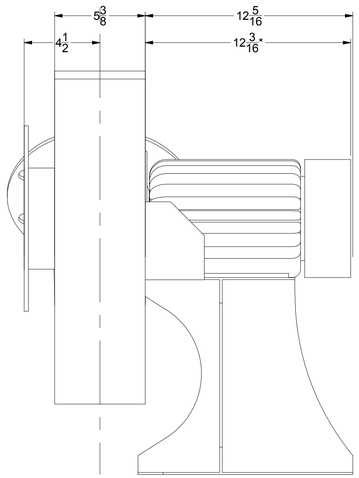
INLET FLANGE

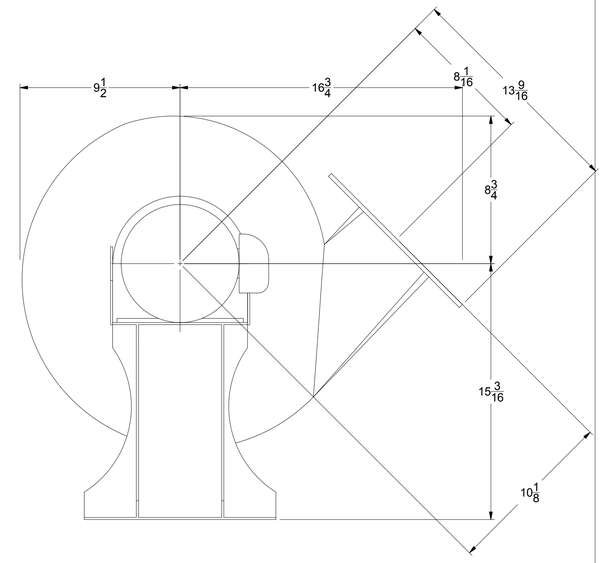


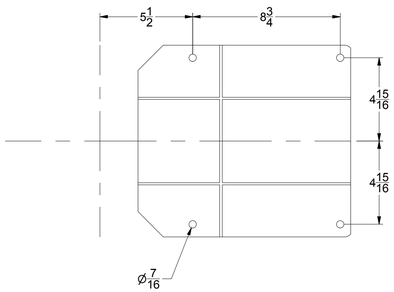


OUTLET FLANGE









*VARIES SLIGHTLY WITH MOTORS OF DIFFERENT MANUFACTURE.

EST FAN SHIPPING WEIGHT 174.0#
EST SHIPPING DIM 54.0 W X 44.0 L X 42.0 H

CUSTOMER WDF Inc.
CUSTOMER'S NO.
FILE NO. DOD124293
TAGGING P.S. 671 - Brooklyn, New Bulding
nyc School Construction Authority
Suction Fan SF-1, Suction Fan SF-2

NOTICE: This drawing is the property of THE NEW YORK BLOWER CO. and is loaned subject to the condition that it shall not be reproduced, copied, loaned or submitted to outside parties without our consent.

1406 COMPACT PRESSURE BLOWER
CCW BAU
Arrangement 4

PROPOSAL DRAWING ONLY

DRAWN DOD | DATE 7/10/2019

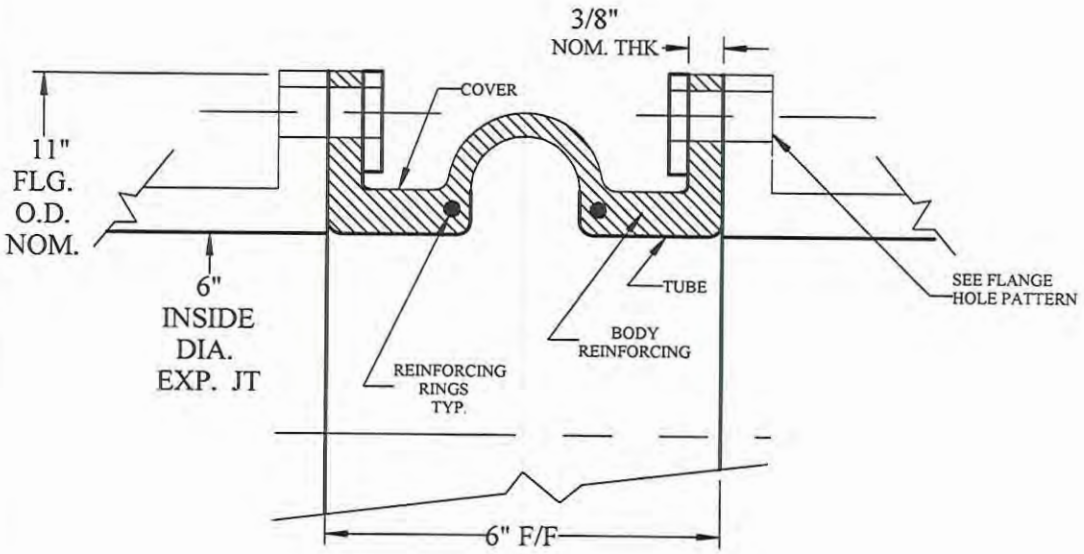
nyb THE NEW YORK BLOWER COMPANY
7660 Quincy Street
Willowbrook, IL 60527-5530
Visit us on the Web: http://www.nyb.com
Phone: (800) 208-7918 Email: nyb@nyb.com

DRAWING NUMBER
DOD124293

HACC - DIGITALLY RECEIVED 09/12/19

NOTE: THESE UNITS SHOULD BE ANCHORER OR INSTALLED WITH CONTRL ROD UNITS TO ASSURE PROPER OPERATION. CONTROL ROD UNITS MUST BE USED IF MAXIMUM RATED JOINT MOVEMENTS COULD BE EXCEEDED.

REV.	WAS CONDITION	BY:	DATE:	CHK'D	DATE:



EXPANSION JOINT DESIGN DATA:

EXPANSION JOINT MATERIALS,
- TUBE: **EPDM**
- BODY REINFORCING: **POLYESTER TIRECORD**
- COVER: **EPDM**
- REINFORCING RINGS: **CARBON STEEL**

DESIGN CONDITIONS,

MAXIMUM PRESSURE:	225 PSIG	112 PSIG
MAXIMUM VACUUM:	24" HG.	24" HG.
MAXIMUM TEMPERATURE:	194° F.	300° F.

DESIGN MOVEMENT,
- MAXIMUM COMPRESSION: **1-1/2"**
- MAXIMUM EXTENSION: **5/8"**
- MAXIMUM LATERAL OFFSET: **3/4"**

FLANGE HOLE PATTERN: 125# STD. ANSI.
8 EA 7/8"Ø HOLES ON 9-1/2" B.C.

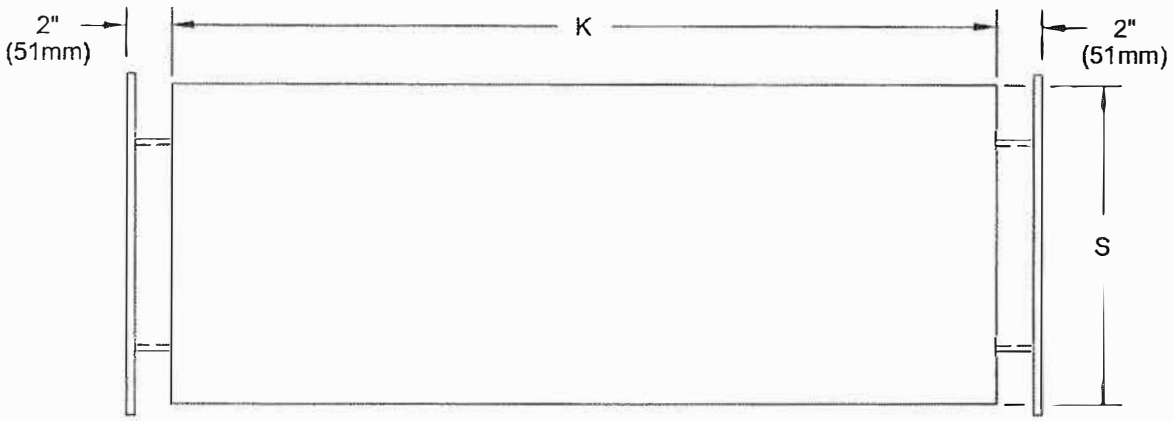
QUANTITY ORDERED:	PEBCO MIPCO	**MECCOM INDUSTRIAL PRODUCTS CO.** *DIVISION OF PEBCO SALES ,INC CLINTON TWP., MI 48036*			
CUSTOMER:		**ELASTOMERIC EXPANSION JOINT 320 EZ / 777**			
PROJECT:					
P.O. NO.:	DIMENSIONS ARE IN INCHES	SCALE: NONE	DATE:		
		BY: PSI- JD			
	REFERENCE #	CHK'D:			
	AUTOCAD FILE	SHEET 1 OF 1		DWG NO.	**MASTER GENERIC**

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CUSTOMER: WDF Inc.

P.O.: nyc School Construction Authority TAG 1: 671 - Brooklyn

TAG 2: SF-1, SF-2 Outlet Silencer



Dimensions not to be used for construction unless certified.

ITEM	DIMENSIONS	
	in	mm
K	36	914
Silencer I.D.	6 1/8	156
S (O.D.)	14	356

FAN SILENCERS ARE OF 14 GAUGE STEEL CONSTRUCTION FILLED WITH HIGH DENSITY ACOUSTICAL ABSORPTION MATERIAL.

DIL: 2-14-23-32-34-29-25-23

MAXIMUM TEMPERATURE: 600°F (315°C)

WEIGHT: 75 LBS

TOLERANCE: ±1/8" (±3mm)

FLANGE	DIMENSIONS	
	in	mm
I.D.	6	152
O.D.	11	279
B.C.	9 1/2	241
No. Holes	8	-
Hole Dia.	7/8	22

nyb THE NEW YORK BLOWER COMPANY
7660 Quincy Street
Willowbrook, IL 60527-5530

Visit us on the Web:
http://www.nyb.com
Phone: (800) 208-7918
Email: nyb@nyb.com

OUTLET SILENCER

SIZE: 06

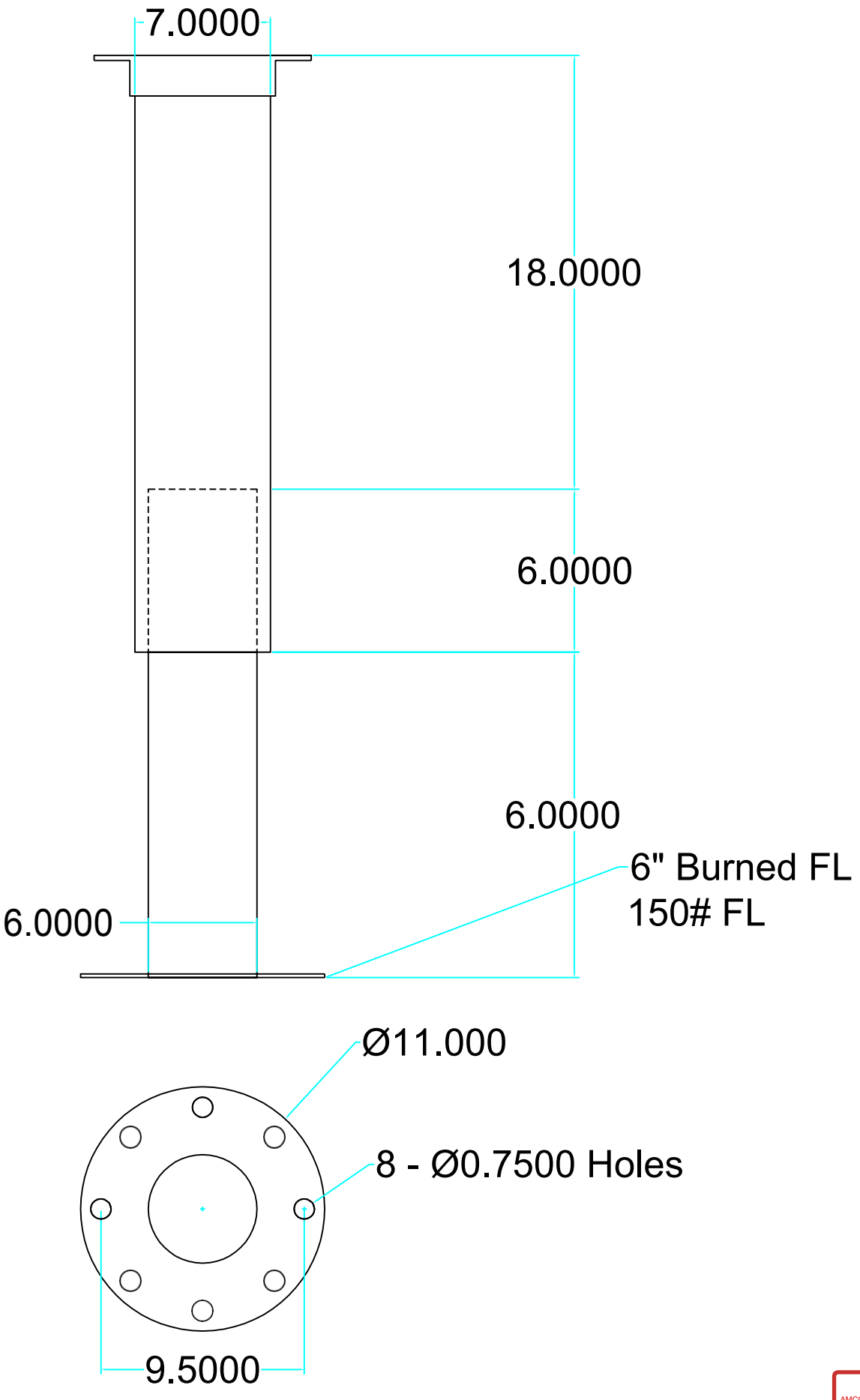
Date 07-08-19 Certified

Drawing No. 2019-13900 Rev.

H10

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No-Loss Stack, 304 Stainless Steel



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SSDS Suction Fans

SF-Spare

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The New York Blower Company

Date:	7.10.2019		
File:	2019-13900	Control:	2
Sequence:	2	Chg Order:	
Revision:		Processor:	JPR

Customer: **WDF Inc.**

Purchase Order: **Office Reference:** C.8380.1.200.0119
Tagging: Suction Fan SF-Spare

FAN INFORMATION

Quantity:	One (1)
Product Line:	Compact Pressure Blower (CPB)
Size:	140606
Class/Wheel Type:	NA/0966
Rotation:	CCW
Arrangement:	4
Discharge:	BAU

Motor By: Weg S/A
Mounting By: **nyb**

Total fan wt. With accessories: 174 lbs

FAN PERFORMANCE DATA

Capacity	CFM	SP	RPM	BHP	TEMP	DENS	ALT	MAX SS
STANDARD	300	13	3476	1.78	70*F.	0.075	0	3900

SALES MEMO INFORMATION

QTY	DESCRIPTION	Drawing#
1	**nyb** 140606 Arrangement 4 Compact Pressure Blower, CCW-BAU, 0966 wheel	124294
1	Weg 00236ET3E145T-W22 motors: 2 HP, 3600 RPM, 3-60-208-230/460V., TEFC, premium efficiency, 145T frame, inverter-duty	
1	Factory-mounting of the motor	
1	Factory-testing of the fan assembly	
1	Drilled inlet and outlet flanges; 6-inch, 150# pattern	
1	Stainless steel motor mounting platform	
1	AMCA Type B Spark-Resistant Contruction	
1	Housing drain	
1	Housing access door; flush-bolted @ 10:00 o'clock	

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The New York Blower Company

Fan-to-Size
Fan Selection Data

Project:	nycSCA P.S. 671
Location:	Brooklyn, NY
Contact:	WDF - John Duval

Fan Tagging: Suction Fan SF-Spare

Fan Design

Product:	Compact Pressure Blower	Arrangement:	4
Size/Model:	140606	Drive type:	Direct
Wheel Type:	0966		
Wheel Material:	Aluminum		
Wheel Width:	100 %	Wheel Diameter:	100.0 %

Operating Conditions

Volume Flow Rate:	300 CFM	Fan Speed:	3476 rpm
Fan Static Pressure:	13.0 in wg	Fan Input Power:	1.78 bhp
Outlet Velocity:	1667 ft/min	VP/SP ratio:	0.0133
Altitude (above mean sea level):	0. m	Operating Temperature:	70 Deg F
Operating Inlet Airstream Density:	0.0750 lb/ft3		
Static Efficiency:	34.45%	Mechanical Efficiency:	34.91%
Maximum Operating Temperature:	70 Deg F	Maximum Safe Operating Speed:	3900 rpm

Sound Power Level Ratings

Sound **Power** and sound **Pressure** levels are shown in decibels. (Power levels reference 10^{-12} watts and pressure levels reference $2x10^{-7}$ microbar.) Sound power ratings are calculated per AMCA Standard 301. Ratings do not include the effects of duct end correction. Sound levels do not include motors or drives. Pressure levels are estimated. A-weighting is per ANSI S.1.42-2001 (R2011).

Octave Bands:	1	2	3	4	5	6	7	8	
Center Frequency (Hz):	63	125	250	500	1000	2000	4000	8000	Overall
Total Fan Power Levels (dB)	85.4	85.4	93.1	91.4	91.	90.5	84.4	88.4	100.
Inlet Ducted	-3.	-3.	-3.	-3.	-3.	-3.	-3.	-3.	
A-Weighting	-26.2	-16.1	-8.6	-3.2	0.	1.2	1.	-1.1	
Convert to Pressure	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	
Inlet Sound Pressure Levels (dBA)	**28.**	**38.**	**54.**	**57.**	**60.**	**61.**	**55.**	**57.**	**66.**
Total Fan Power Levels (dB)	85.4	85.4	93.1	91.4	91.	90.5	84.4	88.4	100.
Outlet Ducted	-3.	-3.	-3.	-3.	-3.	-3.	-3.	-3.	
Silencer, Outlet, Custom	-2.	-14.	-23.	-32.	-34.	-29.	-25.	-23.	
A-Weighting	-26.2	-16.1	-8.6	-3.2	0.	1.2	1.	-1.1	
Convert to Pressure	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	
Outlet Sound Pressure Levels (dBA)	**26.**	**25.**	**31.**	**25.**	**26.**	**32.**	**30.**	**34.**	**39.**
Total Fan Power Levels (dB)	85.4	85.4	93.1	91.4	91.	90.5	84.4	88.4	100.
Housing-Radiated Adjustment	-6.	-10.	-14.	-16.	-13.	-14.	-15.	-16.	
A-Weighting	-26.2	-16.1	-8.6	-3.2	0.	1.2	1.	-1.1	
Convert to Pressure	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	-27.8	
Housing-Radiated Sound Pressure Levels (dBA)	**25.**	**32.**	**43.**	**44.**	**50.**	**50.**	**43.**	**44.**	**55.**

Directivity/Reflection is hemispherical radiation (Q = 2); Distance is 10 m.
At 10 m, the estimated sound pressure level:

1. outside the fan due to an open inlet is 66 dBA.
2. at silencer outlet is 39 dBA (silencer attenuated).
3. housing radiated noise when inlet and outlet are ducted away from listening point is 55 dBA.

Your Representative:
ACFM Dynamics; P.O. Box 386; Marion, CT 06444-0386; USA; Phone: 203-395-3227; Fax: 203-271-0141; E-Mail: philritola@acfmdynamics.net

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The New York Blower Company

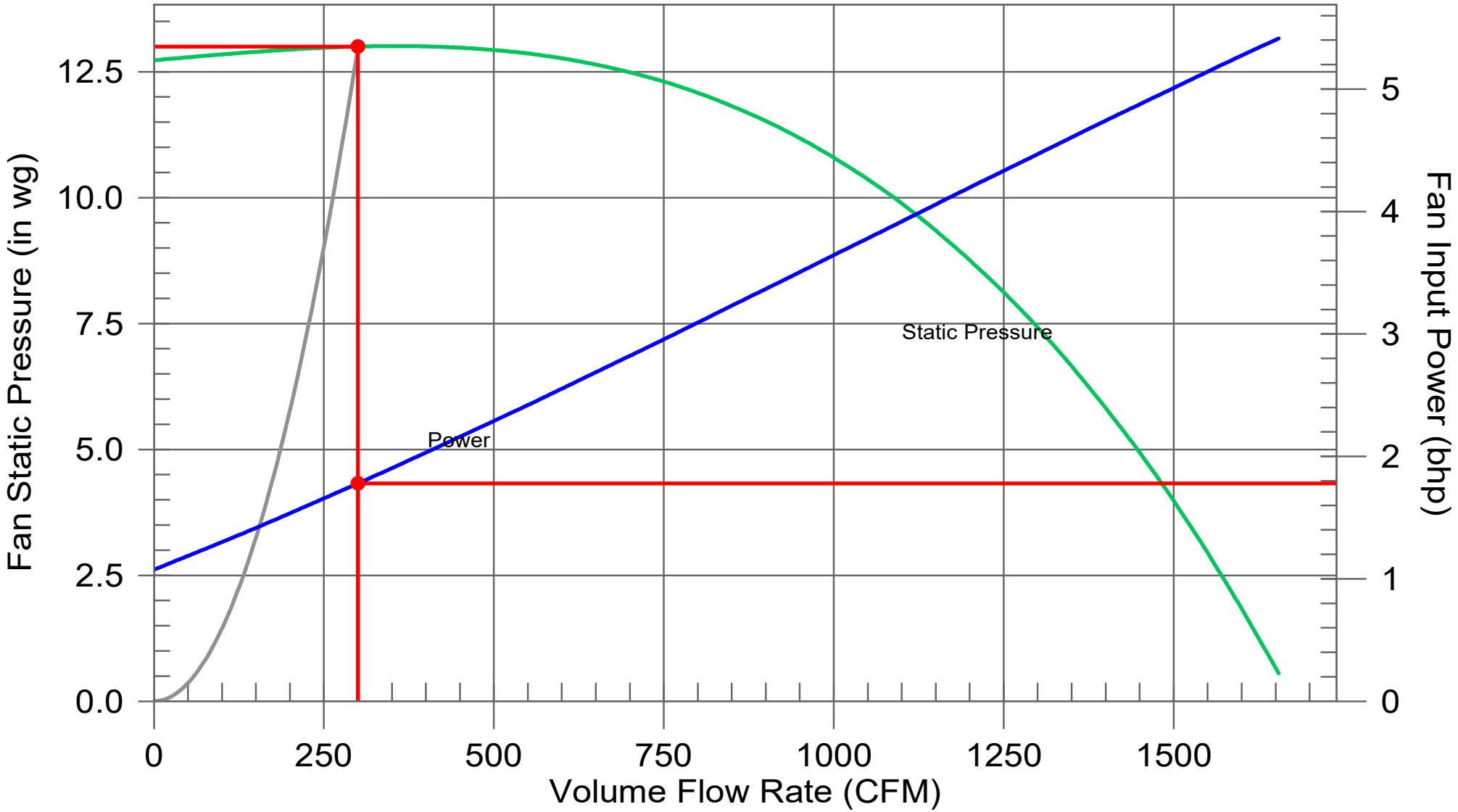
Fan-to-Size

Compact Pressure Blower
140606 0966
Arr.: 4

Volume Flow Rate: 300 CFM
Fan Static Press.: 13.0 in wg
Speed: 3476 rpm
Power: 1.78 bhp

Temp.: 70 Deg F
Altitude: 0. m
Density: 0.0750 lb/ft3
Outlet Velocity: 1667 ft/min

Tag: Suction Fan SF-Spare



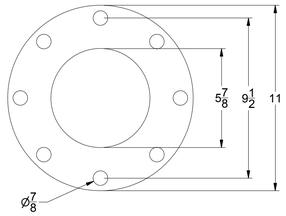
Customer:
WDF Inc.

[v1.86.35-R -- February 2015] Date Printed: 7/8/2019

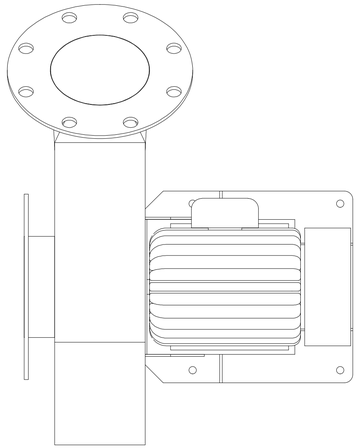
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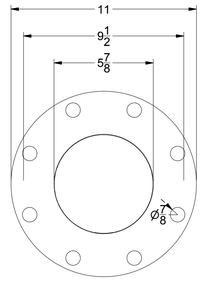
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ACFM Dynamics
Phone: 203-395-3227

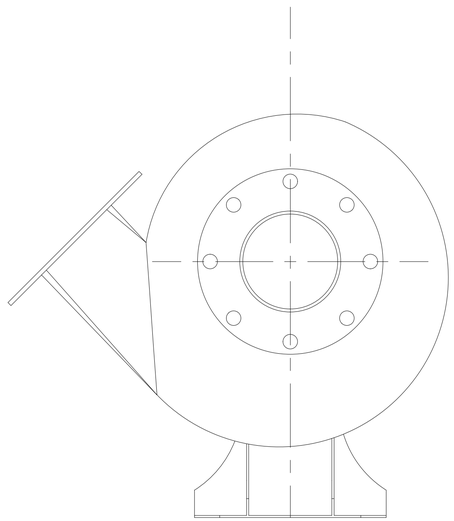


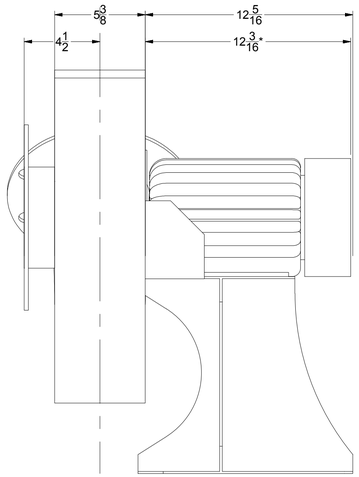
INLET FLANGE

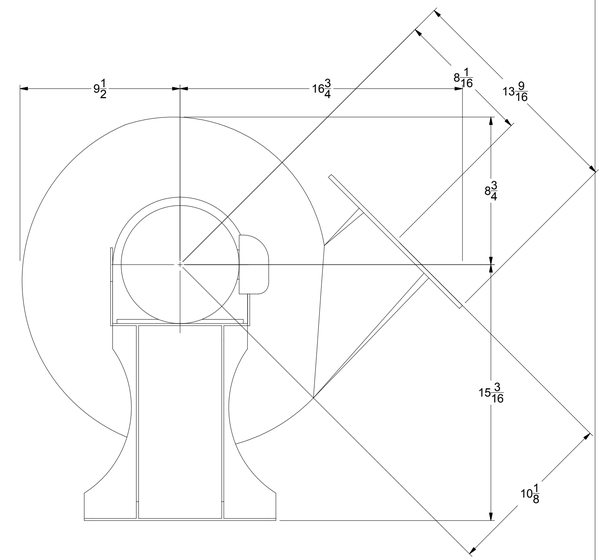


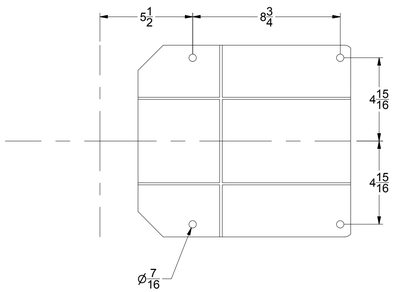


OUTLET FLANGE









*VARIES SLIGHTLY WITH MOTORS OF DIFFERENT MANUFACTURE.

EST FAN SHIPPING WEIGHT 174.0#
EST SHIPPING DIM 54.0 W X 44.0 L X 42.0 H

CUSTOMER WDF Inc.
CUSTOMER'S NO.
FILE NO. DOD124294
TAGGING P.S. 671 - Brooklyn, New Bulding
nyc School Construction Authority
Suction Fan Spare

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1406 COMPACT PRESSURE BLOWER
CCW BAU
Arrangement 4

PROPOSAL DRAWING ONLY

DRAWN DOD | DATE 7/10/2019

nyb THE NEW YORK BLOWER COMPANY
7660 Quincy Street
Willowbrook, IL 60527-5530
Visit us on the Web: http://www.nyb.com
Phone: (800) 208-7918 Email: nyb@nyb.com

DRAWING NUMBER
DOD124294

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SSDS Accessories

Instrumentation & Devices

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DATA SHEET

Three Phase Induction Motor - Squirrel Cage

Customer	: WDF Inc.
Customer reference	: P.S. 671 - Brooklyn

Product line	: W22 NEMA Premium Efficiency Three-Phase	Product code :	11456827
		Catalog # :	00236ET3E145T-W22

Frame	: 143/5T	Locked rotor time	: 30s (cold) 17s (hot)
Output	: 2 HP (1.5 kW)	Temperature rise	: 80 K
Poles	: 2	Duty cycle	: Cont.(S1)
Frequency	: 60 Hz	Ambient temperature	: -20°C to +40°C
Rated voltage	: 208-230/460 V	Altitude	: 1000 m.a.s.l.
Rated current	: 5.60-5.12/2.56 A	Protection degree	: IP55
L. R. Amperes	: 49.8-45.6/22.8 A	Cooling method	: IC411 - TEFC
LRC	: 8.9x(Code L)	Mounting	: F-1
No load current	: 1.55-1.80/0.900 A	Rotation[1]	: Both (CW and CCW)
Rated speed	: 3475 rpm	Noise level[2]	: 68.0 dB(A)
Slip	: 3.47 %	Starting method	: Direct On Line
Rated torque	: 2.98 ft.lb	Approx. weight[3]	: 50.5 lb
Locked rotor torque	: 350 %		
Breakdown torque	: 380 %		
Insulation class	: F		
Service factor	: 1.25		
Moment of inertia (J)	: 0.0605 sq.ft.lb		
Design	: B		

Output	50%	75%	100%
Efficiency (%)	82.5	85.5	85.5
Power Factor	0.71	0.80	0.86

Foundation loads

Max. traction	: 83 lb
Max. compression	: 133 lb

		Drive end	Non drive end
Bearing type	:	6205 ZZ	6204 ZZ
Sealing	:	V'Ring	V'Ring
Lubrication interval	:	-	-
Lubricant amount	:	-	-
Lubricant type	:	Mobil Polyrex EM	

Notes
SSDS Suction Fan Motors - with thermostats (one per phase @ 155*C.), inverter duty.

This revision replaces and cancel the previous one, which must be eliminated.
(1) Looking the motor from the shaft end.
(2) Measured at 1m and with tolerance of +3dB(A).
(3) Approximate weight subject to changes after manufacturing process.
(4) At 100% of full load.

These are average values based on tests with sinusoidal power supply, subject to the tolerances stipulated in NEMA MG-1.

Rev.	Changes Summary	Performed	Checked	Date

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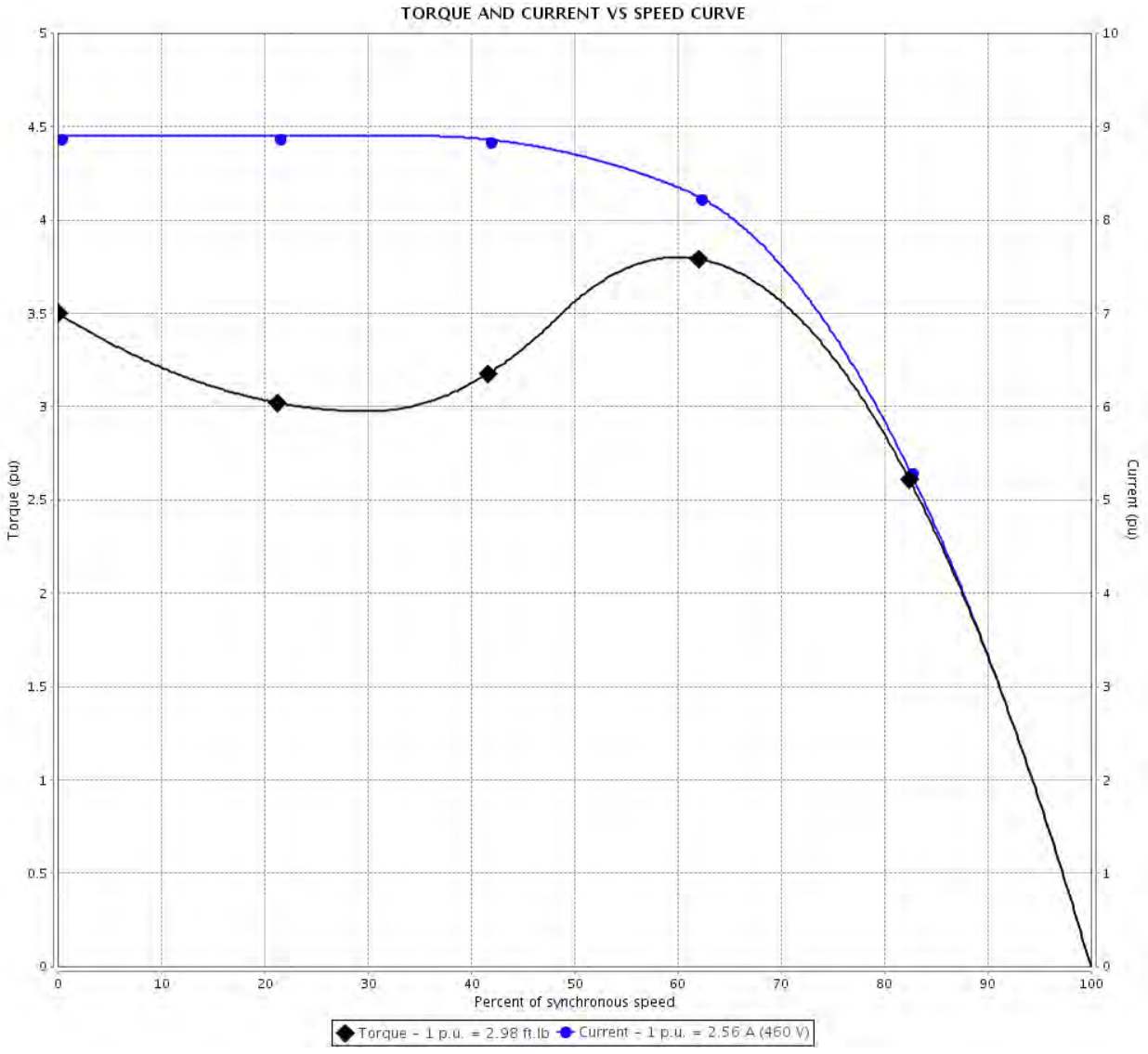
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TORQUE AND CURRENT VS SPEED CURVE

Three Phase Induction Motor - Squirrel Cage

Customer	: WDF Inc.
Customer reference	: P.S. 671 - Brooklyn

Product line	: W22 NEMA Premium Efficiency Three-Phase	Product code :	11456827
		Catalog # :	00236ET3E145T-W22



Performance	: 208-230/460 V 60 Hz 2P

Rated current	: 5.60-5.12/2.56 A	Moment of inertia (J)	: 0.0605 sq.ft.lb
LRC	: 8.9	Duty cycle	: Cont.(S1)
Rated torque	: 2.98 ft.lb	Insulation class	: F
Locked rotor torque	: 350 %	Service factor	: 1.25
Breakdown torque	: 380 %	Temperature rise	: 80 K
Rated speed	: 3475 rpm	Design	: B

Locked rotor time	: 30s (cold) 17s (hot)

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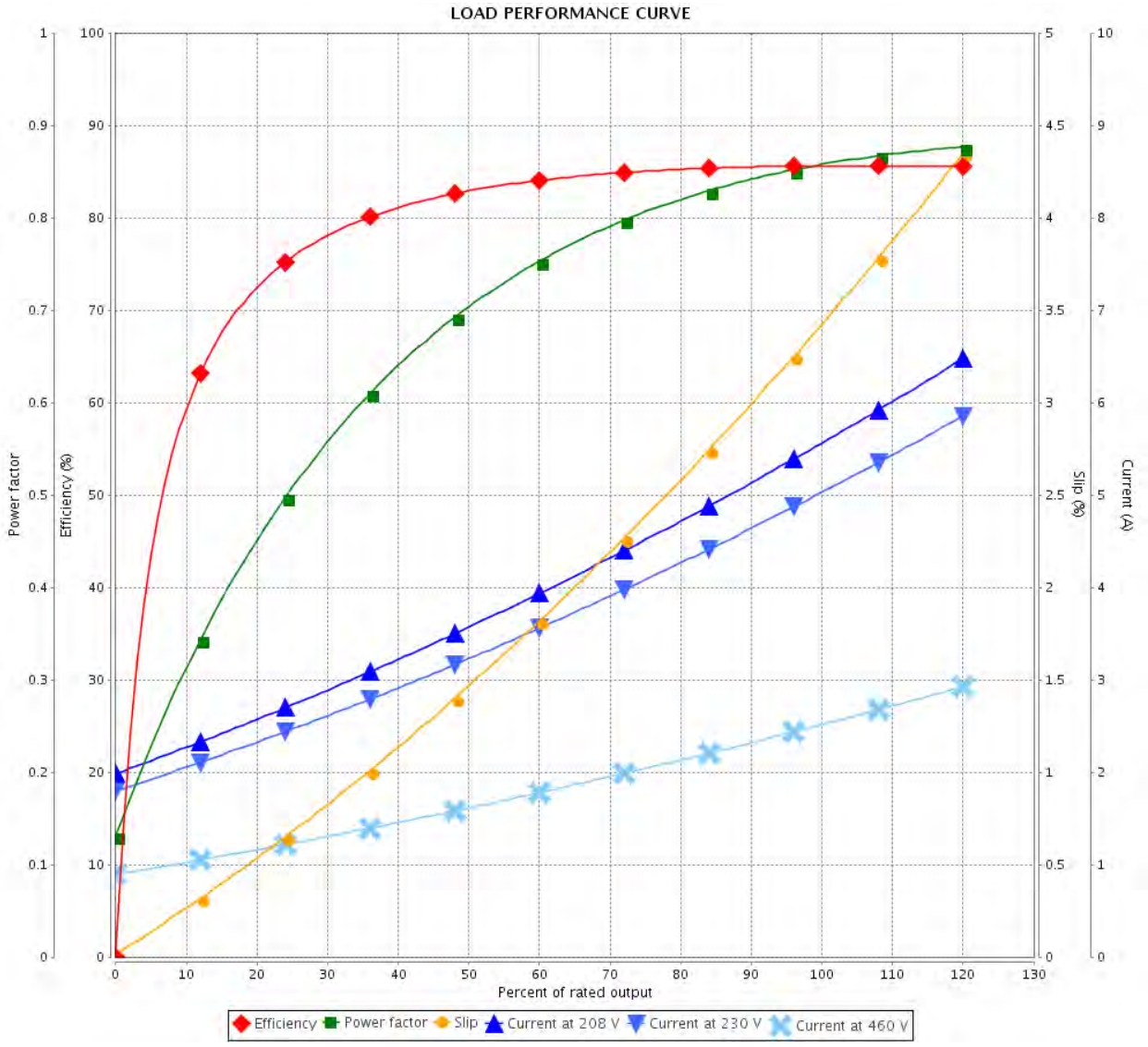
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LOAD PERFORMANCE CURVE

Three Phase Induction Motor - Squirrel Cage

Customer	: WDF Inc.
Customer reference	: P.S. 671 - Brooklyn

Product line	: W22 NEMA Premium Efficiency Three-Phase	Product code :	11456827
		Catalog # :	00236ET3E145T-W22



Performance	: 208-230/460 V 60 Hz 2P

Rated current	: 5.60-5.12/2.56 A	Moment of inertia (J)	: 0.0605 sq.ft.lb
LRC	: 8.9	Duty cycle	: Cont.(S1)
Rated torque	: 2.98 ft.lb	Insulation class	: F
Locked rotor torque	: 350 %	Service factor	: 1.25
Breakdown torque	: 380 %	Temperature rise	: 80 K
Rated speed	: 3475 rpm	Design	: B

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THERMAL LIMIT CURVE

Three Phase Induction Motor - Squirrel Cage

Customer	: WDF Inc.
Customer reference	: P.S. 671 - Brooklyn

Product line	: W22 NEMA Premium Efficiency Three-Phase	Product code :	11456827
		Catalog # :	00236ET3E145T-W22

Performance	: 208-230/460 V 60 Hz 2P

Rated current	: 5.60-5.12/2.56 A	Moment of inertia (J)	: 0.0605 sq.ft.lb
LRC	: 8.9	Duty cycle	: Cont.(S1)
Rated torque	: 2.98 ft.lb	Insulation class	: F
Locked rotor torque	: 350 %	Service factor	: 1.25
Breakdown torque	: 380 %	Temperature rise	: 80 K
Rated speed	: 3475 rpm	Design	: B
Heating constant			
Cooling constant			

Rev.	Changes Summary	Performed	Checked	Date

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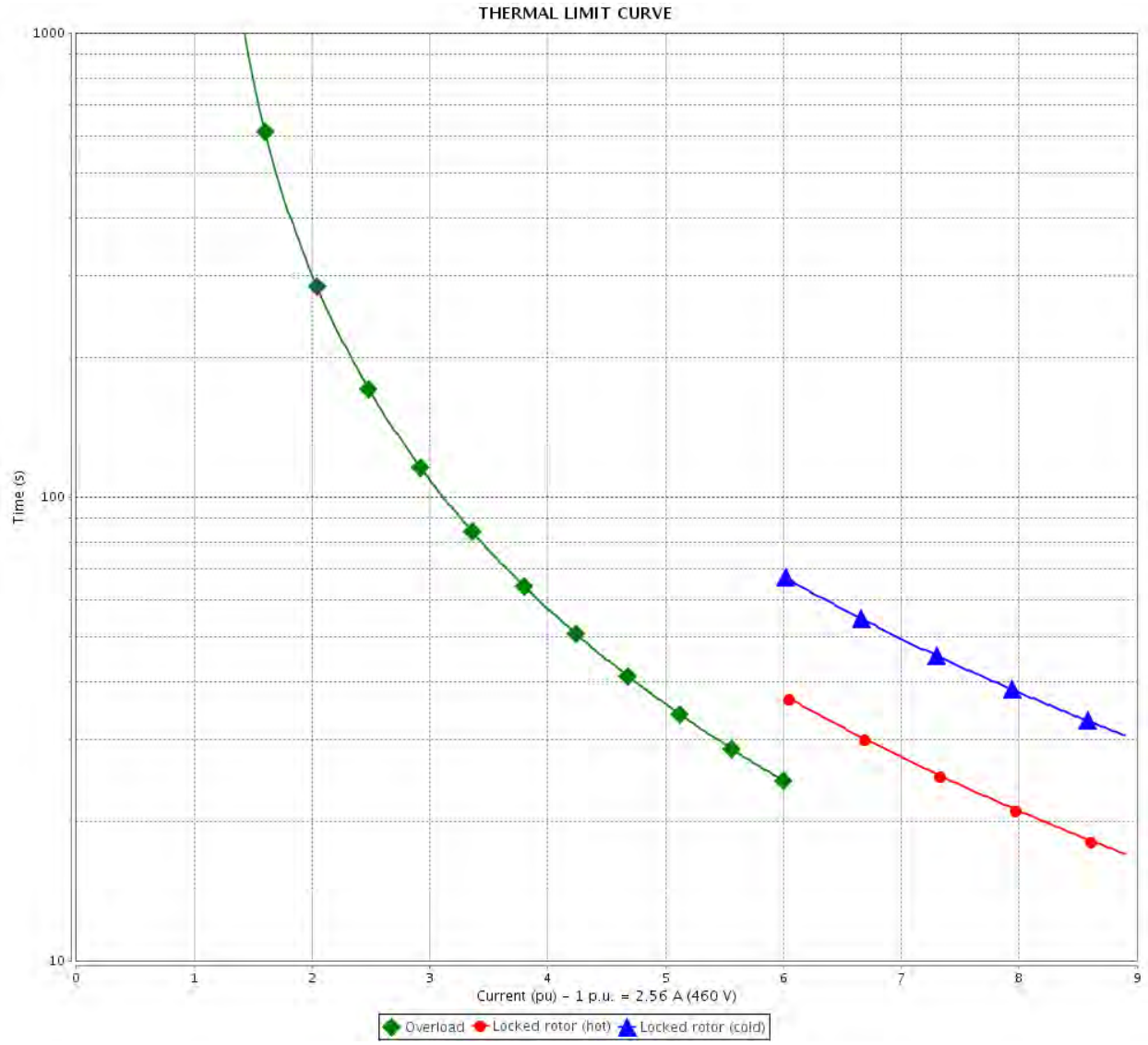
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THERMAL LIMIT CURVE

Three Phase Induction Motor - Squirrel Cage

Customer : WDF Inc.
Customer reference : P.S. 671 - Brooklyn



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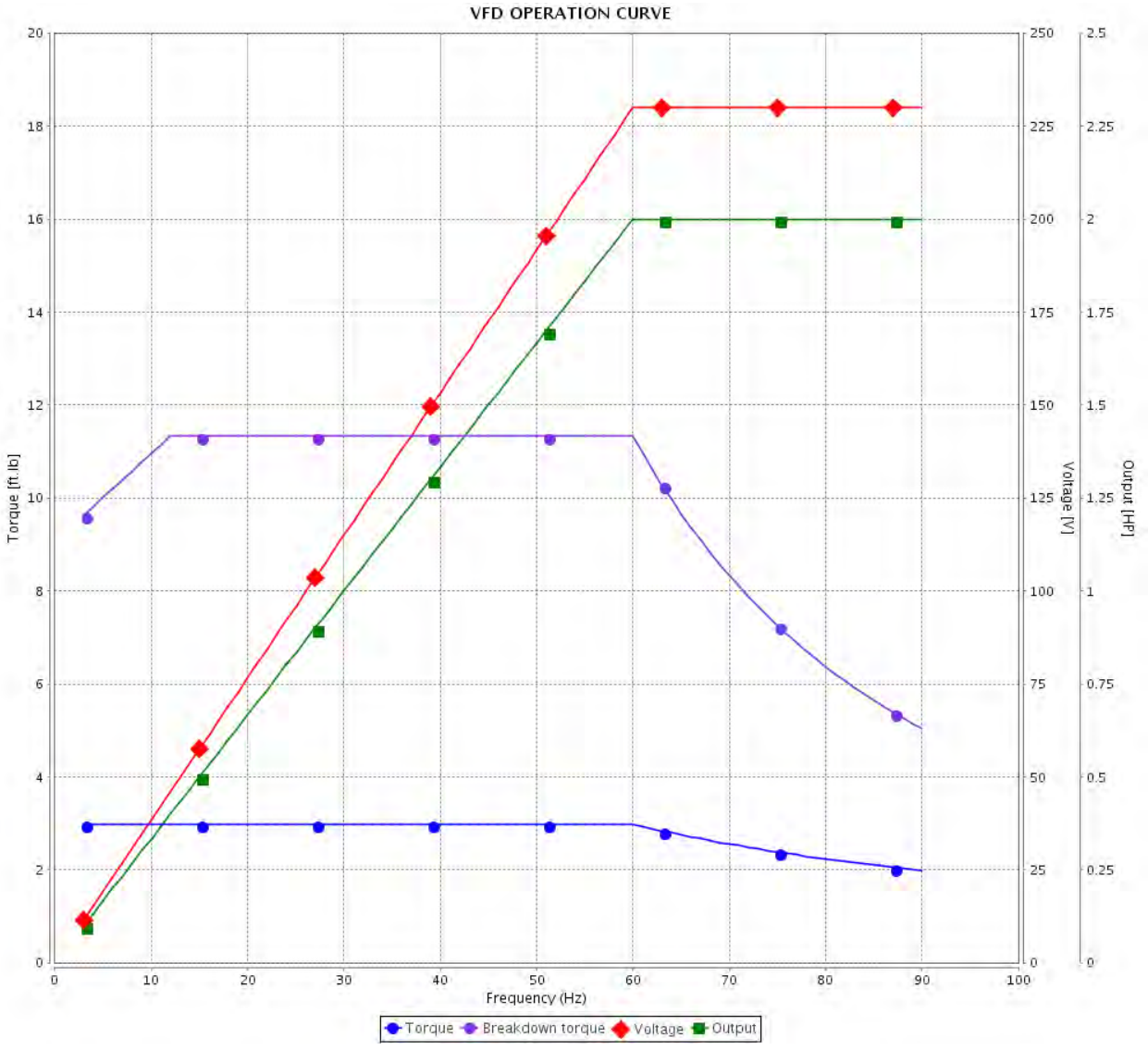
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VFD OPERATION CURVE

Three Phase Induction Motor - Squirrel Cage

Customer	: WDF Inc.
Customer reference	: P.S. 671 - Brooklyn

Product line	: W22 NEMA Premium Efficiency Three-Phase	Product code :	11456827
		Catalog # :	00236ET3E145T-W22



Performance	: 208-230/460 V 60 Hz 2P

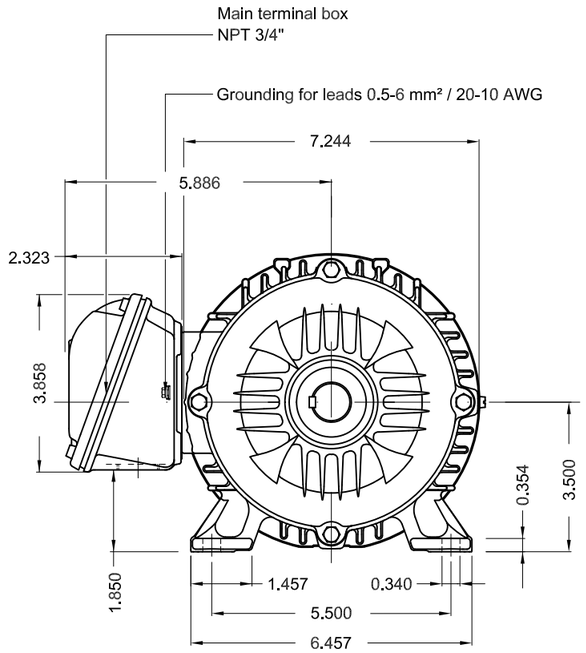
Rated current	: 5.60-5.12/2.56 A	Moment of inertia (J)	: 0.0605 sq.ft.lb
LRC	: 8.9	Duty cycle	: Cont.(S1)
Rated torque	: 2.98 ft.lb	Insulation class	: F
Locked rotor torque	: 350 %	Service factor	: 1.25
Breakdown torque	: 380 %	Temperature rise	: 80 K
Rated speed	: 3475 rpm	Design	: B

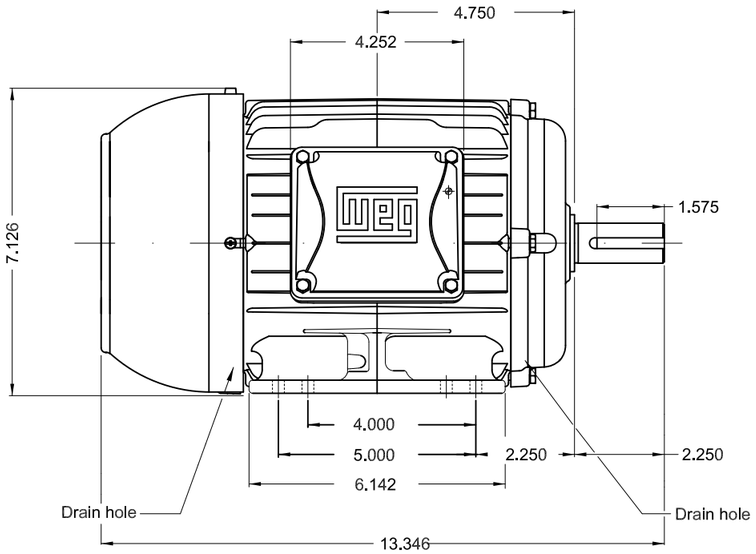
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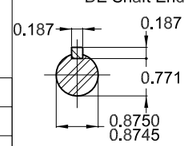


Color RAL 5009

Painting plan 207A

Mounting B3R(D)

DE Shaft End



2 HP 02 Poles 60Hz | A

ECM	LOC	SUMMARY OF MODIFICATIONS	EXECUTED	CHECKED	RELEASED	DATE	VER

EXECUTED	USERADMIN	THREE PHASE W22 MOTOR - NEMA PREMIUM EFF	PREVIEW
CHECKED		FRAME 143/5T IP55 TEFC	WDD
RELEASED			
REL DT.		WMO Jaragua do Sul Product Engineering	SHEET 1 / 1

Dimensions in inches

A3

XME

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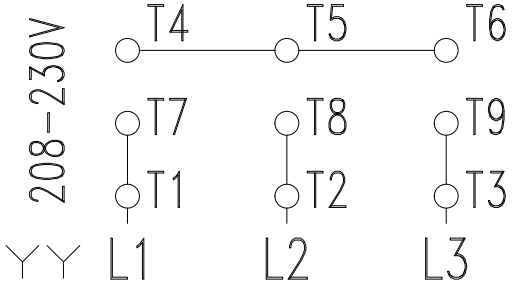
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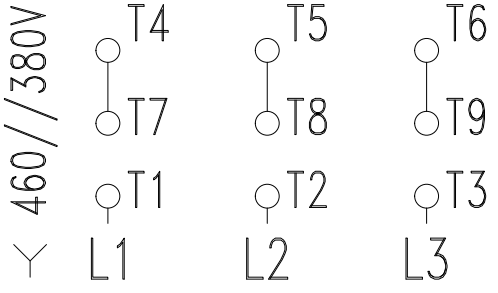
W22 NEMA Premium® Inverter Duty Motor
CC029A Severe Duty

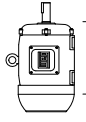
11456827

MADE IN MÉXICO MODEL 00236ET3E145T-W22

PH 3	FR 143/5T	HP(kW) 2.0(1.5)	Hz 60	SF 1.25	PF 0.86
V 230/460	A 5.12/2.56	RPM 3475	INS. CL. F	△T 80 K	IP55
NEMA NOM EFF 85.5 %	DES B	DUTY CONT.	AMB 40°C		
ENCL TEFC	SFA 6.40/3.20	USABLE @208V 5.60 A	SF 1.15	SFA 6.44	
2.0HP 1.5kW 50Hz 380V 3.07A 2835RPM SF1.25 EFF 82.5% (IE2)				CODE L	







6205-ZZ

6204-ZZ

MOBIL POLYREX EM

ALT 1000 m.a.s.l. | 51 Lbs

For 60Hz: Class I, Div 2, Gr. A, B, C and D – T3
Class I, Zone 2, IIC – T3
Class II, Div 2, Gr. F and G – T5

For use on PWM, Gr. A, B, C, D, F and G
VT1000:1, CT20:1, 1.0SF, T4A

C SP® US Energy Verified

C UL® US LISTED 3P19

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FOR SAFE AREA

ABB

ACH550
AC MOTOR SPEED CONTROL

SUBMITTAL FOR:
APPROVAL

PROJECT:	nycSCA P.S. 671
CONTRACTOR:	WDF Inc. Mount Vernon NY
SUBMITTED BY:	ACFM Dynamics, LLC PO Box 386 Marion CT 06444
SUBMITTAL DATE:	7/11/2019
REVISION:	0

51250804

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Submittal Schedule

This schedule includes the products supplied as part of this submittal.

Schedule			Motor Data[1]			Drive Data			
Item	Qty	Tag	HP	FLA	Volts	Product ID	HP	Amps	Volts
1	2	SF-1, 2	2	5.6	208 VAC	ACH550-BCR-06A6-2+B058+F267	2	6.6	240 VAC

Notes:

1. AC motor data is per National Electrical Code Table 430.250 for typical motors used in most applications. It is provided as typical data only. DC motor data is per typical industry standards. Actual motor data may vary

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Submittal Schedule Details for VFD-1, 2

Item	Tag / Equipment ID	Product ID
1	SF-1, 2	ACH550-BCR-06A6-2+B058+F267

Item Description
Input Voltage: 240 VAC Three Phase **Rated Output Current:** 6.6A **Enclosure:** UL (NEMA) Type 3R **Nominal Horsepower:** 2 HP **Frame Size:** R1 **Input Disconnecting Means:** Circuit Breaker **Bypass:** E-Clipse Bypass (Box) **Input Impedance:** 5% **Short Circuit Current Rating:** 100 kA **Communication Protocols:** Johnson Controls N2, Siemens Building Technologies FLN (P1), Modbus RTU, BACnet (MS/TP) **Other Options:** [+B058]: UL (NEMA) Type 3R, [+F267]: Service Switch

Drive Input Fuse Ratings	
Fuse Class	**Amps (600 V)**
Class CC	15A

Wire Size Capacities of Power Terminals		
Input Wiring	**Output Wiring**	**Ground Wiring**
#12 62 in-lbs	#6 11-13 in-lbs	#4 35 in-lbs

Dimensions and Weights			
Height *in* *(mm)*	**Width** *in* *(mm)*	**Depth** *in* *(mm)*	**Weight** *lbs* *(kg)*
34.1 (865)	17.8 (452)	13.5 (343)	128 (58)

Heat Dissipation & Airflow Requirements			
Power Losses		**Airflow**	
BTU/Hr	**Watts**	**CFM**	**CM/Hr**
249	73	26	44

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ACH550 Product Overview

Description

The ACH550 series is a microprocessor based Pulse Width Modulated (PWM) adjustable speed AC drive. The ACH550 drive takes advantage of sophisticated microprocessor control and advanced IGBT power switching technology to deliver high-performance control of AC motors for a wide range of HVAC applications.

With drives ranging from 1 to 550 HP, the ACH550 series features a universal full graphic interface that "speaks" to the operator in plain English phrases, greatly simplifying set-up, operation, and fault diagnosis. The ACH550 is also programmable in fourteen other languages.

Each ACH550 drive comes equipped with an extensive library of pre-programmed HVAC application macros which, at a touch of a button, allow rapid configuration of inputs, outputs, and performance parameters for specific HVAC applications to maximize convenience and minimize start-up time. The ACH550 series can handle the most demanding commercial applications in an efficient, dependable, and economic manner.



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ACH550 Standard Features

- UL, cUL labeled and CE marked, BTL listed
- EMI/RFI Filter (1st Environment, Restricted Distribution)
- Seismic Certificate of Compliance in accordance with
  - IBC 2000 referencing ASCE 7-98 and ICC AC156
  - IBC 2003 referencing ASCE 7-02 and ICC AC156
  - IBC 2006 referencing ASCE 7-05 and ICC AC156
  - IBC 2009 referencing ASCE 7-05 and ICC AC156
- Start-Up Assistants
- Maintenance Assistants
- Diagnostic Assistants
- Real Time Clock (Includes Day, Date and Time)
- Operator Panel Parameter Backup (read/write)
- Full Graphic and Multilingual Display
  - for Operator Control, Parameter Set-Up and Operating Data Display:
    - Output Frequency (Hz) / Motor Speed (RPM)
    - Motor Current
    - Calculated Energy Savings ($, kWh/MWh, CO^2)
    - Calculated % Motor Torque
    - Calculated Motor Power (kW)
    - DC Bus Voltage
    - Output Voltage
    - Heatsink Temperature
    - Elapsed Time Meter (reset-able)
    - KWh (reset-able)
    - Input / Output Terminal Monitor
    - PID Actual Value (Feedback) & Error
    - Fault Text
    - Warning Text
    - Three (3) Scalable Process Variable Displays
    - User Definable Engineering Units
- Two (2) Programmable Analog Inputs
- Six (6) Programmable Digital Inputs
- Two (2) Programmable Analog Outputs
- Up to six (6) Programmable Relay Outputs (Three (3) Standard)
- Adjustable Filters on Analog Inputs and Outputs
- Mathematical Functions on Analog Reference Signals
- All Control Inputs Isolated from Ground and Power
- Four (4) Resident Serial Communication Protocols
  - BACnet (MS/TP)
  - Johnson Controls N2
  - Siemens Building Technologies FLN (P1)
  - Modbus RTU
- Input Speed Signals
  - Current 0 (4) to 20 mA
  - Voltage 0 (2) to 10 VDC
  - Increase/Decrease Reference Contacts (Floating Point)
  - Serial Communications
- Start/Stop
  - 2 Wire (Dry Contact Closure)
  - 3 Wire (Momentary Contact)
  - Application of Input Power
  - Application of Reference Signal (PID Sleep/Wake-Up)
  - Serial Communications
- Start Functions
  - Ramp
    - Flying Start
    - Pre-magnetization (DC Brake) on Start
  - Automatic Torque Boost
  - Automatic Torque Boost with Flying Start
  - Auto Restart (Reset) – Customer Selectable and Adjustable
- Stop Functions
  - Ramp or Coast to Stop
  - Emergency Stop
  - DC Braking / Hold at Stop
  - Flux Braking
- Accel/Decel
  - Two (2) sets of Independently Ramps
  - Linear or Adjustable 'S' Curve Accel/Decel Ramps
- HVAC Specific Application Macros
- Separate Safeties (2) and Run Permissive Inputs
- Damper Control
- Override Input (Fire Mode)
- Timer Functions
  - Four (4) Daily Start/Stop Time Periods
  - Four (4) Weekly Start/Stop Time Periods
  - Four Timers for Collecting Time Periods and Overrides
- Seven (7) Preset Speeds
- Supervision Functions
- Adjustable Current Limit
- Electronic Reverse
- Automatic Extended Power Loss Ride Through (Selectable)
- Programmable Maximum Frequency to 500 Hz
- PID Control
  - Two (2) Integral Independent Programmable PID Setpoint Controllers (Process and External)
  - External Selection between Two (2) Sets of Process PID Controller Parameters
  - PID Sleep/Wake-Up
- Motor Control Features
  - Scalar (V/Hz) and Vector Modes of Motor Control
  - V/Hz Shapes
    - Linear
    - Squared
  - Energy Optimization
  - IR Compensation
  - Slip Compensation
  - Three (3) Critical Frequency Lockout Bands
- Preprogrammed Protection Circuits
  - Overcurrent
  - Short Circuit
  - Ground Fault
  - Overvoltage
  - Undervoltage
    - Input Phase Loss
  - Output Device (IGBT) Overtemperature
  - Adjustable Current Limit Regulator
  - UL508C approved Electronic Motor Overload (I^2T)
- Programmable Fault Functions for Protection Include
  - Loss of Analog Input
  - Panel Loss
  - External Fault
  - Motor Thermal Protection
  - Stall
  - Underload
  - Motor Phase Loss
  - Ground Fault
- Input Impedance
  - 5% Equivalent Impedance with Internal Reactor(s)
    - Patented Swinging Choke Design for Superior Harmonic Mitigation (R1…R6 Frames)
  - 3% Equivalent Impedance (R8 Frame)

OPTIONAL FEATURES

- 3 Relay Extension Module (OREL-01)
- 115/230 V Digital input Interface Card (OHDI-01)
- Fieldbus Adapter Modules
  - LonWorks
  - BACnet IP to MS/TP Router
  - Profibus
  - DeviceNet
  - Ethernet
  - ControlNet
- DriveWindow Light Start-up, Operation, Programming and Diagnostic Tool
- Fan Replacement Kit

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ACH550 Specifications

Input Connection

Input Voltage (U_1) ..... 208…240 VAC 3-phase +/-10%
208…240 VAC 1-phase +/-10%
380…480 VAC 3-phase +/-10%
500…600 VAC 3-phase +/-10%
Frequency: ..... 48 - 63 Hz
Line Limitations: ..... Max +/-3% of nominal phase to phase input voltage
Fundamental Power Factor (cos φ): ..... 0.98 at nominal load
Connection: ..... U_1, V_1, W_1 (U_1, V_1, 1-phase)

Output (Motor) Connection

Output Voltage: ..... 0 to U_1, 3-phase symmetrical, U_2 at the field weakening point
Output Frequency: ..... -500 to 500 Hz
Frequency Resolution: ..... 0.01 Hz
Continuous Output Current:
Variable Torque: ..... 1.0 * I_{2N} (Nominal rated output current, Variable Torque)
Short Term Overload Capacity:
Variable Torque: ..... 1.1 * I_{2N}, (1 min/10 min)
Peak Overload Capacity:
Variable Torque: ..... 1.35 * I_{2N}, (2 sec/1 min)
Base Motor Frequency Range: ..... 10 to 500 Hz
Switching Frequency: ..... 1, 4, 8 or 12 kHz
Acceleration Time: ..... 0.1 to 1800 s
Deceleration Time: ..... 0.1 to 1800 s
Efficiency: ..... 0.98 at nominal power level
Short Circuit Withstand Rating: ..... 100,000 AIC (UL)
Connection: ..... U_2, V_2, W_2

Enclosure

Style: ..... UL (NEMA) Type 1, Type 12, or Type 3R

Agency Approval

Listing and Compliance: ..... UL, cUL, CE

Ambient Conditions, Operation

Air Temperature: ..... -15^0 to 40^0C (5^0 to 104^0F), above 40^0C the maximum output current is de-rated 1% for every additional 1^0C (up to 50^0C (122^0F) maximum limit.
Relative Humidity: ..... 5 to 95%, no condensation allowed, maximum relative humidity is 60% in the presence of corrosive gasses
Contamination Levels:
IEC: ..... 60721-3-1, 60721-3-2 and 60721-3-3
Chemical Gasses: ..... 3C1 and 3C2
Solid Particles: 3S2
Installation Site Altitude: ..... 0 to 1000 m (3300 ft) above sea level. At sites over 1000 m (3300 ft) above sea level, the maximum power is de-rated 1% for every additional 100 m (330 ft). If the installation site is higher than 2000 m (6600 ft) above sea level, please contact your local ABB distributor or representative for further information
Vibration: ..... Max 3.0 mm (0.12 in) 2 to 9 Hz, Max 10 m/s^2 (33 ft/s^2) 9 to 200 Hz sinusoidal
Seismic Certified referencing IBC 2000, 2003, 2006 and 2009

Ambient Conditions, Storage and Transportation (in Protective Shipping Package)

Air Temperature: ..... -40^0 to 70^0C (-40^0 to 158^0F)
Relative Humidity: ..... Less than 95%, no condensation allowed
Atmospheric Pressure: ..... 60 to 106 kPa (8.7 to 15.4 PSI)
Vibration: ..... In accordance with ISTA 1A and 1B specifications
Max 3.5 mm (0.14 in) 2 to 9 Hz, Max 15 m/s^2 (49 ft/s^2) 9 to 200 Hz sinusoidal
Shock (IEC 60086-2-29): ..... Max 100 m/s^2 (330 ft/s^2) 11 ms
Free Fall: ..... R1: 76 cm (30 in)
R2: 61 cm (24 in)
R3: 46 cm (18 in)
R4: 31 cm (12 in)
R5 & 6: 25 cm (10 in)

Cooling Information

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Cooling Method:.....Integral fan(s)
Power Loss: .....Approximately 3% of rated power

ACH550 Specifications (continued)

Analog Inputs

Quantity.....Two (2) programmable
Voltage Reference: .....0 (2) to 10 V, 312kOhm, single ended
Current Reference: .....0 (4) to 20 mA, 100Ohm, single ended
Potentiometer:.....10 VDC, 10 mA (1K to 10KOhms)
Input Updating Time.....8 ms
Terminal Block Size .....2.3mm^2 / 14AWG

Reference Power Supply

Reference Voltage .....+10 VDC, 1% at 25^{0}C (77^{0}F)
Maximum Load .....10 mA
Applicable Potentiometer.....1 kOhm to 10 kOhm
Terminal Block Size .....2.3mm^2 / 14AWG

Analog Outputs

Quantity.....Two (2) programmable current outputs
Signal Level.....0 (4) to 20 mA
Accuracy .....+/- 1% full scale range at 25^{0}C (77^{0}F)
Maximum Load Impedance.....500 Ohms
Output Updating Time.....2 ms
Terminal Block Size .....2.3mm^2 / 14AWG

Digital Inputs

Quantity.....Six (6) programmable digital inputs
Isolation .....Isolated as one group
Signal Level.....24 VDC, (10V Logic 0)
Input Current .....15 mA at 24 VDC
Input Updating Time: .....4 ms
Terminal Block Size .....2.3mm^2 / 14AWG

Internal Power Supply

Primary Use.....Internal supply for digital inputs
Voltage:.....+24 VDC, max 250 mA
Maximum Current: .....250 mA
Protection: .....Short circuit protected

Relay Outputs

Quantity.....Three (3) programmable relay (Form C) outputs
Switching Capacity:.....8 A at 24 VDC or 250 VAC, 0.4 A at 120 VDC
Max Continuous Current: .....2A RMS
Contact Material: .....Silver Cadmium Oxide (AgCdO)
Isolation Test Voltage .....4 kVAC, 1 minute
Output Updating Time.....12 ms
Terminal Block Size .....2.3mm^2 / 14AWG

Protections

Single Phase.....Protected (input & output)
Overcurrent Trip Limit: .....3.5 x I_{2N} instantaneous
Adjustable Current Regulation Limit: .....1.1 x I_{2N} (RMS) max.
Overvoltage Trip Limit: .....1.30 x U_N
Undervoltage Trip Limit: .....0.65 x U_N
Overtemperature (Heatsink):.....+115°C (+239°F)
Auxiliary Voltage:.....Short Circuit Protected
Ground Fault: .....Protected
Short Circuit:.....Protected
Microprocessor fault: .....Protected
Motor Stall Protection: .....Protected
Motor Overtemperature Protection (I^2t): .....Protected
Input Power Loss of Phase: .....Protected
Loss of Reference:.....Protected
Short Circuit Current Rating: .....100,000 RMS symmetrical Amperes
Input Line Impedance:.....Swinging choke 5% equivalent R1-R6, 3% equivalent R8

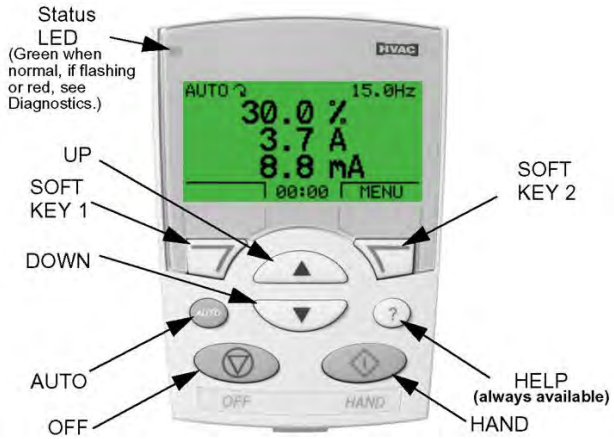
U_1 = Input Voltage
U_2 = Output Voltage
P_N = Power – Normal Duty (HP)
U_N = Nominal Motor Voltage
f_N = Nominal Motor Frequency
I_{2N} = Nominal Motor Current – Normal Duty

Specifications are subject to change without notice. Please consult the factory when specifications are critical.

