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June 7, 2017

Subject: Soil Management Plan
585 22nd Street
Oakland, California
Alameda County Department of Environmental Health
Case RO0003187

We declare, under penalty of perjury, that the information and/or recommendations contained in the attached Soil Management Plan are true and correct to the best of our knowledge.

A handwritten signature in black ink that reads "Charles A. Long".

Charles A. Long
Principal

A handwritten signature in blue ink that reads "Matt Ticknor".

Matt Ticknor
Principal



SOIL MANAGEMENT PLAN

585 22nd Street
Oakland, California
Alameda County Department of Environmental Health
Case RO0003187

AEC Project No. 16-046SD
June 7, 2017

Presented to:

Alameda County Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502-6540

On Behalf Of:

585 22nd Street, LLC
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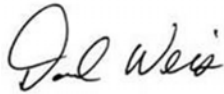
Soil Management Plan

585 22nd Street
Oakland, California
Alameda County Department of Environmental Health
Case RO0003187

Advantage Environmental Consultants, LLC has prepared this Soil Management Plan (SMP) for the above referenced property which is being submitted to the Alameda County Department of Environmental Health for review and approval. This report was completed in accordance with the standards of care exercised by environmental professionals in the industry.

PROJECT MANAGER CERTIFICATION

I certify that the information contained in or included with this submittal is accurate and complete. This submittal and all attachments were prepared at my direction and in accordance with protocols designed to assure that qualified personnel gathered and evaluated the information submitted in accordance with the standards of care exercised by environmental professionals in the industry.



Daniel Weis, R.E.H.S.
Branch Manager

WORK PROGRAM CERTIFICATION

This report presents the technical approach of AEC to conduct soil management activities at proposed development project located at 585 22nd Street in Oakland, California. This report has been completed in accordance with the standards of care exercised by environmental professionals in the industry.



Eric Cathcart, MS, PG
Senior Geologist
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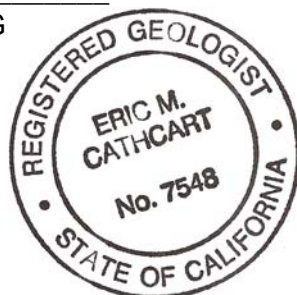


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1.0 INTRODUCTION

This Soil Management Plan (SMP) has been prepared by Advantage Environmental Consultants, LLC (AEC) on behalf of 585 22nd Street, LLC for work to be completed as part of development activities for the proposed residential housing project located at 585 22nd Street in the City of Oakland, California (i.e. Site). The guidelines presented herein to provide technical and procedural steps to assist in achieving best practice environmental management for the grading and displacement of Site soils during construction. In addition, this plan discusses the planned installation and operations and maintenance (O&M) of a vapor barrier to be installed in two future elevator pit/shaft areas to prevent any residual volatile organic compounds (VOCs) at the Site from venting into such shaft areas. The guidelines have also been designed to assist with decision-making and provide greater certainty to construction contractors, local governments and the community for development of the SMP for the construction activities required for the project.

1.1 Project Location and Description

The Site is comprised of an approximately 23,000 square foot (0.53-acre) area located at the physical addresses of 600 21st Street, 572 21st Street and 585 22nd Street. The Site is further identified by Alameda County Assessor's Parcel Numbers 008-0647-014, 008-0647-013 and 008-0647-028-04. The current land uses at the Site are as follows:

- 600 21st Street - Historical house to be relocated.
- 572 21st Street – Six-unit apartment building and historical house to be relocated
- 585 22nd Street – Asphalt paved lot

A Vicinity Map depicting the general location of the Site is included as Figure 1. An aerial photograph of the Site is included as Figure 2.

