# Interim Corrective Action Plan

## Washington Metropolitan Area Transit Authority
## Northern Bus Garage
## Washington, DC

September 7, 2023

Revised December 1, 2023

# Contents

# Figures



# Tables



# Appendices

# Acronyms and Abbreviations

| | |
|---|---|
| amsl | above mean sea level |
| Arcadis | Arcadis U.S., Inc. |
| CAP | Corrective Action Plan |
| CSM | conceptual site model |
| CVOC | chlorinated volatile organic compound |
| DC | District of Columbia |
| DOEE | District of Columbia Department of Energy and Environment |
| DQO | data quality objective |
| DCMR | District of Columbia Municipal Regulations |
| DCRBCA | District of Columbia Risk-Based Corrective Action |
| DCWSA | District of Columbia Water and Sewer Authority |
| DNAPL | dense non-aqueous phase liquid |
| DRO | diesel range organics |
| EDD | electronic data deliverable |
| GRO | gasoline range organics |
| ICAP | Interim Corrective Action Plan |
| IDW | investigation-derived waste |
| PCB | polychlorinated biphenyl |
| µg/L | micrograms per liter |
| mg/kg | milligrams per liter |
| PCB | polychlorinated biphenyls |
| PID | photoionization detector |
| PSS | Phase Separation Science |
| RSL | regional screening level |
| Site | Northern Bus Garage property located at 4615 14$^{th}$ Street Northwest, Washington, DC 20011 |
| SVOC | semivolatile organic compound |
| TPH | total petroleum hydrocarbon |
| USDA | United States Department of Agriculture |
| USEPA | United States Environmental Protection Agency |
| UST | underground storage tank |
| VOC | volatile organic compound |
| WMATA | Washington Metropolitan Area Transit Authority |

# 1 Introduction

On behalf of the Washington Metropolitan Area Transit Authority (WMATA), Arcadis U.S., Inc. (Arcadis) has prepared this Interim Corrective Action Plan (ICAP) to address soil impacts at the Northern Bus Garage property located at 4615 14th Street Northwest, Washington, District of Columbia (DC) 20011 (the Site) (Figure 1). STV Incorporated (under contract to Clark Construction) retained Arcadis to prepare this document in response to a DC Department of Energy and Environment (DOEE) Directive dated July 27, 2023 and following discussions with DOEE, STV Incorporated, Clark Construction, and WMATA on September 29, 2023 (DOEE 2023). Additional comments were received from DOEE on October 2, 2023 and are addressed herein.

This ICAP is designed to provide direction for Directive 4: Soil Sampling Requirements during Construction Activities. Additionally, this ICAP provides guidance for the handling of impacted soils and other structures that are encountered during construction activities to reduce the potential exposures of human receptors during that time. Directives 1, 2, 3, and 5, including potential remediation of groundwater impacts will be addressed in a future Corrective Action Plan (CAP) that will be provided separately.

This ICAP serves as a supplement to the previously implemented Soil and Groundwater Management and Monitoring Plan (PSI 2022a).

## 1.1 Site Description

The Site is located within Square 2811/2815 and Property ID 2811 0802 of the Washington, DC Real Estate Map, and is located in a mixed-use neighborhood surrounded by residential housing and commercial properties. The Site is currently cleared of buildings and vegetation and is in the process of undergoing excavation and mass grading. Previously, the Site was improved with an approximately 270,000-square-foot multi-story building, with the oldest portion of the building constructed circa 1906. The Site has been used for the operation and maintenance of transit vehicles beginning with trolley cars in the early 1900s for Capital Traction Company (Versar 2003). A detailed site history is provided in the Baseline Risk Assessment Report (Arcadis 2023), which was submitted to DOEE in July 2023.

## 1.2 Proposed Remedy

The proposed remedy for this ICAP is removal and disposal of underground structures including fuel storage tanks and piping, excavation and off-site disposal of impacted soil material, the installation of a vapor mitigation system in proposed buildings, and the installation of seven monitoring/recovery wells at select locations on the Site. Additional details on the remedy are presented in Section 2.5.

# 2 Site Background

This section summarizes the current environmental conditions and further describes the proposed remedy for the Site.

## 2.1 Geology

The following sections outline the general geology of the Site and the subsurface conditions that may be encountered during the exploration of the Site.

### 2.1.1 Regional Geology

The Site is located within the Piedmont Physiographic Province and is mapped as the Laurel Gneiss (granitic gneiss), which grades into the early Paleozoic-aged Wissahickon Formation. The Laurel Gneiss was derived from the Wissahickon Formation rock by hydrothermal alteration. The Wissahickon Formation, as observed in the Washington, DC area, consists of quartz-mica schist, phyllite, and quartzite (PSI 2022a). At lower elevations (eastern and southern portions of the Site), the Site is underlain by unconsolidated valley bottom materials (soil) of the Patuxent Formation containing clay, silt, sand, and gravel, along with weathered/decomposed rock fragments from upslope areas (PSI 2022a).

### 2.1.2 Site Geology

The United States Department of Agriculture (USDA) 1976 Soil Survey for the District of Columbia and the current USDA Web Soil Survey identify site soils primarily as Urban Land (PSI 2022a). Urban Land is used to designate areas where natural soils have been disturbed by development or are covered by impervious surfaces or structures. The Site is situated at an approximate average elevation of 199 feet above mean sea level (amsl) to the north, with a gradual topographic slope to 177 feet amsl to the southeast (PSI 2022a).

The February 7, 2020, Preliminary Environmental Investigation Report prepared by PSI noted the location of the Site as being an unconformable contact between the Laurel Formation (Lower Cambrian) and sand-dominated lithofacies of the Potomac Formation (Lower Cretaceous). The mapped contact between the two formations approximately bisects the Site from north to south. As mapped, the Potomac Formation underlies the western portion of the Site, and the Laurel Formation underlies the eastern portion of the Site (PSI 2022a).

Subsurface characterization of bedrock at the Site conducted as part of a geotechnical engineering study performed by PSI indicated that the underlying geology of the Site consists of intermediate to mafic igneous rocks, rather than the Laurel Formation or Potomac Formation as mapped by PSI in 2020 (PSI 2022a). Rock cores collected at the Site were classified as massive to foliated metadiorite. The metadiorite is predominantly intermediate in composition, although variation is observed across the Site and in some areas the bedrock is more mafic, bordering on a gabbroic composition. In select areas of the Site, the metadiorite is foliated enough to be considered a gneiss. The Laurel Formation is intruded throughout by igneous rocks, many of which are known collectively as the Georgetown Intrusive Suite (Early Ordovician) (PSI 2022a). Based on mineralogical assemblages, country rock xenoliths, and cross-cutting relationships of the rock samples recovered from the geotechnical investigation, bedrock at the Site is likely associated with the Georgetown Intrusive Suite, which intruded into the Laurel Formation (PSI 2022a).

## 2.2 Hydrogeology

The Site appears to be underlain by an unconfined aquifer system with two units:  overburden and an underlying bedrock. Groundwater generally flows from the northwest to southeast, in the direction of decreasing topographic surface. Based on field observations, the approximate depth to groundwater is between 13 and 15 feet below the

ground surface. Bedrock at the Site is overlain by unconsolidated material, which consists of a combination of weathered regolith and more geologically recent soil deposits. The overburden strata generally consist of coarse to fine-grained soils, which may have sufficient permeability for groundwater in bedrock to communicate with the overburden zone in an unconfined manner. It was observed that adjacent boreholes, where one was drilled into bedrock and the other terminated in soil, generally had similar groundwater elevations, indicating the underlying bedrock aquifer is unconfined. Spatially dispersed layers of low-permeability clay likely allow perched zone conditions to develop and may, in some locations, result in semi-confined aquifer conditions (PSI 2022a).

Although in situ hydraulic conductivities of the overburden and bedrock were not measured, primary porosity flow within the bedrock is likely low based on published values for similar rock types. It was observed during the 2020 geotechnical engineering field investigation conducted by PSI that fracturing and jointing are pervasive throughout the rock at all sampled depths (PSI 2022a). Iron staining and calcite deposits were observed on fracture faces of rock core samples, as well as rock saturation surrounding fractures, indicating secondary porosity flow of groundwater. It is possible that transmissive fracture systems within the bedrock may produce greater hydraulic conductivities. The overburden hydraulic conductivity could potentially be up to an order of magnitude greater than flow within the bedrock based on typical permeabilities of diorite versus granular soil.

Subsurface conditions in the southeastern portion of the Site suggest the presence of a potential remnant stream valley (PSI 2020). Borings advanced in the area indicate that the top of weathered bedrock elevation decreases sharply, forming an approximately linear valley feature in the bedrock. Soil samples recovered during the advancement of select borings adjacent to or in this linear bedrock feature are potentially indicative of stream deposits (e.g., sand with gravel). A preliminary review of historical information revealed that the historical Piney Brook stream, or an associated meandering channel, may have transected the southeastern portion of the Site near the location of the potential remnant stream valley prior to the Site being developed. The potential remnant stream valley likely has a greater hydraulic conductivity than surrounding strata and may, locally, create a downward vertical hydraulic gradient that intercepts the greater northwest to southeast groundwater flow observed at the Site.

## 2.3 Groundwater Use

Groundwater is not used as a source of potable water on or in the vicinity of the Site. There are no known potable or supply wells within 1,000 feet of the Site. Further, no future potable wells are proposed to be installed on the Site. The Site and surrounding properties are fully serviced by public utilities including water and sewer supplied by the District of Columbia Water and Sewer Authority.

## 2.4 Site Investigation History

Previous investigations at the Site have been conducted by Versar, PSI, and others. Based on historical information provided in the Versar 2003 Environmental Site Assessment Report, petroleum-related soil and/or groundwater impacts have been identified at the Site at various times during the facility operation. The petroleum-related impacts have been attributed to leaking underground storage tanks (USTs) utilized at the facility for storing fuel and/or automotive oils. Following the discovery of the soil impacts, remediation activities at the Site were initiated in the late 1980s and continued through 2002. Between 1989 and 1990, a groundwater recovery and treatment system was installed in the southeastern portion of the Site. Site renovation activities were also performed from 1990 through 1991, during which several USTs and approximately 13,750 cubic yards of

petroleum-impacted soil were removed from the Site for proper disposal. In 1993, chlorinated solvent impacts were identified in groundwater collected from the southern portion of the Site. In 1996, a risk assessment was conducted to address concerns regarding concentrations of solvents detected in on-site monitoring wells. The report concluded that the detected volatile organic compounds (VOCs) posed no excess risk to human health at that time and sampling for VOCs was discontinued (Versar 2003). In 1998, an in-well separator free product recovery pump was installed in one of the on-site monitoring wells. In 1999, an air sparge unit replaced the in-well separator due to insufficient product recovery. In 2002, environmental media at both on-site and off-site locations were investigated, as documented in Versar (2003). The highest observed concentrations of chlorinated solvents and associated daughter compounds at on-site locations ranged from 100 to 500 µg/L while the highest observed concentrations at off-site locations ranged from 148 to 1,100 µg/L indicating that this contamination and the associated daughter compounds are most likely the result of releases to groundwater from one or more of the former dry cleaners that historically operated along 14th Street NW (Versar 2003). The historical information (Versar 2003) also indicated that on-site chlorinated solvent and petroleum-related groundwater impacts appeared to be degrading and/or naturally attenuating. The report also stated that a lack of off-site detected petroleum-related impacts indicated that the bus garage operations and maintenance activities had not significantly impacted the surrounding area (Versar 2003).

Environmental sampling was conducted within the on-site building footprint during the November and December 2019 preliminary environmental investigation (PSI 2020) and the November and December 2022 supplemental site assessment activities (PSI 2023b, c). Complete excavation and removal of seven USTs,13 aboveground storage tanks and all associated underground infrastructure were completed in 2023. Soil impacts were generally localized in the vicinity of the inground structures used for facility operations.

Historical soil samples collected during investigation activities between 2019 and 2023 were submitted for laboratory analysis using some or all of the following testing methods: VOCs via United States Environmental Protection Agency (USEPA) Method 8260, semivolatile organic compounds (SVOCs) via USEPA Method 8270, total petroleum hydrocarbons (TPH) diesel range organics (DRO) and gasoline range organics (GRO) via USEPA Method 8015D, and Priority Pollutant metals via USEPA Methods 6010C and 7471B. Elevated concentrations of TPH and fuel-related VOC constituents were identified in samples collected from locations in the vicinity of the former inground structures used for facility operations. Generalized areas of identified impacts are presented on Figure 3 as reference.

Based on former land uses, additional contaminants may be present at the Site. Site records indicate that an automotive repair facility was previously located on the southwestern portion of the Site and historical dry cleaning operations have been identified off site along 14th Street. In the most recent sample collection events conducted on-site between 2019 and 2022, chlorinated solvents and associated daughter compounds have been identified at concentrations ranging from 1.8 µg/L to 690 µg/L in groundwater samples and ranging from 0.0025 milligrams per kilogram (mg/kg) to 0.74 mg/kg in soil samples collected from the Site. Groundwater impacts will be addressed in a forthcoming CAP.

## 2.5 Proposed Remedy – Excavation and Off-site Disposal

All encountered underground infrastructure has been removed and disposed of off site. These structures included USTs, subsurface sand and grit filters, oil-water separators, and associated underground piping. If additional structures are encountered, they will also be removed and disposed of off site.

Excavation and off-site disposal are planned as a source control measure to remove impacted material from the Site. All excavated material will be removed from the Site and disposed of at an approved off-site waste disposal facility (impacted soil) or at an approved off-site location (non-impacted soil). Excavated material will be considered 'impacted' if analytical results indicate an exceedance of USEPA Industrial Soil Regional Screening Levels (RSLs) or the District of Columbia Risk Based Corrective Action (DCRBCA) screening levels, whichever is lower, and the background threshold value for arsenic, as identified in Section 3.2. No excavated material will be reused on the Site. If needed, the Site will be excavated to bedrock but not deeper.

Pre-excavation sampling conducted on site identified soil impacts on the southern and northeastern portions of the Site. Overall mass grading has been completed on the majority of the Site with all excavated material removed and not reused. Additional soil excavations are planned for the area of identified petroleum impacts located on the northeastern portion of the Site. This targeted excavation area is identified on Figure 2. Additional areas of excavation will be determined by a site-wide grid soil sampling program, as discussed in Section 3.2. Material will be handled as described in Section 3.2, and the extent of impacted material removed will be defined by performing a confirmatory soil sampling program, as discussed in Section 3.3. Excavated soil will not be used as backfill material for regrading. All excavated soil will be removed and disposed of at an approved waste disposal facility.

# 3 Interim Corrective Action Plan

Soil excavation with off-site disposal is planned as a source control measure to remove impacted soils from the Site. Material removed from targeted excavation areas (Figure 2) will be disposed of at an approved off-site waste disposal facility (impacted soil) or at an approved off-site location (non-impacted soil). Guidance for field screening and sample collection is provided in Section 3.2. Proposed soil sampling locations are presented in Figure 3.

Additionally, future engineering and monitoring controls proposed for the Site include a sub-slab vapor management system for future buildings (Section 3.6) and installation of seven groundwater monitoring wells (Section 3.7). Groundwater remediation, as needed, will be addressed under a subsequent CAP submittal.

In summary, the planned corrective action measures, and associated statuses as of the date of this ICAP, include:

- Task 1: Removal of underground structures, storage vessels, and associated distribution piping: Complete
- Task 2: Identify additional areas of soil impacts on site via Grid Sampling Program (Section 3.2): Ongoing
- Task 3: Impacted soil excavation and disposal (Sections 3.3 and 3.4)
    - Known petroleum impacts: Pending
    - Other areas of impacts, if encountered: Pending
- Task 4: Free phase petroleum removal and disposal if encountered (Sections 3.3.4 and 3.3.5): Pending
- Task 5: Vapor management system below slab of all proposed on-site structures (Section 3.6): Pending
- Task 6: Groundwater monitoring well installation and monitoring (Section 3.7): Pending permit approvals

## 3.1 Planning

To date, site-wide pre-excavation soil sampling activities have been completed during Site grading efforts. Soil samples collected during the pre-excavation soil sampling effort were analyzed for waste disposal parameters in order to facilitate direct loading of the excavated material into dump trucks and avoid stockpiling on site.

Additionally, the pre-excavation soil sampling analysis was used to identify the approximate depth and extent of TPH impacts in soil as the site excavation activities approach the planned sub-grade of the new building structure. The proposed focused, expanded excavation of soils within the identified impacted areas are shown on Figure 2.

The selected contractor will perform a site inspection and structural assessment to determine the safest method for continued access and preparation of the proposed work areas, as well as for the removal, handling, and transportation of excavated materials from the Site. Based on field observations and the results of pre-excavation soil sampling, the targeted excavation area encompasses approximately 10,000 square feet.

## 3.2 Grid Sampling Program

A site-wide grid soil sampling program will be conducted in an approximate 50-foot grid post site-grading and excavation to document on-site subgrade soil conditions prior to structure construction as shown on Figure 3. Specifically, the 50-foot grids will be approximately 50 feet x 50 feet in size over the majority of the Site, and a minimum 25 feet x 50 feet in size, or smaller, over the area of identified petroleum impacts located on the northeastern portion of the Site. Up to two soil samples will be collected from each sampling gird: one sample from the center of the grid, and one sample from a variable location in each grid if visual indicators or photoionization detector (PID) field screening results indicative of the impacts from the constituents of concern are observed. If no visual indicators are observed, 10 locations will be screened at random. Areas of excavation that contain shoring along the sidewalls will have the variable location samples collected from as close to the edge of excavation as possible. The resulting sampling grid results in 109 center-grid soil sampling locations collected throughout the Site (Figure 3). In addition to the 109 center-grid soil sampling locations, five samples will be collected as close as possible to the locations of MW-003, TMW-05, TMW-023, SB-002, and SB-011 (PSI 2022a) (SGSS110 – SGSS114, Figure 3). Soil sample SGSS03 (Figure 3) will be taken as close as possible to the location of MW-002 and will serve as the center-grid sample as well.

At each proposed sampling location, soil will be collected from the center at approximately 8 to 12 inches below the proposed finished subgrade surface (which is approximately 169 feet throughout the majority of the Site) with a clean stainless steel hand auger following the guidance in Section 4 and will be analyzed for VOCs via USEPA Method 8260, SVOCs via USEPA Method 8270, TPH-DRO/GRO via USEPA Method 8015D, polychlorinated biphenyls (PCBs) via USEPA Method 8082A, Priority Pollutant Pesticides via USEPA Method 8081B, Priority Pollutant Metals via USEPA Methods 6010C and 7471B, and hexavalent chromium via USEPA Method 7196, following the guidance in Section 4.

Soil sample results will be compared to the final remediation levels identified in Table 1, which include:

- DCRBCA Sub-surface Soil Risk-Based Screening Levels for a Commercial Worker including indoor and outdoor inhalation (2011),
- DCRBCA Soil up to Depth of Construction for Construction Workers including ingestion, inhalation (vapor emissions and particulates) and dermal contact (2011),

- USEPA Industrial Soil RSLs (2023a). USEPA RSLs are based on a target cancer risk of $1\times10^{-6}$ and a target non-cancer hazard of 0.1 to account for additive effects, and
- Background threshold value for arsenic in Soil Type 4, Urban Land (Table 6.21, Tetra Tech 2022). Alternate remediation levels may be proposed when there is no documented source for the constituent in question. This alternate remediation level for arsenic was approved by DOEE in November 2023.

The Site is currently undergoing redevelopment for future commercial use; therefore, current and future residential use of the Site is not likely to occur. Currently, construction and utility workers may be exposed to constituents present in subsurface soils, groundwater, and vapors migrating from soil or groundwater. Potential exposure to groundwater will be limited through the use of dewatering practices, as discussed in Section 3.3.5; therefore, worker exposure to groundwater is not likely to occur. Groundwater at the Site is not currently being used as a potable water source and will not be used for the foreseeable future. Surficial soils have been excavated and removed from the Site; therefore, the exposure pathway for surficial soil is not complete. The conceptual site model (CSM) for potential receptors and exposure pathways is presented and discussed in the Draft Baseline Risk Assessment Report (Arcadis 2023), provided to WMATA and DOEE under separate cover.

Based on this CSM, final remediation levels were selected based on the most likely current and future scenarios for the Site that may be potentially complete pathways of exposure. Therefore, soil sample results from the grid soil sampling program will be compared to the minimum of the DCRBCA or the USEPA Industrial Soil RSLs and the Background threshold value for arsenic as identified in Table 1. Based on the findings of the soil screening, additional impacted areas may be identified, and additional areas of targeted soil excavation may be proposed. Areas noted to have impacts will be over excavated 12 inches and resampled. Excavation for remediation purposes below the groundwater level or into bedrock is not proposed.

Following redevelopment, the entire ground surface at the Site will be covered by either a building or concrete driveways. Though contaminant migration from soil to groundwater is likely to be minimized under the building footprint, screening levels for the protection of groundwater are presented in Table 2 for the purpose of identifying concentrations remaining in soil that have the potential to impact groundwater above the risk-based RSLs or Maximum Contaminant Levels. This information will be used to determine the need for additional groundwater monitoring in areas of the Site with exceedances of the screening levels for the protection of groundwater. Groundwater impacts will be addressed in a separate CAP submittal that is forthcoming, which includes the installation of six new groundwater monitoring wells, proposed quarterly groundwater monitoring plans and potential remedial action which will be performed as needed.

## 3.3 Targeted Soil Excavation

During intrusive activities, engineering controls, including fencing and signage, will be established around the work zone to prevent unauthorized personnel from entering the work area. Excavation workers and authorized personnel will use appropriate personal protective equipment as specified in a Health and Safety Plan to be prepared by the contractor.

### 3.3.1 Dust Control

Wet methods will be used when sweeping, brushing, and cleaning work areas as a dust control measure. Trucks equipped with tarps will be used for the transportation and off-site disposal of impacted soil and construction debris. Excavated material will be direct loaded to dump trucks as much as possible to minimize soil stockpile and

staging on site. Any soil stockpiles that need be created will be covered by heavy duty polyethylene sheeting when not being actively managed. Workers, using both visual and real-time air monitoring methods, will monitor for particulates at the perimeter and within the work area. If fugitive dust exceeds action thresholds specified in the Health and Safety Plan, the work will temporarily cease until proper engineering controls are in place (e.g., use of a water truck, tarps/temporary covers).

### 3.3.2 Traffic Control and Road Maintenance

Trucks and subsurface excavation equipment will enter the Site using the entrance/exit at the southern portion of the Site. Truck and excavation equipment will be staged on site and loaded in the order of their arrival. Truck and excavation equipment tires/treads will be broom cleaned (or equivalent) using wet methods prior to exiting the Site via the approved entrance/exit to minimize the tracking of soil onto off-site streets, other paved areas, and sidewalks. If material is tracked from the Site onto the surface of off-site streets, other paved areas, or sidewalks, the deposited material will be removed as soon as possible, or at a minimum, daily. Current maintenance measures include sweeper trucks, wheel washes, and cattle grates.

### 3.3.3 Concrete Processing and Handling

Concrete removed from the excavation will be disposed of off site at an approved waste disposal facility; it will not be used as fill material or recycled at the Site. Excavated concrete will be segregated from excavated soils for recycling.

### 3.3.4 Free Product and Extent of Impacts in Excavated Soils

Excavated soil will be periodically screened with a photoionization detector and a non-aqueous phase liquid dye test kit such as Red Oil-O or similar reagent to confirm areas of soil impacts in the targeted excavation areas. Grossly impacted soils (soil containing free product, noticeable odors, and/or elevated PID readings) will be removed to the maximum extent practicable without undermining the structural integrity of on-site or adjacent infrastructure. To preserve the load-bearing capacity of the subsurface soils, excavation of impacted soil will not continue below the groundwater table level, if encountered, off site, and/or more than 2 feet beyond the extent of the planned foundation footprint. Potential impacts to on-site groundwater, as well as proposed quarterly groundwater monitoring plan and potential remedial action, will be addressed in a separate CAP provided to WMATA separately.

If encountered, free product in excavated soils will be captured to the maximum extent practical with sorbent pads. If a significant volume of free product is encountered, a vacuum truck, pump, or other similar capture method may be utilized to remove the product from the excavation area to be staged on site in a frac tank, baker tank, or similar mobile container pending characterization and disposal at an approved off-site waste disposal facility. All excavated soil will be handled as per guidance in Section 3.3.7 with confirmation sampling conducted as per guidance in Sections 3.2 and 3.4.

### 3.3.5 Construction Dewatering

Based on field observations, the approximate groundwater table level is between 13 and 15 feet below the ground surface. If excavation activities extend below the groundwater table and/or rainwater enters the excavations, construction dewatering will occur as needed so that excavation and construction activities can proceed. Water

removed by dewatering efforts will be pumped into a frac tank, baker tank, or similar mobile container where it will be treated and discharged under the Site's discharge permit. On-site treatment may include sediment removals, skimmer booms, flocculant treatments and/or pumping construction water through a multi-phase filtration system that includes granular-activated carbon vessels prior to discharge.

Specific methods of treatment will be dependent on the characteristics of the collected groundwater sample analysis to ensure compliance with the DC Water and Sewer Authority (DCWSA) discharge permit conditions. The DCWSA discharge permit indicates that collected construction water will be analyzed for TPH Oil and Grease via USEPA Method 1664, VOCs via USEPA Method 8260, PCBs via USEPA Method 608.3, total lead via USEPA Method 6010, total suspended solids, and pH. All site construction water found to be within acceptable DCWSA permit limits will be discharged to the combined sanitary sewer system. There will be no discharge to any surface stormwater network. A copy of the DCWSA Temporary Discharge Authorization Permit is presented as Appendix A.

If free product is encountered in the groundwater, it will be pumped into a separate frac tank, baker tank, or similar mobile container and staged on site pending waste characterization analysis. The appropriate off-site disposal method will be determined and conducted based on the results of the waste characterization analysis.

### 3.3.6 Stormwater Management

The former on-site buildings were demolished prior to excavation, and therefore, stormwater management continues to be a critical component of the Site's redevelopment as excavation and grading activities are ongoing. The types of stormwater management controls to be implemented during the excavation depend on the Site's redevelopment schedule. Temporary stormwater management controls are currently in place for the overall construction/grading phase of the project and should be maintained and inspected daily during excavation efforts.

### 3.3.7 Management of Investigation-Derived Waste

All excavated soil and material will be directly loaded into dump trucks and removed from the Site to the maximum extent possible, facilitated by pre-excavation characterization sampling (Sections 3.1 and 3.2). If excavated material needs to be staged on site, it will be stockpiled and covered by heavy-duty 6-mil or equivalent polyethylene construction sheeting in a manner that prevents rainwater from infiltrating the pile until the material can be removed in accordance with state and federal regulations. Investigation-derived waste (IDW) generated during the installation of the proposed groundwater monitoring wells will be containerized in 55-gallon drums pending characterization and off-site disposal.

The following streams of IDW are anticipated to be generated during the source control corrective action: concrete, subsurface soil, and decontamination water. Additional samples will be collected as needed for waste characterization purposes to facilitate direct loading and minimize the duration of on-site stockpiling of excavated materials. If waste materials are determined to be hazardous based on pre-characterization analysis, they will be segregated and managed separately from non-hazardous waste. Additional waste characterization samples may be required by the selected disposal facility if excavated material exceed approved volumes. If groundwater is encountered during the excavation effort, the water will be pumped into a separate frac tank, baker tank, or similar mobile container and staged on site pending waste characterization analysis and subsequent treatment/discharge.

## 3.4 Post-Excavation Verification Sampling

Soil samples will be collected from the bottom of the targeted excavation areas to document the soil concentrations at the excavation extents. These samples will be collected as part of the overall site grid-sampling program (Section 3.2), which includes a 50-foot x 50-foot sampling grid over most of the Site, and a minimum 25-foot x 50-foot or smaller sampling grid over the areas of identified petroleum impacts. The sampling grid is presented on Figure 3. The majority of the western and northern sides of the Site are confined by shoring while site grading efforts are on-going, which prevent access to excavation sidewalls for sampling purposes. The eastern and southern site boundaries “daylight” to the downslope gradient and do not have any sidewall present. Where possible, variable location samples will be collected as close to the sidewall locations as possible in areas of known soil impacts.

## 3.5 Backfill with Amendment and Restoration

After completion of overburden and impacted soil excavation, off-site clean fill provided by a reputable aggregate supplier will be added to the excavation as required to achieve the final finished grade. Clean fill will be certified by the supplier and/or demonstrated to be clean (below industrial RSLs or DCRBCA, whichever is lower). Certifications will be submitted to DOEE for review 15 days prior to any use in backfilling activities. Excavated site soils will not be used for backfilling, regrading, or restoration activities unless specifically approved by DOEE. Based on the Site location, the proposed backfill material will be either bank run gravel, sand, or processed stone that will be sourced from a native quarry.

In the area of TPH impacted soils where excavation is conducted below the final finished grade, agricultural grade granular gypsum (calcium sulfate di-hydrate) and/or Epsom salt (magnesium sulfate heptahydrate) will be emplaced and overlain with the approved backfill material. In general, dissolved sulfate in groundwater decreases at areas with known petroleum hydrocarbon impacts as sulfate is consumed as a terminal electron acceptor degrading the petroleum hydrocarbon in the process via anaerobic bio-oxidation. Additional sulfate supply will enhance the ongoing biodegradation. Gypsum has a low solubility (approximately 2 grams per liter at 20°C) and will provide a lasting source of sulfate, whereas Epsom salt dissolves rapidly (approximately two orders of magnitude higher than gypsum at 20°C) and will readily provide sulfate to facilitate anaerobic bio-oxidation.

The gypsum and Epsom salt amendment loading will target in situ sulfate concentrations between 2,000 and 3,000 milligrams per liter, at a 0.05 percent loading rate, which is optimum to initiate the anaerobic bio-oxidation performance and maintain aggressive degradation rates with a steady supply of terminal electron acceptors in the form of sulfate. After emplacement, the sulfate amendment will be watered with potable water until thoroughly soaked to initiate sulfate dissolution before approved backfill material is overlain. The layered sulfate amendment with clean backfill approach will serve as a long-term sulfate source to stimulate continued anaerobic degradation of petroleum hydrocarbons in the subsurface.

Where needed, excavations will be backfilled with clean fill within approximately 1 foot of grade and restored to a manner similar to the original surface cover. Clean fill will consist of natural mineral soil and be void of debris. Fill material will be spread and compacted in accordance with site-specific engineering specifications.

## 3.6 Vapor Intrusion Mitigation

Infrastructure for an active soil vapor management system will be incorporated within the bottom floor/slab of any b uilding constructed as part of future development of the Site. The vapor management system will be designed as a n active system that will utilize a petroleum- and solvent-resistant 30-mil-thick vapor barrier. Final configuration of the active system components located above the slab on grade within the building, including manifolding of piping, sizing of fans, and the decision to use activated carbon or other treatment media will be deferred pending the results of the post construction sub-slab sampling.

The vapor management system will be installed as a preemptive engineering control and will incorporate sampling ports where appropriate in order to facilitate the post construction sub-slab sampling as well as future monitoring. The vapor barrier and collection system will be installed beneath the floor slab, with vertical vent risers installed within the building to facilitate ventilation. Monitoring and inspection of the vapor management system will be conducted on a regular basis to monitor interior air quality conditions. If elevated vapor concentrations are identified in the zone beneath the floor slab, a vacuum system and air stripper will be installed to treat captured vapors prior to discharge into the atmosphere. Additional details of the soil vapor management system are included in the October 16, 2023, WMATA-Northern Bus Division Replacement Basis of Design Report, Vapor Management System (Clark 2023), which is presented as Appendix B, and corresponding design plans are presented as Appendix C. Final sub-slab sampling point locations and associated specifications will be submitted to DOEE for review and comment prior to implementation.

## 3.7 Monitoring Well Installation and Sampling Plan

In addition to the soil excavation and vapor intrusion mitigation plan, a total of seven 4-inch groundwater monitoring wells are proposed to be installed in the general vicinity of on-site areas with the reported highest chlorinated volatile organic compound (CVOC) and TPH impacts to groundwater for the purpose of monitoring current site conditions and potential future investigative use. Wells will be installed in accordance with the District of Columbia Municipal Regulations (DCMR), 21 DCMR Chapter 18 Well Construction, Maintenance, and Abandonment Standards.

### 3.7.1 Permitting and Notifications

Well permit applications will be prepared and submitted for approval through the Surface and Groundwater System (SGS). DOEE will be notified of monitoring well installation activities a minimum of two days prior to the initiation of the activities. A well completion report will also be prepared and submitted within 60 days following completion of monitoring well installation activities.

Prior to commencing drilling activities, the proposed monitoring well locations will be clearly marked in the field and a utility check will be performed by a qualified subcontractor to locate subsurface utilities near the proposed monitoring well location. The proposed locations of monitoring wells are shown on Figure 3 and Figure 4. The proposed locations may be offset by up to 15 feet during implementation due to utilities or other existing or planned structures.

### 3.7.2 Well Installation

Upon approval of the well permit, seven monitoring wells will be installed by a licensed driller in the DC area. Three wells in the area of TPH impacts will be set and screened in the unconsolidated zone straddling the water table, as described below. Two unconsolidated and bedrock well pairs will be set and screened in the area of known CVOC impacts. Previous geologic and geotechnical characterization have identified the diorite bedrock surface across the Site (PSI 2022a, PSI 2023b, c), and this surface (as to be modified for building construction in the western side of the Site) is shown on Figure 4. One CVOC area well pair location was selected to target a previously identified topographic low in the bedrock surface (PSI 2022a) adjacent to soil boring SB020S and geotechnical boring 19BH080, which are located approximately 80 feet north of temporary well pair TMW-004S/D (location of maximum CVOC concentrations in 2022 [PSI 2023c]). The second well pair location was selected to be in the vicinity of temporary well locations TMW-022S/D (located adjacent to former repair/maintenance activities [PSI 2023c]).

Borings in the area of TPH impacts will be advanced using 6.25-inch inner diameter hollow-stem auger drilling. Continuous split spoon samples will be collected for lithologic characterization until refusal is met. Depth to water will be determined. A 4-inch diameter monitoring well will then be set with the screen set 2 feet above the water table interface and 8 feet below the water table, as described below.

The borings for the two shallow (unconsolidated zone) wells in the area of CVOC impacts will be advanced using 6.25-inch hollow-stem auger drilling. Continuous split spoon samples will be collected for lithologic characterization until refusal is met. The bottom of the well screen will be set at the depth of refusal, directly above bedrock.

The borings for the two deep (bedrock) wells in the area of CVOC impacts will be installed with 12-inch fluid rotary drilling. Continuous split spoon samples will be collected for lithologic characterization until refusal is met. Temporary casing will be set to allow diamond bit coring to begin in the upper bedrock. A permanent 8-inch diameter steel isolation casing will then be set at least 10 feet into competent bedrock. Diamond bit coring (HQ core size) will continue until a saturated fracture zone is encountered. Cores will be described, including information regarding oxidation, fracture frequency/orientation, and rock quality designation will be calculated. The 10-foot well screen will be set at a depth that includes the shallowest observed water-bearing fracture set. The borehole will be widened using air rotary to allow the required annular space to set the well.

The shallow wells will be drilled and installed first. If there is any indication of separate-phase contamination after drilling the shallow wells (for instance visual evidence of dense non-aqueous phase liquid [DNAPL] in cuttings or purge water and high PID readings) DOEE will be notified before drilling of the deep wells in order to assure protection of the deeper bedrock aquifer. Should such an event occur, a decision will be made at that time concerning whether the deep wells should be installed or relocated.

At each of the seven well locations, a 4-inch diameter monitoring well will be set with 10 feet of 4-inch diameter continuous stainless steel wire-wrap screen of 0.010-inch slot size surrounded by a silica sand filter pack equivalent to U.S. Silica No. 1 sand and a Schedule 40 polyvinyl chloride riser. If backfilling is required in the unconsolidated zone to set the well at the target depth (e.g., shallow TPH area wells), the boring will be backfilled with bentonite pellets. The sand filter pack should extend at least 2 feet above the top of the well screen. If backfilling is required in the bedrock zone, cement grout will be used. At least 2 feet of bentonite slurry (ratio of 1 gallon of water to 2 pounds of bentonite) will be placed above the well filter pack. The remainder of the well annulus will be cemented to ground surface. Each monitoring well will be completed with flush-mounted manholes set in 2-foot by 2-foot concrete pads. Well construction details planned for inclusion in the well permit package are

provided in Appendix D. Drilling tooling and well construction information provided herein are based on available information from prospective drilling contractors. Final drilling and well construction details are subject to modification during driller contracting and the well permitting process.

Field screening will consist of lithologic soil data, approximate depth to ground water, visual observations (e.g., staining), olfactory observations and, volatile organic vapor measurements using a PID. The PID will be calibrated before use at the Site to a test gas standard consisting of 100 parts per million isobutylene.

A mixture of detergent and deionized water will be used to decontaminate equipment or tools with the following three-step process: the tool or equipment is rinsed or washed clean of dirt or other gross contamination with water, submerged and scrubbed in detergent solution, and rinsed clean.

### 3.7.3 Well Development

Well development will take place no sooner than 24 hours after the well is completed. Initially, the wells will be developed using a surge block and then, fines will be removed using a submersible pump. A minimum of three well volumes will be purged from the well and the well will be purged until groundwater quality parameters (temperature, pH, conductivity, dissolved oxygen, and oxidation-reduction potential) stabilize within 10%.

### 3.7.4 Waste Management

Soil waste and purge water generated during well reinstallation activities will be containerized in Department of Transportation approved 55-gallon steel drums. Drums will be appropriately labeled and temporarily stored on site pending analytical results. Upon receipt of analytical results, the drums will be removed from the Site and transported to an appropriate off-site disposal facility.

### 3.7.5 Surveying

A certified land surveyor will survey the top of casing elevations and ground surface elevation of the newly installed monitoring wells. Elevations will be measured using the National Geodic Vertical Datum (NGVD) 88 Geodetic datum.

### 3.7.6 Sampling

After a minimum of 48 hours following development, each newly installed well will be sampled using low-flow sampling methods. Samples will be analyzed for VOCs via USEPA Method 8260, SVOCs via USEPA Method 8270, TPH-DRO/GRO via USEPA Method 8015D, PCBs via USEPA Method 8082A, Priority Pollutant Pesticides via USEPA Method 8081B, Priority Pollutant Metals via USEPA Methods 6010C and 7471B and, hexavalent chromium via USEPA Method 7196 following the guidance in Section 4. Samples for analysis of bio-oxidation monitoring parameters will also be collected from wells in the TPH area. Including sulfate and nitrate by USEPA Method 300.0, field filtered iron and manganese by USEPA Method 6010 or 6020, dissolved methane by USEPA Method 8015B Modified, sulfide by SM4500-S2 D-2000, and total dissolved solids by USEPA Method 160.1. Continued monitoring of the six new groundwater monitoring wells will be quarterly, and the specific details will be covered in the forthcoming CAP.

# 4 Quality Assurance Project Plan

This section presents the data quality objectives (DQOs), the environmental sampling and analysis program, and quality assurance/quality control procedures that will be employed to verify that technical data generated are accurate, representative, and of known and usable quality.

## 4.1 Data Quality Objectives

DQOs are qualitative or quantitative statements derived during the planning process. DQOs are used to clarify the study objectives and define the appropriate type of data required to support project decisions. The DQOs for the scope of work presented in this ICAP are presented below:

- Waste characterization sample data will be collected in such a manner that the data will be usable to determine appropriate waste disposal measures.
- Soil quality data will be collected in such a manner to determine the extent to which soil removal activities achieve the interim remedial goal of removing soil with significant impacts in the targeted excavation area.
- Groundwater quality data will be collected in such a manner that the data will be suitable to determine whether the groundwater quality meets disposal facility criteria only. It should be noted that the focus of this ICAP is the handling and removal of impacted soil, and groundwater dewatering described herein pertains to construction dewatering for the purposes of excavating impacted soil only. If encountered, guidance for the management of on-site impacted groundwater will be provided in a separate CAP.

DQOs will be achieved through the implementation of specific procedures for sample collection, blank assessments, chain-of-custody documentation, equipment calibration, internal quality control audits, preventive maintenance, and corrective actions as necessary.

## 4.2 Sampling Quality Controls

### 4.2.1 Field Documentation

Pre-printed field forms and logs or electronic field forms will be used to document field operations and sample custody. For daily activities, a pre-printed daily log or bound field logbook will be used.

All aspects of sample collection and handling as well as visual observations will be documented. All entries will be dated, legible, and contain accurate and inclusive documentation of project activities. At the end of each day's activity, or of a particular event as appropriate, all documents in the field will be secured by the field manager for each task. Once completed, the pre-printed field forms and electronic field records will be maintained as part of the project files.

### 4.2.2 Field Quality Assurance

Field quality assurance components of the proposed sampling-related activities are described below.

**Waste Characterization**. Pre-excavation concrete, soil, and water samples will be collected as needed for waste characterization purposes. Additional waste characterization analyses may be performed if required by the waste

disposal facility. The excavation sampling program is described below; additional information on procedures, sample handling and documentation is provided in Section 4.3:

- *Excavation Concrete*. All concrete waste that is anticipated to be found has been removed from the Site and recycled. If additional concrete is encountered during excavation efforts, it will be segregated from the excavated soil and also removed from the Site as per applicate regulations.
- *Excavation Soil*. Subsurface soil samples will be collected using a direct-push macro-core sampler or hand auger for waste characterization purposes. One composite sample per grid area will be collected from the 1- to 5-foot below ground surface interval and be composited in a stainless-steel trowel and bowl. Samples will be analyzed for VOCs via USEPA Method 8260, SVOCs via USEPA Method 8270, TPH-DRO/GRO via USEPA Method 8015D, PCBs via USEPA Method 8082A, and Priority Pollutant Metals via USEPA Methods 6010C and 7471B.
- *Excavation Area Groundwater*. Groundwater and rainwater that pools in the proposed excavation areas during excavation efforts will be collected/staged on site in mobile tanks and will be analyzed for the following in compliance with the DCWSA discharge permit conditions: TPH Oil and Grease vis USEPA Method 1664, VOCs via USEPA Method 8260, PCBs vis USEPA Method 608.3, total lead via USEPA Method 6010C, total suspended solids, and pH.
- It should be noted that waste characterization sampling frequency will be based on the recovered volume of waste and is dependent on the selected waste disposal facility's requirements.

**Post-Excavation Verification Soil Sampling.** Confirmatory soil samples will be collected from the Site in a grid pattern as per the guidance in Section 3.2. The samples will be collected with hand auger where possible, or with an excavator or telescoping pole with a sampling cup to minimize the need for the sampler to enter an excavation. Post-excavation verification samples will be analyzed for VOCs via USEPA Method 8260, SVOCs via USEPA Method 8270, TPH-DRO/GRO via USEPA Method 8015D, PCBs via USEPA Method 8082A, Priority Pollutant Pesticides via USEPA Method 8081B, Priority Pollutant metals via USEPA Methods 6010C and 7471B, and hexavalent chromium via USEPA Method 7196.The sampling program procedures are further described in Section 4.3.