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ACH550 Control Panel

The ACH550 Control Panel is a multifunction control panel with full graphic LCD display and multiple language capability. The control panel can be connected to and detached from the ACH550 at any time. The panel can be used to upload and copy parameters to other ACH550 drives.



Run Indication and Shaft Direction ↷ located in upper left corner of display.

Control Panel Display	Significance
Rotating arrow (clockwise or counterclockwise)	Drive is running and at set point Shaft direction is forward or reverse
Rotating arrow blinking	Drive is operating but not at setpoint
Stationary arrow	Drive is stopped

LED Indicators

The green LED indicates that the power is on and the drive is operating normally. The red LED indicates a fault. A blinking green LED indicates an alarm condition. A blinking red LED indicates a fault that requires power to be cycled off and on to reset the drive.

Fault Indications

The ACH550 Control Panel can display over 20 alarm and fault messages. The last fault and previous faults (1 to 9) are retained in memory. The last fault and previous faults (1 & 2) also record important diagnostic information to assist in troubleshooting. Most faults can be reset by pressing the RESET key (Soft Key 1).

Parameters

Application specific parameters are immediately accessible through a selection of start-up "Assistants". A complete list of parameters is also available grouped by function in approximately 33 menu groups. One of the basic menu functions can be used to display the complete list of changed parameters.

Real Time Clock

The Operator Control Panel includes a real time clock which provides Day, Date and Time information, displayed in a choice of formats. The real time clock has a 10 year battery back up and provides time and date stamping of drive faults and other events. The clock is also used by the ACH550s internal timer functions, providing an integral time clock for start/stop control as well as other control operations.

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Control Modes

When the HAND key is pressed, the drive starts and pressing the UP/DOWN keys can modify the reference frequency. The HAND (keypad) control mode is indicated.

When the OFF key is pressed, the drive stops and the OFF control mode is indicated.

When the AUTO key is pressed, the AUTO control mode is indicated. The drive can be started and stopped using whichever remote start/stop command has been configured, a contact closure applied to the start/stop input, a serial communication command or a process feedback signal. In AUTO mode the drive speed is typically controlled by the external speed reference input or by the PID controller.

If the HAND key is pressed while the drive is running in the AUTO control mode, the drive continues to run without changing speed, but ceases to respond to external input or PID speed reference changes. (Bumpless transfer) Pressing the UP/DOWN keys can modify the reference frequency.

If the AUTO key is pressed while the drive is running in the HAND control mode and an external start command is present, the drive continues to run and follows the acceleration or deceleration control ramp to the speed set by the external input or PID speed reference. (Bumpless transfer)

Cable Connections

Terminal	Description	Note
U1, V1, W1	3~ power supply input	Use of 1~ supply requires 50% derate of output current and is applicable for 208 to 240 VAC operation only.
PE / GND	Protective Ground	Follow local rules for cable size.
U2, V2, W2	Power output to motor	
Uc+, Uc-	DC bus	
X1 1 to 18	Control Wiring	Low voltage control – Use shielded cable
X1 19 to 27	Control Wiring	Low voltage or 115VAC
X1 28 to 32	Serial Communications	Use shielded cable

Follow local codes for cable size. To avoid electromagnetic interference, use separate metallic conduits for input power wiring, motor wiring, control and communications wiring. Keep these four classes of wiring separated in situations where the wiring is not enclosed in metallic conduit. Also, keep 115VAC control wiring separated from low voltage control wiring and power wiring.

Use shielded cable for control wiring.

Ampacity is based on the use of 60 °C rated power cable up to 100 Amps (75 °C over 100 Amps).

Refer to the included tables for current ratings, fuse recommendations and maximum wire size capacities and tightening torques for the terminals. The ACH550 is suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical amperes, 480 V maximum. The ACH550 has an electronic motor protection feature that complies with the requirements of the National Electric Code (NEC). When this feature is selected and properly adjusted. Additional overload protection is not required unless more than one motor is connected to the drive or unless additional protection is required by applicable safety regulations.

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For CE installation requirements, see ABB publication CE-US-02 "CE Council Directives and Variable Speed Drives." Contact your local ABB representative for specific IEC installation instructions.

ACH550 Control Terminals - Main I/O Terminal X1

X1	Identification	Description	
1	SCR	Terminal for signal cable screen. (Connected internally to chassis ground.)	
2	AI 1	Analog input channel 1, programmable. Default[2] = External reference Resolution 0.1 % accuracy ±1 %. 0 (4) - 20 mA (R_i = 312 kΩ) (J1:AI1 ON) 0 (2) - 10 V (R_i = 100 Ω) (J1:AI1 OFF)	
3	AGND	Analog input common. (Connected internally to chassis ground through 1 MΩ)	
4	10 V	10 V/10 mA reference voltage output for analog input potentiometer, accuracy ±2 %. (1 kΩ ≤ R ≤ 10 kΩ)	
5	AI 2	Analog input channel 2, programmable. Default[2] = PID Feedback Resolution 0.1 % accuracy ±1 %. 0 (4) - 20 mA (R_i = 312 kΩ) (J1:AI2 ON) 0 (2) - 10 V (R_i = 100 Ω) (J1:AI2 OFF)	
6	AGND	Analog input common. (Connected internally to chassis ground through 1 MΩ)	
7	AO1	Analog output channel 1, programmable. Default[2] = Output frequency 0 (4) - 20 mA (load < 500 Ω), accuracy ±3% full scale.	
8	AO2	Analog output channel 2, programmable. Default[2] = Output current 0 (4) - 20 mA (load < 500 Ω), accuracy ±3% full scale.	
9	AGND	Analog output common. Connected internally to chassis ground through 1 MΩ)	
10	24 V	Auxiliary voltage output 24 V DC / 250 mA (Reference to AGND). Short circuit protected.	
11	GND	Common for digital input (DI) return signals.	
12	DCOM	Digital input circuit common for all digital inputs (DIs). Connected internally as floating.	
DI Configuration[1]		To activate a digital input, there must be ≥ +10 V (or ≤ -10 V) between that input and DCOM. The 24 V may be provided by the ACH550 (X1:10) or by an external 12-24 V source of either polarity.	
13	DI 1	Digital input 1, programmable. Default[2] = Start/Stop (AUTO mode) Activation starts the drive	
14	DI 2	Digital input 2, programmable. Default[2] = Not configured.	
15	DI 3	Digital input 3, programmable. Default[2] = Constant (Preset) speed. Activation selects constant speed 1	
16	DI 4	Digital input 4, programmable. Default[2] = Start enable 1 (safety interlock) Deactivation stops the drive.	
17	DI 5	Digital input 5, programmable. Default[2] = Not configured.	
18	DI 6	Digital input 5, programmable. Default[2] = Not configured.	
19	RO1C	Common	Relay output 1, programmable (Default[2] = Ready – 19 connected to 21). 12 - 250 V AC / 30 V DC, 10 mA - 2 A
20	RO1A	Normally Closed (NC)	
21	RO1B	Normally Open (NO)	
22	RO2C	Common	Relay output 2, programmable (Default[2] = Running - 22 connected to 24). 12 - 250 V AC / 30 V DC, 10 mA - 2 A
23	RO2A	Normally Closed (NC)	
24	RO2B	Normally Open (NO)	
25	RO3C	Common	Relay output 3, programmable (Default[2] = Fault (-1)[3] - 25 connected to 27). 12 - 250 V AC / 30 V DC, 10 mA - 2 A
26	RO3A	Normally Closed (NC)	
27	RO3B	Normally Open (NO)	
28	Screen	Terminal for signal cable screen. (Connected internally to chassis ground.)	
29	B	RS-485 Serial Communications Positive input connection	
30	A	RS-485 Serial Communications Negative input connection	
31	AGND	Analog input common. (Connected internally to chassis ground through 1 MΩ.)	
32	Screen	Terminal for signal cable screen. (Connected internally to chassis ground.)	

Notes: 1. Digital input impedance 1.5 kΩ. Maximum voltage for digital inputs is 30 V. Use multi-strand wire, size range: 20-16 AWG (0.5-1.5 mm^2)
2. Default values depend on the macro used. Values specified are for the HVAC default macro.
3. For fail-safe reasons, the Fault (-1) Relay signals a "Fault", when the ACH550 is powered down.

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ACH550 with ABB E-Clipse bypass – Overview

ABB E-Clipse bypass Standard Features

- Door Interlocked Disconnect or Circuit Breaker
- English Language Back-Lit LCD Display
- Operator Control Panel
- LED Status Pilot Lights
- Smoke Control
- Override Mode
- Serial Communications
- 5 Programmable Relay Outputs (Form C)
- 100% Functionality with Drive Removed
- Programmable Auto Transfer to Bypass
- Plain English Safety Annunciation
- UL & cUL Listed
- Seismic Zone 4 Certified (IBC 2006)
- UL Type 1, Type 12 or Type 3R Enclosure
- Programmable Class 10, 20, or 30 OL
- Automatic Restart
- 24 Month Parts and Labor Warranty (with Certified Start-up)
- Two Contactor Bypass
- System Status Display
- Bypass Diagnostics Display
- Drive Exclusive Fast-Acting Fuses
- Electronic Motor Overload Protection
- Damper Control - VFD and Bypass Modes
- 6 Digital Inputs (5 programmable)
- Single Phase Protection in VFD & Bypass Mode
- Bullet Proof Contactor Protection
- Serial Communications Pass Through I/O
- Proof-of-Flow Indication & Action
- Conformal Coated Circuit Boards
- +30%; -35% Input Voltage Tolerance
- Run Permissive Circuit
- Supervisory Control
- UL Listed I^2T Electronic Overload
- UL Listed and tested 100,000 Ampere SCCR (VCR and BCR Units)

The ACH550 with ABB E-Clipse bypass is an ACH550 HVAC Drive in an integrated UL Type 1, UL Type 12 or NEMA 3R enclosure with a bypass motor starter. The ACH550 with ABB E-Clipse bypass provides an input disconnect switch or circuit breaker with door mounted and interlocked operator (padlockable in the OFF position), a bypass starter, electronic motor overload protection, a local programming and operator keypad with indicating lights, provisions for external control connections, and serial communications capability. Certain configurations (+F267) also provide a drive service switch.

UL Type 1 (NEMA 1) and UL Type 12 (NEMA 12) E-Clipse units are available from 1 to 100 HP at 208/240V, 1 to 400 HP at 480V, and 2 to 150 HP at 600V. UL Type 1 and UL Type 12 units are wall mounted from 1 to 200 HP and floor mounted from 250 to 550 HP. The operator keypad is mounted on the door of the enclosure.

For outdoor applications, UL Type 3R (NEMA 3R) E-Clipse unit are available from 1 to 100 HP at 208/240V, 1 to 200 HP at 480V and 2 to 150 HP at 600V. Construction is sheet steel with a tough powder coat paint finish for corrosion resistance. A thermostatically controlled space heater and thermostatic control of the force ventilated cooling system are standard. The operator keypads are mounted on the enclosure door and covered by a hinged panel.

The ACH550 with ABB E-Clipse bypass includes two contactors. One contactor is the bypass contactor, used to connect the motor directly to the incoming power line in the event that the ACH550 is out of service. The other contactor is the ACH550 output contactor that disconnects the ACH550 from the motor when the motor is operating in the Bypass mode. The drive output contactor and the bypass contactor are electrically interlocked to prevent "back feeding".

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The ACH550 with ABB E-Clipse bypass is a microprocessor-controlled "intelligent" system which features programmable Class 20 or 30 overload curves, programmable underload (broken belt) and overload trip or indication. Also included as standard features are single-phase protection in bypass mode, programmable manual or automatic transfer to bypass, fireman's override, smoke control, damper control, no contactor chatter on brown-out power conditions and serial communications. Should a drive problem occur, fast acting fuses exclusive to the ACH550 drive path disconnect the drive from the line prior to clearing upstream branch circuit protection, maintaining bypass capability.

Damper Control Circuit (Run Permissive)

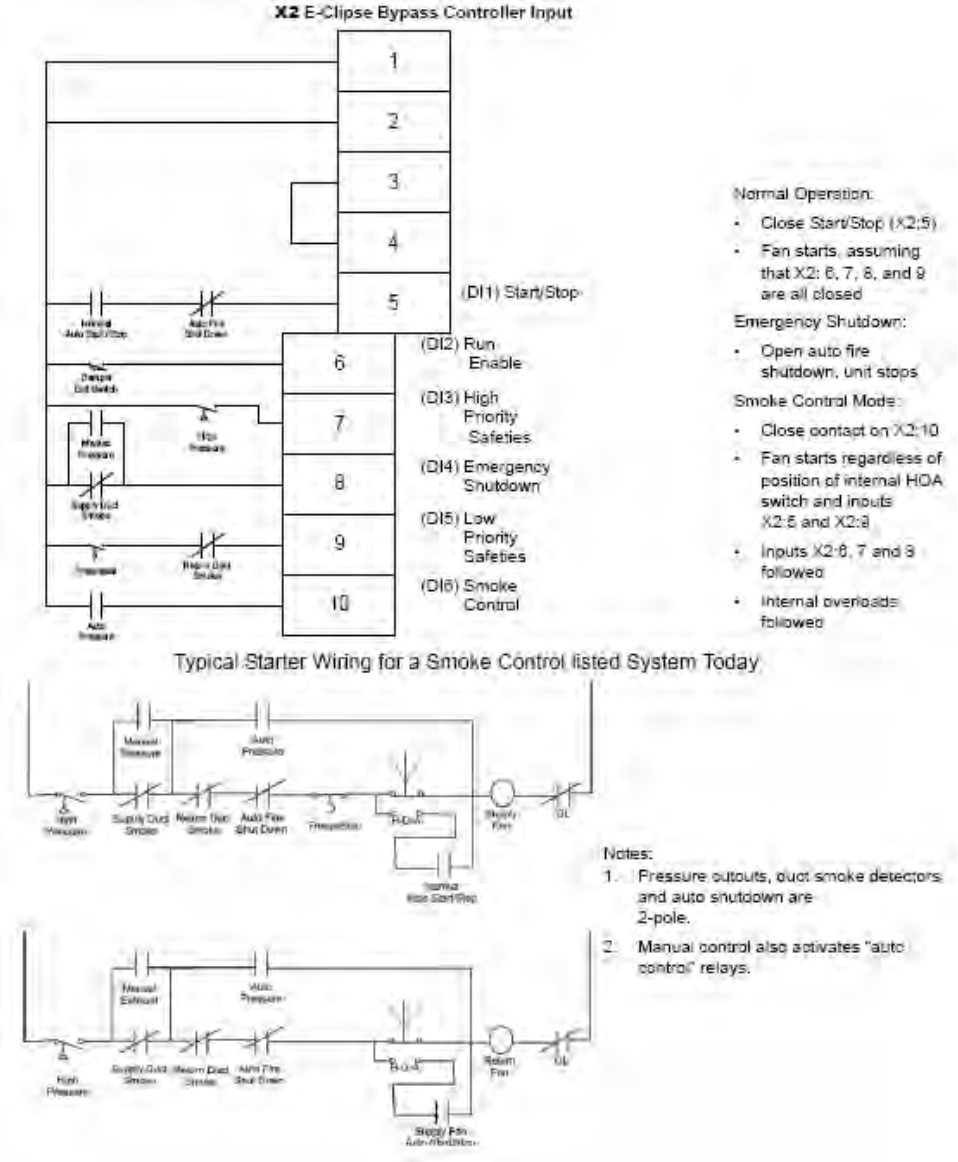
The damper control circuit closes a dry contact upon a start command to open a damper such as an outdoor air damper, fire damper, isolation damper, etc. before the motor is allowed to operate in drive mode or bypass mode regardless of the source of the run command. When the damper is fully open, a normally open dry contact from the damper end-switch closes and allows the motor to operate. Up to four dedicated inputs are provided for safety interlocks such as firestats, smoke detectors, etc.

The safety interlock inputs may also be linked to plain English keypad diagnostic indications to be displayed on the LCD. The unit may be set-up to display any of the following diagnostics upon opening of a digital input: Vibration Switch; Firestat; Freezestat; Over Pressure; Vibration Trip; Smoke Alarm; Safety Open; Low Suction; Start Enable; Run Enable; Damper End Switch; Valve Open Proof; or Pre-Lube Cycle. When any of these contacts open, the motor stops (in drive or bypass mode) and the damper is commanded to close. Although it is not a recommend sequence of operation, this run permissive circuit may also be controlled via serial communications.

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Smoke Control and Override Modes

The ACH550 with ABB E-Clipse bypass has two Override modes of operation for critical control situations. The Smoke Control Override accepts a normally open dry contact that forces the motor to run in bypass and ignores all keypad inputs. In Smoke Control Override mode, the system acknowledges high priority digital inputs such as overpressure safeties and damper end-switch run permissive proofs, and disregards other, low priority digital inputs. See the attached sample wiring diagram for further details. Smoke Control Override (Override 1) response is not field programmable. The unit will go into smoke Override mode whenever DI6 is closed.



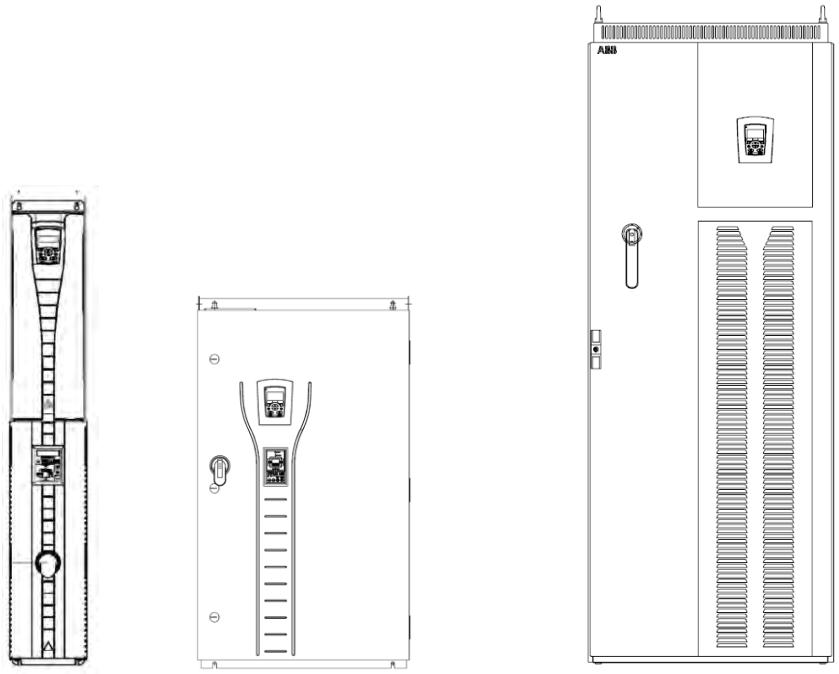
The second mode, Override 2, is fully programmable. Override 2 default programming is designed for "Run to Destruction" operation. However, the end user can program the unit to acknowledge some external inputs while ignoring others, ignore all external inputs or acknowledge all external inputs. This mode is fully programmable to allow the user to program the response of the unit to match his local AHJ.

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Serial communications

All ABB E-Clipse bypass units have the following Embedded Fieldbus (EFB) protocols included as standard: Modbus RTU; Johnson Controls N2; Siemens Building Technologies FLN (P1); and BACnet (MS/TP).

The ACH550 with ABB E-Clipse bypass has the ability to monitor VFD/Bypass mode of operation, the status of the bypass H-O-A switch, bypass fault and override status over serial communication. In addition, the user can monitor and / or control over 45 points of bypass information via the communications protocols. Serial communication capabilities include - bypass run-stop control; the ability to force the unit to bypass; and the ability to control all relay outputs. The DDC system can monitor bypass feedback such as, current (in amps), kilowatt hours (resettable), operating hours (resettable), and bypass logic board temperature. The DDC system is also capable of monitoring the bypass relay output status, and all digital input status'. All bypass diagnostic warning and fault information is transmitted over the serial communications bus. Remote system (drive or bypass) fault reset is possible.



Vertical & Standard ABB E-Clipse bypass Exterior Views

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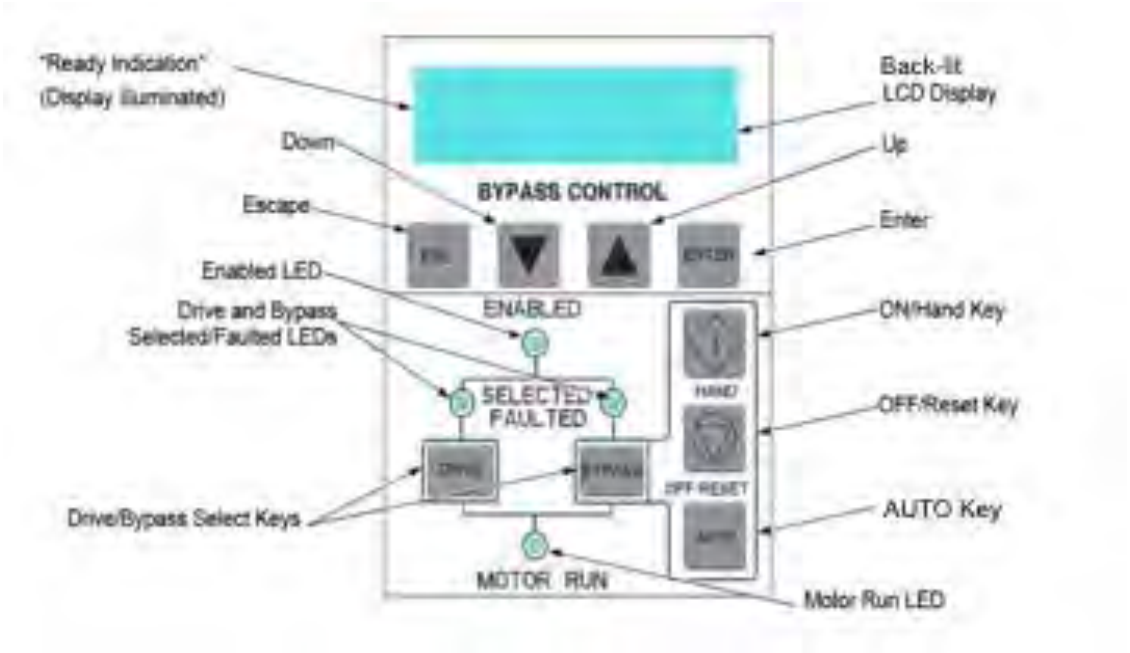
ACH550 Control Panel

The ACH550 Control Panel is a keypad with an LCD unit that provides status indication and operator controls for the ACH550 drive. In normal operation with the ABB E-Clipse bypass, the ACH550 should be placed in the *Auto* mode of operation by pressing the *Auto* key on the ACH550 Control Panel. Refer to the *ACH550 User's Manual* for additional information on the ACH550 Control Panel and other aspects of ACH550 operation.

Bypass Control Keypad

The ABB E-Clipse bypass has a separate keypad with an LCD unit that provides status indication and programming of the system. This keypad is also used for selecting the *Drive* or *Bypass* mode of operation and manually starting and stopping the motor in the *Bypass* mode. The bypass keypad has LED indicating lights that indicate the status of both the bypass and the drive as well as an LCD display that provides programming, status and warning/fault indications.

The illustration below shows the bypass control keypad and identifies the keys and LED indicating lights.



The functions of the various keys and LEDs are described in the following table.

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Enabled LED	The *Enabled* LED is illuminated green under the following conditions: • Both the Safety Interlock(s) and Run Enable contacts are closed. • The Safety Interlock(s) contact are closed with no Start command present. The *Enable* LED flashes green if the Run Enable contact is open and when the Safety Interlock contact(s) are closed and a Start command is present. The Enable LED is illuminated red when the Safety Interlock contact(s) are open.
Drive Selected LED	The *Drive Selected* LED is illuminated green when the drive has been selected as the power source for the motor and no drive fault is present.
Bypass Selected LED	The *Bypass Selected* LED is illuminated green when the bypass has been selected as the power source for the motor and no bypass fault is present.
Motor Run LED	The *Motor Run* LED is illuminated green whenever the system is running. The *Motor Run* LED flashes green to indicate the system has been placed in an Override operating mode.
Drive Faulted LED	The *Drive Fault* LED is illuminated red when the bypass has lost its' communications link with the drive or when the motor or drive protection functions have shut down the drive.
Bypass Faulted LED	The *Bypass Faulted* LED is illuminated or flashes red when the motor or bypass protective functions have shut down the bypass.
Drive Key	The *Drive* Key selects the drive as the power source for the motor.
Bypass Key	The *Bypass* Key selects the bypass as the power source for the motor.
Auto Key	The *Auto* key selects the *Auto Start* contact or serial communications as the means for starting and stopping the motor in the bypass mode.
Off/Reset Key	The *Off/Reset* key may be used to manually stop the motor if the motor is running on bypass power. The *Off/Reset* Key also resets most bypass faults. It may take several minutes before the bypass can be reset after an overload trip. If a bypass fault condition is present, the second push of the *Off/Reset* key puts the bypass in the Off mode.
Hand Key	The *Hand* key can be used to manually start the motor when the bypass has been selected as the power source for the motor.
UP Key	Used to navigate through system programming steps.
Down Key	Used to navigate through system programming steps.

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Control Modes

Drive mode

Under normal conditions the system is in the *Drive* mode. The ACH550 drive provides power to the motor and controls its speed. The source of the drive's start/stop and speed commands is determined by the *Auto* or *Hand* mode selection of the drive's keypad. Commands come from the control terminals or serial communications when the *Auto* mode has been selected or from the drive keypad when the *Hand* mode has been selected. The user can normally switch to the *Drive* mode by pressing the *Drive* key on the bypass keypad.

Bypass mode

In the *Bypass* mode, the motor is powered by AC line power through the bypass contactor. The source of the bypass start/stop commands is determined by the *Auto* or *Hand* mode selection of the bypass' keypad. Commands come from the control terminals or serial communications when the *Auto* mode has been selected or from the bypass keypad when the *Hand* mode has been selected. The user can normally switch to the *Bypass* mode by pressing the *Bypass* key on the bypass keypad.

Smoke Control mode

In the *Smoke Control (Override 1)* mode, the motor is powered by AC line power through the bypass contactor. The source of the Smoke Control command is DI 6 and is unaffected by external stop commands. The VFD Keypad and the Bypass Keypad will not accept user commands when the system is in Smoke Control mode (the keypad user inputs are disabled). The user can switch to the *Smoke Control* mode by closing the *Smoke Control* input contact (DI 6). When the *Smoke Control* input contact is closed, the system is forced to bypass and runs the motor. The Motor Run LED flashes green when the system is in override. While in *Smoke Control*, the system only responds to certain inputs. Normally when the *Smoke Control* input contact is switched from closed to open, the system returns to the operating mode that existed prior to entering *Smoke Control* and can once again be controlled using the *Drive* and *Bypass* keys. The exception to this is when the *Bypass Override (Override 2)* input contact is closed, in which case the system switches to *Bypass Override* operation.

Bypass Override mode

In the *Bypass Override (Override 2)* mode, the motor is powered by AC line power through the bypass contactor. The source of the start command is internal and unaffected by external stop commands. The VFD Keypad and the Bypass Keypad will not accept user commands when the system is in Bypass Override mode (the keypad user inputs are disabled). The user can switch to the *Bypass Override* mode by closing the *Bypass Override* input contact (DI 5-if programmed). When the *Bypass Override* input contact is closed, the system is forced to bypass and does not respond to the *Drive* and *Bypass* keys. The Motor Run LED flashes green when the system is in override. While in *Bypass Override* the system responds to bypass overloads and programmed faults. The system may be custom programmed to acknowledge or disregard certain faults, safeties and enables. The unit is default programmed to ignore all external safeties and run enables. See Group 17 for programmability of the digital input and fault functions. Normally when the *Bypass Override* input contact is switched from closed to open, the system switches to the *Drive* mode and can be controlled using the *Drive* and *Bypass* keys. The exception to this is when the *Smoke Control (Override 1)* input contact is closed, in which case the system remains in *Smoke Control* operation.

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Hand mode

When the system is in the *Bypass* mode, the operator can manually start the motor by pressing the *Hand* key. The motor will run and the *Hand* LED will be illuminated green. In order to run the motor, the *Safety Interlock* and *Run Enable* contacts must be closed (green *Enable* LED) and any bypass fault must be reset.

Auto mode

In the *Auto* mode the bypass start/stop command comes from the *Start/Stop* input terminal on the bypass control board or from serial communications – if programmed. The *Auto* mode is selected by pressing the *Auto* key on the bypass keypad. The *Auto* LED is illuminated green when the bypass is in the *Auto* mode. If the system is in the *Bypass* mode, the motor will run across the line if the *Auto* mode is selected, the *Start/Stop, Safety Interlock* and *Run Enable* contacts are closed and any bypass fault is reset.

Off Mode

If the motor is running in the *Bypass* mode, the operator can manually stop the motor by pressing the *OFF* key. The *Motor Running* LED will go out. The motor can be restarted by pressing the *Hand* key or the bypass can be returned to the *Auto* mode by pressing the *Auto* key. If the system is in the *Drive* mode, pressing the *OFF* key will take the bypass out of the *Auto* mode, but will not affect motor operation from the drive. If the system is switched to the *Bypass* mode, a motor that is running will stop.

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Programmable Relay Contact Outputs

The ABB E-Clipse bypass has five programmable relay outputs as standard. The default programming descriptions for these relay outputs is described below.

Bypass Not Faulted

The *Bypass Not Faulted* relay is energized during normal operation. The *Bypass Not Faulted* relay is de-energized when a bypass fault has occurred.

System Running

The *System Running* relay is energized when the ABB E-Clipse bypass System is running. The *System Running* relay provides an output when the motor is running whether powered by the ACH550 drive or the bypass.

System Started

The *System Started* relay is energized when the ABB E-Clipse bypass system is started. Three conditions must be met in order for the relay to energize. 1) a *Start* command must be present, 2) the *Safety Interlock* input contact must be closed and 3) there can be no fault present in the system. The *Start* command can come from the bypass control board terminal block, the ACH550 keypad, the bypass keypad, or serial communications depending on the operational mode selected. The *System Started* relay is ideal for use in damper actuator circuits, opening the dampers only under those conditions where the system is preparing to run the motor. The *System Started* relay will de-energize, closing the dampers if the safeties open, the system faults, or when a *Stop* command is issued.

Bypass Selected

Relay output four is factory default programmed for Bypass Selected. The relay will be energized anytime the user has placed the system in Bypass mode.

Bypass Auto

Relay Output five is factory default programmed for *Bypass Auto*. The relay will be energized anytime the user has placed the bypass in the Auto mode.

The complete list of programmable relay output functions follows:

0 = NOT SEL	10 = DRV NOT FLT	20 = BYP UNDERLD
1 = SYS READY	11 = DRIVE ALARM	21 = PCB OVERTMP
2 = SYS RUNNING	12 = OVERRIDE	22 = SYS UNDERLD
3 = SYS STARTED	13 = BYPASS HAND	23 = SYSTEM FLT
4 = BYPASS SEL	14 = BYPASS OFF	24 = SYS FLT/ALM
5 = BYPASS RUN	15 = BYPASS AUTO	25 = SYS EXT CTL
6 = BYPASS FLT	16 = COM CTRL	26 = SYS OVERLD
7 = BYP NOT FLT	17 = SYS ALARM	27 = CONTACT FLT
8 = BYPASS ALRM	18 = BYPASS FLT/ALM	
9 = DRIVE FAULT	19 = BYP OVERLD	

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Cable Connections

The following illustrations show the ACH550 with ABB E-Clipse bypass cable connection points for the various enclosure styles. The illustrations indicate the location of input and output power connections as well as equipment and motor grounding connection points.

ACH550 drives are configured for wiring access from the bottom only on Vertical ABB E-Clipse bypass units and from the top only on Standard ABB E-Clipse bypass units. At least three separate metallic conduits are required, one for input power, one for output power to the motor and one for control signals.

All ABB E-Clipse bypass units provided with a circuit breaker input - VCR and BCR configurations have a panel short circuit current rating of 100,000 RMS symmetrical Amperes. Units provided with a disconnect input - VDR and BDR configurations require separate external low peak fuses (supplied by others) to obtain the 100,000 KAIC SCCR.

Terminal Sizes

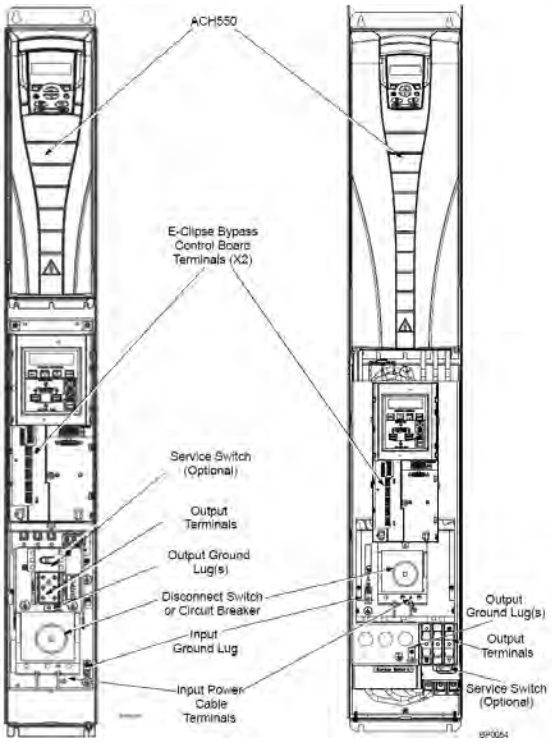
Power and motor cable terminal sizes are shown in the *Submittal Schedule Details* and in the *Wire Size Capacities of Power Terminals* Table. The information provided is for connections to an input circuit breaker or disconnect switch, a motor terminal block, overload relay and ground lugs. The table also lists torque that should be applied when tightening the connections.

Protections

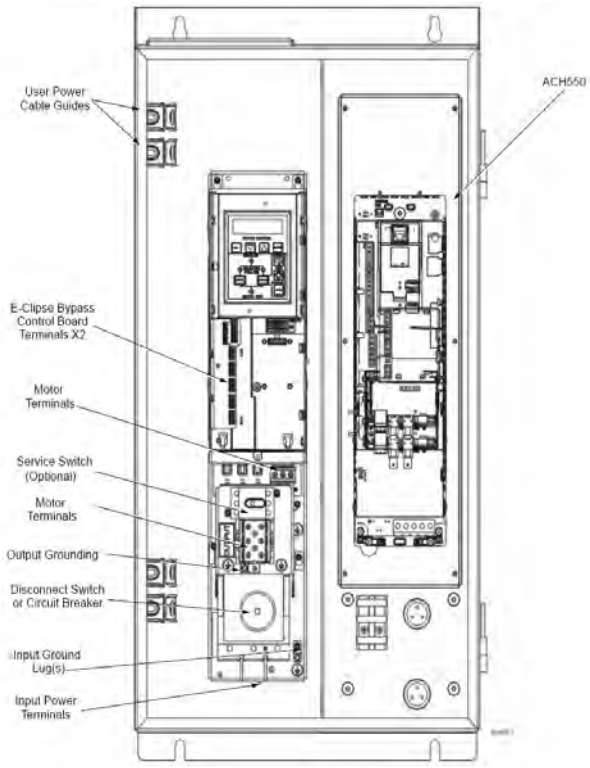
All ABB E-Clipse bypass units include the following protective features: single phase input and output; motor open phase; motor overload (UL Listed); stuck contactor; contactor coil open; undervoltage; motor underload (proof-of-flow / broken belt); serial communications loss; and overtemperature. All printed circuit boards are conformally coated as standard.

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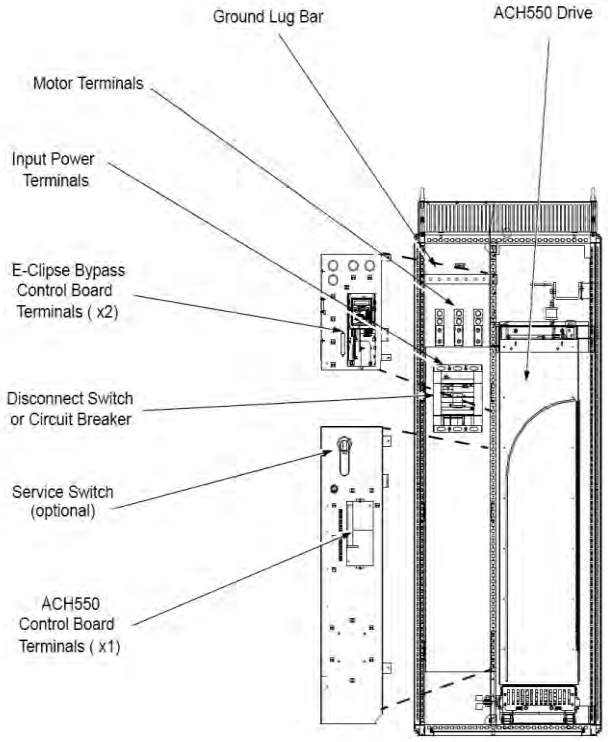
Internal Layout Drawings



Vertical ABB E-Clipse Bypass (UL Type 1 / 12)



Standard Wall Mount ABB E-Clipse Bypass

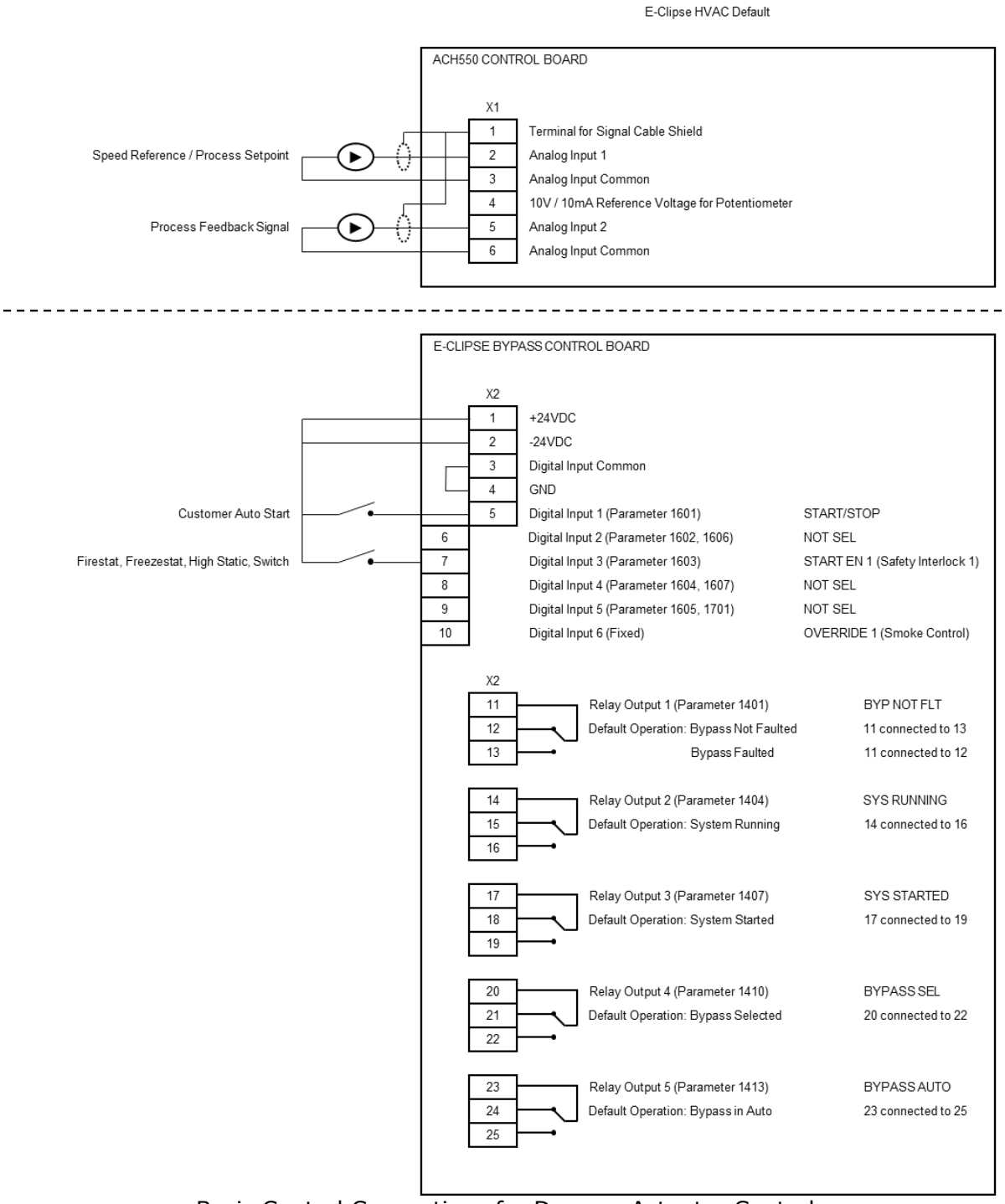


Standard Floor Mount ABB E-Clipse Bypass

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Control Terminals

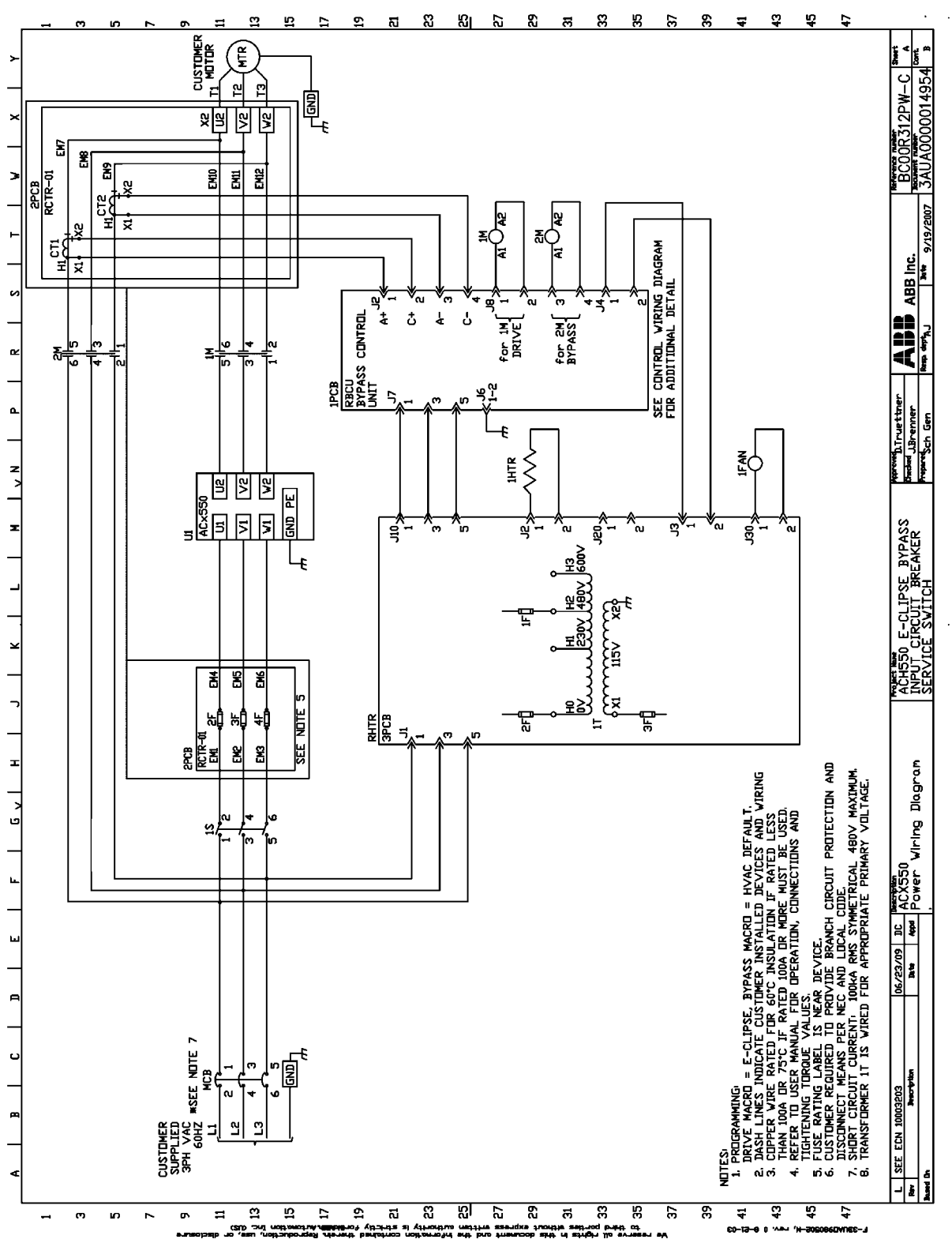
The control wiring includes connections to an analog speed command signal and a start/stop relay contact for controlling the motor in the AUTO mode. There may also be connections to external run enable interlock contacts and a connection from the Motor Run contact to an external status indication circuit. For a detailed description of the control circuit functions and alternate Control Connection diagrams, refer to the *ACH550 with ABB E-Clipse bypass Users Manual.*



Basic Control Connections for Damper Actuator Control

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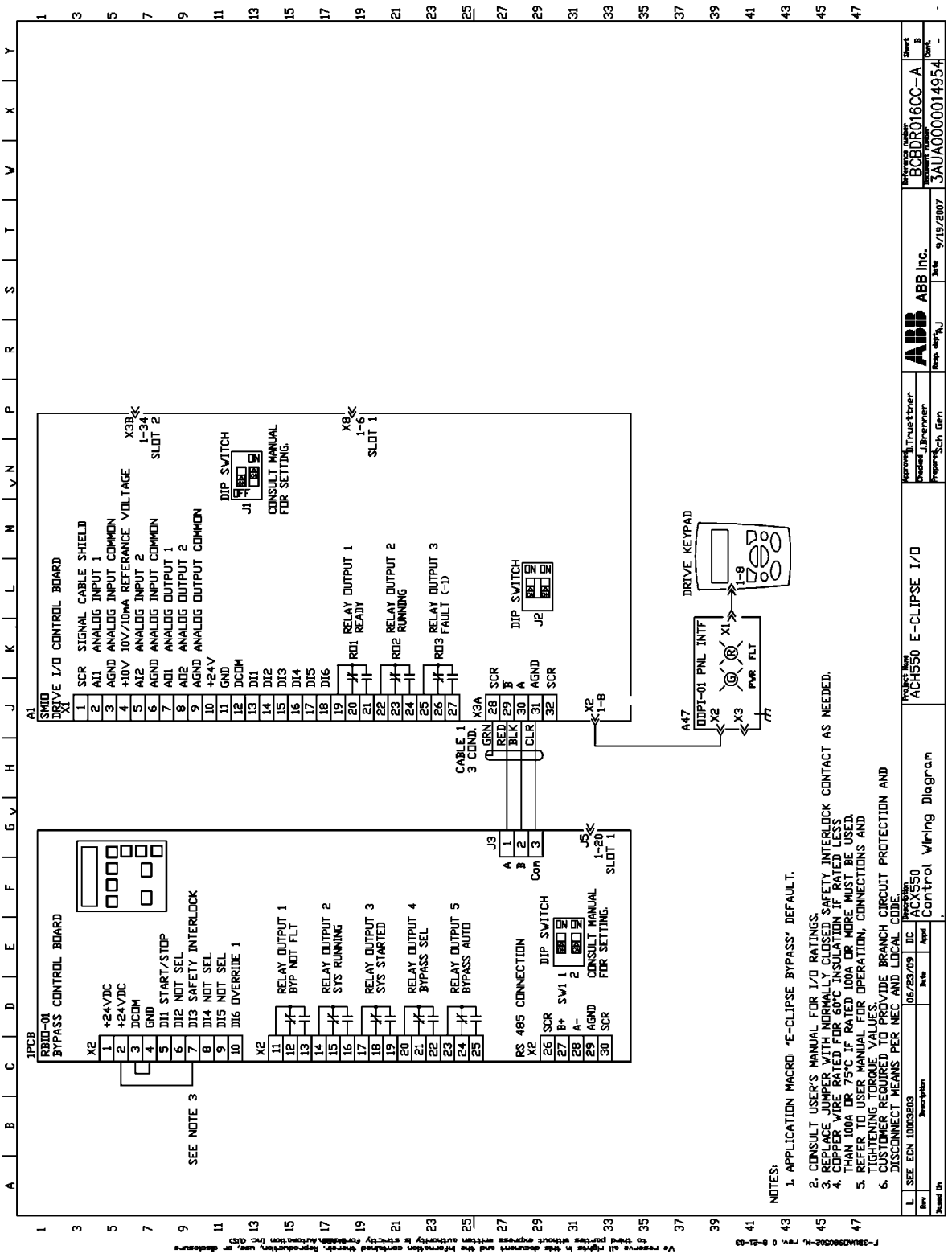
Item	Part Number	Customer Designation
1	ACH550-BCR-06A6-2+B058+F267	VFD-1, 2



{BC00R312PW-C.png}

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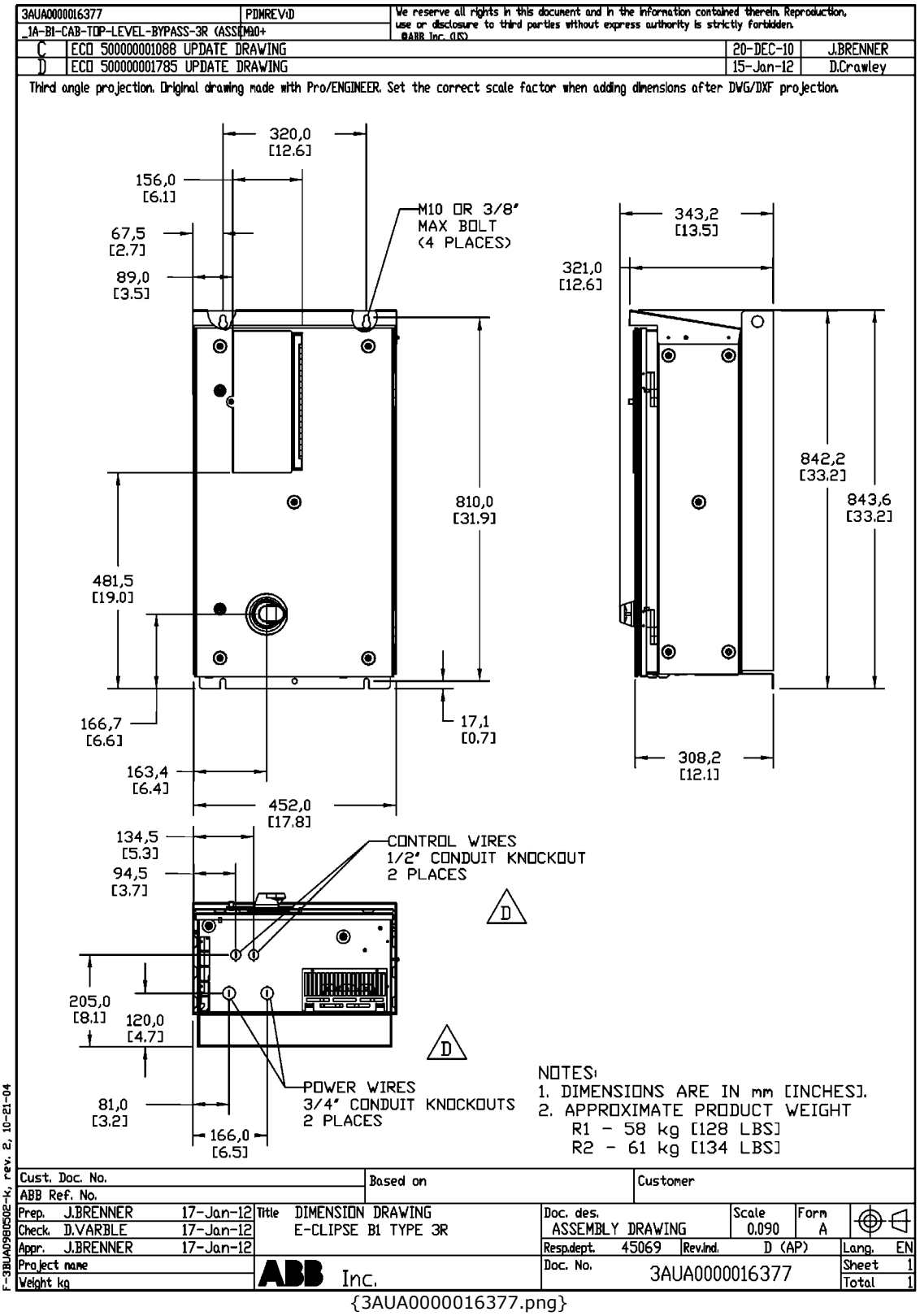
Item	Part Number	Customer Designation
1	ACH550-BCR-06A6-2+B058+F267	VFD-1, 2



{BCBDR016CC-A.png}

AMCC - DIGITALLY RECEIVED 09/12/19

Item	Part Number	Customer Designation
1	ACH550-BCR-06A6-2+B058+F267	VFD-1, 2



{3AUA0000016377.png}

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Enclosed 30A Fusible Disconnect (NEMA 1, 12, 3R, 4X) & Enclosed Non - Fusible Disconnects. UL508

ENCLOSED 30A Fusible Disconnect



Part # CC-30A-RG-4X

NEMA 4X, IP 67

Above part number shown as Red / Yellow Operatior. For Black Version Replace "RG" with "SS".
Example: CC-30A-SS-4X (same price)

The Enclosed 30 Amp Fusible Disconnect is saftey door interrlocked with capability of being " Locked Out " with up to three padlocks.

Fuse type required is "cc" rejection feature Fuse : Operator is capable of being defeated. Standard part number is inclusive with 3 poles. If Auxiliaries are desired see next page for adder. (1N.C / 1N.C) Add suffix - "AX" Example : CC - 30A - RG - 4X - AX

(Enclosed) "Non" - Fusible Disconnects NEMA 1, 3R,12,4X (3 Pole) 25 Amp - 80 Amps

	General Purpose Amps	Horsepower Rating / HP	1 Phase	3 Phase	Handle Color	Part Number	Dimensions		
	25A	110-120V AC	1	2	Red / Yellow	25A - 3P - RG - 4X	25Amp		
		200V AC	2	5			H	W	D
		208V AC	2	5					
		220-240V AC	3	7.5					
		265V AC	3	7.5					
		277V AC	3	7.5					
		380-415V AC	5	10	Black	25A - 3P - SS - 4X	118	96.4	106
		440-480V AC	7.5	15					
		550-600V AC	5	10					
	40A	Horsepower Rating / HP	1 Phase	3 Phase	Red / Yellow	40A - 3P - RG - 4X	40Amp		
		110-120V AC	2	3			H	W	D
		200V AC	3	7.5					
		208V AC	3	7.5					
		220-240V AC	5	10					
		265V AC	5	10					
		277V AC	5	10					
		380-415V AC	7.5	15	Black	40A - 3P - SS - 4X	190	144	131
		440-480V AC	10	20					
		550-600V AC	7.5	15					
	60A	Horsepower Rating / HP	1 Phase	3 Phase	Red / Yellow	60A - 3P - RG - 4X	60Amp		
		110-120V AC	3	5			H	W	D
		200V AC	5	10					
		208V AC	5	10					
		220-240V AC	5	10					
		265V AC	5	10					
		277V AC	7.5	10					
		380-415V AC	10	20	Black	60A - 3P - SS - 4X	190	144	131
		440-480V AC	15	25					
		550-600V AC	15	25					
	80A ▲	Horsepower Rating / HP	1 Phase	3 Phase	Red / Yellow	80A - 3P - RG - 4X	80Amp		
		110-120V AC	3	7.5			H	W	D
		200V AC	7.5	10					
		208V AC	7.5	15					
		220-240V AC	7.5	15					
		265V AC	10	20					
		277V AC	10	20					
		380-415V AC	15	25	Black	80A - 3P - SS - 4X	190	144	131
		440-480V AC	20	30					
		550-600V AC	25	40					

▲ Contact Factory: For larger sizes. Also available are Stainless steel Enclosed version.

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Dwyer

SERIES 1900

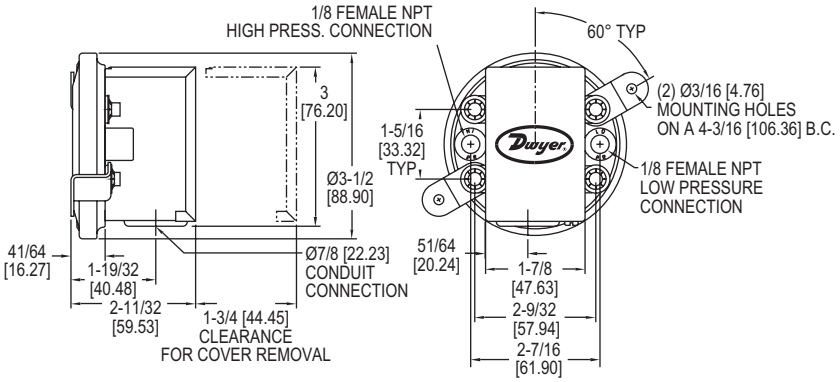
COMPACT LOW DIFFERENTIAL PRESSURE SWITCHES

Set Points from 0.07 to 20 in w.c. Repetitive Accuracy within 3%





Series 1910 switch with conduit enclosure off. Shows electric switch and set point adjustment screw located on same side for easy installation.



The Dwyer-engineered force-motion amplifier increases the leverage of diaphragm movement and results in a switch with excellent sensitivity and repeatability.

VIDEO ONLINE

Our most popular **SERIES 1900** combines advanced design and precision construction to make these switches able to perform many of the tasks of larger, costlier units. Designed for air conditioning service, they also serve many fluidics, refrigeration, oven and dryer applications. Series 1900 switches have set points from 0.07 to 20 in w.c. (1.8 to 508 mm). Set point adjustment is easy with range screw located inside conduit enclosure. Internal location helps prevent tampering. UL, CE and CSA listed, and FM approved. For use with air or compatible gages.

FEATURES/BENEFITS

- Compact size and repeatability, provides a high-value switch for many industrial and OEM applications
- Wide range of models from 0.07 in w.c. to 20 in w.c. can meet exacting OEM specific tions for a low pressure switch
- Range screw protected inside enclosure provides simplifies making adjustments but prevents tampering

APPLICATIONS

- Air conditioning refrigeration coil icing detection; defrost cycle initiation
- Clogged filter detectio
- Variable air volume controller

SPECIFICATIONS	
Service: Air and non-combustible, compatible gases. **Wetted Materials:** Consult factory. **Temperature Limits:** -30 to 180°F (-34 to 82.2°C). **Pressure Limits:** 45 in w.c. (11.2 kPa) continuous, 10 psig (68.95 kPa) surge. **Switch Type:** Single-pole double-throw (SPDT). **Repeatability:** ±3%. **Electrical Rating:** 15 A @ 120-480 VAC, 60 Hz. Resistive 1/8 HP @125 VAC, 1/4 HP @ 250 VAC, 60 Hz. Derate to 10 A for operation at high cycle rates.	**Electrical Connections:** 3 screw type, common, normally open and normally closed. **Process Connections:** 1/8″ female NPT. **Mounting Orientation:** Diaphragm in vertical position. Consult factory for other position orientations. **Set Point Adjustment:** Screw type inside conduit enclosure. **Weight:** 1 lb 4.5 oz (581 g). **Agency Approvals:** CE, CSA, FM, and UL. Optional-EXPL explosion-proof enclosure does not possess any agency approvals.

OPTIONS
Weatherproof Housing
16 ga. steel enclosure with gasketed cover (NEMA 4, IP66) for wet or oily conditions. Withstands 200 hour salt spray test. Wt. 5-1/2 lb (2.5 kg). Switch must be factory installed.
Note: To order, change 1910 base number to 1911 and add -WP suffix **Example:** 1911-1-WP
Explosion-Proof Housing
Cast iron base with brass cover. Rated Class I, Groups D; Class II, Div. 2, Groups E, F, G; Class III and NEMA 7, 9 NEMA 3. (7 lb). Switch must be factory installed.
Note: To order, change 1910 base number to 1911 and add -EXPL suffix **Example:** 1911-1-EXPL
Manual Reset Option (Model 1900 MR)
Includes special snap switch which latches on pressure increase above the setpoint. Switch must be manually reset after pressure drops below the setpoint. Available on -1, -5,-10 or -20 ranges only. Option is not UL, CSA or FM listed. For use only in single positive pressure applications.
Note: To order, change 1910 base number to 1900 and add -MR suffix **Example:** 1900-10-MR

MODEL CHART			
		Approximate Deadband	
Model	Operating Range, in w.c.	At Min. Set Point	At Max. Set Point
1910-00	0.07 to 0.15	0.04	0.04
1910-0	0.15 to 0.5	0.10	0.10
1910-1	0.40 to 1.6	0.15	0.16
1910-5	1.40 to 5.5	0.30	0.30
1910-10	3.0 to 11.75	0.40	0.40
1910-20	4.0 to 20.0	0.40	0.50

ACCESSORIES	
Model	**Description**
A-399	Duct pressure monitor kit; for use with standard or manual reset model switches; includes mounting flange, tubing and adapter
A-329	Street ell; brass adapter for applications requiring right angle connections; two required for differential pressures
A-302F-A	303 SS static pressure tip with mounting flange; for 3/16″ ID rubber or plastic tubing; 4″ insertion depth; includes mounting screws
A-489	4″ straight static pressure tip with flang

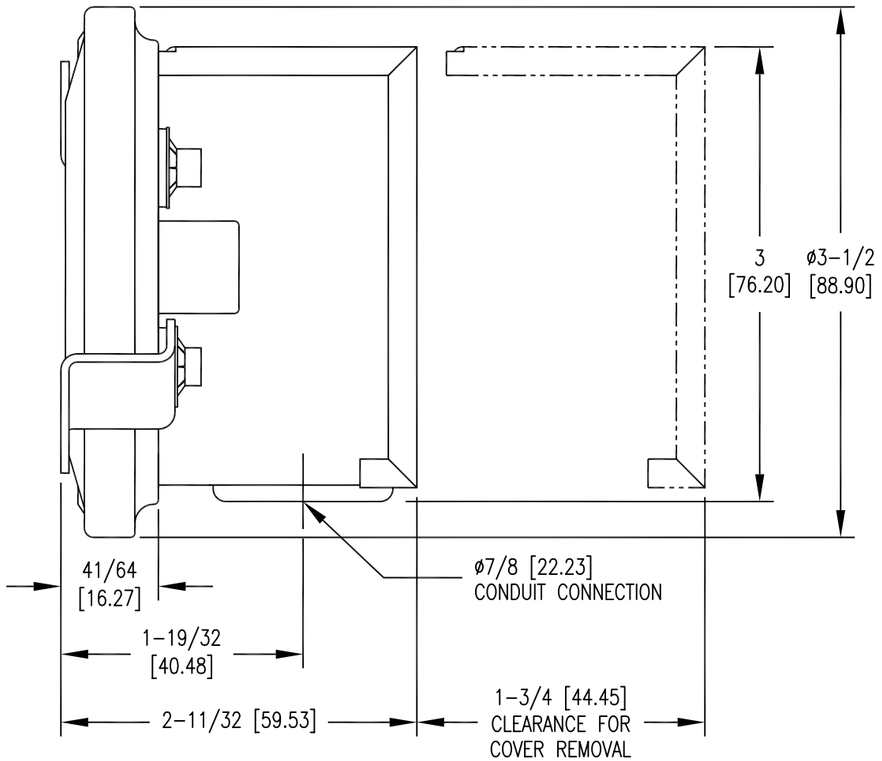


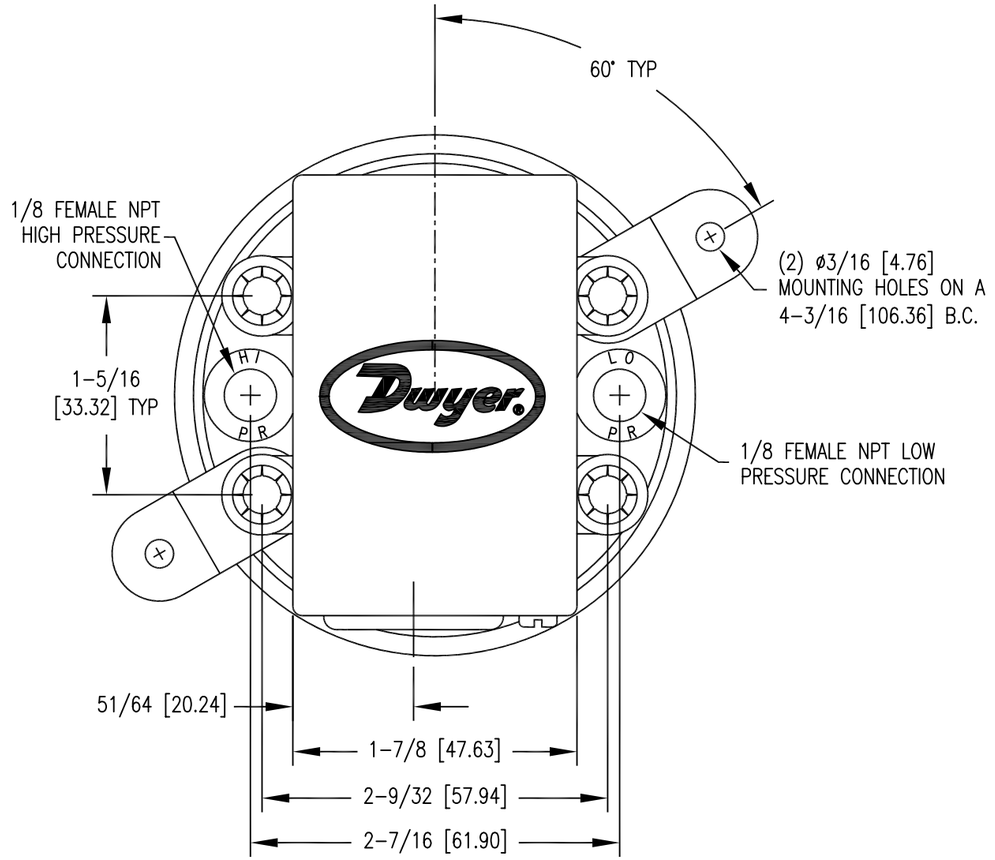
Manual Reset Option

USA: California Proposition 65
⚠WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Process Tubing Options: See page 499 (Gage Tubing Accessories)

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STANDARD TOLERANCES UNLESS NOTED:
ALL DECIMAL DIMENSIONS ± .005
ALL ANGLES ± 1°

SCALE 1:1

NO.	CHANGES	BY/DATE

DATE
DWN BY
CHKD
APPD

NAME: 1900 PRESSURE SWITCH

ACAD2002

MATERIAL

FINISH

DWYER INSTRUMENTS, INC.
MICHIGAN CITY, INDIANA 46360 U.S.A.

FR. NO.

NOTICE: This drawing and the principles and elements of design embodied therein are the exclusive property of DWYER INSTRUMENTS, INC. and are not to be communicated, disclosed, reproduced or used except as previously authorized in writing by such corporation and must not be submitted to outside parties for examination without the written consent of said corporation.

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HAMMOND MANUFACTURING

Quality Products. Service Excellence.

Type 4 Mild Steel Junction Box *Eclipse Junior Series*

Continuous Hinge Door with Quarter Turn



Inner Panel Included

Application

- Designed to enclose electrical and/or electronic equipment and protect against harsh, industrial environments.
- For use as instrument enclosures, electric, hydraulic or pneumatic control housings, electrical junction boxes or terminal wiring enclosures.
- Impressive styling features make the Eclipse Junior a suitable addition to any high-tech equipment installation.

Standards

- UL 508A Type 3R, 4, 12 and 13
- CSA Type 3R, 4, 12 and 13
- Complies with
  - NEMA Type 3R, 4, 12 and 13
  - IEC 60529, IP66

Construction

- Body and cover are formed from 16 gauge steel.
- Smooth, continuously welded seams without knockouts, cutouts, or holes.
- Formed lip on enclosure to exclude flowing liquids and contaminants.
- 14 gauge welded brackets provide for enclosure mounting.
- Continuously hinged cover has 304 stainless steel hinges and provides 180° opening.
- Door latches feature the added safety of quarter turn slot requiring use of tool for opening
- Quarter turn latches formed from black zinc diecast.
- Seamless poured-in place gasket.
- Models larger than 4"x4" include a removable 14 gauge galvanized inner panel.
- Internal threaded weld studs are provided for mounting inner panels.
- A bonding stud is provided on the door and a grounding stud is provided on the enclosure.
- Grounding and panel mounting hardware provided.

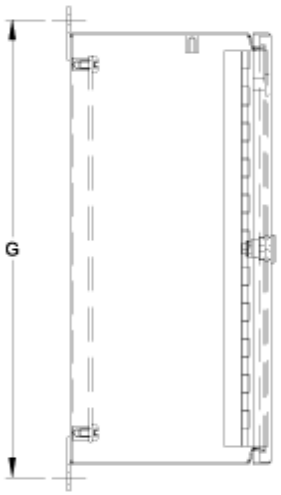
Finish

- Cover and enclosure are finished with a recoatable powder inside and out with choice of ANSI 61 smooth Gray (GY) or RAL7035 textured light gray (LG).
- Inner panels are unpainted galvanized steel.