Site development will require conventional grading (removal and recompaction of soil) to depths that are yet to be determined, but are expected to be less than five feet from existing grades. Following the completion of grading activities, there will be a reported 2,615 cubic yards of soil exported from the Site. Such soil will be derived from preparing subgrade for the future structural slab, footing excavations, excavations for future automobile stacker systems and excavations for future elevators and other utility vaults. Site development plans will include a residential development constructed on a concrete slab-on-grade foundation system. There will be 78 residential units constructed at the Site. None of the residential units will be located on the ground floor of the future structure. The ground floor of the future structure will include parking areas, utility/mechanical rooms and enclosures, storage rooms, trash enclosures, bicycle lockers a lobby and a leasing area/lounge. The three above referenced parcels will be merged into one single parcel (parcel number yet to be determined) prior to the start of construction. The future physical address of the development will be 570 21st Street. The two historical houses at 572 21st Street and 600 21st Street will be relocated to the adjacent property located at 610 21st prior to the start of construction of the 78 unit apartment building.

The future Site building will consist of four stories of wood frame construction over a 15 foot high ground floor concrete podium with a total building height of 55 feet. This is typically categorized as Type 5 construction over a podium. The ground floor podium will accommodate parking stalls, ground floor elevator entrances, lobbies and other common area spaces. The

podium area is ventilated with an exhaust fan that takes air from the podium and exhausts it in a vent on the roof. The elevator pits/shafts will require excavation to 5 feet 9 inches and as stated previously, will be lined with a vapor barrier to prevent any residual VOCs at the Site from venting into the shafts. The project will be parked with 78 parking stalls configured in 26 stackers of three stalls each with the bottom three stalls of each stacker requiring pits to a depth of 5 feet 9 inches. A copy of the Site demolition plan and grading plan is included as Appendix A of this SMP.

1.2 Previous/Recent Assessment Work

AEC completed the following prior environmental documents pertaining to the Site, all which are in the possession of the Alameda County Department of Environmental Health (ACDEH):

- Phase II Environmental Site Assessment, 585 22nd Street, Oakland, California dated August 13, 2015
- Phase I Environmental Site Assessment, 585 22nd Street, Oakland, California dated August 14, 2015
- Site Investigation Report, 585 22nd Street, Oakland, California - Alameda County Department of Environmental Health Case RO0003187 dated February 17, 2016

During the course of the completion of the August 2015 Phase I ESA, it was revealed that the 585 22nd Street portion of the Site was occupied by an engraving/plating facility/business which reportedly ceased operations in the late 1970s to early 1980s. In addition, AEC corresponded with ACDEH regarding a former leaking underground storage tank (LUST) case that was associated with this portion of the Site and previously closed under commercial land use. The 572 21st Street and 600 21st Street portions of the Site were historical utilized for residential purposes and have sustained no land uses of potential environmental concern.

The LUST case pertained to the removal of a former underground storage tank (UST) that was previously operated by the United States Postal Service for the fueling of their delivery trucks. The Site reportedly started being used by the USPS in the early to mid-1980s. AEC was informed by ACDEH that if a change in land use of the Site from commercial to residential is proposed, that ACDEH would expect the Site owner, development proponent or other party to voluntarily work with the Department to have them review and approve the proposed change in land use relative to subsurface environmental conditions, and in particular related to potential vapor intrusion/human health risk based concerns that were not commonly evaluated during the closure of older LUST cases. As a result, a Voluntary Remedial Action Agreement was executed between 585 22nd Street, LLC and the ACDEH on September 25, 2015 and a Work Plan for Supplemental Investigation dated October 13, 2015 was submitted to the ACDEH for review. The primary objective of the Work Plan was to develop a program to further investigate the presence and spatial distribution of VOCs in vadose zone soil gas at the Site, and utilizing the data obtained, conduct an evaluation of the human health risks associated with potential soil gas exposures and vapor intrusion for the planned development. Additional soil sampling and analysis was also proposed to rule out various contaminants of potential concern at the Site.