**Decontamination**. Decontamination of non-dedicated sampling equipment will be conducted using a three-step process (gross wash, gross rinse, and distilled water rinse) before and after sample collection at each location. Distilled water will be used during decontamination activities. Decontamination will be added to the collected construction water for staging and removal.

**Field Duplicates and Blanks**. Sampling precision will be measured through the collection and evaluation of field duplicate samples for constituents of concern. Parent and field duplicate samples will be collected together at a frequency of one in 10 samples per matrix for constituents of concern. Rinse blanks will be collected at a frequency of one blank per 20 environmental samples but will not be required if dedicated sampling equipment is used. Field duplicate samples and rinse blanks will be treated as separate samples during collection, shipping, and analysis, and will be analyzed by the same laboratory as the environmental samples.

**Matrix Spike Samples.** Analytical precision will be measured through the analysis of matrix spike/matrix spike duplicate sample at a frequency of one in 20 samples. The matrix spike sample will be a replicate of one of the environmental samples and simply indicated on the chain of custody for the analytical laboratory to process during sample receipt and login.

# 4.3 Sampling Procedures, Handling, and Custody

## 4.3.1 Calibration Procedures

Field equipment such as PIDs and water quality meters will be calibrated daily in accordance with the manufacturer's instructions as appropriate. Calibration data will be recorded on a field form or in the field logbook.

## 4.3.2 Sample Management

Samples will be collected in laboratory-provided sample containers appropriate for the selected analysis. Immediately after the samples are collected, they will be stored in insulated coolers pre-chilled to less than 6 degrees Celsius using double bags of ice. Samples will remain in the possession of the field technician until delivered to the laboratory courier or common carrier. Chain of custody forms will be used to document sample cooler possession at a frequency of one chain of custody form per sample collection day. Sample coolers will be sealed with custody seals prior to shipment.

## 4.3.3 Sample Identification

Each sample will be given a unique identification based upon sample matrix, location, and depth (for direct-push technology samples). Labels with sample identification including sample date, time, and preservation will be attached to each container.

Sample information will also be recorded on the chain-of-custody form and in the daily log. Sample identification nomenclature for the proposed sampling activities has been designated for each medium as follows:

- *Verification bottom soil samples*. Designated to start with VBSS#-#(ft-ft) where # indicates the excavation area and # indicates the sample number (e.g., 1, 2, 3) and ft-ft indicates the sample collection depth below ground surface.
- *Subsurface grid soil samples*. Designated to start with SGSS#-#(ft-ft) where # indicates the grid identifier and # indicates the sample number (e.g., 1, 2, 3 - 108) and ft-ft indicates the sample collection depth below ground surface. For example, a subsurface soil sample collected from grid #30 would be named "SGSS30-1 (1-1.5)".
- *Groundwater samples*. Designated by monitoring well ID followed by date collected in parentheses (mmddyy).
- *Field duplicates*. Designated by adding 100 to the parent ID. For example, a field duplicate for sample VSSS4-02(20-22) would be named VSSS4-102(20-22). When field duplicate samples are collected, the location of the parent ID will be recorded in the field notes.
- *IDW characterization samples*. Designated to start with IDW, then the storage container type and the date collected (mmddyy). For example, a sample collected from an on-site soil stockpile on June 1, 2023, would be named: IDW-SoilStockpile (060123), a sample collected from an on-site soil or water drum generated from future well installation on June 1, 2023, would be named: IDW-Drum# (060123), and a sample collected from an on-site construction water on June 1, 2023, would be named: IDW-CGW(060123).

## 4.4 Analytical Quality Controls

Laboratory quality control will include laboratory control samples/laboratory control sample duplicates, initial and continuing calibration standards, laboratory duplicates, matrix spike/matrix spike duplicates, and method blanks. A matrix spike/matrix spike duplicate sample will be analyzed at a frequency of one in 20 samples. The matrix spike will be a replicate of one of the environmental samples.

## 4.5 Analytical Procedures

Field samples will be analyzed using USEPA-approved methods by a fixed-base laboratory. The proposed analysis and analytical methods for confirmatory soil samples and groundwater samples include VOCs via USEPA Method 8260, SVOCs and PAHs via USEPA Method 8270, TPH-DRO/GRO via USEPA Method 8015D, PCBs via USEPA Method 8082A, Priority Pollutant Pesticides via USEPA Method 8081B, Priority Pollutant metals via USEPA Methods 6010C and 7471B, and hexavalent chromium via USEPA Method 7196.

Waste characterization analyses will be dependent on the selected disposal facility. Samples are proposed to be analyzed by Phase Separation Science (PSS), in Catonsville, Maryland. PSS is accredited by the nationally recognized National Environmental Laboratory Accreditation Program, and maintains accreditation in USEPA Region III States which includes Pennsylvania, Maryland, Virginia, West Virginia, Delaware, and the District of Columbia through reciprocity. The reporting limit and method detection limit summaries for the proposed analysis suite are presented as Table 2. Analytical results will be reported to the method detection limit.

## 4.6 Data Management

The project analytical laboratory will provide Level II analytical laboratory reports and electronic data deliverables (EDDs). Laboratory data reports will be provided in Contract Laboratory Program type packages that include final results (uncorrected for blanks and recoveries), analytical methods, quantitation/detection limits, surrogate recovery data, and method blank data. Analytical results will be reported to the method detection limit. EDDs will be provided in EQuIS 4-file format.

## 4.7 Data Verification, Validation and Usability

A procedure for data verification and usability will be implemented throughout the scope of work. Specifically, the database manager will use EQuIS to cross-check laboratory EDDs for completeness, screen analytical results against final remediation levels identified in Section 3.2 and populate screened data into report tables. A Level IV data validation of approximately 10 percent of the analytical laboratory reports will be conducted in accordance with USEPA National Functional Guidelines for data validation, method criteria, and laboratory-specific quality control sample recovery limits as guidance, where appropriate. The results of the data validation will be summarized in a checklist-style report, documenting the items reviewed with text explanations, notations of deficiencies, and a summary of the qualifications applied to the analytical data. Any issues that could impact data usability or quality will be noted in the validation reports.

## 4.8 Assessment and Reporting

Post-excavation soil sampling will be conducted to document the site conditions after the target volume of impacted soils has been removed. Analytical results will be promptly reviewed and compared to the final remediation levels identified in Section 3.2 to make informed decisions and assess the overall performance of the corrective action measures. If the post-excavation soil results indicate that soil impacts at concentrations above the applicable remedial standards remain in place, additional soils may be excavated if those activities can be performed in a safe manner and without negatively impacting the structural integrity of the future building(s). Remedial action completion report(s) will be prepared to document the proposed corrective actions implemented in accordance with this plan. Future quarterly groundwater sampling is proposed for the seven new monitoring wells referenced in Section 3.7. Details pertaining to the future quarterly sampling will be included in the forthcoming CAP that will be submitted under a separate cover.

# 5 Schedule and Monitoring

Monitoring of groundwater will continue following site development. Monthly site inspections and well gauging will be conducted for the first 12 months, and then once a quarter following the initial 12 months.

# 6 References

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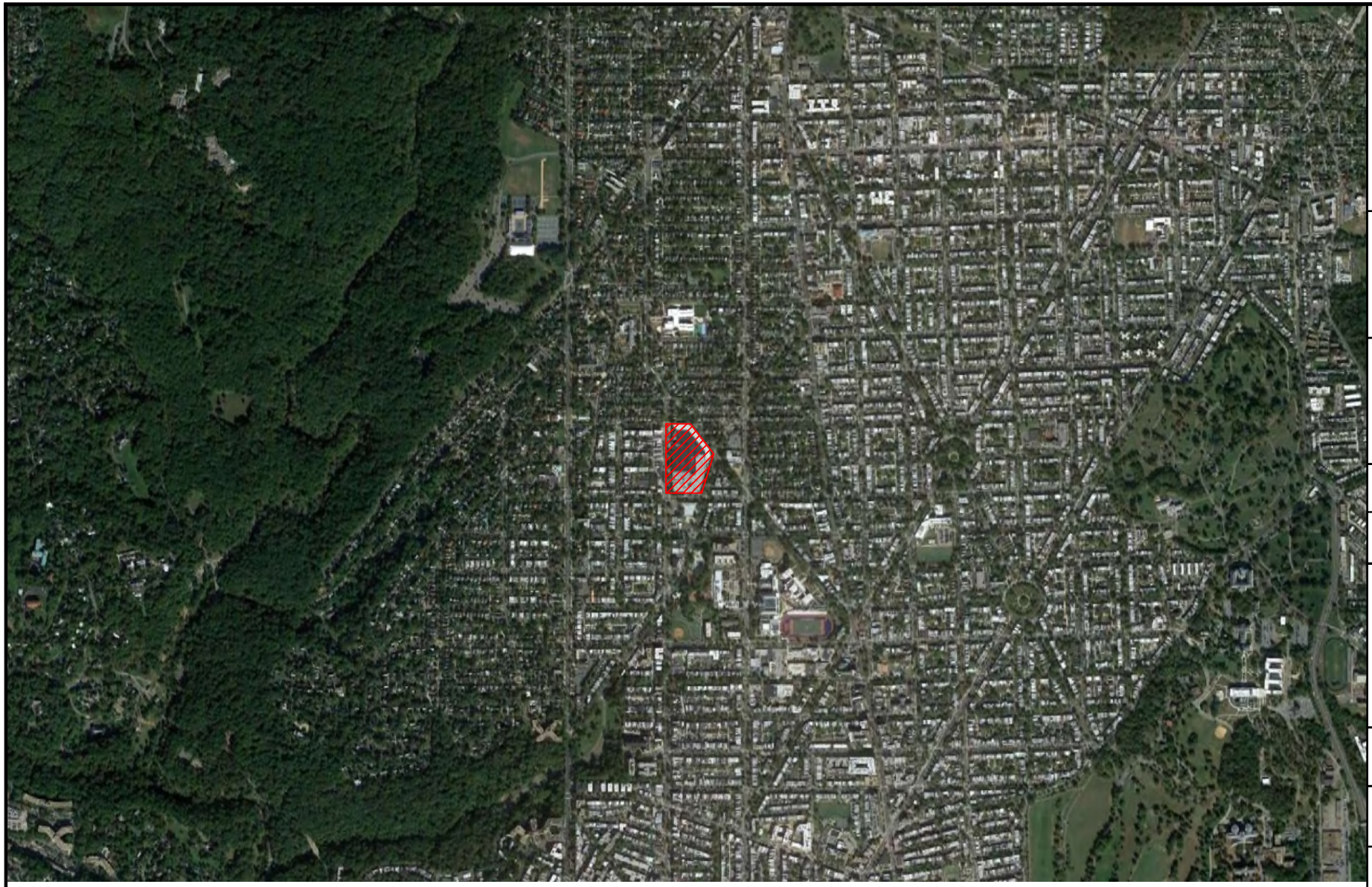
# Figures



**LEGEND:**

SUBJECT PROPERTY


*Environmental Services*

2930 Eskridge Road,
Fairfax, Virginia 22031
Tel (703) 698-9300


*Project Name:*

WMATA Northern Bus Garage
4615 14th Street NW,
Washington, DC 20011

*Figure Title:*

Regional Map

*Drawn By:*

Adam Smak

*Project Manager:*

Andy Acosta

*Figure Legend:*

NORTH

0 500' 1000'
APPROXIMATE SCALE IN FEET

*Project Number:*

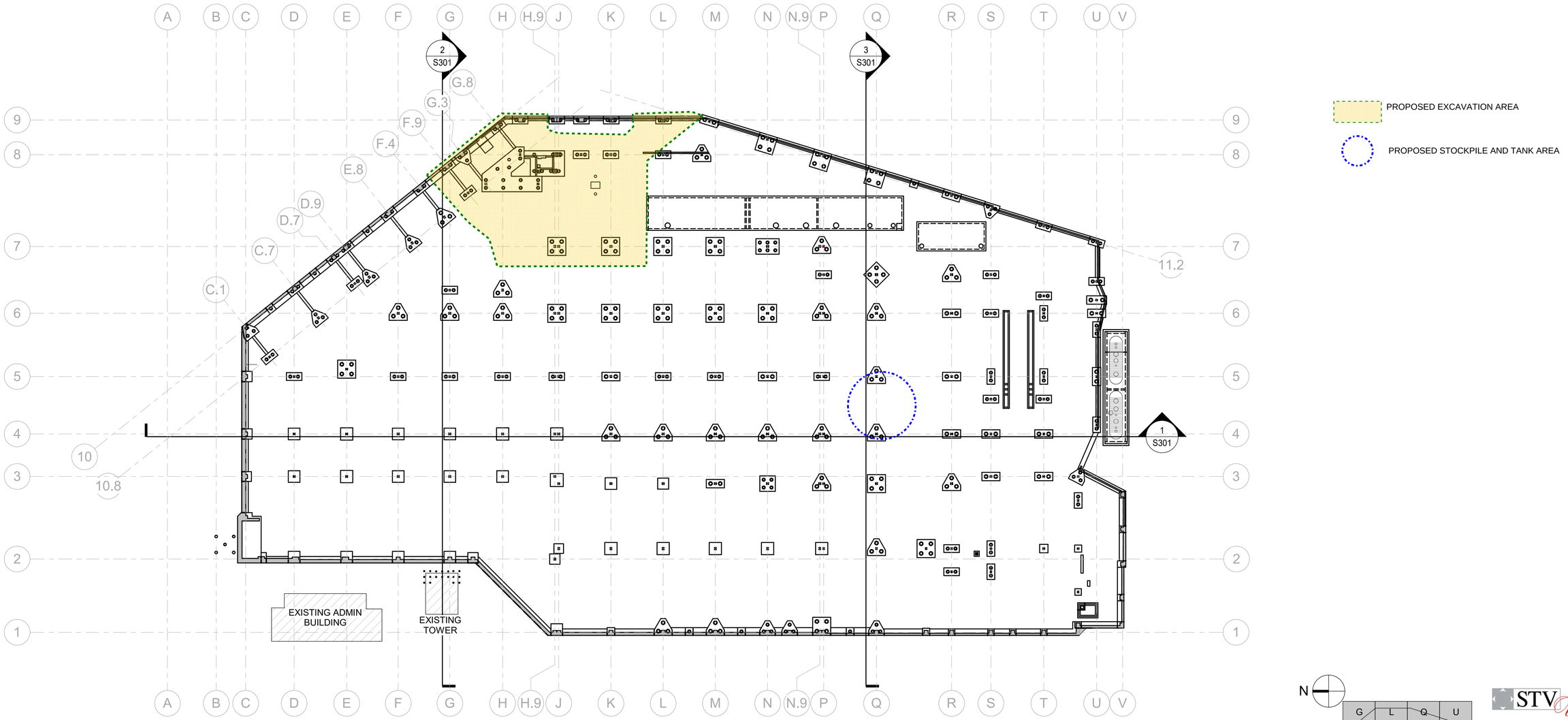
0444100

*Figure Date:*

03-07-2022

*Figure Number:*

1

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|---|---|---|---|---|
| | G | L | Q | U |
| C | F | K | P | T |
| B | E | J | N | S |
| A | D | H | M | R |

KEY PLAN

STV 100 Years

CLARK CONSTRUCTION

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. _____

EXPIRATION DATE: _____

1 / - PROPOSED EXCAVATION AND STOCKPILE LOCATION PLAN

1" = 40'-0"

SCALE: 0 20 40 80 feet

| | | |
|---|---|---|
| DESIGNED | T. LISOFSKY | 05/28/2021 DATE |
| DRAWN | J. McWILLIAMS | 05/28/2021 DATE |
| CHECKED | C. CERINO | 05/28/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|
| | |

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| | | |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

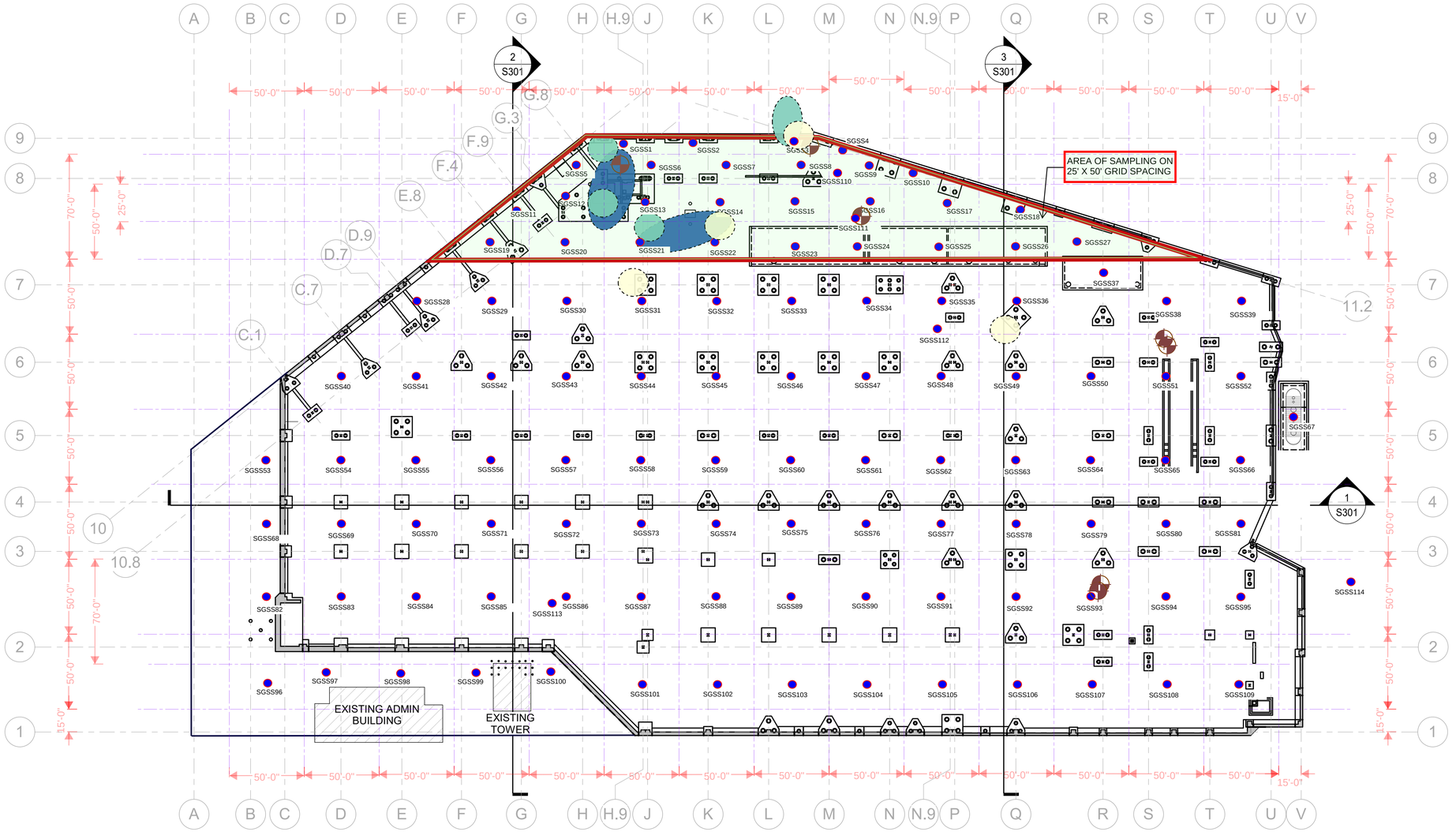
OFFICE OF CAPITAL PROGRAM DELIVERY
ENGA - STRUCTURAL ENGINEERING

APPROVED _____ DATE

APPROVED _____ DATE

# NORTHERN BUS DIVISION REPLACEMENT
# PROPOSED EXCAVATION AND STOCKPILE LOCATION PLAN
# FIGURE 2

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1" = 40'-0" | | |




**NOTE:**

1. IMPACT EXTENTS SHOWN ON THIS FIGURE ARE ESTIMATED SHOWN ON THIS FIGURE ARE ESTIMATED AND PROVIDED FOR ILLUSTRATIVE AND PLANNING PURPOSES. THE DISPLAYED EXTENTS DO NOT ACCOUNT FOR EXISTING ON-SITE IMPACTS LOCATED OUTSIDE OF THE BUILDING FOOTPRINT.

- APPROXIMATE EXTENT OF METALS-IMPACTED SOIL ABOVE EPA RSLs - INDUSTRIAL
- APPROXIMATE EXTENT OF SVOCs -IMPACTED SOIL
- APPROXIMATE EXTENT OF PAH-IMPACTED SOIL
- PROPOSED SUB-GRADE SAMPLING LOCATION (PLUS FOCUSED SAMPLING AS COORDINATED WITH DOEE)
- Proposed Wells

N

1 - PROPOSED 50-FOOT SAMPLING GRID PLAN

1" = 40'-0"

SCALE: 0 20 40 80 feet

STV 100 Years

CLARK CONSTRUCTION

| | | |
|---|---|---|
| DESIGNED | T. LISOFSKY | 05/28/2021 DATE |
| DRAWN | J. McWILLIAMS | 05/28/2021 DATE |
| CHECKED | C. CERINO | 05/28/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|

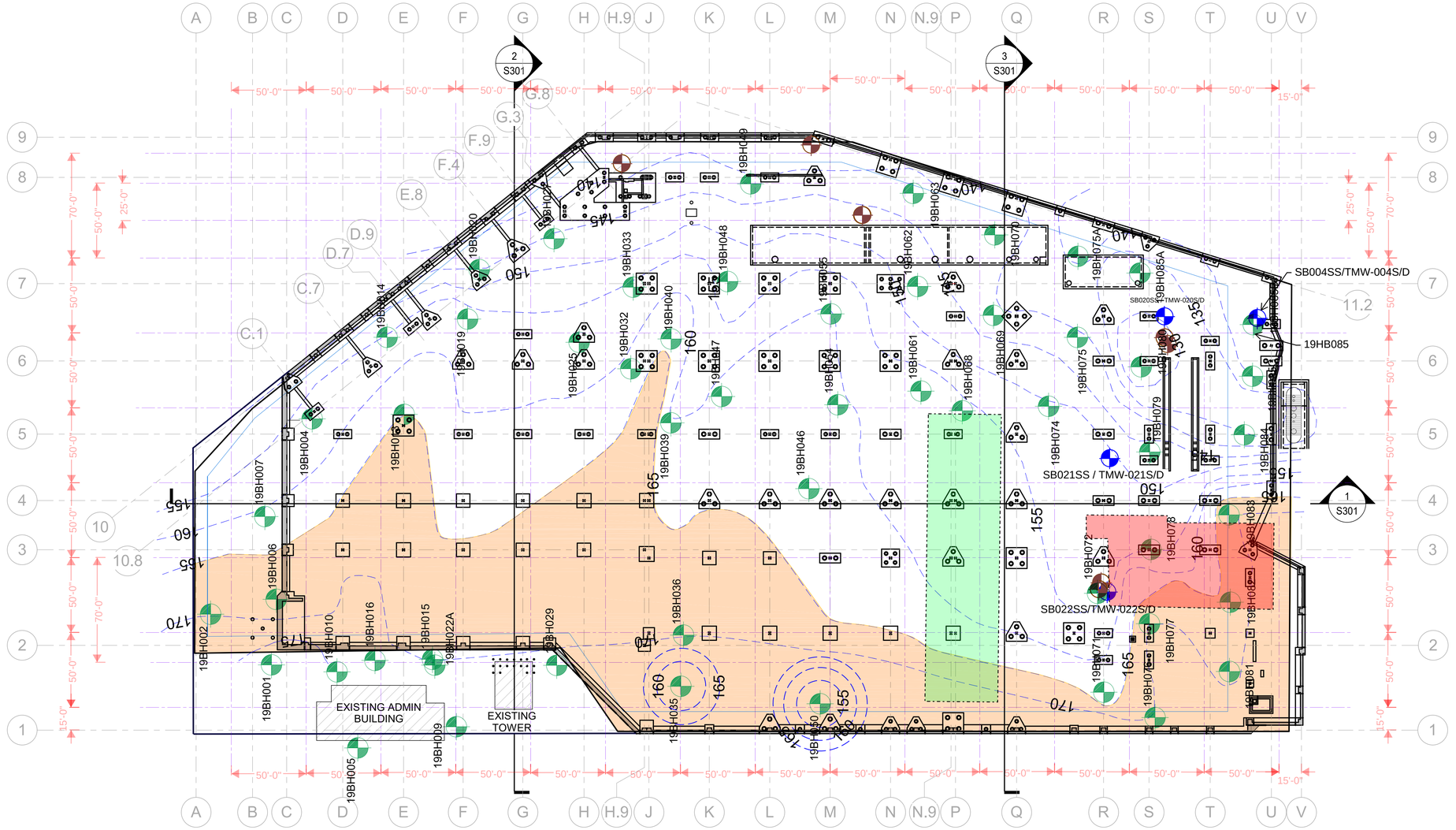
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

APPROVED _____ DATE

APPROVED _____ DATE

NORTHERN BUS DIVISION REPLACEMENT
PROPOSED 50-FOOT SAMPLING GRID PLAN
FIGURE 3

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1" = 40'-0" | | |




**NOTE:**

1. IMPACT EXTENTS SHOWN ON THIS FIGURE ARE ESTIMATED SHOWN ON THIS FIGURE ARE ESTIMATED AND PROVIDED FOR ILLUSTRATIVE AND PLANNING PURPOSES. THE DISPLAYED EXTENTS DO NOT ACCOUNT FOR EXISTING ON-SITE IMPACTS LOCATED OUTSIDE OF THE BUILDING FOOTPRINT.

2. BEDROCK MAP OVERLAY SHOWN IS FROM PSI (2022) WMATA NORTHERN BUS GARAGE, COMPREHENSIVE SITE ASSESSMENT REPORT, EXHIBIT 4. MARCH 10.

- PROPOSED WELLS
- SELECT HISTORICAL BORING AND GROUNDWATER SAMPLE LOCATIONS
- GEOTECHNICAL BORINGS 2022
- PLANNED BEDROCK EXCAVATION AREA (>165' ELEVATION)
- INTERPRETED BEDROCK ELEVATION CONTOURS
- FORMER MAINTENANCE AREA
- FORMER CLEANING/DYEING AREA

1 / - PROPOSED 50-FOOT SAMPLING GRID PLAN

1" = 40'-0"

SCALE: 0 20 40 80 feet

STV 100 Years

CLARK CONSTRUCTION

| | | |
|---|---|---|
| DESIGNED | T. LISOFSKY | 05/28/2021 DATE |
| DRAWN | J. McWILLIAMS | 05/28/2021 DATE |
| CHECKED | C. CERINO | 05/28/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
PROPOSED MONITORING WELL LOCATIONS IN RELATION TO BEDROCK CONTOURS AND SITE FEATURES
FIGURE 4

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1" = 40'-0" | | |

# Tables

Table 1
Summary of Selected Final Remediation Levels and Detection Limits
Washington Metropolitan Area Transit Authority Northern Bus Garage
4615 14th Street NW, Washington, D.C. 20011

| Constituent [a,b] | DCRBCA [c] Construction Worker Soil Upto Depth of Construction Ingestion, Inhalation (Vapor Emissions and Particulates), and Dermal (mg/kg) | DCRBCA [c] Commercial Worker Sub-surface Soil Indoor Inhalation (mg/kg) | DCRBCA [c] Commercial Worker Sub-surface Soil Outdoor Inhalation (mg/kg) | USEPA Industrial Soil Regional Screening Level [c] (mg/kg) | Final Remediation Level [d] (mg/kg) | Final Remediation Level [d] Source | Selected Analytical Laboratory Method Detection Limit [e] (mg/kg) |
|---|---|---|---|---|---|---|---|
| **Priority Pollutant Metals** | | | | | | | |
| Mercury | -- | -- | -- | 12 | 12 | RSL | 0.075 |
| Chromium | -- | -- | -- | 180,000 | 180,000 | RSL | 0.38 |
| Chromium VI | -- | -- | -- | 6.3 | 6.3 | RSL | 0.38 |
| Copper | -- | -- | -- | 4,700 | 4,700 | RSL | 0.475 |
| Lead | -- | -- | -- | 800 | 800 | RSL | 0.115 |
| Nickel | -- | -- | -- | 2,200 | 2,200 | RSL | 0.38 |
| Zinc | -- | -- | -- | 35,000 | 35,000 | RSL | 1.85 |
| Antimony | -- | -- | -- | 47 | 47 | RSL | 0.415 |
| Arsenic [f] | -- | -- | -- | 3.0 | 21 | BKGD | 0.125 |
| Beryllium | -- | -- | -- | 230 | 230 | RSL | 0.28 |
| Cadmium | -- | -- | -- | 10 | 10 | RSL | 0.095 |
| Selenium | -- | -- | -- | 580 | 580 | RSL | 0.135 |
| Silver | -- | -- | -- | 580 | 580 | RSL | 0.085 |
| Thallium | -- | -- | -- | 1.2 | 1.2 | RSL | 0.15 |
| **Polychlorinated biphenyls** | | | | | | | |
| Aroclor (Total) | -- | -- | -- | 0.97 | 0.97 | RSL | NA |
| Aroclor-1016 | -- | -- | -- | 5.1 | 5.1 | RSL | 0.031 |
| Aroclor-1221 | -- | -- | -- | 0.83 | 0.83 | RSL | 0.031 |
| Aroclor-1232 | -- | -- | -- | 0.72 | 0.72 | RSL | 0.031 |
| Aroclor-1242 | -- | -- | -- | 0.95 | 0.95 | RSL | 0.031 |
| Aroclor-1248 | -- | -- | -- | 0.94 | 0.94 | RSL | 0.031 |
| Aroclor-1254 | -- | -- | -- | 0.97 | 0.97 | RSL | 0.031 |
| Aroclor-1260 | -- | -- | -- | 0.99 | 0.99 | RSL | 0.031 |
| Aroclor-1262 | -- | -- | -- | -- | NA | | NA |
| Aroclor-1268 | -- | -- | -- | -- | NA | | NA |
| **Semi-Volatile Organic Compounds** | | | | | | | |
| 1,1'-Biphenyl | -- | -- | -- | 20 | 20 | RSL | NA |
| 1,2,4,5-Tetrachlorobenzene | -- | -- | -- | 3.5 | 3.5 | RSL | NA |
| 2,3,4,6-Tetrachlorophenol | -- | -- | -- | 2,500 | 2,500 | RSL | NA |
| 2,4,5-Trichlorophenol | -- | -- | -- | 8,200 | 8,200 | RSL | 0.004 |
| 2,4,6-Trichlorophenol | -- | -- | -- | 82 | 82 | RSL | 0.0263 |
| 2,4-Dichlorophenol | -- | -- | -- | 250 | 250 | RSL | 0.0263 |
| 2,4-Dimethylphenol | -- | -- | -- | 1,600 | 1,600 | RSL | 0.0317 |
| 2,4-Dinitrophenol | -- | -- | -- | 160 | 160 | RSL | 0.0757 |
| 2,4-Dinitrotoluene | -- | -- | -- | 7.4 | 7.4 | RSL | 0.0233 |
| 2,6-Dinitrotoluene | -- | -- | -- | 1.5 | 1.5 | RSL | 0.0193 |
| 2-Chloronaphthalene | -- | -- | -- | 6,000 | 6,000 | RSL | 0.023 |
| 2-Chlorophenol | -- | -- | -- | 580 | 580 | RSL | 0.0167 |
| 2-Methylnaphthalene | -- | -- | -- | 300 | 300 | RSL | 0.008 |
| 2-Methylphenol | -- | -- | -- | 4,100 | 4,100 | RSL | 0.0183 |
| 2-Nitroaniline | -- | -- | -- | 800 | 800 | RSL | 0.019 |
| 2-Nitrophenol | -- | -- | -- | -- | NA | | 0.0267 |
| 3&4-Methylphenol | -- | -- | -- | 1,600 | 1,600 | RSL | 0.0243 |
| 3,3'-Dichlorobenzidine | -- | -- | -- | 5.1 | 5.1 | RSL | 0.0183 |
| 3-Nitroaniline | -- | -- | -- | 110 | 110 | RSL | 0.0233 |
| 4,6-Dinitro-2-methylphenol (4,6 dinitro-o-cresol) | -- | -- | -- | 6.6 | 6.6 | RSL | 0.0397 |
| 4-Bromophenyl-phenylether | -- | -- | -- | 8.2 | 8.2 | RSL | 0.0173 |
| 4-Chloro-3-methylphenol (p-chloro-m-cresol) | -- | -- | -- | 8,200 | 8,200 | RSL | 0.029 |
| 4-Chloroaniline (P-chloroaniline) | -- | -- | -- | 11 | 11 | RSL | 0.0257 |
| 4-Chlorophenyl-phenylether | -- | -- | -- | 8.2 | 8.2 | RSL | 0.0187 |
| 4-Nitroaniline | -- | -- | -- | 110 | 110 | RSL | 0.0333 |
| 4-Nitrophenol | -- | -- | -- | -- | NA | | 0.0513 |

Table 1
Summary of Selected Final Remediation Levels and Detection Limits
Washington Metropolitan Area Transit Authority Northern Bus Garage
4615 14th Street NW, Washington, D.C. 20011

| Constituent [a,b] | DCRBCA [c] Construction Worker Soil Upto Depth of Construction Ingestion, Inhalation (Vapor Emissions and Particulates), and Dermal (mg/kg) | DCRBCA [c] Commercial Worker Sub-surface Soil Indoor Inhalation (mg/kg) | DCRBCA [c] Commercial Worker Sub-surface Soil Outdoor Inhalation (mg/kg) | USEPA Industrial Soil Regional Screening Level [c] (mg/kg) | Final Remediation Level [d] (mg/kg) | Final Remediation Level [d] Source | Selected Analytical Laboratory Method Detection Limit [e] (mg/kg) |
|---|---|---|---|---|---|---|---|
| **Semi-Volatile Organic Compounds** | | | | | | | |
| Acenaphthene | 37,100 | -- | -- | 4,500 | 4,500 | RSL | 0.006 |
| Acenaphthylene | -- | -- | -- | 4,500 | 4,500 | RSL | 0.0057 |
| Acetophenone | -- | -- | -- | 12,000 | 12,000 | RSL | 0.0213 |
| Anthracene | 186,000 | -- | -- | 23,000 | 23,000 | RSL | 0.0043 |
| Atrazine | -- | -- | -- | 10 | 10 | RSL | 0.0167 |
| Benzaldehyde | -- | -- | -- | 820 | 820 | RSL | NA |
| Benzo[a]anthracene | 59 | 685 | 300,000 | 21 | 21 | RSL | 0.0333 |
| Benzo[a]pyrene | 5.9 | 3,010 | 126,000 | 2.1 | 2.1 | RSL | 0.0047 |
| Benzo[b]fluoranthene | 59 | 23,000 | 2,080,000 | 21 | 21 | RSL | 0.0043 |
| Benzo[g,h,i]perylene | 20,200 | -- | -- | -- | 20,200 | DCRBCA | 0.006 |
| Benzo[k]fluoranthene | 580 | 25,000 | 2,040,000 | 210 | 210 | RSL | 0.0073 |
| Biphenyl (Diphenyl) | -- | -- | -- | 20 | 20 | RSL | 0.0177 |
| bis(2-Chloroethoxy)methane | -- | -- | -- | 250 | 250 | RSL | 0.0217 |
| bis(2-Chloroethyl)ether | -- | -- | -- | 1.0 | 1.0 | RSL | 0.0043 |
| bis(2-Chloroisopropyl)ether | -- | -- | -- | 1.0 | 1.0 | RSL | 0.005 |
| bis(2-Ethylhexyl)phthalate | -- | -- | -- | 160 | 160 | RSL | 0.023 |
| Butylbenzylphthalate | -- | -- | -- | 1,200 | 1,200 | RSL | NA |
| Caprolactam | -- | -- | -- | 40,000 | 40,000 | RSL | 0.012 |
| Carbazole | -- | -- | -- | -- | NA | | 0.026 |
| Chrysene | 5,780 | 14,100 | 5,230,000 | 2,100 | 2100 | RSL | 0.004 |
| Dibenzo[a,h]anthracene | -- | -- | -- | 2.1 | 2.1 | RSL | 0.0057 |
| Dibenzofuran | -- | -- | -- | 120 | 120 | RSL | 0.0193 |
| Diethylphthalate | -- | -- | -- | 66,000 | 66,000 | RSL | 0.02 |
| Dimethylphthalate | -- | -- | -- | 66,000 | 66,000 | RSL | 0.0193 |
| Di-n-butylphthalate (Dibutyl Phthalate) | -- | -- | -- | 8,200 | 8,200 | RSL | 0.0173 |
| Di-n-octylphthalate (Di-n-octyl phthalate) | -- | -- | -- | 820 | 820 | RSL | 0.012 |
| Fluoranthene | 24,800 | -- | -- | 3,000 | 3,000 | RSL | 0.0037 |
| Fluorene | 24,800 | -- | -- | 3,000 | 3,000 | RSL | 0.0057 |
| Hexachlorobenzene | -- | -- | -- | 0.96 | 0.96 | RSL | 0.0063 |
| Hexachlorobutadiene | -- | -- | -- | 5.3 | 5.3 | RSL | 0.019 |
| Hexachlorocyclopentadiene | -- | -- | -- | 0.75 | 0.75 | RSL | 0.03 |
| Hexachloroethane | -- | -- | -- | 8.0 | 8.0 | RSL | 0.0213 |
| Indeno[1,2,3-cd]pyrene | -- | -- | -- | 21 | 21 | RSL | 0.0077 |
| Isophorone | -- | -- | -- | 2,400 | 2,400 | RSL | 0.022 |
| Naphthalene | 4,160 | 1.3 | 848 | 8.6 | 1.3 | DCRBCA | 0.0006 |
| Nitrobenzene | -- | -- | -- | 22 | 22 | RSL | 0.025 |
| N-Nitroso-di-n-propylamine | -- | -- | -- | 0.33 | 0.33 | RSL | 0.003 |
| N-Nitrosodiphenylamine | -- | -- | -- | 470 | 470 | RSL | 0.01 |
| Pentachlorophenol | -- | -- | -- | 4.0 | 4.0 | RSL | 0.0403 |
| Phenanthrene | 20,200 | -- | -- | -- | 20,200 | DCRBCA | 0.005 |
| Phenol | -- | -- | -- | 25,000 | 25,000 | RSL | 0.024 |
| Pyrene | 18,600 | -- | -- | 2,300 | 2,300 | RSL | 0.0043 |
| **Total Petroleum Hydrocarbons** | | | | | | | |
| Gasoline Range Organics | 1,040,000,000 | 376 | 229,000 | -- [g] | 376 | DCRBCA | 0.05 |
| Diesel Range Organics | 127,000,000 | 14,600 | 8,890,000 | -- [g] | 14,600 | DCRBCA | 3.2 |
| Total Petroleum Hydrocarbons | -- | -- | -- | -- [g] | NA | | NA |
| **Volatile Organic Compounds** | | | | | | | |
| 1,1,1-Trichloroethane | -- | -- | -- | 3,600 | 3,600 | RSL | 0.0004 |
| 1,1,2,2-Tetrachloroethane | -- | -- | -- | 2.7 | 2.7 | RSL | 0.0006 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | -- | -- | -- | 2,800 | 2,800 | RSL | NA |
| 1,1,2-Trichloroethane | -- | -- | -- | 0.63 | 0.63 | RSL | 0.0003 |
| 1,1-Dichloroethane | -- | -- | -- | 16 | 16 | RSL | 0.0004 |

**Table 1**
**Summary of Selected Final Remediation Levels and Detection Limits**
**Washington Metropolitan Area Transit Authority Northern Bus Garage**
**4615 14th Street NW, Washington, D.C. 20011**

| Constituent [a,b] | DCRBCA [c] Construction Worker Soil Upto Depth of Construction Ingestion, Inhalation (Vapor Emissions and Particulates), and Dermal (mg/kg) | DCRBCA [c] Commercial Worker Sub-surface Soil Indoor Inhalation (mg/kg) | DCRBCA [c] Commercial Worker Sub-surface Soil Outdoor Inhalation (mg/kg) | USEPA Industrial Soil Regional Screening Level [c] (mg/kg) | Final Remediation Level [d] (mg/kg) | Final Remediation Level [d] Source | Selected Analytical Laboratory Method Detection Limit [e] (mg/kg) |
|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds** | | | | | | | |
| 1,1-Dichloroethene | -- | -- | -- | 100 | 100 | RSL | 0.0004 |
| 1,2,3-Trichlorobenzene | -- | -- | -- | 93 | 93 | RSL | 0.0005 |
| 1,2,4-Trichlorobenzene | -- | -- | -- | 26 | 26 | RSL | 0.0005 |
| 1,2-Dibromo-3-chloropropane | -- | -- | -- | 0.064 | 0.064 | RSL | 0.0009 |
| 1,2-Dibromoethane | 18 | 0.0020 | 1.5 | 0.16 | 0.0020 | DCRBCA | 0.0005 |
| 1,2-Dichlorobenzene | -- | -- | -- | 930 | 930 | RSL | 0.0004 |
| 1,2-Dichloroethane | 304 | 0.016 | 10 | 2.0 | 0.016 | DCRBCA | 0.0004 |
| 1,2-Dichloropropane | -- | -- | -- | 6.6 | 6.6 | RSL | 0.0005 |
| 1,3-Dichlorobenzene | -- | -- | -- | 11 | 11 | RSL | 0.0005 |
| 1,4-Dichlorobenzene | -- | -- | -- | 11 | 11 | RSL | 0.0009 |
| 1,4-Dioxane | -- | -- | -- | 24 | 24 | RSL | NA |
| 2-Butanone (methyl ethyl ketone) | -- | -- | -- | 19,000 | 19,000 | RSL | 0.0023 |
| 2-Hexanone | -- | -- | -- | 130 | 130 | RSL | 0.0007 |
| 4-Methyl-2-pentanone (Methyl isobutyl ketone) | -- | -- | -- | 14,000 | 14,000 | RSL | 0.0006 |
| Acetone | -- | -- | -- | 110,000 | 110,000 | RSL | 0.011 |
| Benzene | 691 | 0.034 | 21 | 5.1 | 0.034 | DCRBCA | 0.0004 |
| Bromochloromethane | -- | -- | -- | 63 | 63 | RSL | 0.0005 |
| Bromodichloromethane | -- | -- | -- | 1.3 | 1.3 | RSL | 0.0004 |
| Bromoform | -- | -- | -- | 86 | 86 | RSL | 0.0005 |
| Bromomethane | -- | -- | -- | 3.0 | 3.0 | RSL | 0.001 |
| Carbon disulfide | -- | -- | -- | 350 | 350 | RSL | 0.0004 |
| Carbon tetrachloride | -- | -- | -- | 2.9 | 2.9 | RSL | 0.0004 |
| Chlorobenzene | -- | -- | -- | 130 | 130 | RSL | 0.0005 |
| Chloroethane (ethyl chloride) | -- | -- | -- | 2,300 | 2,300 | RSL | 0.0005 |
| Chloroform | -- | -- | -- | 1.4 | 1.4 | RSL | 0.0007 |
| Chloromethane | -- | -- | -- | 46 | 46 | RSL | 0.0005 |
| cis-1,2-Dichloroethene | -- | -- | -- | 37 | 37 | RSL | 0.0004 |
| cis-1,3-Dichloropropene | -- | -- | -- | 8.2 | 8.2 | RSL | 0.0004 |
| Cyclohexane | -- | -- | -- | 2,700 | 2,700 | RSL | 0.0004 |
| Dibromochloromethane | -- | -- | -- | 39 | 39 | RSL | 0.0003 |
| Dichlorodifluoromethane | -- | -- | -- | 37 | 37 | RSL | 0.0005 |
| Ethylbenzene | 3,180 | 0.27 | 181 | 25 | 0.27 | DCRBCA | 0.0004 |
| Isopropylbenzene (cumene) | -- | -- | -- | 990 | 990 | RSL | 0.0004 |
| m&p-Xylenes | -- | -- | -- | 240 | 240 | RSL | 0.0011 |
| Methyl Acetate | -- | -- | -- | 120,000 | 120,000 | RSL | 0.0025 |
| Methylcyclohexane | -- | -- | -- | 2,700 | 2,700 | RSL | 0.0004 |
| Methylene chloride | -- | -- | -- | 320 | 320 | RSL | 0.0036 |
| Methyl-t-butyl ether (MTBE) | 8,490 | 1.6 | 1,000 | 210 | 1.6 | DCRBCA | 0.0004 |
| o-Xylene | -- | -- | -- | 280 | 280 | RSL | 0.0004 |
| Styrene | -- | -- | -- | 3,500 | 3,500 | RSL | 0.0004 |
| Tetrachloroethene (PCE) | -- | -- | -- | 39 | 39 | RSL | 0.0004 |
| Toluene | 64,600 | 691 | 449,000 | 4,700 | 691 | DCRBCA | 0.0005 |
| trans-1,2-Dichloroethene | -- | -- | -- | 30 | 30 | RSL | 0.0005 |
| trans-1,3-Dichloropropene | -- | -- | -- | 8.2 | 8.2 | RSL | 0.0004 |
| Trichloroethene (TCE) | -- | -- | -- | 1.9 | 1.9 | RSL | 0.0005 |
| Trichlorofluoromethane | -- | -- | -- | 35,000 | 35,000 | RSL | 0.0005 |
| Vinyl chloride | -- | -- | -- | 1.7 | 1.7 | RSL | 0.0003 |
| Xylenes (Total) | 23,900 | 27 | 17,000 | 250 | 27 | DCRBCA | 0.0004 |
| **Organochlorine Pesticides** | | | | | | | |
| 4,4-DDD | -- | -- | -- | 9.6 | 9.6 | RSL | 0.0012 |
| 4,4-DDE | -- | -- | -- | 9.3 | 9.3 | RSL | 0.0012 |
| 4,4-DDT | -- | -- | -- | 8.5 | 8.5 | RSL | 0.0012 |
| Aldrin | -- | -- | -- | 0.18 | 0.18 | RSL | 0.0012 |
| Chlordane | -- | -- | -- | 7.7 | 7.7 | RSL | 0.052 |

**Table 1**
**Summary of Selected Final Remediation Levels and Detection Limits**
**Washington Metropolitan Area Transit Authority Northern Bus Garage**
**4615 14th Street NW, Washington, D.C. 20011**

| Constituent [a,b] | DCRBCA [c] Construction Worker: Soil Upto Depth of Construction: Ingestion, Inhalation (Vapor Emissions and Particulates), and Dermal (mg/kg) | DCRBCA [c] Commercial Worker: Sub-surface Soil: Indoor Inhalation (mg/kg) | DCRBCA [c] Commercial Worker: Sub-surface Soil: Outdoor Inhalation (mg/kg) | USEPA Industrial Soil Regional Screening Level [c] (mg/kg) | Final Remediation Level [d] (mg/kg) | Final Remediation Level [d] Source | Selected Analytical Laboratory Method Detection Limit [e] (mg/kg) |
|---|---|---|---|---|---|---|---|
| **Organochlorine Pesticides** | | | | | | | |
| Dieldrin | -- | -- | -- | 0.14 | 0.14 | RSL | 0.0015 |
| Endosulfan I | -- | -- | -- | 490 | 490 | RSL | 0.0016 |
| Endosulfan II | -- | -- | -- | 490 | 490 | RSL | 0.0016 |
| Endosulfan sulfate | -- | -- | -- | 490 | 490 | RSL | 0.002 |
| Endrin | -- | -- | -- | 25 | 25 | RSL | 0.002 |
| Endrin aldehyde | -- | -- | -- | 25 | 25 | RSL | 0.0019 |
| Endrin ketone | -- | -- | -- | 25 | 25 | RSL | 0.0023 |
| Heptachlor | -- | -- | -- | 0.63 | 0.63 | RSL | 0.0016 |
| Heptachlor epoxide | -- | -- | -- | 0.33 | 0.33 | RSL | 0.0017 |
| Methoxychlor | -- | -- | -- | 410 | 410 | RSL | 0.0023 |
| Toxaphene | -- | -- | -- | 2.1 | 2.1 | RSL | 0.044 |
| alpha-BHC | -- | -- | -- | 0.36 | 0.36 | RSL | 0.0019 |
| alpha-Chlordane | -- | -- | -- | 50 | 50 | RSL | 0.0015 |
| beta-BHC | -- | -- | -- | 1.3 | 1.3 | RSL | 0.0018 |
| delta-BHC | -- | -- | -- | 1.3 | 1.3 | RSL | 0.0018 |
| gamma-BHC (Lindane) | -- | -- | -- | 2.5 | 2.5 | RSL | 0.0017 |
| gamma-Chlordane | -- | -- | -- | 50 | 50 | RSL | NA |

-- = Not available.
mg/kg = milligram per kilogram.
NA = Not available. There are no toxicity values available for these constituents and therefore an screening level could not be derived.