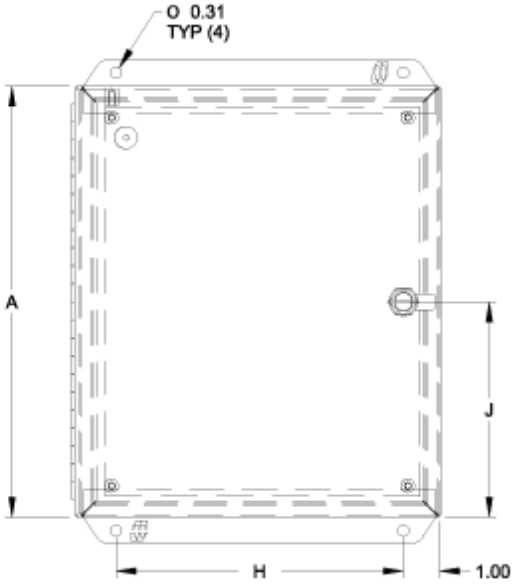
Accessories

- Inner Panels
- Ventilation
- Padlock Adaptor
- Temperature Controls and Accessories
- Swing Panel Kit
- Filtered Fans
- Type 1 Louvered Ventilating Plates
- Terminal Kit Assemblies
- Quarter Turn Assemblies
- Ground Wire Kits

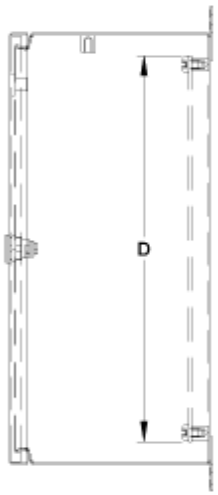
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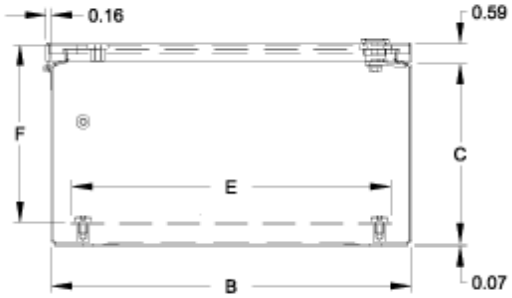
Hinge Side View



Front View



Latch Side View



End View

Part No. (ANSI 61 Gray)	Part No. (RAL 7035 Light Gray)	Overall Dimensions A	B	C	H	Panel Size G	D	E	J	F
EJ443	EJ443LG	4.00	4.00	3.00	2.00	4.75	-	-	2.00	-
EJ643	EJ643LG	6.00	4.00	3.00	2.00	6.75	4.88	2.88	3.00	2.92
EJ683	EJ683LG	6.00	8.00	3.50	6.00	6.75	4.88	6.75	3.00	3.42
EJ863	EJ863LG	8.00	6.00	3.50	4.00	8.75	6.75	4.88	4.00	3.42
EJ444	EJ444LG	4.00	4.00	4.00	2.00	4.75	-	-	2.00	-
EJ644	EJ644LG	6.00	4.00	4.00	2.00	6.75	4.88	2.88	3.00	3.92
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
EJ884	~~EJ884LG~~	8.00	8.00	4.00	6.00	8.75	6.75	6.88	4.00	3.92
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
EJ1084	EJ1084LG	10.00	8.00	4.00	6.00	10.75	8.75	6.88	5.00	3.92
EJ1264	EJ1264LG	12.00	6.00	4.00	4.00	12.75	10.75	4.88	6.00	3.92
EJ12124	EJ12124LG	12.00	12.00	4.00	10.00	12.75	10.75	10.88	6.00	3.92
EJ10125	EJ10125LG	10.00	12.00	5.00	10.00	10.75	8.88	10.75	5.00	4.92
EJ12105	EJ12105LG	12.00	10.00	5.00	8.00	12.75	10.75	8.88	6.00	4.92
EJ866	EJ866LG	8.00	6.00	6.00	4.00	8.75	6.75	4.88	4.00	5.92
EJ1086	EJ1086LG	10.00	8.00	6.00	6.00	10.75	8.75	6.88	5.00	5.92
EJ10106	EJ10106LG	10.00	10.00	6.00	8.00	10.75	8.75	8.88	5.00	5.92
EJ12126	EJ12126LG	12.00	12.00	6.00	10.00	12.75	10.75	10.88	6.00	5.92
EJ12146	EJ12146LG	12.00	14.00	6.00	12.00	12.75	10.88	12.75	6.00	5.92
EJ1486	EJ1486LG	14.00	8.00	6.00	6.00	14.75	12.75	6.88	7.00	5.92
EJ14126	EJ14126LG	14.00	12.00	6.00	10.00	14.75	12.75	10.88	7.00	5.92
EJ14166	EJ14166LG	14.00	16.00	6.00	14.00	14.75	12.88	14.75	7.00	5.92
EJ16106	EJ16106LG	16.00	10.00	6.00	8.00	16.75	14.75	8.88	8.00	5.92
EJ16146	EJ16146LG	16.00	14.00	6.00	12.00	16.75	14.75	12.88	8.00	5.92
EJ12108	EJ12108LG	12.00	10.00	8.00	8.00	12.75	10.75	8.88	6.00	7.92

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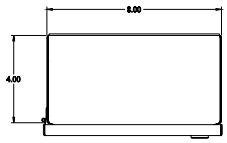
PART No. EJ884

for more information visit

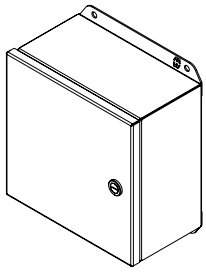
www.hammfg.com

Data subject to change without notice

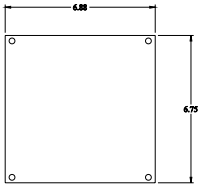
Isometric drawing Not to Scale



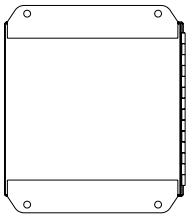
TOP VIEW



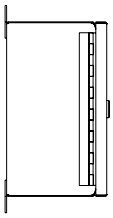
ISOMETRIC VIEW



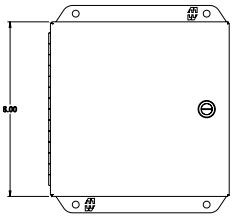
INNER PANEL



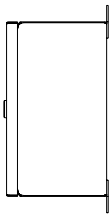
BACK VIEW



SIDE VIEW



FRONT VIEW



SIDE VIEW



BOTTOM VIEW

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WELDED 304 SST TUBING

For Use With	Air, Deionized Water, Hydraulic Fluid, Natural Gas, Oil, Water
Material	304 Stainless Steel
OD	1/4"
OD Tolerance	-0.006" to 0.006"
Wall Thickness	0.02"
ID	0.21"
Maximum Pressure	2,500 psi @ 72° F
Temperature Range	-420° to 1500° F
Fabrication	Welded
Flareable	No
Form	Coil
Bendable	Yes
Bending Method	Tube Bender
Hardness	Rockwell B90
Temper Rating	Soft
Compatible Tube Fittings	Butt Weld, Compression
Sterilize With	Chemicals
Specifications Met	ASTM A269
Length	100 ft.
RoHS	Compliant

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KELE ALARM INDICATION STATION

DESCRIPTION

The **Model AIS** Alarm Indication Station features an indication light, alarm horn and an alarm horn silence switch.

SEQUENCE OF OPERATION

Upon an alarm contact closure, the LED indicator will light, and the horn will sound. The horn can be silenced through the alarm silence switch, while the visual indication will continue to be lighted until the alarm condition has been corrected. A power interruption or open alarm contact will reset the AIS.

FEATURES

- ***Long lasting, red LED indication***
- ***Distinct continuous audible tone***
- ***Horn silence switch***
- ***Compact and rugged design***
- ***Available in 24 VDC, 24 VAC, or 120 VAC***
- ***Bright yellow panel face***

APPLICATION

- ***Refrigerant leak alarm indication***
- ***Water level alarm indication***
- ***Pressure alarm indication***
- ***High/Low temperature limits***
- ***Gas leak indication***
- ***Humidity limit alarm indication***
- ***Vibration limit***
- ***Voltage/Current level limit***
- ***Any contact closure alarm application***

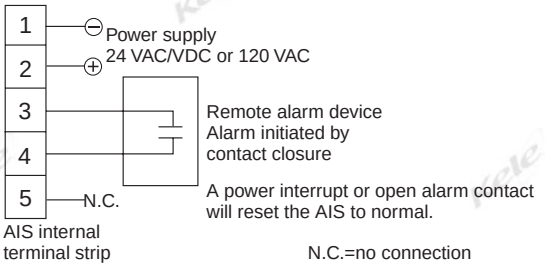


SPECIFICATIONS

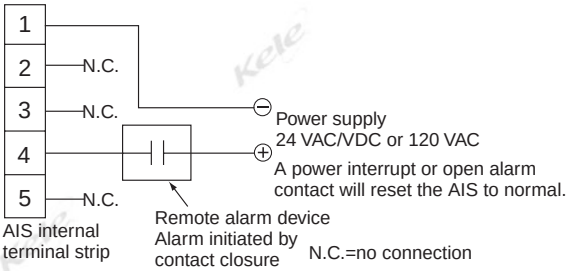
Supply Voltage	24 VAC/ VDC, 120 VAC, 100 mA max
Contact Rating	
AIS-24D	24 VDC, 50 mA min
AIS-24A	24 VAC, 90 mA min
AIS-120A	120 VAC, 70 mA min
Alarm Horn	80 db
Dimensions	7.09"H x 4.33"W x 3.54"D (18.0 x 11.0 x 9.0 cm)
Mounting	Four screws through back
Enclosure	Polystyrene, impact resistant, knock-outs
Approvals	RoHS
Weight	1.1 lb (0.5 kg)
Warranty	1 year

WIRING

Four-wire connection



Two-wire connection



ORDERING INFORMATION

MODEL	DESCRIPTION	
AIS	Alarm indication station	
	12VD	12 VDC powered
	24D	24 VDC powered
	24A	24 VAC powered
	120A	120 VAC powered

AIS – **24A** ***Example:*** **AIS-24A** 24 VAC powered alarm indication station

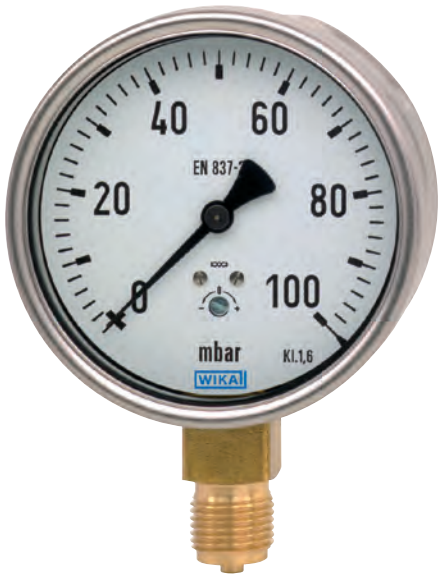
Capsule pressure gauge
Model 612.20, industrial series

Applications

- Robust design and ingress protection IP 54
- For gaseous, dry and non-aggressive media
- Medical, vacuum, environmental, laboratory technology, for contents measurement and filter monitoring

Special features

- Zero adjustment in front
- Case from stainless steel
- Special connection location on request
- Low scale ranges from 0 ... 6 mbar



Capsule pressure gauge model 612.20

Description

Design
EN 837-3

Nominal size in mm
63, 100, 160

Accuracy class
1.6

Scale ranges
NS 63: 0 ... 25 mbar to 0 ... 600 mbar
NS 100: 0 ... 10 mbar to 0 ... 600 mbar
NS 160: 0 ... 6 mbar to 0 ... 600 mbar
or all other equivalent vacuum or combined pressure and vacuum ranges

Pressure limitation
Steady: Full scale value
Fluctuating: 0.9 x full scale value

Permissible temperature
Ambient: -20 … +60 °C
Medium: +100 °C maximum
+ 80 °C maximum (with NS 100 and 160 back mount)

Temperature effect
When the temperature of the measuring system deviates from the reference temperature (+20 °C):
Max. ±0.6 %/10 K of full scale value

Ingress protection
IP 54 per EN 60529 / IEC 529

Data sheets showing similar products:
Test gauge series for NS 160; model 610.20; see data sheet PM 06.09
Industrial series for NS 63, 100 and 160; model 63x.50; see data sheet PM 06.03

Part of your business

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Standard version

Process connection
Cu-alloy,
Lower mount (LM) or lower back mount (LBM) [1)]
NS 63: G ¼ B (male), 14 mm flats
NS 100, 160: G ½ B (male), 22 mm flats

Pressure element
Cu-alloy

Seal
NBR

Movement
Cu-alloy

Zero adjustment
In front

Dial
Aluminium, white, black lettering

Pointer
Aluminium, black

Case
Stainless steel

Window
Instrument glass

Bezel ring
Cam ring (bayonet type), stainless steel

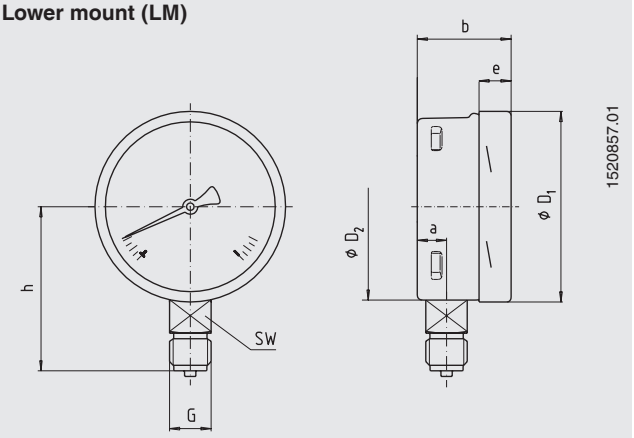
Options

- Other process connection
- Overpressure and vacuum safety with
  scale ranges > 25 mbar: 10 x full scale value
  scale ranges ≤ 25 mbar: 3 x full scale value
- NS 100 and 160: Panel or surface mounting flange
- NS 100 and 160: Triangular bezel with clamp
- NS 100 and 160: Ingress protection IP 65
- Switch contacts model 831 (data sheet AC 08.01)

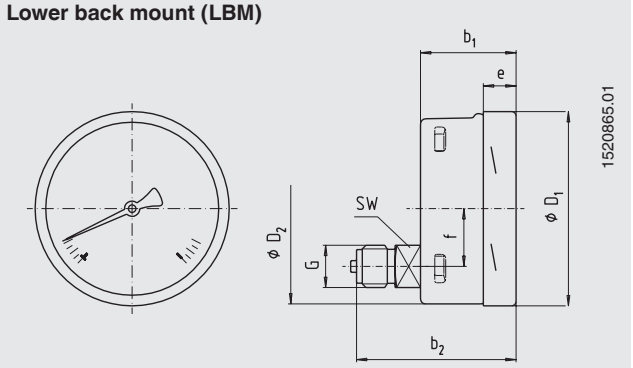
Dimensions in mm

Standard version

Lower mount (LM)



Lower back mount (LBM)



NS	Dimensions in mm											Weight in kg
	a	b	b_1	b_2	D_1	D_2	e	f	G	h ± 1	SW	
63	9.5	33	42	63	64	62	22	1)	G ¼ B	52	14	0.19
100	15.5	49.5	49.5	83	101	99	17.5	30	G ½ B	87	22	0.60
160	15.5	49.5	49.5	83	161	159	17.5	50	G ½ B	118	22	1.10

Process connection per EN 837-3 / 7.3

1) With NS 63: Centre back mount (CBM)

Ordering information
Model / Nominal size / Scale range / Connection size / Connection location / Options

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The specifications given in this document represent the state of engineering at the time of publishing.
We reserve the right to make modifications to the specifications and materials.

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E-mail info@wika.de
www.wika.de

05/2011 GB

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"Apollo"® Valves
SUBMITTAL SHEET

LD145/WD145 Series
Resilient Seated Butterfly Valve

LEAD FREE



Job Name:	411 Wales Avenue
Job Location:	Bronx, NY
Engineer:	TRC Engineers
Contractor:	Air Tech Cooling
Tag:	SSDS System
PO#:	24642
Rep:	ACFM Dynamics, LLC
Wholesale Dist.:	

DESCRIPTION
The **Apollo® LD145/WD145 Series Ductile Iron Butterfly Valves** are ideal for use in Industrial and Commerical/HVAC/Mechanical applications. The WD145 Series is a wafer style valve and the LD145 Series is a lug style. Available in sizes 2" - 12".

FEATURES
- Assembled in USA, Pageland, SC
- Compatible with ANSI Class 125 & 150 flanges
- ISO 5211 top plate allows choice of Apollo® pneumatic actuators and manual operators
- Conforms to MSS SP-67 & API 609
- LD145 series suitable for end of line service to rated pressure (2" - 12")
- 3" and larger meet performance requirements of AWWA C-504
- Gray, epoxy coated bodies
- Pin-less/bolt-less stem shaft design
- Double-D stem input through 12"

PERFORMANCE RATING
- Pressure Rating: 2" to 12": 200 psi

APPROVALS
- NSF/ANSI 372 - Lead Free
- NSF/ANSI 61 - Water Quality*
- CRN: OC/2102CL

applies to bronze and stainless steel disc models

OPTION
- -SF: Silicon Free (Available)

MATERIAL OPTIONS
BODY
- Ductile Iron ASTM A536, (65-45-12)

DISC MATERIAL
- Aluminum Bronze
- Ductile Iron A536 Nickel Plated
- 316 Stainless Steel, CF8M

SEAT MATERIAL
- EPDM: -20°F to +250°F Intermittent, 225°F Continuous (-29°C to +107°C)
- BUNA-N: +10°F to +180°F (-12°C to +82°C)
- Viton B: -20°F to 300°F (-29°C to +149°C)†

OPERATOR
- (-0) None
- (-1) 10 Position Handle
- (-2) Gear Operator (12" Handwheels)
- (-4) Locking Handle
- (-3) Infinite Position Handle
- (-5) Gear Operator w/ Chain Wheel
- (-7) Locking Gear Operator
- (-8) Locking Gear Operator w/ Chain Wheel

STANDARD MATERIAL LIST

BODY	DUCTILE IRON ASTM A536
BUSHINGS	GLASS REINFORCED EPOXY RESIN
STEM SEAL	BUNA-N
SHAFT	416 SS ASTM A276 TYPE 416 (STANDARD) 316 SS ASTM A276 TYPE 316
SEAT	EPDM
	BUNA-N (NITRILE)
DISC	ALUMINUM BRONZE
	DUCTILE IRON / A536 NICKLE PLATED
	316 STAINLESS STEEL / CF8M

SPECIFICATIONS

VALVE SIZE		TORQUE RATING *(IN-LB) FULL RATED PRESSURES (PSI)				FLOW	WEIGHT (LB)		GEAR RATIO
IN.	MM	ΔP 50	ΔP 100	ΔP 150	ΔP 200	C_V FULL OPEN	WD141	LD141	
2	50	100	106	111	117	115	6	9	30:1
2.5	65	150	163	176	189	196	8	10	30:1
3	80	207	220	232	244	302	9	11	30:1
4	100	290	323	357	390	600	11	18	30:1
6	150	599	691	783	875	1579	18	26	30:1
10	250	1671	1872	2074	2275	5340	47	66	50:1
12	300	2568	2795	3023	3250	8250	70	102	50:1

Lubricating Media Surface

*LEAD FREE: The wetted surfaces of this product shall contain no more than 0.25% lead by weighted average. Complies with Federal Public Law 111-380. ANSI 3rd party approved and listed.

This specification is provided for reference only. Apollo reserves the right to change any portion of this specification without notice and without incurring obligation to make such changes to Apollo products previously or subsequently sold. Most current information available at apollovalves.com.

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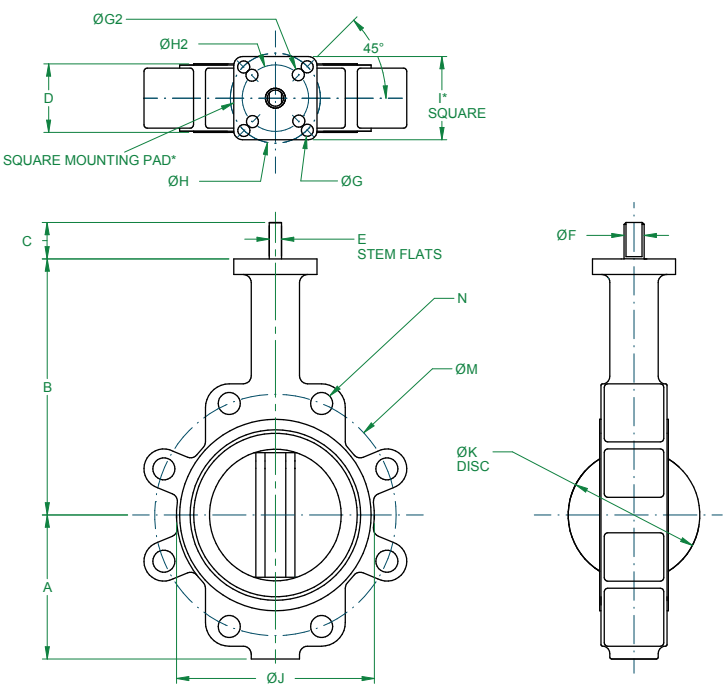
"Apollo"® Valves
SUBMITTAL SHEET

LD145/WD145 Series

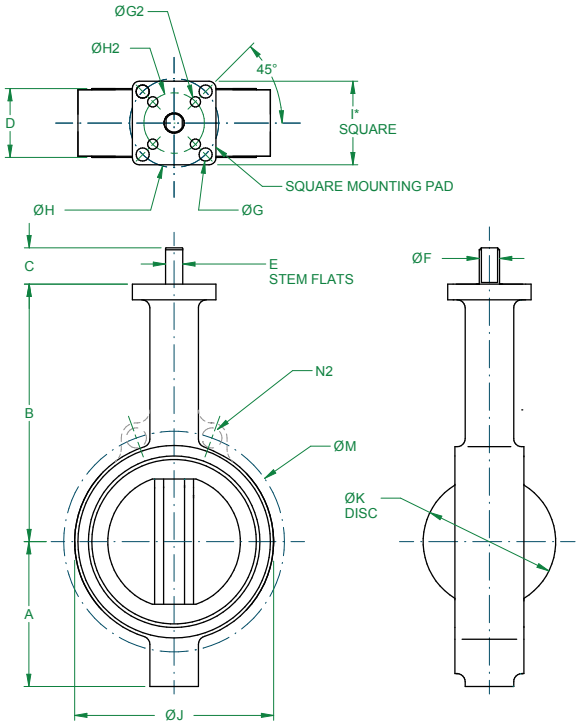
Resilient Seated Butterfly Valve

LEAD FREE

LD MODEL



WD MODEL



DIMENSIONS

SIZE (IN.)	SIZE DN	DIMENSIONS (IN.)																	
		A	B	C	D	E	ØF	ØG	ØG2	KEY	ØH	ØH2	I	ØJ	K	DISC CHORD	M	N (WD)	N 2 (LD)
2	50	3.25	6.375	1.25	1.75	0.394	0.496	0.375	-	-	2.756	-	2.699	4	2.09	1.113	4.75	0.688	.625-11
2.5	65	3.75	6.880	1.25	1.88	0.394	0.496	0.375	-	-	2.756	-	2.699	4.75	2.54	1.706	5.50	0.688	.625-11
3	80	4.00	7.130	1.25	1.88	0.394	0.496	0.375	-	-	2.756	-	2.699	5.13	3.09	2.450	6.00	0.688	.625-11
4	100	4.88	7.880	1.25	2.13	0.472	0.621	0.375	-	-	2.756	-	2.699	6.75	4.09	3.488	7.50	0.688	.625-11
6	150	5.88	8.880	1.25	2.25	0.551	0.745	0.375	-	-	2.756	-	2.699	8.63	6.13	5.697	9.50	0.813	.751-10
10	250	8.25	11.500	1.88	2.75	0.866	1.120	0.563	0.438	-	4.921	4.015	4.606	13.06	9.89	9.484	14.25	0.938	.875-9
12	300	9.75	13.250	1.88	3.13	0.945	1.244	0.563	-	-	4.921	-	4.606	16	11.89	11.456	17.00	0.938	.875-9

This specification is provided for reference only. Apollo reserves the right to change any portion of this specification without notice and without incurring obligation to make such changes to Apollo products previously or subsequently sold. Most current information available at apollovalves.com.

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SSDS Accessories

Installation, Operation, & Maintenance

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THE NEW YORK BLOWER COMPANY
7660 Quincy Street
Willowbrook, IL 60527-5530
Visit us on the Web: http://www.nyb.com
Phone: (800) 208-7918 Email: nyb@nyb.com

INSTALLATION MAINTENANCE, OPERATING INSTRUCTIONS

IM-170

COMPACT PRESSURE BLOWER / COMPACT GI FANS






WORD ABOUT SAFETY

Beginning in June 2012, the above **WARNING** signage has been placed on all **nyb** fans, as specified by ISO and recommended by the European Union. Air moving equipment involves electrical wiring, moving parts, sound, and air velocity or pressure which can create safety hazards if the equipment is not properly installed, operated and maintained. To minimize this danger, follow these instructions as well as the additional instructions and warnings on the equipment itself.

All installers, operators and maintenance personnel should study AMCA Publication 410, "Recommended Safety Practices for Air Moving Devices", which is included as part of every shipment. Additional copies can be obtained by writing to New York Blower Company, 7660 Quincy St., Willowbrook, IL 60527.

ELECTRICAL DISCONNECTS

Every motor driven fan should have an independent disconnect switch to isolate the unit from the electrical supply. It should be near the fan and must be capable of being locked by maintenance personnel while servicing the unit, in accordance with OSHA procedures.

MOVING PARTS

All moving parts must have guards to protect personnel. Safety requirements vary, so the number and type of guards needed to meet company, local and OSHA standards must be determined and specified by the user. Never start a fan without having all safety guards installed. Check regularly for damaged or missing guards and do not operate any fan with guards removed. Fans can also become dangerous because of potential “windmilling”, even though all electrical power is disconnected. Always block the rotating assembly before working on any moving parts.

SOUND

Some fans can generate sound that could be hazardous to exposed personnel. It is the responsibility of the system designer and user to determine sound levels of the system, the degree of personnel exposure, and to comply with applicable safety requirements to protect personnel from excessive noise. Consult **nyb** for fan sound power level ratings.

AIR PRESSURE AND SUCTION

In addition to the normal dangers of rotating machinery, fans present another hazard from the suction created at the fan inlet. This suction can draw materials into the fan where they become high velocity projectiles at the outlet. It can also be extremely dangerous to persons in close proximity to the inlet, as the forces involved can overcome the strength of most individuals. Inlets and outlets that are not ducted should be screened to prevent entry and discharge of solid objects.



Danger: Do Not Enter/Confined Space

ACCESS DOORS

The above DANGER decal is placed on all **nyb** cleanout doors. These doors, as well as access doors to the duct system, should never be opened while the fan is in operation. Serious injury could result from the effects of air pressure or suction. Quick-opening doors must have the door handle bolts securely tightened to prevent accidental or unauthorized opening. Bolted doors must be tightened for the same reason.

RECEIVING AND INSPECTION

The fan and accessories should be inspected on receipt for any shipping damage. Turn the wheel by hand to see that it rotates freely and does not bind. If dampers or shutters are provided, check these accessories for free operation of all moving parts. F.O.B. factory shipping terms require that the receiver be responsible for inspecting the equipment upon arrival. Note damage or shortages on the Bill of Lading and file any claims for damage or loss in transit. **nyb** will assist the customer as much as possible; however, claims must be originated at the point of delivery.

HANDLING AND STORAGE

Fans should be lifted by the base, mounting supports, or lifting eyes only. Never lift a fan by the wheel, shaft, motor, motor bracket, housing inlet, outlet, or any fan part not designed for lifting. A spreader should always be used to avoid damage.

Whenever possible, fans and accessories should be stored in a clean, dry location to prevent rust and corrosion of steel components. If outdoor storage is necessary, protection should be provided. Cover the inlet and outlet to prevent the accumulation of dirt and moisture in the housing. Cover motors with waterproof material. Refer to the bearing section for further storage instructions.

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Check dampers for free operation and lubricate moving parts prior to storage. Inspect the stored unit periodically. **Rotate the wheel by hand every two weeks to redistribute grease on internal bearing parts.**

FAN INSTALLATION

nyb wheels are dynamically balanced when fabricated. Complete fans are test run at operating speeds to check the entire assembly for conformance to **nyb** vibration limits. Nevertheless, all units must be adequately supported for smooth operation. **Ductwork or stacks should be independently supported as excess weight may distort the fan housing and cause contact between moving parts.** Where vibration isolators are used, consult the **nyb** certified drawing for proper location and adjustment.

Slab-Mounted Units

A correctly designed and level concrete foundation provides the best means of installing floor-mounted fans. The mass of the base must maintain the fan/driver alignment, absorb normal vibration, and resist lateral loads. The overall dimensions of the concrete base should extend at least six inches beyond the base of the fan. The weight of the slab should be two to three times the weight of the rotating assembly, including the motor. The foundation requires firmly anchored fasteners such as the anchor bolts shown in Figure 1. Hammer-drilled expansion fasteners can be used in less demanding applications

Move the fan to the mounting location and lower it over the anchor bolts. Shim and grout as required to level the fan. Fasten the fan securely. When isolation is used, check the **nyb** certified drawing for installation instructions.

Elevated Units

When an elevated or suspended structural steel platform is used, it must have sufficient bracing to support the unit load and prevent side sway. The platform should be of welded construction to maintain permanent alignment of all members.

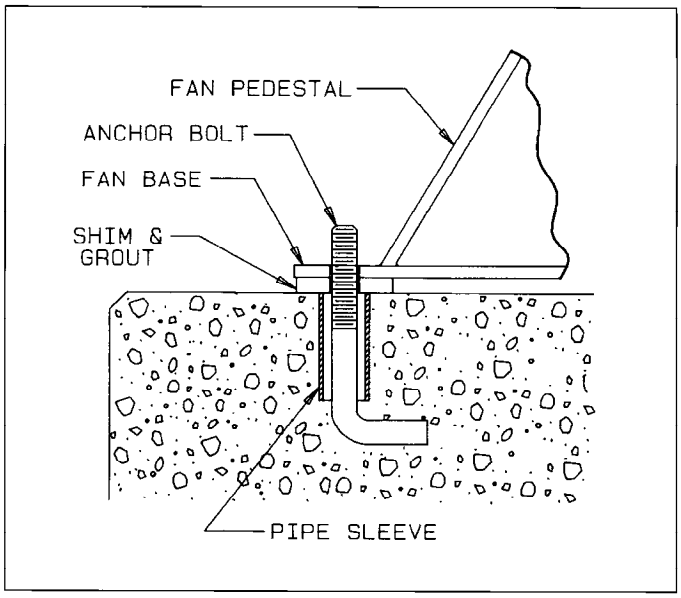


Figure 1

V-BELT DRIVE

Installation

1. Remove all foreign material from the fan and motor shafts. Coat shafts with machine oil for easier mounting. Mount the belt guard backplate at this time if partial installation is required prior to sheave mounting.
2. Mount sheaves on shafts after checking sheave bores and bushings for nicks or burrs. Avoid using force. If resistance is encountered, lightly polish the shaft with emery cloth until the sheave slides on freely.
3. Adjust the motor on its base to a position closest to the fan shaft. Install belts by working each one over the sheave grooves until all are in position. Never pry the belts into place. On **nyb** packaged fans, sufficient motor adjustment is provided for easy installation of the proper size belts.
4. Adjust sheaves and the motor shaft angle so that the sheave faces are in the same plane. Check this by placing a straightedge across the faces of the sheaves. Any gap between the edge and sheave faces indicates misalignment. Important: This method is only valid when the width of the surface between the belt edge and the sheave face is the same for both sheaves. When they are not equal, or when using adjustable-pitch sheaves, adjust so that all belts have approximately equal tension. Both shafts should be at right angles to the center belt.

Belt Tensioning

1. Check belt tension with a tensioning gage and adjust using the motor slide base. Excess tension shortens bearing life while insufficient tension shortens belt life, can reduce fan performance and vay cause vibration. The lowest allowable tension is that which prevents slippage under full load. Belts may slip during start-up, but slipping should stop as soon as the fan reaches full speed. For more precise tensioning methods, consult the drive manufacturer's literature.
2. Recheck setscrews, rotate the drive by hand and check for rubbing, then complete the installation of the belt guard.
3. Belts tend to stretch somewhat after installation. Recheck tension after several days of operation. Check sheave alignment as well as setscrew and/or bushing bolt tightness.

START-UP

Safe operation and maintenance includes the selection and use of appropriate safety accessories for the specific installation. This is the responsibility of the system designer and requires consideration of equipment location and accessibility as well as adjacent components. All safety accessories must be installed properly prior to start-up.

Safe operating speed is a function of system temperature and wheel design. Do not under any circumstances exceed the maximum safe fan speed published in the **nyb** bulletin, which is available from your **nyb** field sales representative.

Procedure

1. If the drive components are not supplied by **nyb,** verify with the manufacturer that the starting torque is adequate for the speed and inertia of the fan.
2. Inspect the installation prior to starting the fan. Check for any loose items or debris that could be drawn into the fan or dislodged by the fan discharge. Check the interior of the fan as well. Turn the wheel by hand to check for binding.

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3. Check drive installation and belt tension.
4. Check the tightness of all setscrews, nuts and bolts. When finished, tighten hub setscrews with the wheel oriented such that the setscrew is positioned underneath the shaft.
5. Install all remaining safety devices and guards. Verify that the supply voltage is correct and wire the motor. “Bump” the starter to check for proper wheel rotation.
6. Use extreme caution when testing the fan with ducting disconnected. Apply power and check for unusual sounds or excessive vibration. If either exists, see the section on Common Fan Problems. To avoid motor overload, do not run the fan for more than a few seconds if ductwork is not fully installed. On larger fans, normal operating speed may not be attained without motor overload unless ductwork is attached. Check for correct fan speed and complete installation. Ductwork and guards must be fully installed for safety.
7. Setscrews should be rechecked after a few minutes, eight hours and two weeks of operation (see Tables 1 & 2 for correct tightening torques).

NOTE: Shut the fan down immediately if there is any sudden increase in fan vibration.

Table 1 - WHEEL SETSCREW TORQUES

Setscrew Size Diameter (in.)	Carbon Steel Setscrew Torque*	
	lb.-in.	lb.-ft.
1/4	75	6.2
5/16	144	12
3/8	252	21
1/2	600	50
5/8	---	97
3/4	---	168

*** Stainless Steel setscrews are not hardened and should not be tightened to more than 1/2 the values shown.**

Table 2 - BEARING SETSCREW TORQUE, In.-Lb.

Setscrew Diameter	Manufacturer				
	Link-Belt	Sealmaster	SKF	McGill	Dodge
1/4	90	65	50	85	--
5/16	185	125	165	165	160

WHEEL – INLET CLEARANCES

Wheel is centered in housing.

FAN MAINTENANCE

nyb fans are manufactured to high standards with quality materials and components. Proper maintenance will ensure a long and trouble-free service life.

Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked. In many cases, a fan can windmill despite removal of all electrical power. The rotating assembly should be blocked securely before attempting maintenance of any kind.

The key to good fan maintenance is regular and systematic inspection of all fan parts. Inspection frequency is determined by the severity of the application and local conditions. Strict adherence to an inspection schedule is essential.

Regular fan maintenance should include the following:

1. Check the fan wheel for any wear or corrosion, as either can cause catastrophic failures. Check also for the build-up of material which can cause unbalance resulting in vibration, bearing wear and serious safety hazards. Clean or replace the wheel as required.
2. Check the V-belt drive for proper alignment and tension (see section on V-belt drives). If belts are worn, replace them as a set, matched to within manufacturer’s tolerances.
3. Lubricate the bearings, but do not over lubricate (see the bearing section for detailed specifications).
4. Ceramic-felt shaft seals require no maintenance, although worn seals should be replaced. When lip-type shaft seals are provided, lubricate them with “NEVER-SEEZ” or other anti-seize compound.
5. During any routine maintenance, all setscrews and bolts should be checked for tightness. See the table for correct torques.
6. When installing a new wheel, the wheel should be centered in the housing between the inlet and drive sides.

WHEEL BALANCE

Airstreams containing particulate or chemicals can cause abrasion or corrosion of the fan parts. This wear is often uneven and can lead to significant wheel imbalance over time. When such wear is discovered, a decision must be made as to whether to rebalance or replace the wheel.

The soundness of all parts should be determined if the original thickness of components is reduced. Be sure there is no hidden structural damage. The airstream components should also be cleaned to remove any build-up of foreign material. Specialized equipment can be used to rebalance a cleaned wheel that is considered structurally sound.

Balance weights should be rigidly attached at a point that will not interfere with the housing nor disrupt airflow. Remember that centrifugal forces can be extremely high at the outer radius of a fan wheel. Welding is the preferred method of balance weight attachment. Weld material for standard Compact GI wheels should be a nickel, aluminum bronze alloy. Be sure to ground the welder directly to the fan wheel. Otherwise, the welding current could pass through the fan bearings and damage them.

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BEARINGS

Storage

Any stored bearing can be damaged by condensation caused by temperature variations. Therefore, **nyb** fan bearings are filled with grease at the factory to exclude air and moisture. Such protection is adequate for shipment and subsequent immediate installation.

For long term or outdoor storage, mounted bearings should be regreased and wrapped with plastic for protection. **Rotate the fan wheel by hand at least every two weeks to redistribute grease on internal bearing parts.** Each month the bearings should be purged with new grease to remove condensation, since even a filled bearing can accumulate moisture. Use caution when purging, as excessive pressure can damage the seals. Rotate the shaft while slowly adding grease.

Operation

Check the setscrew torque before start-up (see table for correct values). Since bearings are completely filled with grease at the factory, they may run at an elevated temperature during initial operation. Surface temperatures may reach 180°F. and grease may bleed from the bearing seals. This is normal and no attempt should be made to replace lost grease. Bearing surface temperatures will decrease when the internal grease quantity reaches a normal operating level. Relubrication should follow the recommended schedule.

Lubrication

Use the following table for bearing lubrication interval, according to operating speed. Bearings should be lubricated with a premium quality lithium-based grease conforming to NLGI Grade 2. Examples are:

Mobil	-	Mobilgrease XHP
Texaco	-	Premium RB
Chevron	-	Amolith #2
Shell	-	Alvania #2

Do not use “high temperature” greases, as many are not formulated for the high speeds associated with fan bearings.

Add grease to the bearing while running the fan or rotating the shaft by hand. Be sure all guards are in place if lubrication is performed while the fan is operating. Add just enough grease to cause a slight purging at the seals. Do not over lubricate.
Disposal of material should be made in accordance to local government regulations.

BEARING LUBRICATION INTERVAL [months]
Sealmaster, McGill, Link-Belt, and SKF

	RPM				
Shaft	1-1000	1001-2000	2001-3000	3001-4000	4001-5000
1”	6	5-6	4-6	3-4	2
1-3/16” & 1-7/16”	6	4-6	4-6	2-4	1

NOTE:

1. **These are general recommendations only; specific manufacturer’s recommendations may vary slightly.**
2. **Assumes clean environment, -20°F. to 120°F.**
   a. **Consult The New York Blower Company for operation below -20°F. ambient.**
   b. **Ambient temperatures greater than 120°F. will shorten bearing life.**
   c. **Under extremely dirty conditions, lubricate more frequently.**
3. **Assumes horizontal mounting configuration. For vertically mounted applications, lubricate twice as frequently.**

COMMON FAN PROBLEMS

Excessive Vibration

A common complaint regarding industrial fans is “excessive vibration”. **nyb** is careful to ensure that each unit is precisely balanced prior to shipment; however, there are many other causes of vibration including:

1. Loose mounting bolts, setscrews, bearings or couplings.
2. Misalignment or excessive wear of couplings or bearings.
3. Misaligned or unbalanced motor.
4. Bent shaft due to mishandling or material impact.
5. Accumulation of foreign material on the wheel.
6. Excessive wear or erosion of the wheel.
7. Excessive system pressure or restriction of airflow due to closed dampers.
8. Inadequate structural support, mounting procedures or materials.
9. Externally transmitted vibration.

Inadequate Performance

1. Incorrect testing procedures or calculations.
2. Fan running too slowly.
3. Fan wheel rotating in wrong direction or installed backwards on shaft.
4. Wheel not properly centered relative to inlet cone.
5. Poor system design, closed dampers, air leaks, clogged filters, or coils.
6. Obstructions or sharp elbows near inlets.
7. Sharp deflection of airstream at fan outlet.

Excessive Noise

1. Fan operating near “stall” due to incorrect system design or installation.
2. Vibration originating elsewhere in the system.
3. System resonance or pulsation.
4. Improper location or orientation of fan intake and discharge.
5. Inadequate or faulty design of supporting structures.
6. Nearby sound reflecting surfaces.
7. Loose accessories or components.
8. Loose drive belts.
9. Worn bearings.

Premature Component Failure

1. Prolonged or major vibration.
2. Inadequate or improper maintenance.
3. Abrasive or corrosive elements in the airstream or surrounding environment.
4. Misalignment or physical damage to rotating components or bearings.
5. Bearing failure from incorrect or contaminated lubricant or grounding through the bearings while arc welding.
6. Excessive fan speed.
7. Extreme ambient or airstream temperatures.
8. Improper belt tension.
9. Improper tightening of wheel setscrews.

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LIMITED PRODUCT WARRANTY

All products are warranted by **nyb** to be free from defects in materials and workmanship for a period of one (1) year after shipment from its plant, provided buyer demonstrates to satisfaction of **nyb** that the product was properly installed and maintained in accordance with **nyb**'s instructions and recommendations and that it was used under normal operating conditions.

This warranty is limited to the replacing and/or repairing by **nyb** of any part or parts which have been returned to **nyb** with **nyb**'s written authorization and which in **nyb**'s opinion are defective. Parts not manufactured by **nyb** but installed by **nyb** in equipment sold to the buyer shall carry the original manufacturer's warranty only. All transportation charges and any and all sales and use taxes, duties, imports or excises for such part or parts shall be paid for by the buyer. **nyb** shall have the sole right to determine whether defective parts shall be repaired or replaced.

This warranty does not cover any customer labor charges for replacement of parts, adjustments or repairs, or any other work unless such charges shall be assumed or authorized in advance, in writing, by **nyb.**

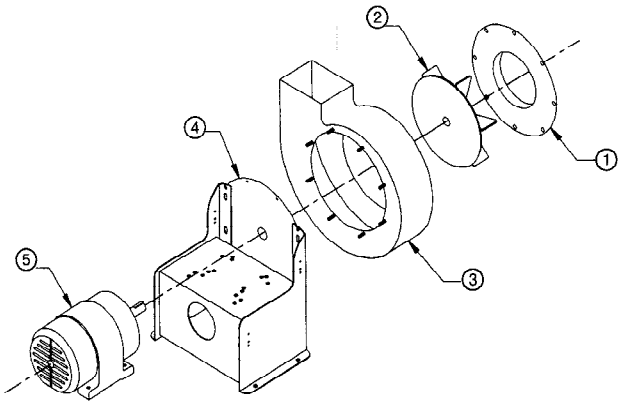
This warranty does not cover any product which, in the judgement of **nyb,** has been subject to misuse or neglect, or which has been repaired or altered outside **nyb's** plant in any way which may have impaired its safety, operation or efficiency, or any product which has been subject to accident.

This warranty shall be null and void if any part not manufactured or supplied by **nyb** for use in any of its products shall have been substituted and used in place of a part manufactured or sup-plied by **nyb** for such use.

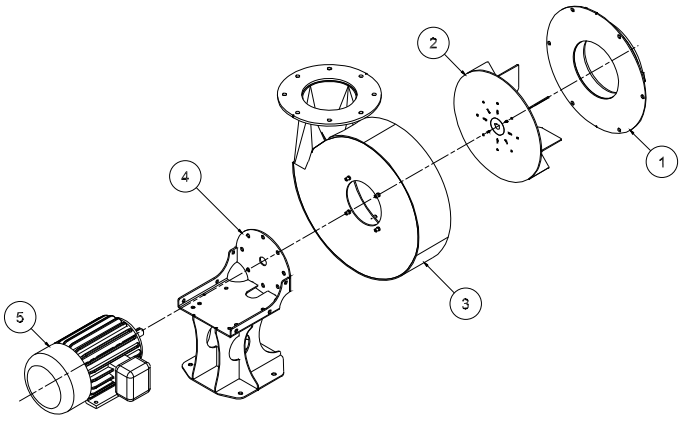
There are no warranties, other than those appearing on the acknowledgement form **INCLUDING NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE,** given in connection with the sale of the goods sold hereunder. The buyer agrees that his sole and exclusive remedy, and the limit of **nyb**'s liability for loss from any cause whatsoever, shall be the purchase price of the goods sold hereunder for which a claim is made.

The New York Blower Company – 7660 Quincy Street – Willowbrook, Illinois 60527-5530

DIRECT DRIVE COMPACT GI FANS



DIRECT DRIVE COMPACT PRESSURE BLOWER



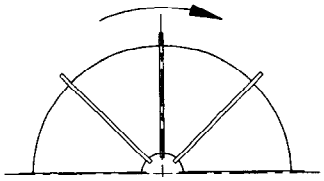
Parts List

1. Inlet Plate
2. Wheel
3. Housing*
4. Drive Side Hanger/Pedestal
5. Motor

* Order for parts must specify rotation.

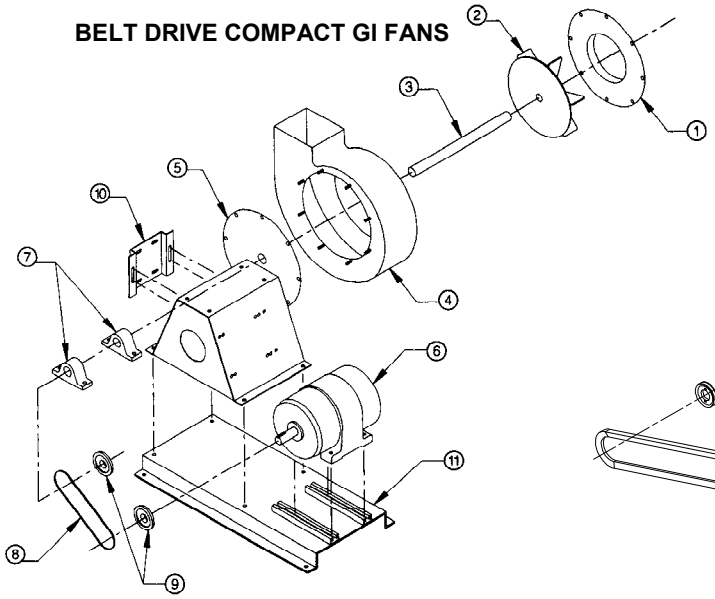
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SPECIFY ROTATION AS VIEWED FROM DRIVE SIDE

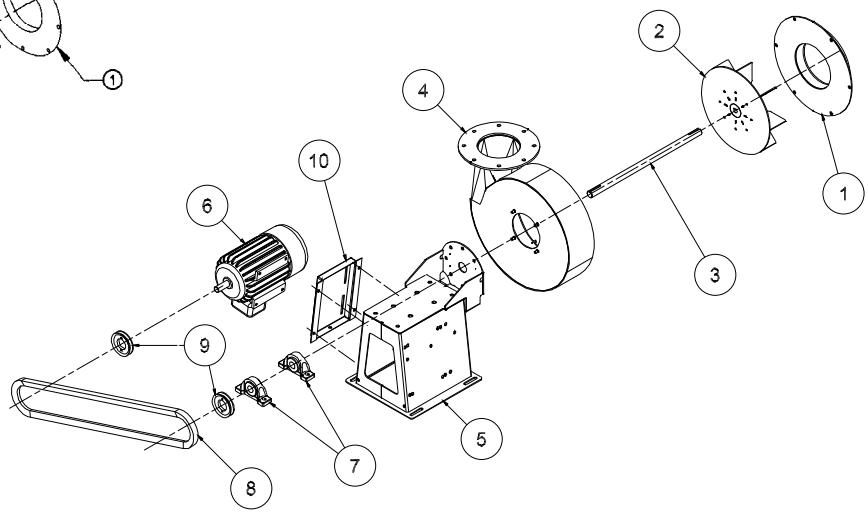


ARROW INDICATES CLOCKWISE ROTATION

BELT DRIVE COMPACT GI FANS



BELT DRIVE COMPACT PRESSURE BLOWERS



REPLACEMENT PARTS

It is recommended that only factory-supplied replacement parts be used. **nyb** fan parts are built to be fully compatible with the original fan, using specific alloys and tolerances. These parts carry a standard **nyb** warranty.

When ordering replacement parts, specify the part name, **nyb** shop and control number, fan size, type, rotation (viewed from drive end), arrangement and bearing size or bore. Most of this information is on the metal nameplate attached to the fan base.

For assistance in selecting replacement parts, contact your local **nyb** representative or visit: http://www.nyb.com.

Example: Part required: Wheel
Shop/control number: B-10106-100
Fan description: Size 125 Compact GI Fan
Rotation: Clockwise
Arrangement: 9

Suggested replacement parts include:

Wheel	Component parts: Damper
Shaft	Motor
Bearings	Sheaves
Shaft Seal	V-Belts

Parts List

1. Inlet Plate
2. Wheel
3. Shaft
4. Housing*
5. Drive Side Hanger/Pedestal
6. Motor
7. Bearings
8. Belt
9. Sheaves
10. Arr. 9 Motor Mounting Base
11. Arr. 9X Motor Mounting Base

* Orders for parts must specify rotation.

For assistance in selecting replacement parts, contact your local **nyb** representative or visit: http://www.nyb.com.

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ENGLISH

1. Foreword

The installation, operation and maintenance of the motor must be always performed by qualified personnel using proper tools and methods and following the instructions contained in the documents supplied with the motor.

The instructions presented in this document are valid for WEG motors with the following characteristics:

- Three-phase and single-phase induction motors (squirrel cage rotor);
- Three-phase permanent magnet motors;
- Three-phase hybrid motors (squirrel cage rotor + permanent magnets);

The objective of this manual is to provide important information, which must be considered during the shipment, storage, installation, operation and maintenance of WEG motors. Therefore, we advise to make a careful and detailed study of the instructions contained herein before performing any procedures on the motor. The noncompliance with the instructions informed in this manual and others mentioned on the website www.weg.net voids the product warranty and may cause serious personal injuries and material damages.

Electric motors have energized circuits and exposed rotating parts which may cause injuries to people.

2. Shipment, storage and handling

Check the conditions of the motor immediately upon receipt. Where any damage is noticed, this must be reported in writing to the transportation company, and immediately communicated to the insurance company and to WEG. In this case, no installation job can be started before the detected problem has been solved.

Check if the nameplate data matches the invoice data and the environmental conditions in which the motor will be installed. If the motor is not immediately installed, it must be stored in a clean and dry room protected against dust, vibrations, gases and corrosive agents, and with relative humidity not exceeding 60%.

In order to prevent water condensation within the motor during the storage period, it is recommended to keep the space heater ON (where provided). In order to prevent oxidation of the bearings and ensure an even distribution of the lubricant, rotate the motor shaft at least once a month (at least five turns), always leaving it in a different position. For bearings with oil mist lubrication systems, the motor must be stored horizontally, independently from the mounting configuration, with ISO VG 68 oil in the bearing, (the amount is indicated in the motor manual available on the website www.weg.net) and the shaft must be turned weekly. If the motors are stored for more than two years, it is recommended to change the bearings, or to remove, wash, inspect and relubricate them before the motor is started. After this storage period, it is also recommended to change the start capacitors of single-phase motors since they loss their operating characteristics.

Always handle the motor carefully in order to prevent impacts and damages to the bearings and always install the shaft transportation/locking device (if supplied) when transporting the motor.Use only the eyebolts to lift the motor. However these eyebolts are designed for the motor weight only. Thus never use these eyebolts to lift the motor with additional loads coupled to it. The lifting eyebolts of the terminal box, fan cover, etc., are intended to handle only these parts when disassembled from the motor. For multimounting motors (with removable feet/base), the eyebolts must be positioned according to the motor mounting position so that the lifting angle is vertically aligned (lifting at 0°). Additional information regarding the maximum allowable angle-of-inclination is indicated in the general manual available on the website www.weg.net.

Periodically and mainly before the initial star-up, measure the insulation resistance of the motor winding. Check the recommended values and the measuring procedures on the website www.weg.net.

3. Installation

During the installation, the motors must be protected against accidental energization.
Check the motor direction of rotation, turning it without load before it is coupled to the load.

Remove the transportation devices and shaft locking device (if supplied) before starting the motor installation.
Motors must be only installed in places compatible with their mounting features and in applications and environments for which they are intended.

Those motors with feet must be installed on bases duly planned in order to prevent vibrations and assure perfect alignment. The motor shaft must be properly aligned with the shaft of the driven machine. Incorrect alignment, as well as improper belt tension, will certainly damage the bearings, resulting in excessive vibrations and even causing the shaft to rupture. The admissible shaft radial and axial loads indicated in the general manual of the website must be respected. Use flexible coupling whenever possible. When motors are fitted with oil lubricated bearings or oil mist lubrication systems, connect the cooling and lubrication tubes (where provided).
For oil lubricated bearings, the oil level must be in the center of the sight glass.
Only remove the corrosion protection grease from the shaft end and flange immediately before the motor installation.
Unless specified otherwise in the purchase order, WEG motors are dynamically balanced with "half key" and without load (uncoupled). The driving elements, such as pulleys, couplings, etc., must be balanced with "half key" before they are mounted on the shaft of the motors.

The motor must always be positioned so the drain hole is at the lowest position.
Motors supplied with rubber drain plugs leave the factory in the closed position and must be opened periodically to allow the exit of condensed water. For environments with high water condensation levels and motor with degree of protection IP55, the drain plugs can be mounted in open position .

For motors with degree of protection IP56, IP65 or IP66, the drain plugs must remain at closed position, being opened only during the motor maintenance procedures.
The drain system of motors with Oil Mist lubrication system must be connected to a specific collection system.

Do not cover and block the motor ventilation openings. Ensure a minimum clearance of ¼ (25%)of the diameter of the air intake of the fan cover from the walls. The air used for cooling the motor must be at ambient temperature, limited to the temperature indicated on the motor nameplate.

For power cables and grounding system connections, terminal box and drip cover assembly, the tightening torques indicated on Table 3.1 must be respected.

Table 3.1 - Tightening torques for fixing elements [Nm]

Component	M4	M5	M6	M8	M10	M12	M14	M16	M20	UNF 8x32	UNF 10x32	UNC 10x24
Terminal block pins	1.0 to 1.5	2.0 to 4.0[1]	4.0 to 6.5	6.5 to 9.0	10.0 to 18.0	15.5 to 30.0	-	30.0 to 50.0	50.0 to 75.0	1.0 to 2.0	-	-
Grounding	1.5 to 3.0	3.0 to 5.0	5.0 to 10.0	10.0 to 18.0	28.0 to 40.0	45.0 to 70.0	-	115.0 to 170	-	-	-	2.5 to 3.0
Terminal box cover	-	3.0 to 5.0	4.0 to 8.0	8.0 to 15.0	18.0 to 30.0	25.0 to 40.0	30.0 to 45.0	35.0 to 50.0	-	-	-	2.5 to 3.0
Drip cover installed in the fan cover	1.5 to 2.3	3.5 to 5.0	6.0 to 9.0	14.0 to 20.0	-	-	-	-	-	-	1.0 to 1.5	-
Drip cover installed in NDE shield	-	3.5 to 5.0	6.0 to 9.0	14.0 to 20.0	-	-	-	-	-	-	1.5 to 2.0	2.5 to 3.0

1) For 12-pin terminal block, the tightening torque range allowed is: minimum 1.5 Nm and maximum 2.5 Nm.

Motors installed outdoors or in the vertical position require the use of additional shelter to protect them from water; for instance, use of a drip cover.
To prevent accidents, ensure that the grounding connection has been performed according to the applicable standards and that the shaft key has been securely fastened before the motor is started.

Connect the motor properly to the power supply by means of safe and permanent contacts, always considering the data informed on the nameplate, such as rated voltage, wiring diagram, etc.

For power cables, switching and protection devices dimensioning, consider the rated motor current, the service factor, and the cable length, among others. For motors without terminal block, insulate the motor terminal cables by using insulating materials that are compatible with the insulation class informed on the nameplate. The minimum insulation distance between the non-insulated live parts themselves and between live parts and the grounding must meet the applicable standards and regulations for each country.

Take the required measures in order to ensure the degree of protection indicated on the motor nameplate:
- unused cable inlet holes in the terminal boxes must be properly closed with blanking plugs;
- the cable entries used must be fitted with components, such as, cable glands and conduits;
- components supplied loose (for example, terminal boxes mounted separately) must be properly closed and sealed;
- fixing elements mounted in the threaded through holes in the motor enclosure (for example, the flange) must be properly sealed.

The motor must be installed with overload protection devices. For three-phase motors, it is recommended to install a phase failure protection device. When motor is fitted with temperature-monitoring devices in the stator windings and/or bearings, they must be connected during the operation and even during tests.

For flying leads motors, do not push the overlength of leads into the motor in order to prevent that they touch the rotor.

Ensure the correct operation of the accessories (brake, encoder, thermal protection, forced ventilation, etc.) installed on the motor before it is started.

Motors fitted with Automatic Thermal Protectors will reset automatically as soon as the motor cools down. Thus, do not use motors with Automatic Thermal Protection in applications where the auto-reseting of this device may cause injuries to people or damage to equipment. Motors fitted with Manual Thermal Protectors require manual reset after they trip. If the Automatic Thermal Protector or the Manual Thermal Protector trip, disconnect the motor from the power supply and investigate the cause of the thermal protector triping.

W22 Magnet motors must be driven by WEG variable frequency drives only.

For more information about the use of variable frequency drives, follow the instructions in the motor manual 50033244 on the website www.weg.net and in the manual of the variable frequency drive.

4. Operation

During operation, do not touch the non-insulated energized parts and never touch or stay too close to rotating parts.
Ensure that the space heater is always OFF during the motor operation.

The rated performance values and the operating conditions are specified on the motor nameplate. The voltage and frequency variations of the power supply should never exceed the limits established in the applicable standards.
Occasional different behavior during the normal operation (actuation of thermal protections, noise level, vibration level, temperature and current increase) must always be assessed by qualified personnel. In case of doubt, turn off the motor immediately and contact the nearest WEG service center.
Do not use roller bearings for direct coupling. Motors fitted with roller bearings require radial load to ensure their proper operation.
For motors fitted with oil lubrication or oil mist systems, the cooling system must be ON even after the machine is OFF and until the machine is at complete standstill.
After complete standstill, the cooling and lubrication systems (if any exist) must be switched OFF and the space heaters must be switched ON.

5. Maintenance

Before any service is performed, ensure that motor is it at standstill, disconnected from the power supply and protected against accidental energization. Even when the motor is stopped, dangerous voltages may be present in space heater terminals.

If motors are fitted with capacitors, discharge them before any handling or service is performed.

Motor disassembly during the warranty period must be performed by a WEG authorized service center only.

For motors with permanent magnet rotor (lines W22 Quattro and W22 Magnet), the motor assembly and disassembly require the use of proper devices due to the attracting or repelling forces that occur between metallic parts. This work must only be performed by a WEG Authorized service center specifically trained for such an operation. People with pacemakers cannot handle these motors. The permanent magnets can also cause disturbances or damages to other electric equipment and components during maintenance.

For the W50 and HGF motor lines provided with axial fans, the motor and the axial fan have different markings for indicating the direction of rotation for prevent incorrect assembly.

The axial fan must be assembled so that the indicative arrow for direction of rotation is always visible, viewing the non-drive end side. The marking indicated on the axial fan blade, CW for clockwise direction of rotation or CCW for counterclockwise direction of rotation, indicates the direction of rotation of the motor viewing the drive end side.

Regularly inspect the operation of the motor, according to its application, and ensure a free air flow. Inspect the seals, the fastening bolts, the bearings, the vibration and noise levels, the drain operation, etc. The lubrication interval is specified on the motor nameplate.

6. Additional information

For further information about shipment, storage, handling, installation, operation and maintenance of electric motors, access the website www.weg.net.
For special applications and operating conditions (for example, smoke extraction motors, totally enclosed air over (TEAO), motors for high thrust applications, motors with brake, motors with encoder) refer to the dedicated manual supplied with the equipment, or the manual 50033244 available in the website or contact WEG.
When contacting WEG, please, have the full description of the motor at hand, as well as the serial number and manufacturing date, indicated on the motor nameplate.

Warranty Term

WEG Equipamentos Elétricos S/A, Motors Unit ("WEG"), offers warranty against defects in workmanship and materials for its products for a period of 18 months from the invoice date issued by the factory or distributor/dealer, limited to 24 months from the date of manufacture.
Motors of the HGF Line are covered for a period of 12 months from the invoice date issued by the factory or distributor / dealer, limited to 18 months from the date of manufacture.
The paragraphs above contain the legal warranty periods.
If a warranty period is defined in a different way in the commercial/technical proposal of a particular sale, that will supersede the time limits set out above.

The warranty periods above are independent of the product installation date and the startup.
If any defect or abnormal occurrence is detected during machine operation, the customer must immediately notify WEG in writing about the occurred defect, and make the product available for WEG or its Authorized Service Center for the period required to identify the cause of the defect, check the warranty coverage, and perform the proper repairs.
In order for the warranty to be valid, the customer must be sure to follow the requirements of WEG's technical documents, especially those set out in the product Installation, Operation and Maintenance Manual, as well as the applicable standards and regulations in force in each country.
Defects arising from the inappropriate or negligent use, operation, and/or installation of the equipment, non-execution of regular preventive maintenance, as well as defects resulting from external factors or equipment and components not supplied by WEG, will not be covered by the warranty.
The warranty will not apply if the customer at its own discretion makes repairs and/or modifications to the equipment without prior written consent from WEG.
The warranty will not cover equipment, components, parts and materials whose lifetime is usually shorter than the warranty period. It will not cover defects and/or problems resulting from force majeure or other causes not imputable to WEG, such as, but not limited to: incorrect or incomplete specifications or data supplied by the customer; transportation, storage, handling, installation, operation and maintenance not complying with the provided instructions; accidents; defects in the construction works; use in applications and/or environments for which the machine was not designed; equipment and/or components not included in the scope of WEG supply. The warranty does not include disassembly services at the buyer's premises, product transportation costs and travel, lodging and meal expenses for the technical staff of the Service Centers, when requested by the customer.
The services under warranty will be provided exclusively at WEG authorized Service Centers or at one of its manufacturing plants. Under no circumstances will the warranty services extend the equipment warranty period.
WEG's Civil Liability is limited to the supplied product; WEG will not be liable for indirect or consequential damages, such as losses of profit and revenue losses and alike which may arise from the contract signed between the parties.

EU DECLARATION OF CONFORMITY

Manufacturers:

WEG EQUIPAMENTOS ELÉTRICOS S.A.
Av. Prefeito Waldemar Grubba, 3000 - CEP 89256-900
Jaraguá do Sul – SC – Brazil
www.weg.net

WEG Linhares Equipamentos Elétricos S.A.
Rod. BR 101, Km 161,5, s/n. Distrito Industrial Rio Quartel.
Bairro Rio Quartel de Baixo
29915-500 – Linhares – ES – Brazil
www.weg.net

WEG MEXICO, S.A. DE C.V
Carretera Jorobas - Tula
Km 3.5, Manzana 5, Lote 1, Fraccionamiento Parque Industrial Huehuetoca, Municipio de Huehuetoca, C.P. 54680, CD. de Mexico y Area Metropolitana – Mexico
www.weg.net/mx

WEG (JIANGSU) ELECTRIC EQUIPMENT CO., LTD.
No. 15 Group, North City Street, Dengyuan Community Rugao City, Jiangsu Province – China
www.weg.net/cn

WEG (NANTONG) ELECTRIC MOTOR
Manufacturing CO.LTD.
No. 128# - Xinkai South Road, Nantong - Economic & Technical Development Zone, Nantong, Jiangsu Province – China
www.weg.net/cn

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CONTACT PERSON: Luis Filipe Oliveira Silva Castro Araújo
Authorised Representative in the European Union
(Single Contact Point)

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Parque Industrial da Ermida
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4780-165 – Santo Tirso – Portugal
www.weg.net/pt

The manufacturer declares under sole responsibility that:

WEG electric motors and components used for following motor lines:
W01, W11, W20, W21, W22, W40, W50, HGF, Roller Table, W21 Magnet, W22 Magnet and W22 Quattro
.....

when installed, maintained and used in applications for which they were designed, and in compliance with the relevant installation standards and manufacturer's instructions, comply with the provisions of the following relevant European Union harmonisation legislation, wherever applicable:

Low Voltage Directive 2014/35/EU*
Regulation (EC) No 640/2009*, Regulation (EU) No 4/2014* and Directive 2009/125/EC*
Machinery Directive 2006/42/EC**
EMC Directive 2014/30/EU (electric motors are considered inherently benign in terms of electromagnetic compatibility)

The fulfilment of the safety objectives of the relevant European Union harmonisation legislation has been demonstrated by compliance with the following standards, wherever applicable:

EN 60034-1:2010 + AC:2010/ EN 60034-2-1:2007/ EN 60034-5:2001 + A1:2007/ EN 60034-6:1993/ EN 60034-7:1993 + A1:2001/ EN 60034-8:2007 + A1: 2014/ EN 60034-9:2005 + A1:2007/ EN 60034-11:2004/ EN 60034-12:2002 + A1:2007/ EN 60034-14:2004 + A1:2007/ EN 60034-30:2009/ EN 60204-1:2006 + A1:2009 + AC:2010 and EN 60204-11:2000 + AC:2010

CE marking in: **1996**
* Electric motors designed for use with a voltage rating higher than 1000V are not considered under the scope.
** Low voltage electric motors are not considered under the scope and electric motors designed for use with a voltage rating higher than 1000V are considered partly completed machinery and are supplied with a

Declaration of Incorporation:

The products above cannot be put into service until the machinery into which they have been incorporated has been declared in conformity with the Machinery Directive.
A Technical Documentation for the products above is compiled in accordance with part B of annex VII of Machinery Directive 2006/42/EC.
We undertake to transmit, in response to a reasoned request by the national authorities, relevant information on the partly completed machinery identified above through WEG authorised representative established in the European Union. The method of transmission shall be electronic or physical method and shall be without prejudice to the intellectual property rights of the manufacturer.

Jaraguá do Sul, April 04th, 2018

Signed for and on behalf of the manufacturer:
Milton Oscar Castella
Engineering Director

APPROVED DIGITALLY RECEIVED 09/12/19

ACH550

Installation, Operation and Maintenance Manual (I, O & M)
ACH550-UH HVAC Drives (1...550 HP)
ACH550-BCR/BDR/VCR/VDR E-Clipse Bypass Drives (1...400 HP)
ACH550-PCR/PDR Packaged Drives with Disconnect (1...550 HP)



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Safety

Use of warnings and notes

There are two types of safety instructions throughout this manual:

- Notes draw attention to a particular condition or fact, or give information on a subject.
- Warnings caution you about conditions which can result in serious injury or death and/or damage to the equipment. They also tell you how to avoid the danger. The warning symbols are used as follows:



Electricity warning warns of hazards from electricity which can cause physical injury and/or damage to the equipment.

- **WARNING!** The ACH550 adjustable speed AC drive should ONLY be installed by a qualified electrician.
- **WARNING!** Even when the motor is stopped, dangerous voltage is present at the power circuit terminals U1, V1, W1 (L1, L2, L3) and U2, V2, W2 (T1, T2 T3) and, depending on the frame size, UDC+ and UDC-, or BRK+ and BRK-.
- **WARNING!** Dangerous voltage is present when input power is connected. After disconnecting the supply, wait at least 5 minutes (to let the intermediate circuit capacitors discharge) before removing the cover.
- **WARNING!** Even when power is switched off from the input terminals of the ACH550, there may be dangerous voltage (from external sources) on the terminals of the relay outputs.
- **WARNING!** When the control terminals of two or more drives are connected in parallel, the auxiliary voltage for these control connections must be taken from a single source which can either be one of the drives or an external supply.
- **WARNING!** Disconnect the internal EMC filter when installing the drive on an IT system (an ungrounded power system or a high-resistance-grounded [over 30 ohm] power system).
- **WARNING!** Do not attempt to install or remove EM1, EM3, F1 or F2 screws while power is applied to the drive's input terminals.



General warning warns about conditions, other than those caused by electricity, which can result in physical injury and/or damage to the equipment.

- **WARNING!** Do not control the motor with the disconnecting device (disconnecting means); instead, use the control panel keys or commands via the I/O board of the drive. The maximum allowed number of charging cycles of the DC capacitors (i.e. power-ups by applying power) is five in ten minutes.
- **WARNING!** Never attempt to repair a malfunctioning ACH550; contact the factory or your local Authorized Service Center for repair or replacement.
- **WARNING!** The ACH550 will start up automatically after an input voltage interruption if the external run command is on.
- **WARNING!** The heat sink may reach a high temperature.

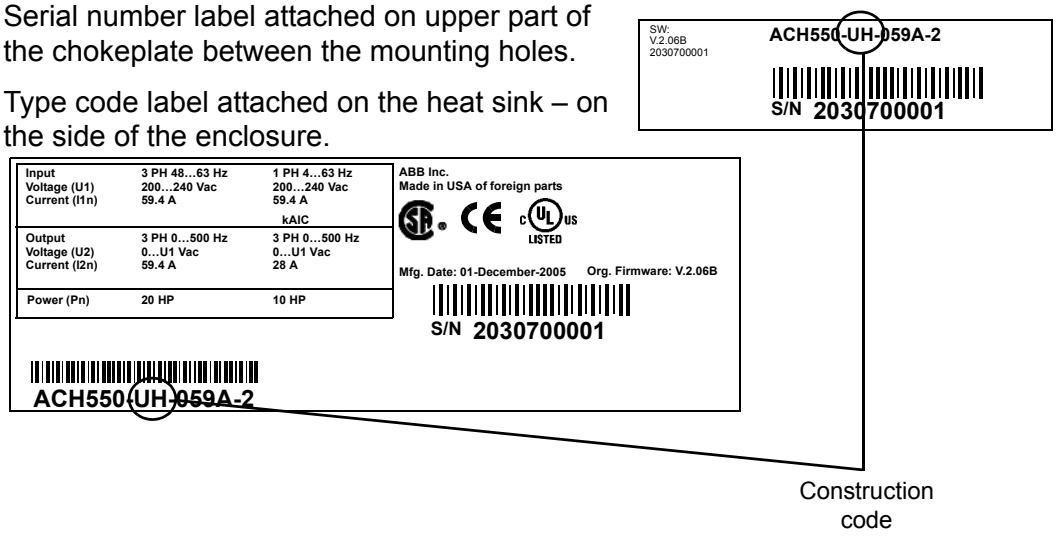
Note: For more technical information, contact the factory or your local ABB representative.