The two phases of subsurface assessment at the Site conducted by AEC included the drilling of multiple soil borings and the sampling of soil, soil gas and groundwater. Conclusions of the assessments were as follows:

- VOCs, asbestos and metals were not considered to be contaminants of concern in soil at the Site.
- VOCs were not considered to be contaminants of concern in groundwater at the Site.
- VOC detections in soil gas were not considered to be significant relative to the users of the future planned Site development.
- No further action at the Site was considered to be warranted.

AEC and 585 22nd Street, LLC are currently in the process of working with ACDEH to finalize the closure process for the Site. One of the conditions of closure for the Site is the preparation and submittal of this SMP.

2.0 SITE PHYSICAL SETTING

2.1 Topography

According to the United States Geologic Survey topographic map for the Oakland West, California 7.5 minute quadrangle (1997), the Site is shown as being relatively level and located at an elevation of approximately 25 feet above mean sea level. Regional topography is shown as sloping to the south and southeast. No structures are depicted on-Site on the map. However, the Site and its adjacent properties are situated in an area that is shaded grey, indicating dense development. Streets/roadways bordering the Site are shown in their current configuration. Figure 1 (Vicinity Map) is a reproduction of the USGS topographic map.

2.2 Geology

The Site is situated in the Coast Ranges Geomorphic Province; one of 11 physiographic provinces in California recognized by defining features based on geology, faults, topography, and climate. The Coast Ranges are comprised of a series of long, northwest-trending mountain ranges separated by valleys, generally subparallel to faults of the San Andreas Fault system, which were created by extensive folding and faulting during a mountain-building episode beginning in the late Pliocene and culminating in the mid-Pleistocene. Summit elevations average between 2,000 to 4,000 feet above mean sea level (msl), with the highest elevation located in the northern part of the province (Solomon Peak) at approximately 8,000 feet above msl. The Coast Ranges province is also composed of thick Mesozoic and Cenozoic sedimentary strata. The Coast Ranges province is bound on the north by the Oregon state line, on the east by the South Fork Mountain and Coast Range thrusts bordering the Klamath Mountains and Great Valley provinces, on the south by the Santa Ynez fault and Transverse Ranges province, and on the west by the continental borderland. The area is seismically active, including the San Andreas fault which extends 600 miles from the north at Point Arena beyond the Coast Ranges to the south to the Gulf of California. More specifically, the Site is located in the central portion of the Coast Ranges province east of the San Francisco Bay. According to geologic map sources, the Site appears to be underlain by Quaternary older alluvium deposits. These deposits are characterized by partially consolidated sand, gravel, and clay. Artificial fill material is also present beneath the Site in the area of the former underground storage tank (UST).

2.3 Hydrology / Hydrogeology

According to the California Water Quality Control Plan for the San Francisco Bay Region (SF-RWQCB, 1995), the Site is situated within the East Bay Plain groundwater sub-basin of the Santa Clara Valley groundwater basin. Groundwater within the East Bay Plain sub-basin is listed with existing beneficial use designations for municipal, industrial, process supply, and agricultural purposes. Static groundwater beneath the Site is anticipated to be present at depths of 15 feet bgs or greater with an anticipated flow direct in a south to southeasterly direction. Groundwater will not be encountered during the proposed construction activities. As such, there are no provisions for groundwater management included in this plan.

3.0 SOIL MANAGEMENT ACTIVITIES

3.1 Primary Plan Objective and Specific Goals

The primary objective of this SMP is to support the uninterrupted construction at the Site while properly grading, excavating, handling, stockpiling, on-Site reuse or off-Site export of soil from areas planned for excavation and to discuss the planned installation and O&M of a vapor barrier to be installed in two future elevator pit/shaft areas to prevent any residual VOCs at the Site from venting into such shaft areas. This SMP also provides contingency protocols for the following:

- Off-Site disposal of contaminated soil in the unlikely event such soil is discovered in previously unassessed areas at the Site.
- A provision for off-Site assessment if impacts are discovered along Site boundaries, particularly in the northwestern area of the Site which is adjacent to a residential condominium complex and is the former location of the process area of the former engraving/plating facility/business that operated at the Site.