**Notes:**
[a] All constituents analyzed for at the Site are presented.
[b] The following surrogate compounds were selected for those constituents without toxicity information or screening levels:
The screening level for trivalent chromium was used for chromium results.
The screening level for Aroclor-1254 was used for Aroclor (Total) results because the only detected Aroclor was Aroclor-1254.
The screening level for p-cresol was used for 3&4-methylphenol results.
The screening level for 4-nitroaniline was used for 3-nitroaniline results.
The screening level for bis(2-Chloroethyl)ether was used for bis(2-Chloroisopropyl)ether results.
The screening level for 2,2',4,4'-tetrabromodiphenyl ether was used for 4-bromophenyl-phenylether and 4-chlorophenyl-phenylether results.
The screening level for acenaphthene was used for acenaphthylene results.
The screening level for diethylphthalate was used for dimethylphthalate results.
The screening level for 1,4-dichlorobenzene was used for 1,3-dichlorobenzene results.
The screening level for 1,3-dichloropropene was used for cis- and trans-1,3-dichloropropene results.
The screening level for cyclohexane was used for methylcyclohexane results.
The screening level for endosulfan sulfate was used for endosulfan I an II results.
The screening level for endrin was used for endrin aldehyde and endrin ketone results.
The screening level for technical hexachlorocyclohexane (BHC) was used for delta-BHC results.
[c] Screening levels are the District of Columbia Risk Based Corrective Action (DCRBCA; 2011) Sub-surface Soil Risk-Based Screening Levels for a Commercial Worker, Soil up to Depth of Construction for Construction Workers, and the United States Environmental Protection Agency (USEPA) Industrial Soil Regional Screening Levels (RSL) (2023a). USEPA RSLs are based on a target cancer risk of $1\times10^{-6}$ and a target non-cancer hazard of 0.1 (to account for additive effects).
[d] The final selected screening level is the minimum value of the DCRBCA RBSLs and the USEPA Industrial Soil RSL.
[e] The analytical method detection limits are presented.
[f] Background threshold value for arsenic in Soil Type 4, Urban Land (Table 6.21, Tetra Tech 2022).
[g] According to the USEPA RSL Users Guide (2023b), the total petroleum hydrocarbon (TPH) carbon ranges used in the RSLs are not intended to screen against TPH diesel, gasoline, oil or residual range organics analysis, as the carbon ranges do not match those presented in the USEPA Provisional Peer Reviewed Toxicity Values.

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Table 2
Summary of Protection of Groundwater Soil Screening Levels and Detection Limits
Washington Metropolitan Area Transit Authority Northern Bus Garage
4615 14th Street NW, Washington, D.C. 20011

| Constituent [a,b] | USEPA Soil Screening Level (SSL) based on THQ=0.1 [c] (mg/kg) | USEPA Soil Screening Level (SSL) based on THQ=1 [c] (mg/kg) | Selected Analytical Laboratory Method Detection Limit [d] (mg/kg) |
|---|---|---|---|
| **Priority Pollutant Metals** | | | |
| Mercury | 1.4 | 14 | 0.075 |
| Chromium | 180,000 | 180,000 | 0.38 |
| Chromium VI | 0.00067 | 0.00067 | 0.38 |
| Copper | 46 | 46 | 0.475 |
| Lead | 14 | 14 | 0.115 |
| Nickel | 2.6 | 26 | 0.38 |
| Zinc | 37 | 370 | 1.85 |
| Antimony | 0.27 | 0.27 | 0.415 |
| Arsenic | 0.29 | 0.29 | 0.125 |
| Beryllium | 3.2 | 3.2 | 0.28 |
| Cadmium | 0.38 | 0.38 | 0.095 |
| Selenium | 0.26 | 0.26 | 0.135 |
| Silver | 0.080 | 0.80 | 0.085 |
| Thallium | 0.14 | 0.14 | 0.15 |
| **Polychlorinated biphenyls** | | | |
| Aroclor (Total) | 0.0020 | 0.0020 | NA |
| Aroclor-1016 | 0.013 | 0.021 | 0.031 |
| Aroclor-1221 | 0.000080 | 0.000080 | 0.031 |
| Aroclor-1232 | 0.000080 | 0.000080 | 0.031 |
| Aroclor-1242 | 0.0012 | 0.0012 | 0.031 |
| Aroclor-1248 | 0.0012 | 0.0012 | 0.031 |
| Aroclor-1254 | 0.0020 | 0.0020 | 0.031 |
| Aroclor-1260 | 0.0055 | 0.0055 | 0.031 |
| Aroclor-1262 | -- | -- | NA |
| Aroclor-1268 | -- | -- | NA |
| **Semi-Volatile Organic Compounds** | | | |
| 1,1'-Biphenyl | 0.00087 | 0.0087 | NA |
| 1,2,4,5-Tetrachlorobenzene | 0.000079 | 0.00079 | NA |
| 2,3,4,6-Tetrachlorophenol | 0.018 | 0.18 | NA |
| 2,4,5-Trichlorophenol | 0.40 | 4.000 | 0.004 |
| 2,4,6-Trichlorophenol | 0.0012 | 0.0040 | 0.0263 |
| 2,4-Dichlorophenol | 0.0023 | 0.023 | 0.0263 |
| 2,4-Dimethylphenol | 0.042 | 0.42 | 0.0317 |
| 2,4-Dinitrophenol | 0.0044 | 0.044 | 0.0757 |
| 2,4-Dinitrotoluene | 0.00032 | 0.00032 | 0.0233 |
| 2,6-Dinitrotoluene | 0.000067 | 0.000067 | 0.0193 |
| 2-Chloronaphthalene | 0.39 | 3.9 | 0.023 |
| 2-Chlorophenol | 0.0089 | 0.089 | 0.0167 |

Table 2
Summary of Protection of Groundwater Soil Screening Levels and Detection Limits
Washington Metropolitan Area Transit Authority Northern Bus Garage
4615 14th Street NW, Washington, D.C. 20011

| Constituent [a,b] | USEPA Soil Screening Level (SSL) based on THQ=0.1 [c] (mg/kg) | USEPA Soil Screening Level (SSL) based on THQ=1 [c] (mg/kg) | Selected Analytical Laboratory Method Detection Limit [d] (mg/kg) |
|---|---|---|---|
| **Semi-Volatile Organic Compounds** | | | |
| 2-Methylnaphthalene | 0.019 | 0.19 | 0.008 |
| 2-Methylphenol | 0.075 | 0.75 | 0.0183 |
| 2-Nitroaniline | 0.0080 | 0.08 | 0.019 |
| 2-Nitrophenol | -- | -- | 0.0267 |
| 3&4-Methylphenol | 0.030 | 0.30 | 0.0243 |
| 3,3'-Dichlorobenzidine | 0.00082 | 0.00082 | 0.0183 |
| 3-Nitroaniline | 0.0016 | 0.0016 | 0.0233 |
| 4,6-Dinitro-2-methylphenol (4,6 dinitro-o-cresol) | 0.00026 | 0.0026 | 0.0397 |
| 4-Bromophenyl-phenylether | 0.0053 | 0.053 | 0.0173 |
| 4-Chloro-3-methylphenol (p-chloro-m-cresol) | 0.17 | 1.7 | 0.029 |
| 4-Chloroaniline (P-chloroaniline) | 0.00016 | 0.00016 | 0.0257 |
| 4-Chlorophenyl-phenylether | 0.0053 | 0.053 | 0.0187 |
| 4-Nitroaniline | 0.0016 | 0.0016 | 0.0333 |
| 4-Nitrophenol | -- | -- | 0.0513 |
| Acenaphthene | 0.55 | 5.5 | 0.006 |
| Acenaphthylene | 0.55 | 5.5 | 0.0057 |
| Acetophenone | 0.058 | 0.58 | 0.0213 |
| Anthracene | 5.8 | 58 | 0.0043 |
| Atrazine | 0.0019 | 0.0019 | 0.0167 |
| Benzaldehyde | 0.0041 | 0.0041 | NA |
| Benzo[a]anthracene | 0.011 | 0.011 | 0.0333 |
| Benzo[a]pyrene | 0.24 | 0.24 | 0.0047 |
| Benzo[b]fluoranthene | 0.30 | 0.30 | 0.0043 |
| Benzo[g,h,i]perylene | 1.3 | 13 | 0.006 |
| Benzo[k]fluoranthene | 2.9 | 2.9 | 0.0073 |
| Biphenyl (Diphenyl) | 0.00087 | 0.0087 | 0.0177 |
| bis(2-Chloroethoxy)methane | 0.0013 | 0.013 | 0.0217 |
| bis(2-Chloroethyl)ether | 0.0000036 | 0.0000036 | 0.0043 |
| bis(2-Chloroisopropyl)ether | 0.0000036 | 0.0000036 | 0.005 |
| bis(2-Ethylhexyl)phthalate | 1.4 | 1.4 | 0.023 |
| Butylbenzylphthalate | 0.24 | 0.24 | NA |
| Caprolactam | 0.25 | 2.5 | 0.012 |
| Carbazole | -- | -- | 0.026 |
| Chrysene | 9.0 | 9.0 | 0.004 |
| Dibenzo[a,h]anthracene | 0.096 | 0.096 | 0.0057 |
| Dibenzofuran | 0.015 | 0.15 | 0.0193 |

Table 2
Summary of Protection of Groundwater Soil Screening Levels and Detection Limits
Washington Metropolitan Area Transit Authority Northern Bus Garage
4615 14th Street NW, Washington, D.C. 20011

| Constituent [a,b] | USEPA Soil Screening Level (SSL) based on THQ=0.1 [c] (mg/kg) | USEPA Soil Screening Level (SSL) based on THQ=1 [c] (mg/kg) | Selected Analytical Laboratory Method Detection Limit [d] (mg/kg) |
|---|---|---|---|
| **Semi-Volatile Organic Compounds** | | | |
| Diethylphthalate | 0.61 | 6.1 | 0.02 |
| Dimethylphthalate | 0.61 | 6.1 | 0.0193 |
| Di-n-butylphthalate (Dibutyl Phthalate) | 0.23 | 2.3 | 0.0173 |
| Di-n-octylphthalate (Di-n-octyl phthalate) | 5.7 | 57 | 0.012 |
| Fluoranthene | 8.9 | 89 | 0.0037 |
| Fluorene | 0.54 | 5.4 | 0.0057 |
| Hexachlorobenzene | 0.013 | 0.013 | 0.0063 |
| Hexachlorobutadiene | 0.00027 | 0.00027 | 0.019 |
| Hexachlorocyclopentadiene | 0.16 | 0.16 | 0.03 |
| Hexachloroethane | 0.00020 | 0.00020 | 0.0213 |
| Indeno[1,2,3-cd]pyrene | 0.98 | 0.98 | 0.0077 |
| Isophorone | 0.026 | 0.026 | 0.022 |
| Naphthalene | 0.00038 | 0.00038 | 0.0006 |
| Nitrobenzene | 0.000092 | 0.000092 | 0.025 |
| N-Nitroso-di-n-propylamine | 0.0000081 | 0.0000081 | 0.003 |
| N-Nitrosodiphenylamine | 0.067 | 0.067 | 0.01 |
| Pentachlorophenol | 0.0014 | 0.0014 | 0.0403 |
| Phenanthrene | 1.3 | 13 | 0.005 |
| Phenol | 0.33 | 3.3 | 0.024 |
| Pyrene | 1.3 | 13 | 0.0043 |
| **Total Petroleum Hydrocarbons** | | | |
| Gasoline Range Organics | -- [e] | -- [e] | 0.05 |
| Diesel Range Organics | -- [e] | -- [e] | 3.2 |
| Total Petroleum Hydrocarbons | -- [e] | -- [e] | NA |
| **Volatile Organic Compounds** | | | |
| 1,1,1-Trichloroethane | 0.07 | 0.070 | 0.0004 |
| 1,1,2,2-Tetrachloroethane | 0.000030 | 0.000030 | 0.0006 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 2.6 | 26 | NA |
| 1,1,2-Trichloroethane | 0.0016 | 0.0016 | 0.0003 |
| 1,1-Dichloroethane | 0.00078 | 0.00078 | 0.0004 |
| 1,1-Dichloroethene | 0.0025 | 0.0025 | 0.0004 |
| 1,2,3-Trichlorobenzene | 0.0021 | 0.021 | 0.0005 |
| 1,2,4-Trichlorobenzene | 0.20 | 0.20 | 0.0005 |
| 1,2-Dibromo-3-chloropropane | 0.000086 | 0.000086 | 0.0009 |
| 1,2-Dibromoethane | 0.000014 | 0.000014 | 0.0005 |
| 1,2-Dichlorobenzene | 0.58 | 0.58 | 0.0004 |

Table 2
Summary of Protection of Groundwater Soil Screening Levels and Detection Limits
Washington Metropolitan Area Transit Authority Northern Bus Garage
4615 14th Street NW, Washington, D.C. 20011

| Constituent [a,b] | USEPA Soil Screening Level (SSL) based on THQ=0.1 [c] (mg/kg) | USEPA Soil Screening Level (SSL) based on THQ=1 [c] (mg/kg) | Selected Analytical Laboratory Method Detection Limit [d] (mg/kg) |
|---|---|---|---|
| **Volatile Organic Compounds** | | | |
| 1,2-Dichloroethane | 0.0014 | 0.0014 | 0.0004 |
| 1,2-Dichloropropane | 0.0017 | 0.0017 | 0.0005 |
| 1,3-Dichlorobenzene | 0.072 | 0.072 | 0.0005 |
| 1,4-Dichlorobenzene | 0.072 | 0.072 | 0.0009 |
| 1,4-Dioxane | 0.000094 | 0.000094 | NA |
| 2-Butanone (methyl ethyl ketone) | 0.12 | 1.2 | 0.0023 |
| 2-Hexanone | 0.00088 | 0.0088 | 0.0007 |
| 4-Methyl-2-pentanone (Methyl isobutyl ketone) | 0.14 | 1.4 | 0.0006 |
| Acetone | 0.37 | 3.7 | 0.011 |
| Benzene | 0.0026 | 0.0026 | 0.0004 |
| Bromochloromethane | 0.0021 | 0.021 | 0.0005 |
| Bromodichloromethane | 0.022 | 0.022 | 0.0004 |
| Bromoform | 0.021 | 0.021 | 0.0005 |
| Bromomethane | 0.00019 | 0.0019 | 0.001 |
| Carbon disulfide | 0.024 | 0.24 | 0.0004 |
| Carbon tetrachloride | 0.0019 | 0.0019 | 0.0004 |
| Chlorobenzene | 0.068 | 0.068 | 0.0005 |
| Chloroethane (ethyl chloride) | 0.24 | 2.4 | 0.0005 |
| Chloroform | 0.022 | 0.022 | 0.0007 |
| Chloromethane | 0.0049 | 0.049 | 0.0005 |
| cis-1,2-Dichloroethene | 0.021 | 0.021 | 0.0004 |
| cis-1,3-Dichloropropene | 0.00017 | 0.00017 | 0.0004 |
| Cyclohexane | 1.3 | 13 | 0.0004 |
| Dibromochloromethane | 0.021 | 0.021 | 0.0003 |
| Dichlorodifluoromethane | 0.030 | 0.30 | 0.0005 |
| Ethylbenzene | 0.78 | 0.78 | 0.0004 |
| Isopropylbenzene (cumene) | 0.074 | 0.74 | 0.0004 |
| m&p-Xylenes | 0.019 | 0.19 | 0.0011 |
| Methyl Acetate | 0.41 | 4.1 | 0.0025 |
| Methylcyclohexane | 1.3 | 13 | 0.0004 |
| Methylene chloride | 0.0013 | 0.0013 | 0.0036 |
| Methyl-t-butyl ether (MTBE) | 0.0032 | 0.0032 | 0.0004 |
| o-Xylene | 0.019 | 0.19 | 0.0004 |
| Styrene | 0.11 | 0.11 | 0.0004 |
| Tetrachloroethene (PCE) | 0.0023 | 0.0023 | 0.0004 |
| Toluene | 0.69 | 0.69 | 0.0005 |
| trans-1,2-Dichloroethene | 0.031 | 0.031 | 0.0005 |

Table 2
Summary of Protection of Groundwater Soil Screening Levels and Detection Limits
Washington Metropolitan Area Transit Authority Northern Bus Garage
4615 14th Street NW, Washington, D.C. 20011

| Constituent [a,b] | USEPA Soil Screening Level (SSL) based on THQ=0.1 [c] (mg/kg) | USEPA Soil Screening Level (SSL) based on THQ=1 [c] (mg/kg) | Selected Analytical Laboratory Method Detection Limit [d] (mg/kg) |
|---|---|---|---|
| **Volatile Organic Compounds** | | | |
| trans-1,3-Dichloropropene | 0.00017 | 0.00017 | 0.0004 |
| Trichloroethene (TCE) | 0.0018 | 0.0018 | 0.0005 |
| Trichlorofluoromethane | 0.33 | 3.3 | 0.0005 |
| Vinyl chloride | 0.00069 | 0.00069 | 0.0003 |
| Xylenes (Total) | 9.9 | 9.9 | 0.0004 |
| **Organochlorine Pesticides** | | | |
| 4,4-DDD | 0.0075 | 0.0075 | 0.0012 |
| 4,4-DDE | 0.011 | 0.011 | 0.0012 |
| 4,4-DDT | 0.077 | 0.077 | 0.0012 |
| Aldrin | 0.00015 | 0.00015 | 0.0012 |
| Chlordane | 0.27 | 0.27 | 0.052 |
| Dieldrin | 0.000071 | 0.000071 | 0.0015 |
| Endosulfan I | 0.21 | 2.1 | 0.0016 |
| Endosulfan II | 0.21 | 2.1 | 0.0016 |
| Endosulfan sulfate | 0.21 | 2.1 | 0.002 |
| Endrin | 0.081 | 0.081 | 0.002 |
| Endrin aldehyde | 0.081 | 0.081 | 0.0019 |
| Endrin ketone | 0.081 | 0.081 | 0.0023 |
| Heptachlor | 0.033 | 0.033 | 0.0016 |
| Heptachlor epoxide | 0.0041 | 0.0041 | 0.0017 |
| Methoxychlor | 2.2 | 2.2 | 0.0023 |
| Toxaphene | 0.46 | 0.46 | 0.044 |
| alpha-BHC | 0.000042 | 0.000042 | 0.0019 |
| alpha-Chlordane | 0.049 | 0.49 | 0.0015 |
| beta-BHC | 0.00015 | 0.00015 | 0.0018 |
| delta-BHC | 0.00015 | 0.00015 | 0.0018 |
| gamma-BHC (Lindane) | 0.0012 | 0.0012 | 0.0017 |
| gamma-Chlordane | 0.14 | 1.40 | NA |

Notes on last page.

**Table 2**
**Summary of Protection of Groundwater Soil Screening Levels and Detection Limits**
**Washington Metropolitan Area Transit Authority Northern Bus Garage**
**4615 14th Street NW, Washington, D.C. 20011**

| Constituent [a,b] | USEPA Soil Screening Level (SSL) based on THQ=0.1 [c] (mg/kg) | USEPA Soil Screening Level (SSL) based on THQ=1 [c] (mg/kg) | Selected Analytical Laboratory Method Detection Limit [d] (mg/kg) |
|---|---|---|---|

-- = Not available.
mg/kg = milligram per kilogram.
NA = Not available.

**Notes:**
[a] All constituents analyzed for at the Site are presented.
[b] The following surrogate compounds were selected for those constituents without toxicity information or screening levels:
The screening level for total chromium was used for chromium results.
The screening level for Aroclor-1254 was used for Aroclor (Total) results because only Aroclor-1254 was detected.
The screening level for p-cresol was used for 3&4-methylphenol results.
The screening level for 4-nitroaniline was used for 3-nitroaniline results.
The screening level for bis(2-Chloroethyl)ether was used for bis(2-Chloroisopropyl)ether results.
The screening level for 2,2',4,4'-tetrabromodiphenyl ether was used for 4-bromophenyl-phenylether and 4-chlorophenyl-phenylether results.
The screening level for acenaphthene was used for acenaphthylene results.
The screening level for diethylphthalate was used for dimethylphthalate results.
The screening level for 1,4-dichlorobenzene was used for 1,3-dichlorobenzene results.
The screening level for 1,3-dichloropropene was used for cis- and trans-1,3-dichloropropene results.
The screening level for cyclohexane was used for methylcyclohexane results.
The screening level for endosulfan sulfate was used for endosulfan I an II results.
The screening level for endrin was used for endrin aldehyde and endrin ketone results.
The screening level for technical hexachlorocyclohexane (BHC) was used for delta-BHC results.
[c] Screening levels for the protection of groundwater (SSLs) were based on the maximum contaminant level (MCLs), where available, or otherwise risk-based. Values are based on a dilution attenuation factor of 1. Both a target hazard quotient of 0.1 and 1.0 are presented.
[d] The analytical method detection limits are presented.
[e] According to the USEPA RSL Users Guide (2023b), the total petroleum hydrocarbon (TPH) carbon ranges used in the RSLs are not intended to screen against TPH diesel, gasoline, oil or residual range organics analysis, as the carbon ranges do not match those presented in the USEPA Provisional Peer Reviewed Toxicity Values.

**References:**
District of Columbia Risk-Based Corrective Action Technical Guidance (Risk-Based Decision Making). 2011. District Department of the Environment Toxic Substances Division Underground Storage Tanks Branch. Updated June.
USEPA. 2023a. Regional Screening Levels (RSLs) - Generic Tables. May. Available at: https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.
USEPA. 2023b. Regional Screening Levels (RSLs) - User's Guide. May. Available at: https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide.

# Appendix A

## District of Columbia Water and Sewer Authority Temporary Discharge Authorization Permit

# TEMPORARY DISCHARGE AUTHORIZATION PERMIT

| TDA Number | *0323-1534* | Issue Date | 3/13/23 | Effective Date | 3/13/23 | Expiration Date | 3/12/25 |
|---|---|---|---|---|---|---|---|

| **Issued to:** | | | |
|---|---|---|---|
| Business Name | Clark Construction Group, LLC | | |
| Mailing Address | *7900 Westpark Drive*<br>*McLean, VA 22102* | | |
| Contact Name | *Matt Ellis* | Title | *Senior Superintendent* |
| Telephone No. | *202-345-2886* | Email | *matt.ellis@clarkfoundationllc.com* |
| Project/Discharge Location/Description | *Dewatering of groundwater and stormwater runoff during the demolition of a majority of the existing 270,000 square foot multi-story WMATA bus garage building at 4615 14th Street, NW, in Washington, DC, to redevelop the site for mixed use (new bus garage and retail space). A portion of the original 1906 trolley barn, along the west side of the building, will be preserved. The collected runoff and groundwater from the deep dewatering wells and sumps will be pumped into a treatment system consisting of two 18,000-gallon weir tanks in parallel and four 2,000-pound steel vessels filled with activated liquid phase carbon. Discharge from the treatment system will flow into catch basin C-632-759 which discharges via 12" lines to a 114" combined sewer line running along Arkansas Ave NW, per the attached map. Maximum discharge will be 360,000 gallons per day at a rate of 200 gallons per minute.* | | |
| Owner Name, Contact and Phone No. (if different from above) | *Washington Metropolitan Transit Authority (WMATA)*<br>*Diana Levy – 202-962-2199* | | |

| **Required Contacts Prior to Discharging (this permit is not valid until all required contacts have been made)** | | |
|---|---|---|
| 1) If groundwater is encountered, the permittee must contact DC Water Meter Services, LaTonya McMillan at 202-612-3500, to obtain a DC Water flow meter or install their own meter (in accordance with site-specific conditions on page 2) if a DC Water meter is not available when groundwater is encountered. Sewered groundwater shall be billed at $3.42/CCF or in accordance with 21 DCMR 4101.2(a). | Yes ☑ | NA ☐ |
| 2) The permittee must contact Nichol Sowell, DC Water Pumping and Sewer Operations (DPSO), at Nichol.bellsowell@dcwater.com and Clement Oguns at clement.oguns@dcwater.com (DPSO), to notify them of the intent to discharge to the sewer system and location of the discharge. The permittee must coordinate opening of any manholes with DPSO. Only DC Water staff and authorized persons may open manholes. | Yes ☐ | NA ☑ |
| 3) The permittee must contact DC Water Permit Operations at 202-646-8600, to submit plans and fees to obtain approval to install a temporary hard connection to the sanitary sewer below ground. | Yes ☐ | NA ☑ |
| 4) The permittee must contact the DDOT public space permit section at 202-535-2699 or 202-535-2982 to obtain a permit to access any manhole located in public space (even if it is within the fenced site boundary). | Yes ☐ | NA ☑ |

| **General Conditions** |
|---|
| 1) This permit is valid for discharge to the sewer system only at the location(s) specified above. |
| 2) The permit shall be posted at the job site. |
| 3) All discharges shall comply with D.C. Law 6-95, "Wastewater System Regulation Amendment Act of 1985 (the Act) as amended" and the regulations implementing the Act as contained in Title 21 DCMR Chapter 15. |
| 4) All spills and emergencies or conditions that may result in surpassing the discharge standards or adversely affecting the wastewater system shall be promptly conveyed to the Pretreatment Program Manager by email to pretreatment@dcwater.com and by phone during normal working hours by calling (202) 787-4177, and at all other times by calling (202) 612-3400 (DC Water 24-hour Call Center). |
| 5) A TDA Permit may be valid for up to two (2) years from the effective date of the permit unless otherwise specified. If the initial permit term is less than two years, a request for an extension may be submitted 14 days in advance of the expiration date to extend the permit. If the discharge will continue beyond two years, a new permit application must be submitted. |
| 6) The party/parties signing the TDA Permit Application or letter of request to discharge, and the owner of the property are responsible for compliance with the Act and implementing regulations. Any contractual agreements between the parties involved in requesting a TDA Permit are irrelevant to DC Water. |

# TEMPORARY DISCHARGE AUTHORIZATION PERMIT

## General Conditions (continued)

7) If required, flow meters shall be obtained from DC Water (as available) and returned in like condition. Non-functional flow meters shall be returned for repair within 7 days of becoming aware of the problem. All flow meters must be returned at the end of the discharge permit use. Damaged meters that are returned shall be subject to a charge to be determined by DC Water and applied to the final bill. Meters that are not returned shall be subject to a charge to be determined by DC Water and/or claim filed with DC Metropolitan Police as stolen property. Contact Meter Services Division immediately to report any lost, stolen, or damaged property.

## Miscellaneous Conditions

1) This TDA permit shall be revoked immediately if the discharge causes an explosive vapor buildup inside the sewers or threatens the structural integrity of the sewer system, including blockage or causes the District to exercise its emergency authority under DC Official Code 8-105.12 (emergency suspension of service).

2) The permittee is responsible for notifying DC Water in writing or by email within 15 days following the termination of the temporary discharge and shall submit a photo documenting the condition of the discharge location (catch basin/manhole interior) prior to dewatering and upon completion of the temporary discharge.

3) All correspondence shall include the TDA permit number and be emailed to pretreatment@dcwater.com or mailed to:
Elaine Wilson, Pretreatment Program Manager
DC Water and Sewer Authority Wastewater Treatment
5000 Overlook Ave., SW, Washington, DC 20032

## Site-specific Conditions (*supersede any general and miscellaneous conditions specified above*)

**FLOW METER REQUIREMENTS**

*If a DC Water flow meter is installed, a photo of the meter reading (date-stamped or date certified) shall be submitted monthly to meterservices@dcwater.com and included with the Periodic Compliance Report (PCR) to pretreatment@dcwater.com.*

*If a DC Water flow meter is required above and not available on the date of permit issuance or date groundwater is encountered, the permittee shall install their own flow meter on the groundwater discharge within sixty (60) days of permit issuance or date groundwater was encountered. The flow meter shall be installed on the discharge line after the final treatment. A photo of the meter reading (date-stamped or date certified) shall be submitted upon installation and monthly with the Periodic Compliance Report (PCR) to pretreatment@dcwater.com. The permittee shall set up a billing account with DC Water for quarterly billing of groundwater (or other frequency specified by DC Water).*

*If the flow meter does not appear to be registering accurate flow, detach the meter and run clean water through the meter to dislodge any particles that may be clogging the meter. Report all issues with flow meter readings to pretreatment@dcwater.com within 24-h and include in the PCR.*

**SAMPLING & REPORTING**

*Grab samples of the discharge from the sediment tank shall be collected monthly and analyzed for TPH Oil and Grease (EPA 1664 HEM-SGT), VOCs (EPA 624.1), PCBs (608.3), total lead, total suspended solids (TSS), and pH. Results shall be submitted to DC Water by the 30th of the following month. The report shall include the PCR Form that is signed and certified by a signing official or an alternate individual that is given signing authority in writing by the signing official per 21 DCMR §§ 1508.10-1508.11 and shall include the laboratory report, chain of custody, average daily flow for the reporting period, and meter photo documentation. All sample results from the discharge location must be reported to DC Water.*

*If there is no discharge of groundwater during the month, send an email to pretreatment@dcwater.com stating there was no flow during that period.*

**MAINTENANCE OF DISCHARGE**

*The weir tanks and filter bags must be inspected daily and maintained regularly to prevent the discharge of settled solids to the sewer system. If TSS is >300 mg/L or excessive solids observed, corrective action must be taken immediately to prevent the discharge of excess solids to the sewer system.*

*The pH shall be maintained between 5.0 and 10.0 during normal discharge activities. An upper pH limit of 11.0 is authorized during concrete work and grouting activities. No concrete or grouting solids or slurry shall be discharged to the sewer.*

**SPILLS, OVERFLOW & VIOLATIONS**

*Any spills, sewer overflows, clogs, treatment upsets, violations (e.g., benzene >14 ug/L, TSS >300 mg/L, TPH oil and grease >100 mg/L, or pH <5 or >11), or operational problems that might affect the characteristics of the discharge from the on-site treatment system shall be reported to the Pretreatment Program Manager at 202-787-4177 and pretreatment@dcwater.com within 24-h of becoming aware of the problem.*

*If actual discharges to DC Water sewers are more than 20% greater than the projected flows listed on this permit, a new permit application/flow information must be submitted and a revised permit issued.*

# TEMPORARY DISCHARGE AUTHORIZATION PERMIT

**Site-specific Conditions** (*supersede any general and miscellaneous conditions specified above*)

**PUBLIC SAFETY**

*If the discharge hose is in public space, public safety precautions must be taken, which may include, but not be limited to safety cones, signage, fencing, installation of a ramp over the discharge hose, etc. Avoid spillage from hose joints. Protect the manhole and opening, if authorized to access a manhole. Secure hoses and other materials and equipment to prevent tripping hazards.*

*No open flow discharge to the curb is allowed. All discharges must be directed to the approved discharge location through an enclosed conduit (e.g., hose or pipe).*

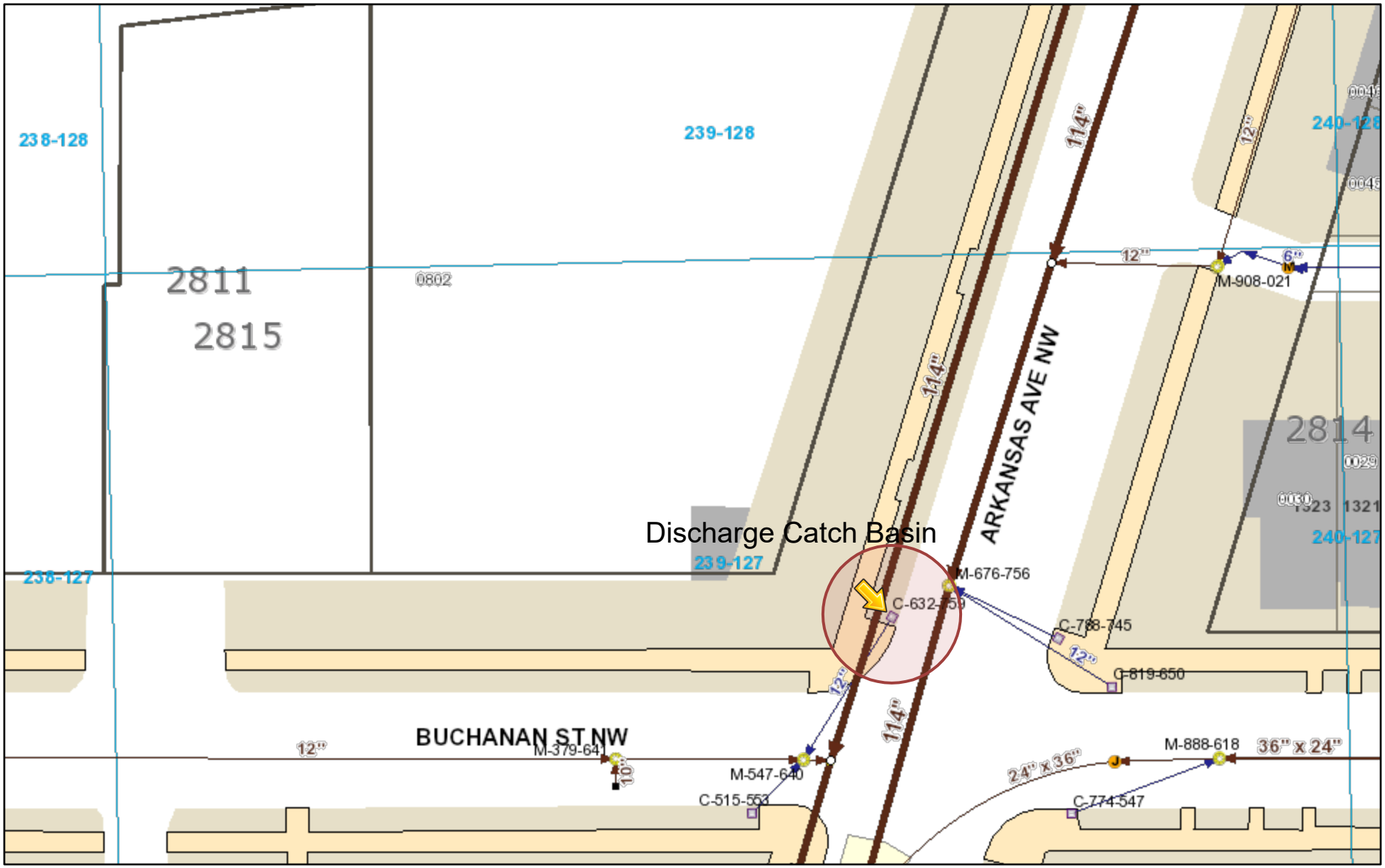
**MATERIALS MANAGEMENT**

*All new and used hazardous or toxic chemicals, fuel, oil, and corrosives (pH<5 or >12) shall be stored under covered or in enclosed secondary containment units.*

The temporary discharge indicated on this form is authorized under the above conditions.

Marc Furney, DC Water Authorized Signature — March 13, 2023 Date

# TDA 0323-1534 Discharge Location Map




3/9/2023, 11:32:18 AM

1:564

0 0 0.01 0.01 mi

0 0.01 0.01 0.02 km

Sewer Shaft
<all other values>
Inline
Offline
Deep/Large Gravity Mains
Combined Storm/Wastewater
Sanitary
Storm
Underground Enclosure
Sewer Structure Area
Regulator Outline
Sewer Pressurized Main

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

# Appendix B

**WMATA – Northern Bus Division Replacement Basis of Design Report, Vapor Management System**

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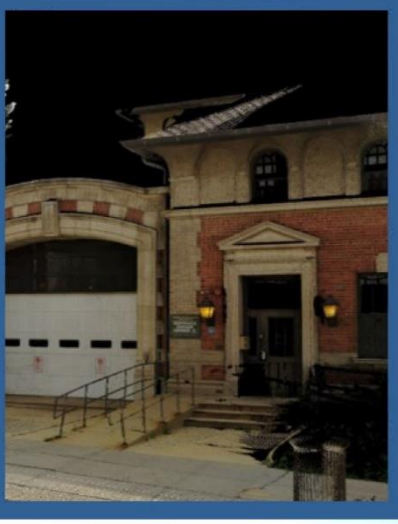
**TO BE REPLACED WITH UPDATED ATTACHMENTS REFLECTING 30-MIL VAPOR BARRIER**



# WMATA – NORTHERN BUS DIVISION REPLACEMENT (NBDR)

RFP FQ19144N

Basis of Design (BOD) Report

Vapor Management System

December 21, 2023


CLARK CONSTRUCTION

## TABLE OF CONTENTS



## TABLE OF FIGURES



**APPENDICES**

A: TerraVent™ Technical Data Sheet
B: AIR 1000 Carbon Vessel Cut Sheet
C: Vapor Barrier Cut Sheet

## INTRODUCTION – VAPOR MANAGEMENT SYSTEM

A vapor management system has been considered within the building footprint due to the identified on-site impacts from petroleum and chlorinated solvents identified in soil samples collected from the property. The following sections will detail the vapor management plan and will be broken into two sections, the sub-slab elements and vapor sampling to be installed during construction and the remaining elements as a proof of concept for space planning purposes for a future installation, if required.