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Contents

This manual is the Operation and Maintenance Manual for the ACH550 Drives. Complete technical details and programming information are available in the *ACH550 User's Manual*, publication number 3AUA0000081823.

1. To determine the type of your drive, refer to its construction code on either:
   - Serial number label attached on upper part of the chokeplate between the mounting holes.
   - Type code label attached on the heat sink – on the side of the enclosure.



2. According to the construction code, proceed to your drive's installation, operation, diagnostics and maintenance information:
   - UH – Below.
   - VCR, VDR, BCR, BDR (E-Clipse Bypass) – page *39*.
   - PCR, PDR (Packaged Drives with Disconnect) – page *79*.

ACH550-UH

Installation

Study these installation instructions carefully before proceeding. **Failure to observe the warnings and instructions may cause a malfunction or personal hazard.**

WARNING! Before you begin read *Safety* on page *2*.

Note: Keep a minimum of 50 mm (2") of free space on each side and 200 mm (8") of free space above and below all units from non-heat producing sources. Double these distances from heat producing sources.

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1. Prepare for installation

Lifting R1…R6

Lift the drive only by the metal chassis.

Lifting R7…R8



WARNING! Handle and ship floor mounted enclosures only in the upright position. These units are not designed to be laid on their backs.

1. Use a pallet truck to move the transport package/enclosure to the installation site.
2. Remove the cabinet side panels for access to the cabinet/pallet mounting bolts. (6 torx screws hold each cabinet side panel in place. Leave the side panels off until later.)
3. Remove the 4 bolts that secure the cabinet to the shipping pallet.



WARNING! Use the lifting lugs/bars at the top of the unit to lift R7/R8 drives.

4. Use a hoist to lift the drive. (Do not place drive in final position until mounting site is prepared.)

Unpack the drive

1. Unpack the drive.
2. Check for any damage and notify the shipper immediately if damaged components are found.
3. Check the contents against the order and the shipping label to verify that all parts have been received.

Tools required

To install the ACH550 you need the following:

- Screwdrivers (as appropriate for the mounting hardware used)
- Wire stripper
- Tape measure
- Drill
- Frame sizes R5…R8 with UL type 12 enclosure: Punch for conduit mounting holes
- Frame sizes R7/R8: pallet truck and hoist
- For installations involving frame size R6…R8: The appropriate crimping tool for power cable lugs.

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- Mounting hardware: screws or nuts and bolts, four each. The type of hardware depends on the mounting surface and the frame size:

Frame Size	Mounting Hardware		Note
R1…R4	M5	#10	
R5	M6	1/4 in	
R6	M8	5/16 in	
R7…R8	M10	7/16	Secures free standing cabinets if required.

- For installations involving frame size R7…R8: Hoist.

WARNING! Before installing the ACH550, ensure the input power supply to the drive is off.

WARNING! Metal shavings or debris in the enclosure can damage electrical equipment and create a hazardous condition. Where parts, such as conduit plates require cutting or drilling, first remove the part. If that is not practical, cover nearby electrical components to protect them from all shavings or debris.

Flange Mounting Instructions

Frame size	IP21 / UL type 1		IP54 / UL type 12	
	Kit	Code (English)	Kit	Code (English)
R1	FMK-A-R1	100000982	FMK-B-R1	100000990
R2	FMK-A-R2	100000984	FMK-B-R2	100000992
R3	FMK-A-R3	100000986	FMK-B-R3	100000994
R4	FMK-A-R4	100000988	FMK-B-R4	100000996
R5	AC8-FLNGMT-R5	ACS800-PNTG01U-EN	-	-
R6	AC8-FLNGMT-R6		-	-

2. Prepare the mounting location

1. Mark the position of the mounting holes.

Note: Frame sizes R3 and R4 have four holes along the top. Use only two. If possible, use the two outside holes (to allow room to remove the fan for maintenance).

Note: ACH400 drives can be replaced using the original mounting holes. For R1 and R2 frame sizes, the mounting holes are identical. For R3 and R4 frame sizes, the inside mounting holes on the top of ACH550 drives match ACH400 mounts.

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Note: Frame sizes R7 and R8 have mounting holes inside the enclosure base.

Where it is not possible to use either mounting hole at the back of the base, use an L-bracket at the top of the enclosure to secure the cabinet to a wall or to the back of another enclosure. Bolt the L-bracket to the enclosure using the lifting lug bolt hole on the top of the enclosure.

2. Drill holes of appropriate size in the mounting location.

3. Remove front cover

R1…R6, *UL type 1*

1. Remove the control panel, if attached.
2. Loosen the captive screw at the top.
3. Pull near the top to remove the cover.

R1…R6, *UL type 12*

1. If hood is present: Remove screws (2) holding the hood in place.
2. If hood is present: Slide hood up and off of the cover.
3. Loosen the captive screws around the edge of the cover.
4. Remove the cover.

R7…R8, *Cabinet Door*

1. To open the cabinet door, loosen the quarter-turn screws that hold the cabinet door closed.

R7…R8, *Side Panels*

The side panels were removed to take the cabinet off the pallet. Installation access is easier if these panels are kept off throughout the installation.

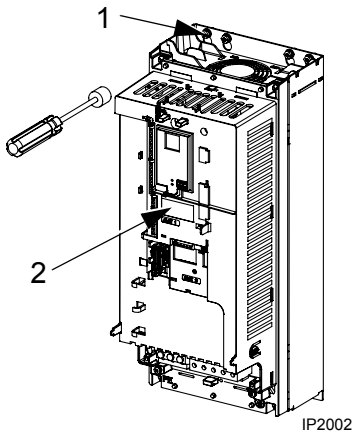
4. Mount the drive

R1…R6, *UL type 1*

1. Position the ACH550 onto the mounting screws or bolts and securely tighten in all four corners.

Note: Use mounting hardware that permits fan replacement without removal.

Note: Lift the ACH550 by its metal chassis.



IP2002

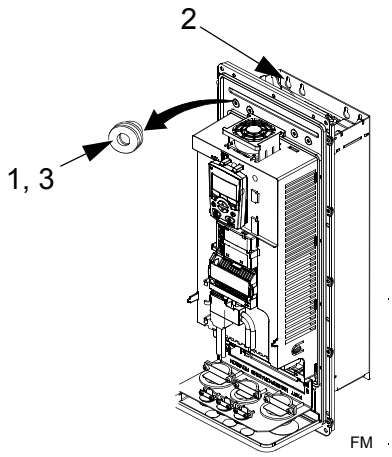
2. Non-English speaking locations: Add a warning sticker in the appropriate language over the existing warning on the top of the module.

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***R1…R6,** UL type 12*

For the UL type 12 enclosures, rubber plugs are required in the holes provided for access to the drive mounting slots.

1. As required for access, remove the rubber plugs. Push plugs out from the back of the drive.
2. R5 & R6: Align the sheet metal hood (not shown) in front of the drive's top mounting holes. (Attach as part of next step.)
3. Position the ACH550 onto the mounting screws or bolts and securely tighten in all four corners.



Note: Lift the ACH550 by its metal chassis (frame size R6 by the lifting holes on both sides at the top).

4. Re-install the rubber plugs.
5. Non-English speaking locations: Add a warning sticker in the appropriate language over the existing warning on the top of the module.

R7…R8

1. Use a hoist to move the cabinet into position.

Note: If the cabinet location does not provide access to the cabinet sides, be sure to re-mount side panels before positioning cabinet.

2. Install and tighten mounting bolts.

5. Install wiring

WARNING! Ensure the motor is compatible for use with the ACH550. The ACH550 must be installed by a competent person. If in doubt, contact your local ABB sales or service office.

Conduit kit

Wiring R1…R6 drives with the UL type 1 Enclosure requires a conduit kit with the following items:

- conduit box
- screws
- cover

The kit is included with UL type 1 Enclosures.

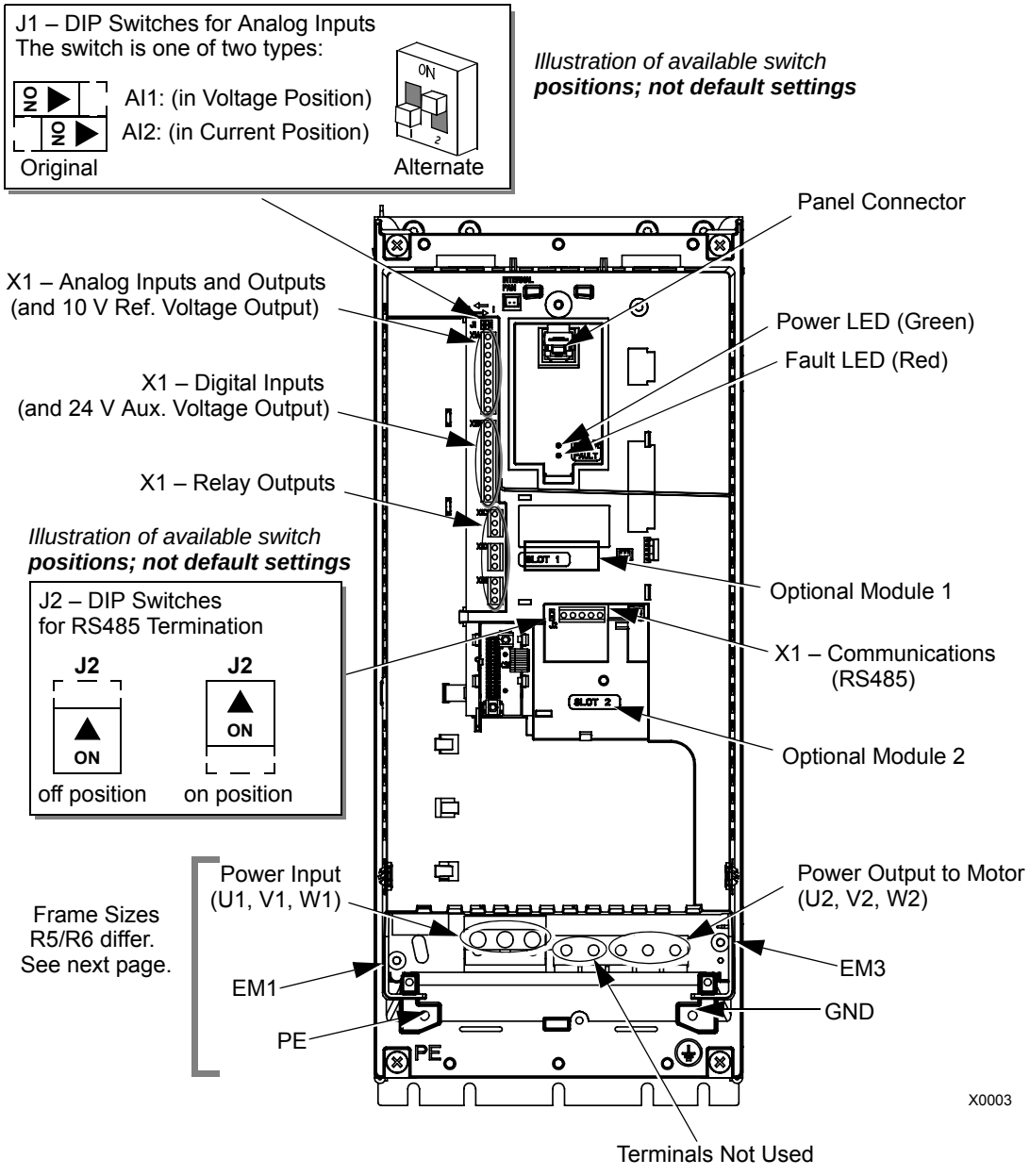
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Connection diagrams

The following diagrams show:

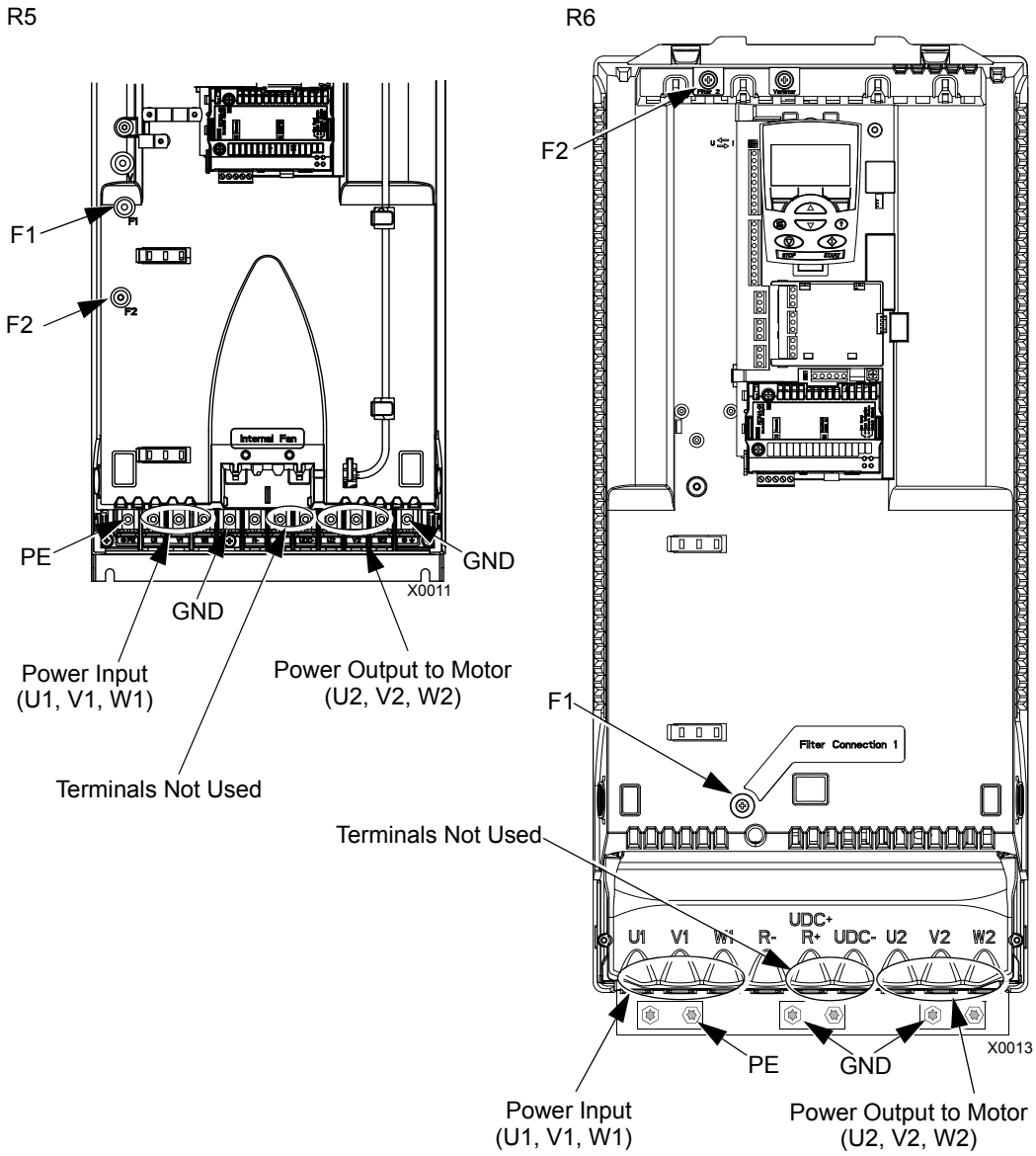
- The terminal layout for frame size R3, which, in general, applies to frame sizes R1...R6, except for the R5/R6 power and ground terminals.
- The R5/R6 power and ground terminals.
- The terminal layout for R7/R8.

R1...R4 (Diagram shows the R3 frame.)



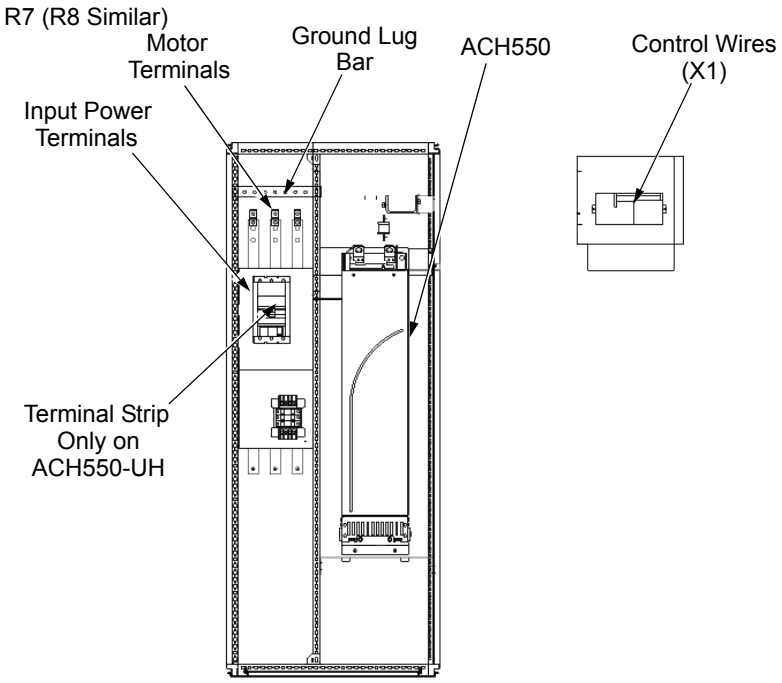
WARNING! To avoid danger, or damage to the drive, on IT systems and corner grounded TN systems, see section *Disconnecting the internal EMC filter* on page *10*.

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WARNING! To avoid danger, or damage to the drive, on IT systems and corner grounded TN systems, see section *Disconnecting the internal EMC filter* on page *10*.

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Disconnecting the internal EMC filter

On certain types of systems, you must disconnect the internal EMC filter, otherwise the system will be connected to ground potential through the EMC filter capacitors, which might cause danger, or damage the drive.

Note: When the internal EMC filter is disconnected, the drive is not EMC compatible.

The following table shows the installation rules for the EMC filter screws in order to connect or disconnect the filter, depending on the system type and the frame size. For more information on the different system types, see *Floating networks* on page *12* and *Unsymmetrically grounded networks* on page *11*.

The locations of screws EM1 and EM3 are shown in the diagram on page *8*. The locations of screws F1 and F2 are shown in the diagram on page *9*.

Frame sizes	Screw	Symmetrically grounded TN systems (TN-S systems)	Corner grounded TN systems	IT systems (ungrounded or high-resistance-grounded [> 30 ohm])
R1…R3	EM1	x	x	–
	EM3	x	•	•
R4	EM1	x	x	–
	EM3	x	•	•
R5…R6	F1	x	x	–
	F2	x	x	–

x = Use the provided metal screw which may already be installed. (EMC filter(s) will be connected.)
• = Use the installed polyamide screw. (EMC output filter will be disconnected.)
– = Remove the installed metal screw. (EMC filter(s) will be disconnected.)
EM1 and EM3 screws are M4 x 12
F1 and F2 screws are M4 x 16

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Ground connections

For personnel safety, proper operation and to reduce electromagnetic emission/pick-up, the drive and the motor must be grounded at the installation site.

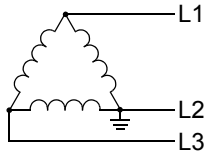
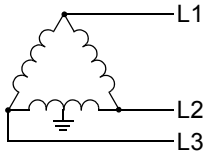
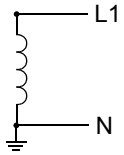
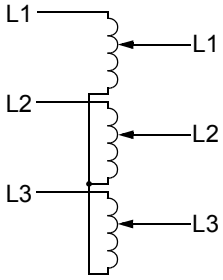
- Conductors must be adequately sized as required by safety regulations.
- Power cable shields must be connected to the drive PE terminal in order to meet safety regulations.
- Power cable shields are suitable for use as equipment grounding conductors only when the shield conductors are adequately sized as required by safety regulations.
- In multiple drive installations, do not connect drive terminals in series.

Unsymmetrically grounded networks

WARNING! Do not attempt to install or remove EM1 or EM3 screws while power is applied to the drive's input terminals.

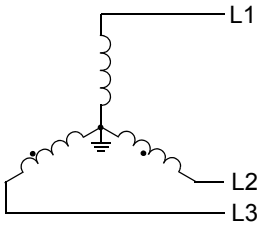
Unsymmetrically grounded networks are defined in the following table. In such networks, the internal connection provided by the EM3 screw (on frame sizes R1…R4 only) must be disconnected by removing EM3. If the grounding configuration of the network is unknown, remove EM3.

Note: ACH550-UH drives are shipped with the screw removed (but included in the conduit box).

Unsymmetrically Grounded Networks – EM3 Must Be Out			
Grounded at the corner of the delta		Grounded at the mid point of a delta leg	
Single phase, grounded at an end point		Three phase "Variac" without solidly grounded neutral	

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EM3 (an M4x16 screw) makes an internal ground connection that reduces electro-magnetic emission. Where EMC (electro-magnetic compatibility) is a concern, and the network is symmetrically grounded, EM3 may be installed. For reference, the diagram at right illustrates a symmetrically grounded network.



Floating networks

WARNING! Do not attempt to install or remove EM1, EM3, F1 or F2 screws while power is applied to the drive's input terminals.

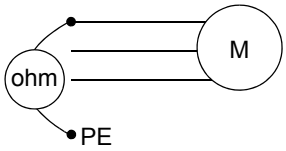
For floating networks (also known as IT, ungrounded, or impedance/resistance grounded networks):

- Disconnect the ground connection to the internal RFI filters:
  - Frame sizes R1…R4: Remove the EM1 screw (unit is shipped with EM3 removed, see *Connection diagrams* on page *8*).
  - Frame sizes R5…R6: Remove both the F1 and F2 screws (see page *9*).
- Where EMC requirements exist, check for excessive emission propagated to neighboring low voltage networks. In some cases, the natural suppression in transformers and cables is sufficient. If in doubt, use a supply transformer with static screening between the primary and secondary windings.
- Do NOT install an external RFI/EMC filter. Using an RFI filter grounds the input power through the filter capacitors, which could be dangerous and could damage the unit.

Checking motor and motor cable insulation

WARNING! Check the motor and motor cable insulation before connecting the drive to input power. For this test, make sure that motor cables are NOT connected to the drive.

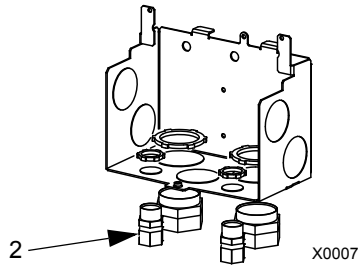
1. Complete motor cable connections to the motor, but NOT to the drive output terminals (U2, V2, W2).
2. At the drive end of the motor cable, measure the insulation resistance between each motor cable phase and Protective Earth (PE): Apply a voltage of 1 kV DC and verify that resistance is greater than 1 Mohm.



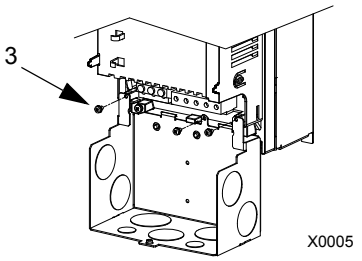
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R1…R6, wiring UL type 1 enclosure

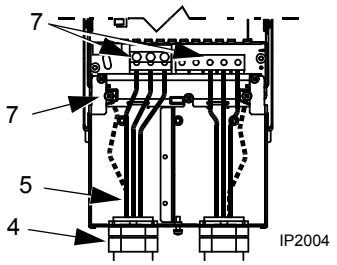
1. Open the appropriate knockouts in the conduit box. (See *Conduit kit* on page *7*.)
2. Install thin-wall conduit clamps (not supplied).



3. Install conduit box.
4. Connect conduit runs for input power, motor and control cables to the box.

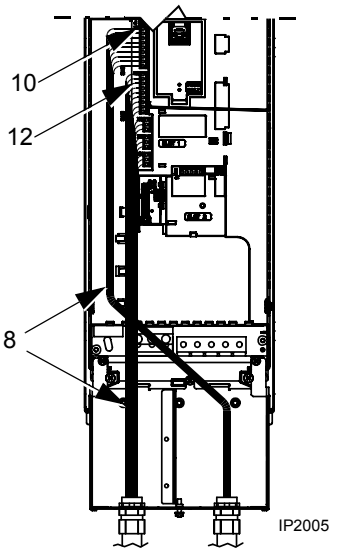


5. Route input power and motor wiring through separate conduits.
6. Strip wires.
7. Connect power, motor, and ground wires to the drive terminals.



Note: For R5 frame size, the minimum power cable size is 25 mm^2 (4 AWG). For R6 frame size, refer to *Power terminal considerations – R6 Frame size* on page *16*.

8. Route the control cables through the conduit (not the same conduit as either input power or motor wiring).
9. Use available secure points and tie strap landings to permanently secure control wiring at a minimum distance of 6 mm (1/4") from power wiring.
10. Strip the control cable sheathing and twist the copper screen into a pig-tail.
11. Connect the ground screen pig-tail for digital and analog I/O cables at X1-1. (Ground only at drive end.)
12. Connect the ground screen pig-tail for RS485 cables at X1-28 or X1-32. (Ground only at drive end.)

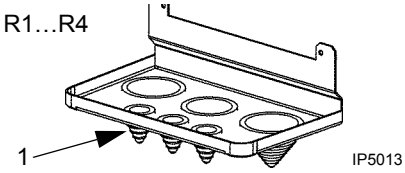


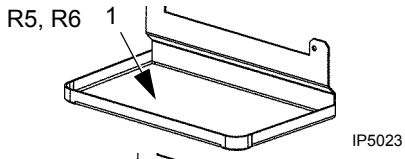
13. Strip and connect the individual control wires to the drive terminals.
14. Install the conduit box cover (1 screw).

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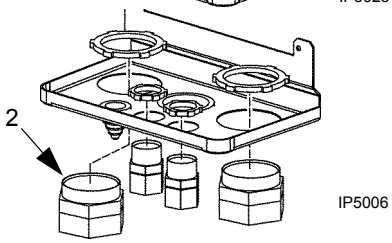
R1…R6, wiring UL type 12 enclosure

1. Step depends on Frame Size:
   - Frame Sizes R1…R4: Remove and discard the cable seals where conduit will be installed. (The cable seals are cone-shaped, rubber seals on the bottom of the drive.)
   - Frame Sizes R4 and R5: Use punch to create holes for conduit connections as needed.

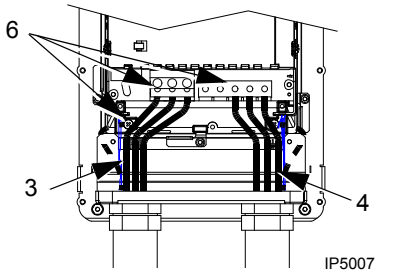




2. For each conduit run (input power, motor and control wiring must be separate), install liquid tight conduit connectors (not supplied).



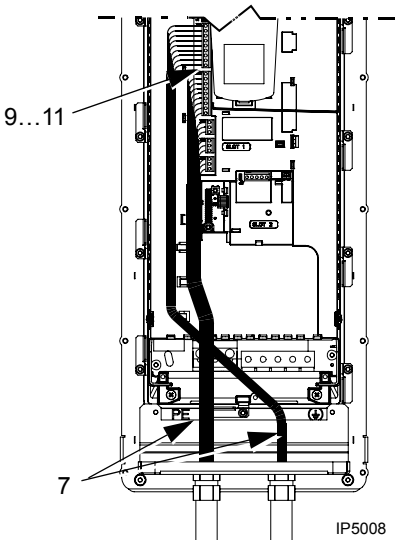
3. Route the power wiring through conduit.
4. Route the motor wiring through conduit (not the same conduit as input power wiring run). Use a separate, metal conduit run for each motor.
5. Strip the wires.
6. Connect the power, motor, and ground wires to the drive terminals.



Note: For R5 frame size, the minimum power cable size is 25 mm^2 (4 AWG). For R6 frame size, refer to *Power terminal considerations – R6 Frame size* on page *16*.

---

7. Route the control cables through the conduit (not the same conduit as either input power or motor wiring runs).
8. Use available secure points and tie strap landings to permanently secure control wiring at a minimum distance of 6 mm (1/4") from power wiring.
9. Strip the control cable sheathing and twist the copper screen into a pig-tail.
10. Connect the ground screen pig-tail for digital and analog I/O cables at X1-1. (Ground only at drive end.)
11. Connect the ground screen pig-tail for RS485 cables at X1-28 or X1-32. (Ground only at drive end.)
12. Strip and connect the individual control wires to the drive terminals.
13. Install the conduit box cover (1 screw).

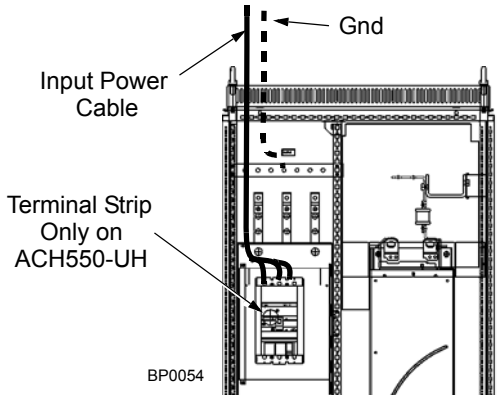


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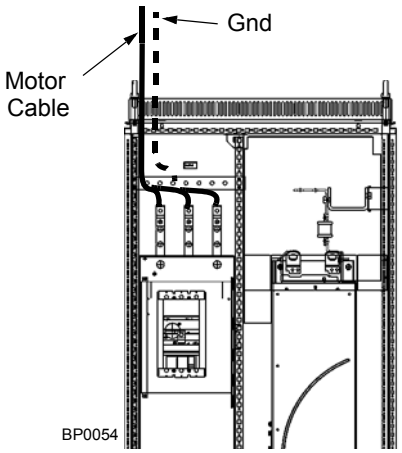
R7…R8, wiring (both enclosure types)

The figures show connections in the R7 cabinet, the R8 cabinet is similar.

1. Remove the conduit connection plate from the top of the left bay.
2. Route the input power, motor and control cables to the top of the cabinet. Each cable type (input power, motor, and control) must be in separate conduit. Use a separate, metal conduit run for each motor.
3. Use punch to create holes for conduit connections as needed.
4. UL type 12 Enclosure: For each conduit run (input power, motor and control wiring must be separate), install liquid tight conduit connectors (not supplied).



5. Connect input power and motor cables to the bus terminals.
6. Connect grounds to ground bar.
7. Use available secure points and tie strap landings to permanently secure control wiring at a minimum distance of 6 mm (1/4") from power wiring.
8. Strip the control cable sheathing and twist the copper screen into a pig-tail.
9. Connect the ground screen pig-tail for digital and analog I/O cables at X1-1. (Ground only at drive end.)
10. Connect the ground screen pig-tail for RS485 cables at X1-28 or X1-32. (Ground only at drive end.)



11. Strip and connect the individual control wires to the drive terminals.

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Drive's power connection terminals

The following table provides specifications for the drive's power connection terminals.

Frame Size	U1, V1, W1 U2, V2, W2 BRK+, UDC+ Terminals						Earthing PE Terminal			
	Min. Wire Size		Max. Wire Size		Torque		Max. Wire Size		Torque	
	mm²	*AWG*	*mm²*	*AWG*	Nm	lb-ft	*mm²*	*AWG*	Nm	lb-ft
R1[Note 1]	0.75	18	10	8	1.4	1	10	8	1.4	1
R2[Note 1]	0.75	18	10	8	1.4	1	10	8	1.4	1
R3[Note 1]	2.5	14	25	3	2.5	1.8	16	6	1.8	1.3
R4[Note 1]	6	10	50	1/0	5.6	4	25	3	2	1.5
R5	6	10	70	2/0	15	11	70	2/0	15	11
R6	95[Note 2]	3/0	185	350 MCM	40	30	95	3/0	8	6
R7	16	6	185	350 MCM	40	30	Attach appropriate ring lugs to ground wires and mount with, up to five 13/32 bolts.			
R8	16	6	2x240	2x500 MCM	57	42				

1. Do not use aluminum cable with frame sizes R1…R4.
2. See the following section for smaller wire sizes on frame size R6.

Power terminal considerations – R6 Frame size

WARNING! For R6 power terminals, if compression lugs are supplied, they can only be used for wire sizes that are 95 mm^2 (3/0 AWG) or larger. Smaller wires will loosen and may damage the drive, and require ring lugs as described below.

On the R6 frame size, if the cable size used is less than 95 mm^2 (3/0 AWG) or if no compression lugs are supplied, use ring lugs.

Drive's control connection terminals

The following table provides specifications for the drive's control terminals

Frame Size	Control			
	Maximum Wire Size		Torque	
	mm²	*AWG*	Nm	lb-ft
All	1.5	16	0.4	0.3

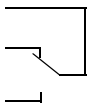
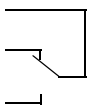
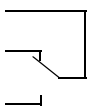
Control terminal descriptions

The following full-page diagram provides a general description of the control terminals on the drive.

Note: Terminals 3, 6, and 9 are at the same potential.

Note: For safety reasons the fault relay signals a "fault" when the ACH550 is powered down.

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	X1		Drive Control Terminal Description
Analog I/O	1	SCR	Terminal for signal cable screen. (Connected internally to chassis ground.)
	2	AI1	Analog input channel 1, programmable. Default[2] = external reference. Resolution 0.1%, accuracy ±1%. J1:AI1 OFF: 0(2)…10 V (R_i = 312 kΩ)  or, for OFF  for ON  J1:AI1 ON: 0(4)…20 mA (R_i = 100 Ω) 
	3	AGND	Analog input circuit common (connected internally to chassis gnd. through 1 MΩ).
	4	+10 V	Potentiometer reference source: 10 V ±2%, max. 10 mA (1kΩ ≤ R ≤ 10kΩ).
	5	AI2	Analog input channel 2, programmable. Default[2] = PID feedback. Resolution 0.1%, accuracy ±1%. J1:AI2 OFF: 0(2)…10 V (R_i = 312 kΩ)  or, for OFF  for ON  J1:AI2 ON: 0(4)…20 mA (R_i = 100 Ω) 
	6	AGND	Analog input circuit common (connected internally to chassis gnd. through 1 MΩ).
	7	AO1	Analog output, programmable. Default[2] = frequency. 0…20 mA (load < 500 Ω). Accuracy ±3% full scale.
	8	AO2	Analog output, programmable. Default[2] = current. 0…20 mA (load < 500 Ω). Accuracy ±3% full scale.
	9	AGND	Analog output circuit common (connected internally to chassis gnd. through 1 MΩ).
Digital Inputs[1]	10	+24V	Auxiliary voltage output 24 VDC / 250 mA (reference to GND), short circuit protected.
	11	GND	Auxiliary voltage output common (connected internally as floating).
	12	DCOM	Digital input common. To activate a digital input, there must be ≥+10 V (or ≤-10 V) between that input and DCOM. The 24 V may be provided by the ACH550 (X1-10) or by an external 12…24 V source of either polarity.
	13	DI1	Digital input 1, programmable. Default[2] = start/stop.
	14	DI2	Digital input 2, programmable. Default[2] = not configured.
	15	DI3	Digital input 3, programmable. Default[2] = constant (preset) speed.
	16	DI4	Digital input 4, programmable. Default[2] = safety interlock.
	17	DI5	Digital input 5, programmable. Default[2] = not configured.
	18	DI6	Digital input 6, programmable. Default[2] = not configured.
Relay Outputs	19	RO1C	 Relay output 1, programmable. Default[2] = Ready Maximum: 250 VAC / 30 VDC, 2 A Minimum: 500 mW (12 V, 10 mA)
	20	RO1A	
	21	RO1B	
	22	RO2C	 Relay output 2, programmable. Default[2] = Running Maximum: 250 VAC / 30 VDC, 2 A Minimum: 500 mW (12 V, 10 mA)
	23	RO2A	
	24	RO2B	
	25	RO3C	 Relay output 3, programmable. Default[2] = Fault (-1) Maximum: 250 VAC / 30 VDC, 2 A Minimum: 500 mW (12 V, 10 mA)
	26	RO3A	
	27	RO3B	

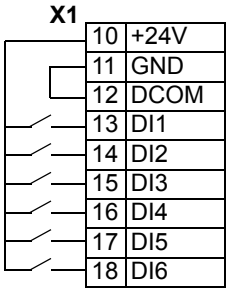
1 Digital input impedance 1.5 kΩ. Maximum voltage for digital inputs is 30 V.

2 Default values depend on the macro used. Values specified are for the HVAC default macro.

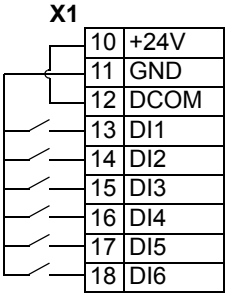
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You can wire the digital input terminals in either a PNP or NPN configuration.

PNP connection (source)



NPN connection (sink)



Serial communications

Terminals 28...32 provide RS485 serial communication connections used to control or monitor the drive from a fieldbus controller.

6. Check installation

Before applying power, perform the following checks.

✓	Check
	Installation environment conforms to the drive's specifications for ambient conditions.
	The drive is mounted securely.
	Space around the drive meets the drive's specifications for cooling.
	The motor and driven equipment are ready for start.
	For floating networks (R1…R6): The internal RFI filter is disconnected (screws EM1 & EM3 or F1 & F2).
	The drive is properly grounded.
	The input power voltage matches the drive nominal input voltage range.
	The input power connections at U1, V1, and W1 are connected and tightened as specified.
	The input power branch circuit protection is installed.
	The motor connections at U2, V2, and W2 are connected and tightened as specified.
	The input power, motor and control wiring are routed through separate conduit runs.
	NO power factor compensation capacitors are in the motor cable.
	The control connections are connected and tightened as specified.
	NO tools or foreign objects (such as drill shavings) are inside the drive.
	NO alternate power source for the motor (such as a bypass connection) is connected – no voltage is applied to the output of the drive.

7. Re-install cover

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8. Apply power

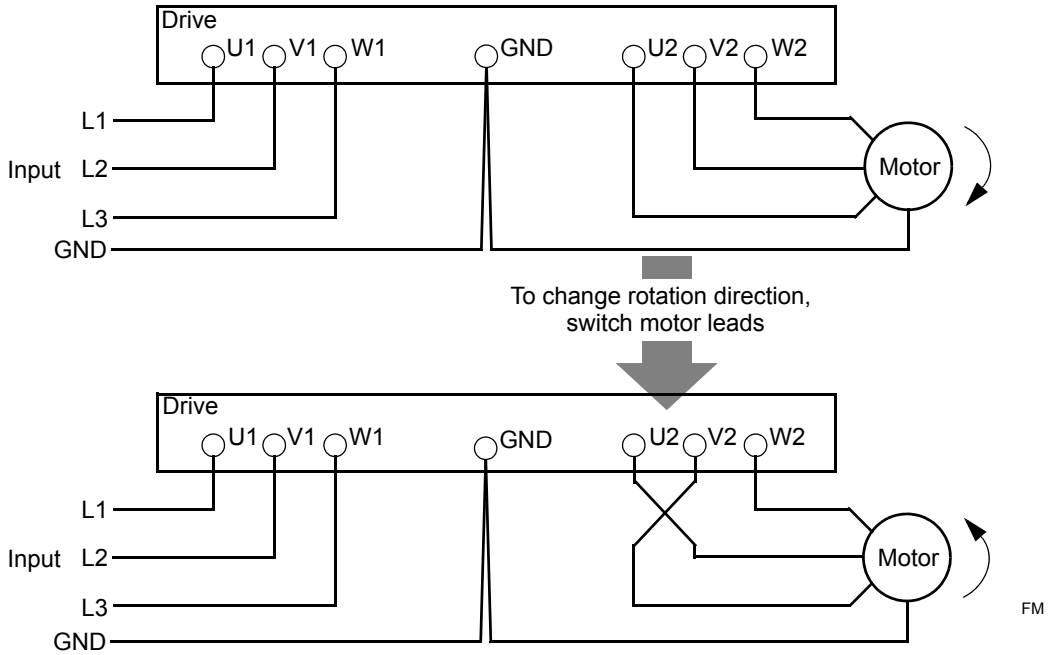
Always re-install the covers before turning power on.

WARNING! The ACH550 will start up automatically at power up, if the external run command is on.

Apply input power. When power is applied to the ACH550, the green LED comes on.

WARNING! Even when the motor is stopped, dangerous voltage is present at the power circuit terminals U1, V1, W1 (L1, L2, L3) and U2, V2, W2 (T1, T2, T3) and, depending on the frame size, UDC+ and UDC-, or BRK+ and BRK-.

Note: Before increasing motor speed, check that the motor is running in the desired direction. To change rotation direction, switch motor leads as shown below. Power circuit terminal designation and location varies depending on the frame size and some terminals are not used (UDC+ and UDC-, or BRK+ and BRK-). Refer to pages *8* and *9* for specific terminal layouts



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9. Before Start-up

The ACH550 has default parameter settings that are sufficient for many situations. However, review the following situations. Perform the associated procedures as appropriate.

Spin motor

When first installed and started the control panel displays a welcome screen with the following options.

- Press Exit to commission the drive as described in section *Start-up by changing the parameters individually* on page *23*.
- Press Enter to move to the following options:
  - Select “Commission Drive” to commission the drive as described in section Start-Up by *Start-up by using the Start-Up Assistant* on page *23*.
  - Select “Spin Motor” to operate the motor prior to commissioning. This option operates the motor without any commissioning, except entry of the motor data as described below. Spin Motor is useful, for example, to operate ventilation fans prior to commissioning.

Note: When using Spin Motor, the motor speed is limited to the range 1/3…2/3 of maximum speed. Also, no interlocks are activated. Finally, once the drive is commissioned, the welcome screen and this option no longer appear.

Motor data

The motor data on the ratings plate may differ from the defaults in the ACH550. The drive provides more precise control and better thermal protection if you enter the rating plate data.

1. Gather the following from the motor ratings plate:
   - Voltage
   - Nominal motor current
   - Nominal frequency
   - Nominal speed
   - Nominal power
2. Edit parameters 9905…9909 to the correct values.
   - Assistant Control Panel: The Start-Up Assistant walks you through this data entry.
   - Basic Control Panel: Refer to *ACH550 User’s Manual*, for parameter editing instructions.

Fault and alarm adjustments

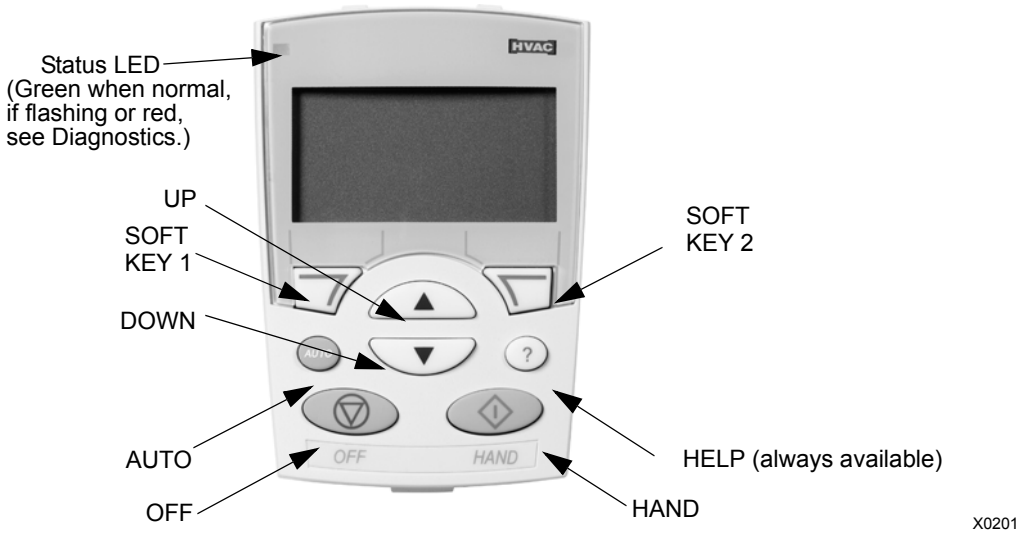
The ACH550 can detect a wide variety of potential system problems. For example, initial system operation may generate faults or alarms that indicate set-up problems.

1. Faults and alarms are reported on the control panel with a number. Note the number reported.
2. Review the description provided for the reported fault/alarm:
   - Use the fault and alarm listings on pages *24* and *29* respectively, or
   - Press the help key (Assistant Control Panel only) while fault or alarm is displayed.
3. Adjust the system or parameters as appropriate.

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Operation

The ACH550 HVAC control panel (ACH-CP-B) features:



General display features

Soft key functions

The soft key functions are defined by text displayed just above each key.

Display contrast

To adjust display contrast, simultaneously press  and  or  , as appropriate.

HVAC control panel modes

The HVAC control panel has several different modes for configuring, operating and diagnosing the drive. To reach the Standard Display Mode, press EXIT until the LCD display shows status information. Select MENU and use UP/DOWN buttons to select other modes. The modes are:

- **Standard Display Mode –** Shows drive status information and operates the drive.
- **Parameters Mode –** Edits parameter values individually.
- **Start-up Assistant Mode –** Guides the start-up and configuration.
- **Changed Parameters Mode –** Shows changed parameters.
- **Fault Logger Mode –** Shows the drive fault history.
- **Drive Parameter Backup Mode –** Stores or uploads the parameters.
- **Clock Set Mode –** Sets the time and date for the drive.
- **I/O Settings Mode –** Checks and edits the I/O settings.
- **Alarm Mode –** Reporting mode triggered by drive alarms.

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Operating the drive

AUTO/HAND – The very first time the drive is powered up, it is in the auto control (AUTO) mode, and is controlled from the Control terminal block X1.

To switch to hand control (HAND) and control the drive using the control panel, press and hold the  or  button.

- Pressing the HAND button switches the drive to hand control while keeping the drive running.
- Pressing the OFF button switches to hand control and stops the drive.

To switch back to auto control (AUTO), press and hold the  button.

Hand/Auto/Off – To start the drive press the HAND or AUTO buttons, to stop the drive press the OFF button.

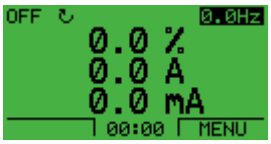
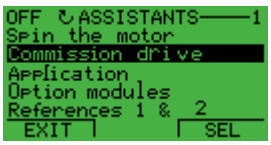
Reference – To modify the reference (only possible if the display in the upper right corner is in reverse video) press the UP or DOWN buttons (the reference changes immediately).

The reference can be modified in the local control mode (HAND/OFF), and can be parameterized (using Group 11 reference select) to also allow modification in the remote control mode.

Note: The Start/Stop, Shaft direction and Reference functions are only valid in local control (HAND/OFF) mode.

Start-up by using the Start-Up Assistant

To start the Start-Up Assistant, follow these steps:

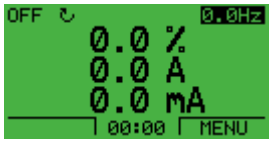
1	Select MENU to enter the main menu.		
2	Select ASSISTANTS with the Up/Down buttons and select ENTER.		
3	Scroll to COMMISSION DRIVE with the Up/Down buttons.		
4	Change the values suggested by the assistant to your preferences and then press SAVE after every change.		

The Start-Up Assistant will guide you through the start-up.

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Start-up by changing the parameters individually

To change the parameters, follow these steps:

1	Select MENU to enter the main menu.		
2	Select the Parameters mode with the UP/DOWN buttons and select ENTER to select the Parameters mode.		
3	Select the appropriate parameter group with the UP/DOWN buttons and select SEL		
4	Select the appropriate parameter in a group with the UP/DOWN buttons. Select EDIT to change the parameter value.		
5	Press the UP/DOWN buttons to change the parameter value.		
6	Select SAVE to store the modified value or select CANCEL to leave the set mode. Any modifications not saved are cancelled.		
7	Select EXIT to return to the listing of parameter groups, and again to return to the main menu.		

Complete the control connections by manually entering the parameters.

Note: The current parameter value appears below the highlighted parameter. To view the default parameter value, press the UP/DOWN buttons simultaneously. To restore the default factory settings, select the application macro HVAC Default.

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Diagnostics

Fault listing

Fault Code	Fault Name In Panel	Description and Recommended Corrective Action
1	OVERCURRENT	Output current is excessive. Check for and correct: • Excessive motor load. • Insufficient acceleration time (parameters 2202 ACCELER TIME 1 and 2205 ACCELER TIME 2). • Faulty motor, motor cables or connections. • Output disconnect device not interlocked. • Interaction with external input filter.
2	DC OVERVOLT	Intermediate circuit DC voltage is excessive. Check for and correct: • Static or transient overvoltages in the input power supply. • Insufficient deceleration time (parameters 2203 DECELER TIME 1 and 2206 DECELER TIME 2). • Verify that overvoltage controller is ON (using parameter 2005). • Interaction with external input filter.
3	DEV OVERTEMP	Drive heatsink is overheated. Temperature is at or above limit. R1…R4 & R7/R8: 115 °C (239 °F) R5/R6: 125 °C (257 °F) Check for and correct: • Fan failure. • Obstructions in the air flow. • Dirt or dust coating on the heat sink. • Excessive ambient temperature. • Excessive motor load.
4	SHORT CIRC	Fault current. Check for and correct: • A short-circuit in the motor cable(s) or motor. • Supply disturbances.
5	RESERVED	Not used.
6	DC UNDERVOLT	Intermediate circuit DC voltage is not sufficient. Check for and correct: • Missing phase in the input power supply. • Blown fuse. • Undervoltage on mains.
7	AI1 LOSS	Analog input 1 loss. Analog input value is less than AI1FLT LIMIT (3021). Check for and correct: • Source and connection for analog input. • Parameter settings for AI1FLT LIMIT (3021) and 3001 AI<MIN FUNCTION.
8	AI2 LOSS	Analog input 2 loss. Analog input value is less than AI2FLT LIMIT (3022). Check for and correct: • Source and connection for analog input. • Parameter settings for AI2FLT LIMIT (3022) and 3001 AI<MIN FUNCTION.
9	MOT TEMP	Motor is too hot, based on either the drive's estimate or on temperature feedback. • Check for overloaded motor. • Adjust the parameters used for the estimate (3005…3009). • Check the temperature sensors and Group 35 parameters.

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Fault Code	Fault Name In Panel	Description and Recommended Corrective Action
10	PANEL LOSS	Panel communication is lost and either: • Drive is in local control mode (the control panel displays HAND or OFF), or • Drive is in remote control mode (AUTO) and is parameterized to accept start/stop, direction or reference from the control panel. To correct check: • Communication lines and connections • Parameter 3002 PANEL COMM ERROR. • Parameters in Group 10: START/STOP/DIR and Group 11: REFERENCE SELECT (if drive operation is AUTO).
11	ID RUN FAIL	The motor ID run was not completed successfully. Check for and correct: • Motor connections • Motor parameters 9905…9909 do not match motor nameplate.
12	MOTOR STALL	Motor or process stall. Motor is operating in the stall region. Check for and correct: • Excessive load. • Insufficient motor power. • Parameters 3010…3012.
14	EXTERNAL FLT 1	Digital input defined to report first external fault is active. See parameter 3003 EXTERNAL FAULT 1.
15	EXTERNAL FLT 2	Digital input defined to report second external fault is active. See parameter 3004 EXTERNAL FAULT 2.
16	EARTH FAULT	Possible ground fault detected in the motor or motor cables. The drive monitors for ground faults while the drive is running and while the drive is not running. Detection is more sensitive when the drive is not running and can produce false positives. Possible corrections: • Check for/correct faults in the input wiring. • Verify that motor cable does not exceed maximum specified length. • A delta grounded input power supply and motor cables with high capacitance may result in erroneous error reports during non-running tests. To disable response to fault monitoring when the drive is not running, use parameter 3023 WIRING FAULT. To disable response to all ground fault monitoring, use parameter 3017 EARTH FAULT.
17	UNDERLOAD	Motor load is lower than expected. Check for and correct: • Disconnected load. • Group 37: USER LOAD CURVE.
18	THERM FAIL	Internal fault. The thermistor measuring the internal temperature of the drive is open or shorted. Contact your local ABB sales representative.
19	OPEX LINK	Internal fault. A communication-related problem has been detected on the fiber optic link between the OITF and OINT boards. Contact your local ABB sales representative.
20	OPEX PWR	Internal fault. Low voltage condition detected on OINT power supply. Contact your local ABB sales representative.
21	CURR MEAS	Internal fault. Current measurement is out of range. Contact your local ABB sales representative.

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Fault Code	Fault Name In Panel	Description and Recommended Corrective Action
22	SUPPLY PHASE	Ripple voltage in the DC link is too high. Check for and correct: • Missing mains phase. • Blown fuse. • Interaction with external input filter. Set parameter 2619 to “ON”.
23	ENCODER ERR	Not used (Available only with encoder and parameter Group 50).
23	ENCODER ERR	The drive is not detecting a valid encoder signal. Check for and correct: • Encoder presence and proper connection (reverse wired, loose connection, or short circuit). • Voltage logic levels are outside of the specified range. • A working and properly connected Pulse Encoder Interface Module, OTAC-01. • Wrong value entered in parameter 5001 PULSE NR. A wrong value will only be detected if the error is such that the calculated slip is greater than 4 times the rated slip of the motor. • Encoder is not being used, but parameter 5002 ENCODER ENABLE = 1 (ENABLED).
24	OVERSPEED	Motor speed is greater than 120% of the larger (in magnitude) of 2001 MINIMUM SPEED or 2002 MAXIMUM SPEED. Check for and correct: • Parameter settings for 2001 and 2002. • Adequacy of motor braking torque. • Applicability of torque control. • Brake chopper and resistor.
25	RESERVED	Not used as of the publication of this manual.
26	DRIVE ID	Internal fault. Configuration Block Drive ID is not valid. Contact your local ABB sales representative.
27	CONFIG FILE	Internal configuration file has an error. Contact your local ABB sales representative.
28	SERIAL 1 ERR	Fieldbus communication has timed out. Check for and correct: • Fault setup (3018 COMM FAULT FUNC and 3019 COMM FAULT TIME). • Communication settings (Group 51 or 53 as appropriate). • Poor connections and/or noise on line.
29	EFB CONFIG FILE	Error in reading the configuration file for the embedded fieldbus.
30	FORCE TRIP	Fault trip forced by the fieldbus. See the fieldbus User’s Manual.
31	EFB 1	Fault code reserved for the embedded fieldbus (EFB) protocol application. These codes are not used as of the publication of this manual.
32	EFB 2	
33	EFB 3	
34	MOTOR PHASE	Fault in the motor circuit. One of the motor phases is lost. Check for and correct: • Motor fault. • Motor cable fault. • Thermal relay fault (if used). • Internal fault.

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Fault Code	Fault Name In Panel	Description and Recommended Corrective Action
35	OUTPUT WIRING	Possible power wiring error detected. When the drive is not running it monitors for an improper connection between the drive input power and the drive output. Check for and correct: • Proper input wiring – line voltageis NOT connected to drive output. • The fault can be erroneously declared if the input power is a delta grounded system and motor cable capacitance is large. This fault can be disabled using parameter 3023 WIRING FAULT.
36	INCOMP SWTYPE	The drive cannot use the software. • Internal Fault. • The loaded software is not compatible with the drive. • Call support representative.
37	CB OVERTEMP	Drive control board is overheated. Check for and correct: • Excessive ambient temperatures • Fan failure. • Obstructions in the air flow.
38	USER LOAD CURVE	Condition defined by parameter 3701 USER LOAD C MODE has been valid longer than the time defined by 3703 USER LOAD C TIME.
101	SERF CORRUPT	Error internal to the drive. Contact your local ABB sales representative and report the error number.
102	RESERVED	
103	SERF MACRO	
104	RESERVED	
105	RESERVED	
201	DSP T1 OVERLOAD	Error in the system. Contact your local ABB sales representative and report the error number.
202	DSP T2 OVERLOAD	
203	DSP T3 OVERLOAD	
204	DSP STACK ERROR	
205	RESERVED (obsolete)	
206	OMIO ID ERROR	
207	EFB LOAD ERR	
1000	PAR HZRPM LIMITS	Parameter values are inconsistent. Check for any of the following: • 2001 MINIMUM SPEED > 2002 MAXIMUM SPEED. • 2007 MINIMUM FREQ > 2008 MAXIMUM FREQ. • 2001 MINIMUM SPEED / 9908 MOTOR NOM SPEED is outside proper range (> 50) • 2002 MAXIMUM SPEED / 9908 MOTOR NOM SPEED is outside proper range (> 50) • 2007 MINIMUM FREQ / 9907 MOTOR NOM FREQ is outside proper range (> 50) • 2008 MAXIMUM FREQ / 9907 MOTOR NOM FREQ is outside proper range (> 50)
1001	PAR PFAREFNG	Parameter values are inconsistent. Check for the following: • 2007 MINIMUM FREQ is negative, when 8123 PFA ENABLE is active.

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Fault Code	Fault Name In Panel	Description and Recommended Corrective Action
1002	RESERVED (Obsolete)	
1003	PAR AI SCALE	Parameter values are inconsistent. Check for any of the following: • 1301 AI 1 MIN > 1302 AI 1 MAX. • 1304 AI 2 MIN > 1305 AI 2 MAX.
1004	PAR AO SCALE	Parameter values are inconsistent. Check for any of the following: • 1504 AO 1 MIN > 1505 AO 1 MAX. • 1510 AO 2 MIN > 1511 AO 2 MAX.
1005	PAR PCU 2	Parameter values for power control are inconsistent: Improper motor nominal kVA or motor nominal power. Check for the following: • 1.1 ≤ (9906 MOTOR NOM CURR * 9905 MOTOR NOM VOLT * 1.73 / P_N) ≤ 3.0 • Where: P_N = 1000 * 9909 MOTOR NOM POWER (if units are kW) or P_N = 746 * 9909 MOTOR NOM POWER (if units are HP, e.g. in US)
1006	EXT ROMISSING	Parameter values are inconsistent. Check for the following: • Extension relay module not connected and • 1410…1412 RELAY OUTPUTS 4…6 have non-zero values.
1007	PAR FBUSMISSING	Parameter values are inconsistent. Check for and correct: • A parameter is set for fieldbus control (e.g. 1001 EXT1 COMMANDS = 10 (COMM)), but 9802 COMM PROT SEL = 0.
1008	PAR PFAWOSCALAR	Parameter values are inconsistent – 9904 MOTOR CTRL MODE must be = 3 (SCALAR: SPEED), when 8123 PFA ENABLE is activated.
1009	PAR PCU1	Parameter values for power control are inconsistent: Improper motor nominal frequency or speed. Check for both of the following: • 1 ≤ (60 * 9907 MOTOR NOM FREQ / 9908 MOTOR NOM SPEED ≤ 16 • 0.8 ≤ 9908 MOTOR NOM SPEED / (120 * 9907 MOTOR NOM FREQ / Motor Poles) ≤ 0.992
1010	PAR PFA OVERRIDE	Both the override mode and PFA are activated at the same time. These modes are mutually incompatible, because PFA interlocks cannot be observed in the override mode.
1011	PAR OVERRIDE PARS	Overeride is enabled, but parameters are incompatible. Verify that 1701 is not zero, and (depending on 9904 value) 1702 or 1703 is not zero.
1012	PAR PFA IO 1	IO configuration is not complete – not enough relays are parameterized to PFA. Or, a conflict exists between Group 14, parameter 8117, NR OF AUX MOT, and parameter 8118, AUTOCHNG INTERV.
1013	PAR PFA IO 2	IO configuration is not complete – the actual number of PFA motors (parameter 8127, MOTORS) does not match the PFA motors in Group 14 and parameter 8118 AUTOCHNG INTERV.
1014	PAR PFA IO 3	IO configuration is not complete – the drive is unable to allocate a digital input (interlock) for each PFA motor (parameters 8120 INTERLOCKS and 8127 MOTORS).

Fault history

For reference, the last three fault codes are stored into parameters 0401, 0412, 0413. For the most recent fault (identified by parameter 0401), the drive stores additional data (in parameters 0402…0411) to aid in troubleshooting a problem. For example, parameter 0404 stores the motor speed at the time of the fault.

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To clear the fault history (all of the Group 04, Fault History parameters):

1. Using the control panel in Parameters mode, select parameter 0401.
2. Press EDIT.
3. Press UP and Down simultaneously.
4. Press SAVE.

Alarm listing

The following table lists the alarms by code number and describes each.

Alarm Code	Display	Description
2001	OVERCURRENT	Current limiting controller is active. Check for and correct: • Excessive motor load. • Insufficient acceleration time (parameters 2202 ACCELER TIME 1 and 2205 ACCELER TIME 2). • Faulty motor, motor cables or connections. • Output disconnect device not interlocked. • Interaction with external input filter.
2002	OVERVOLTAGE	Over voltage controller is active. Check for and correct: • Static or transient overvoltages in the input power supply. • Insufficient deceleration time (parameters 2203 DECELER TIME 1 and 2206 DECELER TIME 2). • Interaction with external input filter.
2003	UNDERVOLTAGE	Under voltage controller is active. Check for and correct: • Undervoltage on mains.
2004	DIR LOCK	The change in direction being attempted is not allowed. Either: • Do not attempt to change the direction of motor rotation, or • Change parameter 1003 DIRECTION to allow direction change (if reverse operation is safe).
2005	I/O COMM	Fieldbus communication has timed out. Check for and correct: • Fault setup (3018 COMM FAULT FUNC and 3019 COMM FAULT TIME). • Communication settings (Group 51 or 53 as appropriate). • Poor connections and/or noise on line.
2006	AI1 LOSS	Analog input 1 is lost, or value is less than the minimum setting. Check: • Input source and connections • Parameter that sets the minimum (3021) • Parameter that sets the Alarm/Fault operation (3001)
2007	AI2 LOSS	Analog input 2 is lost, or value is less than the minimum setting. Check: • Input source and connections • Parameter that sets the minimum (3022) • Parameter that sets the Alarm/Fault operation (3001)

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Alarm Code	Display	Description
2008	PANEL LOSS	Panel communication is lost and either: • Drive is in local control mode (the control panel displays HAND or OFF), or • Drive is in remote control mode (AUTO) and is parameterized to accept start/stop, direction or reference from the control panel. To correct check: • Communication lines and connections • Parameter 3002 PANEL LOSS. • Parameters in Groups 10 START/STOP/DIR and 11: REFERENCE SELECT (if drive operation is AUTO).
2009	DEVICE OVERTEMP	Drive heatsink is hot. This alarm warns that a DEVICE OVERTEMP fault may be near. R1…R4 & R7/R8: 100 °C (212 °F) R5/R6: 110 °C (230 °F) Check for and correct: • Fan failure. • Obstructions in the air flow. • Dirt or dust coating on the heat sink. • Excessive ambient temperature. • Excessive motor load.
2010	MOT OVERTEMP	Motor is hot, based on either the drive's estimate or on temperature feedback. This alarm warns that a Motor Underload fault trip may be near. Check: • Check for overloaded motor. • Adjust the parameters used for the estimate (3005…3009). • Check the temperature sensors and Group 35 parameters.
2011	UNDERLOAD	Motor load is lower than expected. This alarm warns that a Motor Underload fault trip may be near. Check: • Motor and drive ratings match (motor is NOT undersized for the drive) • Settings Group 37: USER LOAD CURVE
2012	MOTOR STALL	Motor is operating in the stall region. This alarm warns that a Motor Stall fault trip may be near.
2013 (note 1)	AUTORESET	This alarm warns that the drive is about to perform an automatic fault reset, which may start the motor. • To control automatic reset, use parameter Group 31: AUTOMATIC RESET.
2014 (note 1)	AUTOCHANGE	This alarm warns that the PFA autochange function is active. • To control PFA, use parameter Group 81: PFA CONTROL
2015	PFA INTERLOCK	This alarm warns that the PFA interlocks are active, which means that the drive cannot start the following: • Any motor (when Autochange is used), • The speed regulated motor (when Autochange is not used).
2016	Reserved	
2017 (note 1)	OFF BUTTON	This alarm warns that parameter 1606 LOCAL LOCK is active and the drive is in the AUTO mode. When the OFF key is pressed, the drive remains in the AUTO mode but coasts to stop.

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Alarm Code	Display	Description
2018 (note 1)	PID SLEEP	This alarm warns that the PID sleep function is active, which means that the motor could accelerate when the PID sleep function ends. • To control PID sleep, use parameters 4022…4026 or 4122…4126.
2019	ID RUN	Performing ID run.
2020	OVERRIDE	This alarm warns that the Override function is active, which may start the motor.
2021	START ENABLE 1 MISSING	This alarm warns that the Start Enable 1 signal is missing. • To control Start Enable 1 function, use parameter 1608. To correct, check: • Digital input configuration. • Communication settings.
2022	START ENABLE 2 MISSING	This alarm warns that the Start Enable 2 signal is missing. • To control Start Enable 2 function, use parameter 1609. To correct, check: • Digital input configuration. • Communication settings.
2023	EMERGENCY STOP	Emergency stop activated.
2024	ENCODER ERROR	The drive is not detecting a valid encoder signal. Check for and correct: • Encoder presence and proper connection (reverse wired, loose connection, or short circuit). • Voltage logic levels are outside of the specified range. • A working and properly connected Pulse Encoder Interface Module, OTAC-01. • Wrong value entered in parameter 5001 PULSE NR. A wrong value will only be detected if the error is such that the calculated slip is greater than 4 times the rated slip of the motor. • Encoder is not being used, but parameter 5002 ENCODER ENABLE = 1 (ENABLED).
2025	FIRST START	Signals that a the drive is performing a First Start evaluation of motor characteristics. This is normal the first time the motor is run after motor parameters are entered or changed. See parameter 9910 (MOTOR ID RUN) for a description of motor models.
2026	RESERVED	Not used.
2027	USER LOAD CURVE	This alarm warns that the condition defined by parameter 3701 USER LOAD C MODE has been valid longer that half of the time difined by 3703 USER LOAD C TIME.
2028	START DELAY	Shown during the Start delay. See parameter 2113 START DELAY.

Note 1. Even when the relay output is configured to indicate alarm conditions (e.g. parameter 1401 RELAY OUTPUT 1 = 5 (ALARM) or 16 (FLT/ALARM)), this alarm is not indicated by a relay output.

Maintenance



Warning! Read *Safety* on page *2* before performing any maintenance on the equipment. Ignoring the safety instructions can cause injury or death.

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Maintenance intervals

If installed in an appropriate environment, the drive requires very little maintenance. This table lists the routine maintenance intervals recommended by ABB.

Maintenance	Application	Interval	Instruction
Check/replace R7/R8 enclosure inlet air filter	R7/R8 UL type 12 enclosures	Check every 3 months. Replace as needed.	*Frame Sizes R7/R8 – UL type 12 enclosure inlet air filter on page 35*
Check/replace R7/R8 enclosure exhaust air filter.	R7/R8 UL type 12 enclosures	Check every 6 months. Replace as needed.	*Frame Sizes R7/R8 – UL type 12 enclosure exhaust filters on page 37*
Check and clean heatsink.	All	Depends on the dustiness of the environment (every 6…12 months)	See *Heatsink* below.
Check cable connections are secure and tighten as specified.	All	Every year.	See *Power & Control Connections on page 16*.
Replace enclosure fan.	UL type 12 enclosures	Every three years.	See *Enclosure fan replacement – UL Type 12 enclosures on page 34*.
Replace drive module fan.	All	Every six years.	See *Drive module fan replacement on page 33*.
Change capacitor.	Frame sizes R5, R6 and R8	Every ten years.	See *Capacitors on page 38*.
Replace battery in the Assistant control panel	All	Every ten years.	See *Control panel on page 38*.

Heatsink

The heatsink fins accumulate dust from the cooling air. Since a dusty heatsink is less efficient at cooling the drive, overtemperature faults become more likely. In a “normal” environment (not dusty, not clean) check the heatsink annually, in a dusty environment check more often.

Clean the heatsink as follows (when necessary):

1. Remove power from drive.
2. Remove the cooling fan (see section *Drive module fan replacement* on page *33*).
3. Blow clean compressed air (not humid) from bottom to top and simultaneously use a vacuum cleaner at the air outlet to trap the dust.

Note: If there is a risk of the dust entering adjoining equipment, perform the cleaning in another room.

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4. Replace the cooling fan.
5. Restore power.

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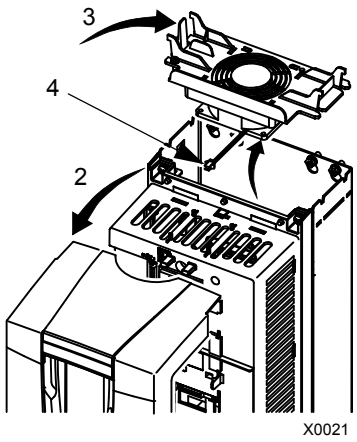
Drive module fan replacement

The drive module fan cools the heatsink. Fan failure can be predicted by the increasing noise from fan bearings and the gradual rise in the heatsink temperature in spite of heatsink cleaning. If the drive is operated in a critical part of a process, fan replacement is recommended once these symptoms start appearing. Replacement fans are available from ABB. Do not use other than ABB specified spare parts.

To monitor the running time of the cooling fan, see *Group 29: MAINTENANCE TRIG* instructions.

Frame Sizes R1...R4

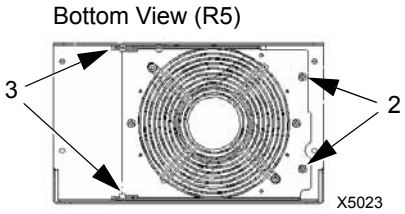
To replace the fan:



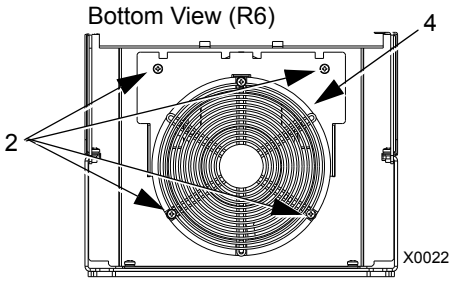
1. Remove power from drive.
2. Remove drive cover.
3. For Frame Size:
   - R1, R2: Press together the retaining clips on the fan cover sides, and lift.
   - R3, R4: Press in on the lever located on the left side of the fan mount, and rotate the fan up and out.
4. Disconnect the fan cable.
5. Install the fan in reverse order.
6. Restore power.