In addition, this SMP assists with the following:

- Facilitates construction operations and the project schedule by planning soil management in advance.
- Provides for soil management and disposal option in compliance with federal, state and/or local requirements, while minimizing liability.
- Establishes consistent guidelines for managing soil based upon constituent content.
- Minimizes handling and movement of soil.
- Affirms the protection of human health during the excavation activities.
- Ensures that proper waste characterization and management activities are conducted during Site work.

A pre-construction conference will be conducted at the Site prior to the start of work. Representatives from trades related to the excavation of soil and management of soil stockpiles shall attend the conference, along with City or ACDEH staff (at their discretion).

3.2 General Approach and Methodology

As stated previously, Site development will require conventional grading (removal and recompaction of soil) to depths that are yet to be determined, but are expected to be less than five feet from existing grades. Following the completion of grading activities, there will be a reported 2,615 cubic yards of soil exported from the Site. Such soil will be derived from preparing subgrade for the future structural slab, footing excavations, excavations for future automobile stacker systems and excavations for future elevators and other utility vaults. Grading and excavation activities will be conducted utilizing excavators, dozers, loaders and other conventional equipment.

At this time and based on the analytical data generated at the Site during prior assessment work, we expect that all soil to be exported from the Site will be suitable for reuse at receiving facilities to be designated by the selected excavation contractor without further sampling, testing and evaluation. Available analytical data pertaining to the Site will be provided by the Site owner to the potential receiving facilities. However, third-parties involved with the review and evaluation of analytical data pertaining to the Site will have the ability to complete additional sampling and analysis of Site soils at their discretion prior to it being imported to said receiving facility or facilities.

However, as a contingency plan, in the unlikely event that discoveries of unforeseen contaminated soil are made during the grading and excavation activities, provisions for appropriate segregation, sampling and laboratory analysis (discussed in later sections of this SMP) will be conducted and are presented herein. If deemed warranted, the contaminated soil would be removed using excavators, backhoes, loaders and/or other conventional equipment and placed onto trucks for off-Site disposal (if warranted) under appropriate manifesting protocol. If contaminated soil requires removal from the Site, potential receiving facilities will be discussed with the ACDEH in advance of the removal activities. The criteria for soil being further evaluated as potentially impacted during the course of the construction activities is as follows:

- Soil that exhibits significant hydrocarbon or other chemical staining and/or odors.
- Soil that contains a significant amount of burned debris or ash.
- Soil that when screened with a photoionization detector (PID) calibrated to 100 parts per million (ppm) of isobutylene exhibits a concentration of undifferentiated VOCs of five ppm sustained for at least 30 seconds.

Environmental professionals working under the oversight of California Professional Geologists will be present as-needed during on-Site grading and excavation activities conducted during the course of the project. Personnel responsible for and involved in the implementation of this SMP will be thoroughly knowledgeable and experienced in the various aspects of the work to be completed. This knowledge and experience will include, but not be limited to, familiarity with the Site geologic and hydrogeologic conditions, laboratory data review and verification, Site physical conditions and access, Site personnel and contacts and Site health and safety rules, procedures, and protocols. AEC Field personnel will have 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and current 8-hour annual refresher training in accordance with 29 Code of Federal Regulations 1910.120 [Title 8 California Code of Regulations 5192]. Site field work will also be conducted in accordance with the Site-specific Worker Health and Safety Plan. In the unlikely event that soil is confirmed to be contaminated during the course of construction activities, a 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) trained supervisor will be present on-Site during all impacted soil grading operations. In addition, employees of the excavation contractor retained for this project that will be in contact with contaminated soil that is considered to be hazardous waste in the State of California (unlikely) will have the proper 40-hour HAZWOPER training. The excavation contractor handling such hazardous soil (if any) will also hold a Class A, Engineering Contractor's license with a Hazardous Substance Removal Certification (HAZ) issued by the State of California.