## SECTION 1 – SUB-SLAB VAPOR MANAGEMENT SYSTEM

The sub-slab vapor management system will consist of a vapor barrier, vapor collection system (sub-slab), and sub-slab soil vapor sampling. The previously designed building ventilation system is a separate system from the vapor management system. The design of the previously designed building ventilation system will remain the same and maintain the designed high air exchange rate of a minimum of four (4) air changes per hour.

The vapor management system is part of the Soil Remediation and Vapor Management Plan provided to WMATA and DOEE dated August 12, 2022.

### Vapor Barrier

The vapor barrier is a petroleum and solvent resistant 30-mil (one thousandth of an inch) thick vapor barrier to be placed just below the concrete slab on the Bus Storage Level. Absolute Barrier (Y30BAC) or an equivalent vapor barrier will be used. Technical information for the Absolute Barrier product is included in Appendix C.

### Collection System

The collection system will be installed as a hybrid PVC and low-profile flexible sub-slab vapor collection system. The basis of design for the flexible sub-slab vapor collection system is TerraVent™ and the Technical Data Sheet can be found in Appendix A. A series of 6-inch PVC pipes will connect to the TerraVent™ lines and form a collection system that will then be connected to 6-inch diameter PVC vertical vent pipes. At these locations, vapor sampling will occur as described below. The 6-inch diameter vent pipes will be capped two feet above the concrete slab. Section 2 below of the continuation of the vapor management system and will further explain the proposed pathway, treatment process and operations.

### Sub-Slab Soil Vapor Sampling

To allow for the collection of sub-slab vapor samples and to monitor the effectiveness of the vapor management system, a 1/4-inch sample port ball valve will be installed at each capped vent pipe to allow for the collection of soil vapor samples in each area of the vapor collection system.

### Operations

Quarterly sampling of ambient air, indoor air and sub-slab monitoring points is recommended until sufficient data is collected to support reducing to semi-annual or annual sampling.

## SECTION 2 – FUTURE VAPOR MANAGEMENT SYSTEM (PROOF OF CONCEPT)

The sub-slab vapor management system will consist of a vapor barrier, vapor collection system (sub-slab), and sub-slab soil vapor sampling detailed in Section 1 and will also include the extension of the vapor collection system above grade, fans, and pre-treatment via carbon vessels prior to discharging the vapors to the atmosphere. For proof-of-concept purposes, space has been allocated for the vapor collection system, including the carbon vessels and exhaust fans, including electrical capacity for powering the exhaust fans.

### Collection System

The 6-inch diameter PVC vertical vent pipes will be extended and will manifold into two separate lines, each of which will tie into a set of two vapor phase carbon vessels described below. The vapors will be pulled through the PVC pipes by an exhaust fan installed adjacent to the carbon vessels.

### Vapor Phase Carbon Vessels

All air exhaust from the building will be treated prior to leaving the building. The captured sub-slab vapor will be pre-treated with two sets of two vapor phase carbon vessels installed in series. The two sets of carbon vessels will be stored in two locations in the building. The first location is within the Boiler Room (2224) (see **Figure 1**) on the Bus Maintenance Level and the second location is in the Penthouse (3003) (see **Figure 2**) on the Car Parking Level. The basis of design for each carbon vessel is the Air 1000 and the data sheet can be found in Appendix B.

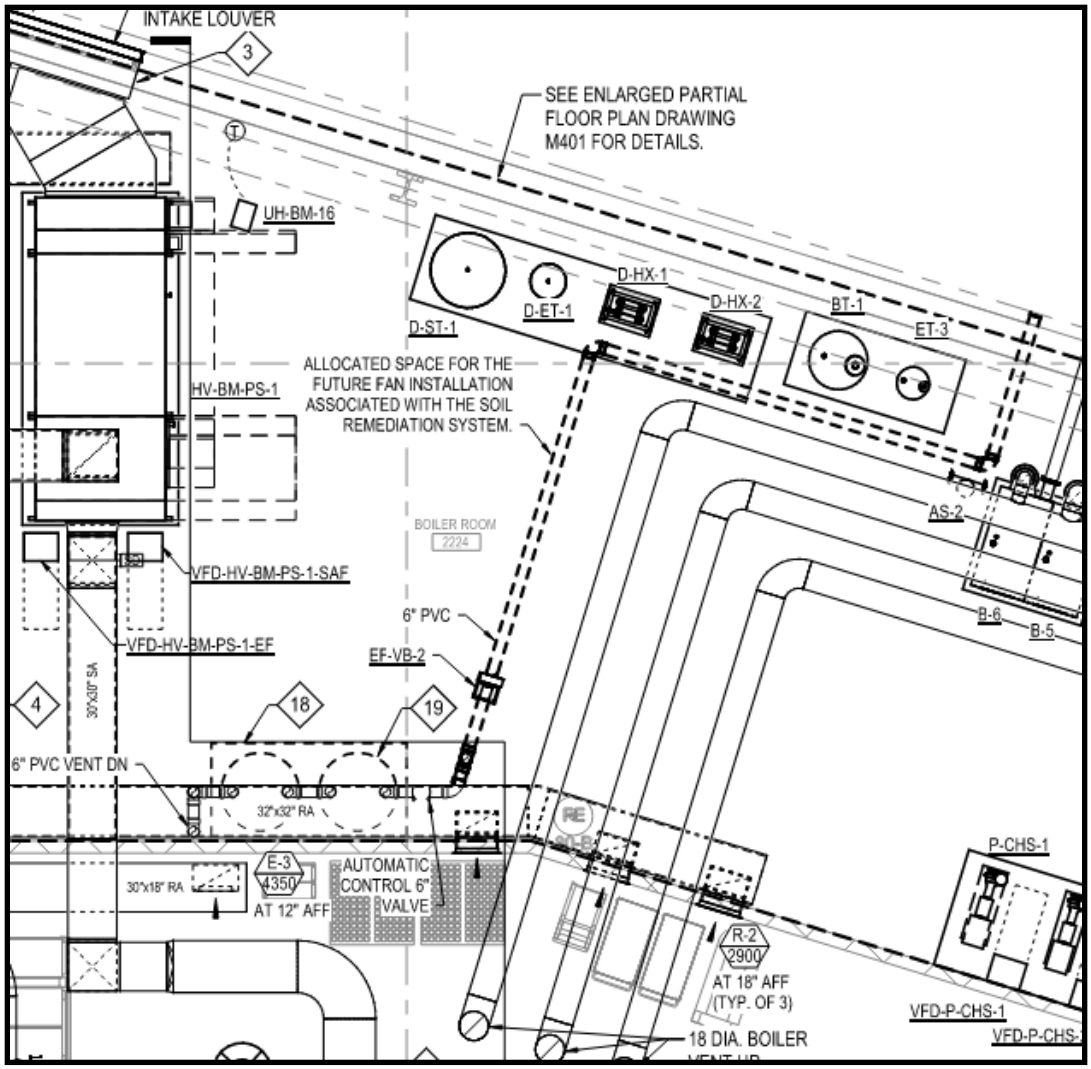



***Figure 1: Boiler Room 2224***

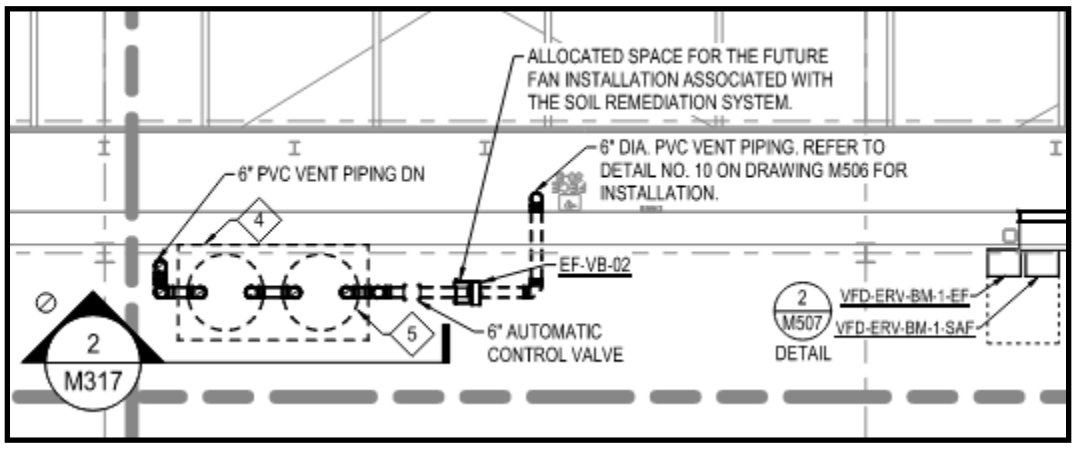



***Figure 2: Penthouse Room 3003***

## Operations

The vapor management system will operate on a continuous basis to recover the vapors from below the building and pull them through the vapor phase carbon vessels using one 300 CFM exhaust fans at each location. The basis of design for the exhaust fans is the FPB-100H. The fans will be placed on the effluent side of the two carbon vessel sets to pull the vapors recovered in the sub-slab vapor recovery system through the carbon vessels for pre-treatment prior to discharging outside of the building. The carbon vessels will be installed with sample ports on the influent end, in between the two vessels, and effluent end of the vessels to allow for regular vapor sample collection to evaluate when and how frequently the carbon will need to be changed out. The vapor samples should be collected monthly for the first year until a trend of break-through time can be determined for carbon change-out. Once the carbon change-out frequency has been determined, the sampling frequency can be reduced.

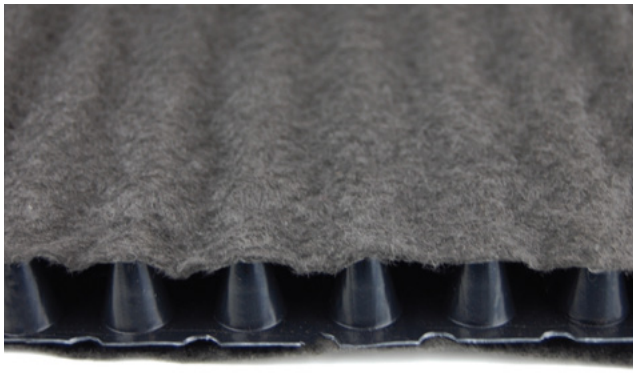
# APPENDICES

# APPENDIX A

## TerraVent™ Technical Data Sheet

# TerraVent™ Technical Data Sheet

TerraVent is a low-profile, trenchless, flexible, sub-slab vapor collection system used in lieu of perforated piping. It consists of a heavy duty 3-dimensional, high flow, polypropylene dimpled core. The core is then wrapped and bonded with a non-woven geotextile to prevent soil, sand or gravel pass into the dimple core. TerraVent core is made from 100% Post-Industrial/Pre-Consumer polypropylene regrind material.



## TerraVent Core Properties

| Properties | Test Method | TerraVent |
|---|---|---|
| Compressive Strength | ASTM D-1621 | 9,500 psf. |
| Thickness | | 1 inch |
| Flow Rate (Hydraulic gradient = 0.1) | ASTM D-4716 | 30 gpm/ft width |

## TerraVent Fabric Properties

| Properties | Test Method | TerraVent |
|---|---|---|
| Grab Tensile Strength | ASTM D-4632 | 100 lbs. |
| CBR Puncture | ASTM D-6241 | 250 lbs. |
| Flow | ASTM D-4491 | 140 gpm/ft$^2$ |
| AOS | ASTM D-4751 | 70 U.S Sieve |
| Permittivity | ASTM D-4491 | 2.0 sec-1 |
| U.V Resistance | ASTM D-4355 | 70% @ 500 hrs. |

## Packaging

| Properties | Value |
|---|---|
| Dimension: | 12” x 165’ |
| Weight | 68 lbs. |

Land Science®
a division of REGENESIS®

Corporate Headquarters
1011 Calle Sombra, San Clemente Ca 92673 USA
Tel: +1.949.366.8000

www.landsciencetech.com

# APPENDIX B

## Air 1000 Carbon Vessel Cut Sheet

Carbon Service & Equipment Company
A Division of Encotech, Inc.

# AIR 1000

| | |
|---|---|
| **TYPICAL FLOWS** | **300-900 scfm** |
| **MAXIMUM SUGGESTED FLOW** | **1250 scfm** |
| **MAXIMUM OPERATING PRESSURE** | **1 psig** |
| **MAXIMUM TEMPERATURE** | **140ºF** |

Diameter: 48”
Overall Height: 60”

## STANDARD FEATURES

- Adsorber with 1,000 lbs. virgin or reactivated carbon
- Heavy-duty ¼” steel vessel with interior corrosion resistant high-solids epoxy lining
- Over 1,800 in² of surface area for superior air distribution and the lowest pressure drops
- 4” inlet and outlet connections
- Advanced internal distribution and collection systems designed to optimize carbon usage rates, minimizing operating expenses

## OPTIONAL FEATURES

- 6” inlet and outlet connections
- Condensate drain line
- Hard pipe manifold systems
- Flexible hose assemblies

•P.O. Box 305•Eighty Four, PA 15330•Phone: 724.222.3334•Fax: 724.222.4095•
•P.O. Box 618102•Orlando, FL 32861•Phone: 407.313.9113•Fax: 407.313.9114•

# APPENDIX C

## Vapor Barrier Cut Sheet and Installation Guide

# ABSOLUTE BARRIER® Y30BAC

HIGH PERFORMANCE LLDPE/EVOH GEOMEMBRANE GAS BARRIER

Viaflex

## PRODUCT DESCRIPTION

Absolute Barrier® Y30BAC is a seven-layer co-extruded geomembrane consisting of very flexible, linear-low-density polyethylene (LLDPE) with an inner core of chemically resistant EVOH barrier resin, designed specifically as a barrier against radon, methane and VOCs. High strength LLDPE provides exceptional tear and impact resistance. A robust stabilization package that exceeds the industry standard; provides long-term protection from thermal oxidation and ultraviolet degradation in exposed applications.

## PRODUCT USE

Absolute Barrier® Y-Series is designed to stop gas vapor migration on Brownfield sites, in residential and commercial buildings, as well as geomembrane containment and covering systems. When installed under concrete slabs as a gas barrier, a passive system is recommended to include a ventilated system with sump(s) that could be converted to an active control system with properly designed ventilation fans. Y30BAC is over 800 times less permeable to methane gas than LLDPE vapor barriers in a comparable thickness.

Absolute Barrier® performs extremely well preventing the degradation of EPS geofoam by protecting it from harsh VOCs including direct gasoline or diesel fuel contact.

Absolute Barrier® Y30BAC is a highly effective, temporary and long-term, landfill caps with VOC diffusion coefficients ranging from 40 to 240 times less than standard 80 mil HDPE geomembranes. Contaminants found in leachate and gas in municipal and hazardous waste landfills can migrate through standard HDPE; contributing to both atmospheric and groundwater contaminations. Absolute Barrier® Y-Series is an effective barrier to a wide range of VOCs including benzene, toluene, trichloroethylene, perchloroethylene, and many others.

## SIZE & PACKAGING

Absolute Barrier® Y30BAC is available in 16' c-fold or in fabricated panels up to 50,000 sq. ft. All fabricated panels are accordion folded and tightly rolled onto a heavy-duty core for ease of handling and time saving installation.

EPS Geofoam Protection

| PRODUCT | PART # |
|---|---|
| ABSOLUTE BARRIER® | Y30BAC |

## APPLICATIONS

- EPS Geofoam Protection
- Landfill Cap
- Temporary Landfill Gas Cover
- Floating Gas Cover
- Underslab VOC Barrier
- Underslab Radon Barrier
- Underslab Methane Barrier
- Underslab Vapor Barrier
- Remediation Cover / Liner
- Leachate Collection Ponds
- Odor Control Barrier
- Secondary Containment

Absolute Barrier®

THE ULTIMATE IN GAS CONTAINMENT

# ABSOLUTE BARRIER® Y30BAC

HIGH PERFORMANCE LLDPE/EVOH GEOMEMBRANE GAS BARRIER

| | | ABSOLUTE BARRIER® Y30BAC | | | |
|---|---|---|---|---|---|
| | | IMPERIAL | | METRIC | |
| PROPERTIES | TEST METHOD | MINIMUM | TYPICAL | MINIMUM | TYPICAL |
| Appearance | | Black | | Black | |
| Thickness | ASTM D5199 | 30 Mils Average | 30 Mils Nominal | 0.76 mm Average | 0.76 mm Nominal |
| Weight | | 150 lbs/msf | | 732 g/m$^2$ | |
| Tensile Strength at Break | ASTM D6693 | 85 lbs/in | 100 lbs/in | 149 N/cm | 175 N/cm |
| Tensile Elongation at Break | ASTM D6693 | 500 % | 600 % | 500 % | 600 % |
| Tear Strength | ASTM D1004 | 18 lbs | 22 lbs | 80 N | 98 N |
| Puncture Resistance | ASTM D4833 | 60 lbs | 75 lbs | 267 N | 334 N |
| Oxidation Induction Time (OIT) or High Pressure OIT (HPOIT) | ASTM D3895<br>ASTM D5885 | 100 min<br>400 min | 250 min<br>- | 100 min<br>400 min | 250 min<br>- |
| Carbon Black Content [7] | ASTM D4218 | 2.0 % | 2.3 % | 2.0 % | 2.3 % |
| Carbon Black Dispersion | ASTM D5596 | Pass | | | |
| Benzene Permeance | See Note [6] | 2.13 x $10^{-10}$ m$^2$/sec or 1.93 x $10^{-13}$ m/s | | | |
| Toluene Permeance | See Note [6] | 2.95 x $10^{-10}$ m$^2$/sec or 7.77 x $10^{-14}$ m/s | | | |
| Ethylbenzene Permeance | See Note [6] | 2.31 x $10^{-10}$ m$^2$/sec or 1.78 x $10^{-14}$ m/s | | | |
| M & P-Xylenes Permeance | See Note [6] | 2.19 x $10^{-10}$ m$^2$/sec or 2.03 x $10^{-14}$ m/s | | | |
| O-Xylene Permeance | See Note [6] | 2.07 x $10^{-10}$ m$^2$/sec or 1.83 x $10^{-14}$ m/s | | | |
| Methane Permeance | ASTM D1434 | < 4.93E$^{-13}$ m/s | | | |
| Hydrogen Sulfide | See Note [9] | 1.45E$^{-09}$ m/s | | | |
| Trichloroethylene (TCE) | See Note [6] | 1.44 x $10^{-10}$ m$^2$/sec or 5.60 x $10^{-15}$ m/s | | | |
| Perchloroethylene (PCE) | See Note [6] | 1.35 x $10^{-10}$ m$^2$/sec or 5.57 x $10^{-15}$ m/s | | | |
| Cold Temperature Impact | ASTM D746 | -40° F | | -40° C | |
| Maximum Static Use Temperature | | 180° F | | 82° C | |
| FACTORY SEAM REQUIREMENTS | | | | | |
| Bonded Seam Strength | ASTM D6392 Mod. [5] | 57 lbs/in. | 75 lbs/in. | 100 N/cm | 131 N/cm |
| Seam Peel Adhesion | ASTM D6392 Mod. [5] | 45 lbs/in. | 60 lbs/in. | 79 N/cm | 105 N/cm |

[5] Viaflex performs seam testing at 20" per minute.

[6] Aqueous Phase Film Permeance.
Permeation of Volatile Organic Compounds through EVOH Thin Film Membranes and Coextruded LLDPE/EVOH/LLDPE Geomembranes, McWatters and Rowe, Journal of Geotechnical and Geoenvironmental Engineering© ASCE/ September 2015. (Permeation is the Permeation Coefficient adjusted to actual film thickness - calculated at 1 kg/m$^3$.) The study used to determine PCE and TCE is titled: Evaluation of diffusion of PCE & TCE through high performance geomembranes by Di Battista and Rowe, Queens University 8 Feb 2018.

[7] No carbon black in barrier layers.

[9] The study used to determine diffusion coefficients is titled: Hydrogen Sulfide ($H_2S$) Transport through Simulated Interim Covers with Conventional and Co-Extruded Ethylene-Vinyl Alcohol (EVOH) Geomembranes.

Absolute Barrier® Y30BAC is a seven-layer co-extruded geomembrane consisting of very flexible, linear-low-density polyethylene (LLDPE) with an inner core of chemically resistant EVOH barrier resin, designed specifically as a barrier against radon, methane and VOCs. High strength LLDPE provides exceptional tear and impact resistance. A robust stabilization package that exceeds the industry standard; provides long-term protection from thermal oxidation and ultraviolet degradation in exposed applications.

Scan QR Code to download technical data sheets.



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www.viaflex.com

27-0004 09/22

# Appendix C

## Active Vapor Management System Plans

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**TO BE REPLACED WITH UPDATED ATTACHMENTS REFLECTING 30-MIL VAPOR BARRIER**

# WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

metro®

# WASHINGTON D.C. AREA METRO
# SECTION T06

## COVER SHEET

## CONTRACT #FQ19144N - DECEMBER 21, 2023
## NORTHERN BUS DIVISION REPLACEMENT
## VAPOR MITIGATION PACKAGE -
## ISSED FOR CONSTRUCTION

## OFFICE OF CAPITAL PROGRAM DELIVERY

## CONSULTANT DESIGN TEAM


**DESIGN BUILDER**
CLARK CONSTRUCTION, LLC
7500 Old Georgetown Road
Bethesda, MD 20814
(301) 272-8100

**DESIGN LEAD**
STV INC
7125 Ambassador Road, Suite 200
Baltimore, MD 21244-2727
(410) 944-9112

**ARCHITECTURAL-LEED**
WENDEL
603 King Street, 4th Floor, Alexandria,
VA 22314
(703)299-8718

**STRUCTURAL-INDUSTRIAL-CIVIL**
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(410) 944-9112

EMC2, INC.
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Rockville, MD 20850
(301) 424-8696

**SIGNAGE**
APPLE DESIGNS INC.
3739 National Drive
Suite 228
Raleigh, NC 27612

**HISTORICAL ARCHITECTURE**
BEYER BLINDER BELLE
ARCHITECTS & PLANNERS LLP
3307 M Street, NW, Suite 301
Washington, DC 20007
(202)683-1481

**ELECTRICAL-COMMUNICATIONS**
EPCM, INC.
9006 Fern Park Drive, Suite B, 2nd Floor
Burke, VA 22015-1602
(703)503-0900

**PLUMBING-MECHANICAL-FIRE PROTECTION**
MIN ENGINEERING, INC.
10 SUDBROOK LANE
PIKESVILLE, MD 21208
(410) 486-4692

2023.04.21 S-269 40% BEB Design Package – Drawings - 00

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## DRAWING INDEX - VOLUME 1

| SHEET NO. | DRAWING NO. | SHEET NAME | LATEST REVISION | DATE |
|---|---|---|---|---|
| GENERAL | | | | |
| M1323-I | G001 | SHEET INDEX PAGE 1 | REV 1 | 07/13/2023 |
| **M1323-II** | **G002** | **SHEET INDEX PAGE 2** | **REV 2** | **12/21/2023** |
| CIVIL | | | | |
| M1323 | C001 | STANDARD SYMBOLS AND ABBREVIATIONS - 1 | IFC | 3/24/2023 |
| M1323 | C002 | STANDARD SYMBOLS AND ABBREVIATIONS - 2 | IFC | 3/24/2023 |
| M1323 | C104 | EXISTING CONDITIONS PLAN - 1 | IFC | 3/24/2023 |
| M1323 | C105 | EXISTING CONDITIONS PLAN - 2 | IFC | 3/24/2023 |
| M1323 | C106 | EXISTING CONDITIONS PLAN - 3 | IFC | 3/24/2023 |
| M1323 | C107 | EXISTING CONDITIONS PLAN - 4 | IFC | 3/24/2023 |
| M1323 | C108 | EXISTING CONDITIONS PLAN - 5 | IFC | 3/24/2023 |
| M1323 | C003 | GEOMETRY PLAN | IFC | 3/24/2023 |
| M1323 | C201 | TYPICAL SECTIONS | IFC | 3/24/2023 |
| M1323 | C109 | PAVEMENT PLAN - 1 | IFC | 3/24/2023 |
| M1323 | C110 | 14TH ST. AND BUCHANAN ST. DRIVEWAY PROFILES | IFC | 3/24/2023 |
| M1323 | C111 | PAVEMENT PLAN - 3 | IFC | 3/24/2023 |
| M1323 | C112 | PAVEMENT PLAN - 4 | IFC | 3/24/2023 |
| M1323 | C113 | PAVEMENT PLAN - 5 | IFC | 3/24/2023 |
| M1323 | C114 | PROPOSED GRADING PLAN - 1 | IFC | 3/24/2023 |
| M1323 | C115 | PROPOSED GRADING PLAN - 2 | IFC | 3/24/2023 |
| M1323 | C116 | PROPOSED GRADING PLAN - 3 | IFC | 3/24/2023 |
| M1323 | C117 | PROPOSED GRADING PLAN - 4 | IFC | 3/24/2023 |
| M1323 | C118 | PROPOSED GRADING PLAN - 5 | IFC | 3/24/2023 |
| M1323 | C119 | DRIVEWAY PROFILES | IFC | 3/24/2023 |
| M1323 | C501 | DRIVEWAY AND CURB SITE DETAILS - 1 | IFC | 3/24/2023 |
| M1323 | C502 | DRIVEWAY AND CURB SITE DETAILS - 2 | IFC | 3/24/2023 |
| M1323 | C503 | DRIVEWAY AND CURB SITE DETAILS - 3 | IFC | 3/24/2023 |
| M1323 | C504 | DRIVEWAY AND CURB SITE DETAILS - 4 | IFC | 3/24/2023 |
| M1323 | C505 | DRIVEWAY AND CURB SITE DETAILS - 5 | IFC | 3/24/2023 |
| M1323 | C506 | DRIVEWAY AND CURB SITE DETAILS - 6 | IFC | 3/24/2023 |
| M1323 | C507 | DRIVEWAY AND CURB SITE DETAILS - 7 | IFC | 3/24/2023 |
| M1323 | C120 | UTILITIES PLAN - 1 | IFC | 6/26/2023 |
| M1323 | C121 | UTILITIES PLAN - 2 | IFC | 6/26/2023 |
| M1323 | C122 | UTILITIES PLAN - 3 | IFC | 6/26/2023 |
| M1323 | C123 | UTILITIES PLAN - 4 | IFC | 6/26/2023 |
| M1323 | C124 | UTILITIES PLAN - 5 | IFC | 6/26/2023 |
| M1323 | C125 | STORM SEWER PROFILES - 1 | IFC | 6/26/2023 |
| M1323 | C126 | STORM SEWER PROFILES - 2 | IFC | 6/26/2023 |
| M1323 | C127 | COLLECTOR PIPE PROFILES | IFC | 6/26/2023 |
| M1323 | C128 | SWM STRUCTURE – CISTERN TANK PIPING PROFILE | IFC | 6/26/2023 |
| M1323 | C129 | SANITARY – PIPING PROFILE | IFC | 6/26/2023 |
| M1323 | C601 | UTILITY DETAILS - 1 | IFC | 6/26/2023 |
| M1323 | C602 | UTILITY DETAILS - 2 | IFC | 6/26/2023 |
| M1323 | C603 | UTILITY DETAILS - 3 | IFC | 6/26/2023 |
| M1323 | C604 | UTILITY DETAILS - 4 | IFC | 6/26/2023 |
| M1323 | C605 | UTILITY DETAILS - 5 | IFC | 6/26/2023 |
| M1323 | C606 | UTILITY DETAILS - 6 | IFC | 6/26/2023 |
| M1323 | C607 | GENERAL NOTES | IFC | 3/24/2023 |
| M1323 | CS100 | FUEL DRIVEWAY RETAINING WALL PLAN AND ELEVATION | IFC | 3/24/2023 |
| M1323 | CS101 | FUEL DRIVEWAY RETAINING WALL DETAILS | IFC | 3/24/2023 |
| M1323 | D101 | DRAINAGE AREA MAP | IFC | 6/26/2023 |
| M1323 | D101A | SITE DRAINAGE AREA MAP | IFC | 6/26/2023 |
| M1323 | D102 | DRAINAGE DESIGN COMPUTATIONS | IFC | 6/26/2023 |
| M1323 | D103 | METER SIZING SHEET | IFC | 6/26/2023 |
| M1323 | EC101 | EROSION AND SEDIMENT CONTROL NOTES AND DETAILS - 1 | IFC | 3/24/2023 |
| M1323 | EC102 | EROSION AND SEDIMENT CONTROL NOTES AND DETAILS - 2 | IFC | 3/24/2023 |
| M1323 | EC103 | EROSION AND SEDIMENT CONTROL NOTES AND DETAILS - 3 | IFC | 3/24/2023 |
| M1323 | EC104 | EROSION AND SEDIMENT CONTROL PLAN - 1 | IFC | 3/24/2023 |
| M1323 | EC105 | EROSION AND SEDIMENT CONTROL PLAN - 2 | IFC | 3/24/2023 |
| M1323 | EC106 | EROSION AND SEDIMENT CONTROL PLAN - 3 | IFC | 3/24/2023 |
| M1323 | EC107 | EROSION AND SEDIMENT CONTROL PLAN - 4 | IFC | 3/24/2023 |
| M1323 | EC108 | EROSION AND SEDIMENT CONTROL PLAN - 5 | IFC | 3/24/2023 |
| M1323 | L104 | LANDSCAPE PLAN - 1 | IFC | 3/24/2023 |
| M1323 | L105 | LANDSCAPE PLAN - 2 | IFC | 3/24/2023 |
| M1323 | L106 | LANDSCAPE PLAN -3 | IFC | 3/24/2023 |
| M1323 | L107 | LANDSCAPE PLAN - 4 | IFC | 3/24/2023 |
| M1323 | L108 | LANDSCAPE PLAN - 5 | IFC | 3/24/2023 |
| M1323 | L501 | LANDSCAPE NOTES AND DETAILS - 1 | IFC | 3/24/2023 |
| M1323 | L502 | LANDSCAPE NOTES AND DETAILS - 2 | IFC | 3/24/2023 |
| M1323 | L503 | SITE FURNISHINGS | IFC | 3/24/2023 |
| M1323 | CE100 | STREETLIGHT PLAN - GENERAL NOTES | IFC | 3/24/2023 |
| M1323 | CE100A | STREETLIGHT PLAN - TABLES | IFC | 3/24/2023 |
| M1323 | CE101 | EXISTING STREETLIGHT REMOVAL PLAN - 1 | IFC | 3/24/2023 |
| M1323 | CE102 | EXISTING STREETLIGHT REMOVAL PLAN - 2 | IFC | 3/24/2023 |
| M1323 | CE103 | EXISTING STREETLIGHT REMOVAL PLAN - 3 | IFC | 3/24/2023 |
| M1323 | CE104 | EXISTING STREETLIGHT REMOVAL PLAN - 4 | IFC | 3/24/2023 |
| M1323 | CE105 | EXISTING STREETLIGHT REMOVAL PLAN - 5 | IFC | 3/24/2023 |
| M1323 | CE201 | PROPOSED STREETLIGHT PLAN - 1 | IFC | 3/24/2023 |
| M1323 | CE202 | PROPOSED STREETLIGHT PLAN - 2 | IFC | 3/24/2023 |
| M1323 | CE203 | PROPOSED STREETLIGHT PLAN - 3 | IFC | 3/24/2023 |
| M1323 | CE204 | PROPOSED STREETLIGHT PLAN - 4 | IFC | 3/24/2023 |
| M1323 | CE205 | PROPOSED STREETLIGHT PLAN - 5 | IFC | 3/24/2023 |
| M1323 | CE501 | STREETLIGHT PLAN - DETAILS 1 | IFC | 3/24/2023 |
| M1323 | CE502 | STREETLIGHT PLAN - DETAILS 2 | IFC | 3/24/2023 |
| M1323 | CE601 | STREETLIGHT WIRING | IFC | 3/24/2023 |
| M1323 | T002 | TRAFFIC CONTROL PLAN | IFC | 3/24/2023 |

## DRAWING INDEX - VOLUME 1

| SHEET NO. | DRAWING NO. | SHEET NAME | LATEST REVISION | DATE |
|---|---|---|---|---|
| M1323 | T502 | TRAFFIC CONTROL PLAN -DETAILS 1 | IFC | 3/24/2023 |
| M1323 | T503 | TRAFFIC CONTROL PLAN -DETAILS 2 | IFC | 3/24/2023 |
| M1323 | T504 | TRAFFIC CONTROL PLAN -DETAILS 3 | IFC | 3/24/2023 |
| M1323 | T003 | SIGNING AND PAVEMENT MARKING GENERAL NOTES AND LEGEND | IFC | 3/24/2023 |
| M1323 | T104 | EXISTING AND PROPOSED SIGNING AND PAVEMENT MARKING PLAN - 1 | IFC | 3/24/2023 |
| M1323 | T105 | EXISTING AND PROPOSED SIGNING AND PAVEMENT MARKING PLAN - 2 | IFC | 3/24/2023 |
| M1323 | T106 | EXISTING AND PROPOSED SIGNING AND PAVEMENT MARKING PLAN - 3 | IFC | 3/24/2023 |
| M1323 | T107 | EXISTING AND PROPOSED SIGNING AND PAVEMENT MARKING PLAN - 4 | IFC | 3/24/2023 |
| M1323 | T108 | EXISTING AND PROPOSED SIGNING AND PAVEMENT MARKING PLAN - 5 | IFC | 3/24/2023 |
| M1323 | T601 | PROPOSED SIGN SCHEDULE - 1 | IFC | 3/24/2023 |
| M1323 | T602 | PROPOSED SIGN SCHEDULE - 2 | IFC | 3/24/2023 |
| M1323 | T603 | SIGN DETAILS - 1 | IFC | 3/24/2023 |
| M1323 | T604 | SIGN DETAILS - 2 | IFC | 3/24/2023 |
| M1323 | T605 | SIGN DETAILS - 3 | IFC | 3/24/2023 |
| M1323 | T606 | STREET NAME SIGN - 1 | IFC | 3/24/2023 |
| M1323 | T607 | STREET NAME SIGN - 2 | IFC | 3/24/2023 |
| M1323 | T608 | STREET NAME SIGN - 3 | IFC | 3/24/2023 |
| M1323 | T609 | STREET NAME SIGN - 4 | IFC | 3/24/2023 |
| M1323 | T610 | STREET NAME SIGN - 5 | IFC | 3/24/2023 |
| CORROSION PROTECTION | | | | |
| M1323 | CP100 | CORROSION GENERAL NOTES | IFC | 6/26/2023 |
| M1323 | CP101 | OVERVIEW CORROSION PROTECTION PLAN | IFC | 6/26/2023 |
| M1323 | CP120 | CORROSION PROTECTION PLAN - 1 | IFC | 6/26/2023 |
| M1323 | CP123 | CORROSION PROTECTION PLAN - 4 | IFC | 6/26/2023 |
| M1323 | CP124 | CORROSION PROTECTION PLAN - 5 | IFC | 6/26/2023 |
| M1323 | CP501 | CORROSION PROTECTION DETAILS - 1 | IFC | 6/26/2023 |
| M1323 | CP502 | CORROSION PROTECTION DETAILS - 2 | IFC | 6/26/2023 |
| M1323 | CP503 | CORROSION PROTECTION DETAILS - 3 | IFC | 6/26/2023 |
| STRUCTURAL | | | | |
| M1323 | S001 | GENERAL STRUCTURAL NOTES I | IFC | 3/24/2023 |
| M1323 | S002 | GENERAL STRUCTURAL NOTES II | IFC | 3/24/2023 |
| M1323 | S003 | GENERAL STRUCTURAL NOTES III | IFC | 3/24/2023 |
| M1323 | S004 | STATEMENT OF STRUCTURAL SPECIAL INSPECTIONS I | IFC | 3/24/2023 |
| M1323 | S005 | STATEMENT OF STRUCTURAL SPECIAL INSPECTIONS II | IFC | 3/24/2023 |
| M1323 | S006 | STRUCTURAL LOADING CRITERIA | IFC | 3/24/2023 |
| M1323 | S011 | BUS STORAGE LEVEL LOADING DIAGRAM | IFC | 3/24/2023 |
| M1323 | S012 | MAINTENANCE & OPERATIONS LEVEL LOADING DIAGRAM | IFC | 3/24/2023 |
| M1323 | S013 | LOW ROOF AND CAR PARKING LEVEL LOADING DIAGRAM | IFC | 3/24/2023 |
| M1323 | S014 | PENTHOUSE ROOF LEVEL LOADING DIAGRAM | IFC | 3/24/2023 |
| M1323 | S021 | FOUNDATION OVERALL PLAN | REV 1 | 7/13/2023 |
| M1323 | S022 | BUS STORAGE LEVEL OVERALL GRADE SLAB PLAN | REV 1 | 7/13/2023 |
| M1323 | S023 | MAINTENANCE & OPERATIONS LEVEL OVERALL FRAMING PLAN | IFC | 3/24/2023 |
| M1323 | S030 | FOUNDATION DESIGN CONCEPT PART PLAN - AREA I | IFC | 3/24/2023 |
| M1323 | S031 | FOUNDATION DESIGN CONCEPT PART PLAN - AREA II | IFC | 3/24/2023 |
| M1323 | S032 | FOUNDATION DESIGN CONCEPT PART PLAN - AREA III | REV 1 | 7/13/2023 |
| M1323 | S033 | FOUNDATION DESIGN CONCEPT PART PLAN - AREA IV | REV 1 | 7/13/2023 |
| M1323 | S034 | BUS STORAGE LEVEL DESIGN CONCEPT PART PLAN - AREA I | IFC | 6/26/2023 |
| M1323 | S035 | BUS STORAGE LEVEL DESIGN CONCEPT PART PLAN - AREA II | IFC | 6/26/2023 |
| M1323 | S036 | BUS STORAGE LEVEL DESIGN CONCEPT PART PLAN - AREA III | REV 1 | 7/13/2023 |
| M1323 | S037 | BUS STORAGE LEVEL DESIGN CONCEPT PART PLAN - AREA IV | REV 1 | 7/13/2023 |
| M1323 | S038 | MAINTENANCE & OPERATIONS LEVEL DESIGN CONCEPT PART PLAN - AREA I | IFC | 3/24/2023 |
| M1323 | S100A | FOUNDATION PLAN - AREA A | IFC | 3/24/2023 |
| M1323 | S100B | FOUNDATION PLAN - AREA B | IFC | 3/24/2023 |
| M1323 | S100C | FOUNDATION PLAN - AREA C | IFC | 3/24/2023 |
| M1323 | S100D | FOUNDATION PLAN - AREA D | IFC | 3/24/2023 |
| M1323 | S100E | FOUNDATION PLAN - AREA E | IFC | 3/24/2023 |
| M1323 | S100F | FOUNDATION PLAN - AREA F | IFC | 3/24/2023 |
| M1323 | S100G | FOUNDATION PLAN - AREA G | IFC | 3/24/2023 |
| M1323 | S100H | FOUNDATION PLAN - AREA H | IFC | 3/24/2023 |
| M1323 | S100J | FOUNDATION PLAN - AREA J | IFC | 3/24/2023 |
| M1323 | S100K | FOUNDATION PLAN - AREA K | IFC | 3/24/2023 |
| M1323 | S100L | FOUNDATION PLAN - AREA L | IFC | 3/24/2023 |
| M1323 | S100M | FOUNDATION PLAN - AREA M | IFC | 3/24/2023 |
| M1323 | S100N | FOUNDATION PLAN - AREA N | IFC | 3/24/2023 |
| M1323 | S100P | FOUNDATION PLAN - AREA P | IFC | 3/24/2023 |
| M1323 | S100Q | FOUNDATION PLAN - AREA Q | IFC | 3/24/2023 |
| M1323 | S100R | FOUNDATION PLAN - AREA R | IFC | 3/24/2023 |
| M1323 | S100S | FOUNDATION PLAN - AREA S | IFC | 3/24/2023 |
| M1323 | S100T | FOUNDATION PLAN - AREA T | REV 1 | 7/13/2023 |
| M1323 | S100U | FOUNDATION PLAN - AREA U | IFC | 3/24/2023 |
| M1323 | S101A | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA A | REV 1 | 7/13/2023 |
| M1323 | S101B | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA B | REV 1 | 7/13/2023 |
| M1323 | S101C | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA C | REV 1 | 7/13/2023 |
| M1323 | S101D | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA D | REV 1 | 7/13/2023 |
| M1323 | S101E | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA E | REV 1 | 7/13/2023 |
| M1323 | S101F | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA F | REV 1 | 7/13/2023 |
| M1323 | S101G | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA G | REV 1 | 7/13/2023 |
| M1323 | S101H | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA H | REV 1 | 7/13/2023 |
| M1323 | S101J | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA J | REV 1 | 7/13/2023 |
| M1323 | S101K | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA K | REV 1 | 7/13/2023 |
| M1323 | S101L | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA L | REV 1 | 7/13/2023 |
| M1323 | S101M | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA M | REV 1 | 7/13/2023 |
| M1323 | S101N | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA N | REV 1 | 7/13/2023 |
| M1323 | S101P | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA P | REV 1 | 7/13/2023 |
| M1323 | S101Q | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA Q | REV 1 | 7/13/2023 |
| M1323 | S101R | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA R | REV 1 | 7/13/2023 |