Frame Sizes R5 and R6

To replace the fan:



1. Remove power from drive.
2. Remove the screws attaching the fan.
3. Remove the fan:
   - R5: Swing the fan out on its hinges.
   - R6: Pull the fan out.
4. Disconnect the fan cable.
5. Install the fan in reverse order.
6. Restore power.



Frame Sizes R7 and R8

Refer to the installation instructions supplied with the fan kit.

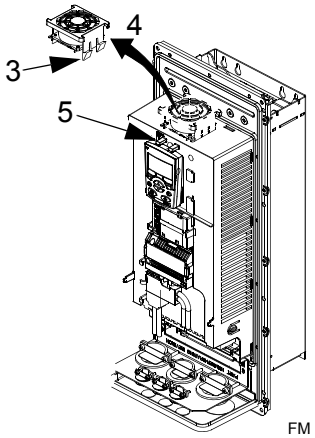
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Enclosure fan replacement – UL Type 12 enclosures

UL type 12 enclosures include an additional fan (or fans) to move air through the enclosure.

Frame Sizes R1 to R4

To replace the internal enclosure fan in frame sizes R1 to R4:



1. Remove power from drive.
2. Remove the front cover.
3. The housing that holds the fan in place has barbed retaining clips at each corner. Press all four clips toward the center to release the barbs.
4. When the clips/barbs are free, pull the housing up to remove from the drive.
5. Disconnect the fan cable.
6. Install the fan in reverse order, noting that:
   - The fan air flow is up (refer to arrow on fan).
   - The fan wire harness is toward the front.
   - The notched housing barb is located in the right-rear corner.
   - The fan cable connects just forward of the fan at the top of the drive.

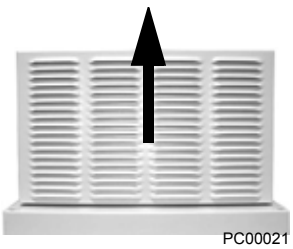
Frame Sizes R5 and R6

To replace the internal enclosure fan in frame sizes R5 or R6:

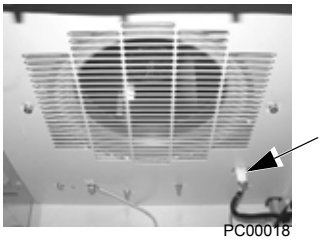
- Remove power from drive.
- Remove the front cover.
- Lift the fan out and disconnect the cable.
- Install the fan in reverse order.
- Restore power.

Frame Sizes R7/R8 – UL type 12 enclosures

The enclosure fan is located in the exhaust box on top of the UL type 12 enclosure.



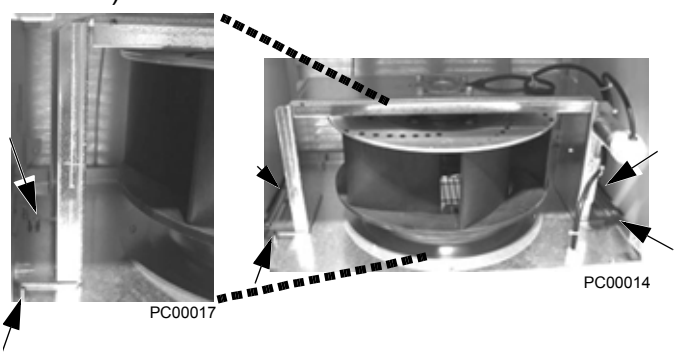
1. Remove the left and right filter frames of the exhaust fan box by lifting them upwards.

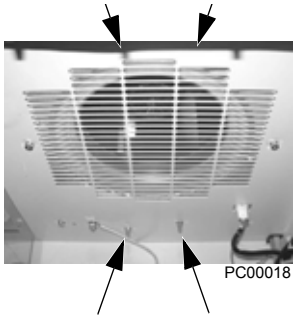


2. Disconnect the fan's electrical connector from the cabinet roof (top right inside the cabinet).

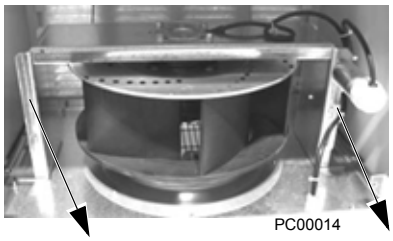
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3. Undo the four fastening screws at the corners of the fan frame. The screws are through bolts with nuts on the inside of the cabinet. (Do not drop the hardware into the drive).

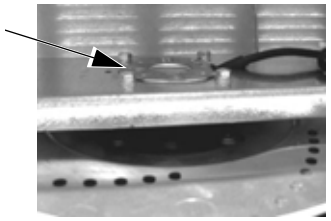




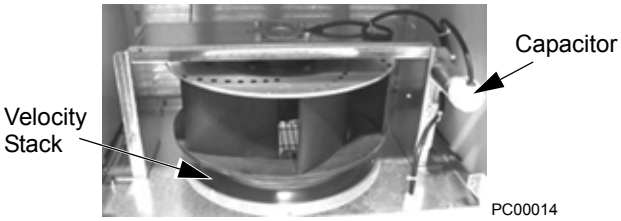
4. Remove the fan and fan frame as one unit.



5. Disconnect the fan wiring and capacitor from the fan frame. Then remove the four screws attaching the fan to the fan frame. Remove the old fan.



6. Install the new fan and capacitor with the replacement part for ABB in the reverse order of the above. Ensure the fan is centered on the velocity stack and rotates freely.



Enclosure air filter replacement – UL Type 12 enclosures

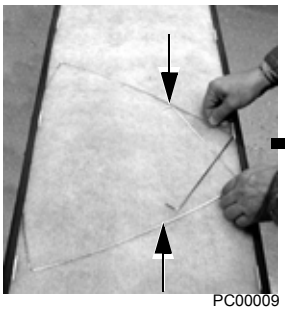
Frame Sizes R7/R8 – UL type 12 enclosure inlet air filter

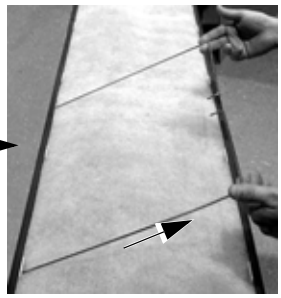
The inlet air filter for the R7/R8 UL type 12 enclosure is located in the enclosure front door.

1. While holding the top of the filter frame, pull up on the bottom of the frame. The filter frame will slide up approximately 3/4 inch and can then safely removed by tilting away from the cabinet and lifting up.

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2. Lay the filter frame on a flat work surface. Remove the 3 retaining brackets by squeezing the tabbed corners in towards the middle of each bracket until the bracket clears the filter frame. Save these brackets for replacement. Remove and inspect the filter.

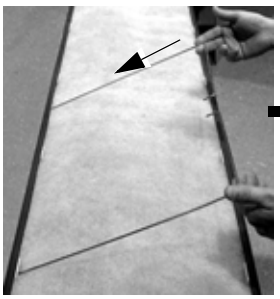

PC00009

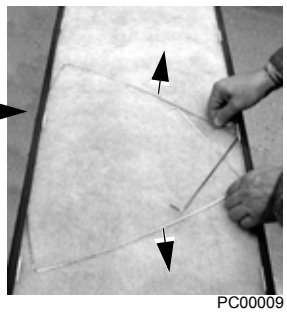

PC00007

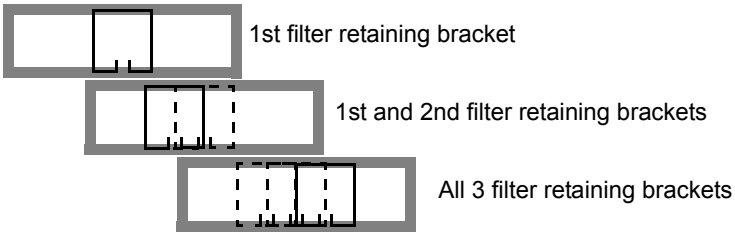
3. Install the replacement filter. Be sure to tuck the filter into the grove around the entire filter frame. This is very important for proper installation.


PC00013

4. Reinstall the 3 filter restraining brackets. These will prevent the filter from being pulled out of the filter frame.
   - Install the center bracket first.
   - Install the 2nd bracket overlapping the center bracket by 1/2 to the left.
   - Install the 3nd bracket overlapping the center bracket by 1/2 to the right.


PC00007


PC00009



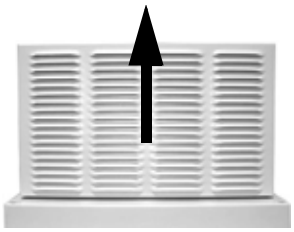
5. Install the filter frame back to the cabinet door. Carefully align the mounting hooks to the slots in the cabinet door. The hooks should be pointing down. Press in at the center of the filter frame with your knee and gently press down with your hands at the top of the frame. The filter frame will slide down approximately 3/4 inch and should be sealed securely to the door around the entire filter frame.

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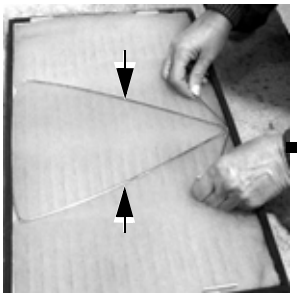
Frame Sizes R7/R8 – UL type 12 enclosure exhaust filters

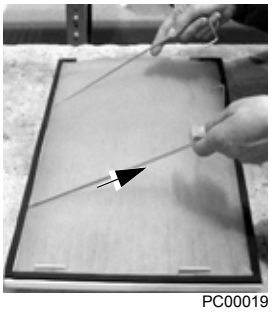
The exhaust filters in the R7/R8 UL type 12 enclosure are located in the exhaust box at the top of the enclosure.

There are 2 filter frames attached to the exhaust box.


PC00021

1. Remove power from drive.
2. Wait 5 minutes to ensure the fan has stopped.
3. Remove each filter frame:
   - Lift up on the filter frame until it slides approximately 3/4 inch.
   - Pull away from the exhaust box to remove.
4. For each filter frame, remove the wire retainers that hold the filters in place:
   - Lay the filter frames on a flat work surface.
   - The wire retainers have a square “U” shape. Remove by squeezing the open end of the “U” towards the middle of the “square” until the retainer top (open end of “U”) clears the filter frame.
   - Save the retainers for reinstallation.


PC00001

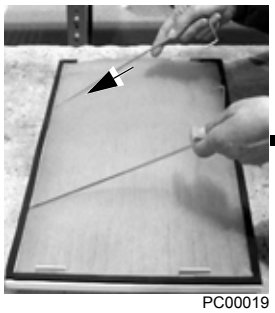

PC00019

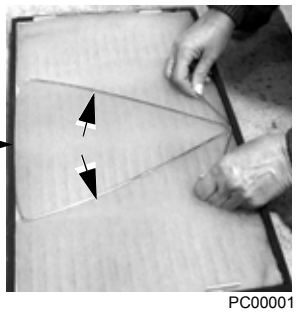
5. Remove and inspect the filter.
6. Install clean filters.

Note: When installing DUSTLOK® filter media, the white side must face to outside of the cabinet, and the orange side faces in.
Be sure to tuck the filter edges into the groove around the entire filter frame. This detail is very important for proper operation.


PC00022

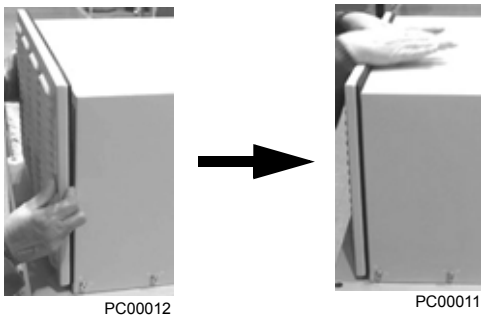
7. Reinstall the filter restrainers.
   - Insert the base of a retainer (bottom of “U” shape) into a filter frame channel.
   - Squeeze the open end of the “U” until it clears the filter frame.
   - Seat the open end of the “U” in the filter frame channel.
   - Release the retainer to its relaxed, square shape.


PC00019


PC00001

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8. Install each filter frame to the bonnet on top of the cabinet.
   - Carefully align the frame's mounting hooks with the slots in the bonnet. (The hooks should be pointing down.)
   - Press down at the top of the filter frame. (The filter frame slides down approximately 3/4 inch).
   - Check all around the filter frame for a secure seal to the exhaust box.


PC00012 PC00011

Capacitors

The drive intermediate circuit employs several electrolytic capacitors. Their life span is from 35,000...90,000 hours depending on drive loading and ambient temperature. Capacitor life can be prolonged by lowering the ambient temperature.

It is not possible to predict a capacitor failure. Capacitor failure is usually followed by a input power fuse failure or a fault trip. Contact ABB if capacitor failure is suspected. Replacements for frame size R5, R6 and R8 are available from ABB. Do not use other than ABB specified spare parts.

Control panel

Cleaning

Use a soft damp cloth to clean the control panel. Avoid harsh cleaners which could scratch the display window.

Battery

A battery is only used in Assistant control panels that have the clock function available and enabled. The battery keeps the clock operating in memory during power interruptions.

The expected life for the battery is greater than ten years. To remove the battery, use a coin to rotate the battery holder on the back of the control panel. Replace the battery with type CR2032.

Note: The battery is NOT required for any control panel or drive function, except the clock.

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ACH550 E-Clipse Bypass

Installation – drive

Follow the *Installation* instructions for the drive on page *3*. **Failure to observe the warnings and instructions may cause a malfunction or personal hazard.**

WARNING! Before you begin read *Safety* on page *2*.

Installation – bypass

WARNING! When the ACH550 with E-Clipse Bypass is connected to the line power, the Motor Terminals T1, T2, and T3 are live even if the motor is not running. Do not make any connections when the ACH550 with E-Clipse Bypass is connected to the line. Disconnect and lock out power to the drive before servicing the drive. Failure to disconnect power may cause serious injury or death.

1. Install wiring – bypass

WARNING!

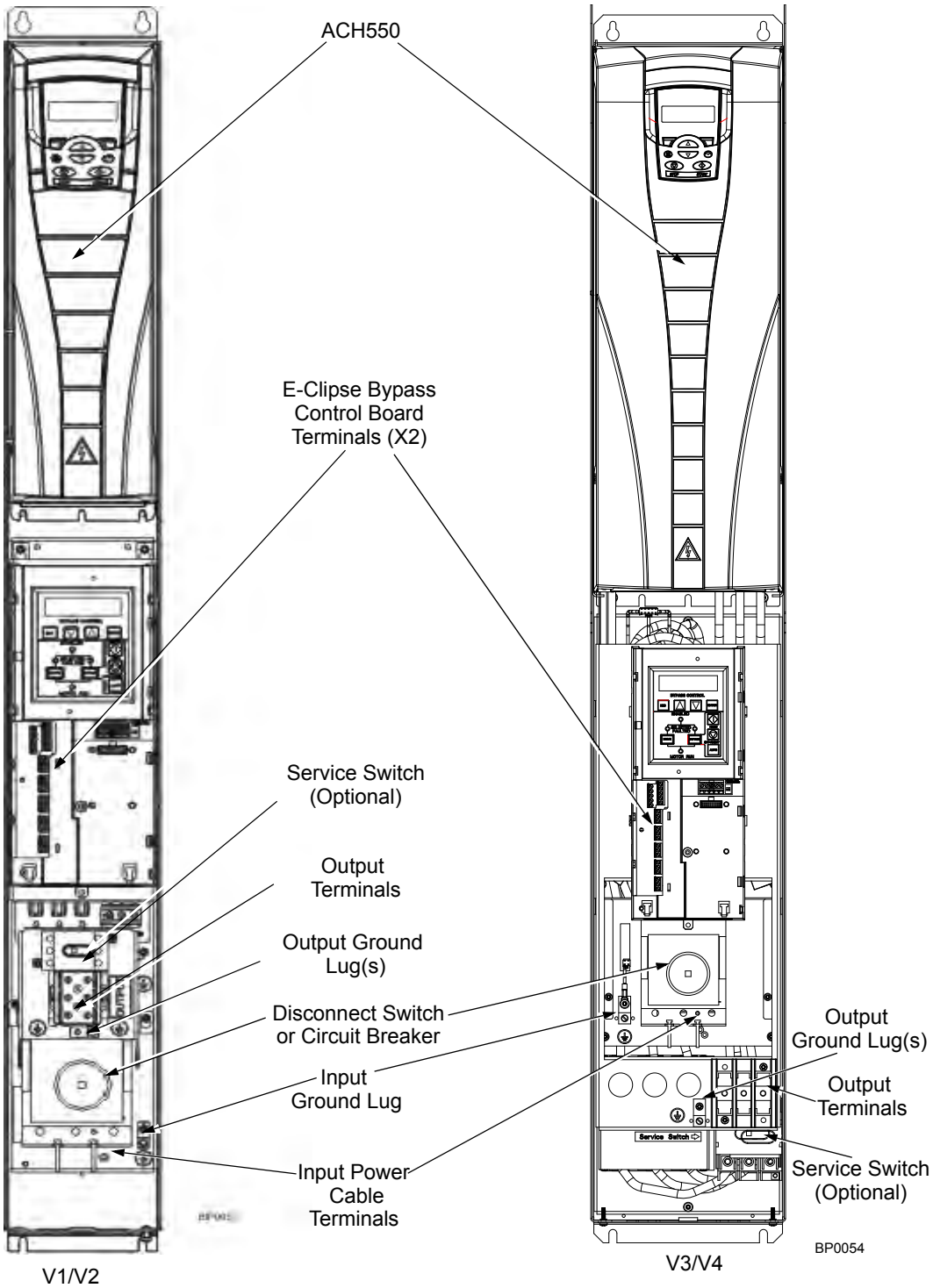
- Do not connect or disconnect input or output power wiring, or control wires, when power is applied.
- Never connect line voltage to drive output Terminals T1, T2, and T3.
- Do not make any voltage tolerance tests (Hi Pot or Megger) on any part of the unit. Disconnect motor wires before taking any measurements in the motor or motor wires.
- Make sure that power factor correction capacitors are not connected between the drive and the motor.

Enclosure Designation	Horsepower Range by Voltage Rating		
	208/240V	480V	600V
V1/V2	1 to 7.5 HP	1 to 15 HP	2 to 15 HP
V3/V4	10 to 25 HP	20 to 60 HP	20 to 60 HP
B1	1 to 7.5 HP	1 to 15 HP	2 to 15 HP
B2	10 to 25 HP	20 to 60 HP	20 to 60 HP
B3	30 to 100 HP	75 to 200 HP	75 to 150 HP
B4	N/A	250 to 550 HP	N/A

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Connection diagrams – Vertical E-Clipse Bypass

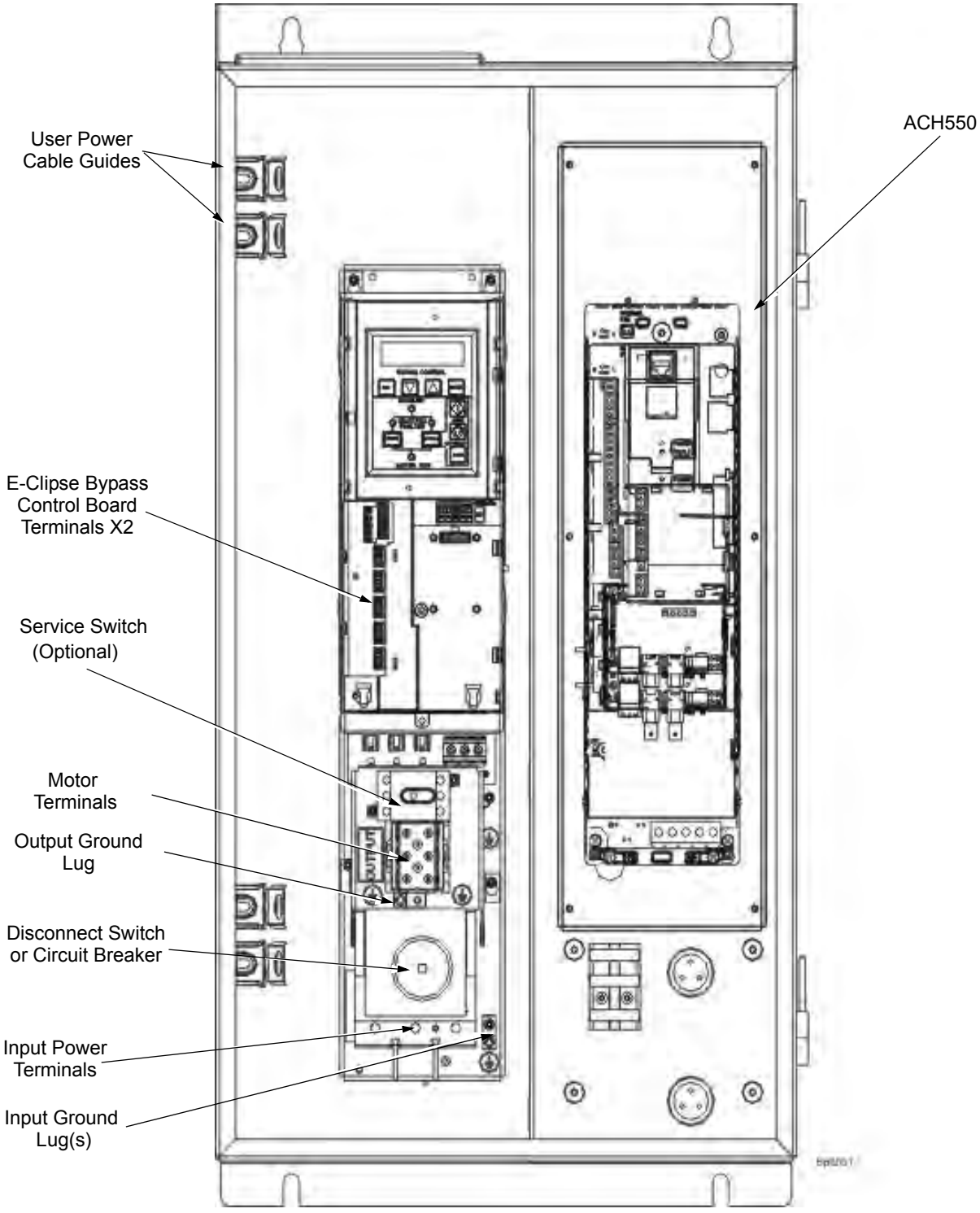
ACH550 Vertical E-Clipse Bypass units are configured for wiring access from the bottom only. The following figure shows the Vertical E-Clipse Bypass wiring connection points.



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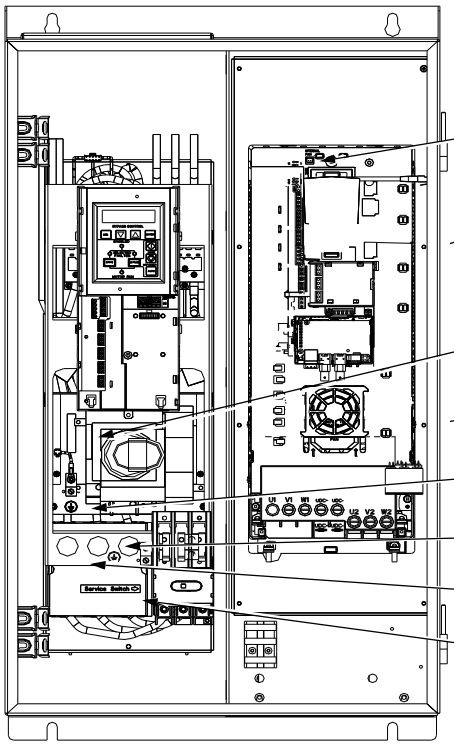
Connection diagrams – Standard E-Clipse Bypass (wall mounted)

ACH550 Standard E-Clipse Bypass units are configured for wiring access from the top. The following figure shows the Standard E-Clipse Bypass (wall mounted) wiring connection points.

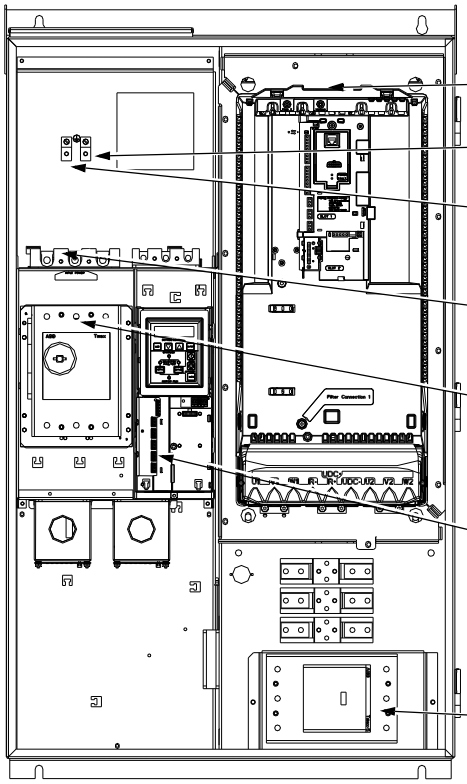


B1

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B2

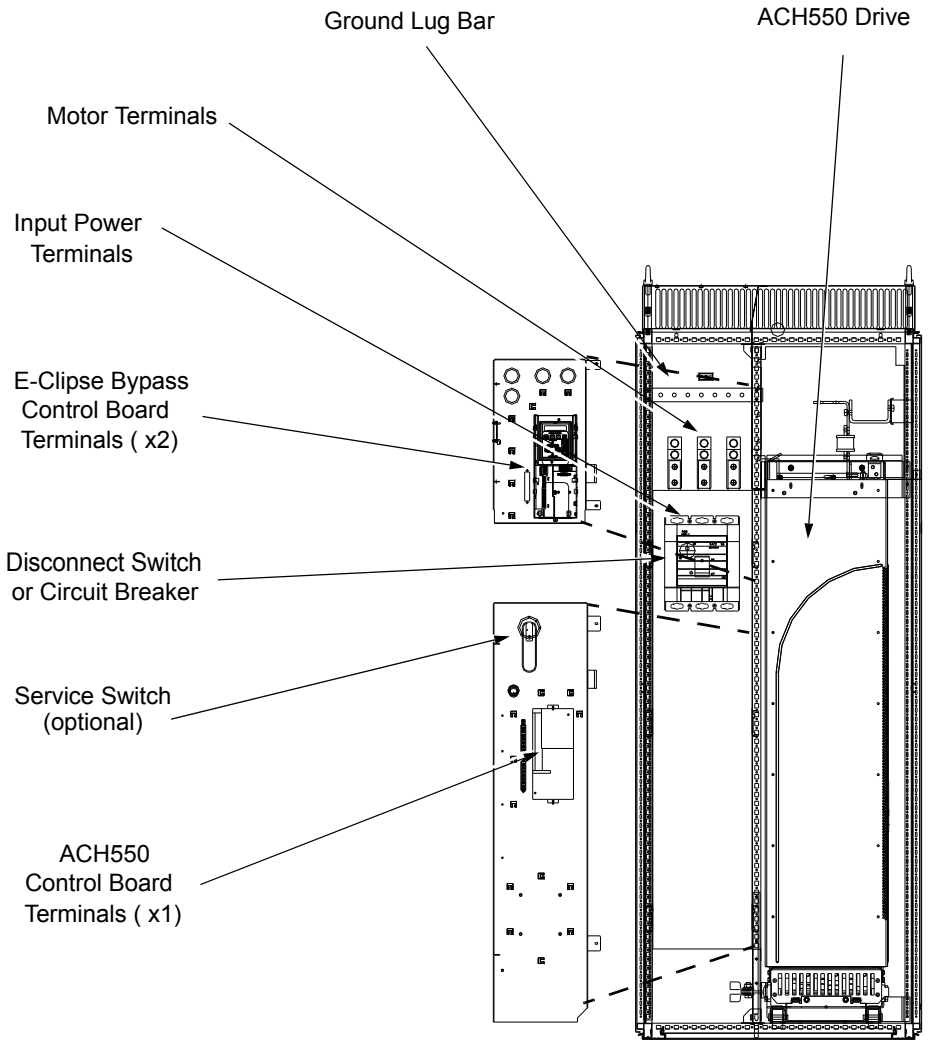


B3

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Connection diagrams – Standard E-Clipse Bypass (R8, floor mounted)

ACH550 Standard E-Clipse Bypass units are configured for wiring access from the top. The following figure shows the Standard E-Clipse Bypass (floor mounted) wiring connection points.



B4

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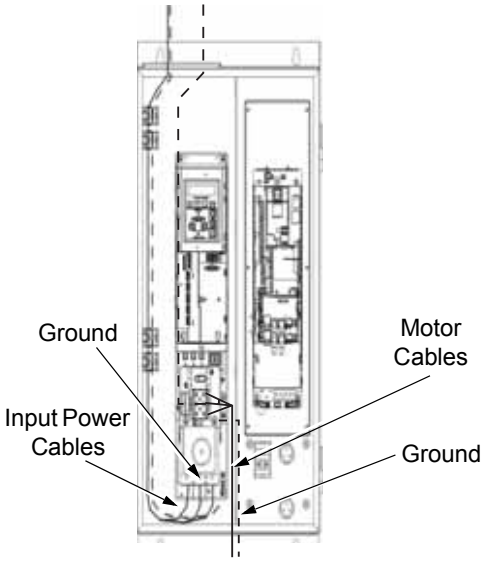
Power connections – Vertical E-Clipse Bypass configurations

Line input connections

Connect the input power to the terminals at the bottom of the disconnect switch or circuit breaker as shown below. Also see *Connection diagrams – Vertical E-Clipse Bypass* on page *40*. Connect the equipment grounding conductor to the ground lug near the input power connection point.

Motor connections

Connect the motor cables to the terminals at the bottom of the bypass section as shown in the figure. Also see *Connection diagrams – Vertical E-Clipse Bypass* on page *43*. Connect the motor grounding conductor to the ground lug near the motor cable terminal block connection point.



Power connections – Standard E-Clipse Bypass configurations (wall mounted)

Line input connections

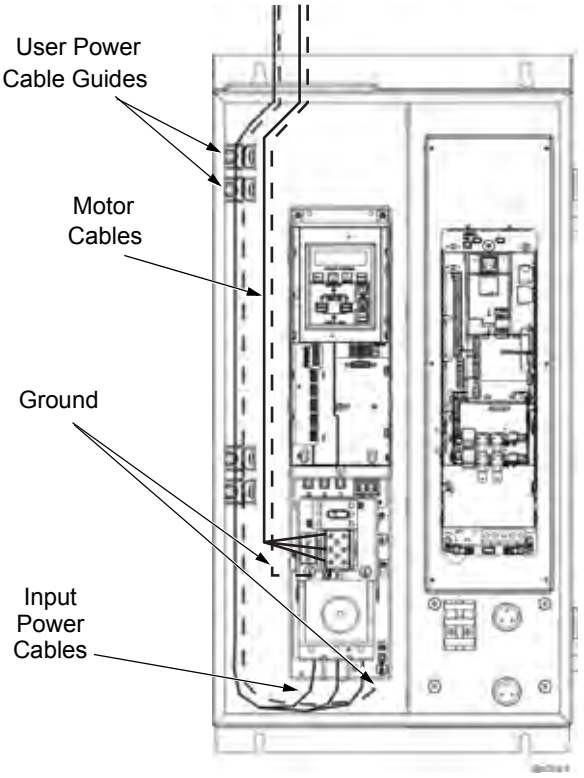
Connect input power to the terminals of the disconnect switch or circuit breaker. Connect the equipment grounding conductor to the ground lug at the top of the enclosure. The figure below shows the connection points for Standard E-Clipse Bypass configurations. Also see *Connection diagrams – Standard E-Clipse Bypass (wall mounted)* on page *41* and *Connection diagrams – Standard E-Clipse Bypass (R8, floor mounted)* on page *43*.

Motor connections

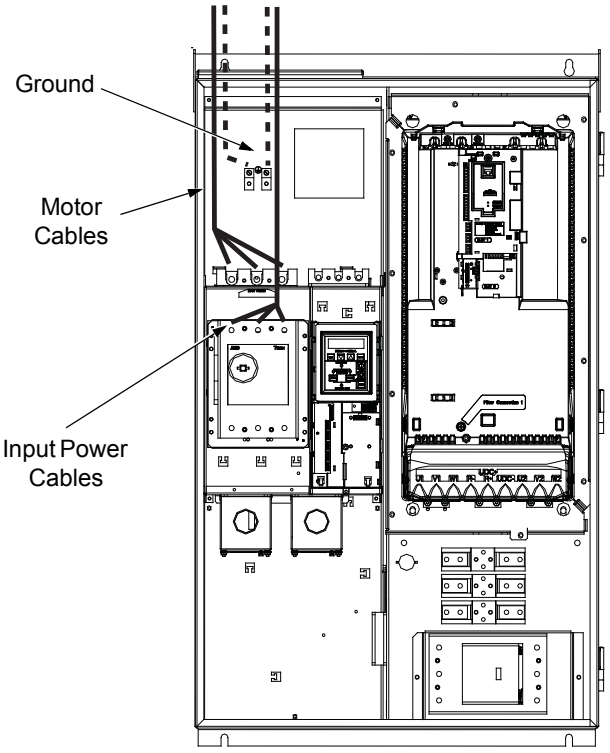
Connect the motor cables to the output terminal block as shown in the figure below. Also see *Connection diagrams – Standard E-Clipse Bypass (wall mounted)* on page *41* and *Connection diagrams – Standard E-Clipse Bypass (R8, floor mounted)* on page *43*. The motor grounding conductor can be connected to the ground lug near the terminal block.

Note: Route cables through the cable guides on the left side of the enclosure. Use separate conduits for input power and motor cables. Follow the guides to separate the cables from each other.

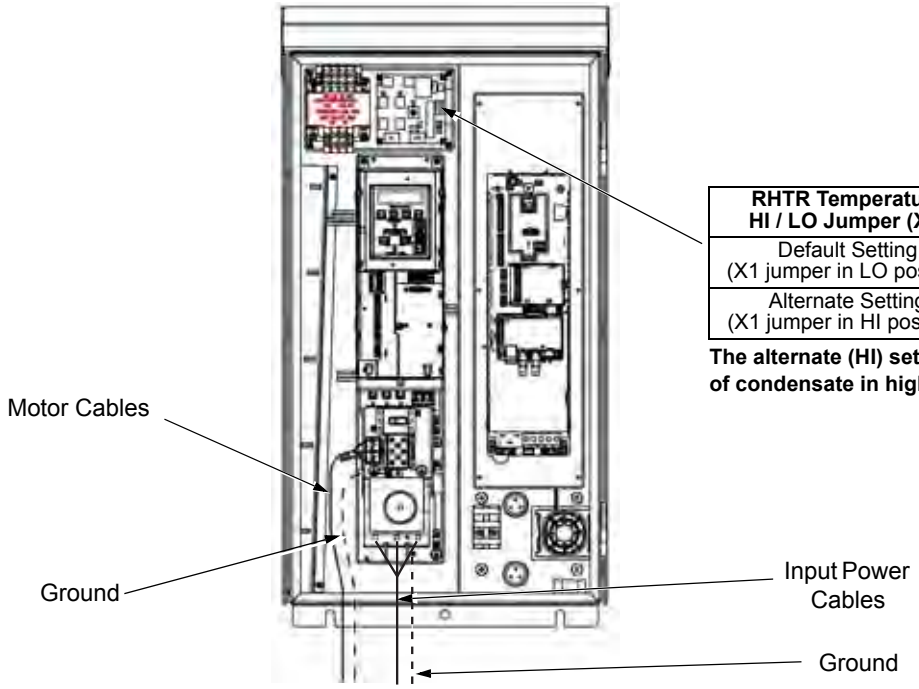
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Standard Configuration (B1/B2)



Standard Configuration (B3)



RHTR Temperature HI / LO Jumper (X1)	Heater ON Temperature	Heater OFF Temperature
Default Setting (X1 jumper in LO position)	14.4 °C 58 °F	21.4 °C 70.5 °F
Alternate Setting (X1 jumper in HI position)	17.8 °C 64 °F	24.7 °C 76.5 °F

The alternate (HI) setting further reduces the likelihood of condensate in high humidity environments.

UL Type 3R Configuration (B1/B2)

Note: UL Type 3R, B1/B2 enclosures are designed to be mounted on a wall. Mounting these 3R enclosures on an open rack system requires the use of the supplied 3R enclosure back plates to maintain 3R integrity.

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WARNING! Check the motor and motor wiring insulation before connecting the ACH550 to line power. Follow the procedure on page 12. Before proceeding with the insulation resistance measurements, check that the ACH550 is disconnected from incoming line power. Failure to disconnect line power could result in death or serious injury.

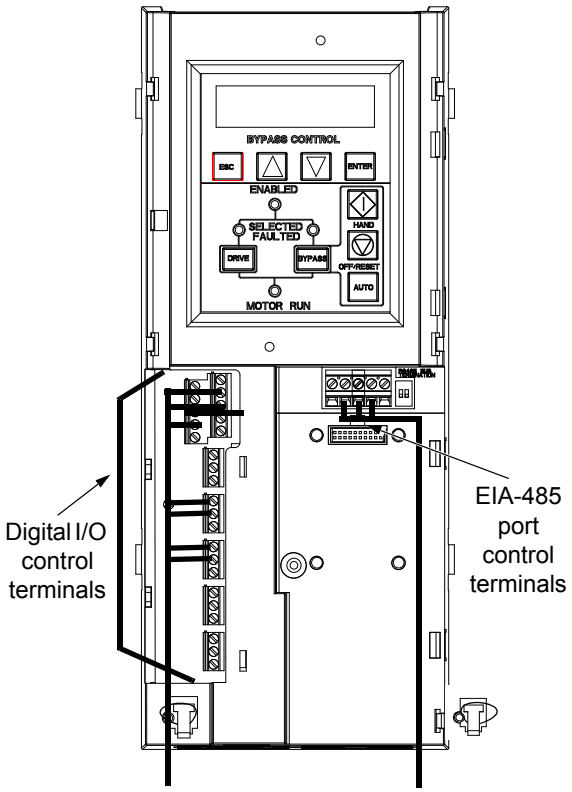
Install the control wiring

Connect control wiring to terminal block X1 on the ACH550 control board and to terminal block X2 on the E-Clipse Bypass control board. For more information on these connections, refer to the following:

- X1 terminal block location and terminal data are defined in the *ACH550-UH User's Manual*.
- X2 terminal block location is illustrated in the figures starting with *Connection diagrams – Vertical E-Clipse Bypass* on page 40.
- X2 terminal data are provided in *Basic control connections for E-Clipse HVAC Default* on page 53.
- Basic connections are described in the following paragraphs. Alternate configurations using the E-Clipse Bypass macro are described in the *ACH550 User's Manual*.
- On Terminal Block X1 inside the ACH550, analog inputs and outputs and additional digital input and relay output connections (AI1, AI2, AO1, AO2, DI1…DI6 and RO1…RO6) are available for use.

Note: The E-Clipse Bypass control circuitry uses serial communications connections (X1:28…X1:32) inside the ACH550. These connections are not available for any other purpose and must not be reconfigured.

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Basic connections

The figure on page *53* shows the basic control connections for use with the E-Clipse Bypass HVAC Default macro. These connections are described in the following paragraphs.

In typical installations, only analog input wires connect to the ACH550 terminal block, with other control connections made on the E-Clipse Bypass control board.

Use wire ties to permanently affix control/ communications wiring to the hooked wire race tie points provided, maintaining a minimum 6 mm (1/4") spacing from power wiring.

Drive's power connection terminals

The following tables list power and motor cable terminal sizes for connections to an input circuit breaker or disconnect switch, a motor terminal block and ground lugs. The tables also list torque that should be applied when tightening the terminals.

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Vertical enclosure terminals

HP	Identification	Frame Size	Maximum Wire Size Capacities of Power Terminals			
			Circuit Breaker	Disconnect Switch	Motor Termination	Ground Lugs
208…240 Volt						
1	ACH550-VxR-04A6-2	R1	#10 35 in-lbs	#10 7 in-lbs	#6 30 in-lbs	#4 35 in-lbs
1.5	ACH550-VxR-06A6-2	R1				
2	ACH550-VxR-07A5-2	R1				
3	ACH550-VxR-012A-2	R1				
5	ACH550-VxR-017A-2	R1				
7.5	ACH550-VxR-024A-2	R2	#8 40 in-lbs	#8 7 in-lbs		
10	ACH550-VxR-031A-2	R2	#2 50 in-lbs		#2 50 in-lbs	#2 50 in-lbs
15	ACH550-VxR-046A-2	R3		#4 18 in-lbs	#2/0 120 in-lbs	
20	ACH550-VxR-059A-2	R3				
25	ACH550-VxR-075A-2	R4	#1 50 in-lbs	#1 55 in-lbs		
380…480 Volt						
1/1.5	ACH550-VxR-03A3-4	R1	#10 35 in-lbs	#10 7 in-lbs	#6 30 in-lbs	#4 35 in-lbs
2	ACH550-VxR-04A1-4	R1				
3	ACH550-VxR-06A9-4	R1				
5	ACH550-VxR-08A8-4	R1				
7.5	ACH550-VxR-012A-4	R1				
10	ACH550-VxR-015A-4	R2	#8 40 in-lbs	#8 7 in-lbs		
15	ACH550-VxR-023A-4	R2				
20	ACH550-VxR-031A-4	R3	#3 50 in-lbs		#2 50 in-lbs	#2 50 in-lbs
25	ACH550-VxR-038A-4	R3		#4 18 in-lbs		
30	ACH550-VxR-045A-4	R3				
40	ACH550-VxR-059A-4	R4	#1 50 in-lbs		#2/0 120 in-lbs	
50	ACH550-VxR-072A-4	R4		#1 55 in-lbs		
60	ACH550-VxR-078A-4	R4		#1 70 in-lbs		

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<table>
<tr><th rowspan="2">HP</th><th rowspan="2">Identification</th><th rowspan="2">Frame Size</th><th colspan="4">Maximum Wire Size Capacities of Power Terminals</th></tr>
<tr><th>Circuit Breaker</th><th>Disconnect Switch</th><th>Motor Termination</th><th>Ground Lugs</th></tr>
<tr><td colspan="7">500…600 Volt</td></tr>
<tr><td>2</td><td>ACH550-VxR-02A7-6</td><td>R2</td><td rowspan="6">#8
62 in-lbs</td><td rowspan="6">#4
18 in-lbs</td><td rowspan="6">#6
30 in-lbs</td><td rowspan="6">#4
35 in-lbs</td></tr>
<tr><td>3</td><td>ACH550-VxR-03A9-6</td><td>R2</td></tr>
<tr><td>5</td><td>ACH550-VxR-06A1-6</td><td>R2</td></tr>
<tr><td>7.5</td><td>ACH550-VxR-09A0-6</td><td>R2</td></tr>
<tr><td>10</td><td>ACH550-VxR-011A-6</td><td>R2</td></tr>
<tr><td>15</td><td>ACH550-VxR-017A-6</td><td>R2</td></tr>
<tr><td>20</td><td>ACH550-VxR-022A-6</td><td>R3</td><td rowspan="2">#4
62 in-lbs</td><td rowspan="4">#1
55 in-lbs</td><td>#2
50 in-lbs</td><td rowspan="5">#2
50 in-lbs</td></tr>
<tr><td>25</td><td>ACH550-VxR-027A-6</td><td>R3</td><td rowspan="4">#2/0
120 in-lbs</td></tr>
<tr><td>30</td><td>ACH550-VxR-032A-6</td><td>R4</td><td rowspan="4">#1
62 in-lbs</td></tr>
<tr><td>40</td><td>ACH550-VxR-041A-6</td><td>R4</td></tr>
<tr><td>50</td><td>ACH550-VxR-052A-6</td><td>R4</td></tr>
<tr><td>60</td><td>ACH550-VxR-062A-6</td><td>R4</td><td>#1
70 in-lbs</td></tr>
</table>

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Standard enclosure terminals

HP	Type Code[1]	Base Drive Frame Size	Power Wiring Data[2]							
			Circuit Breaker UL Type/ NEMA 1 & 12	Circuit Breaker UL Type/ NEMA 3R	Disconnect Switch UL Type/ NEMA 1 & 12	Disconnect Switch UL Type/ NEMA 3R	Motor Terminals UL Type/ NEMA 1 & 2	Motor Terminals UL Type/ NEMA 3R	Ground Lugs UL Type/ NEMA 1 & 2	Ground Lugs UL Type/ NEMA 3R
208…240 Volt										
1	ACH550-BxR-04A6-2	R1	#8 40 in-lbs	#8 40 in-lbs	#8 7 in-lbs	#8 7 in-lbs	#6 30 in-lbs	#6 30 in-lbs	#4 35 in-lbs	#4 35 in-lbs
1.5	ACH550-BxR-06A6-2	R1								
2	ACH550-BxR-07A5-2	R1								
3	ACH550-BxR-012A-2	R1								
5	ACH550-BxR-017A-2	R1								
7.5	ACH550-BxR-024A-2	R2								
10	ACH550-BxR-031A-2	R2	#1 50 in-lbs	#1 50 in-lbs			#3 50 in-lbs	#3 50 in-lbs	#2 50 in-lbs	#2 50 in-lbs
15	ACH550-BxR-046A-2	R3			#4 18 in-lbs	#4 18 in-lbs	#2/0 120 in-lbs	#2/0 120 in-lbs		
20	ACH550-BxR-059A-2	R3								
25	ACH550-BxR-075A-2	R4			#1 55 in-lbs	#1 55 in-lbs				
30	ACH550-BxR-088A-2	R4	350 MCM 274 in-lbs	350 MCM 274 in-lbs	#1/0 70 in-lbs	#1/0 70 in-lbs	#1 53 in-lbs	#1 53 in-lbs	2 x #3/0 250 in-lbs	
40	ACH550-BxR-114A-2	R4			300 MCM 275 in-lbs	300 MCM 275 in-lbs	250 MCM 300 in-lbs	250 MCM 300 in-lbs		
50	ACH550-BxR-143A-2	R6								#2/0 375 in-lbs
60	ACH550-BxR-178A-2	R6					400 MCM 375 in-lbs	400 MCM 375 in-lbs		
75	ACH550-BxR-221A-2	R6	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs	2 x 500 MCM 375 in-lbs	2 x 500 MCM 375 in-lbs		350 MCM 100 in-lbs
100	ACH550-BxR-248A-2	R6								

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HP	Type Code[1]	Base Drive Frame Size	Power Wiring Data[2]							
			Circuit Breaker UL Type/ NEMA 1 & 12	Circuit Breaker UL Type/ NEMA 3R	Disconnect Switch UL Type/ NEMA 1 & 12	Disconnect Switch UL Type/ NEMA 3R	Motor Terminals UL Type/ NEMA 1 & 2	Motor Terminals UL Type/ NEMA 3R	Ground Lugs UL Type/ NEMA 1 & 2	Ground Lugs UL Type/ NEMA 3R
480 Volt										
1/ 1.5	ACH550-BxR-03A3-4	R1	#8 40 in-lbs	#8 40 in-lbs	#8 7 in-lbs	#8 7 in-lbs	#6 30 in-lbs	#6 30 in-lbs	#4 35 in-lbs	#4 35 in-lbs
2	ACH550-BxR-04A1-4	R1								
3	ACH550-BxR-06A9-4	R1								
5	ACH550-BxR-08A8-4	R1								
7.5	ACH550-BxR-012A-4	R1								
10	ACH550-BxR-015A-4	R2								
15	ACH550-BxR-023A-4	R2								
20	ACH550-BxR-031A-4	R3	#1 50 in-lbs	#1 50 in-lbs			#2 50 in-lbs	#2 50 in-lbs	#2 50 in-lbs	#2 50 in-lbs
25	ACH550-BxR-038A-4	R3			#4 18 in-lbs	#4 18 in-lbs				
30	ACH550-BxR-045A-4	R3								
40	ACH550-BxR-059A-4	R4					#2/0 120 in-lbs	#2/0 120 in-lbs		
50	ACH550-BxR-072A-4	R4			#1 55 in-lbs	#1 55 in-lbs				
60	ACH550-BxR-078A-4	R4			#1 70 in-lbs	#1 70 in-lbs				
75	ACH550-BxR-097A-4	R4	350 MCM 274 in-lbs	350 MCM 274 in-lbs	#1/0 70 in-lbs	#1/0 70 in-lbs	#1 53 in-lbs	#1 53 in-lbs	2 x #3/0 250 in-lbs	
100	ACH550-BxR-125A-4	R5			300 MCM 275 in-lbs	300 MCM 275 in-lbs	250 MCM 300 in-lbs	250 MCM 300 in-lbs		#2/0 375 in-lbs
125	ACH550-BxR-157A-4	R6								
150	ACH550-BxR-180A-4	R6					400 MCM 375 in-lbs	400 MCM 375 in-lbs		
200	ACH550-BxR-246A-4	R6	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs	2 x 500 MCM 375 in-lbs	2 x 500 MCM 375 in-lbs		350 MCM 100 in-lbs
250	ACH550-BxR-316A-4	R8					2 x 600 MCM 500 in-lbs		5 Bus bar holes (13/32" bolts)	
300	ACH550-BxR-368A-4	R8								
350	ACH550-BxR-414A-4	R8								
400	ACH550-BxR-486A-4	R8								

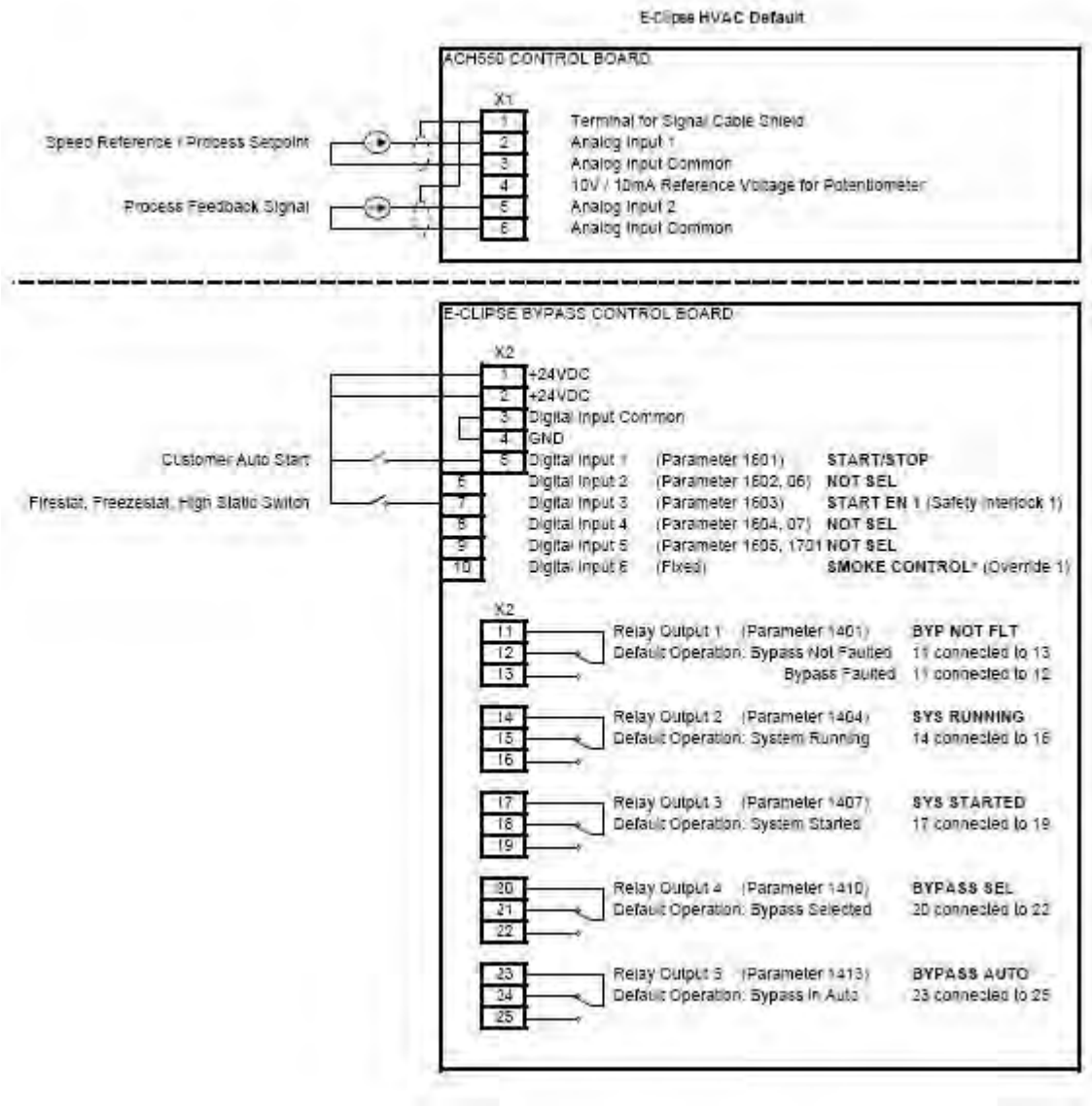
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HP	Type Code[1]	Base Drive Frame Size	Power Wiring Data[2]							
			Circuit Breaker UL Type/ NEMA 1 & 12	Circuit Breaker UL Type/ NEMA 3R	Disconnect Switch UL Type/ NEMA 1 & 12	Disconnect Switch UL Type/ NEMA 3R	Motor Terminals UL Type/ NEMA 1 & 2	Motor Terminals UL Type/ NEMA 3R	Ground Lugs UL Type/ NEMA 1 & 2	Ground Lugs UL Type/ NEMA 3R
600 Volt										
2	ACH550-BxR-02A7-6	R2	#8 62 in-lbs	#8 62 in-lbs	#4 18 in-lbs	#4 18 in-lbs	#6 30 in-lbs	#6 30 in-lbs	#4 35 in-lbs	#4 35 in-lbs
3	ACH550-BxR-03A9-6	R2								
5	ACH550-BxR-06A1-6	R2								
7.5	ACH550-BxR-09A0-6	R2								
10	ACH550-BxR-011A-6	R2								
15	ACH550-BxR-017A-6	R2								
20	ACH550-BxR-022A-6	R3	#1 62 in-lbs	#1 62 in-lbs	#1 55 in-lbs	#1 55 in-lbs	#2 50 in-lbs	#2 50 in-lbs	#2 50 in-lbs	#2 50 in-lbs
25	ACH550-BxR-027A-6	R3								
30	ACH550-BxR-032A-6	R4					#2/0 120 in-lbs	#2/0 120 in-lbs		
40	ACH550-BxR-041A-6	R4								
50	ACH550-BxR-052A-6	R4								
60	ACH550-BxR-062A-6	R4			#1 75 in-lbs	#1 75 in-lbs				
75	ACH550-BxR-077A-6	R6	300 MCM 274 in-lbs	300 MCM 274 in-lbs	#1/0 70 in-lbs	#1/0 70 in-lbs	#1 53 in-lbs	#1 53 in-lbs	3 x #3/0 250 in-lbs	
100	ACH550-BxR-099A-6	R6								
125	ACH550-BxR-125A-6	R6			300 MCM 275 in-lbs	300 MCM 275 in-lbs	250 MCM 300 in-lbs	250 MCM 300 in-lbs		#2/0 375 in-lbs
150	ACH550-Bx-R144A-6	R6								

1. “BxR” represents both BCR and BDR.
2. Torque values shown relate to current production. Check component labels on previously installed units for required tightening torque.

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Basic control connections for E-Clipse HVAC Default



Parameters Changed Relative to E-Clipse HVAC Default

Parameter Number	Description	Setting

* Smoke Control (Override1) is a fixed input. Closing Digital Input 6 **will** place the E-Clipse Bypass in Smoke Control mode which may reassign the function of the other Digital Inputs. Refer to the Smoke Control (Override1) documentation.

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2. Check installation – bypass

Control panel settings and checks

Apply power to the E-Clipse Bypass unit. The ACH550 Control Panel should show the operating status of the drive. If the E-Clipse Bypass Control Panel displays a PHASE SEQ (Phase Sequence) fault, remove power, wait at least 5 minutes and then swap any two input phase wires. If the motor is a standard 208 V, 60 Hz motor connected to a 208 V drive or a 460 V, 60 Hz motor connected to a 480 V drive, the default parameter settings should be suitable for the initial tests described below. If the motor's rating is not 208 V or 460 V, 60 Hz, the MOTOR NOM VOLT and MOTOR NOM FREQ parameters will need to be properly set before proceeding. Refer to the *ACH550-UH User's Manual* and set the parameters as required.

Note: The settings for ALL external serial communication between the ACH550 with E-Clipse Bypass and any Building Automation System are configured using the E-Clipse Bypass operator panel. DO NOT attempt to configure the external serial communication connection using the ACH550 operator panel!

The settings for internal communication between the ACH550 and the E-Clipse Bypass are configured at the factory and require no adjustment.

Drive Link recovery procedure

If the ACH550 Drive communication settings are unintentionally changed during setup a "Drive Link Fault", "Drive Link Error" or "Drive Setup" alarm may be displayed. Should this occur, accomplish the following steps in order.

Using the ACH550 Drive Keypad

1. Set Parameter 9802 to "STD MODBUS"
2. Set Parameter 9902 to "E-CLIPSE"
3. Cycle Power

Following the above steps, in order, should restore proper communications between the ACH550 Drive and the E-Clipse Bypass. Should the E-Clipse Keypad continue to display a "Drive Link Fault", "Drive Link Error" or "Drive Setup" alarm, check the following parameter settings to ensure they have been recovered. If necessary, individually set the correct parameter settings as indicated below and cycle power.

The only ACH550 Drive macro that provides the proper configuration settings by default is the E-Clipse Bypass macro. If any other ACH550 Drive macro is used, that macro should be selected after completing the initial tests. When using any other macro the following ACH550 Drive parameter values must be set and power cycled or the E-Clipse Bypass will not function properly:

- Parameter 9802 must be set to "STD MODBUS"
- Parameter 1001 must be set to "Comm"
- Parameter 1002 must be set to "Comm"
- Parameter 1601 must be set to "Comm"

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- Parameter 1608 must be set to “Comm”
- Parameter 5303 must be set to “76.8 kb/s”
- Parameter 5304 must be set to “8 EVEN 1”
- Parameter 5305 must be set to “DCU PROFILE”
- Parameter 5310 must be set to “103”
- Parameter 5311 must be set to “104”
- Power must be cycled

Refer to the *ACH550-UH User’s Manual* for additional information.

Note: Run motor from drive before attempting bypass operation.

System check: motor connected to ACH550 with E-Clipse Bypass

After performing the control panel checks and setting the ACH550 Drive Start-up Data parameters, check the operation of the ACH550 Drive with E-Clipse Bypass with the motor connected as follows:

1. Disconnect and lock out power to the E-Clipse Bypass unit, wait at least five minutes before disconnecting power.
2. Connect the motor to the output terminals.



CAUTION: If the Advanced Override (Override 2) input contact is closed, the motor will start across the line as soon as power is applied.

If the Safety Interlock and Run Enable input contacts are closed and the Smoke Control (Override 1) input contact is closed, the motor will start across the line as soon as power is applied.

If the Start/Stop, Safety Interlock and Run Enable input contacts are closed and the system is in the Bypass mode and in either Hand or Auto, the motor will start across the line as soon as power is applied.

If the Start/Stop, Safety Interlock and Run Enable input contacts are closed and the system is in the Drive mode with the drive in either Hand or Auto mode, the motor will start on the drive as soon as power is applied.

In order to prevent the motor from starting, the system should be in the Drive mode and the drive should be OFF when the power is disconnected at the end of the previous series of control panel settings and checks.

In order to prevent the motor from running without disconnecting the motor, open the Run Enable and Safety Interlock contacts on bypass control board terminals X2:2, X2:3 and X2:4 before applying power. Set the bypass to Drive mode and the drive to OFF.

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3. Apply power to the E-Clipse Bypass unit. The ACH550 Control Panel display should be illuminated. On the bypass control panel, both the display and Enabled LED should be illuminated. If the Enabled LED is not illuminated solid green, check to see that closed contacts or jumpers connect terminal X2:3 to X2:4 and X2:2 to X2:7 on the bypass control board.
4. The Drive Selected LED should be illuminated. If not, press the Drive Select key to switch to Drive mode. Leave the system in the Drive mode when proceeding to the next step.
5. Press the Hand key on the ACH550 Control Panel. Press and hold the UP key until the motor just starts rotating.

Note: If the ACH550 Control Panel displays an OVERCURRENT or EARTH FAULT, disconnect and lock out power to the E-Clipse Bypass unit. Wait at least 5 minutes. Disconnect the motor leads from the E-Clipse Bypass unit and Megger each motor lead to ground to determine if the motor is good. Check the power leads from the Drive / Bypass to the motor for damaged or improper wiring. If the ACH550 Control Panel displays any other drive faults, correct the fault condition before proceeding to the next step.



CAUTION: Check motor rotation direction as soon as the motor begins to move. If motor does not rotate in the correct direction, shut down the drive, disconnect and lock out power to the drive and wait five minutes. Swap any two motor output wires (T1, T2, and T3). Incorrect motor rotation direction may cause equipment damage.

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6. Increase the speed to 60 Hz or the highest safe operating speed.
7. Press the OFF key on the drive control panel. The motor should stop.

   If the drive does not operate according to these steps, refer to the ACH550-UH User's Manual.

   If the drive operates according to these steps, your ACH550 with E-Clipse Bypass is ready to use with preset or modified macro settings.

Note: The settings for ALL external serial communication between the ACH550 with E-Clipse Bypass and any Building Automation System are configured using the E-Clipse Bypass operator panel. DO NOT attempt to configure the external serial communication connection using the ACH550 operator panel!

The settings for internal communication between the ACH550 and the E-Clipse Bypass are configured at the factory and require no adjustment.

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Note: Both the ACH550 Drive and the E-Clipse Bypass include preset application macros. The only ACH550 Drive macro that provides the proper configuration settings by default is the *E-Clipse HVAC Default macro* (9902 = 15). If any other ACH550 drive macro or any modified setting of the *E-Clipse HVAC Default macro* is used the following ACH550 Drive parameter values must be set and power cycled or the E-Clipse Bypass will not function properly:

- Parameter 9802 must be set to “STD MODBUS”
- Parameter 1001 must be set to “Comm”
- Parameter 1002 must be set to “Comm”
- Parameter 1601 must be set to “Comm”
- Parameter 1608 must be set to “Comm”
- Parameter 5303 must be set to “76.8 kb/s”
- Parameter 5304 must be set to “8 EVEN 1”
- Parameter 5305 must be set to “DCU PROFILE”
- Parameter 5310 must be set to “103”
- Parameter 5311 must be set to “104”
- Power must be cycled

Refer to the *ACH550-UH User’s Manual* for programming instructions.

Note: Run motor from drive before attempting bypass operation.

System check: motor disconnected from the ACH550 with E-Clipse Bypass

If you are familiar with the E-Clipse Bypass operation, you may skip the following section. Otherwise, after performing the system checks and setting the ACH550 Drive Start-up Data parameters, become familiar with the operation of the ACH550 Drive with E-Clipse Bypass without the motor connected as follows:

1. Disconnect and lock out power to the E-Clipse Bypass unit, wait at least five minutes after disconnecting power.
2. Disconnect the motor from the E-Clipse Bypass unit.
3. Apply power to the E-Clipse Bypass unit by turning on the branch circuit disconnect device and the bypass disconnect switch or circuit breaker.
4. The ACH550 Control Panel display should be illuminated. On the E-Clipse Bypass control panel, both the display and *Enabled* LED should be illuminated. If the *Enabled* LED is not illuminated solid green, check to see that closed contacts or jumpers connect terminal X2:3 to X2:4 and X2:2 to X2:7 on the bypass control board.

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5. On the E-Clipse Bypass control panel, either the *Drive Selected* or *Bypass Selected* LED should be illuminated. Pressing the *Drive Select* or *Bypass Select* key should switch the bypass back and forth between the *Drive* mode and the *Bypass* mode as indicated by the LEDs above each button. Check that the bypass control panel switches the system between modes. Leave the system in the Bypass mode when proceeding to the next step.
6. Check to see that pressing the:
   - *Auto* key on the bypass control panel causes the bottom line on the E-Clipse Bypass display to indicate "*Bypass in Auto*"
   - Hand key on the bypass control panel generates a Motor Phase Fault.
   - Under normal conditions (motor connected) pressing the Hand key on the bypass control panel causes the bottom line on the E-Clipse Bypass display to indicate "Hand #A Run"
   - OFF key on the bypass control panel causes the bottom line on the E-Clipse Bypass display to indicate "Off Stop"
7. For Steps 8 through 14, ACH550 Drive Parameter 9904 must be set to "Scalar: Freq". After successful completion of Step 13, Parameter 9904 may be set to "Vector: Speed" if very specific application requirements make it necessary to use this type of motor control. Operation using the "Vector: Speed" setting is unnecessary for control of almost all fan and pump applications. Refer to the *ACH550-UH User's Manual* for details on setting parameters.
8. Press the *Drive Select* key on the E-Clipse Bypass control panel. The *Drive Select* LED should be illuminated.
9. Check to see that pressing the:
   - *Auto* key on the bypass control panel causes the E-Clipse Bypass display to indicate "*Bypass in Auto*"
   - *Hand* key on the bypass control panel causes no change to the E-Clipse Bypass display
   - *OFF* key on the bypass control panel causes the E-Clipse Bypass display to indicate "*Bypass in Off*"
10. Press the *HAND* key on the drive control panel. Note that the top line of the control panel display indicates "HAND" and run as a clockwise rotating arrow. The *Drive Run* LED on the E-Clipse Bypass control panel should be illuminated.
11. Press the *UP* arrow on the drive control panel. Note that the speed reference indication in the top line of the drive control panel display increases from "0.0% SP."
12. In the middle line of the drive control panel display, the output current indication should indicate "0.0 A."
13. Press the *DOWN* arrow on the drive control panel until the speed and frequency indications return to "0.0."
14. Press the *OFF* key on the drive control panel. Note that the bottom line of the drive contol panel display indicates "Off."

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If the ACH550 Drive and E-Clipse Bypass operate according to these steps, and you have familiarized yourself with their operation, disconnect and lock out power to prepare for the next test.

WARNING! Wait at least five minutes after disconnecting power from the drive before you attempt to service the drive. Bus capacitors in the intermediate DC circuit must discharge before servicing the drive. Using a meter rated for 1000 VDC, check for zero volts at:

- Terminals BRK+ to GND and BRK- to GND (frame size R1/R2)
- Terminals UC+ and UC- (frame size R3…R8).

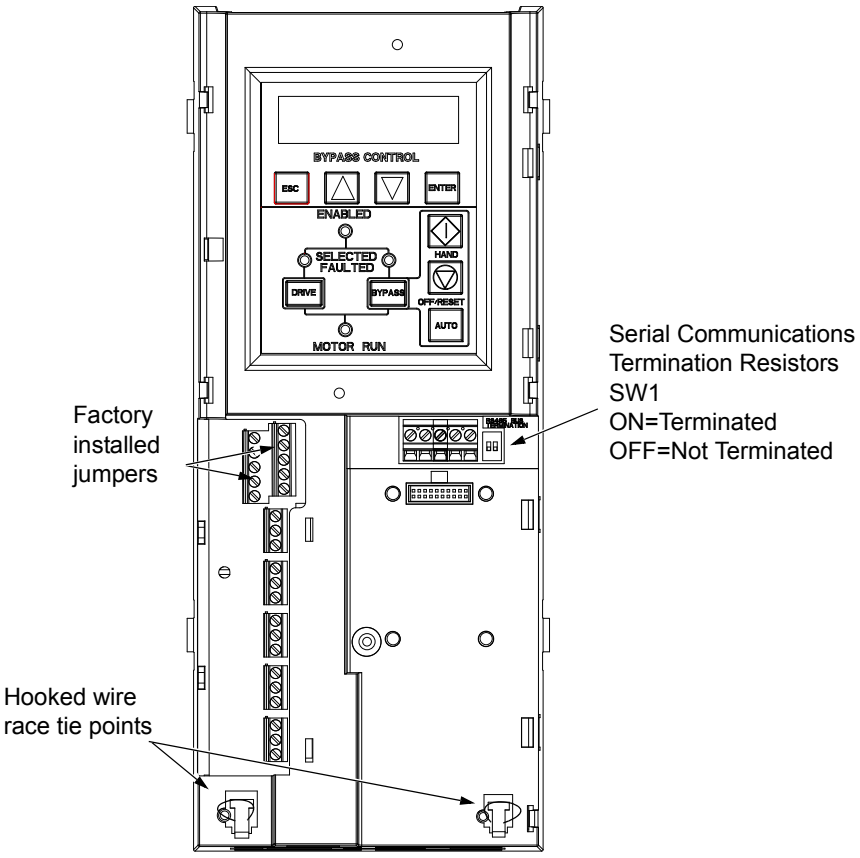
If the drive does not operate according to these steps, refer to the ACH550-UH User's Manual.

3. Check jumpers and switches

The settings described in this section are factory set and, for most situations, do not require adjustment. However, it is a good practice to review these settings to confirm that they are appropriate for the configuration installed.

Jumper and switch locations

The figure below shows the locations of the SW1 DIP switch on the E-Clipse Bypass control board. The function and setting of this switch is explained in the following paragraph.



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DIP switch settings

The DIP switch is used to configure the serial communications termination resistors.

To reduce noise on the serial communications network, terminate the EIA-485 network using 120 ohm resistors at both ends of the network. Use the DIP switches to connect or disconnect the on-board termination resistors. Both switches must be positioned in the ON or OFF position to correctly configure the termination resistors.

Note: When using embedded protocols, set SW1 in the OFF position.

Circuit breaker settings

On some ACH550 E-Clipse Bypasses, the circuit breaker has adjustable settings for instantaneous current protection. The factory default settings are practical for most applications. Refer to the “ABB SACE Instruction Sheet” (supplied with these units) for additional information on the adjustment of these settings.