Worker and community health and safety monitoring would also be performed as-needed by AEC. The lead contractor and other consultants on the project, which may include testing and

inspection, geotechnical, archeological, etc., may also rely on health and safety related monitoring data, although the contractor and other consultants will be ultimately responsible for the training and health and safety of their own workers and employees. If employees of such trades will be working in areas of soil that is deemed to be hazardous waste, they would also be required to have the proper 40-hour HAZWOPER training.

3.3 Soil Screening and Removal in Areas of Unexpected Impacts

During grading activities conducted during the project, if soil that exhibits significant hydrocarbon or other chemical staining and/or odors and/or soil that contains a significant amount of burned debris or ash is encountered, AEC will be notified and will mobilize to the Site immediately to assess the suspect soil in question. During such field screening activities, soil would also be screened using a PID. If concentrations of undifferentiated VOCs of five ppm sustained for at least 30 seconds are identified, this additional criteria will deem such soil potentially contaminated. Sample field and PID monitoring logs are included in Appendix B of this SMP.

In the event that unexpected impacted soils are encountered, AEC would direct the grading/excavation contractor to temporarily stockpile such suspect soil for subsequent analytical testing. The ACDEH would be notified immediately upon discovery of soil that is suspected to be potentially impacted. The lateral extent of soil to be stockpiled would be defined by AEC staff using PID screening, visual/olfactory observations and/or professional judgment but only within the limits of the area of disturbance required for the project. In addition, the vertical extent of excavation of potentially impacted soil would not extend beyond that which is required for grading per construction plans for the project. As such, over excavation of soil within the construction footprint for the purposes removing contaminated soil (if encountered) would not be conducted unless extraordinary circumstances relative to adverse soil conditions are discovered. Confirmation soil samples would be collected as needed at a samples frequency of one sample per 400 square feet of excavation bottom and at 20 foot lateral distances along excavation sidewalls.

In the event that any contaminants of potential concern are detected in one or more of the confirmation soil samples, such detected concentrations will be compared to San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels (ESLs) for a residential exposure scenario in areas of elevator pits and for a commercial exposure scenario in the remaining areas of the Site. If there are any exceedences of applicable ESLs in the confirmation soil samples, excavation will continue (within the limits of the planned construction footprint) until adequate removal is documented by way of the collection and analysis of supplemental confirmation soil samples. In the unlikely event that soil contains one or more contaminants of concern above applicable ESLs at a vertical or horizontal limit of the construction footprint, the ACDEH will be notified and decisions regarding next steps will be made in collaboration with the ACDEH and the project/development team.

Any potentially impacted soil that is stockpiled will be sampled at the following frequency at representative locations within the stockpiles and analyzed for appropriate contaminants of potential concern as required by the designated landfill facility.

- 0 to <500 cubic yards - 4 samples per 100 cubic yards
- 500 to <5,000 cubic yards - 1 additional sample per additional 500 cubic yards
- 5,000 cubic yards or more - 1 additional sample per additional 1,000 cubic yards

The location and depth of samples in each stockpile will be documented, as will the locations of stockpiles relative to Site boundaries and any sensitive areas (i.e. storm drains, etc.). Stockpiles will be protected from storm water run-on by fiber rolls, gravel bags or other appropriate methods. Soil stockpiles will be protected from wind erosion by application of water and by placing on and covering with plastic sheeting. Any soil samples obtained during the soil management activities will be collected using a stainless-steel hand trowel or auger. Statistical analysis of analytical data set pertaining to soil to be exported from the Site may also be conducted in accordance with receiving facility guidelines to include the 80, 90 or 95 percent upper confidence limits of the arithmetic mean. A myriad of analytical tests may be completed on any discovered suspect impacted soil as described in Section 3.5 below.