## DRAWING INDEX - VOLUME 1

| SHEET NO. | DRAWING NO. | SHEET NAME | LATEST REVISION | DATE |
|---|---|---|---|---|
| M1323 | S101S | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA S | REV 1 | 7/13/2023 |
| M1323 | S101T | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA T | REV 1 | 7/13/2023 |
| M1323 | S101U | BUS STORAGE LEVEL GRADE SLAB PLAN - AREA U | REV 1 | 7/13/2023 |
| M1323 | S102A | MAINTENANCE & OPERATIONS LEVEL FRAMING PLAN - AREA A | IFC | 3/24/2023 |
| M1323 | S102B | MAINTENANCE & OPERATIONS LEVEL FRAMING PLAN - AREA B | IFC | 3/24/2023 |
| M1323 | S102C | MAINTENANCE & OPERATIONS LEVEL FRAMING PLAN - AREA C | IFC | 3/24/2023 |
| M1323 | S102D | MAINTENANCE & OPERATIONS LEVEL FRAMING PLAN - AREA D | IFC | 3/24/2023 |
| M1323 | S222 | FAÇADE FRAMING ELEVATIONS | IFC | 6/26/2023 |
| M1323 | S223 | FAÇADE FRAMING ELEVATIONS | IFC | 6/26/2023 |
| M1323 | S224 | FAÇADE FRAMING ELEVATIONS | IFC | 6/26/2023 |
| M1323 | S225 | FAÇADE FRAMING ELEVATIONS | IFC | 6/26/2023 |
| M1323 | S226 | FAÇADE FRAMING ELEVATIONS | IFC | 6/26/2023 |
| M1323 | S227 | FAÇADE SUPPORT DETAILS | IFC | 6/26/2023 |
| M1323 | S230 | FAÇADE SUPPORT DETAILS | IFC | 6/26/2023 |
| M1323 | S301 | BUILDING SECTIONS | IFC | 3/24/2023 |
| M1323 | S321 | STAIR AND ELEVATOR ENLARGED FRAMING PLANS | IFC | 6/26/2023 |
| M1323 | S323 | STAIR AND ELEVATOR ENLARGED FRAMING PLANS | IFC | 6/26/2023 |
| M1323 | S327 | STAIR AND ELEVATOR ENLARGED FRAMING PLANS | IFC | 6/26/2023 |
| M1323 | S329 | STAIR AND ELEVATOR ENLARGED FRAMING PLANS | IFC | 6/26/2023 |
| M1323 | S331 | STAIR SECTIONS | IFC | 6/26/2023 |
| M1323 | S401 | UNDERGROUND TANKS LAYOUT | IFC | 3/24/2023 |
| M1323 | S402 | SWM STRUCTURE - PLAN AND SECTION | IFC | 3/24/2023 |
| M1323 | S403 | SWM STRUCTURE - SECTIONS | IFC | 3/24/2023 |
| M1323 | S404 | SWM STRUCTURE - MATERIAL SPECIFICATIONS | IFC | 3/24/2023 |
| M1323 | S405 | SWM STRUCTURE - REINFORCING PLAN AND SECTIONS | IFC | 3/24/2023 |
| M1323 | S406 | SWM STRUCTURE - REBAR DETAILS | IFC | 3/24/2023 |
| M1323 | S407 | 60,000 GALLON WASH-WATER TANK | IFC | 3/24/2023 |
| M1323 | S408 | 60,000 GALLON WASH-WATER TANK - SECTIONS AND DETAILS | IFC | 3/24/2023 |
| M1323 | S409 | UST VAULT - PLAN AND SECTIONS | IFC | 3/24/2023 |
| M1323 | S410 | UST VAULT - SECTIONS AND DETAILS | IFC | 3/24/2023 |
| M1323 | S411 | OWS TANK | IFC | 3/24/2023 |
| M1323 | S413 | UNDERSLAB DRAINAGE PLAN | REV 1 | 7/13/2023 |
| M1323 | S414 | UNDERSLAB DRAINAGE DETAILS | IFC | 3/24/2023 |
| M1323 | S415 | COLLECTOR PIPE PROFILES - 1 | IFC | 3/24/2023 |
| M1323 | S417 | STORM DRAIN AND SANITARY PIPING LAYOUT | IFC | 3/24/2023 |
| M1323 | S419 | STORM DRAIN DETAILS | IFC | 3/24/2023 |
| M1323 | S420 | SWM STRUCTURE - SECTIONS | IFC | 3/24/2023 |
| M1323 | S421 | SWM STRUCTURE - SECTIONS | IFC | 3/24/2023 |
| M1323 | S422 | SWM STRUCTURE - SECTIONS | IFC | 3/24/2023 |
| M1323 | S423 | TYPICAL DETAILS | IFC | 3/24/2023 |
| M1323 | S424 | TYPICAL DETAILS | IFC | 3/24/2023 |
| M1323 | S425 | FLOW METER STRUCTURE - PLAN AND SECTIONS | IFC | 3/24/2023 |
| M1323 | S426 | UST VAULT - SECTIONS AND DETAIL | IFC | 3/24/2023 |
| M1323 | S501 | FOUNDATION WALL LAYOUT AND SCHEDULE | IFC | 3/24/2023 |
| M1323 | S502 | FOUNDATION SECTIONS | IFC | 3/24/2023 |
| M1323 | S503 | FOUNDATION SECTIONS | IFC | 3/24/2023 |
| M1323 | S504 | FOUNDATION SECTIONS | IFC | 3/24/2023 |
| M1323 | S505 | FOUNDATION SECTIONS | IFC | 3/24/2023 |
| M1323 | S506 | FOUNDATION SECTIONS | IFC | 3/24/2023 |
| M1323 | S507 | FOUNDATION SECTIONS | REV 1 | 7/13/2023 |
| M1323 | S508 | FOUNDATION SECTIONS | IFC | 3/24/2023 |
| M1323 | S509 | FOUNDATION SECTIONS | IFC | 3/24/2023 |
| M1323 | S524 | TYPICAL STEEL DETAILS | IFC | 3/24/2023 |
| M1323 | S531 | TYPICAL CONCRETE DETAILS | IFC | 3/24/2023 |
| M1323 | S532 | TYPICAL CONCRETE DETAILS | IFC | 6/26/2023 |
| M1323 | S533 | TYPICAL CONCRETE DETAILS | REV 1 | 7/13/2023 |
| M1323 | S534 | TYPICAL CONCRETE DETAILS | REV 1 | 7/13/2023 |
| M1323 | S535 | TYPICAL CONCRETE DETAILS | IFC | 6/26/2023 |
| M1323 | S536 | TYPICAL CONCRETE DETAILS | IFC | 6/26/2023 |
| M1323 | S601 | FOUNDATION SCHEDULE AND DETAILS | IFC | 3/24/2023 |
| M1323 | S602 | FOUNDATION SCHEDULE AND DETAILS | IFC | 3/24/2023 |
| M1323 | S603 | ENLARGED FOUNDATION PLANS | IFC | 3/24/2023 |
| M1323 | S611 | COLUMN SCHEDULE | IFC | 3/24/2023 |
| M1323 | S612 | COLUMN SCHEDULE | IFC | 3/24/2023 |
| M1323 | S613 | COLUMN SCHEDULE | IFC | 3/24/2023 |
| M1323 | S614 | COLUMN SCHEDULE | IFC | 3/24/2023 |
| PLUMBING | | | | |
| M1323 | P001 | PLUMBING LEGEND, ABBREVIATIONS & GENERAL NOTES | IFC | 3/24/2023 |
| M1323 | P002 | UNDERSLAB PLUMBING PLAN - OVERALL | IFC | 3/24/2023 |
| M1323 | P100A | UNDERSLAB PLUMBING PLAN - AREA A | IFC | 3/24/2023 |
| M1323 | P100B | UNDERSLAB PLUMBING PLAN - AREA B | IFC | 3/24/2023 |
| M1323 | P100C | UNDERSLAB PLUMBING PLAN - AREA C | IFC | 3/24/2023 |
| M1323 | P100D | UNDERSLAB PLUMBING PLAN - AREA D | IFC | 3/24/2023 |
| M1323 | P100E | UNDERSLAB PLUMBING PLAN - AREA E | IFC | 3/24/2023 |
| M1323 | P100F | UNDERSLAB PLUMBING PLAN - AREA F | IFC | 3/24/2023 |
| M1323 | P100G | UNDERSLAB PLUMBING PLAN - AREA G | IFC | 3/24/2023 |
| M1323 | P100H | UNDERSLAB PLUMBING PLAN - AREA H | IFC | 3/24/2023 |
| M1323 | P100J | UNDERSLAB PLUMBING PLAN - AREA J | IFC | 3/24/2023 |
| M1323 | P100K | UNDERSLAB PLUMBING PLAN - AREA K | IFC | 3/24/2023 |
| M1323 | P100L | UNDERSLAB PLUMBING PLAN - AREA L | IFC | 3/24/2023 |
| M1323 | P100M | UNDERSLAB PLUMBING PLAN - AREA M | IFC | 3/24/2023 |
| M1323 | P100N | UNDERSLAB PLUMBING PLAN - AREA N | IFC | 3/24/2023 |
| M1323 | P100P | UNDERSLAB PLUMBING PLAN - AREA P | IFC | 3/24/2023 |
| M1323 | P100Q | UNDERSLAB PLUMBING PLAN - AREA Q | IFC | 3/24/2023 |
| M1323 | P100R | UNDERSLAB PLUMBING PLAN - AREA R | IFC | 3/24/2023 |
| M1323 | P100S | UNDERSLAB PLUMBING PLAN - AREA S | IFC | 3/24/2023 |
| M1323 | P100T | UNDERSLAB PLUMBING PLAN - AREA T | IFC | 3/24/2023 |
| M1323 | P100U | UNDERSLAB PLUMBING PLAN - AREA U | IFC | 3/24/2023 |

STV 100 Years

CLARK CONSTRUCTION

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. _____

EXPIRATION DATE: _____

| | | |
|---|---|---|
| DESIGNED | RB | 07/12/2023 DATE |
| DRAWN | RB | 07/12/2023 DATE |
| CHECKED | MR | 07/13/2023 DATE |

### REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|
| | |

### REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 07/13/2023 | REV 1 | ISSUED FOR CONSTRUCTION |
| 12/21/2023 | REV 2 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY
ENGA - GENERAL

APPROVED _____ DATE

APPROVED _____ DATE

# NORTHERN BUS DIVISION REPLACEMENT
# DESIGN PACKAGE ISSUED FOR CONSTRUCTION
# SHEET INDEX PAGE 1 OF 2

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | NO SCALE | T06-G001 | M1323-I |

2023.04.21 S-269 40% BEB Design Package – Drawings - 00

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## DRAWING INDEX - VOLUME 2

| SHEET NO. | DRAWING NO. | SHEET NAME | LATEST REVISION | DATE |
|---|---|---|---|---|
| PLUMBING | | | | |
| M1323 | P101H1 | BUS STORAGE DRAINAGE PLAN - AREA H | IFC | 3/24/2023 |
| M1323 | P201M1 | BUS STORAGE DOMESTIC WATER & GAS PLAN - AREA M | IFC | 3/24/2023 |
| M1323 | P501 | PLUMBING DETAILS | IFC | 3/24/2023 |
| M1323 | P601 | PLUMBING SCHEDULES | IFC | 3/24/2023 |
| M1323 | P701 | UNDERSLAB STORM WATER RISER DIAGRAM | IFC | 3/24/2023 |
| M1323 | P702 | UNDERSLAB INDUSTRIAL WASTE RISER DIAGRAM | IFC | 3/24/2023 |
| M1323 | P703 | UNDERSLAB SANITARY RISER DIAGRAM | IFC | 3/24/2023 |
| ELECTRICAL - GENERAL | | | | |
| M1323 | E001 | ELECTRICAL GENERAL NOTES LEGEND AND ABBREVIATIONS | IFC | 3/24/2023 |
| M1323 | E101 | ELECTRICAL SITE - OVERALL PLAN | IFC | 3/24/2023 |
| M1323 | E101C | ELECTRICAL SITE - BUS STORAGE - AREA C | IFC | 3/24/2023 |
| M1323 | E102A | ELECTRICAL SITE - BUS MAINTENANCE - AREA A | IFC | 3/24/2023 |
| M1323 | E102M | ELECTRICAL SITE - BUS MAINTENANCE - AREA M | IFC | 3/24/2023 |
| M1323 | E103 | UNDERSLAB GROUNDING - OVERALL PLAN | IFC | 3/24/2023 |
| M1323 | E103C | UNDERSLAB GROUNDING PLAN - AREA C | IFC | 3/24/2023 |
| M1323 | E103F | UNDERSLAB GROUNDING PLAN - AREA F | IFC | 3/24/2023 |
| M1323 | E103G | UNDERSLAB GROUNDING PLAN - AREA G | IFC | 3/24/2023 |
| M1323 | E103K | UNDERSLAB GROUNDING PLAN - AREA K | IFC | 3/24/2023 |
| M1323 | E103L | UNDERSLAB GROUNDING PLAN - AREA L | IFC | 3/24/2023 |
| M1323 | E103P | UNDERSLAB GROUNDING PLAN - AREA P | IFC | 3/24/2023 |
| M1323 | E103Q | UNDERSLAB GROUNDING PLAN - AREA Q | IFC | 3/24/2023 |
| M1323 | E103S | UNDERSLAB GROUNDING PLAN - AREA S | IFC | 3/24/2023 |
| M1323 | E103T | UNDERSLAB GROUNDING PLAN - AREA T | IFC | 3/24/2023 |
| M1323 | E103U | UNDERSLAB GROUNDING PLAN - AREA U | IFC | 3/24/2023 |
| M1323 | E104Q | UNDERSLAB ELECTRICAL PLAN - AREA Q | IFC | 3/24/2023 |
| M1323 | E104R | UNDERSLAB ELECTRICAL PLAN - AREA R | IFC | 3/24/2023 |
| M1323 | E104U | UNDERSLAB ELECTRICAL PLAN - AREA U | IFC | 3/24/2023 |
| M1323 | E301 | ELECTRICAL SITE - SECTION DETAILS I | IFC | 3/24/2023 |
| M1323 | E302 | ELECTRICAL SITE - SECTION DETAILS II | IFC | 3/24/2023 |
| M1323 | E303 | ELECTRICAL SITE - SECTION DETAILS III | IFC | 3/24/2023 |
| M1323 | E304 | ELECTRICAL SITE - SECTION DETAILS IV | IFC | 3/24/2023 |
| M1323 | E305 | ELECTRICAL SITE - SECTION DETAILS IV | IFC | 3/24/2023 |
| M1323 | E523 | DUCTBANK, LIGHT POLE, AND GROUNDING DETAIL | IFC | 3/24/2023 |
| M1323 | E667 | CONDUIT SCHEDULE | IFC | 3/24/2023 |
| ELECTRICAL - LIGHTING | | | | |
| M1323 | EL011 | LIGHTING PLAN - 1 | IFC | 3/24/2023 |
| M1323 | EL012 | LIGHTING PLAN - 2 | IFC | 3/24/2023 |
| INDUSTRIAL PLUMBING | | | | |
| M1323 | IP001 | ABBREVIATIONS, NOTES, & SYMBOLS | IFC | 3/24/2023 |
| M1323 | IP100 | UNDERGROUND BUS STORAGE - OVERALL PLAN | IFC | 3/24/2023 |
| M1323 | IP100R | UNDERGROUND BUS STORAGE FLOOR PLAN - AREA R | IFC | 3/24/2023 |
| M1323 | IP100S | UNDERGROUND BUS STORAGE FLOOR PLAN - AREA S | IFC | 3/24/2023 |
| M1323 | IP100T | UNDERGROUND BUS STORAGE FLOOR PLAN - AREA T | IFC | 3/24/2023 |
| M1323 | IP401 | FUELING TANK ENLARGED PLAN | IFC | 3/24/2023 |
| M1323 | IP502 | DETAILS SHEET 2 | IFC | 3/24/2023 |
| M1323 | IP503 | DETAILS SHEET 3 | IFC | 3/24/2023 |
| M1323 | IP606 | FUELING SCHEMATICS SHEET 1 | IFC | 3/24/2023 |
| M1323 | IP607 | FUELING SCHEMATICS SHEET 2 | IFC | 3/24/2023 |
| VAPOR MITIGATION | | | | |
| **M1323** | **VM10** | **UNDERGROUND BUS STORAGE PLAN - OVERALL** | **IFC** | **9/14/2023** |
| **M1323** | **VM10A** | **UNDERGROUND BUS STORAGE PLAN - AREA A** | **IFC** | **9/14/2023** |
| **M1323** | **VM10B** | **UNDERGROUND BUS STORAGE PLAN - AREA B** | **IFC** | **9/14/2023** |
| **M1323** | **VM10C** | **UNDERGROUND BUS STORAGE PLAN - AREA C** | **IFC** | **9/14/2023** |
| **M1323** | **VM10D** | **UNDERGROUND BUS STORAGE PLAN - AREA D** | **IFC** | **9/14/2023** |
| **M1323** | **VM10E** | **UNDERGROUND BUS STORAGE PLAN - AREA E** | **IFC** | **9/14/2023** |
| **M1323** | **VM10F** | **UNDERGROUND BUS STORAGE PLAN - AREA F** | **IFC** | **9/14/2023** |
| **M1323** | **VM10G** | **UNDERGROUND BUS STORAGE PLAN - AREA G** | **IFC** | **9/14/2023** |
| **M1323** | **VM10H** | **UNDERGROUND BUS STORAGE PLAN - AREA H** | **IFC** | **9/14/2023** |
| **M1323** | **VM10J** | **UNDERGROUND BUS STORAGE PLAN - AREA J** | **IFC** | **9/14/2023** |
| **M1323** | **VM10K** | **UNDERGROUND BUS STORAGE PLAN - AREA K** | **IFC** | **9/14/2023** |
| **M1323** | **VM10L** | **UNDERGROUND BUS STORAGE PLAN - AREA L** | **IFC** | **9/14/2023** |
| **M1323** | **VM10M** | **UNDERGROUND BUS STORAGE PLAN - AREA M** | **IFC** | **9/14/2023** |
| **M1323** | **VM10N** | **UNDERGROUND BUS STORAGE PLAN - AREA N** | **IFC** | **9/14/2023** |
| **M1323** | **VM10P** | **UNDERGROUND BUS STORAGE PLAN - AREA P** | **IFC** | **9/14/2023** |
| **M1323** | **VM10Q** | **UNDERGROUND BUS STORAGE PLAN - AREA Q** | **IFC** | **9/14/2023** |
| **M1323** | **VM10R** | **UNDERGROUND BUS STORAGE PLAN - AREA R** | **IFC** | **9/14/2023** |
| **M1323** | **VM10S** | **UNDERGROUND BUS STORAGE PLAN - AREA S** | **IFC** | **9/14/2023** |
| **M1323** | **VM10T** | **UNDERGROUND BUS STORAGE PLAN - AREA T** | **IFC** | **9/14/2023** |
| **M1323** | **VM10U** | **UNDERGROUND BUS STORAGE PLAN - AREA U** | **IFC** | **9/14/2023** |
| **M1323** | **VM401** | **VAPOR MANAGEMENT SYSTEM DETAILS** | **IFC** | **9/14/2023** |
| **M1323** | **VM402** | **VAPOR MANAGEMENT SYSTEM DETAILS - 2** | **IFC** | **12/21/2023** |

STV 100 Years

CLARK CONSTRUCTION

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. _____

EXPIRATION DATE: _____

DESIGNED RB 06/25/2023 DATE

DRAWN RB 06/25/2023 DATE

CHECKED MR 06/26/2023 DATE

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|
| | |

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | REV 1 | ISSUED FOR CONSTRUCTION |
| 12/21/2023 | REV 2 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

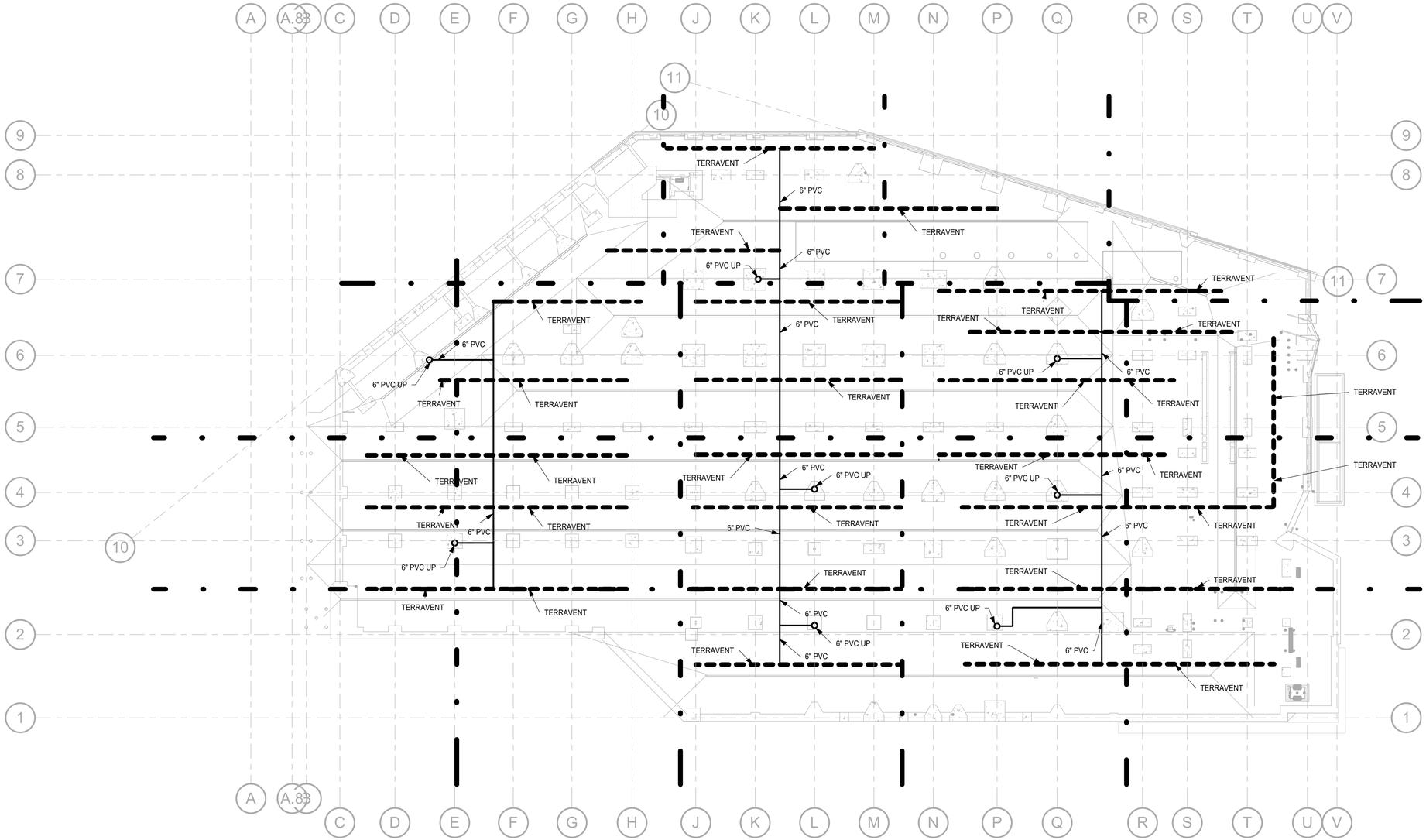
OFFICE OF CAPITAL PROGRAM DELIVERY
ENGA - GENERAL

APPROVED _____ DATE

APPROVED _____ DATE

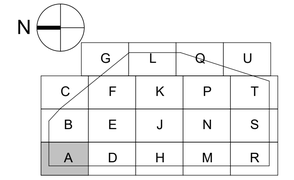
NORTHERN BUS DIVISION REPLACEMENT
DESIGN PACKAGE ISSUED FOR CONSTRUCTION
SHEET INDEX PAGE 2 OF 2

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | NO SCALE | T06-G002 | M1323-I |




1 IP402 UNDERGROUND BUS STORAGE PLAN - OVERALL

GENERAL NOTES:
1. SEE VM401 FOR VAPOR MANAGEMENT DETAILS.
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

DISTRICT OF COLUMBIA · JEFFREY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER

DocuSigned by: PE921787 — 86D7CEED72DA446...

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

9/14/2023

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - OVERALL

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1" = 40'-0" | T06-VM10 - OVERALL | |

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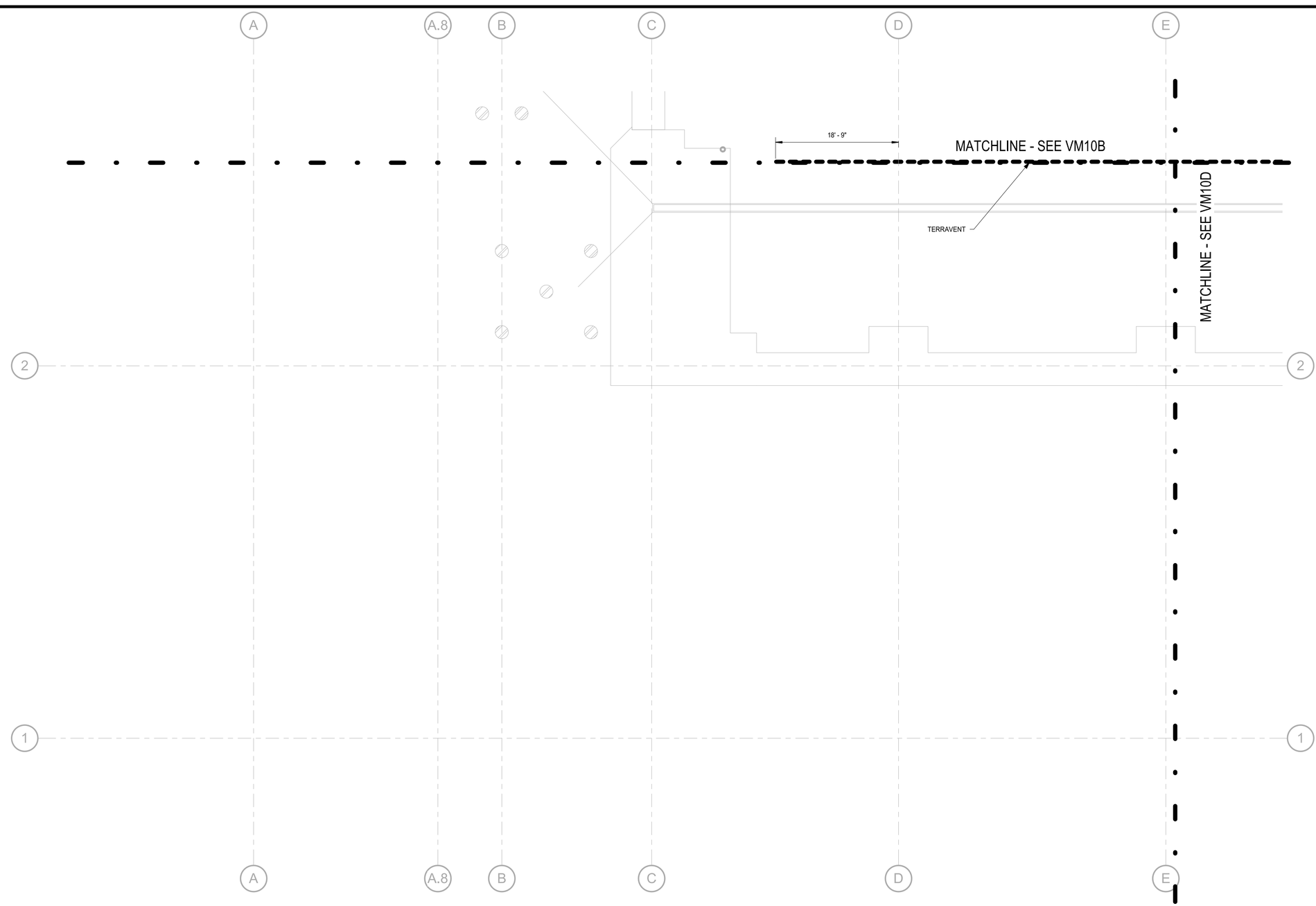
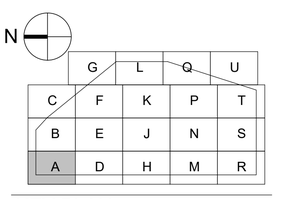



GENERAL NOTES:
1. SEE VM401 FOR VAPOR MANAGEMENT DETAILS.
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA A

DISTRICT OF COLUMBIA
JEREY IRA MESSINGER
LICENSED
PROFESSIONAL ENGINEER
DocuSigned by:
Lic. No. PE921787
9/14/2023

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA A

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10A | |

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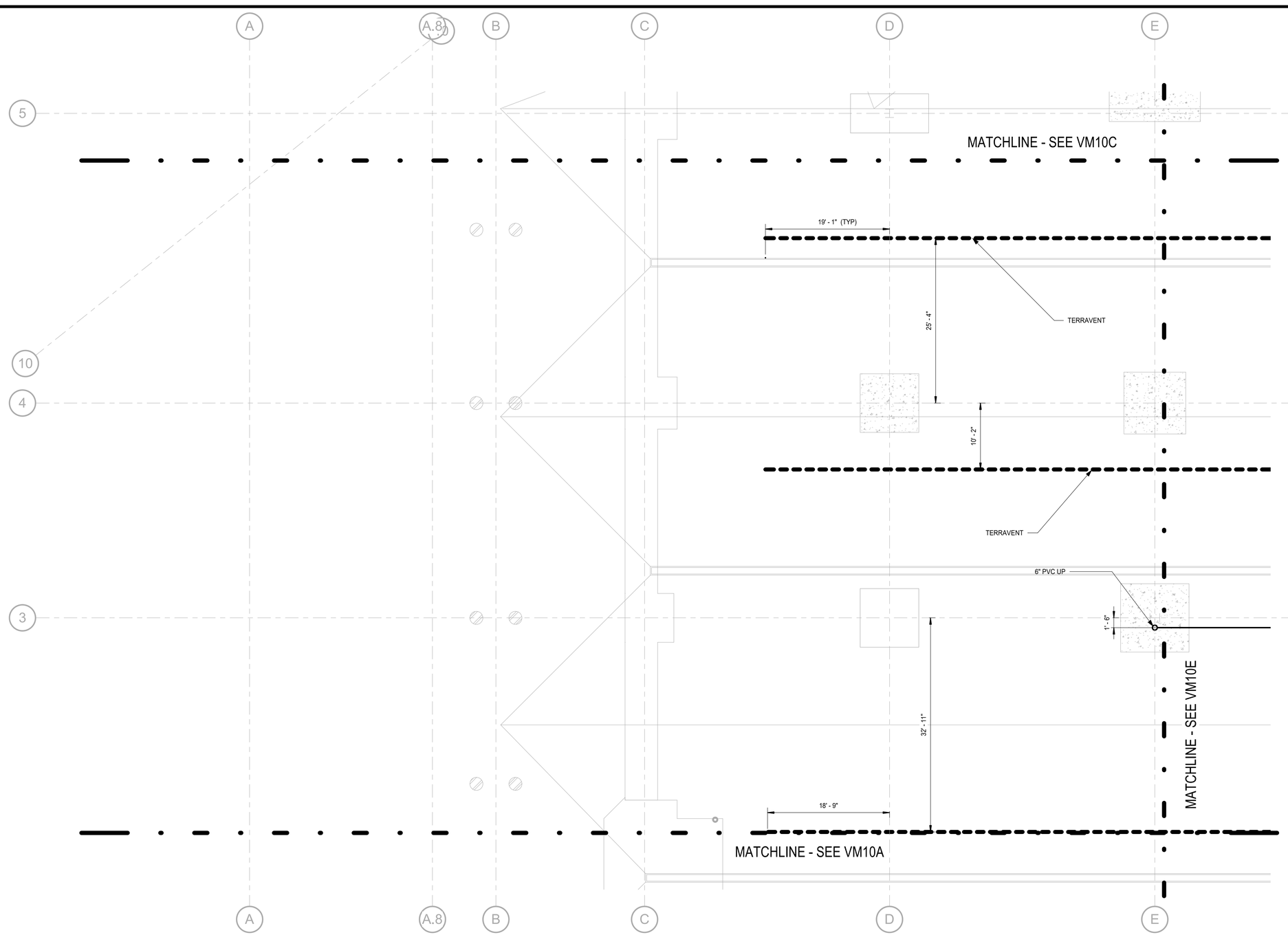


GENERAL NOTES:
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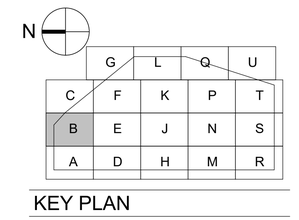
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

1 IP402 UNDERGROUND BUS STORAGE PLAN - AREA B

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

DISTRICT OF COLUMBIA · GREY IRA MESSINGER · DocuSigned by: Lic. No.: PE921787 · LICENSED PROFESSIONAL ENGINEER · 9/14/2023

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA B

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10B | |

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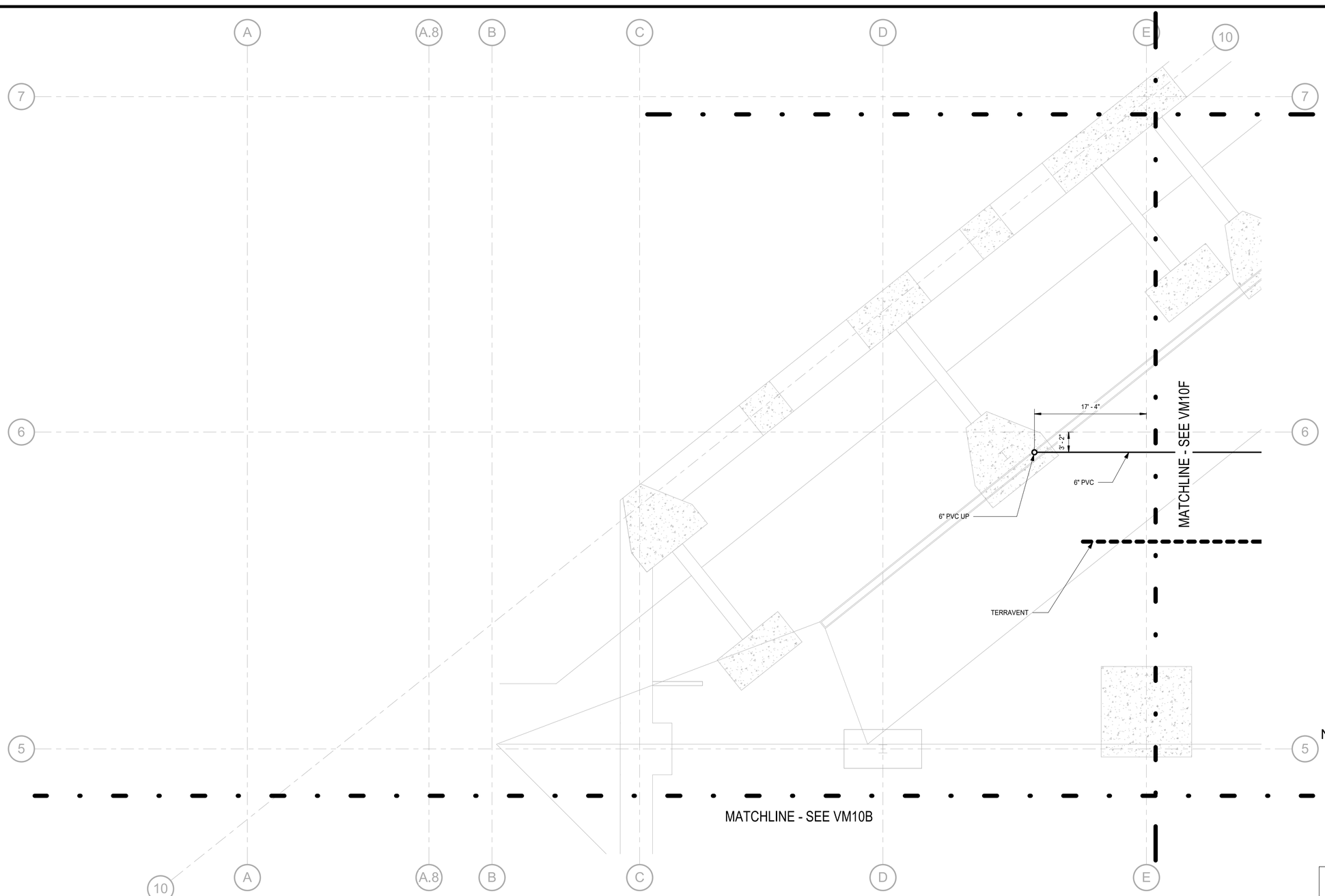


GENERAL NOTES:
1. SEE VM401 FOR VAPOR MANAGEMENT DETAILS.
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.

N

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| | G | L | Q | U |
| C | F | K | P | T |
| B | E | J | N | S |
| A | D | H | M | R |

KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA C

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

DocuSigned by: [illegible] No. PE921787
86D7CEED72DA446...

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

9/14/2023

DISTRICT OF COLUMBIA · REY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
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REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA C

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10C | |

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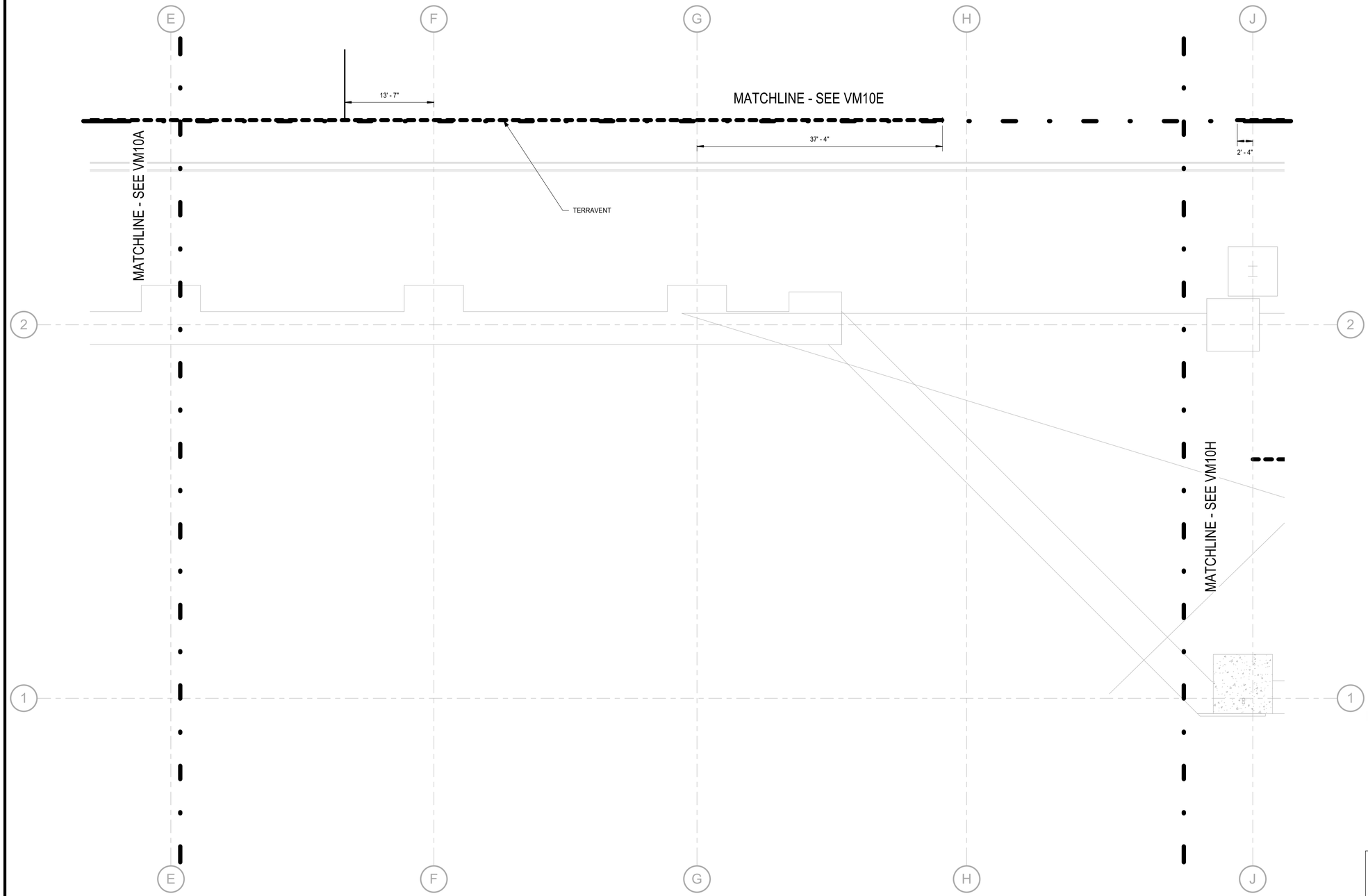


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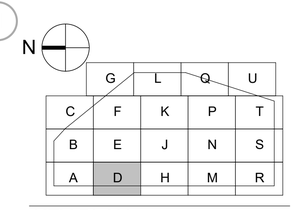


KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA D

DISTRICT OF COLUMBIA
ABREY IRA MESSINGER
DocuSigned by:
Lic. No. PE921787
66D7CEED720A446...
LICENSED
PROFESSIONAL ENGINEER
9/14/2023

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

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| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
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WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA D

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10D | |

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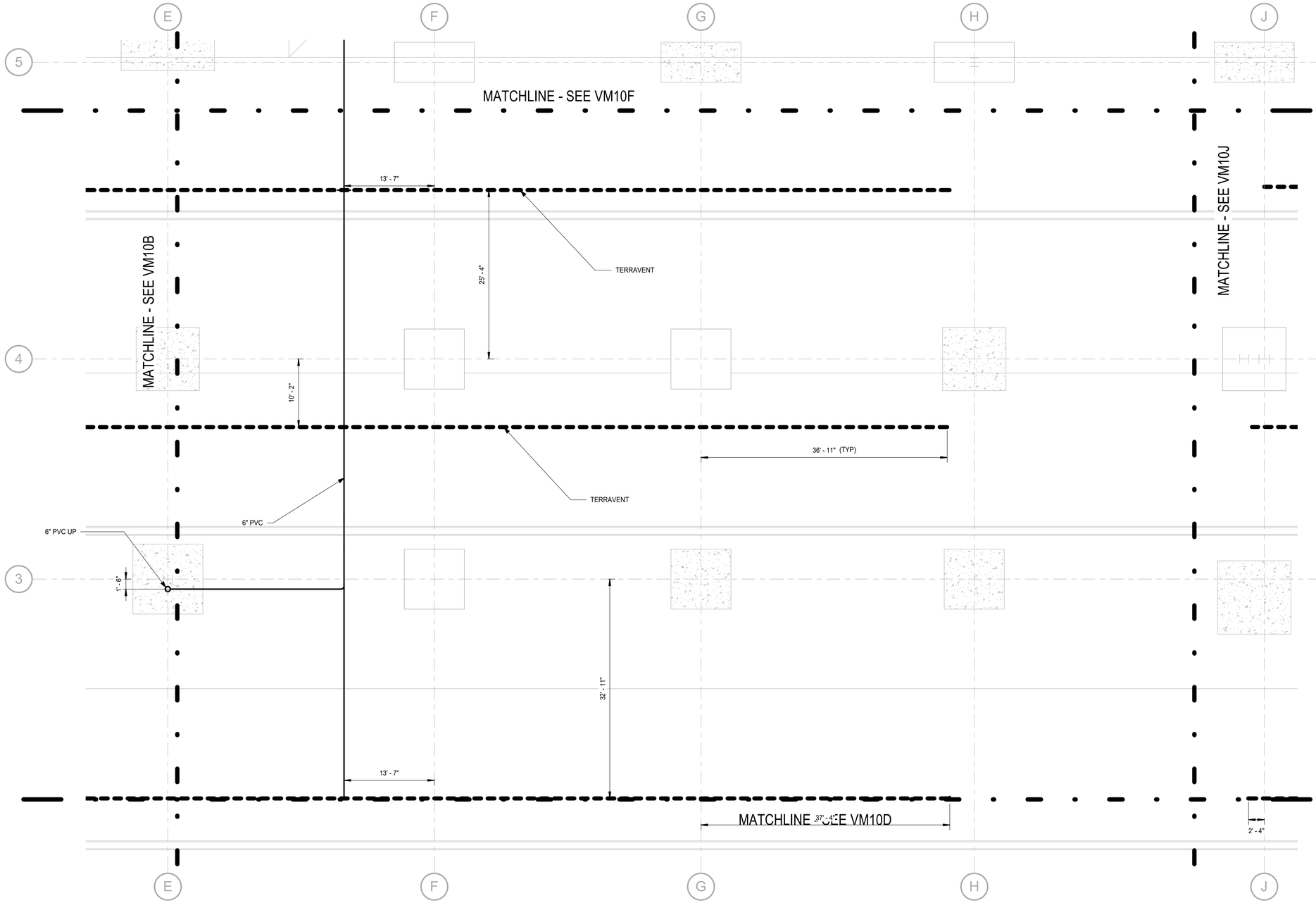


GENERAL NOTES:
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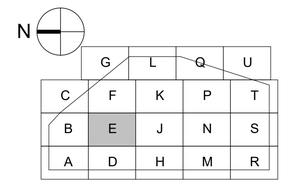


KEY PLAN

1 IP402 UNDERGROUND BUS STORAGE PLAN - AREA E

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

DISTRICT OF COLUMBIA · BREY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER

DocuSigned by: Lic. No. PE921787 — 66D7CEED72DA446...