Operation

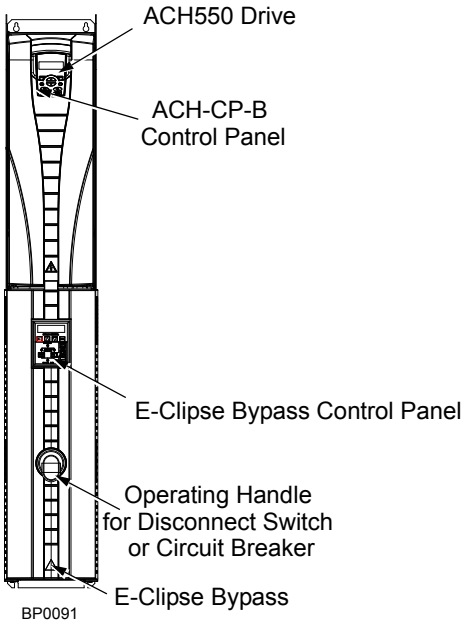
E-Clipse bypass configurations

The ACH550 with E-Clipse Bypass is an ACH550 AC adjustable frequency drive in an integrated UL type 1, UL type 12 or UL type 3R package with a bypass motor starter. The ACH550 with E-Clipse Bypass provides:

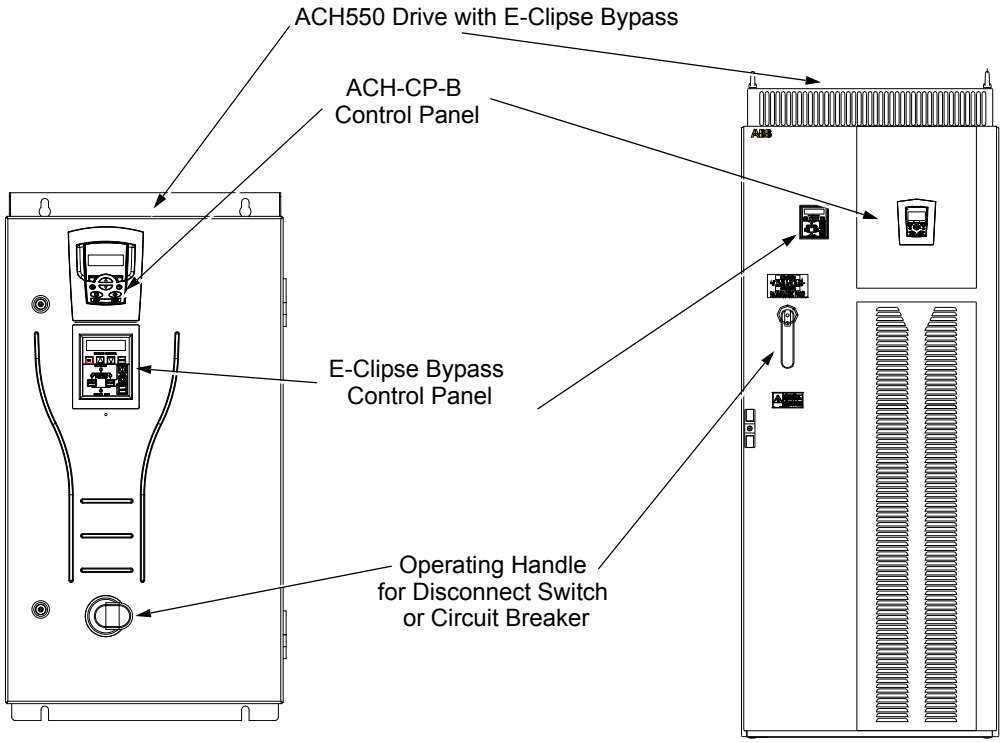
- Disconnect switch or circuit breaker with door mounted control lever. The lever can be padlocked in the OFF position (padlock not supplied).
- Bypass starter.
- Motor overload protection.
- Local operator panel with indicating lights and multifunction display.
- Provisions for external control connections.
- Embedded communications for major BMS protocols including BACnet, Johnson Controls International N2, Siemens Building Technologies FLN, and Modbus
- Optional fieldbus adapters for connection to additional BMS protocols including LonWorks and Ethernet
- Optional drive service switch (drive input disconnect), the functional equivalent of a three-contactor bypass arrangement.

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The following shows the front view of the ACH550 E-Clipse Bypass vertical configuration, and identifies the major components.

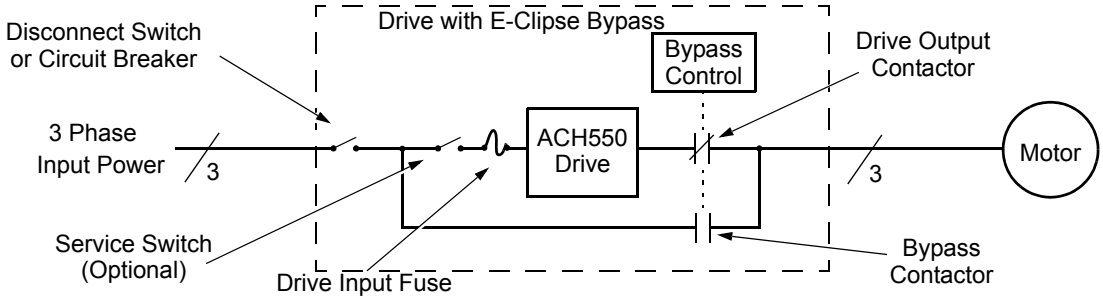


The following shows the front view of the ACH550 E-Clipse Bypass standard configurations, and identifies the major components.



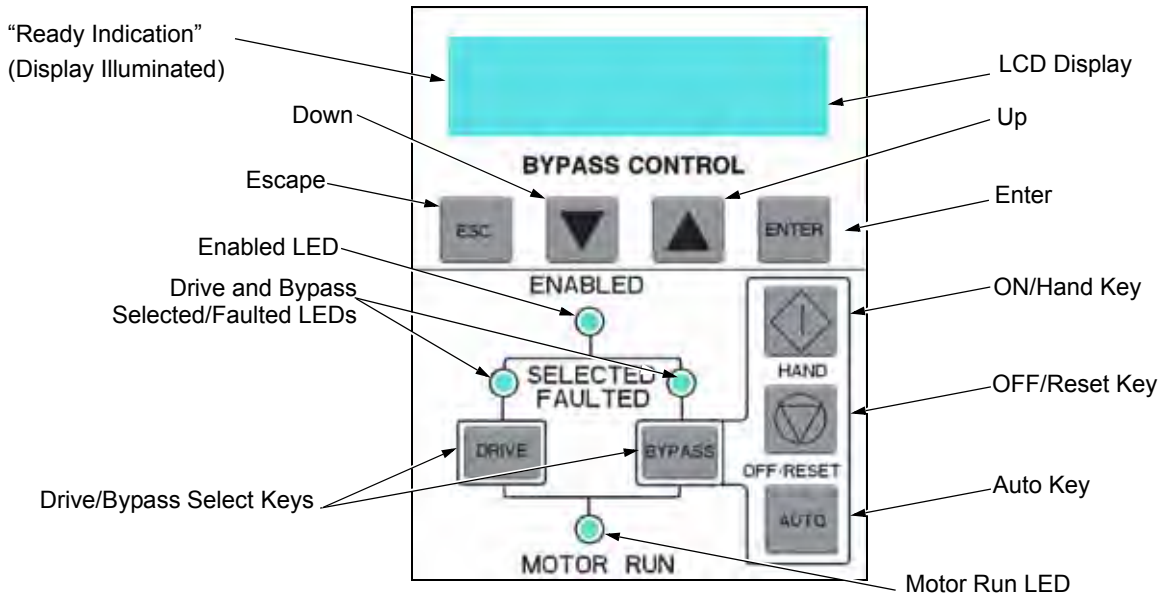
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The following is a typical power diagram.



Bypass control

The bypass control panel features:



Ready (Power On) Indication

The *Ready (Power On) indication* is provided by the bypass control panel. The bypass control panel display will be illuminated and text will be displayed when the disconnect switch or circuit breaker is closed and control power is applied to the bypass.

Enabled LED

The *Enabled LED* is illuminated green under the following conditions:

- Both the Safety Interlock(s) and Run Enable contacts are closed.
- The Safety Interlock contact(s) are closed with no Start command present.

The Enabled LED flashes green if the Run Enable contact is open and when the Safety Interlock contact(s) are closed and a Start command is present.

The Enabled LED is illuminated red when the Safety Interlock contact(s) are open.

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Motor Run LED

The *Motor Run LED* is illuminated green when the motor is running in either bypass mode or in drive mode. The Motor Run LED flashes green to indicate the system has been placed in an Override condition.

Bypass Faulted LED

The *Bypass Faulted LED* is illuminated or flashes red when the motor or bypass protection functions have shut down the bypass. The specific nature of the fault is indicated on the bypass control display. Refer to the *Diagnostics* section of this manual for more details.

Drive Selected LED

The *Drive Selected LED* is illuminated green when the drive has been selected as the power source for the motor and no drive fault is present.

Bypass Selected LED

The *Bypass Selected LED* is illuminated or flashes green when the bypass has been selected as the power source for the motor and no bypass fault is present.

Drive Faulted LED

The *Drive Faulted LED* is illuminated red when the bypass has lost its communications link with the drive or when the motor or drive protection functions have shut down the drive. The specific nature of the fault is indicated on the drive control panel display. Refer to the *Diagnostics* section on page *66* of the ACH550-UH User's Manual for more details.

Automatic Transfer

The *Automatic Transfer* indication is provided on the bypass control panel. The bypass control display will continuously flash an alarm to indicate the system has automatically transferred to Bypass after a Drive fault. The Bypass Selected LED flashes green when the system has automatically transferred to bypass operation. The bypass event log will also record this event.

Auto Indication

The *Auto Indication* is provided on the bypass control panel default display when the bypass control panel Auto key is pressed. Normally this indicates that the Auto Start contact or serial communications has been selected as the means for starting and stopping the motor in the bypass mode.

Off Indication

The *Off Indication* is provided on the bypass control panel default display when bypass control panel Off key is pressed.

Hand Indication

The *Hand Indication* is provided on the bypass control panel default display when the motor has been started manually in the bypass mode.

Drive Select Key

The *Drive Select Key* selects the drive as the power source for the motor.

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Bypass Select Key

The *Bypass Select Key* selects the bypass as the power source for the motor.

Off/Reset Key

The *Off/Reset Key* may be used to manually stop the motor if the motor has been running on bypass power. The Off/Reset key also resets most bypass faults. It may take several minutes before the bypass can be reset after an overload trip. If a bypass fault condition is present the second press of this key places the bypass in the OFF mode.

Auto Key

The *Auto Key* selects the Auto Start contact or serial communications as the means for starting and stopping the motor in the bypass mode.

Hand Key

The *Hand Key* can be used to manually start the motor when the bypass has been selected as the power source for the motor.

Bypass control panel modes

The HVAC Bypass Control Panel has several different modes for configuring, operating and diagnosing the bypass. Select MENU and use the UP/DOWN buttons to select modes. The modes are:

- Default Display mode – Provides (HAND/OFF/AUTO) indication of the bypass operating control mode.
- Bypass Status mode – Provides status indications of the current system operating conditions.
- Start-Up Parameter Mode – Provides a list of parameters or operating conditions that may be configured or viewed during startup.
- Parameter List mode – Used to edit parameter values individually.
- Changed Parameter mode – Displays changed parameters.
- Bypass Fault Display mode – If there is an active bypass fault, the control panel will flash the fault number and fault diagnostic indication in English.
- Bypass Alarm Display mode – If there is an active bypass alarm, the control panel will flash the alarm number and alarm diagnostic indication in English.

Start-up by changing the parameters from the start-up list

To change the parameters, follow these steps:

1	The **Default Display** indicates the **Bypass Control** mode.		DRIVE SELECTED BYPASS IN OFF
2	Press **ENTER** to enter the **Main Menu.**	ENTER	*BYPASS STATUS STARTUP PARAMS

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3	Select the **Startup Params** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	BYPASS STATUS *STARTUP PARAMS
4	Select the appropriate **Parameter** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	*1601 START/STOP 1613 BP DISABLE
5	Press the **Up/Down** arrows to change the **Parameter Value**.	▼ ▲	1601 START/STOP [1:DI1]
6	Press **ENTER** to store the modified value or press **ESC** to leave the **Parameter Edit** mode.	ENTER or ESC	*1601 START/STOP 1613 BP DISABLE
7	Press **ESC** to return to the **Main Menu**, and again to return to the. **Default Display**.	ESC	DRIVE SELECTED BYPASS IN OFF

Start-up by changing the parameters individually from the parameter list

To change the parameters, follow these steps:

1	The **Default Display** indicates the **Bypass Control** mode.		DRIVE SELECTED BYPASS IN OFF
2	Press **ENTER** to enter the **Main Menu.**	ENTER	*BYPASS STATUS STARTUP PARAMS
3	Select the **Parameter List** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	STARTUP PARAMS *PARAMETER LIST
4	Select the appropriate **Parameter Group** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	14 RELAY OUT *16 SYSTEM CTRL
5	Select the appropriate **Parameter** in a group with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	*1601 START/STOP 1602 RUN ENABLE
6	Press the **Up/Down** arrows to change the **Parameter Value**.	▼ ▲	1601 START/STOP [1:DI1]
7	Press **ENTER** to store the modified value or press **ESC** to leave the **Parameter Edit** mode.	ENTER or ESC	*1601 START/STOP 1602 RUN ENABLE
8	Press **ESC** to return to the listing of **Parameter Groups**, and again to return to the **Main Menu**.	ESC ESC	*16 SYSTEM CTRL 17 OVERRIDE

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9	Press **ESC** to return to the **Default Display** from the **Main Menu.**	ESC	DRIVE SELECTED BYPASS IN OFF

Note: In the Parameter Edit mode the current parameter value appears below the parameter name.

Note: To view the default parameter value, press the **Up/Down** arrows simultaneously. Press **Enter** to restore the default parameter value or press **ESC** to leave the **Parameter Edit** mode.

Diagnostics

Fault listing

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3001	COIL CURR FBK	RBCU is sensing abnormal current feedback when neither contactor should be energized	Defective component on RBCU	Change RBCU
3002	BYP CNTACT STUCK	M2 contactor indicates it is not prepared to move on a power up check of the contactor or after contact is commanded to open	Defective Contactor Defective RBCU	Disconnect incoming power from unit Check if contactor armature moves freely. If armature moves freely, then change the RBCU. If armature does not move freely, then change individual contactor (M2) or the complete assembly (RCSA-0x)
3003	DRV CNTACT STUCK	M1 contactor indicates it is not prepared to move on a power up check of the contactor or after contact is commanded to open	Defective Contactor Defective RBCU	Disconnect incoming power from unit Check if contactor armature moves freely. If armature moves freely, then change the RBCU. If armature does not move freely, then change individual contactor (M1) or the complete assembly (RCSA-0x)

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Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3004	BYPASS COIL OPEN	M2 contactor will not close when commanded to do so	Loose J8 connector on RBCU Loose wires on contactor terminals A1 and/or A2 Bad Output on RBCU Bad Contactor	Verify that J8 connector is firmly seated. With incoming power disconnected, check for tightness of A1 and A2 terminals Swap RBCU Change Contactor/ Assembly
3005	DRIVE COIL OPEN	M1 contactor will not close when commanded to do so	Loose J8 connector on RBCU Loose wires on contactor terminals A1 and/or A2 Bad Output on RBCU Bad Contactor	Verify that J8 connector is firmly seated. With incoming power disconnected, check for tightness of A1 and A2 terminals Swap RBCU Change Contactor/ Assembly
3006	UNDERVOLTAGE	Fault will be generated only if the drive is controlling the motor and the power to the bypass is removed before the drive shuts down. This fault is generated when the drive contactor opens while the drive is operating.	Loose J7 connector on RBCU unit Loose input wiring Incoming power problems	Check that J7 connector is firmly seated in RBCU Check tightness of incoming connections Check Parameter 0413 to view voltage level at time of trip Check upstream protection
3008	DRIVE AI2 LOSS	Only displayed when in Supervisory mode. Indicates that AI2 on the drive has failed.	Check ACH550 manual for AI2 loss	Check ACH550 manual for AI2 loss
3009	MTR OVERLOAD	Bypass opens on motor overload conditions defined in the drive	Drive Mode: Bad Motor Bad CT's Bad RBCU Bypass mode: Bad motor Bad CT's Bad RBCU Either mode: low input voltage	Check if overload condition exists Drive Mode: Refer to 550 manual for proper troubleshooting techniques Bypass Mode: Check that J2 connector is firmly seated in RBCU Use clamp meter to verify mtr current vs. display in parameter 0101 Check input voltage

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Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3010	INP PHASE A LOSS	Fault will be generated when the bypass contactor is requested to be closed and the RBCU does not sense voltage on Phase A	Loose J7 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J7 connector Check yellow wire on input block Check incoming voltage, phase to ground
3011	INP PHASE B LOSS	Fault will be generated when the bypass contactor is requested to be closed and the RBCU does not sense voltage on Phase B	Loose J7 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J7 connector Check black wire on input block Check incoming voltage, phase to ground
3012	INP PHASE C LOSS	Fault will be generated when the bypass contactor is requested to be closed and the RBCU does not sense voltage on Phase C	Loose J7 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J7 connector Check red on input block Check incoming voltage, phase to ground
3013	DRIVE 1ST START	Fault generated if attempting to close the bypass contactor with out running the bypass in drive mode first.	NA	Run bypass unit in drive mode before attempting bypass mode
3014	COIL POW SUPPLY	Coil power supply has failed to reach rated voltage	Internal failure on RBCU unit Shorted contactor coil	Cycle power on bypass unit. If contactor coil is shorted, fault 3023 or 3024 will be generated. If 3023 or 3024 is generated, replace respective contactor If 3023 or 3024 is not generated on power up, replace RBCU unit.
3016	EARTH FAULT	Declared if attempting to close the bypass contactor when the drive has earth fault declared	Earth fault in motor	Refer to the fault code 16 on page 25.
3017	MTR UNDERLOAD	If motor power(%) level falls below minimum power level establish in parameter 3003 for the time (s) set in parameter 3002 fault will be generated. Parameter 3003 is a percentage of motor power as defined in the drive via parameter 9909. Fault only applies to bypass mode	Broken belt	Check load Reset bypass keypad Check fault code 17 on page 25, for further action

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Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3018	MAX CYCLE FAULT	Supervisory Mode only. Declared if bypass contactor is closed by supervisory control 16 times within a 1 hour period.	High and low levels of hysteresis band are too tight	Check parameters 3202-3205. Increase time delays on parameters 3204 and 3205
3019	DRIVE LINK FAULT	Supervisory Mode Only. Fault generated if RS-485 link between drive and bypass stops communicating.	Bad cable/connection between drive and bypass. Communication improperly set in drive Parameter 9802. Application Macro improperly set in drive parameter 9902.	Proper seating of cable in drive and RBCU(connector J3) Check drive parameter 9802 (Modbus) and 9902 (E-Clipse) Check drive Group 53 Follow DriveLink recovery procedure
3020	PHASE SEQ	Sequence of 3 phase voltage input is such that bypass operation will result in motor rotation opposite of drive forward operation.	Phase sequence unknown at time of wiring	Swap any two of the three input wires to the bypass unit
3021	PH A CURR FBK	Fault is generated when current in Phase A is detected and the bypass contactor is open	Loose CT connection Bad RBCU Bad CT	Check J2 connector for proper seating Check connector on Current Assembly Replace RBCU Replace RCSA unit
3022	PH C CURR FBK	Fault is generated when current in Phase C is detected and the bypass contactor is open	Loose CT connection Bad RBCU Bad CT	Check J2 connector for proper seating Check connector on Current Assembly Replace RBCU Replace RCSA unit
3023	BYP COIL SHORTED	Coil characteristics are checked only on power up and coil current is greater than allowable values	Shorted contactor coil Shorted/damaged cable Bad RBCU	Replace RBCU Replace RCSA unit
3024	DRV COIL SHORTED	Coil characteristics are checked only on power up and coil current is greater than allowable values	Shorted contactor coil Shorted/damaged cable Bad RBCU	Replace RBCU Replace RCSA unit
3027	INVALID SUB ASM	Contactor assembly as recorded in the RBCU unit does not match drive information communicated via 485 link	RBCU unit from a different size bypass used to replace a defective RBCU. Parameters not matched after Firmware change.	Contact ABB at 1-800-HELP-365 Option 4

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Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3028	EXT COMM LOSS	Time between fieldbus messages has exceeded timeout interval set with parameter 3005	Incorrect Communication settings in Group 51 & 53. Poor Connections Noise on Communication Line	Check Group 51 & 53 Tighten Connections Check Communication Cable Grounding
3029	EFB CONFIG FILE	Error reading configuration file for embedded fieldbus	Internal Startup error	Cycle Power Replace RBCU
3030	FORCE TRIP	Fault trip forced by external fieldbus	Overriding Control System tripped E-Clipse unit via fieldbus.	Check Overriding Control System
3031 ... 3033	EFB 1...EFB 3	Fault code reserved for embedded fieldbus.	For Bacnet: Device object instances for the drive and or bypass are set greater than 4194302 in paramters 5011 5017 and or 5311 5317 respectively	Check Parameters 5011, 5017 and/or 5311, 5317
3034	MTR PHASE	Detects open motor phase. Detection is done by current transformers in bypass unit.	Internal problem Cable problem Motor problem	Check wiring in E-Clipse Unit Check motor cabling Check Motor Check if 3006 is Disabled
3037	PCB TEMP	RBCU unit has reached 190 degrees Fahrenheit, 88 degrees Celsius	Cabinet cooling has failed Ambient conditions too high Bad RBCU unit	Stop drive and let cool down and restart Add additional cooling Replace RBCU
3038	NO DRIVE DATA	No drive data available (Group 112)	Bypass not able to extract drive data on initial power up due to: Bad cable/connection between drive and bypass. Communication improperly set in drive Parameter 9802. Application Macro improperly set in drive parameter 9902.	Proper seating of cable in drive and RBCU (connector J3) Check drive parameter 9802 (Modbus) and 9902 (E-Clipse) Check drive Group 53 Follow DriveLink recovery procedure then cycle power to bypass.
3039	FBA PAR CONF	Non embedded fieldbus has detected an error in Group 51 parameters	Incorrect settings in Group 51	Verify Group 51 parameters
3101	SFLASH CORRUPT	Internal checksum error	NA	Cycle power Replace RBCU Upgrade firmware

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Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3102	PMAP FILE	Parameter file is corrupt		Cycle Power Contact ABB with information that preceeded fault
3201	T1 OVERLOAD	T1 program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU
3202	T2 OVERLOAD	T2 program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU
3203	T3 OVERLOAD	T3 program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU
3204	STACK OVERFLOW	Program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU
3205	UNKNOWN CB	Bypass control board type is unknown.	Firmware is not compatible with control board in RBCU.	Firmware 93F and greater compatible with all RCBU hardware. Firmware 93D and earlier can only be loaded in RBCU Rev D and earlier.
3206	UNKNOWN DRIVE	Drive reports rating not found in bypass software	Drive does not match drives configured in bypass RBCU	Replace RBCU or reload with most current firmware
3207	UNKNOWN BYPASS	NA	NA	Replace RBCU or load most current firmware Contact ABB at 1-800-HELP-365 option 4 Replace RBCU or load most current firmware

Fault History

See page 28.

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Alarm listing

The following table lists the alarms by code number and describes each.

Alarm Code	Alarm Name In Panel	Alarm	Possible Cause	Corrective Action
4001	INP PHASE A LOSS	Alarm will occur in drive mode. In bypass, alarm will occur if bypass contactor has not closed. Unit will trip on Fault 3010 if the bypass contactor is closed	Loose J8 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J8 connector Check yellow wire on input block Check incoming voltage, phase to ground
4002	INP PHASE B LOSS	Alarm will occur in drive mode. In bypass, alarm will occur if bypass contactor has not closed. Unit will trip on Fault 3011 if the bypass contactor is closed	Loose J8 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J8 connector Check black wire on input block Check incoming voltage, phase to ground
4003	INP PHASE C LOSS	Alarm will occur in drive mode. In bypass, alarm will occur if bypass contactor has not closed. Unit will trip on Fault 3012 if the bypass contactor is closed	Loose J8 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J8 connector Check red wire on input block Check incoming voltage, phase to ground
4004	AUTO TRANSFER	Message is displayed when the drive faults and the bypass switches to bypass mode as configured in Parameter 1608	Drive fault	Check drive
4005	EXT COMM ERR	Time between fieldbus messages has exceeded timeout interval set with parameter 3005	Incorrect Communication settings in Group 51 & 53. Poor Connections Noise on Communication Line	Check Group 51& 53 Tighten Connections Check Communication Cable Grounding
4006	Selected by PAR 1620: RUN ENABLE DAMPER END SWITCH VALVE OPENING PRE-LUBE CYCLE	Alarm will occur when start order is given and the “RUN Enable” is not present	Run Enable condition is not satisfied. Bad 24v supply Bad digital input	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 for status of digital input
4007	PCB TEMP	RBCU unit reached 181 degrees Fahrenheit, 83 degrees Celsius	Cabinet cooling has failed Ambient conditions too high Bad RBCU unit	Stop drive and let cool down and restart Add additional cooling Replace RBCU

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Alarm Code	Alarm Name In Panel	Alarm	Possible Cause	Corrective Action
4008	DRIVE SETUP	Alarm generated when configuration of drive is such that bypass can not properly control the drive. Specifically, drive parameters 1001,1002,1601, 1608	Incorrect parameters settings	Set Parameter 1001 to “COMM” Set Parameter 1002 to “COMM” Set Parameter 1601 to “COMM” Set Parameter 1608 to “COMM”
4009	BYPASS RUN DELAY	Alarm is generated when a bypass start command is issued and there is non zero time value in bypass parameter 1614	NA	NA
4010	MTR OVERLOAD	Bypass warning if motor overload conditions exist as defined in the drive	Drive Mode: Bad Motor Bad Ct’s Bad RBCU Bypass mode: Bad motor Bad CT’s Bad RBCU Either mode: low input voltage	Drive Mode: Refer to 550 manual for proper troubleshooting techniques Bypass Mode: Check that J2 connector is firmly seated in RBCU Check input voltage Does overload condition exist?
4011	MTR UNDERLOAD	Alarm comes at half the time of a mtr underload fault. See fault 3017 for further text	NA	Parameter 3002 is the time Parameter 3003 is the level
4012	BYPASS DISABLED	Alarm will be generated if parameter 1613 is set to “Disable”	NA	NA
4013	DRIVE LINK ERROR	Same as Fault 3019 however will occur when not in supervisory mode	Bad cable between drive and bypass Communication improperly set in drive Parameter 98.02(Modbus) Application Macro in 99.02 set to 15 (text)	Proper seating of cable in drive and RBCU(connector J3) Check drive parameter 98.02 and 99.02 Check drive Group 53 Follow DriveLink recovery procedure
4014	DRIVE TEST	Alarm is generated when bypass parameter 1617 is set to “enable”	NA	NA
4015	START DRIVE 1ST	Message displayed on initial “out of box” power up sequence	NA	Run drive in Hand

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Alarm Code	Alarm Name In Panel	Alarm	Possible Cause	Corrective Action
4016	INP VOLTAGE LOW	3-Phase input voltage has not reached a sufficient level to enable editing of parameters via the keypad. This message is generated within a few seconds of power up	NA	Loose J7 connector Low input voltage. Incoming voltage has not reached at least 155 VAC within a few seconds of powerup
4019	OVERRIDE 1	Alarm is generated when override 1 is active	NA	Check Parameter 0103 and 0104 for digital input status
4020	OVRD2 BYP	Alarm is generated when override 2 is active and the bypass is controlling the motor	NA	Check Parameter 0103 and 0104 for digital input status
4021	Selected by PAR 1621 START ENABLE 1 VIBRATION SWITCH FIRESTAT FREEZESTAT OVERPRESSURE VIBRATION TRIP SMOKE ALARM SAFETY OPEN LOW SUCTION PRES	Alarm will occur when start order is given and the “RUN Enable” is not present	Run Enable condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input
4022	Selected by PAR 1622 START ENABLE 2 VIBRATION SWITCH ... LOW SUCTION PRES	Alarm will occur when start order is given and the “RUN Enable” is not present	Run Enable condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input
4023	Selected by PAR 1623 START ENABLE 3 VIBRATION SWITCH ... LOW SUCTION PRES	Alarm will occur when start order is given and the “RUN Enable” is not present	Run Enable condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input

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Alarm Code	Alarm Name In Panel	Alarm	Possible Cause	Corrective Action
4024	Selected by PAR 1624 START ENABLE 4 VIBRATION SWITCH ... LOW SUCTION PRES	Alarm will occur when start order is given and the “RUN Enable” is not present	Run Enable condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input
4025	LOCAL DISABLED	Alarm is displayed if MODE LOCK (16.29) is set to AUTO MODE and the Hand or Off key is pressed		
4026	AUTO DISABLED	This alarm is displayed if MODE LOCK (1629) is set to LOCAL MODE and the Auto key is pressed.		
4027	COMM CONFIG ERR	Alarm is displayed if the drive and bypass MAC addresses are equal or invalid.	E-Clipse parameters 5002(BP MAC ID) & 5302 (DV MAC ID) are set to the same value	Change MAC address to unique values
4028	FBA PAR CONF	Non embedded fieldbus has detected an error in Group 51 parameters		Verify Group 51 parameters
4029	DRIVE FAULTED	The drive is faulted.		Reset drive
4030	OVRD2 VFD	Alarm is generated when override 2 is active and the drive is controlling the motor	NA	Check Parameter 0103 and 0104 for digital input status
4031	OVRD2 STOP	Alarm is generated when override 2 is active and both the bypass and drive output contactors are deenergized	NA	Check Parameter 0103 and 0104 for digital input status

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Bypass status listing

Bypass Status (16 Characters)	Condition	Description
DRIVE/BYPASS?	DRIVE SELECTED BYPASS SELECTED	Displays which one is selected, drive or bypass
SAFETIES?	OPEN CLOSED	Displays if safeties (=START ENABLE 1 and/ or START ENABLE 2) have been applied, or if they are missing
RUN PERMISSIVES?	OPEN CLOSED	Displays if RUN ENABLE is present or not
START REQUEST?	NOT PRESENT PRESENT	Displays if start request has been applied to the system
AUTO TRANSFER?	NOT TRANSFERRED TRANSFERRED	Displays if the system is in Auto Transfer state or not. Does not reflect to PAR 16.08 AUTO XFER value itself
BYP OVERRIDE 1?	NOT ACTIVATED ACTIVATED	Status of Override 1
BYP OVERRIDE 2?	NOT ACTIVATED ACTIVATED	Status of Override 2
DRIVE FAULTED?	NO YES	Displays if drive is faulted or not
BYPASS FAULTED?	NO YES	Displays if bypass is faulted or not
SYSTEM STARTED?	NO YES	Displays if system is started or not
SYSTEM RUNNING?	NO YES	Displays if system is running or not
BYPASS ALARMS?	NO ALARMS ALARM ACTIVE	Displays if there is an active alarm(s) in bypass or not
HAND/OFF/AUTO?	OFF MODE HAND MODE AUTO MODE	Displays operating mode of the bypass - OFF, HAND or AUTO

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Error messages

#	Error Message	Description
1	CAN'T EDIT PAR IS READ ONLY	Try to save value (=press the ENTER key in Parameter Edit State) of a read-only parameter. E.g. try to change value PAR 01.02 INPUT VOLT
2	CAN'T EDIT WHEN STARTED	Try to change value of a parameter, which is allowed to be changed only when system is not started. E.g. PAR 16.02 RUN ENABLE
3	CAN'T EDIT UP+DOWN ONLY	Try to change value of a "reset only" parameter other than zero. UP+DOWN buttons must be pressed simultaneoulsy for requesting default value of the PAR on the display (value zero), and after that ENTER pressed for saving it (reset the parameter). E.g. PAR 04.01 LAST FAULT
4	CAN'T EDIT INP VOLTAGE LOW	Input voltage too low. Changing of parameters prohibited since system cannot save values to nv-mem w/ insufficient voltage.
5	CAN'T EDIT PAR IS HIDDEN	Try to save value (=press the ENTER key in Parameter Edit State) of a hidden parameter. Should not be possible. If hidden parameters are turned visible, this message is not given.
6	CAN'T EDIT UNDER LO-LIMIT	Try to save value which is over LO-LIMIT of the parameter. Should not be possible when changing parameters from control panel.
7	CAN'T EDIT UNDER HI-LIMIT	Try to save value which is over HI-LIMIT of the parameter. Should not be possible when changing parameters from control panel.
8	CAN'T EDIT ENUM VAL ONLY	Try to save value which is out of enumerated value list. Should not be possible when changing parameters from control panel.
9	CAN'T EDIT NO DEFAULT	Try to request default value (=press UP and DOWN buttons simultaneously) for a parameter which is defined not to have a default value. Should not be possible when changing parameters from control panel.
10	CAN'T EDIT TRY AGAIN.	Parameter system is busy, e.g. application macro change is in process at the same time when someone is trying to save a value for a parameter. Should not be possible when changing parameters from control panel.

Maintenance

See *Maintenance* for the ACH550-UH on page *31*.

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ACH550-PCR/PDR

Installation

This information is unique to ACH550 input disconnect configurations (PCR or PDR). The ACH550 with Input Disconnect is an ACH550 AC adjustable frequency drive packaged with an input disconnect switch or circuit breaker. Refer to the *Installation* instructions on page *3*, for all other information. **Failure to observe the warnings and instructions may cause a malfunction or personal hazard.**

WARNING! Before you begin read *Safety* on page *2*.

WARNING! When the ACH550 with Input Disconnect is connected to the line power, the Motor Terminals T1, T2, and T3 are live even if the motor is not running. Do not make any connections when the ACH550 with Input Disconnect is connected to the line. Disconnect and lock out power to the drive before servicing the drive. Failure to disconnect power may cause serious injury or death.

1. Install wiring

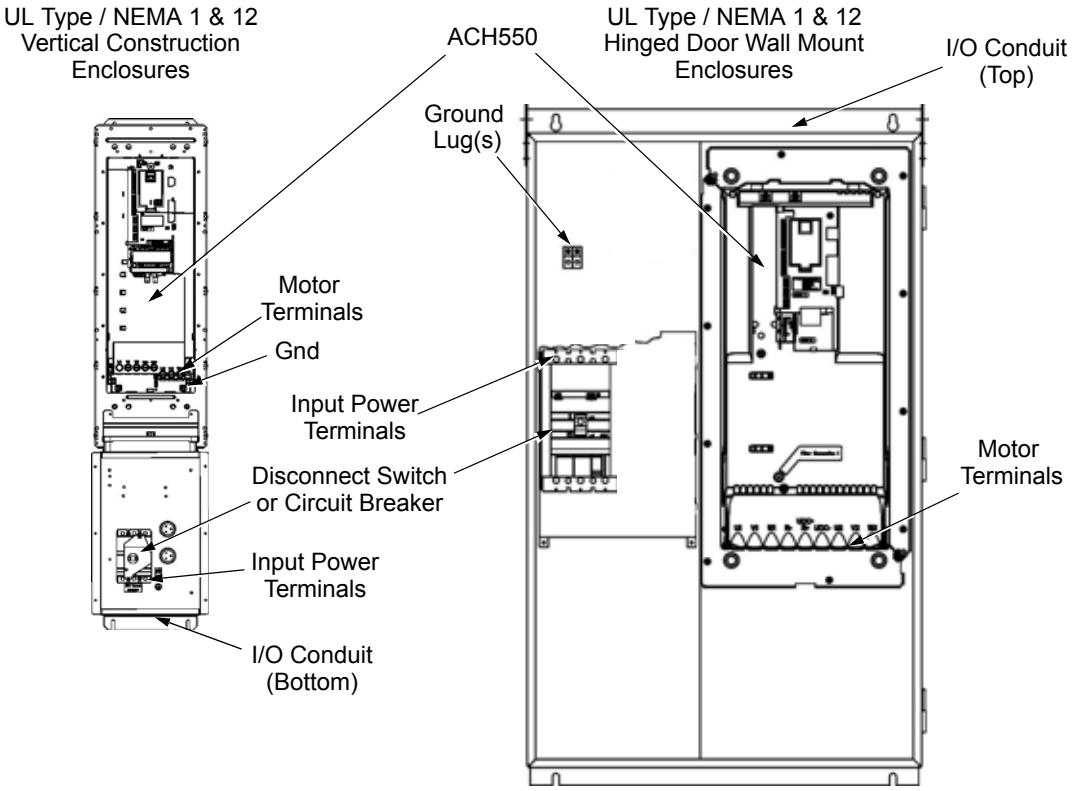
WARNING!

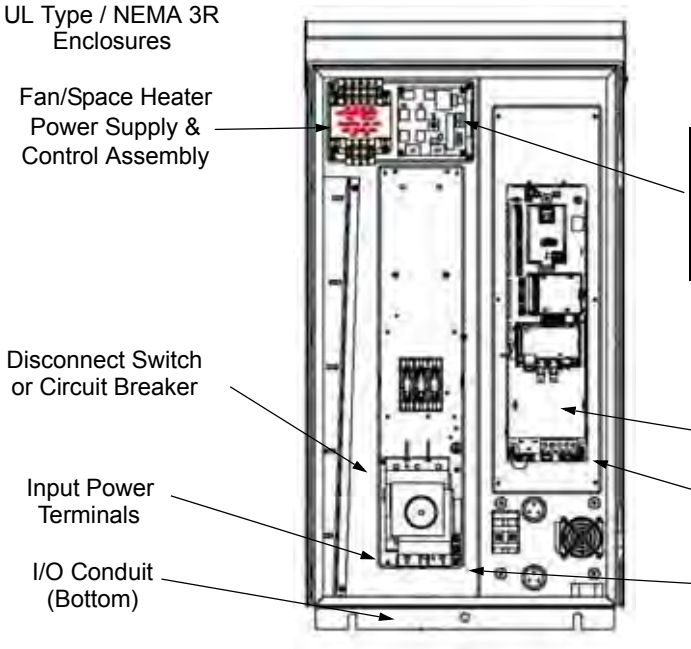
- Metal shavings or debris in the enclosure can damage electrical equipment and create a hazardous condition. Where parts, such as conduit plates require cutting or drilling, first remove the part. If that is not practical, cover nearby electrical components to protect them from all shavings or debris.
- Do not connect or disconnect input or output power wiring, or control wires, when power is applied.
- Never connect line voltage to drive output Terminals T1, T2, and T3.
- Do not make any voltage tolerance tests (Hi Pot or Megger) on any part of the unit. Disconnect motor wires before taking any measurements in the motor or motor wires.
- Make sure that power factor correction capacitors are not connected between the drive and the motor.

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Connection diagrams – standard drive with input disconnect (wall mounted)

The following figure shows the Standard Drive with Input Disconnect (wall mounted) wiring connection points.





RHTR Temperature HI / LO Jumper (X1)	Heater ON Temperature	Heater OFF Temperature
Default Setting (X1 jumper in LO position)	14.4 °C 58 °F	21.4 °C 70.5 °F
Alternate Setting (X1 jumper in HI position)	17.8 °C 64 °F	24.7 °C 76.5 °F

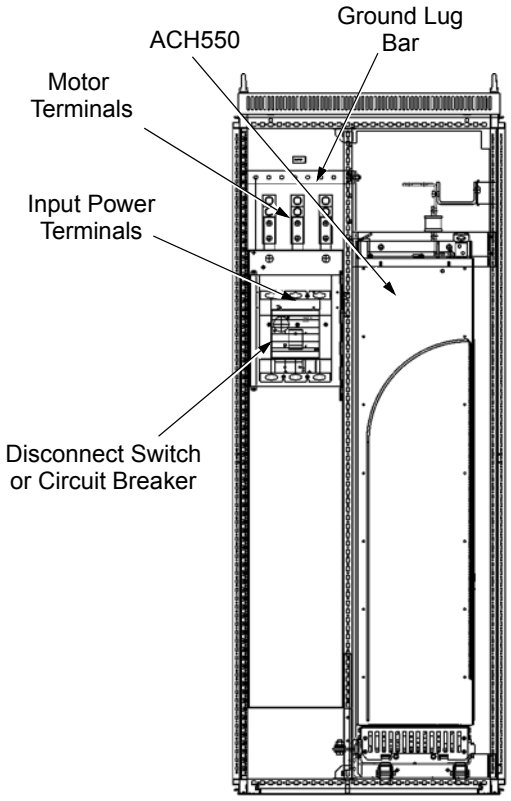
The alternate (HI) setting further reduces the likelihood of condensate in high humidity environments.

Note: Some UL Type 3R enclosures are designed to be mounted on a wall. Mounting some of these 3R enclosures on an open rack system requires the use of the supplied 3R enclosure back plates to maintain 3R integrity.

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Connection diagrams – standard drive with input disconnect (floor mounted)

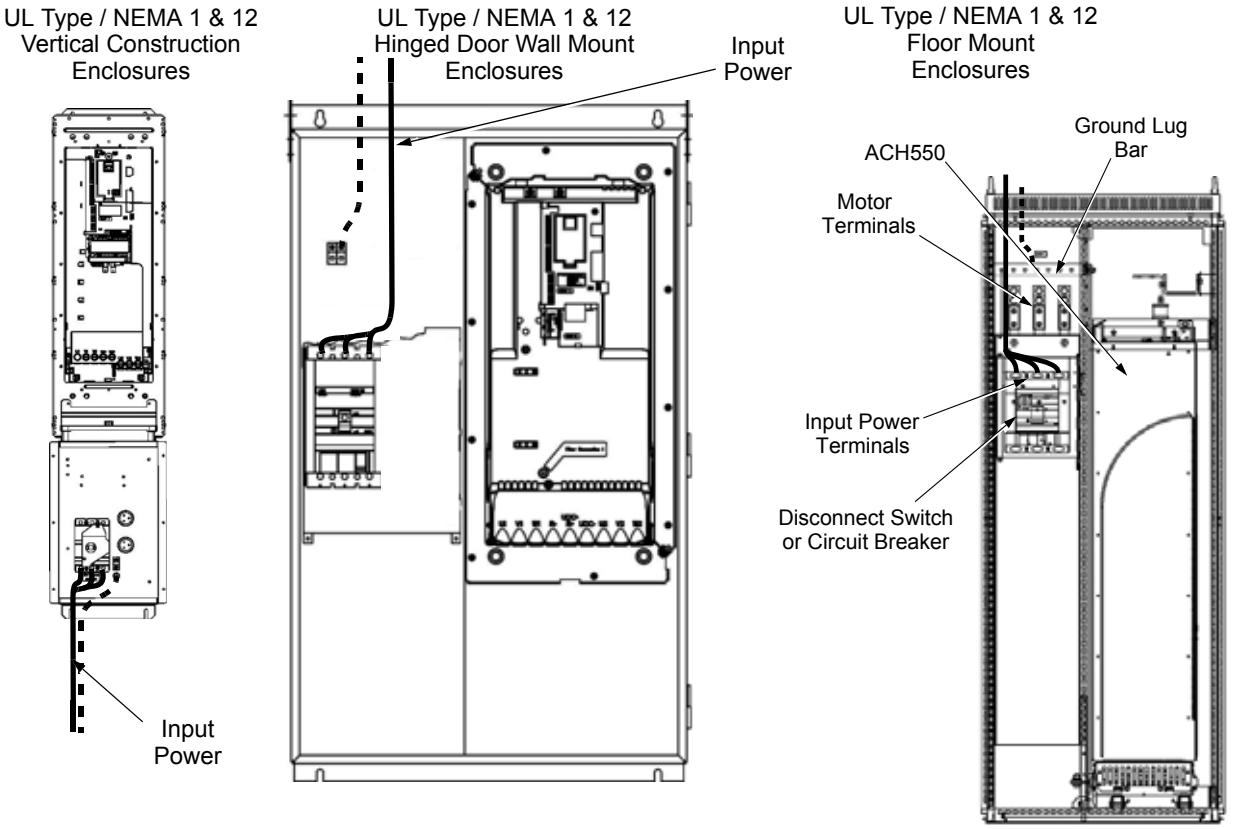
Floor mounted UL Type / NEMA 1 & 12 Drive with Input Disconnect units are configured for wiring access from the top and include a removable conduit mounting plate. The following figure shows the wiring connection points.



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Line input connections – standard drive with input disconnect configurations

Connect input power to the terminals of the disconnect switch or circuit breaker. Connect the equipment grounding conductor to the ground lug at the top of the enclosure. The figure below shows the connection points for Standard Drive with Input Disconnect configurations.



Dashed line is ground run.

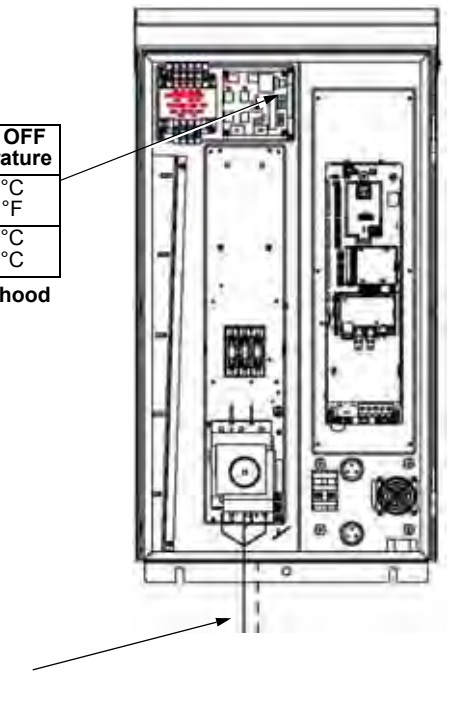
Note: The terminals on disconnect switches for the following rated ACH550-PDR products is 7 in-lbs. Do not use a power driver or over tighten to prevent breaking screw heads or stripping the terminal.

230 VAC	460 VAC	600 VAC
-04A6-2	-03A3-4	-02A7-6
-06A6-2	-04A1-4	-03A9-6
-07A5-2	-06A9-4	-06A1-6
-012A-2	-08A8-4	-09A0-6
-017A-2	-012A-4	-011A-6
-024A-2	-015A-4	-017A-6
-031A-2	-023A-4	

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RHTR Temperature HI / LO Jumper (X1)	Heater ON Temperature	Heater OFF Temperature
Default Setting (X1 jumper in LO position)	14.4 °C 58 °F	21.4 °C 70.5 °F
Alternate Setting (X1 jumper in HI position)	17.8 °C 64 °F	24.7 °C 76.5 °F

The alternate (HI) setting further reduces the likelihood of condensate in high humidity environments.



WARNING! Check the motor and motor wiring insulation before connecting the ACH550 to line power. Follow the procedure on page *12*. Before proceeding with the insulation resistance measurements, check that the ACH550 is disconnected from incoming line power. Failure to disconnect line power could result in death or serious injury.

Note: For the remainder of the wiring (motor and control wiring) refer to page *7*.

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Power connection terminals

The following tables show maximum wire size and required tightening torque for incoming power, grounding and motor terminals.

208/240 Volt		Base Drive Frame Size	Power Wiring Data[2]						
HP	Type Code[1]		Circuit Breaker UL Type/ NEMA 1 &12	Circuit Breaker UL Type / NEMA 3R	Disconnect Switch UL Type/ NEMA 1&12	Disconnect Switch UL Type/ NEMA 3R	Motor Terminals	Ground Lugs UL Type/ NEMA 1&12	Ground Lugs UL Type / NEMA 3R
1	ACH550-PxR-04A6-2	R1	#10 35 in-lbs	#10 35 in-lbs	#10 7 in-lbs	#10 7 in-lbs	Refer to Drive's power connection terminals	#10 35 in-lbs	#10 35 in-lbs
1.5	ACH550-PxR-06A6-2	R1							
2	ACH550-PxR-07A5-2	R1							
3	ACH550-PxR-012A-2	R1							
5	ACH550-PxR-017A-2	R1							
7.5	ACH550-PxR-024A-2	R2	#6 45 in-lbs	#6 45 in-lbs	#8 7 in-lbs	#8 7 in-lbs		#6 35 in-lbs	#6 35 in-lbs
10	ACH550-PxR-031A-2	R2							
15	ACH550-PxR-046A-2	R3	#3 50 in-lbs	#3 50 in-lbs	#4 18 in-lbs	#4 18 in-lbs		#3 50 in-lbs	#3 50 in-lbs
20	ACH550-PxR-059A-2	R3							
25	ACH550-PxR-075A-2	R4	#1 50 in-lbs	#1 50 in-lbs	#1 55 in-lbs	#1 55 in-lbs		#2 50 in-lbs	#2 50 in-lbs
30	ACH550-PxR-088A-2	R4	350 MCM 274 in-lbs	300 MCM 200 in-lbs	#1/0 70 in-lbs	#1/0 70 in-lbs			
40	ACH550-PxR-114A-2	R4			300 MCM 275 in-lbs	300 MCM 200 in-lbs			
50	ACH550-PxR-143A-2	R6						3 x #3/0 250 in-lbs	#2/0 275 in-lbs
60	ACH550-PxR-178A-2	R6							
75	ACH550-PxR-221A-2	R6	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs			350 MCM 100 in-lbs
100	ACH550-PxR-248A-2	R6							

1. "PxR" represents both PCR and PDR.

2. Torque values shown relate to current production. Check component labels on previously installed units for required tightening torque.

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480 Volt		Base Drive Frame Size	Power Wiring Data[2]						
HP	Type Code[1]		Circuit Breaker UL Type/ NEMA 1 &12	Circuit Breaker UL Type/ NEMA 3R	Disconnect Switch UL Type/ NEMA 1&12	Disconnect Switch UL Type/ NEMA 3R	Motor Terminals	Ground Lugs UL Type/ NEMA 1&12	Ground Lugs UL Type / NEMA 3R
1/1.5	ACH550-PxR-03A3-4	R1	#10 35 in-lbs	#10 35 in-lbs	#10 7 in-lbs	#10 7 in-lbs	Refer to Drive's power connection terminals	#10 35 in-lbs	#10 35 in-lbs
2	ACH550-PxR-04A1-4	R1							
3	ACH550-PxR-06A9-4	R1							
5	ACH550-PxR-08A8-4	R1							
7.5	ACH550-PxR-012A-4	R1							
10	ACH550-PxR-015A-4	R2	#6 45 in-lbs	#6 45 in-lbs	#8 7 in-lbs	#8 7 in-lbs		#6 35 in-lbs	#6 35 in-lbs
15	ACH550-PxR-023A-4	R2							
20	ACH550-PxR-031A-4	R3	#3 50 in-lbs	#3 50 in-lbs				#3 50 in-lbs	#3 50 in-lbs
25	ACH550-PxR-038A-4	R3			#4 18 in-lbs	#4 18 in-lbs			
30	ACH550-PxR-045A-4	R3							
40	ACH550-PxR-059A-4	R4	#1 50 in-lbs	#1 50 in-lbs				#1 50 in-lbs	#1 50 in-lbs
50	ACH550-PxR-072A-4	R4			#1 55 in-lbs	#1 55 in-lbs			
60	ACH550-PxR-078A-4	R4			#1 50 in-lbs	#1 62 in-lbs			
75	ACH550-PxR-097A-4	R4	350 MCM 274 in-lbs	300 MCM 200 in-lbs	#1/0 70 in-lbs	#1/0 70 in-lbs		3 x #3/0 250 in-lbs	#2 50 in-lbs
100	ACH550-PxR-125A-4	R5			300 MCM 275 in-lbs	300 MCM 200 in-lbs			#2/0 375 in-lbs
125	ACH550-PxR-157A-4	R6							
150	ACH550-PxR-180A-4	R6							350 MCM 100 in-lbs
200	ACH550-PxR-246A-4	R6	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs	2 x 500 MCM 274 in-lbs			
250	ACH550-PxR-316A-4	R8	2 x 500 MCM 274 in-lbs		2 x 500 MCM 274 in-lbs			5 Bus Bar Holes (13/32")	
300	ACH550-PxR-368A-4	R8							
350	ACH550-PxR-414A-4	R8							
400	ACH550-PxR-486A-4	R8							
450	ACH550-PxR-526A-4	R8	3 x 400 MCM 375 in-lbs		3 x 400 MCM 375 in-lbs				
500	ACH550-PxR-602A-4	R8							
550	ACH550-PxR-645A-4	R8							

1. "PxR" represents both PCR and PDR.

2. Torque values shown relate to current production. Check component labels on previously installed units for required tightening torque.

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600 Volt		Frame Size	Power Wiring Data[2]						
HP	Type Code[1]		Circuit Breaker UL Type / NEMA 1 &12	Circuit Breaker UL Type / NEMA 3R	Disconnect Switch UL Type / NEMA 1&12	Disconnect Switch UL Type / NEMA 3R	Motor Terminals	Ground Lugs UL Type / NEMA 1&12	Ground Lugs UL Type / NEMA 3R
2	ACH550-PxR-02A7-6	R2	#6 62 in-lbs	#6 62 in-lbs	#8 7 in-lbs	#8 7 in-lbs	Refer to Drive's power connection terminals	#6 35 in-lbs	#6 35 in-lbs
3	ACH550-PxR-03A9-6	R2							
5	ACH550-PxR-06A1-6	R2							
7.5	ACH550-PxR-09A0-6	R2							
10	ACH550-PxR-011A-6	R2							
15	ACH550-PxR-017A-6	R2							
20	ACH550-PxR-022A-6	R3	#3 62 in-lbs	#3 62 in-lbs				#3 50 in-lbs	#3 50 in-lbs
25	ACH550-PxR-027A-6	R3							
30	ACH550-PxR-032A-6	R4	#1 62 in-lbs	#1 62 in-lbs	#4 18 in-lbs	#4 18 in-lbs		#2 50 in-lbs	#2 50 in-lbs
40	ACH550-PxR-041A-6	R4							
50	ACH550-PxR-052A-6	R4			#1 55 in-lbs	#1 55 in-lbs			
60	ACH550-PxR-062A-6	R4			#1 62 in-lbs	#1 62 in-lbs			
75	ACH550-PxR-077A-6	R6	350 MCM 274 in-lbs	300 MCM 275 in-lbs	#1/0 70 in-lbs	#1/0 70 in-lbs		3 x #3/0 250 in-lbs	
100	ACH550-PxR-099A-6	R6							
125	ACH550-PxR-125A-6	R6			300 MCM 275 in-lbs	300 MCM 200 in-lbs			#2/0 375 in-lbs
150	ACH550-PxR-144A-6	R6							

1. "PxR" represents both PCR and PDR.

2. Torque values shown relate to current production. Check component labels on previously installed units for required tightening torque.

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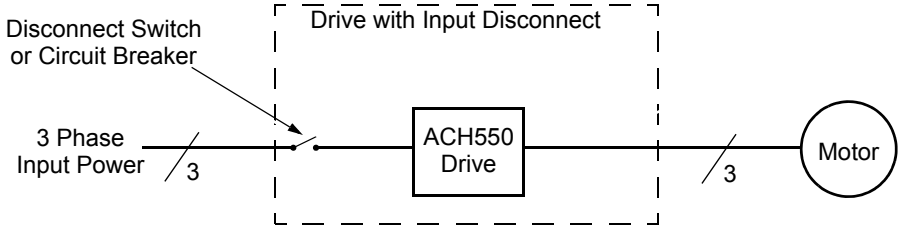
Operation

This information is unique to ACH550 input disconnect configurations (PCR or PDR). Refer to the *Operation* instructions on page *21* for all other information.

Input disconnect configuration

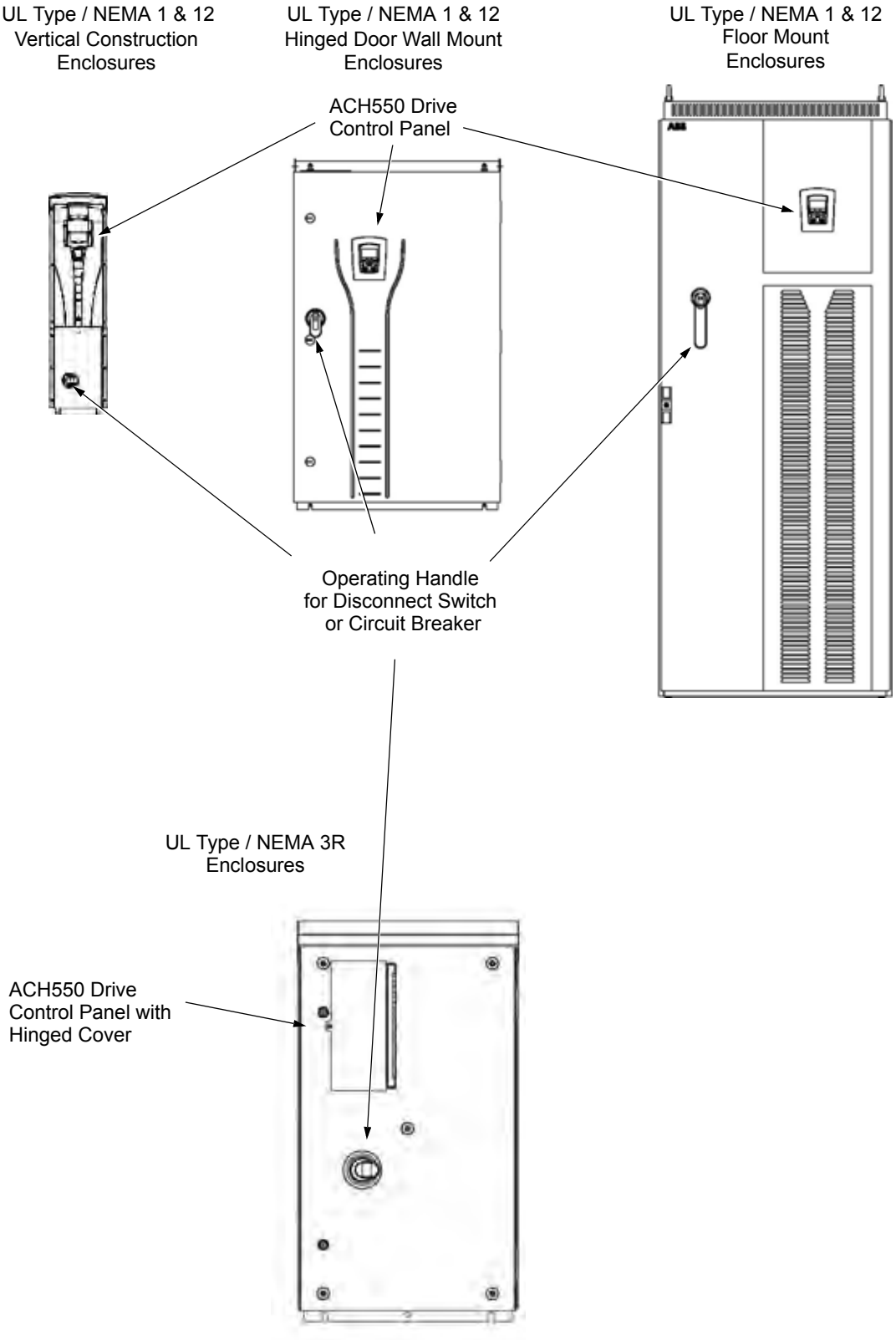
The ACH550 with Input Disconnect is an ACH550 AC adjustable frequency drive packaged with an input disconnect switch or circuit breaker, and with a door interlocked, external operating handle. The operating handle can be padlocked in the OFF position (padlock not supplied). Enclosure options are UL Type 1, UL Type 12, and UL Type 3R (NEMA 1, NEMA 12, and NEMA 3R).

The following is a typical power diagram.



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The following shows the front view of the ACH550 Drive with Input Disconnect standard configurations, and identifies the major components.



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Maintenance

Maintenance intervals

If installed in an appropriate environment, the drive requires very little maintenance. This table lists the routine maintenance intervals recommended by ABB for ACH550 enclosures in addition to the intervals on page 31.

Maintenance	Configuration	Interval	Instruction
Check/replace hinged door wall mount enclosure inlet air filter	Hinged door wall mount UL Type / NEMA 12 enclosures	Check every 3 months. Replace as needed.	*Enclosure air filter replacement – UL Type / NEMA 12 hinged door wall mount enclosures* on page 89.
Check/replace floor mount enclosure inlet air filter	Floor mount UL Type / NEMA 12 enclosures	Check every 3 months. Replace as needed.	See *Maintenance* on page 34 and *Enclosure air filter replacement – UL Type / NEMA 12 hinged door wall mount enclosures* on page 89.
Check/replace NEMA 3R enclosure air filters	UL Type / NEMA 3R enclosures - PX3R-5 and higher	Check every 3 months. Replace as needed.	See PX3R dimensional information.
Check/replace floor mount enclosure exhaust air filter.	Floor mount UL Type / NEMA 12 enclosures	Check every 6 months. Replace as needed.	See *Maintenance* on page 35 and *Enclosure air filter replacement – UL Type / NEMA 12 hinged door wall mount enclosures* on page 89.

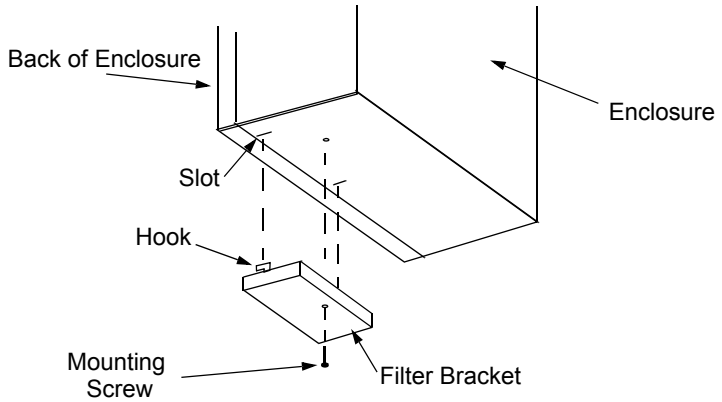
Enclosure air filter replacement – UL Type / NEMA 12 hinged door wall mount enclosures

Filter material

Material	Filter Type
American Air Filter (358-35-06A-12A)	Polykleon White 12.7 mm x 152.4 mm x 304.6 mm stk

This procedure applies to drive with input disconnect configurations in UL Type / NEMA 12 hinged door wall mount enclosures. This filter is located at the bottom of the enclosure. Use the following procedure to check and replace filters.

1. On the enclosure, remove the screw holding the filter bracket in place.
2. Slide the filter bracket forward until the hooks on the bracket clear the slots on the enclosure base. This step allows the filter and bracket to drop free from the enclosure.



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3. Lift the filter out of the filter bracket and replace as appropriate.
4. With the filter in the filter bracket, align the hooks on the bracket with the slots in the enclosure base, and press the hooks up into the slots.
5. Slide the filter bracket back, making sure that the hooks catch on the enclosure.
6. Replace the mounting screw. Tighten until the gasket on the bracket is about 50% compressed.

Enclosure air filter replacement – UL Type / NEMA 12 floor mount enclosures

Filter material

Enclosure Type	Inlet (door)	Outlet (roof)
UL Type / NEMA 12	3AUA0000006723 (qty 1)	3AUA0000006722 (qty 2)

Note: When installing the filter media, the white side must face the outside of the cabinet and the colored side must face the inside of the cabinet. Refer to page *34*.

Diagnostics

Refer to the *Diagnostics* instructions on page *24*.

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Complete ACH550 Drive Parameter List

GROUP 01
OPERATING DATA
101 SPEED & DIR
102 SPEED
103 OUTPUT FREQ
104 CURRENT
105 TORQUE
106 POWER
107 DC BUS VOLTAGE
109 OUTPUT VOLTAGE
110 DRIVE TEMP
111 EXTERNAL REF 1
112 EXTERNAL REF 2
113 CTRL LOCATION
114 RUN TIME (R)
115 KWH COUNTER (R)
116 APPL BLK OUTPUT
118 DI 1-3 STATUS
119 DI 4-6 STATUS
120 AI 1
121 AI 2
122 RO 1-3 STATUS
123 RO 4-6 STATUS
124 AO 1
125 AO 2
126 PID 1 OUTPUT
127 PID 2 OUTPUT
128 PID 1 SETPNT
129 PID 2 SETPNT
130 PID 1 FBK
131 PID 2 FBK
132 PID 1 DEVIATION
133 PID 2 DEVIATION
134 COMM RO WORD
135 COMM VALUE 1
136 COMM VALUE 2
137 PROCESS VAR 1
138 PROCESS VAR 2
139 PROCESS VAR 3
140 RUN TIME
141 MWH COUNTER
142 REVOLUTION CNTR
143 DRIVE ON TIME HI
144 DRIVE ON TIME LO
145 MOTOR TEMP
150 CB TEMP
153 MOT THERM STRESS
158 PID COMM VALUE 1
159 PID COMM VALUE 2
174 SAVED KWH
175 SAVED MWH
176 SAVED AMOUNT 1
177 SAVED AMOUNT 2
178 SAVED CO2
GROUP 03
FB ACTUAL SIGNALS
301 FB CMD WORD 1
302 FB CMD WORD 2
303 FB STS WORD 1
304 FB STS WORD 2
305 FAULT WORD 1
306 FAULT WORD 2
307 FAULT WORD 3
308 ALARM WORD 1
309 ALARM WORD 2
GROUP 04
FAULT HISTORY
401 LAST FAULT
402 FAULT TIME 1
403 FAULT TIME 2
404 SPEED AT FLT
405 FREQ AT FLT
406 VOLTAGE AT FLT
407 CURRENT AT FLT
408 TORQUE AT FLT
409 STATUS AT FLT
410 DI 1-3 AT FLT
411 DI 4-6 AT FLT
412 PREVIOUS FAULT 1
413 PREVIOUS FAULT 2
GROUP 10
START/STOP/DIR
1001 EXT1 COMMANDS
1002 EXT2 COMMANDS
1003 DIRECTION

GROUP 11
REFERENCE SELECT
1101 KEYPAD REF SEL
1102 EXT1/EXT2 SEL
1103 REF1 SELECT
1104 REF 1 MIN
1105 REF 1 MAX
1106 REF2 SELECT
1107 REF 2 MIN
1108 REF 2 MAX
GROUP 12
CONSTANT SPEEDS
1201 CONST SPEED SEL
1202 CONST SPEED 1
1203 CONST SPEED 2
1204 CONST SPEED 3
1205 CONST SPEED 4
1206 CONST SPEED 5
1207 CONST SPEED 6
1208 CONST SPEED 7
1209 TIMED MODE SEL
GROUP 13
ANALOG INPUTS
1301 MINIMUN AI1
1302 MAXIMUM AI1
1303 FILTER AI1
1304 MINIMUM AI2
1305 MAXIMUM AI2
1306 FILTER AI2
GROUP 14
RELAY OUTPUTS
1401 RELAY OUTPUT 1
1402 RELAY OUTPUT 2
1403 RELAY OUTPUT 3
1404 RO 1 ON DELAY
1405 RO 1 OFF DELAY
1406 RO 2 ON DELAY
1407 RO 2 OFF DELAY
1408 RO 3 ON DELAY
1409 RO 3 OFF DELAY
1410 RELAY OUTPUT 4
1411 RELAY OUTPUT 5
1412 RELAY OUTPUT 6
1413 RO 4 ON DELAY
1414 RO 4 OFF DELAY
1415 RO 5 ON DELAY
1416 RO 5 OFF DELAY
1417 RO 6 ON DELAY
1418 RO 6 OFF DELAY
GROUP 15
ANALOG OUTPUTS
1501 AO1 CONTENT
1502 AO1 CONTENT MIN
1503 AO1 CONTENT MAX
1504 MINIMUM AO1
1505 MAXIMUM AO1
1506 FILTER AO1
1507 AO2 CONTENT
1508 AO2 CONTENT MIN
1509 AO2 CONTENT MAX
1510 MINIMUM AO2
1511 MAXIMUM AO2
1512 FILTER AO2
GROUP 16
SYSTEM CONTROLS
1601 RUN ENABLE
1602 PARAMETER LOCK
1603 PASS CODE
1604 FAULT RESET SEL
1605 USER PAR SET CHG
1606 LOCAL LOCK
1607 PARAM SAVE
1608 START ENABLE 1
1609 START ENABLE 2
1610 DISPLAY ALARMS
1611 PARAMETER VIEW
1612 FAN CONTROL
1613 FAULT RESET
GROUP 17
OVERRIDE
1701 OVERRIDE SEL
1702 OVERRIDE FREQ
1703 OVERRIDE SPEED
1704 OVERR PASS CODE
1705 OVERRIDE
1706 OVERRIDE DIR
1707 OVERRIDE REF
GROUP 20
LIMITS
2001 MINIMUM SPEED
2002 MAXIMUM SPEED
2003 MAX CURRENT
2006 UNDERVOLT CTRL
2007 MINIMUM FREQ
2008 MAXIMUM FREQ
2013 MIN TORQUE SEL
2014 MAX TORQUE SEL
2015 MIN TORQUE 1
2016 MIN TORQUE 2
2017 MAX TORQUE 1
2018 MAX TORQUE 2
GROUP 21
START/STOP
2101 START FUNCTION
2102 STOP FUNCTION
2103 DC MAGN TIME
2104 DC HOLD CTL
2105 DC HOLD SPEED
2106 DC CURR REF
2107 DC BRAKE TIME
2108 START INHIBIT
2109 EM STOP SEL
2110 TORQ BOOST CURR
2113 START DELAY
GROUP 22
ACCEL/DECEL
2201 ACC/DEC 1/2 SEL
2202 ACCELER TIME 1
2203 DECELER TIME 1
2204 RAMP SHAPE 1
2205 ACCELER TIME 2
2206 DECELER TIME 2
2207 RAMP SHAPE 2
2208 EM DEC TIME
2209 RAMP INPUT 0
GROUP 23
SPEED CONTROL
2301 PROP GAIN
2302 INTEGRATION TIME
2303 DERIVATION TIME
2304 ACC COMPENSATION
2305 AUTOTUNE RUN
GROUP 25
CRITICAL SPEEDS
2501 CRIT SPEED SEL
2502 CRIT SPEED 1 LO
2503 CRIT SPEED 1 HI
2504 CRIT SPEED 2 LO
2505 CRIT SPEED 2 HI
2506 CRIT SPEED 3 LO
2507 CRIT SPEED 3 HI
GROUP 26
MOTOR CONTROL
2601 FLUX OPT ENABLE
2602 FLUX BRAKING
2603 IR COMP VOLT
2604 IR COMP FREQ
2605 U/F RATIO
2606 SWITCHING FREQ
2607 SW FREQ CTRL
2608 SLIP COMP RATIO
2609 NOISE SMOOTHING
2619 DC STABILIZER
2625 OVERMODULATION
GROUP 29
MAINTENANCE TRIG
2901 COOLING FAN TRIG
2902 COOLING FAN ACT
2903 REVOLUTION TRIG
2904 REVOLUTION ACT
2905 RUN TIME TRIG
2906 RUN TIME ACT
2907 USER MWH TRIG
2908 USER MWH ACT
GROUP 30
FAULT FUNCTIONS
3001 AI<MIN FUNCTION
3002 PANEL COMM ERR
3003 EXTERNAL FAULT 1
3004 EXTERNAL FAULT 2
3005 MOT THERM PROT
3006 MOT THERM TIME
3007 MOT LOAD CURVE
3008 ZERO SPEED LOAD
3009 BREAK POINT FREQ
3010 STALL FUNCTION
3011 STALL FREQUENCY
3012 STALL TIME
3017 EARTH FAULT
3018 COMM FAULT FUNC
3019 COMM FAULT TIME
3021 AI1 FAULT LIMIT
3022 AI2 FAULT LIMIT
3023 WIRING FAULT
3024 CB TEMP FAULT
3028 EARTH FAULT LVL
GROUP 31
AUTOMATIC RESET
3101 NR OF TRIALS
3102 TRIAL TIME
3103 DELAY TIME
3104 AR OVERCURRENT
3105 AR OVERVOLTAGE
3106 AR UNDERVOLTAGE
3107 AR AI<MIN
3108 AR EXTERNAL FLT
GROUP 32
SUPERVISION
3201 SUPERV 1 PARAM
3202 SUPERV 1 LIM LO
3203 SUPERV 1 LIM HI
3204 SUPERV 2 PARAM
3205 SUPERV 2 LIM LO
3206 SUPERV 2 LIM HI
3207 SUPERV 3 PARAM
3208 SUPERV 3 LIM LO
3209 SUPERV 3 LIM HI
GROUP 33
INFORMATION
3301 FW VERSION
3302 LP VERSION
3303 TEST DATE
3304 DRIVE RATING
3305 PARTABLE VERSION
GROUP 34
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3401 SIGNAL 1 PARAM
3402 SIGNAL 1 MIN
3403 SIGNAL 1 MAX
3404 OUTPUT 1 DSP FORM
3405 OUTPUT 1 UNIT
3406 OUTPUT 1 MIN
3407 OUTPUT 1 MAX
3408 SIGNAL 2 PARAM
3409 SIGNAL 2 MIN
3410 SIGNAL 2 MAX
3411 OUTPUT 2 DSP FORM
3412 OUTPUT 2 UNIT
3413 OUTPUT 2 MIN
3414 OUTPUT 2 MAX
3415 SIGNAL 3 PARAM
3416 SIGNAL 3 MIN
3417 SIGNAL 3 MAX
3418 OUTPUT 3 DSP FORM
3419 OUTPUT 3 UNIT
3420 OUTPUT 3 MIN
3421 OUTPUT 3 MAX
GROUP 35
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3501 SENSOR TYPE
3502 INPUT SELECTION
3503 ALARM LIMIT
3504 FAULT LIMIT
GROUP 36
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3601 TIMERS ENABLE
3602 START TIME 1
3603 STOP TIME 1
3604 START DAY 1
3605 STOP DAY 1
3606 START TIME 2
3607 STOP TIME 2
3608 START DAY 2
3609 STOP DAY 2
3610 START TIME 3
3611 STOP TIME 3
3612 START DAY 3
3613 STOP DAY 3
3614 START TIME 4
3615 STOP TIME 4
3616 START DAY 4
3617 STOP DAY 4
3622 BOOST SEL
3623 BOOST TIME
3626 TIMER 1 SRC
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3628 TIMER 3 SRC
3629 TIMER 4 SRC
GROUP 37
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3701 USER LOAD C MODE
3702 USER LOAD C FUNC
3703 USER LOAD C TIME
3704 LOAD FREQ 1
3705 LOAD TORQ LOW 1
3706 LOAD TORQ HIGH 1
3707 LOAD FREQ 2
3708 LOAD TORQ LOW 2
3709 LOAD TORQ HIGH 2
3710 LOAD FREQ 3
3711 LOAD TORQ LOW 3
3712 LOAD TORQ HIGH 3
3713 LOAD FREQ 4
3714 LOAD TORQ LOW 4
3715 LOAD TORQ HIGH 4
3716 LOAD FREQ 5
3717 LOAD TORQ LOW 5
3718 LOAD TORQ HIGH 5
GROUP 40
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4001 GAIN
4002 INTEGRATION TIME
4003 DERIVATION TIME
4004 PID DERIV FILTER
4005 ERROR VALUE INV
4006 UNITS
4007 DSP FORMAT
4008 0% VALUE
4009 100% VALUE
4010 SET POINT SEL
4011 INTERNAL SETPNT
4012 SETPOINT MIN
4013 SETPOINT MAX
4014 FBK SEL
4015 FBK MULTIPLIER
4016 ACT1 INPUT
4017 ACT2 INPUT
4018 ACT1 MINIMUM
4019 ACT1 MAXIMUM
4020 ACT2 MINIMUM
4021 ACT2 MAXIMUM
4022 SLEEP SELECTION
4023 PID SLEEP LEVEL
4024 PID SLEEP DELAY
4025 WAKE-UP DEV
4026 WAKE-UP DELAY
4027 PID 1 PARAM SET
GROUP 41
PROCESS PID SET 2
4101 GAIN
4102 INTEGRATION TIME
4103 DERIVATION TIME
4104 PID DERIV FILTER
4105 ERROR VALUE INV
4106 UNITS
4107 UNIT SCALE
4108 0% VALUE
4109 100% VALUE
4110 SET POINT SEL
4111 INTERNAL SETPNT
4112 SETPOINT MIN
4113 SETPOINT MAX
4114 FBK SEL
4115 FBK MULTIPLIER
4116 ACT1 INPUT

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4117	ACT2 INPUT
4118	ACT1 MINIMUM
4119	ACT1 MAXIMUM
4120	ACT2 MINIMUM
4121	ACT2 MAXIMUM
4122	SLEEP SELECTION
4123	PID SLEEP LEVEL
4124	PID SLEEP DELAY
4125	WAKE-UP DEV
4126	WAKE-UP DELAY
GROUP 42	
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4201	GAIN
4202	INTEGRATION TIME
4203	DERIVATION TIME
4204	PID DERIV FILTER
4205	ERROR VALUE INV
4206	UNITS
4207	DSP FORMAT
4208	0% VALUE
4209	100% VALUE
4210	SET POINT SEL
4211	INTERNAL SETPNT
4212	SETPOINT MIN
4213	SETPOINT MAX
4214	FBK SEL
4215	FBK MULTIPLIER
4216	ACT1 INPUT
4217	ACT2 INPUT
4218	ACT1 MINIMUM
4219	ACT1 MAXIMUM
4220	ACT2 MINIMUM
4221	ACT2 MAXIMUM
4228	ACTIVATE
4229	OFFSET
4230	TRIM MODE
4231	TRIM SCALE
4232	CORRECTION SRC
GROUP 45	
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4502	ENERGY PRICE
4507	CO2 CONV FACTOR
4508	PUMP POWER
4509	ENERGY RESET
GROUP 51	
EXT COMM MODULE	
5101	FBA TYPE
5102	FBA PAR 2…26
5127	FBA PAR REFRESH
5128	FILE CPI FW REV
5129	FILE CONFIG ID
2130	FILE CONFIG REV
5131	FBA STATUS
5132	FBA CPI FW REV
5133	FBA APPL FW REV
GROUP 52	
PANEL COMM	
5201	STATION ID
5202	BAUD RATE
5203	PARITY
5204	OK MESSAGES
5205	PARITY ERRORS
5206	FRAME ERRORS
5207	BUFFER OVERRUNS
5208	CRC ERRORS
GROUP 53	
EFB PROTOCOL	
5301	EFB PROTOCOL ID
5302	EFB STATION ID
5303	EFB BAUD RATE
5304	EFB PARITY
5305	EFB CTRL PROFILE
5306	EFB OK MESSAGES
5307	EFB CRC ERRORS
5308	EFB UART ERRORS
5309	EFB STATUS
5310	EFB PAR 10-18
5319	EFB PAR 19-20
GROUP 64	
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6401	PVL SIGNAL
6402	PVL FILTER TIME
6403	LOGGERS RESET
6404	AL2 SIGNAL
6405	AL2 SIGNAL BASE
6406	PEAK VALUE
6407	PEAK TIME 1
6408	PEAK TIME 2
6409	CURRENT AT PEAK
6410	UDC AT PEAK
6411	FREQ AT PEAK
6412	TIME OF RESET 1
6413	TIME OF RESET 2
6414	AL1RANGE0TO10
6415	AL1RANGE10TO20
6416	AL1RANGE20TO30
6417	AL1RANGE30TO40
6418	AL1RANGE40TO50
6419	AL1RANGE50TO60
6420	AL1RANGE60TO70
6421	AL1RANGE70TO80
6422	AL1RANGE80TO90
6423	AL1RANGE90TO
6424	AL2RANGE0TO10
6425	AL2RANGE10TO20
6426	AL2RANGE20TO30
6427	AL2RANGE30TO40
6428	AL2RANGE40TO50
6429	AL2RANGE50TO60
6430	AL2RANGE60TO70
6431	AL2RANGE70TO80
6432	AL2RANGE80TO90
6433	AL2RANGE90TO
GROUP 81	
PFA CONTROL	
8103	REFERENCE STEP 1
8104	REFERENCE STEP 2
8105	REFERENCE STEP 3
8109	START FREQ 1
8110	START FREQ 2
8111	START FREQ 3
8112	LOW FREQ 1
8113	LOW FREQ 2
8114	LOW FREQ 3
8115	AUX MOT START D
8116	AUX MOT STOP D
8117	NR OF AUX MOT
8118	AUTOCHNG INTERV
8119	AUTOCHNG LEVEL
8120	INTERLOCKS
8121	REG BYPASS CTRL
8122	PFA START DELAY
8123	PFA ENABLE
8124	ACC IN AUX STOP
8125	DEC IN AUX START
8126	TIMED AUTOCHNG
8127	MOTORS
8128	AUX START ORDER
GROUP 98	
OPTIONS	
9802	COMM PROT SEL
GROUP 99	
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9901	LANGUAGE
9902	APPLIC MACRO
9904	MOTOR CTRL MODE
9905	MOTOR NOM VOLT
9906	MOTOR NOM CURR
9907	MOTOR NOM FREQ
9908	MOTOR NOM SPEED
9909	MOTOR NOM POWER
9915	MOTOR COSPHI

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GROUP 01	
ACTUAL DATA	
0101	MOTOR CURR
0102	INPUT VOLT
0103	DI STATUS
0104	RO STATUS
0105	PCB TEMP
0106	KW HOURS
0107	COMM RO
0108	RUN TIME
0109	ON TIME 1
0110	ON TIME 2
0111	A-B VOLT
0112	B-C VOLT
0113	C-A VOLT
0114	MWH SAVED
0115	COST SAVED
0116	CO2 SAVED
0117	KWH SAVE L
0118	KWH SAVE H
GROUP 03	
STATUS	
0301	FBUS CW 1
0303	FBUS SW 1
0305	FLT WORD 1
0306	FLT WORD 2
0307	FLT WORD 3
0308	ALR WORD 1
0309	ALR WORD 2
GROUP 04	
FAULT LOG	
0401	LAST FAULT
0402	F1 TIME 1
0403	F1 TIME 2
0404	F1 VOLTAGE
0405	F1 CURRENT
0406	F1 EVENT 1
0407	F1 E1 TIME
0408	F1 EVENT 2
0409	F1 E2 TIME
0410	FAULT 2
0411	F2 TIME 1
0412	F2 TIME 2
0413	F2 VOLTAGE
0414	F2 CURRENT
0415	F2 EVENT 1
0416	F2 E1 TIME
0417	F2 EVENT 2
0418	F2 E2 TIME
0419	FAULT 3
0420	FAULT 4
0421	FAULT 5
GROUP 05	
EVENT LOG	
0501	LAST EVENT
0502	E1 TIME 1
0503	E1 TIME 2
0504	EVENT 2
0505	E2 TIME 1
0506	E2 TIME 2
0507	EVENT 3
0508	E3 TIME 1
0509	E3 TIME 2
0510	EVENT 4
0511	E4 TIME 1
0512	E4 TIME 2
GROUP 14	
RELAY OUT	
1401	RO1 SELECT
1402	R1 ON DLY
1403	R1 OFF DLY
1404	RO2 SELECT
1405	R2 ON DLY
1406	R2 OFF DLY
1407	RO3 SELECT
1408	R3 ON DLY
1409	R3 OFF DLY
1410	RO4 SELECT
1411	R4 ON DLY
1412	R4 OFF DLY
1413	RO5 SELECT
1414	R5 ON DLY
1415	R5 OFF DLY
GROUP 16	
SYSTEM CTRL	
1601	START/STOP
1602	RUN ENABLE
1603	START EN 1
1604	START EN 2
1605	START EN 3
1606	START EN 4
1607	RESET SRC
1608	AUTO XFR
1609	OC TRANSFR
1610	OV TRANSFR
1611	UV TRANSFR
1612	AI TRANSFR
1613	BP DISABLE
1614	BP RUN DLY
1615	SAVE PARAM
1616	DISP ALRMS
1617	DRIVE TEST
1618	PASS CODE
1619	PAR LOCK
1620	RUN EN TXT
1621	ST EN1 TXT
1622	ST EN2 TXT
1623	ST EN3 TXT
1624	ST EN4 TXT
1625	COMM CTRL
1626	MODE LOCK
1627	COST/KWH
1628	LEARN MODE
1629	LEARN TIME
1630	REVERSE REQ
1631	DRV/BYPASS
GROUP 17	
OVERRIDE 2	
1701	OVERRIDE 2
1702	RUN EN OVR
1703	ST EN1 OVR
1704	ST EN2 OVR
1706	ST EN4 OVR
1707	FAULTS OVR
1708	OVRD2 MODE
GROUP 30	
FLT FUNCTION	
3001	UL ACTION
3002	UL TIME
3003	UL TRIP %
3004	COMM LOSS
3005	COMM TIME
3006	PHASE LOSS
3007	PHASE SEQ
3008	BYPASS MOL
GROUP 32	
SUPERV CTRL	
3201	SUPER CTRL
3202	START LVL
3203	STOP LEVEL
3204	START DLY
3205	STOP DLY
3206	FBK LOSS
GROUP 33	
INFORMATION	
3301	FW VERSION
3302	PT VERSION
3303	LP VERSION
3304	CB VERSION
3305	TEST DATE
3306	DRIVE TYPE
3307	SUB ASMBLY
3308	PLANT CODE
3309	MFG DATE
3310	UNIT NUM
GROUP 50	
BYPASS EFB	
5001	BP PROT ID
5002	BP MAC ID
5003	BAUD RATE
5004	EFB PARITY
5005	PROFILE
5006	BP OK MSG
5007	BP CRC ERR
5008	UART ERROR
5009	BP STATUS
5010	BP PAR 10
5011	BP PAR 11
5012	BP PAR 12
5013	BP PAR 13
5014	BP PAR 14
5015	BP PAR 15
5016	BP PAR 16
5017	BP PAR 17
5018	BP PAR 18
5019	BP PAR 19
5020	BP PAR 20
GROUP 51	
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5101	FBA TYPE
5102	FBA PAR 2
5103	FBA PAR 3
5104	FBA PAR 4
5105	FBA PAR 5
5106	FBA PAR 6
5107	FBA PAR 7
5108	FBA PAR 8
5109	FBA PAR 9
5110	FBA PAR 10
5111	FBA PAR 11
5112	FBA PAR 12
5113	FBA PAR 13
5114	FBA PAR 14
5115	FBA PAR 15
5116	FBA PAR 16
5117	FBA PAR 17
5118	FBA PAR 18
5119	FBA PAR 19
5120	FBA PAR 20
5121	FBA PAR 21
5122	FBA PAR 22
5123	FBA PAR 23
5124	FBA PAR 24
5125	FBA PAR 25
5126	FBA PAR 26
5127	REFRESH
5128	FBA PAR 28
5129	FBA PAR 29
5130	FBA PAR 30
5131	FBA STATUS
5132	FBA PAR 32
5133	FBA PAR 33
GROUP 53	
DRIVE EFB	
5301	DV PROT ID
5302	DV MAC ID
5303	BAUD RATE
5304	EFB PARITY
5305	PROFILE
5306	DV OK MSG
5307	DV CRC ERR
5308	UART ERROR
5309	DV STATUS
5310	DV PAR 10
5311	DV PAR 11
5312	DV PAR 12
5313	DV PAR 13
5314	DV PAR 14
5315	DV PAR 15
5316	DV PAR 16
5317	DV PAR 17
5318	DV PAR 18
5319	DV PAR 19
5320	DV PAR 20
GROUP 54	
FBA DATA IN	
5401	DATA IN 1
5402	DATA IN 2
5403	DATA IN 3
5404	DATA IN 4
5405	DATA IN 5
5406	DATA IN 6
5407	DATA IN 7
5408	DATA IN 8
5409	DATA IN 9
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5501	DATA OUT 1
5502	DATA OUT 2
5503	DATA OUT 3
5504	DATA OUT 4
5505	DATA OUT 5
5506	DATA OUT 6
5507	DATA OUT 7
5508	DATA OUT 8
5509	DATA OUT 9
5510	DATA OUT10
GROUP 98	
OPTIONS	
9802	COMM PROT SEL
GROUP 99	
STARTUP DATA	
9902	B.P. MACRO

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3AUA0000081824 REV C
Effective: 12/01/2014
Supersedes: 04/15/2012

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25A-3P-RG-4X

ENCLOSURE TYPE 4X
General Use 25A 600V~
MANUAL MOTOR CONTROLLER
Suitable as Motor Disconnect
Short circuit rating 10kA 600VAC
when protected by FUSES

class	K5	RK5	RK1	J
Amp.	30A	30A	60A	80A
3PH V~ 208	415	480	600	
3PH HP 5	10	15	10	
1PH V~ 120	240	Break All		
1PH HP 1.5	3	Lines		

c UL us LISTED IND.CONT.EQ. 12SL

USE COPPER CONDUCTORS ONLY
14-8 AWG 75°C
TERMINAL TORQUE 16 LB.IN.

Ith 40A IP66

AC-22A 25A 690V~
AC-23A 25A 690V~
AC-23A 11kW 415V~

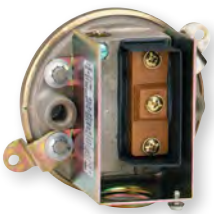
IEC 60947-3

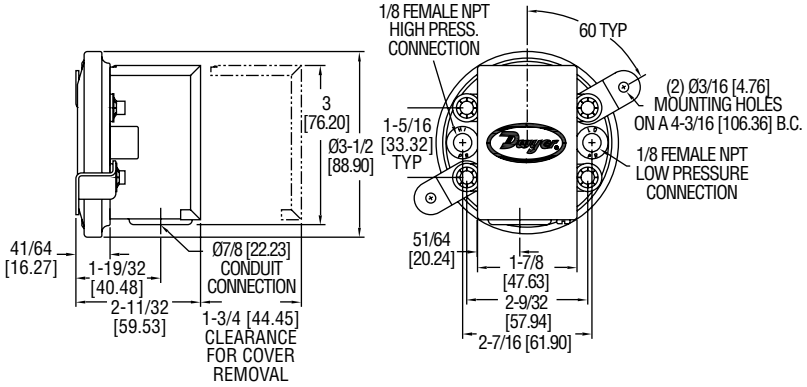
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Series 1900 Pressure Switch

Specifications - Installation and Operating Instruction







Series 1910 pressure switch. All pressure and electrical connections and set point adjustments are on one side for easy installation.

Series 1910 switch with conduit enclosure off. Shows electric switch and set point adjustment screw.

The Dwyer-engineered force-motion amplifier increases the leverage of diaphragm movement and results in a switch with excellent sensitivity and repeatability.

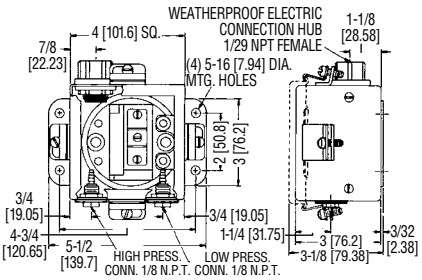
Advanced design and precision construction permit these switches to perform many of the tasks of larger, costlier units. Designed for air conditioning service, they also serve many fluidics, refrigeration, oven and dryer applications. For use with air and non-combustible gases. Series 1900 switches are available with set points of 0.07 to 20 inches water column. Set point adjustment can be made easily - before or after installation. Range screw is inside conduit enclosure to help prevent tampering. For easy mounting and access, pressure and electrical connections and set point adjustment are located on one side. This permits installation in corners or spaces too small for other switches.

SPECIAL MODELS & ACCESSORIES

Special close coupled street elbow for right angle pressure connections. Can be installed on switch anytime. Zinc plated aluminum.

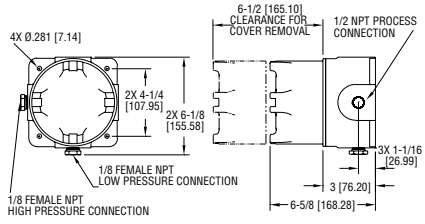
Weatherproof Housing

16 ga. steel enclosure with gasketed cover (NEMA 4) for wet or oily conditions. Withstands 200 hour salt spray test. Wt. 5 lbs. (2.3 kg). Switch must be factory installed. Change 1910 base number to 1911 and add -WP suffix. Example: 19 1-1-WP.



Explosion-Proof Housing

NEMA 7, 9 NEMA 3. (7 lbs). Switch must be factory installed. Change model to 1911 and add -EXPL suffix. Example: 1911-1-EXPL. Aluminum base and cover rated Class I, Groups C & D, Div. 1. Class II, Groups E, F, & G, Div. 1.



SPECIFICATIONS

Service: Air and non-combustible, compatible gases.
Environment: Standard model intended for indoor use.
Wetted Materials: Consult factory.
Temperature Limits: -30 to 180°F (-34 to 82.2°C) (32°F for non dry air).
Pressure Limits: 45″ w.c. (11.2 kPa) continuous, 10 psig (68.95 kPa) surge.
Humidity Limit: 80% RH (non-condensing).
Altitude Limit: 6560 ft (2000 m) max.
Switch Type: Single-pole double-throw (SPDT).
Repeatability: ±3%.
Electrical Rating: 15 A @ 120-480 VAC (~), 60 Hz. Resistive 1/8 HP @125 VAC(~), 1/4 HP @ 250 VAC(~), 60 Hz. Derate to 10 A for operation at high cycle rates.
Electrical Connections: 3 screw type, common, normally open and normally closed.
Installation Category: III (transient over-voltage).
Process Connections: 1/8″ female NPT.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Set Point Adjustment: Screw type inside conduit enclosure.
Pollution Degree: 2.
Weight: 1lb. 4.5 oz. (581 g).
Agency Approvals: CE, UL, CSA, FM.

Explanation of Symbols		
Symbol	**Publication**	**Description**
~	IEC 60417 - 5032	Alternating current
⏚	IEC 60417 - 5019	Protective conductor terminal

Series 1910 Switches - Models Operating Ranges, Deadbands			
		Approximate Dead Band	
Model	**Operating Range, in w.c.**	**At Min. Set Point**	**At Max. Set Point**
1910-00	0.07 to 0.15	0.04	0.04
1910-0	0.15 to 0.5	0.10	0.10
1910-1	0.40 to 1.6	0.15	0.16
1910-5	1.40 to 5.5	0.30	0.30
1910-10	3.0 to 11.75	0.40	0.40
1910-20	4.0 to 20.0	0.40	0.50

DWYER INSTRUMENTS, INC.
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INSTALLATION

1. Select a location that is free from excessive vibration, corrosive atmosphere and where the ambient temperature is within the limits for these switches.

2. Mount standard switches with the diaphragm in a vertical plane and with switch lettering and nameplate in an upright position. Some switches are position sensitive and may not reset properly unless they are mounted with the diaphragm vertical. (Special units can be furnished for other than vertical mounting arrangements if required.)

3. Connect switch to source of pressure, vacuum or differential pressure. Metal tubing with 1/4″ O.D. is recommended, but any tubing which will not restrict the air flow can be used. Connect to the two 1/8″ female NPT pressure ports as noted below:

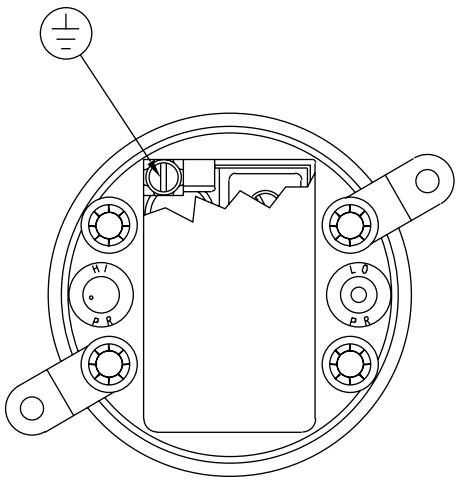
• Differential pressures - connect pipes or tubes from source of greater pressure to high pressure port marked HI-PR and from source of lower pressure to low pressure port marked LO-PR.
• Pressure only (above atmospheric) - connect tube from source of pressure to high pressure port. The low pressure port is left open to atmosphere.
• Vacuum only (below atmospheric pressure) - connect tube from source of vacuum to low pressure port. The high pressure port is left open to atmosphere.

⚠ CAUTION Power must be off while wiring connections are being made.

4. Electrical connections to the standard single pole, double throw snap switch are provided by means of screw terminals marked “common”, “norm open”, and “norm closed”. The normally open contacts close and the normally closed contacts open when pressure increases beyond the set point.

⚠ CAUTION Do not exceed the specified voltage rating. Permanent damage not covered by warranty may result.

5. Switch loads should not exceed the maximum specified current rating of 15 amps resistive. Switch capabilities decrease with high load inductance or rapid cycle rates. Whenever an application involves either of these factors, the user may find it desirable to limit the switched current to 10 amps or less in the interest of prolonging switch life.



OPERATION

Pressure acting on the power diaphragm rotates the amplifying lever, which in turn extends the range spring and rotates the snap switch input lever. When the set point is reached, the snap switcch is actuated and the electrical contacts make or break.

ADJUSTMENT

To change the set point, proceed as follows:
A. Remove the snap-on cover from the conduit enclosure by loosening its retaining screw and pulling firmly at its bottom end. Turn the slotted adjustment screw at the top of range spring housing clockwise to raise the set point pressure and counter-clockwise to lower the set point.

B. The recommended procedure for calibrating or checking
calibration is to use a “T” assembly with three rubber tubing leads, all as short as possible and the entire assembly offering minimum flow restriction. Run one lead to the pressure switch, another to the manometer of known accuracy and appropriate range, and apply pressure through the third tube. Make final approach to the set point very slowly. Note that manometer and pressure switch will have different response times due to different internal volumes, lengths of tubing, fluid drainage etc. Be certain the switch is checked in the position it will assume in use, i.e. with diaphragm in a vertical plane and switch lettering and nameplate in an upright position.

C. For highly critical applications it is a good idea to check the set point adjustment and reset it as necessary once or twice in the first few months of operation. This will compensate for any change in initial tension which may occur in the spring and diaphragm. For most applications this change will not be significant and no resetting will be required.

MAINTENANCE

Moving parts of these switches are sealed in and are permanently tamper proof. The single adjustment is that of the set point. Care should be taken to keep the switch reasonably dry and free from dust or dirt. No lubrication or unusual precautions are required for normal use.

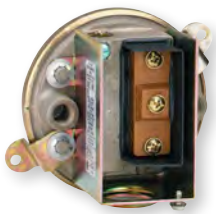
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Fax: 219/872-9057 **e-mail: info@dwyermail.com**

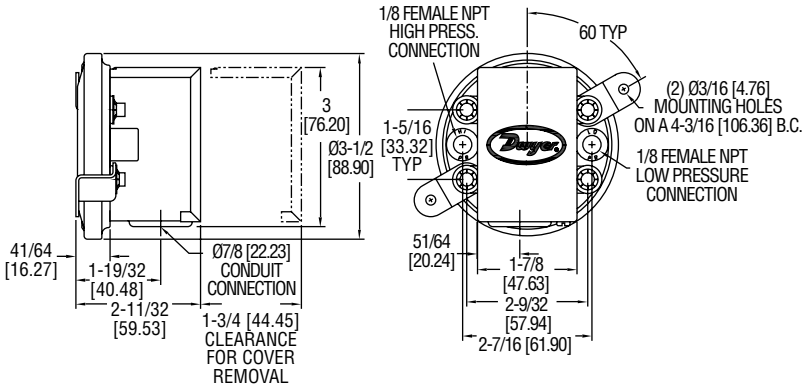
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Presostatos Serie 1900

Instrucciones de Montaje y Operación







Series 1910 pressure switch. All pressure and electrical connections and set point adjustments are on one side for easy installation.

Series 1910 switch with conduit enclosure off. Shows electric switch and set point adjustment screw.

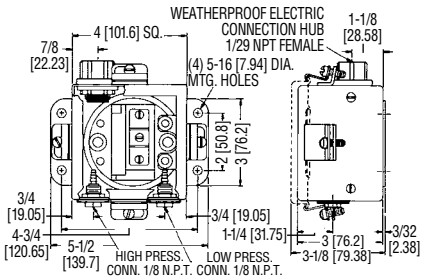
The Dwyer-engineered force-motion amplifier increases the leverage of diaphragm movement and results in a switch with excellent sensitivity and repeatability.

El diseno avanzado y la constucción prcisa permitne que estospresostatos reemplacen a otros de mayor precio y tamaño. Sirven para uso en acondicionamiento de aire, hornos, secaderos y aplicaciones en fluídica y refrigeración. Aptos para uso en aire y gases no combustibles. Ranges disponibles desde 0.07″ a 20″ de C.A.
El ajuste puede ser antes o después de instalado. El tornillo de ajuste está oculto dentro de la cubierta de conexiones para evitar manipuleo indebido. El ajuste, las conexiones de presión y elelctricas están de un solo lado para facilitar el montaje. Esto permite la instalación en rincones o lugares estrechos.

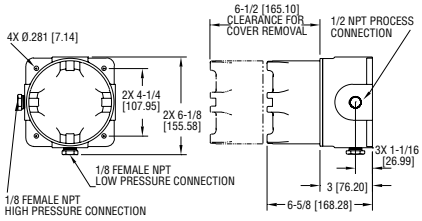
MODELOS Y ACCESORIOS ESPECIALES
Accesorio Dwyer A-329

Codo de conexión an ángulo recto. Puede instalarse en cualquier momento. Construcción en aluminio zincado.

Gabinete Hermético
Gabinete de acero cal. #16 para ambientes extremadamente húmedos o aceitosos. Peso 5 lb. Presóstato instalado en fábrica. Especifique “WP” más el nro. de modelo.



Gabinete Antiexplosivo
Base de hierro fundido y tapa en aluminio. Peso aprox. 5 lb. Especifique “EXPL” más el nro. de modelo.



SPECIFICATIONS

Servicio: Aire y no combusibles, gases compatibles.
Ambiente: Para uso en interiores.
Materiales mojados: Consulte con la fábrica.
Límites de temperature: -30 to 180°F (-34 to 82.2°C).
Límites de presión: 45″ w.c. (11.2 kPa) continuo, 10 psig (68.95 kPa) marejada.
Humedad límite: 80% RH (sin condensación).
Altitud límite: 6560 ft (2000 m) máximo.
Tipo de conmutador: SPDT.
Repetibilidad: ±3%.
Calificación eléctrica 15A @ 120 to 480 VAC, 60 Hz resistador 1/8 HP @ 125 VAC, 1/4 HP @ 250 VAC, 60 Hz desclasifique a 10 para la operación en las tasas de ciclo de alta.
Conexiones eléctricas: 3 tipo de tornillo, C, N.O., N.C.
Categoría de Instalación: III (sobretensión transitoria).
Conexiones a proceso: 1/8″ NPT hembra.
Orientación de montaje: Diafragma en posición vertical. Consulte con la fábrica para las orientaciones otra posición.
Ajuste del punto de ajuste: Tipo de tornillo interior de la caja del conducto.
El grado de contaminación: 2.
Peso: 1 lb 4.5 oz (581 g).
Aprobaciones de las agencias: CE, UL, CSA y FM. Opcional EXPL caja prueba de explosions no posee ninguna autorización de agencias.

Explicación de los símbolos

Symbol	Publication	Description
~	IEC 60417 - 5032	Corriente alterna
⏚	IEC 60417 - 5019	Terminal del conductor de protector

PRESOSTATOS SERIE 1910 - RANGOS Y BANDA MUERTA

Modelo	Rango	Banda Muerta	
		Aj. Minimo	Aj. Máximo
1910-00	0,07 to 0,15	0,04	0,04
1910-0	0,15 to 0,5	0,10	0,10
1910-1	0,40 to 1,6	0,15	0,16
1910-5	1,40 to 5,5	0,30	0,30
1910-10	3,0 to 11,75	0,40	0,40
1910-20	4,0 to 20,0	0,40	0,50

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INSTALACION

1. Elija un sitio donde no haya vibraciones excesivas, atmósfera corrosiva, y la temperatura se mantenga dentro de los límites tolerados por el presóstato (vea las especificaciones)

2. Instale el presóstato con el diafragma en un plano vertical, y el Logo de DWYER y la escritura de la etiqueta en la parte superior. Algunos instrumentos son sensibles a la posición y no conmutarian adequadamente si el diafragma no está vertical.

Si se requiere, se pueden suministrar unidades especiales para montaje en distinte posición.

3. Conecte el presostato a proceso por medio de los conectores hembra NPT de 1/8″. Se recomienda para esto., utilizar tubo metalico de 1/4″ diam. ext. sin embargo puede usarse cualquier tubo que no retrinja el paso de aire. Recuerde que:

• Presión diferencial: Conecte la alta presion a HI-PR (alta presion) y la baja a LO-PR (baja presion).

• Presión: conecte la presión (superior a la atmosférica) a HI-PR, dejando LO-PR abierto a la atmósfera.

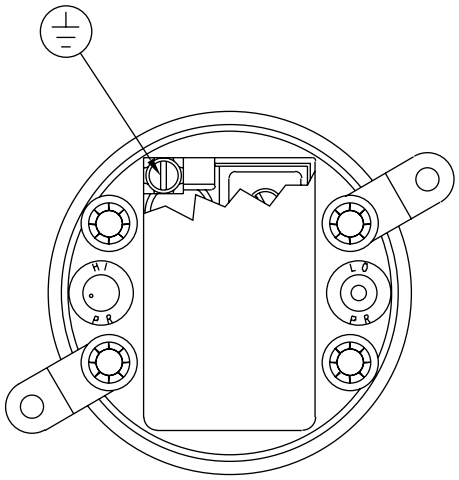
• Vacío: igual gue para Presión, pero invirtiendo las conexiones a proceso. Deje el conector no utilizado abierto a la atmósfera.

⚠ CAUCIÓN El poder debe estar apagado mientras que las conexiones del cableado se están realizando.

4. Las conexiones electricas se efectúan mediante terminales a tornillo, marcados " Common" (Común); "Norm Open" (Normal Abierto) y "Norm Closed: (Normal Cerrado). Los contactos se invierten al incrementarse la presión por sobre el ajuste (set point).

⚠ CAUCIÓN No exceda el valor nominal de tensión especificado. Daños permanentes que no estén cubiertos por la garantía puede dar lugar a.

5. La corriente no debe exceder do los 15 A sobre carga resistiva, La capaciedad del interruptor decrece con cargas inductivas, o ciclos rápidos de conmutación. Cuando estas condiciones se presenten, o se esté en dudas acerca de las mismas, se recomienda limitar la corriente a 10 A para prolgar la vida util de interuptor. Otro método consiste enaumentar la capacidad de corriente del interruptor mediante un relé para alta corriente o contactor. Consulte al Representante de DWYER en caso necesario.



OPERACION

La presión actúa sobre el diafragma, girando la palanea amplificadora. Esta a su vez, extiende el resorte antagónico (de calibrasión) el que está mecánicamente vinculado a la palanca actuadora del interruptor inversor: Al alcanzarse el valor preajustado, la condición de los contactos se invierte, es decir el NA pasa cerrado, y el NC pasa abierto.

AJUSTE

Para cambiar el ajuste, proceda de la siguiente manera:

A. Retire la tapa cubre-conexiones aflojando el tornillo de retención, y tirando firmemente de su extremo inferior. Gire el tornillo de ajuste en sentido horario para incrementar la presión de actuación, o bien gírelo en sentido anti-horario para disminuir la misma.

B. El procedimiento más seguro y simple para consequir una calibración correcta (o la verificación) del punto de trabajo es la siguiente

1. Conecte una tubería de goma de poca longitud desde el presóstato a una T de conexión, otra desde la T a un manómetro de exactitud reconocida, y otra desde una fuente disponible de presión.
2. Aplique presión lentamente, teniendo en cuenta gue el presóstato y el manómetro pueden tener diferentes tiempos de reacción debido a diferencias en volumen de aire, además de otras característcas mecanicas diferentes. La aproximación final al punto de trabajo debe ser muy lenta.
3. Asegúrese que el presóstato está en posición correcta de funcionamiento, o por lo menos en la posición que será montado. Recuerde que el funcionamiento correcto de la unidad corresponde a montaje vertical del diafragma.

C. En aplicaciones muy críticas, es conveniente durante los primeros meses de servicio verificar el punto de trabajo, y eventualmente restablecer el contacto varias veces, para compensar cambios iniciales en la tension del resorte antagónico, y diafragma. En la mayoría de los casos, esto no es necesario.

MANTENIMIENTO

Las partes móviles y contactos están sellados, siendo inalterables. El único ajuste disponible es del punto de trabajo. Evite ingreso de suciedad y acumulación humedad. No se requiere lubricación periódica.

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KELE ALARM INDICATION STATION

DESCRIPTION

The **Model AIS** Alarm Indication Station features an indication light, alarm horn and an alarm horn silence switch.

SEQUENCE OF OPERATION

Upon an alarm contact closure, the LED indicator will light, and the horn will sound. The horn can be silenced through the alarm silence switch, while the visual indication will continue to be lighted until the alarm condition has been corrected. A power interruption or open alarm contact will reset the AIS.

FEATURES

- ***Long lasting, red LED indication***
- ***Distinct continuous audible tone***
- ***Horn silence switch***
- ***Compact and rugged design***
- ***Available in 24 VDC, 24 VAC, or 120 VAC***
- ***Bright yellow panel face***

APPLICATION

- ***Refrigerant leak alarm indication***
- ***Water level alarm indication***
- ***Pressure alarm indication***
- ***High/Low temperature limits***
- ***Gas leak indication***
- ***Humidity limit alarm indication***
- ***Vibration limit***
- ***Voltage/Current level limit***
- ***Any contact closure alarm application***

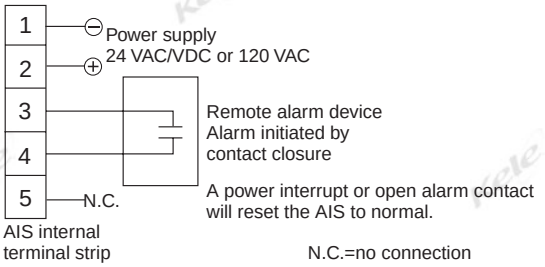


SPECIFICATIONS

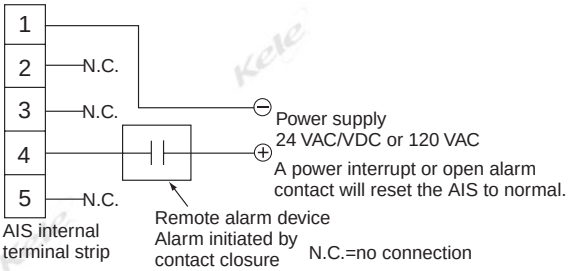
Supply Voltage	24 VAC/ VDC, 120 VAC, 100 mA max
Contact Rating	
AIS-24D	24 VDC, 50 mA min
AIS-24A	24 VAC, 90 mA min
AIS-120A	120 VAC, 70 mA min
Alarm Horn	80 db
Dimensions	7.09"H x 4.33"W x 3.54"D (18.0 x 11.0 x 9.0 cm)
Mounting	Four screws through back
Enclosure	Polystyrene, impact resistant, knock-outs
Approvals	RoHS
Weight	1.1 lb (0.5 kg)
Warranty	1 year

WIRING

Four-wire connection



Two-wire connection



ORDERING INFORMATION

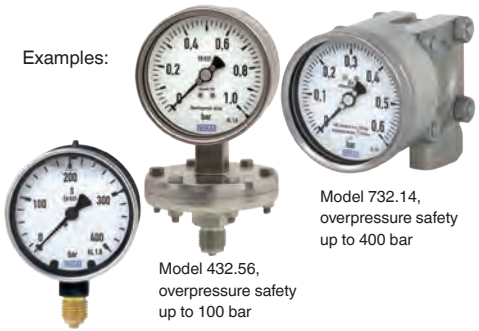
MODEL	DESCRIPTION	
AIS	Alarm indication station	
	12VD	12 VDC powered
	24D	24 VDC powered
	24A	24 VAC powered
	120A	120 VAC powered

AIS – **24A** ***Example:*** **AIS-24A** 24 VAC powered alarm indication station

Operating instructions EN

Pressure gauges

Examples:



Model 213.40

Model 432.56, overpressure safety up to 100 bar

Model 732.14, overpressure safety up to 400 bar

WIKA
Part of your business

Notes per current pressure equipment directive

- The pressure gauges are defined as “pressure accessories”
- The volume of the “pressure-bearing housings” of WIKA pressure gauges is < 0.1 L
- The pressure gauges carry CE marking for fluid group 1 per annex II, diagram 1 when their permissible working pressure is > 200 bar

Instruments that do not carry the mark are manufactured per article 4, paragraph 3 “sound engineering practice”.

Applicable standards (depending on model)

EN 837-1	Bourdon tube pressure gauges, dimensions, metrology, requirements and testing
EN 837-2	Selection and installation recommendations for pressure gauges
EN 837-3	Diaphragm and capsule pressure gauges, dimensions, metrology, requirements and testing

Specifications: See data sheet at www.wika.de

Subject to technical modifications.

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1. Safety

WARNING!
Before installation, commissioning and operation, ensure that the appropriate pressure gauge has been selected in terms of measuring range, design and suitable wetted material (corrosion) for the specific measuring conditions. In order to guarantee the measurement accuracy and long-term stability specified, the corresponding load limits must be observed.

Only qualified persons authorised by the plant manager are permitted to install, maintain and service the pressure gauges.

For hazardous media such as oxygen, acetylene, flammable or toxic gases or liquids, and refrigeration plants, compressors, etc., in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.

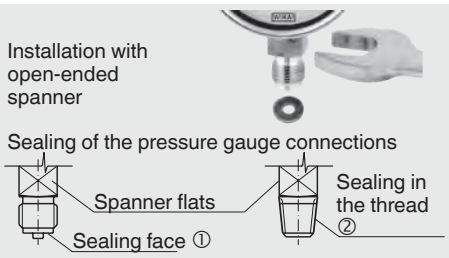
From pressure gauges which do not correspond to a safety version per EN 837 highly pressurised media might leak out through the possibly bursting window in case of a component failure. For gaseous media and working pressures > 25 bar a pressure gauge with safety version S3 is recommended per EN 837-2.

After an external fire, pressure media can leak out, particularly at soft solder joints. All instruments must be checked and, if necessary, replaced before recommissioning the plant.

Non-observance of the respective regulations can cause serious injuries and/or damage to the equipment.

2. Mechanical connection

In accordance with the general technical regulations for pressure gauges (e.g. EN 837-2). When screwing the instruments in, the force required to do this must not be applied through the case, but only through the spanner flats provided for this purpose, and using a suitable tool.
For parallel threads, use flat gaskets, lens-type sealing rings or WIKA profile sealings at the



sealing face ①. With tapered threads (e.g. NPT threads), sealing is made in the threads ② using additional sealing materials, e.g. PTFE tape (EN 837-2).
The torque depends on the sealing used. In order to orientate the measuring instrument so that it can be read as well as possible, a connection with clamp socket or union nut should be used.
When a blow-out device is fitted to a pressure gauge, it must be protected against being blocked by debris and dirt. With safety pressure gauges (see Ⓢ) there must be a free space of > 15 mm behind the blow-out back.
After installation, open the vent valve (if available)



or set from CLOSE to OPEN. With models 4 and 7, do not open the flange mounting screws. The version of the vent valve depends on the model and can deviate from the above illustration!

Requirements for the installation point

If the line to the measuring instrument is not adequately stable, a measuring instrument holder should be used for fastening (and possibly via a flexible capillary). If vibrations cannot be avoided by means of suitable installation, instruments with liquid filling should be used. The instruments should be protected against coarse dirt and wide fluctuations in ambient temperature.
Note for model 732.14, for front bezel mounting: The front bezel serves as centring and as the aperture in the mounting panel. Securing and thus the weight-bearing must be made via the pressure connection piping.

3. Permissible ambient and operating temperatures

When mounting the pressure gauge it must be ensured that, taking into consideration the influence of convection and heat radiation, no deviation above or below the permissible temperature limits can occur. Observe the influence of temperature on the indication accuracy!

4. Storage

To protect the pressure gauges from mechanical damage keep them in the original packaging until installation.
Protect the measuring instruments from humidity and dust.
Storage temperature range: -40 ... +70 °C
Storage temperature range model PG23LT: -70 ... +70 °C

5. Maintenance and repairs

The pressure gauges are maintenance-free. Regular checks should be carried out to ensure the measurement accuracy. Checks or recalibrations must only be carried out by qualified skilled personnel with the appropriate equipment. When dismounting, close the vent valve (if available).

WARNING! Residual media in dismounted pressure gauges can result in a risk to persons, the environment and equipment. Take sufficient precautionary measures.

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APOLLO
Butterfly Valves & Controls
A Division of Conbraco Industries, Inc.

LD145/WD145 SERIES

BUTTERFLY VALVE

INSTALLATION
OPERATION
MAINTENANCE

P.O. Box 125 /1418 S. Pearl Street Pageland SC 29728

I981800
ECN# M14630

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INTRODUCTION

DESIGN FEATURES
LD145/WD145 SERIES

- Available in wafer or lug body.
- Flange holes comply with ANSI Class 125/150 dimensions.
- Cast-in top plate with ISO-5211 mounting dimensions provides for direct-mounting of Apollo® actuators and manual operators.
- The face-to-face dimensions were designed to comply with MSS SP-67 and API 609.
- Wafer body features four alignment holes for ease of installation.
- Through-shaft design with spline connection with stem to disc. Disc-to-seat interface provides bubble-tight shut-off with reduced torque and extended service life.
- Equipped with a stretch-resistant, non-collapsible, blowout-proof, phenolic-backed cartridge seat. (14" through 24" have aluminum backing)
- Meets the intent and has passed AWWA C504-87 Section 5 proof of design tests.
- Factory tested to 110% of full rated pressure in both directions before shipping.
- NSF 372 Approved.

FLANGE AND PIPE COMPATIBILITY

APOLLO® Butterfly Valves are designed to fit between the following piping flanges:

- ANSI 125 Cast iron flanges (all sizes)
- ANSI 150 Steel flanges, schedule 40 (all sizes)
- ANSI 150 Steel flanges, schedule 80 (2"-12")

Note: When installing valves in schedule 80 piping, make sure the valve is properly centered between the pipe flanges to prevent disc edge damage since the clearance between the disc O.D. and the pipe I.D. is reduced. If there is a compatibility question, compare the minimum pipe I.D. with the disc chord dimensions in Table 1.

OPERATING PRESSURES
LD145/WD145 SERIES:

- **2"-12"** (50mm-300mm) – 200 psig (13.78 bar)

PRODUCT STORAGE

- The valves should be stored with the disc in the partially open position.
- The valves should be stored indoors in a clean, dry, well-ventilated place away from corrosive materials and protected from excessive dust and dirt.
- The valves should be stored on a rack or pallet off the floor and arranged to prevent damage during handling.
- Keep valves out of direct sunlight and in a cool location to prolong elastomer life.
- Valves should be protected to prevent damage to the flange faces, disc sealing edge and operator.

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PRODUCT MARKING

All APOLLO® Butterfly Valves are equipped with an identification tag attached to the valve neck. This tag provides the model number, part number, size, max pressure rating, and date of manufacture.

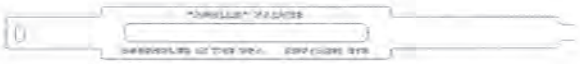


FIGURE 1. NAME PLATE

INSTALLATION INFORMATION

APOLLO® butterfly valves are designed for use between the faces of ANSI 125 and 150 pound flat, raised face, slip-on or weld-neck flanges at the pressure indicated on the nameplate. **Flange gaskets should not be used**. Due to the brittle nature of cast iron, consideration should be given to the proper piping alignment prior to the installation of any cast iron lug bodied valve. All APOLLO® resilient seated butterfly valves are bi-directional with the ability to control flow equally in either direction. All LD145 Series APOLLO® lug style butterfly valves may be used for dead-end service in either direction at their full pressure rating.

INSTALLATION INSTRUCTIONS

Step 1. Check to make sure that the pipe flange and valve sealing faces are clean and free from any debris (pipe scale, welding slag, etc.).

Step 2. Check the valve nameplate to ensure that the pressure and valve materials are correct for the application. See Tables 3 for seat material temperature ratings.

WARNING! – Apollo butterfly valves should never be installed where service conditions could exceed the valve ratings. Failure to heed warning may result in personal injury or property damage.

Step 3. The seat sealing face on the LD145/WD145 Series butterfly valves is wider than the valve body providing a leak-proof seal when compressed between pipe flanges. Therefore, no flange gaskets are required when installing any APOLLO® butterfly valve.

Step 4. To prevent damage to the disc sealing edge during installation, position the disc in the "partially open" position (Figure 2) so that the disc is still contained within the valve body.

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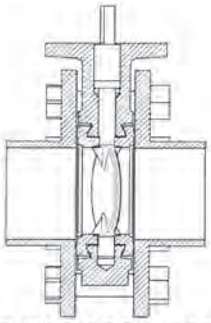


FIGURE 2. VALVE IN PARTIALLY OPEN POSITION

Step 5. Spread the pipe flanges apart allowing the valve to be slipped easily in between the flanges.

Step 6. Center the valve between the flanges and loosely install all the flange bolts. On the Model 145 wafer valve, the flange bolts that pass through the alignment lugs should be installed first. Consult Table 2 for correct flange bolt size and quantity.

Step 7. Slowly open the valve to the full open position (Figure 3) and back to the partially open position ensuring that the disc moves freely without any obstruction. If no obstruction is encountered, return the valve to the full open position and hand-tighten all flange bolts using the bolt tightening sequence shown in Figure 4.

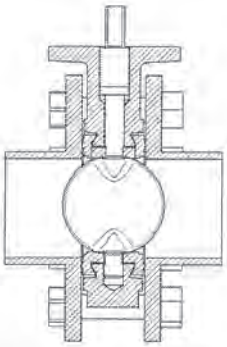


FIGURE 3. VALVE IN FULL OPEN POSITION

Step 8. Rotate the disc from the fully open position to the fully closed position and make sure that the valve is properly centered and the disc edge does not contact the pipe ID. Return the disc to the full open position and tighten the flange bolts following the bolt tightening sequence shown in Figure 4. However, do not fully tighten each flange bolt all at once. Tighten each bolt incrementally following the sequence in Figure 4 several times until the flange bolts are tight. After all flange bolts are fully tightened, cycle the valve from full open to full closed to ensure that there is proper disc clearance.

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MAINTENANCE AND REPAIR

APOLLO® butterfly valves are designed for extended service with minimal wear and servicing. No regular lubrication is required. Prior to any replacement or repair, the valve must be removed from the line following these precautions:

1. The pipeline on either side of the valve must be depressurized and drained.
2. Ensure that the disc is in the partially open or full closed position before removing the valve from the line.
3. **DO NOT** remove an actuator or operator from the valve while the line is still pressurized.

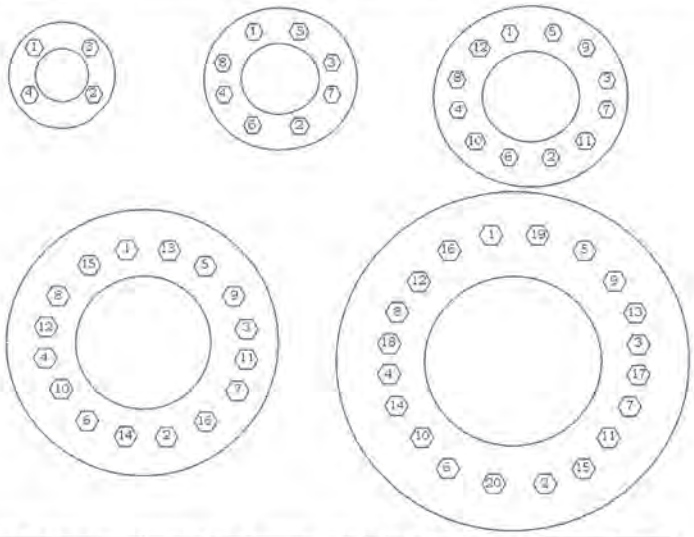
Valve Size		Disc Chord
(in)	(mm)	
2	50	1.133
2.5	65	1.706
3	80	2.450
4	100	3.488
5	125	4.296
6	150	5.697
8	200	7.468
10	250	9.484
12	300	11.456
14	350	13.000
16	400	14.970
18	450	16.847
20	500	18.650
24	600	22.558

TABLE 1. BUTTERFLY VALVE DISC CHORD DIMENSIONS

		WAFER BODY HEAVY HEX BOLTS & NUTS WITH NC THREAD			LUG BODY REGULAR HEX HEAD SCREWS WITH NC THREADS		
Valve Size		Diameter	Length	Quantity	Diameter	Length	Quantity
(in)	(mm)						
2	50	5/8"	4"	4	5/8"	1-1/2"	8
2.5	65	5/8"	4-1/4"	4	5/8"	1-1/2"	8
3	80	5/8"	4-1/2"	4	5/8"	1-3/4"	8
4	100	5/8"	5"	8	5/8"	1-3/4"	16
5	125	3/4"	5"	8	3/4"	1-3/4"	16
6	150	3/4"	5"	8	3/4"	2"	16
8	200	3/4"	6"	8	3/4"	2-1/4"	16
10	250	7/8"	6"	12	7/8"	2-1/4"	24
12	300	7/8"	6-1/2"	12	7/8"	2-1/2"	24
14	350	1"	7"	12	1"	2-3/4"	24
16	400	1"	8-1/2"	16	1"	3-1/4"	32
18	450	1-1/8"	9"	16	1-1/8"	3-1/2"	32
20	500	1-1/8"	10"	20	1-1/8"	4"	40
24	600	1-1/4"	11"	20	1-1/4"	4"	40

TABLE 2. STUD AND BOLT SPECIFICATION FOR LUG AND WAFER

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FLANGE SIZE	BOLT SIZE	MIN. BOLT TORQUE (FT./LBS.)	MAX BOLT TORQUE (FT./LBS.)
2"-4"	5/8"	20	70
5"-8"	3/4"	30	120
10" AND 12"	7/8"	50	200
14" AND 16"	1"	70	240
18" AND 20"	1-1/8"	100	380
24"-30"	1-1/4"	140	520
32"-48"	1-1/2"	200	800
54"-60"	1-3/4"	350	1800

FIGURE 4. FLANGE BOLT TIGHTENING SEQUENCE AND TORQUE VALUES

ASSEMBLY/DISASSEMBLY INSTRUCTIONS

LD145/WD145 SERIES BUTTERFLY VALVE ASSEMBLY AND DISASSEMBLY

The LD145/WD145 Series butterfly valves **DO NOT** have field replaceable parts. Therefore, assembly or disassembly is not permitted. Once the valve is removed from the line, inspect the parts for wear. If valve parts show wear, replacement is necessary. Contact your local APOLLO® distributor for a replacement valve.

Type	Min	Max
Buna-N	+10 °F (-12 °C)	+180 °F (82 °C)
EPDM	-30 °F (-34 °C)	+225 °F (135 °C)
Viton	-20 °F (-29 °C)	+300 °F (149 °C)

TABLE 3. LD145/WD145 SERIES SEAT MATERIAL TEMPERATURE RANGES

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BUTTERFLY VALVE PART LISTS

LD145/WD145 SERIES PARTS LIST

ITEM #	PART #	QTY	DESCRIPTION
1	LB14103D	1	BODY,3",DI,APC BFV,LD145
2	SH14103S4	1	SHAFT,3"APC BFV,416 SS,
3	S14103WE	1	SEAT,3" BFV,WRC-EPDM,
4	D14103B	1	DISC,3" BFV,ALUM BRZ,
5	BU14103P	1	BUSHING,3"APC BFV,PTFE,
6	O14103N	1	O-RING,3"APC BFV,EPDM,
7	W14103W	1	WASHER,FLAT,3"APC BFV,BRS,
8	RS14103W	1	RET RING,EXT,3"APC BFV,STL,
9	RH14103W	1	RET RING,INT,3"APC BFV,STL,
10	HF14103W	2	SCREW,SET,3"APC BFV,STL,FLAT PNT
11	HC14103W	2	SCREW,SET,3"APC BFV,STL,CONE PNT
12	I950800	1	NAMEPLATE,145 SERIES BFV,ALUM

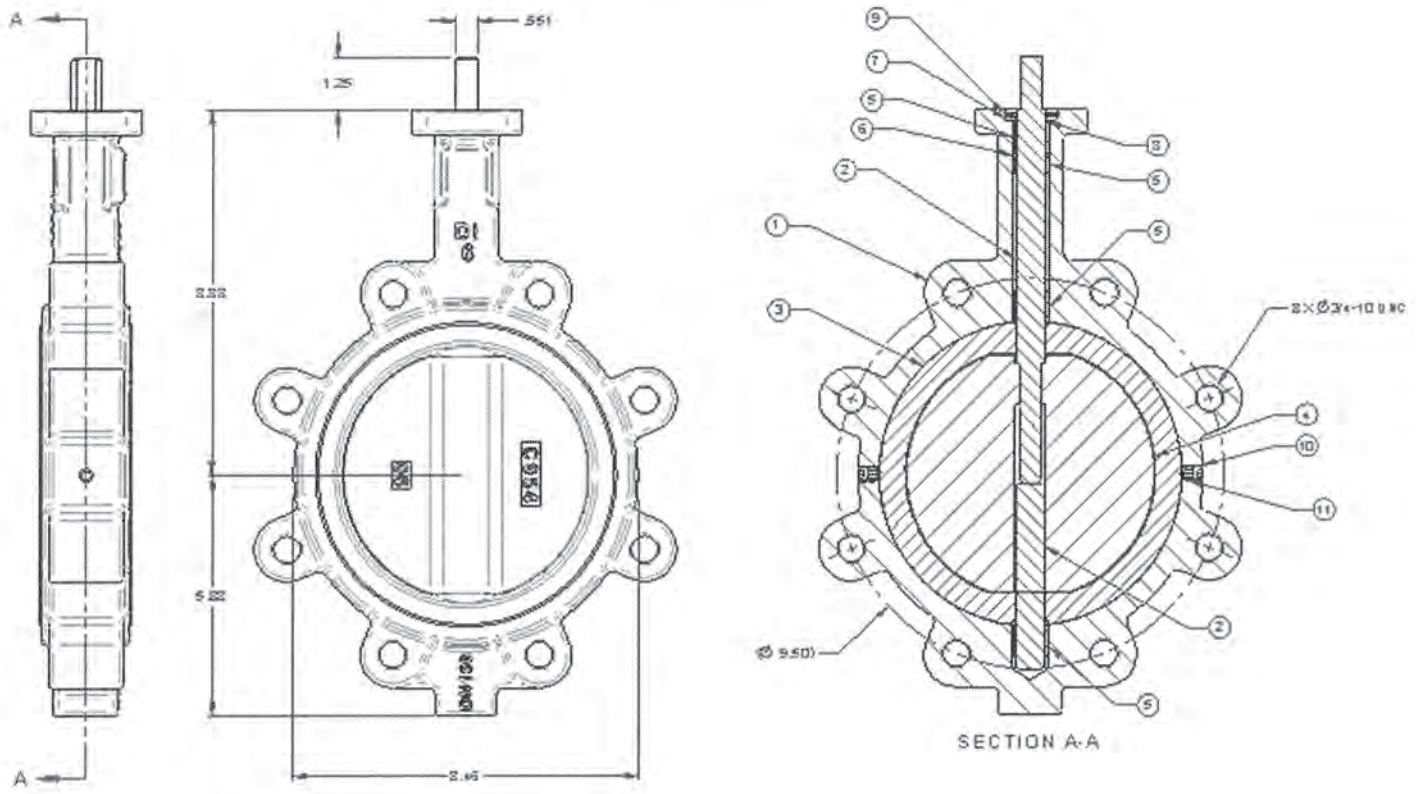


Figure 5: Assembly View: 3" Butterfly Valve Shown

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DOUBLE-D AND KEYED STEM

Size Inches	Size DN	Dimensions in Inches																	
		A	B	C	D	E	ØF	ØG	ØG2	Key	ØH	ØH2	ØI	ØJ	K	L	M	N (WD)	N (LD)
2	50	3.25	6.375	1.25	1.75	0.394	0.496	0.375	--	--	2.756	--	2.699	4	2.09	1.113	4.75	0.688	.625-11
2.5	65	3.75	6.880	1.25	1.88	0.394	0.496	0.375	--	--	2.756	--	2.699	4.75	2.54	1.706	5.50	0.688	.625-11
3	80	4.00	7.130	1.25	1.88	0.394	0.496	0.375	--	--	2.756	--	2.699	5.13	3.09	2.450	6.00	0.688	.625-11
4	100	4.88	7.880	1.25	2.13	0.472	0.621	0.375	--	--	2.756	--	2.699	6.75	4.09	3.488	7.50	0.688	.625-11
5	125	5.38	8.380	1.25	2.25	0.551	0.745	0.375	--	--	2.756	--	2.699	7.75	4.85	4.296	8.50	0.813	.625-11
6	150	5.88	8.880	1.25	2.25	0.551	0.745	0.375	--	--	2.756	--	2.699	8.63	6.13	5.697	9.50	0.813	.751-10
8	200	7.13	10.250	1.75	2.50	0.669	0.870	0.563	0.438	--	4.921	4.015	4.606	10.56	7.89	7.468	11.75	0.813	.750-10
10	250	8.25	11.500	1.88	2.75	0.866	1.120	0.563	0.438	--	4.921	4.015	4.606	13.06	9.89	9.484	14.25	0.938	.750-10
12	300	9.75	13.250	1.88	3.13	0.945	1.244	0.563	--	--	4.921	--	4.606	16	11.89	11.456	17.00	0.938	.875-9

Approximate Weight for Bare Shaft Valve

Valve Size		WD Model Lbs (kg)	LD Model Lbs (kg)
Inches	DN		
2	50	6 (2.7)	8 (3.6)
2.5	65	6 (2.7)	10 (4.5)
3	80	7(3.2)	11 (5.0)
4	100	11 (5.0)	17 (7.7)
5	125	13 (5.9)	20 (9.1)
6	150	16 (7.3)	23 (10.4)
8	200	29 (13.2)	39 (17.7)
10	250	44 (20.0)	62 (28.1)
12	300	70 (31.8)	97 (44.0)

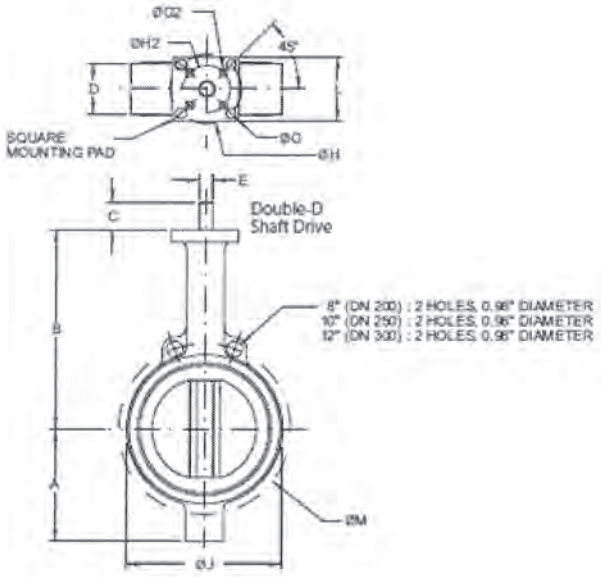
145 Series: Assembled & Tested in USA

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WD145 MODEL

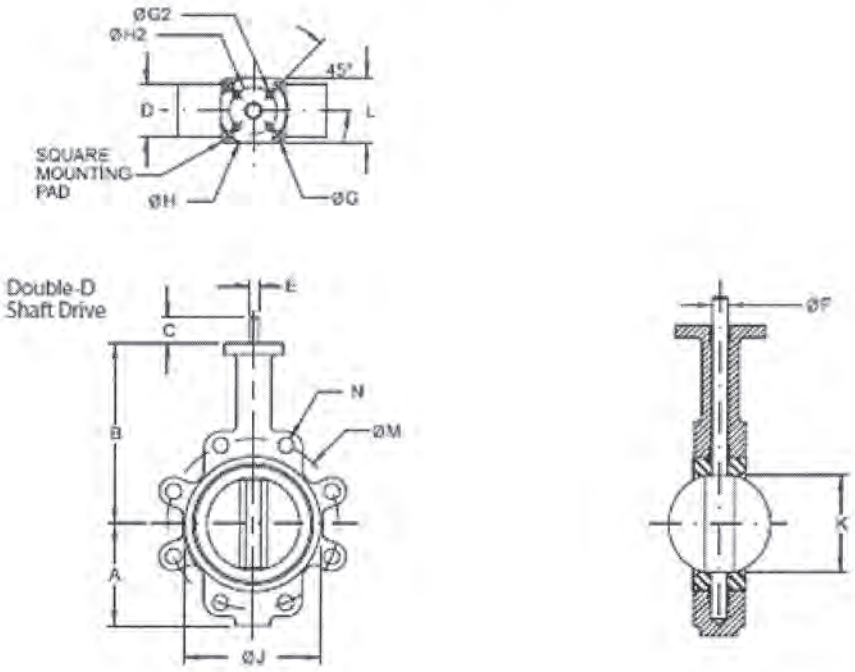
145 Series: Assembled & Tested in USA

2"-12"



LD 145 MODEL

2"-12"



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MANUAL OPERATOR INSTALLATION

LEVER HANDLE MOUNTING PROCEDURE

Step 1. First, start by loosely assembling the notch plate on the valve top plate. The notch plate should be installed with the notches in the third quadrant of the valve top plate with the stop tabs at the 6 o'clock and 9 o'clock position. The notch plate should be installed with the stop tabs pointing upward (Figure 5).

Step 2. Next, install the handle so that the lever fully engages in the notches when the lever is released and tighten the handle set screw.

Step 3. Compress the handle lever and position the disc so that the valve is in the fully closed position. Align the last notch on the notch plate at the 9 o'clock position with the handle lever and tighten the notch plate screws.

Step 4. Compress the handle lever and position the disc so that the valve is in the fully open position and release the lever. The lever should line-up with the last notch on the notchplate at the 6 o'clock position.

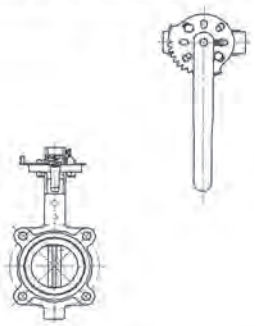


FIGURE 6. NOTCHPLATE INSTALLATION POSITION

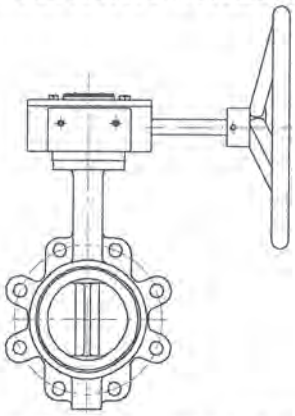


FIGURE 7. GEAR OPERATOR INSTALLATION POSITION

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Instructions for Setting Gear Operator – (Refer to illustrations 1 and 2)

Step 1. Mount gear operator (Item 1) on top of butterfly valve with the four bolts and washers provided with each assembly.

Step 2. Use Allen wrench to remove locking set screws (item 2) and to adjust stops (item 3), see tools required.

Step 3. Remove locking (short) set screw from both sides of the gear operator. (Item 2)

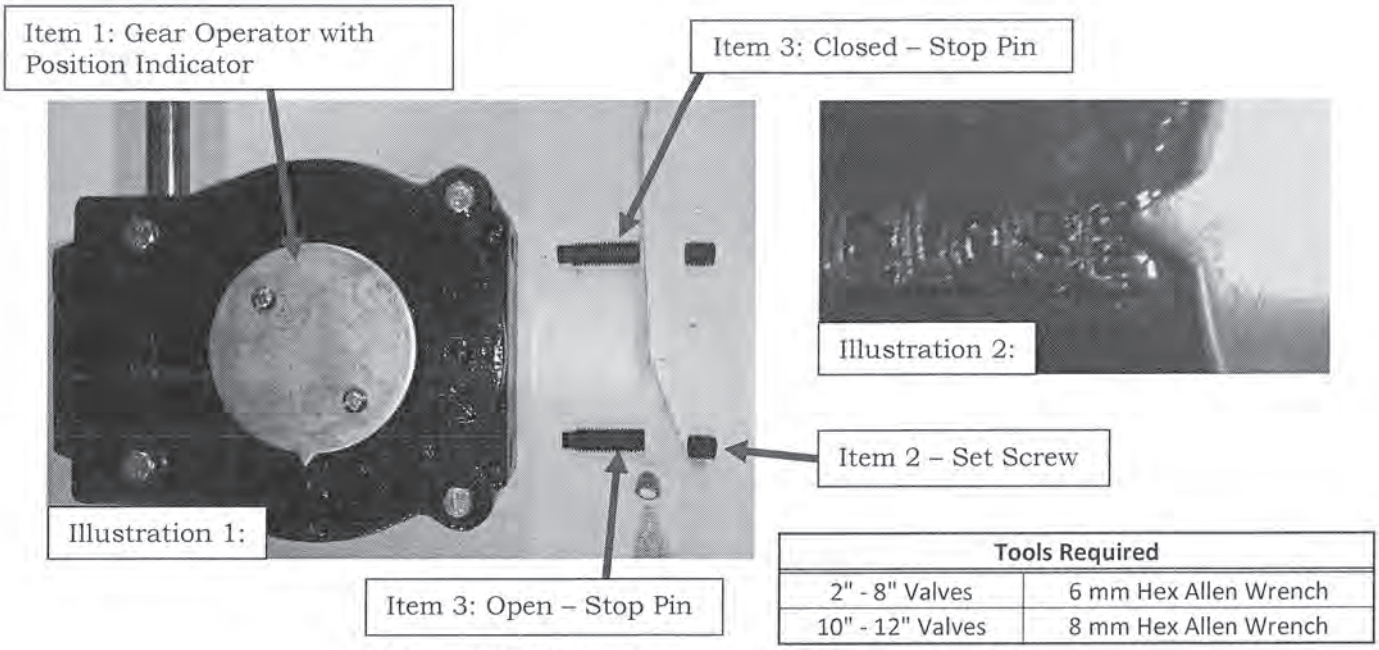
Step 4. Loosen the second (longer) set screws (Item 3) approximately three to four turns on both sides of the gear operator.