9/14/2023

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA E

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10E | |

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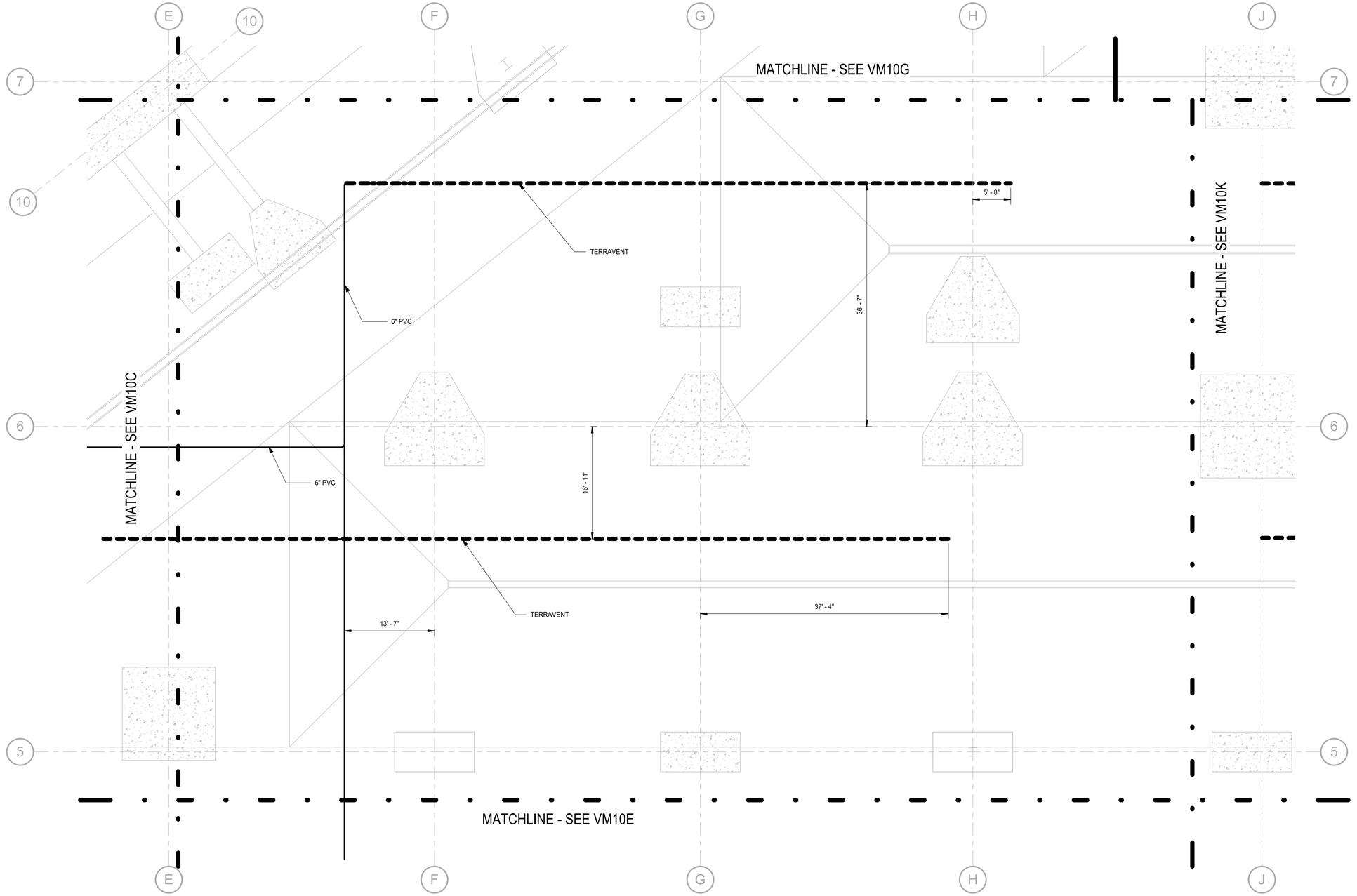


GENERAL NOTES:

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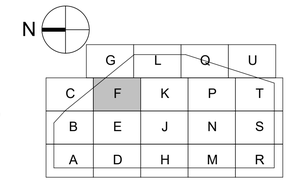


KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA F

DISTRICT OF COLUMBIA
BERREY IRA MESSINGER
DocuSigned by:
No. PE921787
68D7CEED72DA446...
LICENSED
PROFESSIONAL ENGINEER
9/14/2023

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

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REFERENCE DRAWINGS

| NUMBER | TITLE |
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REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA F

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10F | |

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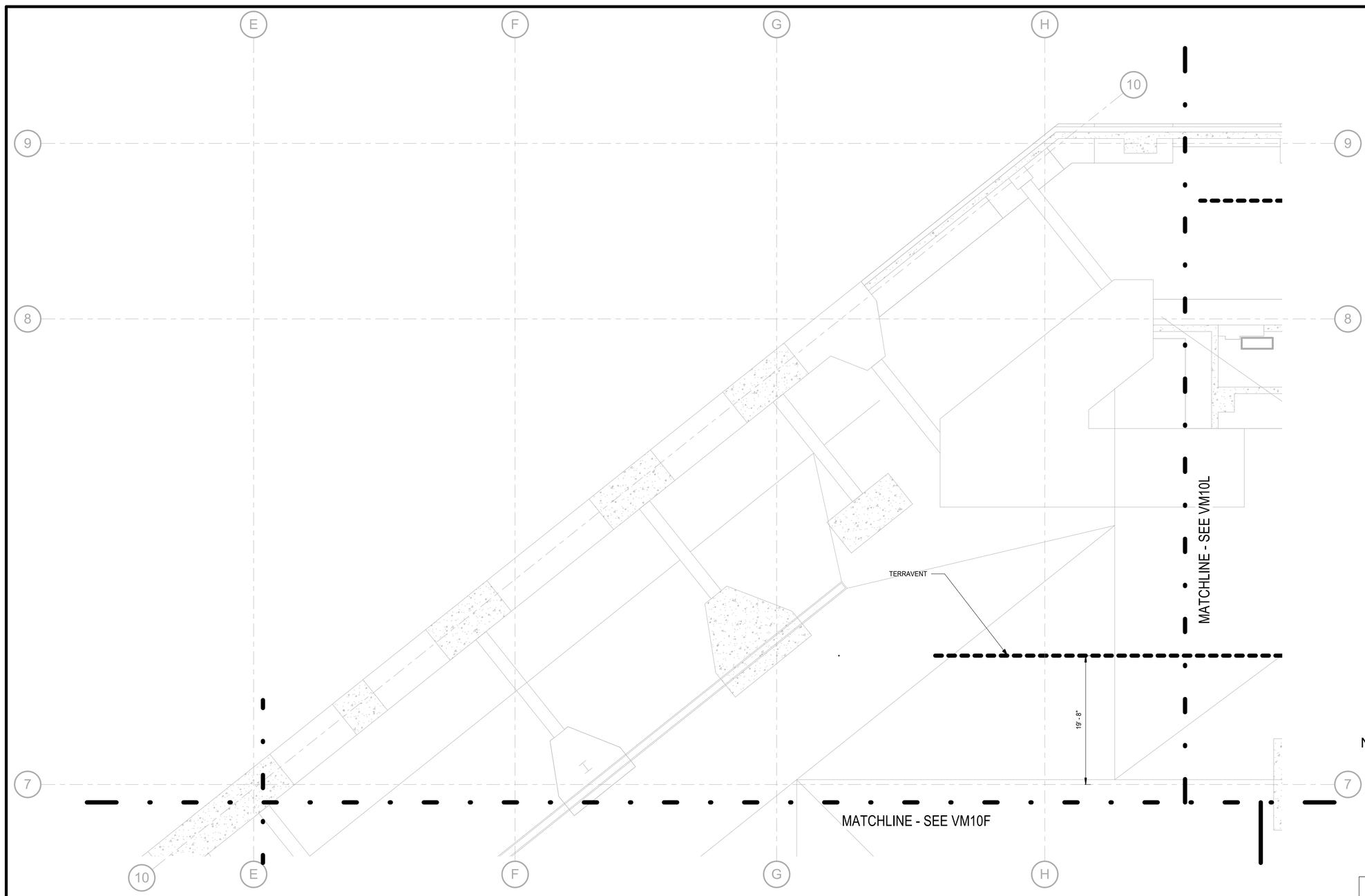


GENERAL NOTES:
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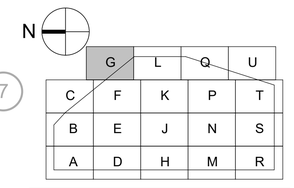


KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA G

DISTRICT OF COLUMBIA
BARRY IRA MESSINGER
DocuSigned by:
No. PE921787
LICENSED PROFESSIONAL ENGINEER
9/14/2023

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. PE921787

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| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
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REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA G

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10G | |

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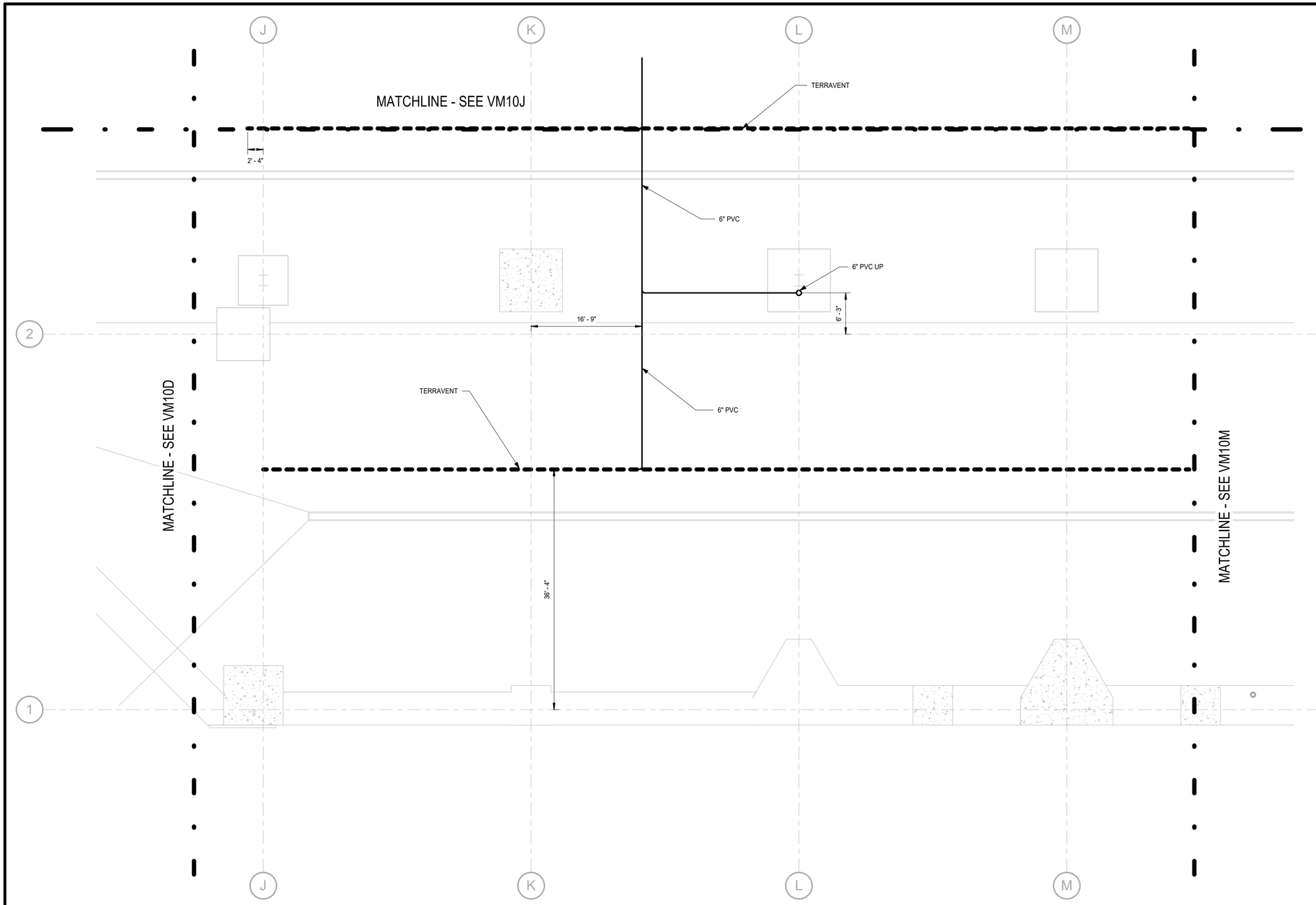


GENERAL NOTES:
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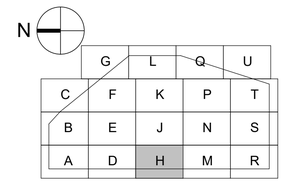


KEY PLAN

1 IP402 UNDERGROUND BUS STORAGE PLAN - AREA H

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

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DISTRICT OF COLUMBIA · GREY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER · DocuSigned by: PE921787 · 66D7CEED72DA446...

9/14/2023

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|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
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| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA H

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10H | |

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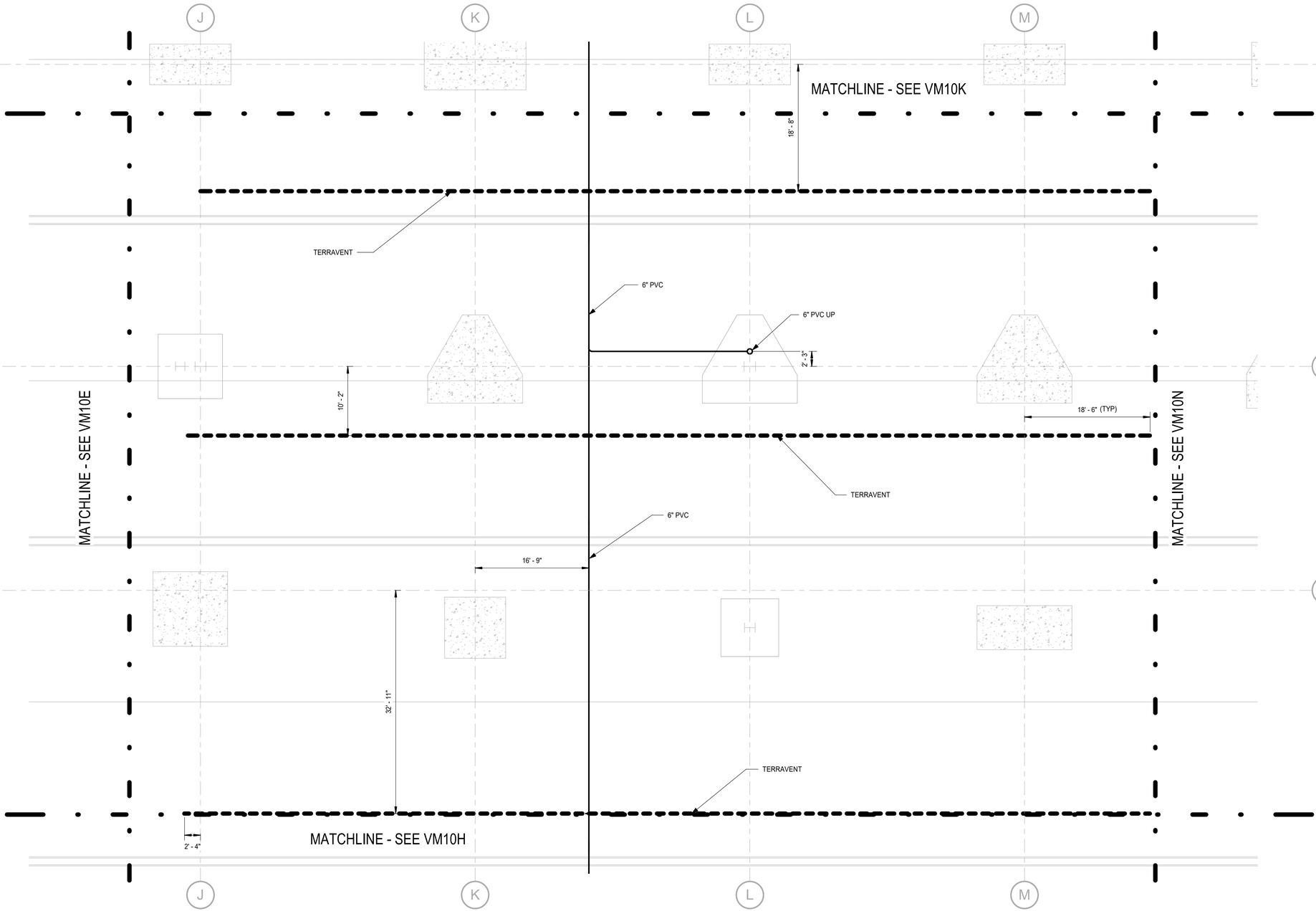
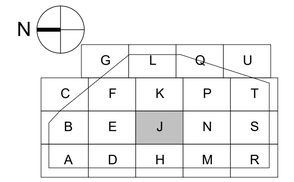



1 IP402 UNDERGROUND BUS STORAGE PLAN - AREA J

GENERAL NOTES:
1. SEE VM401 FOR VAPOR MANAGEMENT DETAILS.
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

DISTRICT OF COLUMBIA
GREY IRA MESSINGER
DocuSigned by:
LIC. No. PE921787
66D7CEED72DA446...
LICENSED PROFESSIONAL ENGINEER
9/14/2023

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA J

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10J | |

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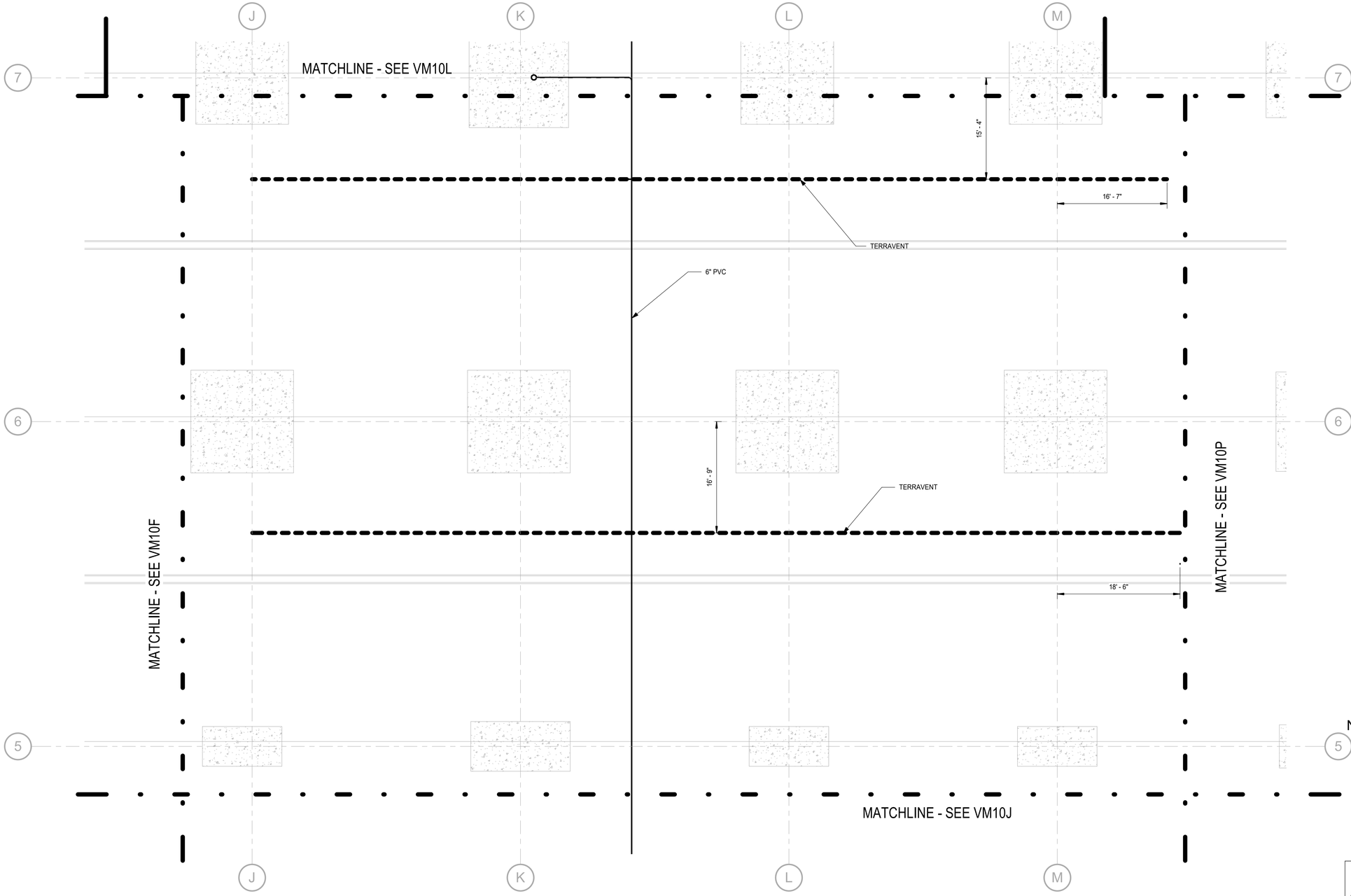
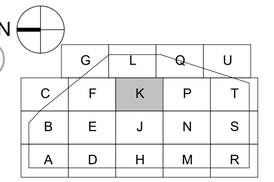



GENERAL NOTES:

1. SEE VM401 FOR VAPOR MANAGEMENT DETAILS.
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA K

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

DISTRICT OF COLUMBIA · JEFFREY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER

DocuSigned by: PE921787 — 66D7CEED72DA446...

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

9/14/2023

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA K

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10K | |

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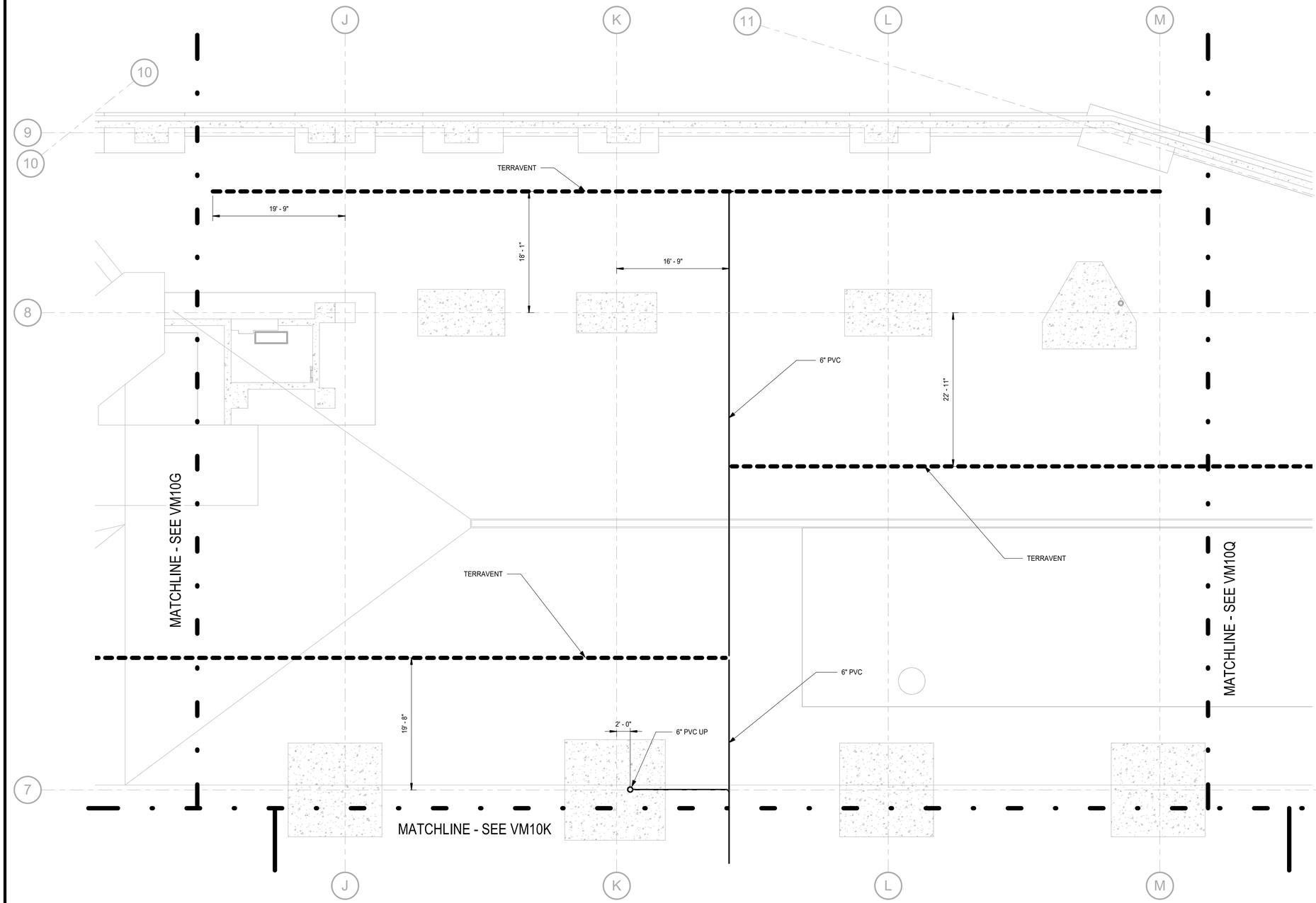


GENERAL NOTES:

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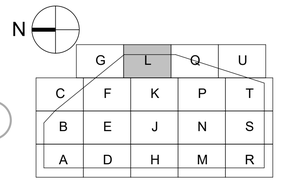
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA L

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

DISTRICT OF COLUMBIA · BARRY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER

DocuSigned by: No.: P921787 — 9/14/2023

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA L

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10L | |

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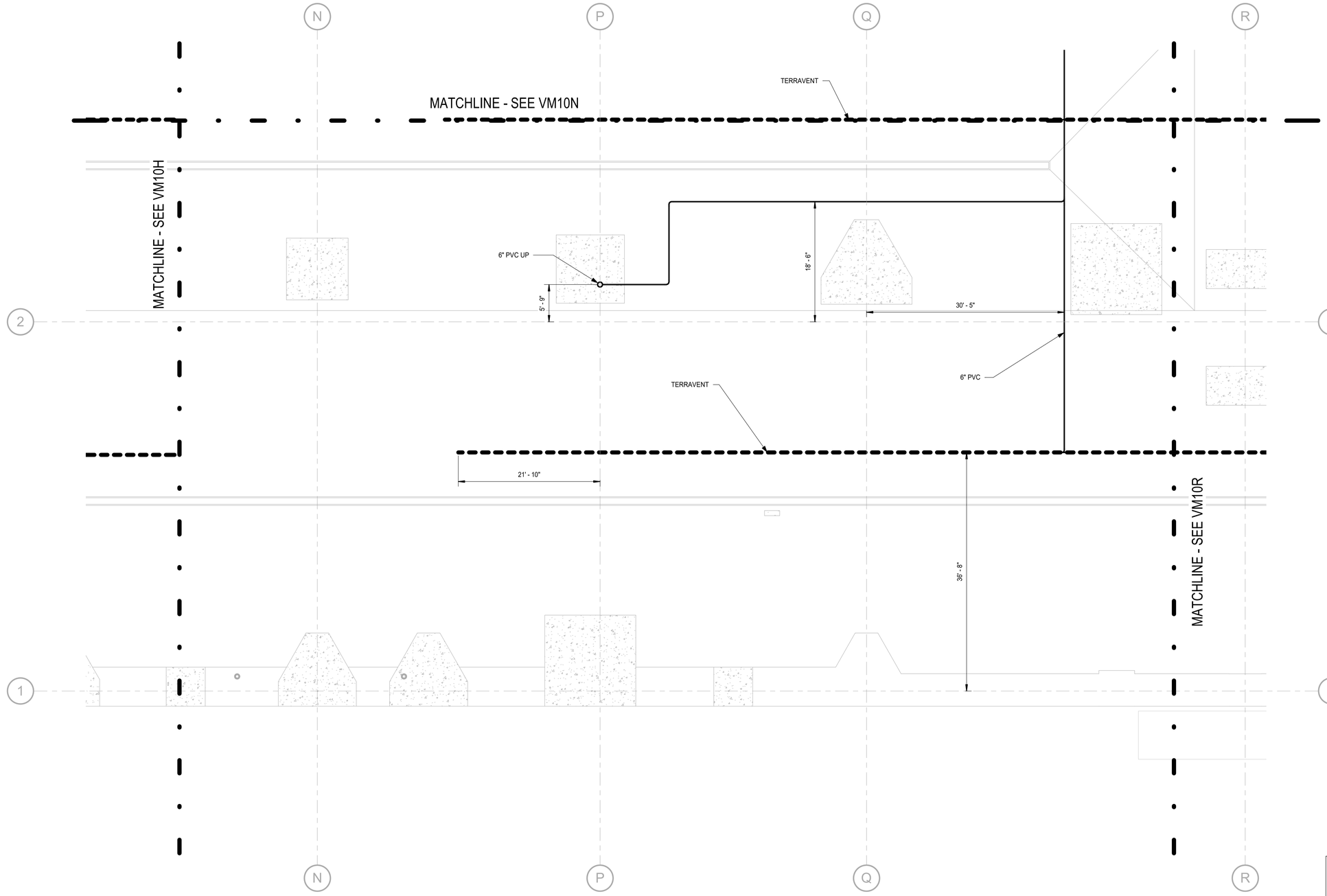


GENERAL NOTES:
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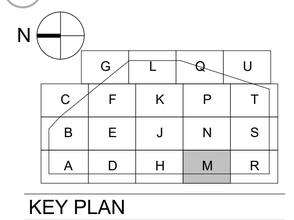
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA M

DISTRICT OF COLUMBIA
JEREY IRA MESSINGER
DocuSigned by:
No. PE921787
66D7CEED72DA446...
LICENSED PROFESSIONAL ENGINEER
9/14/2023

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

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|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
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REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA M

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10M | |

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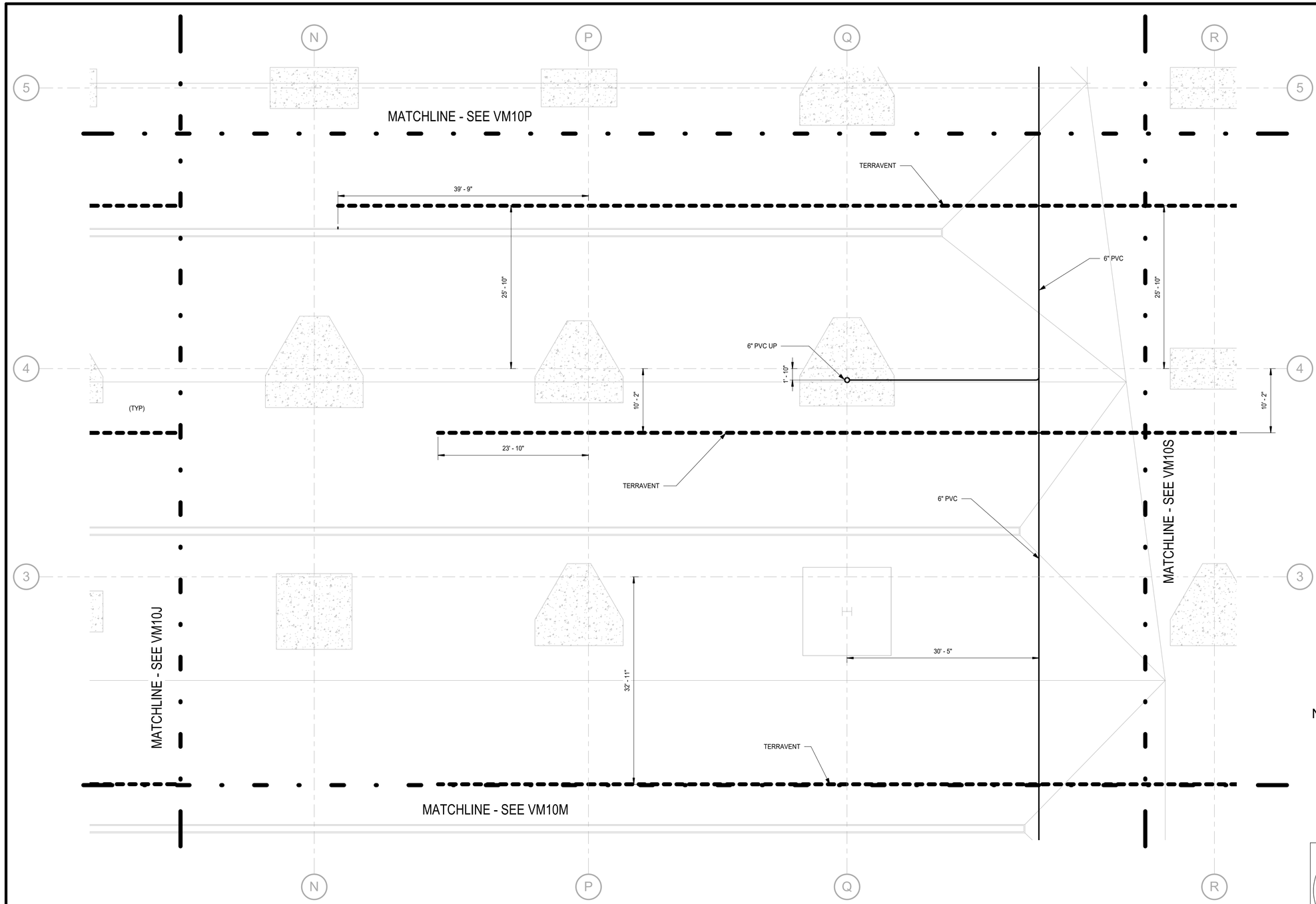
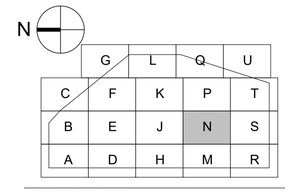



GENERAL NOTES:
1. SEE VM401 FOR VAPOR MANAGEMENT DETAILS.
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

1 IP402 UNDERGROUND BUS STORAGE PLAN - AREA N

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

DISTRICT OF COLUMBIA · BREY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER

DocuSigned by: Lic. No. PE921787 — 66D7CEED72DA446...

9/14/2023

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

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|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
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REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA N

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10N | |

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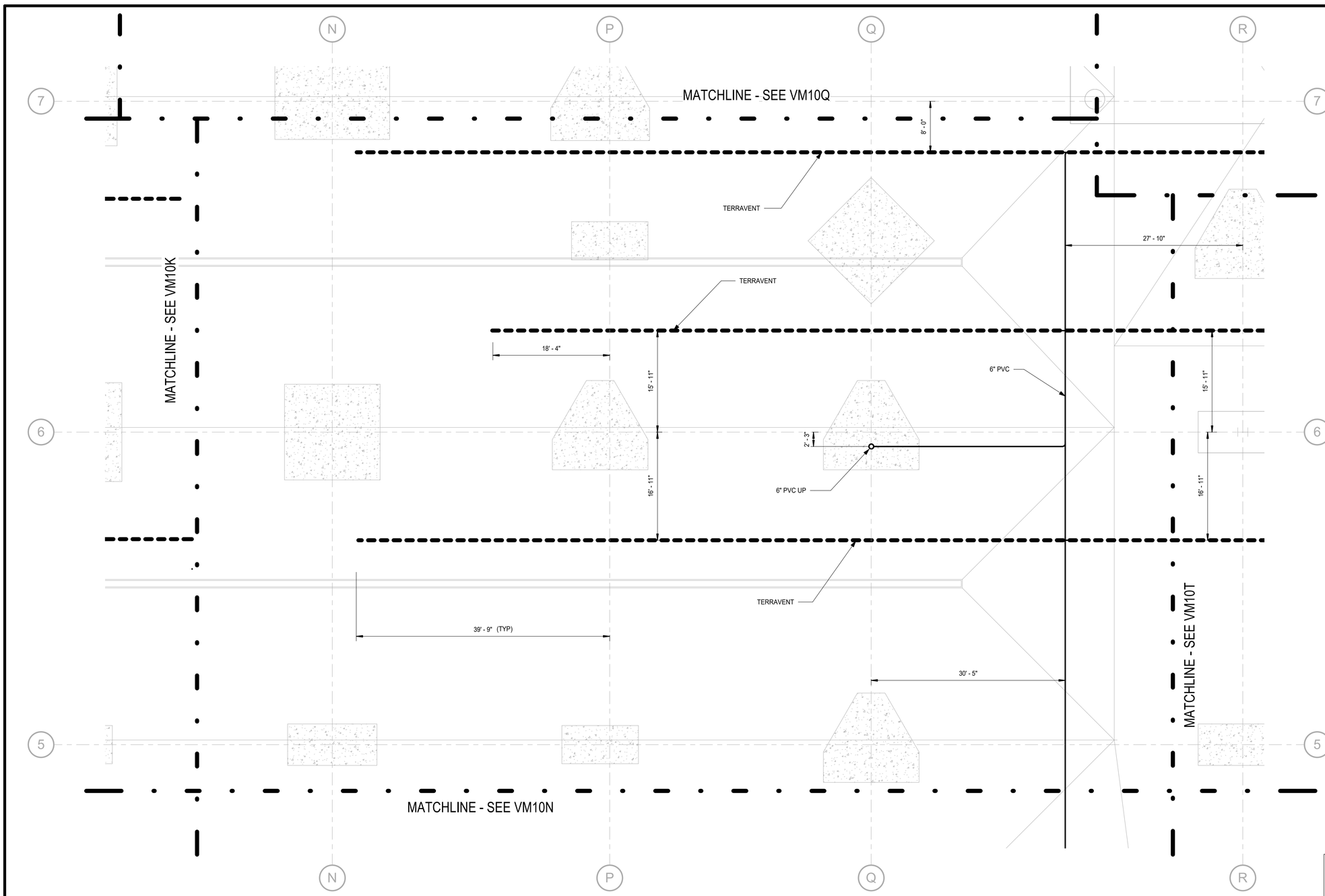
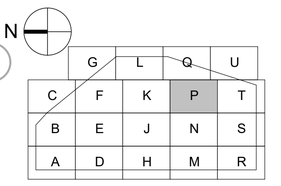



GENERAL NOTES:
1. SEE VM401 FOR VAPOR MANAGEMENT DETAILS.
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA P

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

DISTRICT OF COLUMBIA · JEREY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER

DocuSigned by: PE921787 — 66D7CEED72DA446...

9/14/2023

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA P

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10P | |

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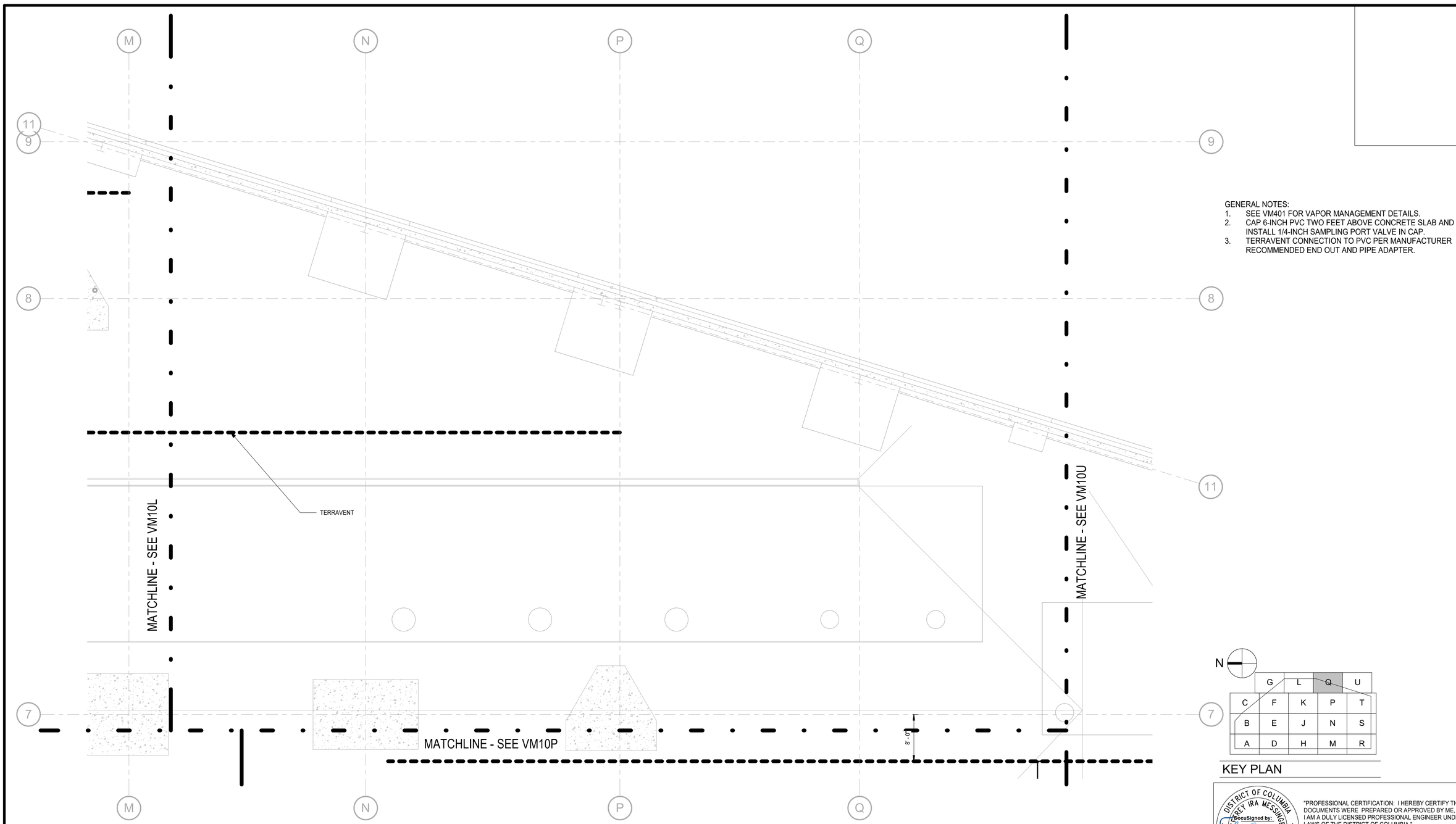


GENERAL NOTES:
1. SEE VM401 FOR VAPOR MANAGEMENT DETAILS.
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

1 IP402 UNDERGROUND BUS STORAGE PLAN - AREA Q

DISTRICT OF COLUMBIA
CASEY IRA MESSINGER
LICENSED
PROFESSIONAL ENGINEER
DocuSigned by:
PE921787
68D7CEED72DA446...
9/14/2023

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
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REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA Q

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10Q | |

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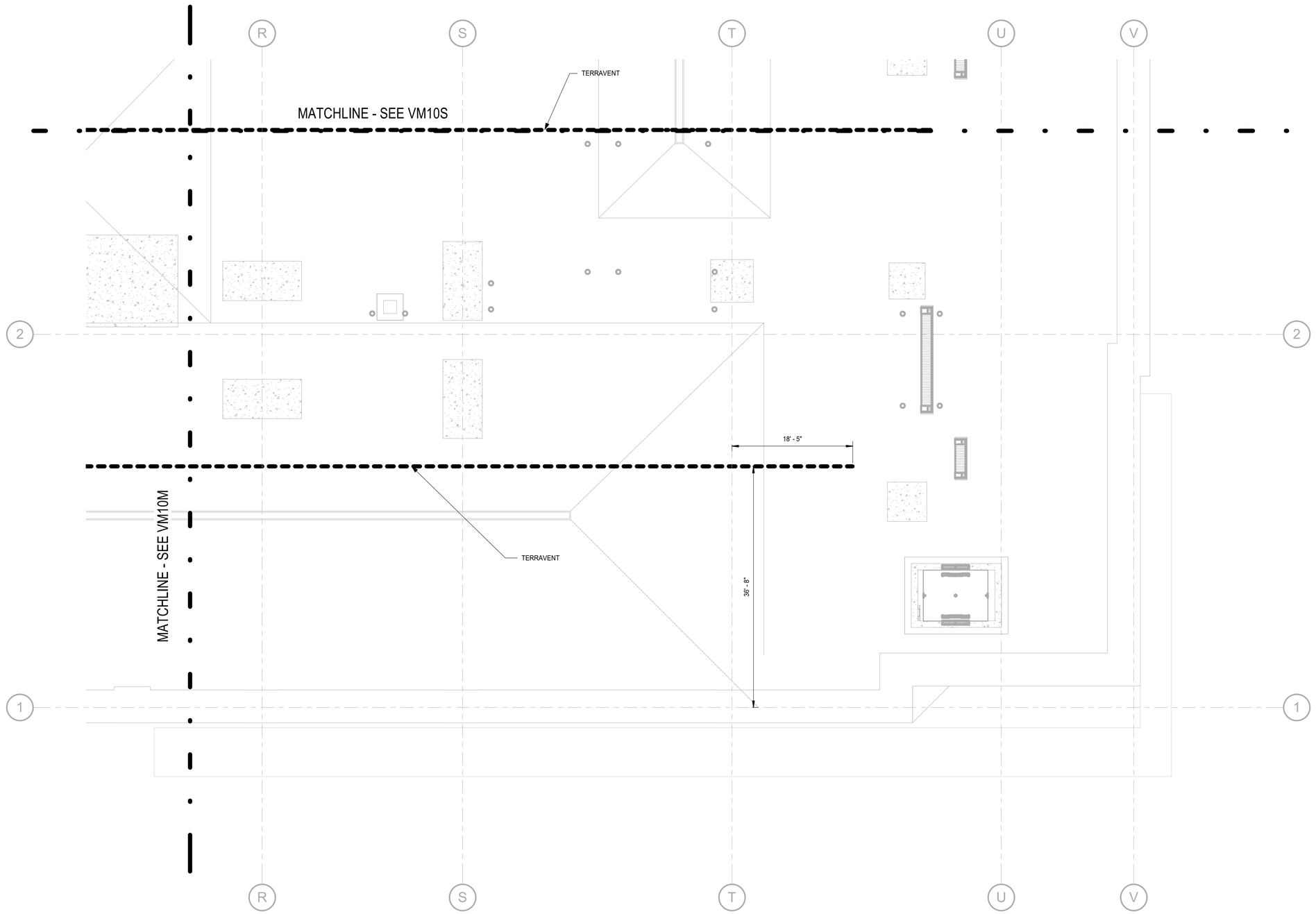
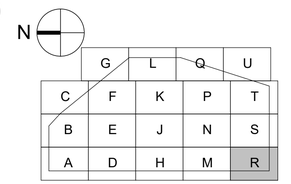



GENERAL NOTES:
1. SEE VM401 FOR VAPOR MANAGEMENT DETAILS.
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

emc2. Inc.

CLARK CONSTRUCTION

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA R

DISTRICT OF COLUMBIA · CASEY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER

DocuSigned by: PE921787 — 66D7CEED72DA446...

9/14/2023

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

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| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED ____ DATE

APPROVED ____ DATE

NORTHERN BUS DIVISION REPLACEMENT
DESIGN PACKAGE 2 (DP2) ISSUED FOR PERMIT
UNDERGROUND BUS STORAGE PLAN - AREA R

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10R | |

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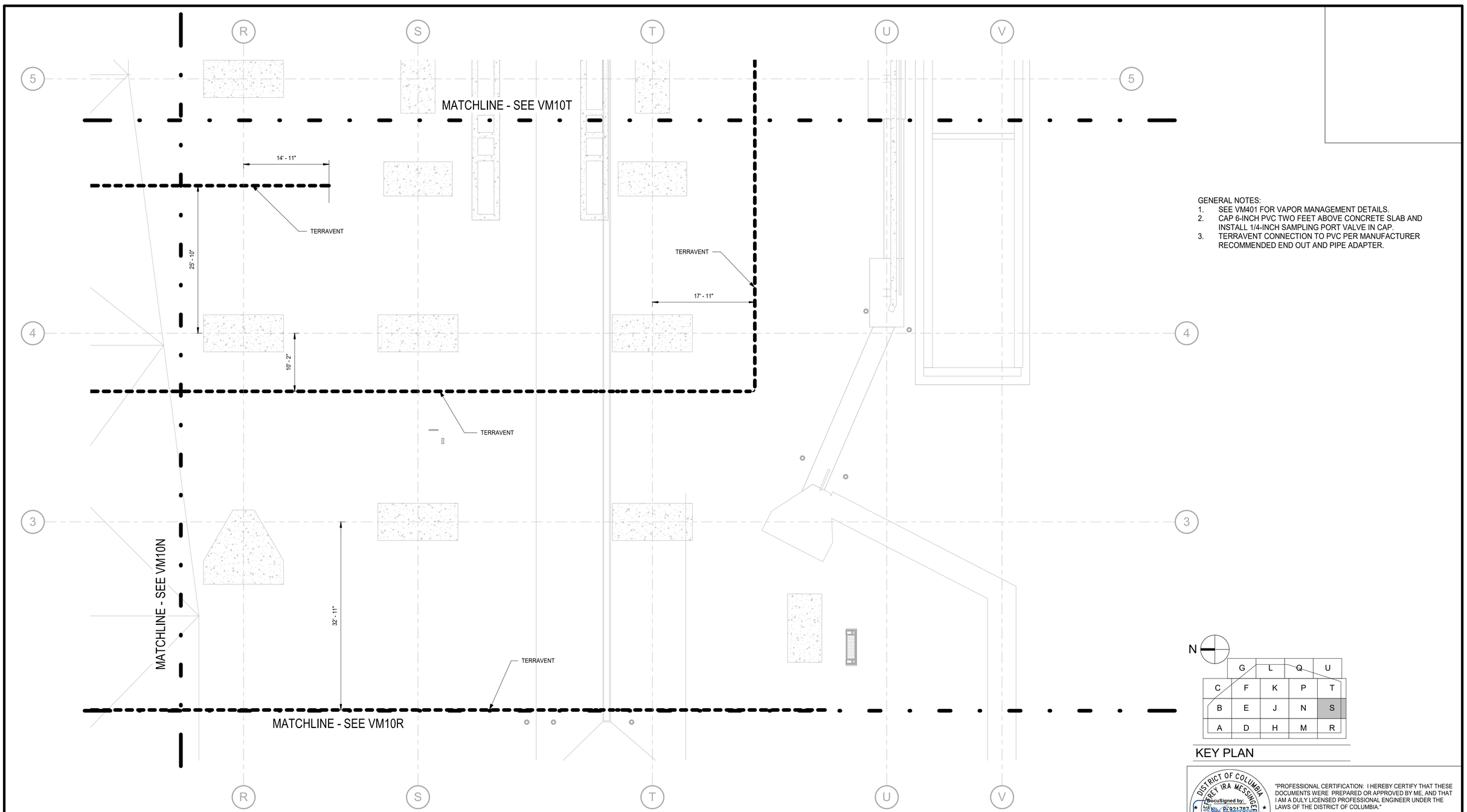


GENERAL NOTES:

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2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA S

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

DISTRICT OF COLUMBIA · JEREY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER · DocuSigned by: Lic. No. PE921787 · 9/14/2023

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

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REVISIONS

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WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA S

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10S | |

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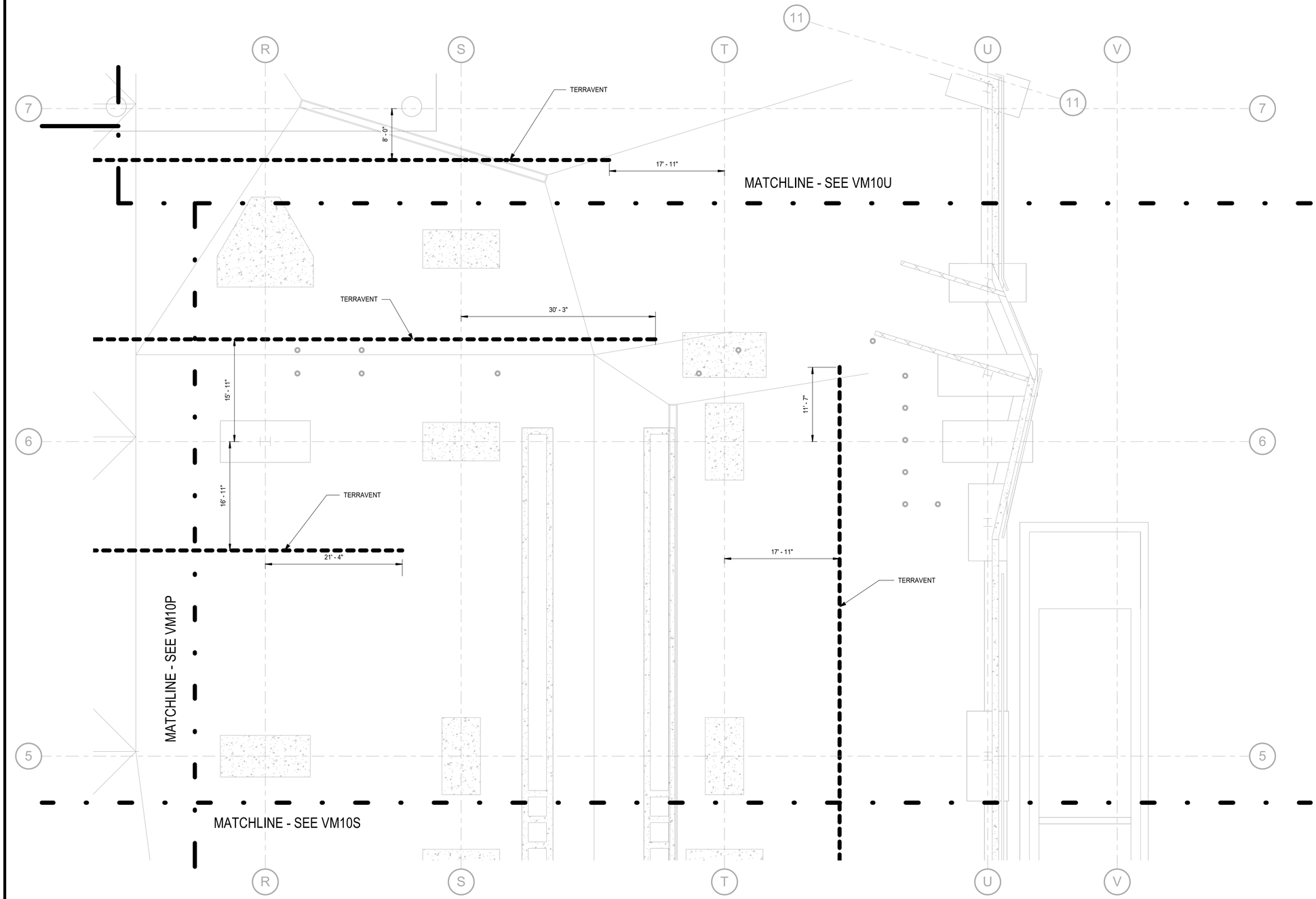


GENERAL NOTES:
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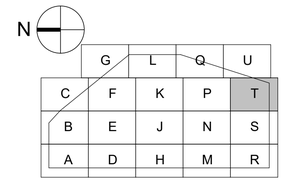


KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA T

DISTRICT OF COLUMBIA · JEFFREY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER
DocuSigned by: 66D7CEED72DA446...
9/14/2023

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

| | | |
|---|---|---|
| DESIGNED | J.OMARA | 06/07/2021 DATE |
| DRAWN | K.MACMILLAN | 06/07/2021 DATE |
| CHECKED | R.ROSSI | 06/07/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY

APPROVED DATE

APPROVED DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
UNDERGROUND BUS STORAGE PLAN - AREA T

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10T | |

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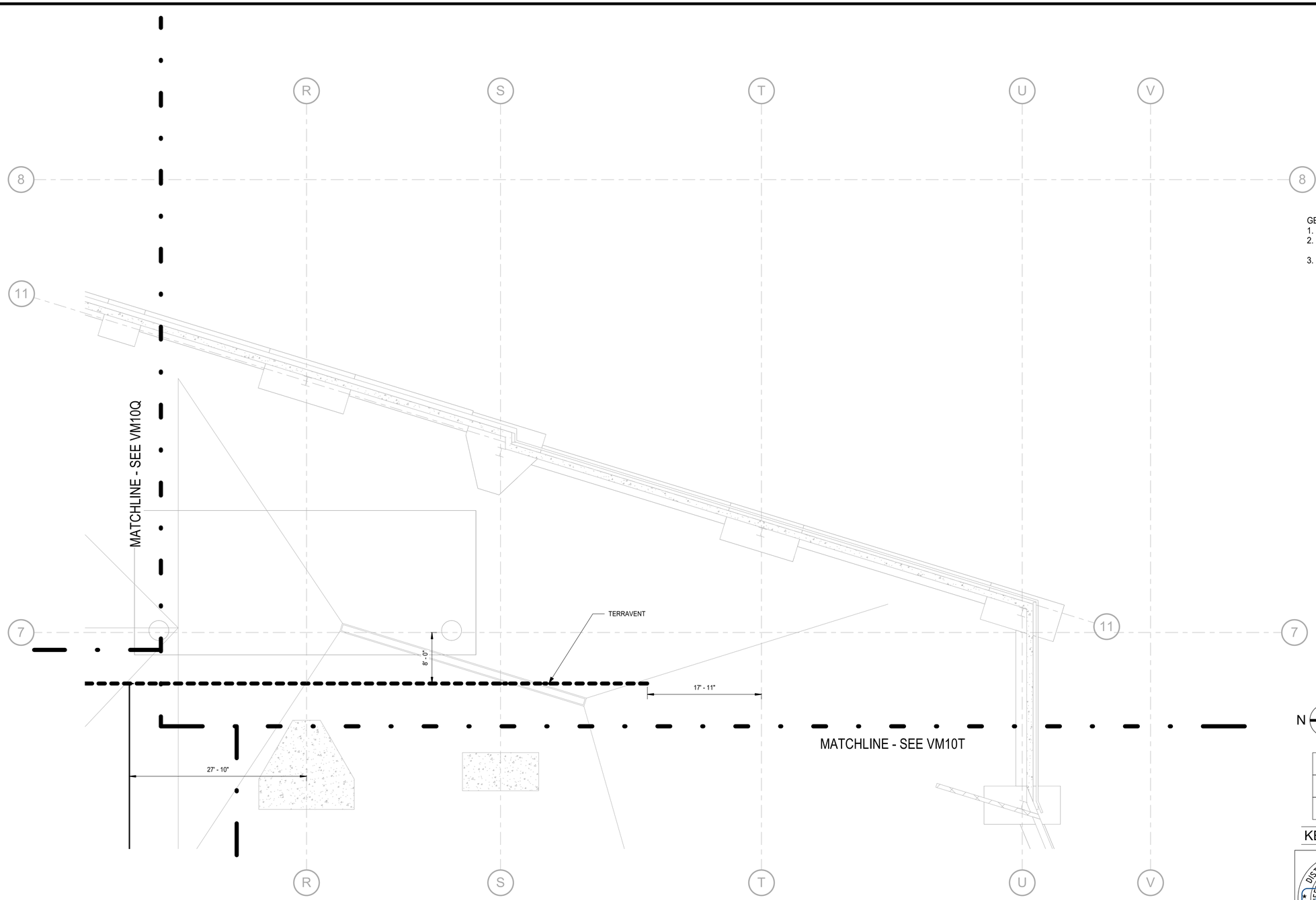
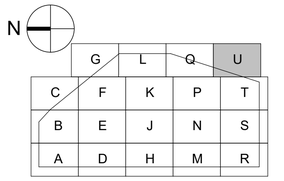



GENERAL NOTES:
1. SEE VM401 FOR VAPOR MANAGEMENT DETAILS.
2. CAP 6-INCH PVC TWO FEET ABOVE CONCRETE SLAB AND INSTALL 1/4-INCH SAMPLING PORT VALVE IN CAP.
3. TERRAVENT CONNECTION TO PVC PER MANUFACTURER RECOMMENDED END OUT AND PIPE ADAPTER.




KEY PLAN

1 / IP402 UNDERGROUND BUS STORAGE PLAN - AREA U

"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE DISTRICT OF COLUMBIA."

LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

DISTRICT OF COLUMBIA · REY IRA MESSINGER · No. PE921787 · LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 66D7CEED72DA446...

9/14/2023

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| DESIGNED | J.OMARA | 06/07/2021 DATE |
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UNDERGROUND BUS STORAGE PLAN - AREA U

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | 1/8" = 1'-0" | T06-VM10U | |

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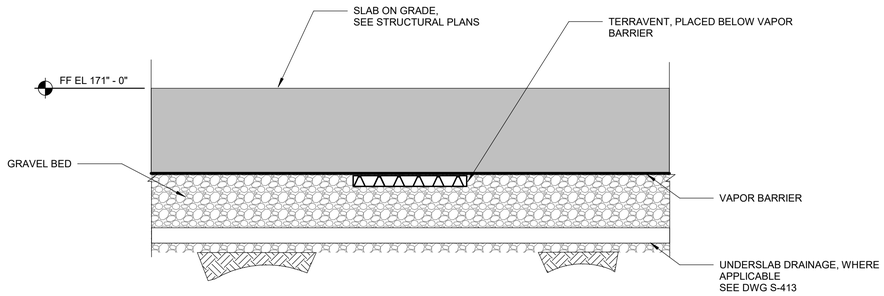
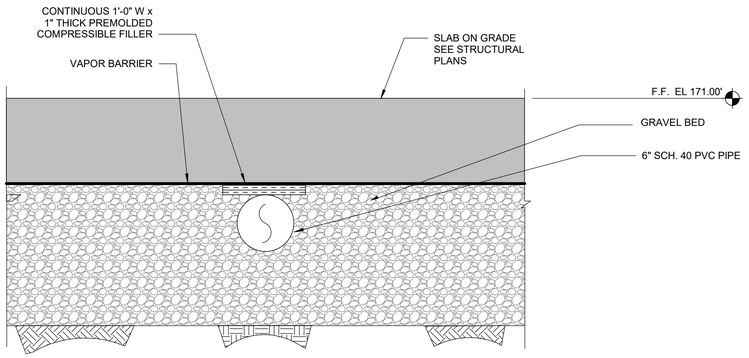


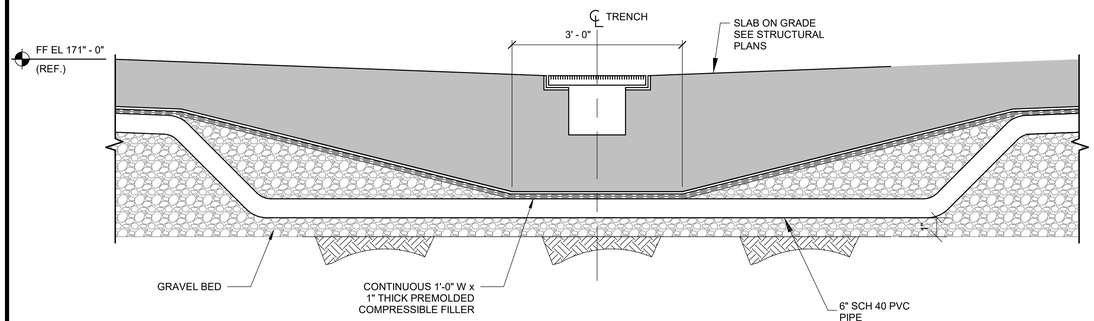

## 1 TYPICAL TERRAVENT SECTION

1 1/2" = 1'-0"



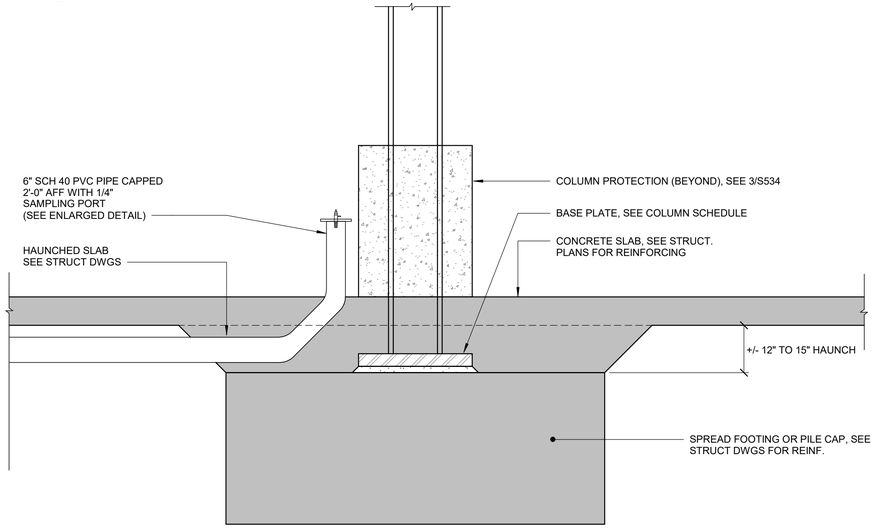

## 2 VAPOR MANAGEMENT SYSTEM PVC PIPE DETAIL

1 1/2" = 1'-0"



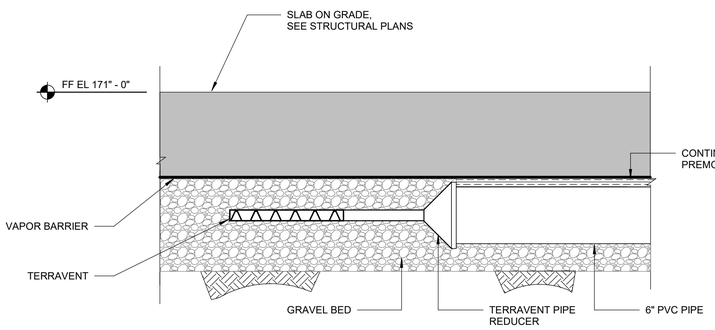

## 3 TYPICAL VAPOR MANAGEMENT SYSTEM PVC PIPE CROSSING AT TRENCH

3/4" = 1'-0"



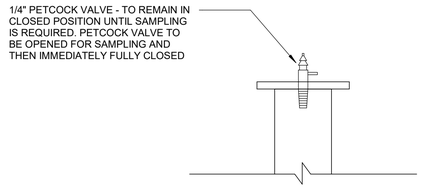

## 4 TYPICAL VAPOR MANAGEMENT SYSTEM PIPE DETAIL AT FOOTING

1/2" = 1'-0"




## 5 TYPICAL TERRAVENT TO PVC PIPE CONNECTION DETAIL

1 1/2" = 1'-0"




## 6 ENLARGED SAMPLING PORT DETAIL

1 1/2" = 1'-0"

STV 100 Years

CLARK CONSTRUCTION

DISTRICT OF COLUMBIA · BRIEY IRA MESSINGER · LICENSED PROFESSIONAL ENGINEER · DocuSigned by: PE921787 · 66D7CEED72DA446...

9/14/2023

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LICENSE No. PE921787

EXPIRATION DATE: 08/31/2024

| | | |
|---|---|---|
| DESIGNED | | 05/28/2021 DATE |
| DRAWN | | 05/28/2021 DATE |
| CHECKED | | 05/28/2021 DATE |

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|
| S413 | UNDERSLAB DRAINAGE PLAN |

REVISIONS

| DATE | NUM | DESCRIPTION |
|---|---|---|
| 09/14/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY
ENGA - CIVIL ENGINEERING

APPROVED _____ DATE

APPROVED _____ DATE

NORTHERN BUS DIVISION REPLACEMENT
ISSUED FOR CONSTRUCTION
VAPOR MANAGEMENT SYSTEM DETAILS

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | AS INDICATED | T06 - VM-401 | M1323- |

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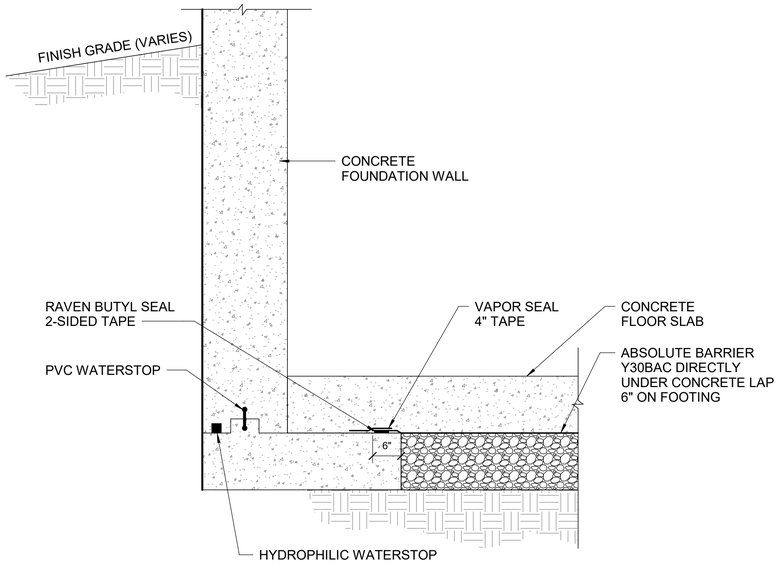
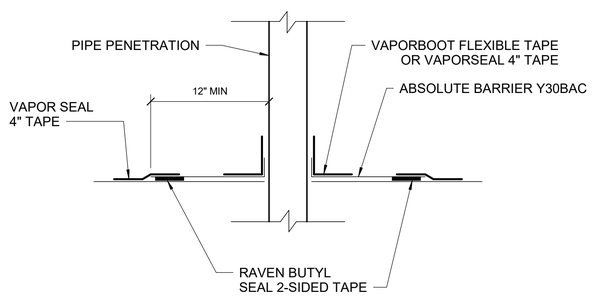



(STRUCTURAL REINFORCEMENT NOT SHOWN FOR CLARITY, SEE STRUCTURAL DRAWINGS FOR REINFORCING)

1 - VAPOR BARRIER DETAILS

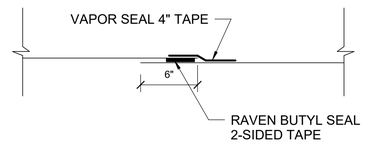
3/4" = 1'-0"




**NOTE:** DETAIL APPLIES TO ALL PENETRATIONS FOR MONITORING WELLS, PLUMBING PIPING, CONDUIT, ETC

2 - VAPOR BARRIER PENETRATION DETAIL

1 1/2" = 1'-0"




3 - VAPOR BARRIER JOINT DETAIL

1 1/2" = 1'-0"

STV 100 Years

CLARK CONSTRUCTION

DISTRICT OF COLUMBIA · ASHLEY IRA MESSING · LICENSED PROFESSIONAL ENGINEER · DocuSigned by: 6B7CEEDF2DA4... · 12/21/2023

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REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|
| S413 | UNDERSLAB DRAINAGE PLAN |

REVISIONS

| DATE | NUM | DESCRIPTION |
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| 06/26/2023 | 0 | ISSUED FOR CONSTRUCTION |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF CAPITAL PROGRAM DELIVERY
ENGA - CIVIL ENGINEERING

APPROVED _____ DATE

APPROVED _____ DATE

NORTHERN BUS DIVISION REPLACEMENT
DESIGN PACKAGE 1 (DP1) ISSUED FOR PERMIT
VAPOR MANAGEMENT SYSTEM DETAILS 2

| CONTRACT NO. | SCALE | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| FQ19144N | AS INDICATED | T06 - VM-402 | M1323- |

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**

# SPECIFICATIONS MANUAL

## NORTHERN BUS DIVISION REPLACEMENT

**4615 14th Street NW, Washington DC**

**Project No.: FQ19144N**

**Vapor Mitigation Specs - Issued for Construction**

**December 21, 2023**

**OFFICE OF CAPITAL PROGRAM DELIVERY**

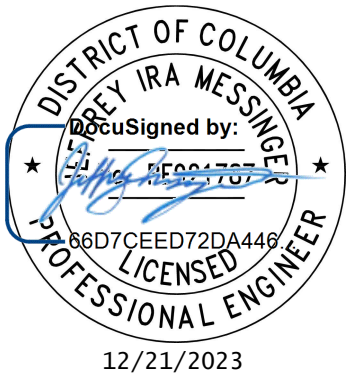
**ISSUED FOR CONSTRUCTION**

THIS PAGE NOT USED

**CONTRACT SPECIFICATIONS**

**SEAL PAGE**

The Professional seal and signature fixed hereon indicates the professionals' review and participation in the preparation of the Contract Specifications.




Sections:

31 21 11

# TABLE OF CONTENTS

**LEGEND**

**Rev: Revision Number**
**(To be used after Issued for Construction)**
**X: Issued as part of indicated package**

**Prep (Preparing Discipline)**
AR – Architectural
BEB – Battery Electric Bus
CI – Civil
CxA – Commissioning Agent
DF – Demolition & Foundations
EL – Electrical
FP – Fire Protection
GH – Geotechnical / HAZMAT
GR – From WMATA RFP
HP – Historic Preservation
IN – Industrial Equipment & Piping
ME – Mechanical
PL – Plumbing
PV – Photovoltaic
SI – Supplemental Information
ST – Structural
STT – Structural Temporary

| | | DEMO 100% | DP1 | DP2 VOL. 01 | BEB | Prep |
|---|---|---|---|---|---|---|
| 01 32 20 | CONTRACT PROGRESS REPORTING | | | | | GR |
| 01 33 00 | SUBMITTAL PROCEDURES | | | | | GR |
| 01 35 91 | HISTORIC TREATMENT PROCEDURES | X | | | | HP |
| 01 41 00 | REGULATORY REQUIREMENTS | | | | | GR |
| 01 42 00 | REFERENCES | | | | | GR |
| 01 47 00 | QUALITY MANAGEMENT SYSTEM | | | | | GR |
| 01 51 00 | TEMPORARY UTILITIES | | | | | GR |
| 01 52 00 | TEMPORARY CONSTRUCTION FACILITIES | | | | | GR |
| 01 53 00 | TEMPORARY DECKING | | | | | GR |
| 01 55 00 | MAINTENANCE OF TRAFFIC, ACCESS, AND PARKING | | | | | GR |
| 01 56 00 | TEMPORARY BARRIERS AND ENCLOSURES | | | | | GR |
| 01 57 00 | TEMPORARY CONTROLS | | | | | GR |
| 01 58 00 | PROJECT SIGNS | | | | | GR |
| 01 61 00 | BASIC PRODUCT REQUIREMENTS | | | | | GR |
| 01 63 00 | PRODUCT SUBSTITUTION PROCEDURES | | | | | GR |
| 01 71 10 | ACCEPTANCE OF CONDITIONS | | | | | GR |
| 01 72 10 | LAYOUT OF WORK AND FIELD ENGINEERING | | | | | GR |
| 01 72 20 | MOBILIZATION | | | | | GR |
| 01 72 30 | PROTECTION OF ADJACENT CONSTRUCTION | | | | | GR |
| 01 73 10 | CUTTING AND PATCHING | | | | | GR |
| 01 74 00 | CLEANING | | | | | GR |
| 01 74 19 | DEMOLITION WASTE MANAGEMENT AND DISPOSAL | X | | | | AR |
| 01 74 21 | CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL | | X | | | AR |
| 01 77 50 | CLOSEOUT | | | X | | GR |
| 01 81 13 | SUSTAINABLE DESIGN REQUIREMENTS | X | | | | AR |
| 01 82 00 | DEMONSTRATION AND TRAINING | | | | | GR |
| 01 91 13 | GENERAL COMMISSIONING REQUIREMENTS (TBD) | | | | | CxA |
| 01 91 15 | COMMISSIONING OF BUILDING ENCLOSURE REQUIREMENTS (TBD) | | | | | CxA |
| | | | | | | |
| **DIVISION 02 - EXISTING CONDITIONS** | | | | | | |
| 02 41 00 | DEMOLITION | X | | | | DF |
| 02 43 17 | REMOVAL AND SALVAGE OF EXISTING FACILITIES | X | | | | HP |
| 02 65 00 | UNDERGROUND STORAGE TANK REMOVAL | X | | | | GH |
| 02 82 13.41 | ASBESTOS ABATEMENT | X | | | | GH |
| 02 83 33.13 | LEAD BASED PAINT AND UNIVERSAL WASTE REMOVAL | X | | | | GH |
| | | | | | | |

| | | DEMO 100% | DP1 | DP2 VOL. 01 | BEB | Prep |
|---|---|---|---|---|---|---|
| **DIVISION 03 - CONCRETE** | | | | | | |
| 03 10 00 | CONCRETE FORMING AND ACCESSORIES | X | | | | ST |
| 03 20 00 | CONCRETE REINFORCING | X | | | | ST |
| 03 30 00.01 | CAST-IN-PLACE CONCRETE – TEMPORARY | X | | | | STT |
| 03 30 00.02 | CAST-IN-PLACE CONCRETE – PERMANENT | X | | | | ST |
| 03 37 13 | SHOTCRETE | X | | | | DF |
| 03 42 13 | PRECAST CONCRETE PRODUCTS FOR BELOW GRADE CONSTRUCTION | | X | | | DF |
| 03 45 00 | PRECAST ARCHITECTURAL CONCRETE | | | X | | AR |
| 03 62 13 | NON-METALLIC NON-SHRINK GROUTING | | X | | | STV |
| | | | | | | |
| **DIVISION 04 - MASONRY** | | | | | | |
| 04 03 22 | HISTORIC BRICK UNIT MASONRY REPAIR, REPOINTING, AND CLEANING | | | X | | HP |
| 04 03 42 | HISTORIC STONE MASONRY REPAIR, REPOINTING, AND CLEANING | | | X | | HP |
| 04 05 13 | MORTAR, GROUT, AND MASONRY ACCESSORIES | | X | | | AR |
| 04 20 00 | UNIT MASONRY | | | X | | AR |
| | | | | | | |
| **DIVISION 05 - METALS** | | | | | | |
| 05 12 00.01 | STRUCTURAL STEEL FRAMING - TEMPORARY | X | | | | ST |
| 05 12 00.02 | STRUCTURAL STEEL FRAMING - PERMANENT | | X | | | ST |
| 05 31 00 | METAL DECKING | | X | | | ST |
| 05 40 00 | COLD-FORMED METAL FRAMING | | | X | | AR |
| 05 50 00 | MISCELLANEOUS METALS | | X | | | AR |
| 05 51 00 | METAL STAIRS | | X | | | AR |
| 05 52 13 | PIPE AND TUBE RAILINGS | | X | | | AR |
| 05 53 13 | BAR GRATINGS | | X | | | ST |
| 05 73 00 | DECORATIVE METAL RAILINGS | | | X | | AR |
| | | | | | | |
| **DIVISION 06 - WOOD PLASTICS AND COMPOSITES** | | | | | | |
| 06 10 00 | ROUGH CARPENTRY | | | X | | AR |
| 06 16 00 | SHEATHING | | | X | | AR |
| 06 40 23 | INTERIOR ARCHITECTURAL WOODWORK | | | X | | AR |
| | | | | | | |
| **DIVISION 07 - THERMAL AND MOISTURE PROTECTION** | | | | | | |
| 07 13 00 | MEMBRANE WATERPROOFING | | X | | | AR |
| 07 18 00 | TRAFFIC COATINGS | | | X | | AR |

| | | DEMO 100% | DP1 | DP2 VOL. 01 | BEB | Prep |
|---|---|---|---|---|---|---|
| 07 24 00 | BUILDING INSULATION | | X | | | AR |
| 07 27 26 | FLUID-APPLIED MEMBRANE AIR BARRIERS | | | X | | AR |
| 07 31 26 | SLATE ROOF | | | X | | HP |
| 07 42 10.11 | COMPOSITE FRAMING SUPPORT SYSTEM | | | X | | AR |
| 07 42 47 | ULTRA-HIGH-PERFORMANCE CONCRETE (UPHC) PANEL SYSTEM | | | X | | AR |
| 07 42 93 | SOFFIT PANELS | | | X | | AR |
| 07 54 19 | POLYVINYL-CHLORIDE (PVC) ROOFING | | | X | | AR |
| 07 55 56 | FLUID-APPLIED PROTECTED MEMBRANE ROOFING | | | X | | AR |
| 07 60 00 | FLASHING AND SHEET METAL | | X | | | AR |
| 07 61 00 | SHEET METAL ROOFING | | | X | | HP |
| 07 72 00 | ROOF ACCESSORIES | | | X | | AR |
| 07 72 73 | VEGETATED ROOF SYSTEMS | | | X | | AR |
| 07 76 00 | CONCRETE PAVERS | | | X | | AR |
| 07 81 15 | SPRAYED FIREPROOFING | | | X | | AR |
| 07 81 23 | INTUMESCENT FIREPROOFING | | | X | | AR |
| 07 84 00 | FIRESTOPPING | | | X | | AR |
| 07 84 43 | JOINT FIRESTOPPING | | | X | | AR |
| 07 92 00 | JOINT SEALANTS | | X | | | AR |
| 07 92 19 | ACOUSTICAL JOINT SEALANTS | | | X | | AR |
| 07 95 13 | EXPANSION JOINT COVER ASSEMBLIES | | | X | | AR |
| | | | | | | |
| **DIVISION 08 - OPENINGS** | | | | | | |
| 08 03 52 | HISTORIC TREATMENT OF WOOD WINDOWS | | | X | | HP |
| 08 11 13 | HOLLOW METAL DOORS AND FRAMES | | | X | | AR |
| 08 11 19 | STAINLESS-STEEL DOORS AND FRAMES | | | X | | AR |
| 08 11 77 | BULLET-RESISTANT STEEL DOORS | | | X | | AR |
| 08 31 13 | ACCESS DOORS AND FRAMES | | | X | | AR |
| 08 33 13 | COILING COUNTER DOORS | | | X | | AR |
| 08 33 23 | OVERHEAD COILING DOORS | | | X | | AR |
| 08 33 23.13 | HIGH PERFORMANCE OVERHEAD HIGH SPEED DOORS | | | X | | AR |
| 08 33 26 | OVERHEAD COILING GRILLES | | | X | | AR |
| 08 33 33 | FIRE SHUTTERS | | | X | | AR |
| 08 36 13 | SECTIONAL DOORS | | | X | | AR |
| 08 41 13 | ALUMINUM ENTRANCES AND STOREFRONTS | | | X | | AR |
| 08 44 13 | GLAZED ALUMINUM CURTAIN WALL | | | X | | AR |
| 08 44 23 | FIRE RATED CURTAIN WALL | | | X | | AR |

| | | DEMO 100% | DP1 | DP2 VOL. 01 | BEB | Prep |
|---|---|---|---|---|---|---|
| 08 51 13 | ALUMINUM WINDOWS | | | X | | AR |
| 08 52 00 | ALUMINUM CLAD WOOD WINDOWS | | | X | | HP |
| 08 56 53 | SECURITY WINDOWS | | | X | | AR |
| 08 71 11 | DOOR HARDWARE | | | X | | AR |
| 08 80 00 | GLASS AND GLAZING | | | X | | AR |
| 08 80 00.13 | INSULATED WINDOW PANELS | | | X | | AR |
| 08 91 00 | METAL LOUVERS | | | X | | AR |
| | | | | | | |
| **DIVISION 09 - FINISHES** | | | | | | |
| 09 21 16 | DRYWALL SYSTEMS | | | X | | AR |
| 09 24 00 | PORTLAND CEMENT PLASTERING STUCCO | | | X | | HP |
| 09 30 00 | CERAMIC TILE | | | X | | AR |
| 09 51 13 | ACOUSTICAL PANEL CEILINGS | | | X | | AR |
| 09 65 00 | RESILIENT FLOORING AND ACCESSORIES | | | X | | AR |
| 09 66 23 | RESINOUS MATRIX TERRAZZO FLOORING | | | X | | AR |
| 09 68 13 | TILE CARPETING | | | X | | AR |
| 09 72 00 | WALL COVERINGS | | | X | | AR |
| 09 84 53 | PARTITION CLOSURE | | | X | | AR |
| 09 91 23 | INTERIOR PAINTING | | | X | | AR |
| 09 96 00 | HIGH-PERFORMANCE COATINGS | | X | | | AR |
| | | | | | | |
| **DIVISION 10 - SPECIALTIES** | | | | | | |
| 10 11 00 | VISUAL DISPLAY UNITS | | | X | | AR |
| 10 14 00 | SIGNAGE | | | X | | AR |
| 10 21 13.19 | PLASTIC TOILET COMPARTMENTS | | | X | | AR |
| 10 22 13 | WIRE MESH PARTITIONS | | | X | | AR |
| 10 22 39 | FOLDING PANEL PARTITIONS | | | X | | AR |
| 10 26 00 | WALL PROTECTION | | | X | | AR |
| 10 26 41 | BULLET RESISTANT PANELS | | | X | | AR |
| 10 28 13 | TOILET ACCESSORIES | | | X | | AR |
| 10 30 00 | DOORWAY SPILL BARRIER | | X | | | AR |
| 10 44 13 | FIRE PROTECTION CABINETS | | | X | | AR |
| 10 44 16 | FIRE EXTINGUISHERS | | | X | | AR |
| 10 51 13 | METAL LOCKERS | | | X | | AR |
| 10 56 00 | STORAGE ASSEMBLIES | | | X | | IN |
| 10 75 16 | GROUND-SET FLAGPOLES | | X | | | AR |