Step 5. Rotate handle to the fully open position and tighten set screw (item 3) into position. Now, add locking set screw (item 2) and lock both into place.

Step 6. Rotate hand wheel to the fully closed position. Note disc should be centered in the seating surface.

Step 7. Once disc is fully closed, tighten set screw (item 3) into the stop position. Then open disc 20% and then back to closed position. Re-adjust set screw (item 3) if necessary. Add Locking set screw (item 2) and lock both into place. You have now locked both the open and closed positions into place.

Step 8. As a quick reference, note the position of the pointer and the word **CLOSE**. The pointer should be near the center or close to the top of the letter "E" in the word **CLOSE**. See Illustration 2.



Tools Required	
2" - 8" Valves	6 mm Hex Allen Wrench
10" - 12" Valves	8 mm Hex Allen Wrench

Figure8: Pointer Location in Closed Position

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AMENDMENT REGISTER

Date	ECN	Rev.	Page	Description	Initiator
9/22/2014	M14630	A	ALL	New Release	SAV EDS

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SSDS Accessories

Warranty

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THE NEW YORK BLOWER COMPANY

LIMITED PRODUCT WARRANTY

The Suction Fans and motors furnished for the NYCSCA PS 671 Brooklyn project are warranted by **nyb** to be free from defects in materials and workmanship for a period of five (5) years after shipment from its plant, provided buyer demonstrates to satisfaction of **nyb** that:

- the product was properly installed and maintained in accordance with **nyb**'s instructions and recommendations
- that the product was used under normal operating conditions
- that the product was not operated in excess of its design limits or operational standards as set forth in **nyb**'s order acknowledgement or quotation
- that the product was paid for in accordance with **nyb**'s standard Conditions of Sale

This warranty is limited to the replacing and/or repairing by **nyb** of any part or parts which have been returned to **nyb** with **nyb's** written authorization and which in **nyb's** opinion are defective. Parts not manufactured by **nyb** but installed by **nyb** in equipment sold to the buyer shall carry the original manufacturer's warranty only. All transportation charges and any and all sales and use taxes, duties, imports or excises for such part or parts shall be paid for by the buyer. **nyb** shall have the sole right to determine whether defective parts shall be repaired or replaced.

This warranty does not cover any customer labor charges for replacement of parts, adjustments or repairs, or any other work unless such charges shall be assumed or authorized in advance, in writing, by **nyb**.

This warranty does not cover abrasion, erosion and wear, nor does it cover any product which, in the judgment of **nyb**, has been subject to misuse or neglect, or which has been repaired or altered outside **nyb's** plant in any way which may have impaired its safety, operation or efficiency, or any product which has been subject to accident.

This warranty shall be null and void if any part not manufactured or supplied by **nyb** for use in any of its products shall have been substituted and used in place of a part manufactured or supplied by **nyb** for such use.

There are no warranties, other than those appearing on the acknowledgement form **INCLUDING NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE**, given in connection with the sale of the goods sold hereunder. The buyer agrees that his sole and exclusive remedy, and the limit of **nyb's** liability for loss from any cause whatsoever, shall be the purchase price of the goods sold hereunder for which a claim is made.

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Warranty Policy

No-Fault Warranty (excludes Washdown motors)

Motors with frame sizes 215T and smaller are covered under a "No-Fault" warranty. This warranty claim is offered one time, per end-user, per application. If there is more than one failure, please contact the Service Department for review. The following must be sent to the WEG Service Department to process a "No-Fault" warranty claim.

- Original nameplate from the failed motor
- Copy of the original WEG invoice or invoice # for the failed motor
- Brief description of the failure for quality control purposes
- Please send request no later than 30 days after failure.

Warranty on Larger Motors

WEG Electric requires that motors larger than 215T frame be inspected by a WEG Authorized Service Center, or if none is available, an EASA-affiliated service shop. Depending on the inspection results, WEG will decide whether to cover the motor under warranty. Prior to a decision being made on a claim for warranty, the following are required from the service shop and customer.

- Completed EASA inspection report
- Repair Quote
- Copy of the original WEG Invoice or WEG Invoice Number
- For Frame 215T and above, photos of the failure in JPEG format suitable for e-mailing

The inclusion of photos allows WEG to properly evaluate the details of your claim, as well as to ensure that any data sent to our factory Quality Control engineers are fully understood. The warranty claim will be evaluated after receipt of the above items. Upon review of the claim, the WEG Service Department will make contact and advise how to proceed. The service shop should not remove the nameplate nor make repairs without being requested to do so by a WEG Service Department representative.

NOTE: For all Ingersoll-Rand motors, please contact the WEG Service Department prior to any inspection.

Warranty on Washdown Motors:

HydroDuty™, PickerPlus™, HydroWash™and Shark™

The warranty coverage period on these models is 12/24: 12 months from date of first installation or 24 months from the date on motor nameplate, whichever occurs first.

Any warranty claim submitted to the WEG Service Department must include:

- Copy of the original WEG invoice or invoice number for the failed motor
- Brief description of the failure for quality control purposes accompanied by photographs of the motor wire connections and any other photograph supporting the claimed failure

WEG Service Department will analyze the claim, along with the supporting documents and determine if the warranty is applicable. When warranty is granted and credit or replacement is determined, it will be executed once the terminal box cover of the failed motor is submitted and received at the WEG Service Department.

Communication

Correspondence with the WEG Service Department may be via e-mail, fax or regular mail. Please keep a photocopy of all nameplates for your records.

Limited Warranty:

WEG Electric Corp. is proud of all of our product lines. WEG and its employees are committed to our customers and users to provide the best designed and manufactured motors, drives and controls. WEG provides a limited warranty on our products against defects in materials and workmanship for a specific period from the date of purchase. If a motor's date code is within its stated warranty period (18 month, 36 month, etc.), no proof of purchase is required. Otherwise, a copy of the invoice is necessary to show the date of purchase.

Warranty Period:

- The standard warranty for WEG products is 18 months from the invoice date.
- For General Purpose TEFC and ODP Premium Efficiency motors the warranty is 36 months from the invoice date.
- For IEEE 841 motors, the warranty is 60 months from the invoice date.

Authorized Service Centers:

WEG has service centers around the world to meet the needs of our customers. Information regarding the nearest service center can be found on our web site at **www.weg.net** or by calling **1-800-ASK-4WEG** (1-800-275-4934). Any warranty repair by a service shop must be pre-approved by WEG.

Warranty Service:

If a WEG product requires warranty service due to defective materials or workmanship, WEG will, at its option, either repair or replace the defective product. By "replace", WEG means the original purchaser's account will be credited for the cost on the WEG invoice (less freight). If warranty is granted, and replacement is specified, the motor's nameplate must be sent to the Service Dept. Warranty is applied to products that have been, at all times, properly maintained and operated or used under normal operating conditions for which the product was designed. WEG is not responsible for any expenses incurred in installation, removal from service, transportation (freight) or consequential expenses.

Limitation of Warranty:

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF QUALITY AND PERFORMANCE, WRITTEN, ORAL OR IMPLIED, AND ALL OTHER WARRANTIES INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ARISING FROM COURSE OF DEALING OR USAGE OF TRADE ARE HEREBY DISCLAIMED BY WEG. THE FOREGOING OBLIGATION TO REPAIR OR REPLACE WEG PRODUCTS OR PARTS SHALL BE THE SOLE AND EXCLUSIVE REMEDY OF THE PURCHASER, ITS CUSTOMERS, OR USERS OF THE PRODUCTS OR PARTS.

Proper Storage of Motors:

When motors are not immediately installed, they should be stored in their normal upright position in a dry even temperature location, free of dust, gases and corrosive atmosphere. Inactive motors tend to expel grease from between the bearing surfaces, thereby removing the protective film that impedes metal-to-metal contact. At least once per month shafts should be rotated in accordance with WEG's installation and maintenance manual. Motors stored for a period exceeding one year should have the bearings re-lubricated in accordance with the WEG motor installation and maintenance manual.

Return Policy

WEG products that are purchased from our stocking warehouses must be returned within 90 days, freight to be paid by customer. Returned products must be unused, and in undamaged original packaging. If products are ordered incorrectly by the customer and need to be returned to stock, then a 20% re-stocking charge will be applied. If the returned products are deemed not to be in unused, undamaged condition, or in original packaging, then additional fees will be applied (up to and including full price of item). Returns on any modified products will not be allowed. Any products that are ordered as specials (with features that would not allow them to be stocked items) cannot be returned.

Contact WEG Service:

Toll -Free: **1-800-839-2529** E-Mail: **warranty@weg.net**

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ABB Inc.
Effective December 16, 2016
ACH550-PNPT01U-EN REV. F
Variable Frequency Drives
For HVAC Applications

1.01 WARRANTY

A. The VFD Product Warranty shall be 36 months from the date of factory shipment. The warranty shall include all parts, labor, travel time and expenses. A toll free 24/365 technical support line shall be available.

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EECONTROLS

Limited Warranty

1. **RETURN OF EQUIPMENT:** Material is not to be returned to EEC without first obtaining written authorization from an authorized officer of EEC. Equipment may be returned only if new, unused, and in its original condition and within ninety (90) days of invoice for such material from EEC. Equipment thus proper;y accepted for credit by EEC are potentially subject to a minum service charge of 20% of original invoice and all transportation charges. Charges incurred by repairing or replacing equipment becuase of damages are the responsibility of the Purchaser. Equipment built to order is not subject to return for credit.

2. **LIMITED WARRANTY AND EXCLUSIVE REMEDY:** Each EEC Assembled Component (as defined below) shipped by EEControls, Inc. (the "Company") is warranted, on the date of shipment, to have wire connections between components that conform to the then applicable national electric code ("NEC") standards, to the extent such connections are made by the Company. This warranty is subject to permissible variations and defects defined by NEC, provided that these products are used with compatible parts in appropiate environments, within the applications and ranges for which they were manufactured, and in accordance with applicable instructions, and provided further that they have not been subject to improper installation, improper maintenance, abuse, accident, negligence, alteration, miuse or the like. The warranty period for EEC Assembled Components is twelve (12) months after shipment, unless another period is specified. The sole and exclusive remedy available under this limited warranty is the repair or replacement, at Company's option, of any products which the Company determines to be defective or, if the Company determines that this exclusive remedy fails its essential purpose, the Purchaser will, at its option, be entitled to a refund of the purchase --price for the products in question or a credit therefor. For purposes hereof, the term "EEC Assembled Components" means components that (i) contain the prefix "ED" in Company's designated part number and (ii) are qired by Company pursuant to written specifications stored in Company's engineering ED files, as determined by Company. Company only makes the express warranty with respect to EEC Assembled Components. Company makes no other warranty whatsoever with respect to products that are not EEC Assembled Components, which products will carry only the warranty of the manufacturer, if any.

3. **LIMITATION OF WARRANTY:** THERE ARE NO OTHER WARRANTIES HEREUNDER WHETHER EXPRESSED OR IMPLIED, ARISING BY OPERATION LAW OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTIES ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR USAGE OF TRADE. UNLESS A STATEMENT IS SPECIFICALLY IDENTIFIED IN THIS BROCHURE AS A WARRANTY, THE STATEMENT MADE HEREIN RELATING TO ANY PRODUCTS ARE NOT EXPRESS WARRANTIES BUT ARE MERELY COMPANY'S OPINION OR COMMENDATION OF SUCH PRODUCTS ANY DESCRIPTION OF PROCDUCTS SPECIFIED HEREIN IS NOT INTEDED TO BE A WARRANTY, BUT IS FOR THE SOLE PURPOSE OF IDENTIFYING SUCH PRODUCTS AND IT DOES NOT CONSTITUTE A WARRANTY THAT PRODUCTS WILL CONFORM TO THAT DESCRIPTION SIMILARLY, THE USE OF ANY SAMPLES, MODELS, DIAGRAMS OR DRAWINGS IS ONLY FOR ILLUSTRATIVE PURPOSES AND DOES NOT CONSTITUTE A WARRANTY THAT PRODUCTS WILL CONFORM WITH SUCH SAMPLES, MODELS, DIAGRAMS OR DRAWINGS.

4. **WAIVER OF CONSEQUENTIAL DAMAGES:** UNDER NO CIRCUMSTANCE WILL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, EXEMPLARY, INCIDENTAL, INDIRECT, OR SPECIAL DAMAGES, OR LOST PROFITS, EXPENSES OR LOSSES ARISING OUT OF OR RELATING TO THE SALE OR USE OF ANY OF ITS PRODUCTS.

For a full statement of the limited warranty offered by the Company and the exclusive rights and remedies thereunder, together with the Company's limitations of warranties and limitation of liability, please refer to the Company's purchase order ackn owledgements on reverse side of packing list If you do not have this form, please contact a represntati ve of the Company and one will be provided promptly.

Warning: SInce each system utilizing components is unique with differing wiring and component configurations and attributes and differing requirements and environments, all of which can, among other things, affect product performance, the selection and use of any product offered by the Company must be determined by competent engineers and other appropiate professionals who are familiar with the specific system in question. Nothing contained in this brochure shall constitute any professional advice and should not be used as a substitute for competent professional determinations. Since the Company has not given any professional advice, it is not responsible or liable for improper slection, use or installation of products offered by the Company and, with respect to the systems in which such products are utilized, improper system design or the inadequacy of back-up systems.

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Dwyer
Manufacturing Excellence
Since 1931

DWYER INSTRUMENTS
102 Indiana Highway 212 | P.O. Box 373 | Michigan City, IN 46360
dwyer-inst.com

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. Products qualifying for an extended warranty period will have the extended warranty as expressly indicated on the catalog page, web page, IOM, or will be covered by a specific written agreement that is (i) approved by an officer of Dwyer Instruments, Inc. and (ii) defines the warranty period. If no express statement of extended warranty is made, then the standard 1 year warranty applies. The Extended Limited Warranty only applies to products manufactured after April 1, 2017. The Warranty period extends from the date of shipment to the initial customer and not the project installation date or use.

Specific warranty exclusions include, but are not limited to:

- Specific product components not covered by the extended warranty:
  - Humidity Sensors
  - Batteries
  - Electro-Chemical Gas Sensors
  - Snap Switches
  - Any component which exceed its normal life cycle
  - Other Specific items added as required.

- Normal or excessive wear and tear is not cause for warranty replacement.
- Products not properly maintained, operated, installed, or use in an application not suited for the product.
- Modifications, alterations, changes, or additions outside those which are required for normal operation.
- Failure to notify Dwyer of any defect within a reasonable time.
- Damage which the customer has not taken timely action to minimize or mitigate.
- Products on which the labels, markings, nameplates, etc. have been tampered with.
- Products which contain broken factory seals or have been tampered with shall void warranty.

Liability under this warranty is limited to repair or replacement EXW Ex Works Dwyer Instruments, Inc. of any parts which prove to be defective within that time or repayment of the purchase price at the Seller's option. All products must be returned to the Seller, transportation prepaid, unless other arrangements have been pre-approved by Seller.

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 EXW Ex Works Dwyer Instruments, Inc. 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.

THIS EXPRESS LIMITED WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER REPRESENTATIONS MADE BY ADVERTISEMENTS OR BY AGENTS AND ALL OTHER WARRANTIES, BOTH EXPRESS AND IMPLIED. THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE FOR GOODS COVERED HEREUNDER.

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Kele's standard 1 year warranty on the parts will apply.

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Terms and Conditions of Sale
WIKA Instrument, LP

I. GENERAL

These terms and conditions apply to purchases from WIKA Instrument, LP ("Seller") on all orders for products and/or services.

A. Buyer purchase orders are not binding until confirmed by written acceptance by Seller. Oral orders are not accepted.
B. Prices are based on these terms and conditions of sales and are effective from date of publication, and subject to change without notice.
C. Seller reserves the right, without prior notice, to:
   1. Change and/or revoke any price.
   2. Change and/or evoke any provisions contained herein.
   3. Discontinue shipments to buyer.
   4. Resolve any inconsistencies, conflicts or ambiguities.
D. Special production runs or product orders are subject to Seller requirements such as, but not limited to, minimum quantities and extended delivery times. On special production run products, Seller reserves the right to over ship 10% or under ship 5% of the purchase order quantity and invoice accordingly. Special orders are subject to reasonable cancellation charges.

II. PAYMENT TERMS AND SALES TAX

A. If Buyer has previously established credit terms: Net 30 days from shipment date.
B. If credit is not established, payment plus estimated (by Seller) freight charges shall accompany purchase order.
C. Cash or anticipation discounts are not permitted.
D. Seller reserves the right to revoke any credit extended to Buyer if Buyer fails to pay for any shipments when due. If, in Seller's opinion, there is any adverse change in Buyer's financial condition, Seller shall have the right to suspend further shipments until receipt of adequate assurance of Buyer's ability to pay therefore.
E. Payment terms are specified on the invoice. Any invoice not paid when due is subject to a late payment charge of 1.5% per month, or if such rate is greater than the maximum rate permitted by applicable law, then at the highest rate allowed by applicable law. In the event the Buyer fails to make full payment when due and Seller employs an attorney or collection agency to assist in collection of the account, Buyer agrees to pay all of Seller's reasonable cost of collection, including collection agency fees and court costs.
F. Unless otherwise stated, prices do not include sales, use, excise, and similar taxes applicable to either the products or the materials used in the manufacture of products or services. All such taxes and charges shall be shown separately on Seller's invoices.

III. TRANSPORTATION

A. All shipments are Ex Works, (Incoterms 2010), Seller's loading dock, except as expressly provided below.
B. Each shipment is deemed accepted in good condition by the common carrier and title and all risk of loss or damage pass to Buyer upon that acceptance by the carrier. Buyer is responsible for inspecting the merchandise upon receipt. Buyer shall insist that visible damage be noted on its copy of the freight bill. If the product has been lost or damaged in transit, Buyer must file the claim with the carrier, as Seller bears no responsibility for any such loss or damage.
C. Freight, handling and insurance charges:
   1. Prepaid Shipments: All freight, handling and insurance charges shall be invoiced to Buyer.
   2. Collect Shipments via UPS or FedEx: All freight and handling charges shall be billed to the collect account number provided. Collect shipments are NOT insured. Buyer must request coverage if required and the insurance cost will be added to the freight charge. All uninsured shipments are the responsibility of Buyer. Seller assumes no responsibility for any such loss or damage.
   3. Truck Shipments: All freight, handling and insurance charges shall be billed to the account number provided. Truck shipments are NOT insured. Buyer must request insurance coverage, if required, and the insurance cost will be added to the freight charge. All uninsured shipments are the responsibility of the Buyer. Seller assumes no responsibility for any such loss or damage.
D. All shipments are made by carriers of Seller's choice. Any special arrangements requested by Buyer shall be at Buyer's additional expense.
E. Buyer shall report any quantity shortages, incorrect items, or billing errors in writing to the Seller within fifteen (15) days of delivery. Sales order and invoice numbers are to be furnished on all claims.
F. Seller reserves the right to make delivery in installments. All such installments shall be separately invoiced and paid for when due, without regard to subsequent deliveries. Delay in delivery of any installment shall not relieve Buyer of Buyer's obligation to accept remaining deliveries.
G. Seller shall not be liable for failure to deliver or delay in delivery occasioned by causes beyond Seller's control, including without limitation, strikes, lockouts, fires, embargoes, terrorist attacks, war or other breakouts of hostilities, acts of God, inability to obtain shipping, space, machinery breakdowns, delays of carriers or suppliers, and domestic or foreign governmental acts or regulations. In the event of any delay in delivery due to such causes, unless otherwise agreed, the time for delivery shall be deemed extended for a period of sixty (60) days, and Buyer shall extend the letter of credit if payment is to be made by letter of credit. If delivery is not made within such extended sixty-day period, the contract shall be deemed cancelled without liability to either party. In no event shall Buyer be entitled to incidental or consequential damages for late performance or a failure to perform.

IV. RETURNS

No return shall be accepted without a Seller-furnished Return Material Authorization number (RMA#). Please reference the Seller Return Material Authorization (RMA) Policy for Seller Products.

V. LIMITED WARRANTIES

A. Seller warrants that Seller's products, when shipped, will meet Seller's published specifications and that Seller's work (including services and installation) will be performed in a workmanlike manner. All claims under this warranty must be made in writing immediately upon discovery and except as noted below, within one (1) year from invoice date. All claims for services and/or installation must be made in writing immediately upon discovery and within eighteen (18)

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www.wika.com e-mail: info@wika.com

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months after completion of applicable work by Seller. Any product which is determined by Seller to be defective and returned to Seller freight collect at Sellers's expense shall be, as Buyer's sole and exclusive remedy, repaired, replaced or credited, at Seller's option.

B. Seller warrants certain designated bimetal thermometers (Models 30, 31, 32, 50, 51, and 52) and differential pressure gauges (700.04, 700.05, 732.25, and 732.26) manufactured and sold by Seller to be free from defects in material and workmanship under normal use and service for a period of seven (7) years from invoice date.

C. Seller warrants all XSEL™ Process Gauges (Models 2XX.34) against defects in material and workmanship under normal use and service for five (5) years after date of invoice from Seller unless otherwise stated. XSEL™ Process Gauges (Models 2XX.34) are further warranted against pressure system leakage due to defects in workmanship or materials, for a period of ten (10) years after date of invoice from Seller unless otherwise stated, provided use is in accordance with the guidelines prescribed in pressure gauge standard ASME B40.100-2013.

D. Seller warrants all electronic pressure products (TRONIC) against defects in workmanship or materials under normal use for two (2) years after date of invoice from Seller, unless otherwise stated.

E. Seller warrants all flow products manufactured and sold by Seller to be free from defects for a period of one (1) year from the date of installation (but in no event longer than eighteen (18) months after date of notification of readiness for shipment. Seller will either repair or replace, at its option, such defective products. Normal erosion, corrosion due to use, or any damage caused by improper handling during transit, storage, or installation, are not covered by this warranty. In order to make a claim under this warranty, the Buyer shall, at its own cost and expense, return the defective products to Seller.

F. THE FOREGOING LIMITED WARRANTIES ARE EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF TITLE, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF SELLER, AND SELLER NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT, ANY OTHER LIABILITY IN CONNECTION WITH THE SALE HEREUNDER. SELLER DISCLAIMS ANY LIABILITY FOR PRODUCT DEFECTS THAT ARE DUE TO PRODUCT MISUSE, IMPROPER USE, DAMAGE, IMPROPER PRODUCT SELECTION OR MISAPPLICATION.

VI. INTELLECTUAL PROPERTY LIABILITY

Seller reserves all rights in all Seller intellectual property, including without limitation offer documents, in particular illustrations, drawings, calculations, brochures, catalogs, models, samples, and tools. Such documents must not be made available to third parties without written consent from Seller. Buyer, upon Seller's request, will return all offer documents that are no longer necessary in the ordinary course of business. For orders according to Buyer specifications, Buyer is liable for third-party rights or property rights and indemnifies Seller against such claims.

Seller agrees to indemnify, defend and hold harmless Buyer against any claims, suits, actions or proceedings claiming the infringement of intellectual property rights by any Seller designed product. Seller agrees to either pay for costs of such defense, including legal fees, provide a non-infringing replacement, or refund to Buyer the amount that Buyer paid Seller for the infringing product. .

VII. LIMITATION OF LIABILITY

UNLESS APPLICABLE LAW OTHERWISE REQUIRES, SELLER'S AND ANY OF IT'S VENDOR'S TOTAL LIABILITY TO BUYER, BUYER'S CUSTOMERS OR TO ANY OTHER PERSON, RELATING TO ANY PURCHASES GOVERNED BY THESE TERMS & CONDITIONS, FROM THE USE OF THE PRODUCTS FURNISHED OR SERVICES RENDERED OR FROM ANY ADVICE, INFORMATION OR ASSISTANCE PROVIDED BY SELLER (BY ANY METHOD, INCLUDING A WEBSITE), IS LIMITED TO THE PRICE OF THE PRODUCTS OR SERVICES GIVING RISE TO THE CLAIM, WHICH AMOUNT SHALL BE FIXED AS LIQUIDATED DAMAGES AND NOT AS A PENALTY, AND SHALL BE THE COMPLETE AND EXCLUSIVE REMEDY AGAINST THE SELLER. BUYER'S FAILURE TO TIMELY SUBMIT A CLAIM HEREUNDER SHALL WAIVE ALL CLAIMS FOR DAMAGES OR OTHER RELIEF INCLUDING BUT NOT LIMITED TO CLAIMS BASED ON LATENT DEFECTS. NEITHER SELLER NOR ITS VENDORS SHALL BE LIABLE FOR ANY SPECIAL, INCIDENTAL, DIRECT, CONSEQUENTIAL OR PENAL DAMAGES (INCLUDING, BUT NOT LIMITED TO BACK-CHARGES, LABOR COSTS, COSTS OF REMOVAL, REPLACEMENT, TESTING OR INSTALLATION, LOSS OF EFFICIENCY, LOSS OF PROFITS OR REVENUES, LOSS OF USE OF THE PRODUCTS OR ANY ASSOCIATED PRODUCTS, DAMAGE TO ASSOCIATED PRODUCTS, LATENESS OR DELAYS IN DELIVERY, UNAVAILABILITY OF PRODUCTS, COST OF CAPITAL, COST OF SUBSTITUTE PRODUCTS, FACILITIES OR SERVICES, DOWNTIME, OR CLAIMS FROM BUYER'S CUSTOMERS OR OTHER PARTIES). IF SELLER FURNISHES BUYER WITH ADVICE OR OTHER ASSISTANCE WHICH CONCERNS ANY PRODUCTS SUPPLIED HEREUNDER, OR ANY SYSTEM OR EQUIPMENT IN WHICH ANY SUCH PRODUCTS MAY BE INSTALLED, , THE FURNISHING OF SUCH ADVICE OR ASSISTANCE IS GRATUITIOUS AND WILL NOT SUBJECT SELLER TO ANY LIABILITY, WHETHER BASED ON CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR OTHER GROUNDS.

VIII. CANCELLATION CHARGES

Seller may impose cancellation charges equal to the cost of raw materials purchased by Seller and labor and materials costs incurred (and not otherwise mitigated), dedicated to manufacturing Products prior to the date of Buyer's cancellation notice. A 25% cancellation fee will be assessed if engineering calculations and drawings (if needed) are completed prior to the date of Buyer's cancellation notice.

IX. ARBITRATION; CONTROLLING LAW; JURISDICTION AND VENUE

A. Except for actions to protect intellectual property rights and to enforce an arbitrator's decision hereunder, all disputes, controversies, or claims arising out of or relating to this Agreement or a breach thereof shall be submitted to and finally resolved by arbitration under the rules of the American Arbitration Association ("AAA") then in effect. There shall be one arbitrator, and such arbitrator shall be chosen by mutual agreement of the parties in accordance with AAA rules. The arbitration shall take place in Atlanta, Georgia, USA. The arbitrator shall apply the laws of the State of Georgia, to all issues in dispute. The controversy or claim shall be arbitrated on an individual basis, and shall not be consolidated in any arbitration with any claim or controversy of any other party. The findings of the arbitrator shall be final and binding on the parties, and may be entered in any court of competent jurisdiction for enforcement. Enforcements of any award or judgment shall be governed by the United Nations Convention on the Recognition and Enforcement of Foreign Arbitral Awards.

B. This Agreement shall be governed, controlled, interpreted and defined by and under the laws of the State of Georgia without regard to conflicts of law provisions thereof.

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www.wika.com e-mail: info@wika.com

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C. The parties agree that the courts of Fulton County in the State of Georgia, and the U.S. District Court for the Northern District of Georgia, Atlanta Division shall be the exclusive jurisdiction and venue for all legal proceedings that are not arbitrated under these Terms and Conditions and RMA Policy.

X. ASSIGNMENT

An order shall not be assigned by either party without the express written consent of the other. Consent will not be required, however, for internal transfers and assignments as between either party and its affiliates under common ownership, and nothing herein shall limit either party's right to factor or sell receivables.

XI. TERMINATION

Either party may terminate the whole or any part of the other party's performance under a purchase order if there is a material breach of these Terms & Conditions and RMA Policy. In the event of any such breach, the non-breaching party will provide the breaching party with written notice of the nature of the breach and the non-breaching party's intention to terminate for default. In the event the breaching party does not cure such failure within ten (10) days of such notice, the non-breaching party may, by written notice, terminate the order; provided, that the breaching party shall continue its performance to the extent not terminated.

XII. EXPORT COMPLIANCE

Buyer acknowledges that the Product is subject to U.S. export control laws, rules and regulations including, but not limited to: The Export Administration Act of 1979 (50 U.S.C. § 2401 et seq., as extended by Executive Order 13222); The Arms Export Control Act of 1976 (22 U.S.C. § 2751 et seq.); The Export Administration Regulations (15 C.F.R. § 730 et seq.); The International Traffic in Arms Regulations (22 C.F.R. § 120 et seq.); and The International Emergency Economic Powers Act (50 U.S.C. § 1701 et seq.). Buyer shall comply with all applicable export control and trade embargo laws, rules and regulations and shall not resell, export, re-export, distribute, transfer or dispose of the Product, directly or indirectly, without first obtaining all necessary written consents, permits and authorizations and completing such formalities as may be required by any such laws, rules and regulations. Buyer acknowledges that any diversion of these commodities contrary to the afore- mentioned laws, rules and regulations is prohibited. Failure by Buyer to comply with all applicable export control and trade embargo laws, rules and regulations shall constitute a material breach of these Terms and Conditions of Sale. Seller assumes no responsibility or liability for Buyer's failure to obtain required authorizations. Buyer agrees to impose this same compliance requirement in its contracts with third parties pertaining to the Product.

XIII. MISCELLANEOUS

These Terms and Conditions and RMA Policy constitute the entire understanding of the parties with respect to the subject matter of this agreement and merges all prior communications, understandings, and agreements. These Terms and Conditions and RMA Policy may be modified only by a written agreement signed by the parties. Seller objects to and rejects any terms between Buyer and any other party, and no such terms, including but not limited to any government regulations or "flow-down" terms, shall be a part of or incorporated into any order from Buyer to Seller, unless agreed to in writing by an authorized representative of Seller.

The failure of either party to enforce at any time any of the provisions hereof shall not be a waiver of such provision, or any other provision, or of the right of such party thereafter to enforce any provision hereof. If any provision of These Terms and Conditions and RMA Policy are declared invalid or unenforceable, such provision shall be deemed modified to the extent necessary and possible to render it valid and enforceable. In any event, the unenforceability or invalidity of any provision shall not affect any other provision of these Terms and Conditions and RMA Policy, and these terms shall continue in full force and effect, and be construed and enforced, as if such provision had not been included, or had been modified as above provided, as the case may be.

WARNING: Seller's Products may contain chemicals known to the State of California to cause cancer and/or reproductive harm.

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Return Material Authorization (RMA) Policy
WIKA Instrument, LP

IF YOU HAVE A REQUEST FOR A MERCHANDISE RETURN, PLEASE CALL 1-888-WIKAUSA OR YOUR ACCOUNT MANAGER TO EXPEDITE YOUR RMA CREDIT OR RETURN.

For products purchased at WIKA Instrument, LP ("Seller") Lawrenceville facility, Seller will issue a credit and/or initiate a product replacement resolution within 24 hours.

Seller may require a product be returned for evaluation to make improvements in design and manufacturing processes. If a return is necessary, a shipping label and decontamination certificate will be emailed within 24 hours.

As part of the evaluation, the product may be disassembled and not re-assembled to the condition in which it was sent to Seller, rendering the product unusable. If the root cause is due to Seller, the product will be replaced.

An RMA number is valid for forty-five (45) days from issuance.

Merchandise returned to Seller for any reason must have a Seller supplied Return Material Authorization (RMA) number. Warranty returns should contain a proof of purchase (invoice number and date). All returns require the original purchase order number. If the original purchase order number is not available, a new purchase order number is acceptable for credit and rebilling.

Please use the RMA number and shipping label provided and insure the RMA number is clearly visible on the outside of the package to improve processing time. A packing list should be included referencing the RMA number, quantity, product description and reason for return.

If a failure analysis is required, a Corrective Action Report (CAR) must be requested when the RMA is issued and detailed information must be provided about the application including the type of media, and operating conditions.

I. WARRANTY RETURNS

(See Limited Warranty Policy in Terms and Conditions.) Seller's shipping account information will be on the RMA. Upon receipt and inspection of the material, if the merchandise is determined to be covered under warranty, the merchandise will be, replaced or credited at Seller's option under Seller's warranty terms. The merchandise will be returned to the Buyer freight PPD at Seller's expense. If the merchandise is determined not to be covered under warranty, the merchandise will, at Buyer's discretion be:

A. Returned to Buyer and freight charges will be responsibility of Buyer; or
B. Discarded; or
C. Replaced and Buyer must place a new purchase order for replacement product. Freight charges will be the responsibility of Buyer.

Restocking fees may apply. Custom product is not returnable.

II. Credit Memos

Seller will issue a credit memo for the returned merchandise. Buyer should not make deductions from payments until a credit memo from seller has been received.

III. SAFETY AND HANDLING REQUIREMENTS

For the safety of our employees, as well as to meet government regulations, Seller requires the following information to accompany returned product. All items must be packaged properly for shipping.

A. SDS are required for all returned products which have been in service, tested or installed.
B. Signed decontamination certification for each return.

If these items do not accompany the return, the product will not be inspected and the RMA will not be processed. Seller cannot be held responsible for any returned merchandise that has not been decontaminated by Buyer. Any such items may be refused or returned at Buyer's expense.

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WARRANTY & TERMS AND CONDITIONS OF SALE

"Apollo"® Valves







Conbraco Industries, Inc. warrants, to its initial purchaser only, that its products which are delivered to this initial purchaser will be of the kind described in the order or price list and will be free of defects in workmanship or material for a period of FIVE years from the date of delivery to you, our initial purchaser. This warranty applies to Apollo brand product with "Made in the USA" markings only.

Should any failure to conform to this warranty appear within FIVE years after the date of the initial delivery to our initial purchaser, Conbraco will, upon written notification thereof and substantiation that the goods have been stored, installed, maintained and operated in accordance with Conbraco's recommendations and standard industry practice, correct such defects by suitable repair or replacement at Conbraco's own expense.

APOLLO INTERNATIONAL PRODUCTS: Conbraco Industries, Inc. warrants its International products, to its initial purchaser only, that its international products which are delivered to this initial purchaser will be of the kind described in the order or price list and will be free of defects in workmanship or material for a period of TWO years from the date of delivery to you, our initial purchaser.

THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHER WARRANTY OF QUALITY, WHETHER EXPRESSED OR IMPLIED, EXCEPT THE WARRANTY OF TITLE AND AGAINST PATENT INFRINGEMENT. Correction of non-conformities, in the manner and for the period of time provided above, shall constitute fulfillment of all liabilities of Conbraco to our initial purchaser, with respect to the goods, whether based on contract, negligence, strict tort or otherwise. It is the intention of Conbraco Industries, Inc. that no warranty of any kind, whether expressed or implied shall pass through our initial purchaser to any other person or corporation.

LIMITATION OF LIABILITY: Conbraco Industries, inc. SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE FOR SPECIAL OR CONSEQUENTIAL DAMAGES SUCH AS, BUT NOT LIMITED TO, DAMAGES OR TO LOSS OF OTHER PROPERTY OR EQUIPMENT, LOSS OF PROFITS OR REVENUE, COST OF CAPITAL, COST OF PURCHASED OR REPLACEMENT GOODS, OR CLAIMS OF CUSTOMERS OF OUR INITIAL PURCHASER. THE REMEDIES OF OUR INITIAL PURCHASER, AND ALL OTHERS, SET FORTH HEREIN, ARE EXCLUSIVE, AND THE LIABILITY OF CONBRACO WITH RESPECT TO SAME SHALL NOT, EXCEPT AS EXPRESSLY PROVIDED HEREIN, EXCEED THE PRICE OF THE GOODS UPON WHICH SUCH LIABILITY IS BASED.

* It is the end user's responsibility to confirm that items intended for use satisfy local codes and standards.

TERMS AND CONDITIONS OF SALE

- Payment: 2% 10th prox. Net 30 days.
- All prices F.O.B. shipping point with freight allowed on shipments of 750 pounds and/or $5,000 net minimum to all shipping points within the United States excluding Alaska and Hawaii. No freight allowed on Air Freight or Parcel Post shipments. Claims for shortages must be made within 10 days of receipt of material. Our responsibility ends when a receipt is furnished us by the carrier.
- No Invoice Rendered For Less Than $50.00.
- No freight will be allowed on Air Freight, Air Express, Parcel Post or U.P.S. shipments.
- All Conbraco products may be combined to make sufficient weight for full freight allowance.
- Phone order quoted prices are subject to correction. Prices and designs are subject to change without notice.
- Orders for material or special design or specification are made to customer's order and are not subject to cancellation or return.
- All goods returned to us will not be accepted unless a full explanation has been made and our written authorized permission obtained in advance. All goods returned – if accepted – will be credited at invoice price, less 30% for service and rehandling charges, plus shipping expenses.
- We reserve the right to adjust orders to box quantities.

main **704.847.9191**
fax **704.841.6640**
P.O. Box 247 | Matthews, NC | 28106

www.**apollovalves**.com

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TRC
1430 Broadway, 10th Floor
New York, New York, 10018

Main 212.221.7822
Fax 212.221.7840

Transmittal

To: Anna Ramirez
IEH Division
New York City School Construction Authority
30-30 Thomson Avenue
Long Island City, NY 11101-3045
(718) 472-8620

Date: February 9, 2021

TRC No: 356549.0000.0000

Project: K671
840 5th Avenue
Brooklyn, NY
LLW#: 106889

We have enclosed:

☐ B/W Prints ☐ Reproducible ☐ Reports ☐ Letter
☐ Specifications ☐ Memorandum X Contractor Submittals

Description

SSDS Shop Drawings (02221-008-001)
No Exceptions Taken

Sent Via:

☐ Messenger ☐ 1st Class Mail ☐ FedEx [Type] X Email

Copy to: M. Sherwood (NYCSCA)

Very truly yours,
TRC

Phillip Castellano, PE

TRC Engineers, Inc. (TRC) has reviewed the revised sub-slab depressurization system (SSDS) shop drawings submitted for K671. The submittal was prepared by AMCC Corp., is dated February 5, 2021, and was received by TRC on February 8, 2021. Please find TRC's comments to the submittal below.

The submittal has been marked "**No Exceptions Taken**".

TRC notes:

A. TRC takes no exception to the revised location of SSDS pit, P-2.

B. Pipe sleeves over grade/strap beams and gas permeable aggregate around these beams must be installed in accordance with Detail 3 on Drawing H204.

The comments should not be construed in any way as intent to limit the Contractor's responsibilities. The absence of a comment with respect to a specific Contract requirement should not be interpreted as a suggestion to change a Contract requirement.

AMCC CORP.

50-18 VERNON BLVD

LONG ISLAND CITY, NY 11101

Phone: 718-472-9500
Fax: 718-472-2250

TRANSMITTAL

No. 02258

PROJECT: PS671k

DATE: 02/08/2021

TO: GRAVES-MMA JV Architects, PLLC
3297 Route 66, Studio B
Neptune, NJ 07753

REF: 02221-008-001
Dwg: SSDS Piping - SSDS1-UG
WDFrev2

ATTN: Pete Larsen

WE ARE SENDING:		SUBMITTED FOR:		ACTION TAKEN:	
☑	Shop Drawings	☑	Approval	☐	Approved as Submitted
☐	Letter	☐	Your Use	☐	Approved as Noted
☐	Prints	☑	As Required	☐	Returned After Loan
☐	Change Order	☐	Review and Comment	☐	Resubmit
☐	Plans			☑	Submit
☐	Samples	**SENT VIA:**		☐	Returned
☐	Specifications	☑	Attached	☐	Returned for Corrections
☐	Other:	☐	Separate Cover Via: Mail	☐	Due Date:

ITEM NO.	COPIES	DATE	ITEM	NUMBER	REV. NO.	DESCRIPTION	STATUS
008	1	02/08/2021	SUT	02221-008	001	Dwg: SSDS Piping - SSDS-UG	NEW

Remarks: WDF comment: Relocated SSDS P-2 pit and piping to resolve field condition with electrical conduit.

TRC Engineers, Inc.

☑ No Exceptions Taken	Exp. Proj. Name: K671	Reviewed By R. Bowden, P. Castellano
☐ Make Corrections Noted	Design/LLW No. 106889	Contract No. C000015348
☐ Rejected – Revise and Resubmit	Date Received 2/8/21	Date Returned 2/9/21
☐ Rejected – Not Acceptable for ☐ No Action Taken	Submittal No. 02221-008-001	

Submittal reviewed as:
☑ Per Spec/ Basis of Design ☐ "Or Equal Substitution"/Non-basis of Design ☐ "Alternate Substitution"

CORRECTIONS OR COMMENTS MADE ON THE SUBMITTAL DURING THIS REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. SUBMITTAL APPROVAL IS ONLY FOR GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION, PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATING THE WORK WITH THAT OF ALL OTHER TRADES AND PERFORMING THE WORK IN A SAFE AND SATISFACTORY MANNER.

Bobby Kang

Signed _____
Bobby Kang

CC: Main Office / Field Copy

Primavera ®

TRANSMITTAL LETTER

WDF, Inc.
30 North MacQuesten Pkwy.
Mount Vernon, NY 10550

Phone: (914)-776-8000
Fax: (914)-776-8033

Date:	2/5/2021
School:	PS 671K
Project:	
CM13 Name:	
Contract No:	
Design/ LLW No:	LLW 106889

Relocated SSDS P-2 pit and piping to resolve field condition with electrical conduit.

To: AMCC Corp.
50-18 Vernon Blvd
Long Island City, NY 11101

Attn: Charles Marino

We are sending by : Electronic the following items.

LIST OF ITEMS SUBMITTED

# of Items	Type	Submittal #	Description	Previous Submittal No.	Per Spec section	"or Equal" Substitution	"Alternate Substitution"
1	Shop Drawing	02221-Rev2	SSDS Piping (Per Spec/Basis of Design)		X		

Comments:

Submitted by: WDF, Inc. Ernest Martinez Date: _____

Received by: _____ _____

Print Name: _____

SUBMITTAL DATA

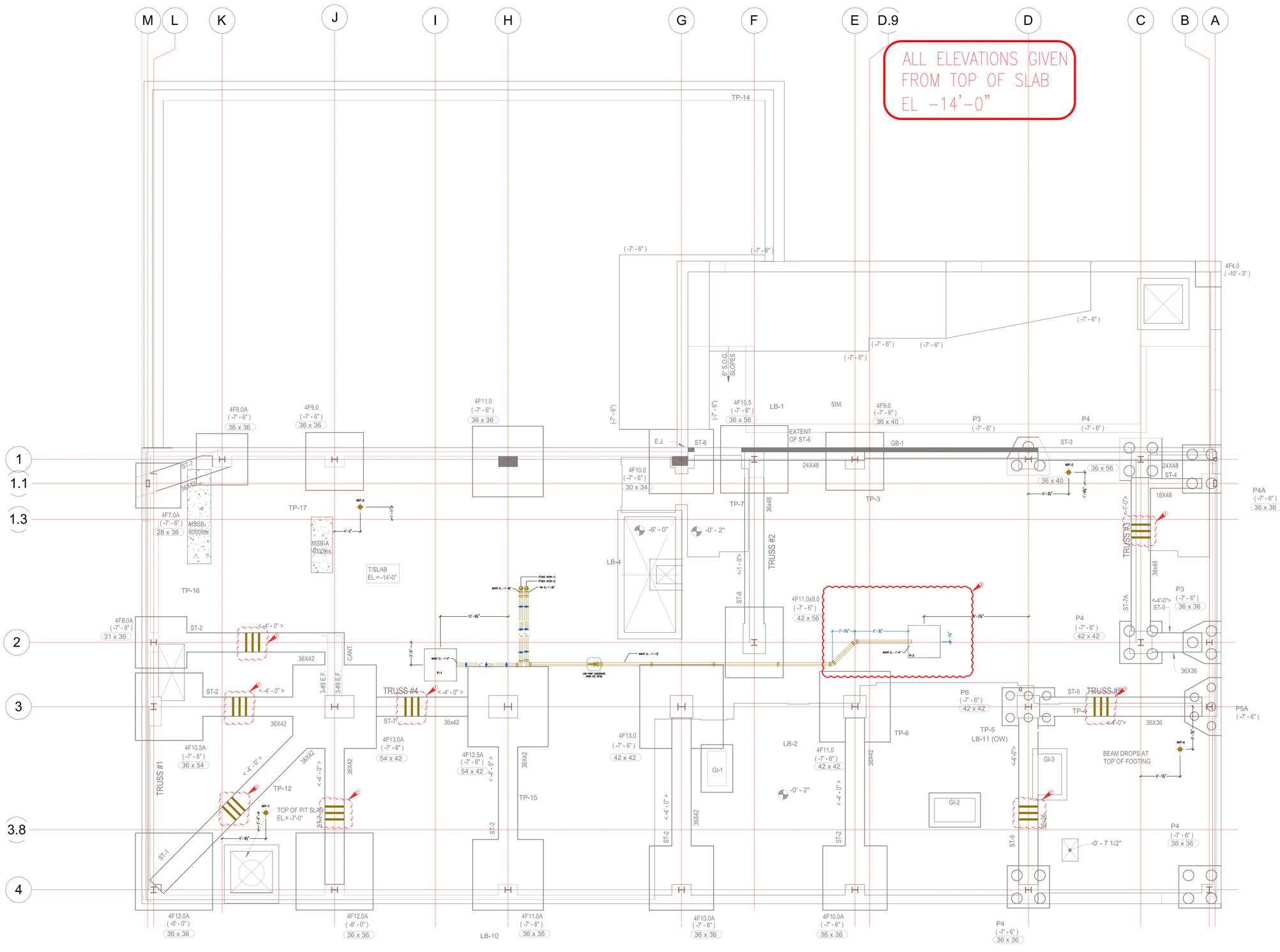
Submittal Date	2/5/2021
Project	PS 671K
Description	SSDS Piping
Spec. Section Paragraph	02221
Submission #	
Drawing Reference:	
Deviation:	N/A

Relocated SSDS P-2 pit and piping to resolve field condition with electrical conduit.

Reviewed by: Ernest Martinez

X_____

30 North Macquesten Parkway Mount Vernon, New York 10550
T: 914-776-8000 F: 914-664-1287



DRAWING NOTES

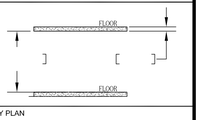
1. THIS DRAWING IS THE SOLE AND EXCLUSIVE PROPERTY OF WDF INC., WHO RETAINS ALL COPYRIGHT, TRADEMARK, AND PROPRIETARY RIGHTS THERETO. THIS INFORMATION HAS BEEN SUBMITTED FOR REVIEW ONLY, AND MAY NOT BE USED FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF WDF INC.
2. OTHER TRADES WORK AND EQUIPMENT INDICATED THRU "BY OTHERS" MAY BE SHOWN FOR COORDINATION PURPOSE ONLY AND IS NOT PART OF THIS DRAWING. WE ARE NOT RESPONSIBLE FOR ANY A/E COMMENTS ON OTHER TRADES WORK.
3. ANY EXTRA WORK INDICATED ON THIS DRAWING, IS SHOWN TO EXPEDITE JOB PROGRESS ONLY. CHANGE ORDERS MUST BE ISSUED AND APPROVED BEFORE ANY PIPING IS INSTALLED.

ARCH./ENG. NOTES

① BEAMS WERE LOWERED IN REDESIGNED FOUNDATTION DRAWINGS. TOP OF BEAMS ARE NOW -4'-0" BELOW CELLAR SLAB. ARE THE SLEEVES STILL NECESSARY ABOVE THE BEAMS?

② REVISED PER FIELD CONDITIONS

No.	Date	Revision	BY
0	11.1.19	SUBMITTED FOR APPROVAL	CG
2	02.05.21	REVISED PER FIELD CONDITIONS	KM



KEY PLAN

CONTRACTOR
WDF Inc.
A GREENSTAR COMPANY
30 N. MacQuesten Pkwy
Mt. Vernon, NY 10550
914 776-8000
www.wdfinc.net

DRAWING TITLE

PS-671

CELLAR LEVEL
BELOW SLAB PIPING
SSDS PIPING DRAWING

SCALE	DRAWN
3/16"=1'-0"	C.GILL

PROJECT NO.

DRAWING NO.	REVISION NO.
SSDS-UG	2

CONTRACTOR'S SHOP DRAWING

FILE NAME: K:\PS-671\Constructs\03-Plumbing\01-plm\UG-SSDS.dwg SAVED ON 2/5/2021 2:41 PM PLOTTED ON 2/5/2021 2:42 PM PLOTTED BY KAMAR MITCHELL

APPENDIX E

- **GAS VAPOR BARRIER DOCUMENTATION**
  - GAS VAPOR BARRIER PE CERTIFICATION

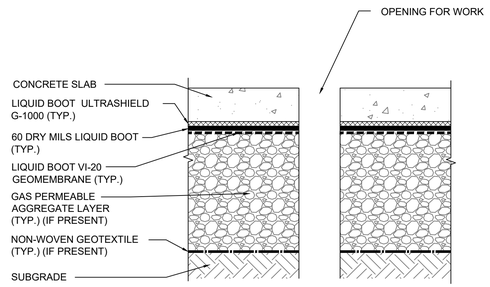
- **SUB-SLAB DEPRESSURIZATION SYSTEM DOCUMENTATION**
  - SSDS PE CERTIFICATION

APPENDIX F

- **STANDARD REPAIR DETAILS FOR GAS VAPOR BARRIER**

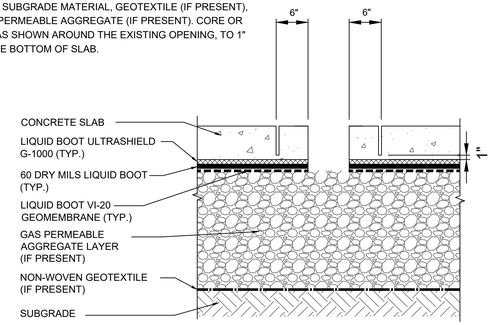
STEP 1:

REMOVE FLOOR COVERINGS, CONCRETE SLAB, AND SUB-GRADE MATERIALS REQUIRED TO PERFORM THE WORK. MEASURE THE SLAB THICKNESS.



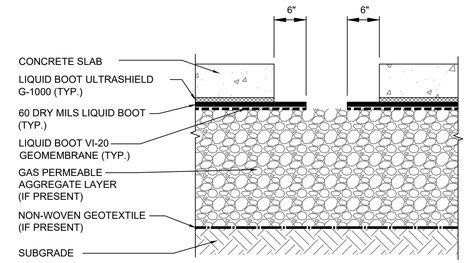
STEP 2:

AFTER INTRUSIVE ACTIVITIES ARE COMPLETE, REPLACE REMOVED SUBGRADE MATERIAL, GEOTEXTILE (IF PRESENT), AND GAS PERMEABLE AGGREGATE (IF PRESENT). CORE OR SAWCUT AS SHOWN AROUND THE EXISTING OPENING, TO 1" ABOVE THE BOTTOM OF SLAB.



STEP 3:

USE A CHIPPING HAMMER TO CAREFULLY REMOVE CONCRETE AS SHOWN. EXPOSE EXISTING LIQUID BOOT MEMBRANE. CAREFULLY REMOVE EXPOSED LIQUID BOOT G-1000 ULTRASHIELD WHILE LEAVING THE 60 DRY MILS OF LIQUID BOOT AND LIQUID BOOT GEOMEMBRANE INTACT. CLEAN THE EXPOSED LIQUID BOOT TO ENSURE MEMBRANE IS FREE OF ALL DUST, DIRT, GREASE, CURING COMPOUNDS, AND RELEASING AGENTS, ETC.



NOTES:

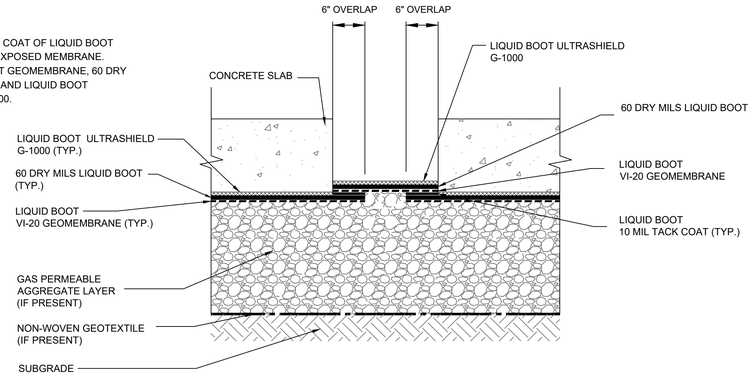
1. DETAILS SHOW TYPICAL CONDITIONS. ACTUAL CONDITIONS MAY VARY. PRIOR TO MOBILIZING CONSULT WITH IEH DIVISION OF THE AUTHORITY REGARDING SITE SPECIFIC REQUIREMENTS.
2. RELATIVE THICKNESS OF GAS VAPOR BARRIER SHOWN IS EXAGGERATED FOR ILLUSTRATIVE PURPOSES.
3. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR GAS VAPOR BARRIER DETAILS.
4. ANY DEVIATION FROM THIS INSTALLATION MUST BE SUBMITTED TO AUTHORITY FOR APPROVAL.
5. ALL GAS VAPOR BARRIER WORK MUST BE COMPLETED BY A MANUFACTURER-CERTIFIED CONTRACTOR.
6. THE IEH DIVISION OF THE AUTHORITY MUST BE NOTIFIED FIVE (5) BUSINESS DAYS PRIOR TO START OF WORK.
7. DO NOT USE FOR INSTALLATION OF NEW PENETRATIONS (SUCH AS PIPING OR CONDUIT) THROUGH FLOOR SLAB.
8. FOR HORIZONTAL SURFACES ONLY.

LIQUID BOOT REPAIR - PRODUCT LIST:

1. LIQUID BOOT (FLUID APPLIED)
2. LIQUID BOOT (TROWEL-GRADE)
3. LIQUID BOOT ULTRASHIELD G-1000
4. LIQUID BOOT VI-20 GEOMEMBRANE

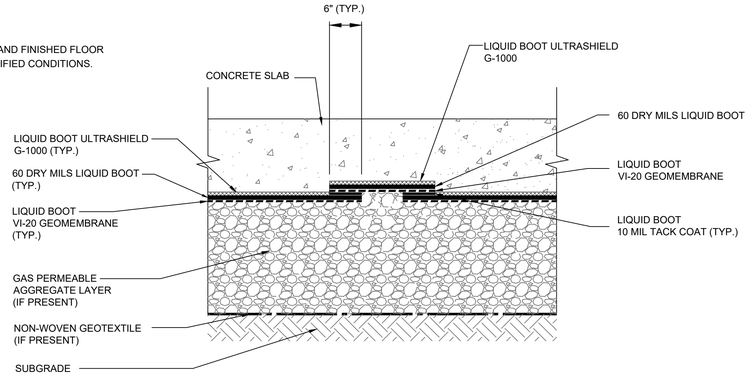
STEP 4:

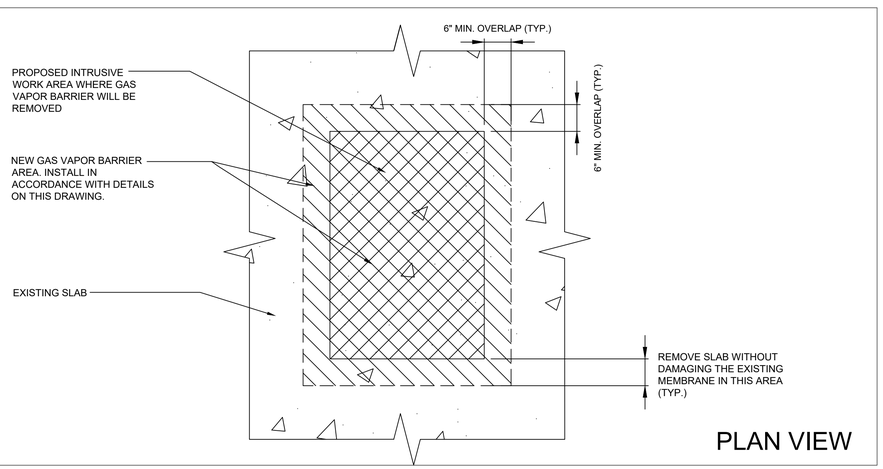
APPLY 10 MIL TACK COAT OF LIQUID BOOT TO THE EXISTING EXPOSED MEMBRANE. APPLY LIQUID BOOT GEOMEMBRANE, 60 DRY MILS LIQUID BOOT, AND LIQUID BOOT ULTRASHIELD G-1000.



STEP 5:

RESTORE CONCRETE AND FINISHED FLOOR TO ORIGINAL OR SPECIFIED CONDITIONS.





PLAN VIEW

PROJECT: ####

TITLE: **TYPICAL LIQUID BOOT AREA REPAIR DETAILS**

DRAWN BY:	H. DELGADO	PROJ. NO.:	NA
CHECKED BY:	P. CASTELLANO		
APPROVED BY:	K. BOGER		**DRAWING 001**
DATE:	JULY 2022		

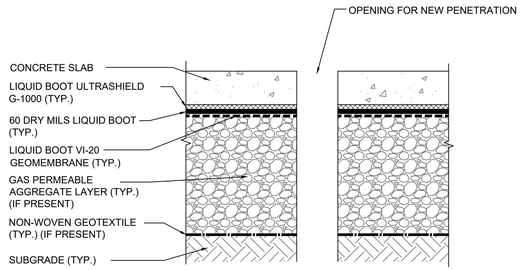
TRC
1430 Broadway, 10th Floor
New York, NY 10018
Phone: 212.221.7822
www.TRCcompanies.com

FILE NO.: xxx - Liquid Boot Repair Details.dwg

24x36 --- USER: RBowden --- ATTACHED XREF'S: --- ATTACHED IMAGES:
DRAWING NAME: \\nyc-fp1\environmental\Shared\Projects\NYCSCA Contract C000014345\337198 - R070 Building Phase CI\O&M Plan\Attachments\Appendix F - Standard Repair Details for Vapor Barrier\ xxx - Liquid Boot Repair Details.dwg --- PLOT DATE: July 27, 2022 - 11:21AM --- LAYOUT: xx
Version: 2017.10.21

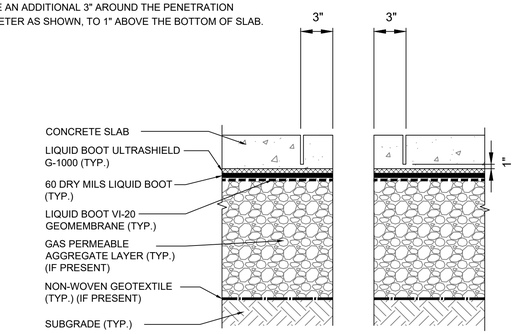
STEP 1:

REMOVE FLOOR COVERINGS AND CORE TO DIMENSION REQUIRED FOR INSTALLATION OF THE PENETRATION. REMOVE SUB-GRADE MATERIAL REQUIRED TO PERFORM THE WORK. MEASURE THE SLAB THICKNESS.



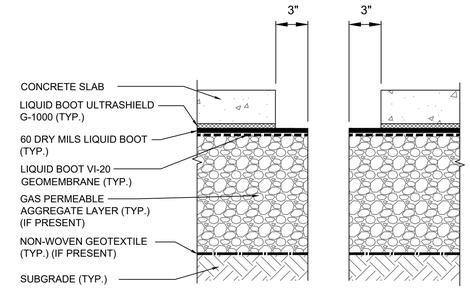
STEP 2:

CORE AN ADDITIONAL 3" AROUND THE PENETRATION DIAMETER AS SHOWN, TO 1" ABOVE THE BOTTOM OF SLAB.



STEP 3:

USE A CHIPPING HAMMER TO CAREFULLY REMOVE AN ADDITIONAL 3" RING OF CONCRETE. EXPOSE EXISTING LIQUID BOOT MEMBRANE. CAREFULLY REMOVE EXPOSED LIQUID BOOT G-1000 ULTRASHIELD WHILE LEAVING THE 60 DRY MILS OF LIQUID BOOT AND LIQUID BOOT GEOMEMBRANE INTACT.

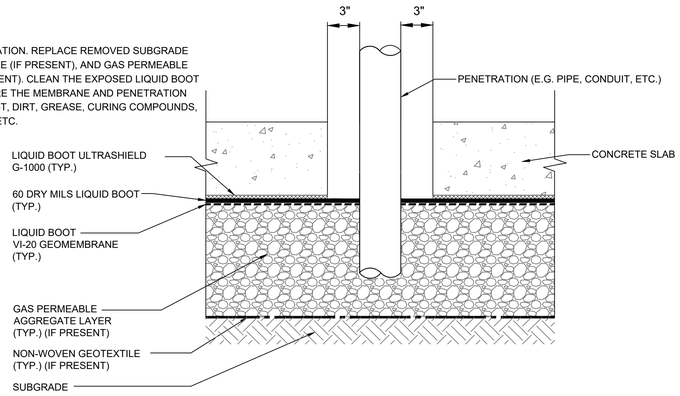


NOTES:

1. DETAILS SHOW TYPICAL CONDITIONS. ACTUAL CONDITIONS MAY VARY. PRIOR TO MOBILIZING CONSULT WITH IEH DIVISION OF THE AUTHORITY REGARDING SITE SPECIFIC REQUIREMENTS.
2. RELATIVE THICKNESS OF GAS VAPOR BARRIER SHOWN IS EXAGGERATED FOR ILLUSTRATIVE PURPOSES.
3. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE EXCEPT FOR GAS VAPOR BARRIER DETAILS.
4. SUBMIT DETAIL OF ANY VAPOR BARRIER PENETRATIONS NOT SHOWN TO AUTHORITY FOR APPROVAL.
5. ANY DEVIATION FROM THIS INSTALLATION MUST BE SUBMITTED TO AUTHORITY FOR APPROVAL.
6. ALL GAS VAPOR BARRIER WORK MUST BE COMPLETED BY A MANUFACTURER-CERTIFIED CONTRACTOR.
7. THE IEH DIVISION OF THE AUTHORITY MUST BE NOTIFIED FIVE (5) BUSINESS DAYS PRIOR TO START OF WORK.
8. FOR PENETRATIONS THROUGH HORIZONTAL SURFACES ONLY.

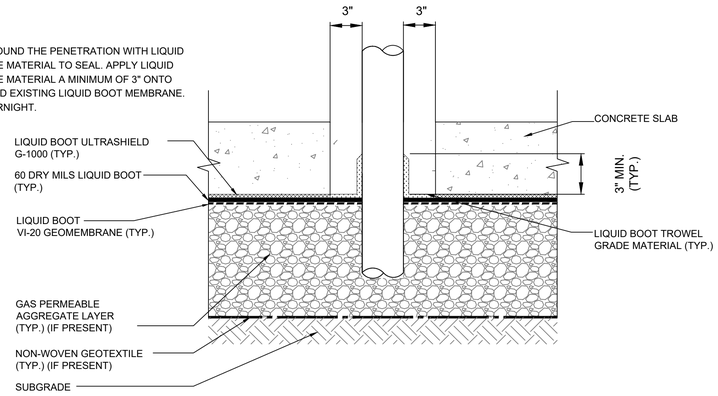
STEP 4:

INSTALL THE PENETRATION. REPLACE REMOVED SUBGRADE MATERIAL, GEOTEXTILE (IF PRESENT), AND GAS PERMEABLE AGGREGATE (IF PRESENT). CLEAN THE EXPOSED LIQUID BOOT MEMBRANE TO ENSURE THE MEMBRANE AND PENETRATION ARE FREE OF ALL DUST, DIRT, GREASE, CURING COMPOUNDS, RELEASING AGENTS, ETC.



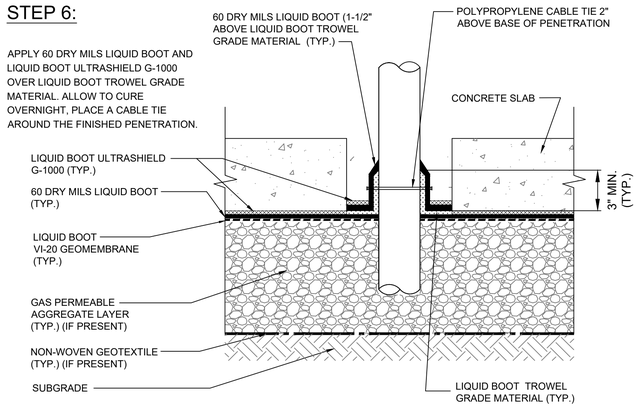
STEP 5:

FILL IN ALL SPACE AROUND THE PENETRATION WITH LIQUID BOOT TROWEL GRADE MATERIAL TO SEAL. APPLY LIQUID BOOT TROWEL GRADE MATERIAL A MINIMUM OF 3" ONTO THE PENETRATION AND EXISTING LIQUID BOOT MEMBRANE. ALLOW TO CURE OVERNIGHT.



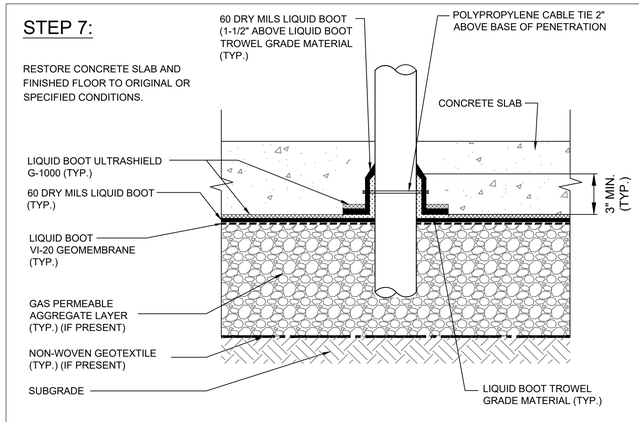
STEP 6:

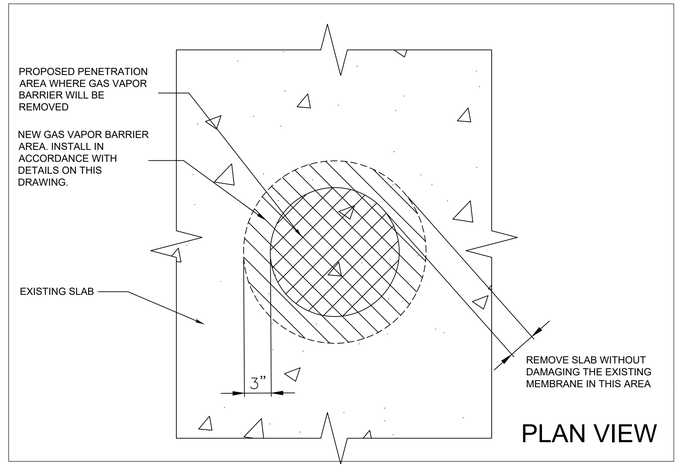
APPLY 60 DRY MILS LIQUID BOOT AND LIQUID BOOT ULTRASHIELD G-1000 OVER LIQUID BOOT TROWEL GRADE MATERIAL. ALLOW TO CURE OVERNIGHT, PLACE A CABLE TIE AROUND THE FINISHED PENETRATION.



STEP 7:

RESTORE CONCRETE SLAB AND FINISHED FLOOR TO ORIGINAL OR SPECIFIED CONDITIONS.





PLAN VIEW

LIQUID BOOT REPAIR - PRODUCT LIST:

1. LIQUID BOOT (FLUID APPLIED)
2. LIQUID BOOT (TROWEL-GRADE)
3. LIQUID BOOT ULTRASHIELD G-1000
4. LIQUID BOOT VI-20 GEOMEMBRANE

PROJECT: ####

TITLE: **TYPICAL LIQUID BOOT PENETRATION REPAIR DETAILS**

DRAWN BY:	H. DELGADO	PROJ. NO.:	NA
CHECKED BY:	P. CASTELLANO		
APPROVED BY:	K. BOGER		**DRAWING 002**
DATE:	JULY 2022		

TRC
1430 Broadway, 10th Floor
New York, NY 10018
Phone: 212.221.7822
www.TRCcompanies.com

FILE NO.: xxx - Liquid Boot Pipe Penetration Details.dwg

24x36 --- USER: RBowden --- ATTACHED XREFS: --- ATTACHED IMAGES:
DRAWING NAME: \\nyc-fp1\environmental\Shared\Projects\NYCSCA Contract C000014345337198 - R070 Building Phase CI\O&M Plan\Attachments\Appendix F - Standard Repair Details for Vapor Barrier\ xxx - Liquid Boot Pipe Penetration Details.dwg --- PLOT DATE: July 27, 2022 - 11:22AM --- LAYOUT: xxx
Version: 2017-10-21

APPENDIX G

REQUEST TO IMPORT/REUSE FILL MATERIAL FORM

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e). Use of this form is not a substitute for reading the applicable Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is: Restricted Residential Use

Have Ecological Resources been identified? no

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that would pass a size 80 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

Revised August 2014