| | | DEMO 100% | DP1 | DP2 VOL. 01 | BEB | Prep |
|---|---|---|---|---|---|---|
| | | | | | | |
| **DIVISION 11 - EQUIPMENT** | | | | | | |
| 11 05 00 | COMMON WORK RESULTS FOR EQUIPMENT | | X | | X | IN |
| 11 11 10 | SERVICE STATION EQUIPMENT | | X | | | IN |
| 11 11 19 | LUBRICATION EQUIPMENT | | | X | | IN |
| 11 11 20 | AIR COMPRESSOR AND APPURTENANCES | | | X | | IN |
| 11 11 26 | VEHICLE WASH EQUIPMENT | | X | | | IN |
| 11 11 36 | BATTERY ELECTRIC BUS CHARGER | | | | X | EL |
| 11 12 00 | PARKING CONTROL EQUIPMENT | | | X | | AR |
| 11 16 00 | VAULT EQUIPMENT | | | X | | IN |
| 11 19 16 | CLEARING TRAP | | | X | | AR |
| 11 19 23 | GUN SAFE | | | X | | AR |
| 11 19 25 | WALL MOUNTED FIREARMS BOX | | | X | | AR |
| 11 30 13 | RESIDENTIAL APPLIANCES | | | X | | AR |
| 11 52 13 | PROJECTION SCREENS | | | X | | AR |
| 11 96 00 | GENERAL SHOP EQUIPMENT | | | X | X | IN |
| 11 96 10 | MISCELLANEOUS EQUIPMENT | | | X | | IN |

| | | DEMO 100% | DP1 | DP2 VOL. 02 | BEB | Prep |
|---|---|---|---|---|---|---|
| **DIVISION 12 - FURNISHINGS** | | | | | | |
| 12 24 13 | ROLLER WINDOW SHADES | | | X | | AR |
| 12 48 13 | ENTRANCE FLOOR MATS AND FRAMES | | X | | | AR |
| 12 50 00 | FURNITURE | | | X | | AR |
| 12 93 13 | BICYCLE RACKS AND ACCESSORIES | | | X | | AR |
| | | | | | | |
| **DIVISION 13 - SPECIAL CONSTRUCTION** | | | | | | |
| 13 34 23 | PRE-FABRICATED HAZARDOUS MATERIALS STORAGE SYSTEMS | | | X | | IN |
| 13 60 00 | FABRICATED EQUIPMENT | | | X | | IN |
| | | | | | | |
| **DIVISION 14 - CONVEYING EQUIPMENT** | | | | | | |
| 14 21 20 | GEARED TRACTION PASSENGER ELEVATORS | | X | | | AR |
| 14 24 10 | IN-GROUND HYDRAULIC ELEVATORS | | X | | | AR |
| 14 45 00 | VEHICLE LIFTS | | X | | | IN |
| 14 80 00 | SCAFFOLDING | | | | X | IN |
| 14 83 00 | ELEVATING PLATFORMS | | | X | X | IN |
| | | | | | | |

| | | DEMO 100% | DP1 | DP2 VOL. 02 | BEB | Prep |
|---|---|---|---|---|---|---|
| **DIVISION 15 to 20 - NOT USED** | | | | | | |
| | | | | | | |
| **DIVISION 21 - FIRE SUPPRESSION** | | | | | | |
| 21 05 13 | COMMON MOTOR REQUIREMENTS FOR FIRE SUPPRESSION EQUIPMENT | | | X | | FP |
| 21 05 18 | ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING | | | X | | FP |
| 21 05 23 | GENERAL-DUTY VALVES FOR FIRE PROTECTION PIPING | | | X | | FP |
| 21 05 29 | HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT | | X | | | FP |
| 21 05 48 | VIBRATION CONTROLS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT | | | X | | FP |
| 21 05 53 | IDENTIFICATION OF FIRE-SUPPRESSION PIPING AND EQUIPMENT | | | X | | FP |
| 21 11 19 | FIRE DEPARTMENT CONNECTIONS | | | X | | FP |
| 21 12 05 | FIRE PROTECTION AND SUPPRESSION | | | X | | FP |
| 21 31 13 | ELECTRIC-DRIVE, CENTRIFUGAL FIRE PUMPS | | | X | | FP |
| | | | | | | |
| **DIVISION 22 - PLUMBING** | | | | | | |
| 22 05 13 | COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT | | | X | | PL |
| 22 05 17 | SLEEVES AND SLEEVE SEALS FOR PIPING | | X | | | PL |
| 22 05 19 | METERS AND GAGES FOR DOMESTIC PLUMBING | | | X | | PL |
| 22 05 33 | HEAT TRACING FOR PLUMBING PIPING | | | X | | PL |
| 22 05 48 | VIBRATION ISOLATION | | | X | | PL |
| 22 05 53 | IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT | | | X | | PL |
| 22 07 00 | PLUMBING INSULATION | | | X | | PL |
| 22 08 00 | COMMISSIONING OF PLUMBING (TBD) | | | | | CxA |
| 22 10 00 | PIPING SYSTEMS | | X | | | PL |
| 22 11 23 | FACILITY NATURAL-GAS PIPING | | | X | | ME |
| 22 11 35 | MISCELLANEOUS PLUMBING PUMPS | | | X | | PL |
| 22 12 23 | FACILITY INDOOR POTABLE WATER STORAGE TANKS | | | X | | PL |
| 22 14 13 | FACILITY STORM DRAINAGE PIPING | | X | | | PL |
| 22 14 23 | STORM DRAINAGE PIPING SPECIALTIES | | X | | | PL |
| 22 25 13 | COALESCING OIL/WATER SEPARATOR | | | X | | PL |
| 22 33 00 | DOMESTIC WATER HEATERS | | | X | | PL |
| 22 42 10 | PLUMBING FIXTURES | | | X | | PL |
| 22 70 13 | FLUID SYSTEM PIPING | | X | | | IPL |
| | | | | | | |
| **DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)** | | | | | | |

| | | DEMO 100% | DP1 | DP2 VOL. 02 | BEB | Prep |
|---|---|---|---|---|---|---|
| 23 05 13 | COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT | | | X | | ME |
| 23 05 16 | EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING | | | X | | ME |
| 23 05 18 | ESCUTCHEONS FOR HVAC PIPING | | | X | | ME |
| 23 05 19 | METERS AND GAGES FOR HVAC PIPING | | | X | | ME |
| 23 05 23 | GENERAL VALVES FOR HVAC PIPING | | | X | | ME |
| 23 05 29 | HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT | | | X | | ME |
| 23 05 48 | VIBRATION CONTROLS FOR HVAC | | | X | | ME |
| 23 05 53 | IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT | | | X | | ME |
| 23 05 93 | SYSTEM BALANCING AND TESTING | | | X | | ME |
| 23 07 00 | HVAC INSULATION | | | X | | ME |
| 23 08 00 | COMMISSIONING OF HVAC (TBD) | | | | | CxA |
| 23 09 00 | CONTROL EQUIPMENT | | | X | | ME |
| 23 09 15.01 | CONTROL DOCUMENTATION | | | X | | ME |
| 23 09 23 | ULTRASONIC FLOWMETERS | | | X | | ME |
| 23 09 28 | GAS INSTRUMENTS | | | X | | ME |
| 23 21 13 | HYDRONIC PIPING | | | X | | ME |
| 23 21 16 | HYDRONIC PIPING SPECIALTIES | | | X | | ME |
| 23 21 23 | CHILLED WATER PUMPS | | | X | | ME |
| 23 21 24 | HYDRONIC PUMPS | | | X | | ME |
| 23 23 00 | REFRIGERANT PIPING | | | X | | ME |
| 23 25 00 | WATER TREATMENT SYSTEM | | | X | | ME |
| 23 31 00 | DUCTWORK | | | X | | ME |
| 23 34 00 | FANS | | | X | | ME |
| 23 34 33 | AIR CURTAINS | | | X | | ME |
| 23 36 00 | AIR TERMINAL UNITS | | | X | | ME |
| 23 37 00 | OUTLETS AND GRILLES | | | X | | ME |
| 23 37 23 | HVAC GRAVITY VENTILATORS | | | X | | ME |
| 23 41 00 | FILTERS | | | X | | ME |
| 23 52 16 | CONDENSING BOILERS | | | X | | ME |
| 23 60 00 | CHILLER PLANT | | | X | | ME |
| 23 64 00 | CHILLERS | | | X | | ME |
| 23 73 13 | VENTILATING UNITS | | | X | | ME |
| 23 73 14 | INDOOR SEMI-CUSTOM, BASIC AIR-HANDLING UNITS | | | X | | ME |
| 23 74 16 | PACKAGED, ROOFTOP AIR-CONDITIONING UNITS (FOR RETAIL) | | | X | | ME |
| 23 81 23 | COMPUTER-ROOM AIR-CONDITIONERS | | | X | | ME |
| 23 81 26 | SPLIT-SYSTEM AIR-CONDITIONERS | | | X | | ME |

| | | DEMO 100% | DP1 | DP2 VOL. 02 | BEB | Prep |
|---|---|---|---|---|---|---|
| 23 82 00 | HEATING EQUIPMENT | | | X | | ME |
| 23 82 39 | CABINET UNIT HEATERS | | | X | | ME |
| 23 82 40 | PROPELLER UNIT HEATERS | | | X | | ME |

| | | DEMO 100% | DP1 | DP2 VOL. 03 | BEB | Prep |
|---|---|---|---|---|---|---|
| **DIVISION 24 to 25 - NOT USED** | | | | | | |
| | | | | | | |
| **DIVISION 26 - ELECTRICAL** | | | | | | |
| 26 00 00 | ELECTRIC WORK FOR BUS FACILITY | | X | | | EL |
| 26 01 00 | OPERATION AND MAINTENANCE TRAINING FOR AC ROOMS | | | X | | EL |
| 26 02 00 | BASIC ELECTRICAL MATERIALS AND METHODS | | X | | | EL |
| 26 05 10 | INTERFACE CRITERIA AND RESPONSIBILITIES | | | X | | EL |
| 26 05 13 | MEDIUM VOLTAGE CABLE | | | X | | EL |
| 26 05 19 | WIRE, CABLE AND BUSWAYS (LOW VOLTAGE) | | X | | X | EL |
| 26 05 26 | GROUNDING AND BONDING | | X | | | EL |
| 26 05 29 | WIRE CONNECTION ACCESSORIES | | | X | | EL |
| 26 05 33 | RACEWAYS, BOXES AND CABINETS | | X | | X | EL |
| 26 05 43 | UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS | | X | | | EL |
| 26 05 72 | OVERCURRENT PROTECTIVE DEVICE SHORT-CIRCUIT STUDY | | | X | | EL |
| 26 05 73 | OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY | | | X | | EL |
| 26 05 74 | OVERCURRENT PROTECTIVE DEVICE ARC-FLASH STUDY | | | X | | EL |
| 26 08 00 | COMMISSIONING OF ELECTRICAL SYSTEMS (TBD) | | | | | CxA |
| 26 09 23 | WIRING AND CONTROL DEVICES | | | X | | EL |
| 26 11 13 | UNIT SUBSTATION | | | X | | EL |
| 26 12 10 | TRANSFORMERS | | | X | | EL |
| 26 13 00 | HIGH-VOLTAGE AC SWITCHGEAR | | | X | | EL |
| 26 23 00 | LOW-VOLTAGE SWITCHGEAR AND SWITCHBOARD | | | X | | EL |
| 26 24 14 | PROGRAMMABLE LOGIC CONTROLLER (PLC) AND HUMAN MACHINE INTERFACE (HMI) FOR AC SWITCHGEAR SYSTEMS | | | X | | EL |
| 26 24 19 | MOTOR STARTERS | | | X | | EL |
| 26 24 21 | CIRCUIT BREAKERS, PANELBOARDS AND LOAD CENTERS | | | X | | EL |
| 26 27 13 | ELECTRICITY METERING | | | X | | EL |
| 26 28 16 | ENCLOSED SWITCHES AND CIRCUIT BREAKERS | | | X | | EL |
| 26 31 00 | PHOTOVOLTAIC (PV) SYSTEM – ROOF MOUNTED | | | X | | EL |
| 26 31 02 | EV CHARGING SYSTEM | | | X | | EL |
| 26 32 13 | EMERGENCY STANDBY GENERATOR SYSTEM | | | X | | EL |

| | | DEMO 100% | DP1 | DP2 VOL. 03 | BEB | Prep |
|---|---|---|---|---|---|---|
| 26 33 13.1 | BATTERIES LEAD ACID-SELENIUM | | | X | | EL |
| 26 33 53 | UNINTERRUPTIBLE POWER SYSTEM | | | X | | EL |
| 26 42 00 | CORROSION CONTROL | X | | | | STV |
| 26 42 19 | CORROSION CONTROL SYSTEM TESTING | X | | | | STV |
| 26 51 19 | LED INTERIOR LIGHTING | | | X | | EL |
| 26 51 20 | LIGHTING CONTROL SYSTEMS | | | X | | EL |
| 26 52 19 | EMERGENCY AND EXIT LIGHTING | | | X | | EL |
| 26 56 13 | LIGHTING POLES AND STANDARDS | | | X | | EL |
| 26 56 19 | LED EXTERIOR LIGHTING | | | X | | EL |
| 26 56 19.01 | LED HISTORIC DISPLAY LIGHTING | | | X | | EL |
| 26 60 00 | LIGHTNING PROTECTION | | | X | | EL |
| | | | | | | |
| **DIVISION 27 - COMMUNICATIONS** | | | | | | |
| 27 00 00 | TELECOMMUNICATION AND DATA COMMUNICATIONS OVERVIEW | | | X | | EL |
| 27 00 10 | COMMUNICATIONS STANDARD SPECIFICATIONS - ENGINEERING SERVICES | | | X | | EL |
| 27 00 20 | COMMUNICATIONS STANDARD SPECIFICATIONS - INSTALLATION | | X | | | EL |
| 27 00 30 | COMMUNICATIONS STANDARD SPECIFICATIONS - EQUIPMENT AND MATERIALS | | | X | | EL |
| 27 00 40 | COMMUNICATIONS SYSTEM SUBMITTALS AND SERVICES | | | X | | EL |
| 27 00 60 | COMMUNICATIONS - TELEPHONE AND DATA SYSTEM | | | X | | EL |
| 27 00 70 | COMMUNICATIONS SYSTEMS QUALITY ASSURANCE & TESTING | | | X | | EL |
| 27 02 40 | COMMUNICATIONS-METRO AREA RADIO SYSTEM | | | X | | EL |
| 27 05 43 | UNDERGROUND ELECTRICAL AND COMMUNICATIONS DISTRIBUTION SYSTEMS | | X | | | EL |
| 27 10 10 | COMMUNICATIONS GROUNDING | | X | | | EL |
| 27 10 20 | COMMUNICATIONS ELECTRICAL POWER DISTRIBUTION | | X | | | EL |
| 27 26 28 | INTERCOM SYSTEM | | | X | | EL |
| 27 32 26 | AORA RING-DOWN EMERGENCY PHONE | | | X | | EL |
| 27 51 16.02 | COMMUNICATIONS – IP PUBLIC ADDRESS SYSTEM | | | X | | EL |
| | | | | | | |
| **DIVISION 28 - ELECTRONIC SAFETY AND SECURITY** | | | | | | |
| 28 13 00 | ELECTRONIC ACCESS CONTROL SYSTEMS | | | X | | EL |
| 28 23 11 | COMMUNICATIONS - CLOSED-CIRCUIT TELEVISION SYSTEM | | | X | | EL |
| 28 31 00 | ENVIRONMENTAL AIR SAMPLING FOR SMOKE DETECTION | | | X | | EL |
| 28 31 32 | COMMUNICATIONS - FIRE ALARM, DETECTION, AND NOTIFICATION | | | X | | EL |
| 28 40 00.01 | SCADA WORK FOR AC ROOMS | | | X | | EL |

| | | DEMO 100% | DP1 | DP2 VOL. 03 | BEB | Prep |
|---|---|---|---|---|---|---|
| 28 40 02 | REMOTE TERMINAL UNIT (RTU) FOR ELECTRICAL SCADA SYSTEMS | | | X | | EL |
| 28 40 04 | NETWORK SWITCH FOR SCADA AND AUTOMATION SYSTEMS | | | X | | EL |
| 28 40 06.01 | SCADA SYSTEMS INTEGRATION TESTING AND DOCUMENTATION FOR AC ROOMS | | | X | | EL |
| 28 40 07.01 | HUMAN MACHINE INTERFACE FOR AC ROOM SCADA SYSTEMS | | | X | | EL |
| 28 40 08 | WIRE, CABLE, CABLE TRAY, AND TERMINATION PANEL FOR SCADA SYSTEMS | | X | | | EL |
| | | | | | | |
| **DIVISION 29 to 30 - NOT USED** | | | | | | |
| | | | | | | |
| **DIVISION 31 - EARTHWORK** | | | | | | |
| 31 09 13 | GEOTECHNICAL AND STRUCTURAL INSTRUMENTATION | X | | | | DF |
| 31 10 10 | SITE CLEARING | X | | | | DF |
| 31 20 10 | GRADING, EXCAVATING AND BACKFILLING | X | | | | CI |
| 31 21 11 | SOIL GAS COLLECTION SYSTEM | | X | | | IN |
| 31 23 16.26 | ROCK REMOVAL | | X | | | GH |
| 31 23 19 | DEWATERING | X | | | | DF |
| 31 40 10 | UNDERPINNING, SUPPORT AND RESTORATION OF STRUCTURE | X | | | | DF |
| 31 50 10 | SUPPORT OF EXCAVATION | X | | | | DF |
| 31 63 29 | DRILLED CAISSONS | | X | | | GH |
| 31 63 33 | MICRO PILES | X | | | | DF |
| | | | | | | |
| **DIVISION 32 - EXTERIOR IMPROVEMENTS** | | | | | | |
| 32 00 00 | GENERAL DIVISION 32 PUBLIC RIGHT-OF-WAY SPECIFICATIONS | X | | | | CI |
| 32 17 23 | INTERIOR PAVEMENT MARKINGS | | | X | | AR |
| | | | | | | |
| **DIVISION 33 - SITE IMPROVEMENTS** | | | | | | |
| 33 00 00 | GENERAL DIVISION 33 PUBLIC RIGHT OF WAY SPECIFICATIONS | X | | | | CI |
| 33 05 26 | MARKERS | | X | | | CI |
| 33 46 00 | SLAB SUBDRAINAGE | | X | | | CI |
| | | | | | | |
| **DIVISION 34 to 40 - NOT USED** | | | | | | |
| | | | | | | |
| **DIVISION 41 - MATERIAL PROCESSING AND HANDLING EQUIPMENT** | | | | | | |
| 41 22 00 | CRANES AND HOISTS | | | X | | IN |
| 41 63 00 | GENERAL VEHICLES | | | X | | IN |

**--- End of Table of Contents ---**

# SECTION 31 21 11

# SOIL GAS COLLECTION SYSTEM

## PART 1 – GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Contract Requirements and General and Supplementary Conditions from the Division 00 and 01 Specification Sections, apply to this Section.

### 1.02 SUMMARY

A. This Section includes the following:

1. Vapor Retarder.
2. Vapor Collection Materials

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Cast-in-Place Concrete: 03 30 00.02
2. Facility Storm Drainage Piping: 22 14 13

### 1.03 PERFORMANCE REQUIREMENTS

A. General: Provide a gas venting material that collects gas vapors and directs them to discharge or to collection points as specified in the gas vapor collection system drawings and complies with the physical requirements set forth by the manufacturer.

### 1.04 SUBMITTALS

A. Submit Product Data for each element of the vapor management system specified, including manufacturer's specifications.

B. Sample – Submit representative samples of the following for approval:

1. Vapor Retarder
2. Vapor Collection
3. Pre-Molded Compressible Filler

## PART 2 – PRODUCTS

### 2.01 MANUFACTURER

A. Vapor Collection

1. Land Science, San Clemente, CA. (949) 481-8118
   a. TerraVent
2. CETCO, Bethlehem, PA. (800) 527-9948
   a. GEOVENT
3. Approved equal

B. Vapor Retarder

1. Viaflex, Sioux Falls, SD (605) 335-0174

a. Absolute Barrier Y30BAC

2. Approved Equal

C. Pre-Molded Compressible Filler

1. W.R. Meadows, Inc, Hampshire, IL (800) 342-5976

## 2.02 VAPOR COLLECTION MATERIALS

A. Provide a low profile, trenchless, flexible, sub slab vapor collection system with the following physical properties:

| PROPERTIES | TEST METHOD | Material |
|---|---|---|
| | | |
| **Vent Core Properties** | | |
| Compressive Strength | ASTM D-1621 | 9,500 psf. |
| Thickness | | 1 inch |
| Flow Rate - Hydraulic gradient - 0.1 | ASTM D-4716 | 30 gpm/ft width |
| | | |
| **Vent Fabric Properties** | | |
| Grab Tensile Strength | ASTM D-4632 | 100 lbs. |
| CBR Puncture | ASTM D-6241 | 250 lbs. |
| Flow | ASTM D-4491 | 140 gpm/ft2 |
| AOS | ASTM D-4751 | 70 U.S Sieve |
| Permittivity | ASTM D-4491 | 2.0 sec-1 |
| U.V Resistance | ASTM D-4355 | 70% @500 hrs. |

Include manufacturer's recommended pipe outlets and adhesive or pressure sensitive tape.

B. Vapor Retarder – High performance geomembrane gas barrier; not less than 30 mils (one thousandth of an inch) thick. Include manufacturer's recommended adhesive or pressure sensitive tape. The vapor retarder must be petroleum and solvent resistant.

## 2.03 PVC PIPE AND FITTINGS

A. Solid-Wall PVC sch 40 Pipe: ASTM D 2665; drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

D. Solvent Cement: ASTM D 2564.

## 2.04 VALVES

A. Petcock Valve (for Sampling):

1. Body Material: PVC.
2. Body Style: Inline.
3. Valve Structure: One Piece.
4. Pipe Size: ¼ inch.
5. Connection Type: MNPT x Barb.
6. Port: Full.
7. Maximum Pressure: 150 psi CWP.
8. Temperature Range: 30 to 120 degrees Fahrenheit.
9. Ball Material: PVC.
10. Seat Material: PTFE.
11. Stem: One Piece Stem.
12. Handle Type: Tee.
13. Handle Material: ABS.
14. Stem Material: PVC.
15. Body Seal Material: EPDM.
16. Standards: NSF-61.
17. Features: Precise Finger Tip Control.

### 2.05 Pre-molded Compressible Filler

A. Provide a lightweight, non-staining, polypropylene, closed-cell expansion joint filler meeting the following specifications/standards:

1. ASTM D8139-17 – Standard Specification for Semi-Rigid, Closed-Cell Polypropylene Foam, Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction
2. ASTM D1751 – Extrusion, Compression Recovery, Water Absorption

## PART 3 – EXECUTION

### 3.01 INSTALLATION

A. Examine substrates, areas, and conditions under which gas vent system will be installed, with installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.02 STRIP VAPOR COLLECTION INSTALLATION

A. Install TerraVent over substrate material where designated on drawings with the flat base of the core placed up. Shall be overlapped in accordance with manufacturer's recommendations.

B. At areas where TerraVent strips intersect cut and fold back fabric to expose the dimpled core. Arrange the strips so that the top strip interconnects into the bottom strip. Unfold fabric to cover the core and use reinforcing tape, as approved by the manufacturer, to seal the connection to prevent sand or gravel from entering the core.

C. When connecting TerraVent to PVC pipe, attach a TerraVent End Outlet at both ends of the PVC pipe before connecting the TerraVent to the pipe reducer. Seal the TerraVent to the TerraVent End Outlet using fabric reinforcement tape.

D. Place vent risers per specifying engineer's project specifications. Connect TerraVent to TerraVent End Outlet and seal with fabric reinforced tape. Use TerraVent End Outlet with the specified diameter piping as shown on system drawings.

## 3.03 SHEET VAPOR RETARDER INSTALLATION

A. Unroll vapor barrier with the longest dimensions parallel with the direction of the concrete placement and face laps away from the expected direction of the placement where feasible.

B. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.

C. Overlap joint six inches and seal with manufacture's recommended seam tape.

D. Seal all penetrations per manufacturer's instructions.

E. Repair damaged areas per the following:

1. Less than one inch – use manufacturer's recommended seam tape.
2. Larger than one inch – patch area with same geomembrane with patch extending six inches from nearest damage and seal with manufacturer's recommended seam tape.
3. Slit or tears – circle cut end of each slit or tear and patch area with same geomembrane. The patch shall extend six inches from nearest damage and seal with manufacturer's recommended seam tape

## 3.04 PLACEMENT OF OVERLYING AND ADJACENT MATERIALS

A. All overlying and adjacent material shall be placed or installed using approved procedures and guidelines to prevent damage to the strip vapor collection system and vapor barrier.

B. Equipment shall not be directly driven over and stakes or any other materials may not be driven through the strip vapor collection system.

C. Any penetrations through the vapor barrier shall be detailed per manufacturer's recommended details prior to being covered by subsequent pours.

**END OF SECTION**

# Appendix D

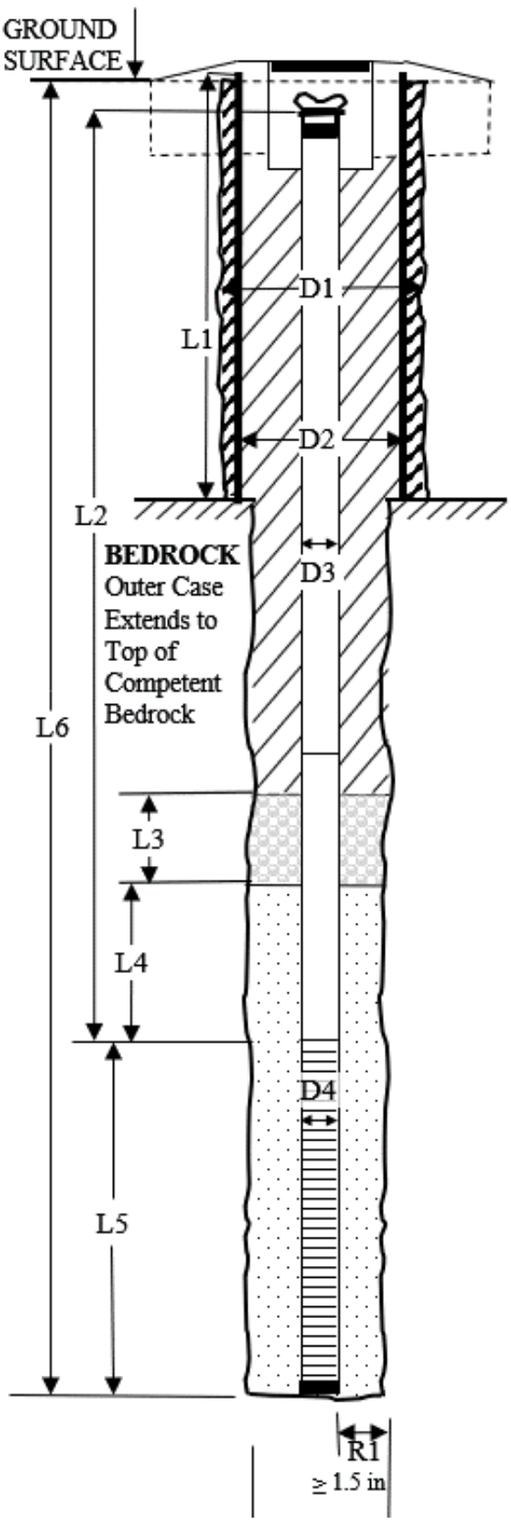
## Well Construction Details

DEPARTMENT OF ENERGY & ENVIRONMENT

# MONITORING WELL SCHEMATIC (Flush Mount) Outer Casing Extended to Bedrock

**District of Columbia Regulatory Review Division**

*Check one: Application* ☒ *Change-In-Use* ☐ *as-Built* ☐




| | | |
|---|---|---|
| **1** | **Watertight cap?** | ☒ |
| **2** | **Curb box and concrete pad** | |
| 2.1 | Concrete pad area (square feet) | **4 (2'x2')** |
| **3** | **Borehole diameter (D1) (inches)** | **10.5** |
| **4** | **Outer casing (use if area is contaminated)** | |
| 4.1 | Temporary or permanent? | **N/A** |
| 4.2 | Material | **N/A** |
| 4.3 | Diameter (D2) (inches) | |
| 4.4 | Length (L1) (feet) | |
| 4.5 | Depth to top of weathered rock (feet) | |
| 4.6 | Depth to top of competent bedrock (feet) | **30** |
| **5** | **Grout around outer casing** | |
| 5.1 | Material | **N/A** |
| 5.2 | Ratio of solids to solids (if applicable) (pounds : pounds) | |
| 5.3 | Ratio of solids to water (pounds : gallons) | |
| 5.4 | Hydraulic conductivity (cm/s) | |
| **6** | **Well casing** | |
| 6.1 | Material | **PVC** |
| 6.2 | Diameter (D3) (inches) | **4** |
| 6.3 | Joint type | **Threaded** |
| 6.4 | Length (L2) (feet) | **10** |
| **7** | **Grout around well casing (ignore if same as outer casing's grout)** | |
| 7.1 | Material | **Portland** |
| 7.2 | Ratio of solids to solids (if applicable) (pounds : pounds) | **Neat Cement** |
| 7.3 | Ration of solids to water (pounds : gallons) | **94 : 6** |
| 7.4 | Hydraulic conductivity (cm/s) | |
| **8** | **Low permeability seal** | |
| 8.1 | Material | **Bentonite** |
| 8.2 | Length (L3) (feet) | **2** |
| **9** | **Filter pack** | |
| 9.1 | Material | **U.S. Silica No. 1 Sand equivalent** |
| 9.2 | Length (L4) (feet) | **2** |
| **10** | **Well screen** | |
| 10.1 | Material | **PVC** |
| 10.2 | Diameter (D4) (inches) | **4** |
| 10.3 | Length (L5) (feet) | **10** |
| 10.4 | Screen size opening (inches) | **0.01** |
| **11** | **Depth to bottom of well (L6) (feet)** | **20** |
| **12** | **Well annulus (≥ 1.5 inches) (R1) (inches)** | **3** |
| **13** | **Bottom borehole diameter (inches)** | **10.5** |

WELL ID'S: **TBD - 3 wells in TPH Area**
REGISTRATION NUMBER (S): **TBD**
APPLICATION DATE: **TBD**
PERMIT NUMBER: **TBD**
WELL ADDRESS: **4615 14th Street NW**
LOT & SQUARE: **0802 & 2811**

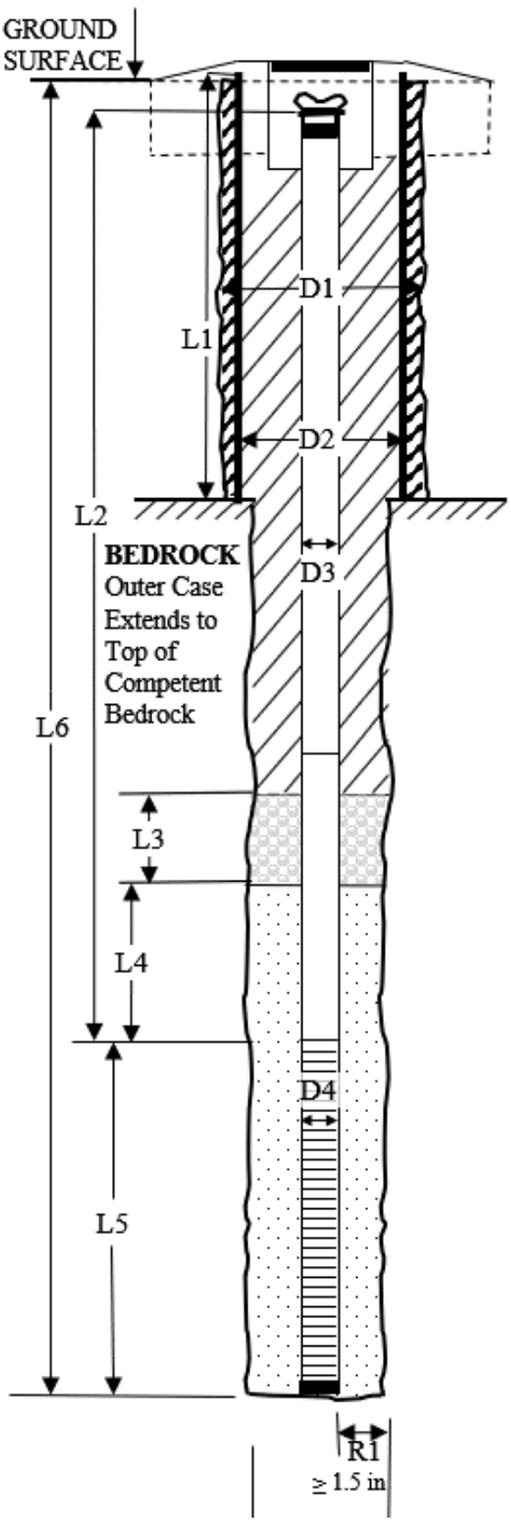
WELL OWNER: **James Ashe**
OWNER ADDRESS: **James Ashe**
**4615 14TH Street NW**
**WASHINGTON, DC 20011**
SIGNATURE: **TBD**
DATE & TIME: **TBD**

DEPARTMENT OF ENERGY & ENVIRONMENT

# MONITORING WELL SCHEMATIC (Flush Mount) Outer Casing Extended to Bedrock

**District of Columbia Regulatory Review Division**

*Check one: Application* ☒ *Change-In-Use* ☐ *as-Built* ☐




| | | |
|---|---|---|
| **1** | **Watertight cap?** | ☒ |
| **2** | **Curb box and concrete pad** | |
| 2.1 | Concrete pad area (square feet) | **4 (2'x2')** |
| **3** | **Borehole diameter (D1) (inches)** | **10.5** |
| **4** | **Outer casing (use if area is contaminated)** | |
| 4.1 | Temporary or permanent? | **N/A** |
| 4.2 | Material | **N/A** |
| 4.3 | Diameter (D2) (inches) | |
| 4.4 | Length (L1) (feet) | |
| 4.5 | Depth to top of weathered rock (feet) | |
| 4.6 | Depth to top of competent bedrock (feet) | **30** |
| **5** | **Grout around outer casing** | |
| 5.1 | Material | **N/A** |
| 5.2 | Ratio of solids to solids (if applicable) (pounds : pounds) | |
| 5.3 | Ratio of solids to water (pounds : gallons) | |
| 5.4 | Hydraulic conductivity (cm/s) | |
| **6** | **Well casing** | |
| 6.1 | Material | **PVC** |
| 6.2 | Diameter (D3) (inches) | **2** |
| 6.3 | Joint type | **Threaded** |
| 6.4 | Length (L2) (feet) | **20** |
| **7** | **Grout around well casing (ignore if same as outer casing's grout)** | |
| 7.1 | Material | **Portland** |
| 7.2 | Ratio of solids to solids (if applicable) (pounds : pounds) | **Neat Cement** |
| 7.3 | Ration of solids to water (pounds : gallons) | **94 : 6** |
| 7.4 | Hydraulic conductivity (cm/s) | |
| **8** | **Low permeability seal** | |
| 8.1 | Material | **Bentonite** |
| 8.2 | Length (L3) (feet) | **2** |
| **9** | **Filter pack** | |
| 9.1 | Material | **U.S. Silica No. 1 Sand equivalent)** |
| 9.2 | Length (L4) (feet) | **2** |
| **10** | **Well screen** | |
| 10.1 | Material | **PVC** |
| 10.2 | Diameter (D4) (inches) | **4** |
| 10.3 | Length (L5) (feet) | **10** |
| 10.4 | Screen size opening (inches) | **0.01** |
| **11** | **Depth to bottom of well (L6) (feet)** | **30** |
| **12** | **Well annulus (≥ 1.5 inches) (R1) (inches)** | **3** |
| **13** | **Bottom borehole diameter (inches)** | **10.5** |

WELL ID'S: **TBD - 2 wells in CVOC Area**
REGISTRATION NUMBER (S): **TBD**
APPLICATION DATE: **TBD**
PERMIT NUMBER: **TBD**
WELL ADDRESS: **4615 14th Street NW**
LOT & SQUARE: **0802 & 2811**

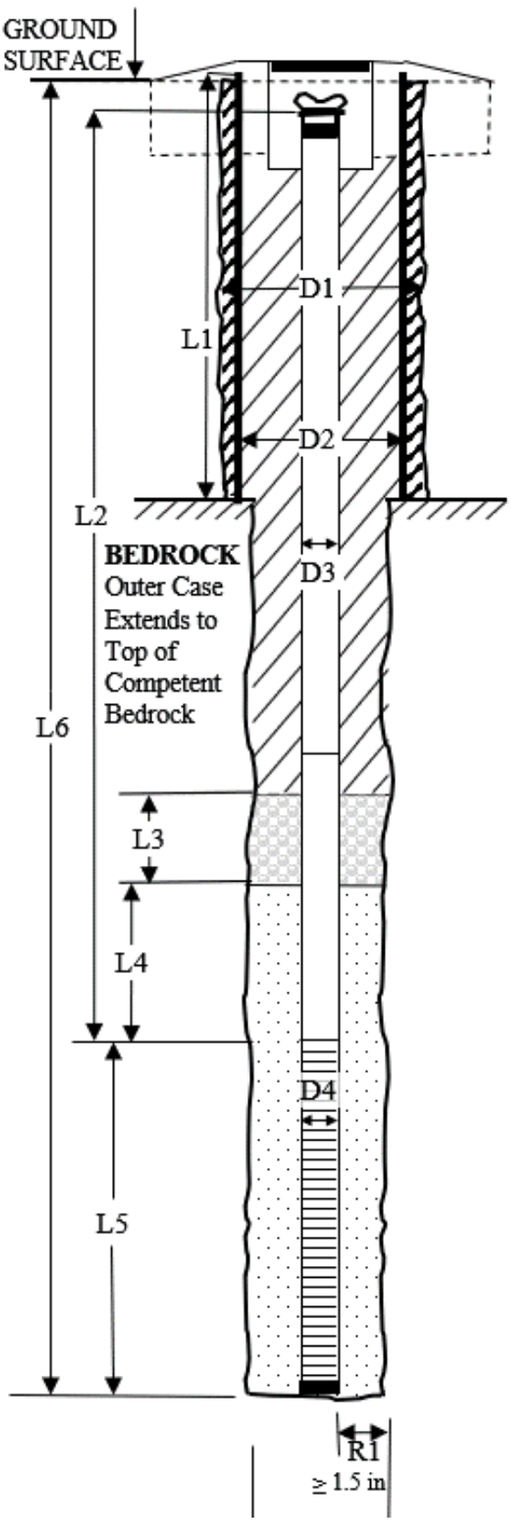
WELL OWNER: **James Ashe**
OWNER ADDRESS: **James Ashe**
**4615 14TH Street NW**
**WASHINGTON, DC 20011**
SIGNATURE: **TBD**
DATE & TIME: **TBD**

DEPARTMENT OF ENERGY & ENVIRONMENT

# MONITORING WELL SCHEMATIC (Flush Mount) Outer Casing Extended to Bedrock

**District of Columbia Regulatory Review Division**

*Check one: Application* ☒ *Change-In-Use* ☐ *as-Built* ☐




| | | |
|---|---|---|
| **1** | **Watertight cap?** | ☒ |
| **2** | **Curb box and concrete pad** | |
| 2.1 | Concrete pad area (square feet) | **4 (2'x2')** |
| **3** | **Borehole diameter (D1) (inches)** | **12** |
| **4** | **Outer casing (use if area is contaminated)** | |
| 4.1 | Temporary or permanent? | **Permanent** |
| 4.2 | Material | **Steel** |
| 4.3 | Diameter (D2) (inches) | **8** |
| 4.4 | Length (L1) (feet) | **40** |
| 4.5 | Depth to top of weathered rock (feet) | |
| 4.6 | Depth to top of competent bedrock (feet) | **30** |
| **5** | **Grout around outer casing** | |
| 5.1 | Material | **Portland** |
| 5.2 | Ratio of solids to solids (if applicable) (pounds : pounds) | **Neat Cement** |
| 5.3 | Ratio of solids to water (pounds : gallons) | **94 : 6** |
| 5.4 | Hydraulic conductivity (cm/s) | |
| **6** | **Well casing** | |
| 6.1 | Material | **PVC** |
| 6.2 | Diameter (D3) (inches) | **2** |
| 6.3 | Joint type | **Threaded** |
| 6.4 | Length (L2) (feet) | **45** |
| **7** | **Grout around well casing (ignore if same as outer casing's grout)** | |
| 7.1 | Material | **same as outer** |
| 7.2 | Ratio of solids to solids (if applicable) (pounds : pounds) | |
| 7.3 | Ration of solids to water (pounds : gallons) | |
| 7.4 | Hydraulic conductivity (cm/s) | |
| **8** | **Low permeability seal** | |
| 8.1 | Material | **Bentonite** |
| 8.2 | Length (L3) (feet) | **2** |
| **9** | **Filter pack** | |
| 9.1 | Material | **U.S. Silica No. 1 Sand equivalent)** |
| 9.2 | Length (L4) (feet) | **2** |
| **10** | **Well screen** | |
| 10.1 | Material | **PVC** |
| 10.2 | Diameter (D4) (inches) | **4** |
| 10.3 | Length (L5) (feet) | **10** |
| 10.4 | Screen size opening (inches) | **0.01** |
| **11** | **Depth to bottom of well (L6) (feet)** | **55** |
| **12** | **Well annulus (≥ 1.5 inches) (R1) (inches)** | **2** |
| **13** | **Bottom borehole diameter (inches)** | **8** |

WELL ID'S: **TBD - 2 bedrock wells in CVOC Area**
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LOT & SQUARE: **0802 & 2811**

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