During the course of the soil management activities, construction stakes with pertinent information notated on such stakes will be used to designate stockpiles as noticeably non-impacted from soil that is potentially impacted. Soil that is noticeably non-impacted will not be sampled prior to reuse. In the event that suspect impacted soil is confirmed to be contaminated by way of analytical laboratory testing, it will be considered to be a regulated waste at that time. The California Water Code and Titles 23 and 27 of the California Code of Regulations dictate that soil with detectable concentrations of hazardous substances or petroleum products are considered to be "waste" following excavation. Any waste is required to be transported to an appropriate waste management facility and be treated, stored, or disposed, and/or reused on-Site or off-Site in accordance with applicable local, state, and federal regulations. On-Site reuses or off-Site reuse of impacted soil at a non-regulated receiving facility is not proposed for this project in the event that such soil is discovered. During the implementation of this SMP, any confirmed contaminated soil will be segregated and shipped to regulated receiving facilities. All laboratory results of any sampling and analysis conducted during the course of the project will be forwarded to the ACDEH for review.

As stated previously in Section 3.1, this SMP provides a provision for off-Site assessment if impacts are discovered along Site boundaries, particularly in the northwestern area of the Site which is adjacent to a residential condominium complex. This area is also the former location of the process area of the former engraving/plating facility/business that operated at the Site. As a conservative measure, five soil samples (approximately one sample per 20 linear feet) will be collected from along the northwestern Site boundary that adjoins the neighboring residential condominium complex. Samples will be collected from vertical depths ranging from approximately three to five feet below existing grades depending on the required depth of grading in such an area. Each of the five soil samples will be analyzed for total petroleum hydrocarbons (gasoline, diesel and oil ranges) by United States Environmental Protection Agency (EPA) test Method 8015B, VOCs by United States EPA test method 8260B, Title 22 Metals by United States EPA test Methods 6010B/7471A and hexavalent chromium by United States EPA test Method 7196 or 7199. In the event that any contaminants of potential concern are detected in one or more of the soil samples, such detected concentrations will be compared to ESLs for a residential exposure scenario. Such laboratory results will be forwarded to the ACDEH for review and in the unlikely event that soil conditions indicate that hazardous substances have migrated to the western adjoining property, a work plan for off-Site assessment will be submitted to the ACDEH under separate cover. Such additional assessment (if deemed warranted) would require an access agreement with the neighboring property owners.

3.4 Soil Import

Soil import is not proposed for the project. However, in the unlikely event that import soil is deemed warranted at a later time, the general contractor will be responsible for identifying suitable import soil for the Site that is free of organic and inorganic contaminants. When a potential source of clean import soil is identified, AEC would be provided with any environmental and/or geotechnical related documents pertaining to the property in question that would assist AEC in evaluating the historical and current uses of any proposed properties in which import soil would be delivered from. Using contractor provided and supplemental research to be completed by AEC (i.e. regulatory and historical research, etc.) analytical testing of the proposed import soil would be conducted. The frequency of sampling and analytical methods to be used to evaluate the import soil for use at the Site would be in accordance with the California Department of Toxic Substances Control (DTSC) Information Advisory for Clean Imported Fill Material. A copy of the DTSC advisory is included as Appendix C of this SMP. The results of AEC's assessment of potential import sources (if required) will be submitted to the ACDEH for its review and approval prior to any import operations commencing. When suitable sources of import soil are identified and approved by the ACDEH, AEC would observe the import operations (as-needed) to ensure that no suspect conditions are noted in such soil as it is delivered to the Site and placed as fill.

3.5 Analytical Laboratory Methods

A list of analytical laboratory methods to be used (as required) during waste profiling and soil management activities during the course of the project is as follows:

- Single element total metal by United States Environmental Protection Agency (EPA) test Method 6010B or 7471A (mercury);
- Title 22 Metals by EPA test Methods 6010B and 7471A;
- Single element soluble metal – Soluble Threshold Limit Concentration (STLC);
- Single element soluble metal – Toxicity Characteristic Leaching Procedure (TCLP);
- STLC 17 metals;
- TCLP 8 metals;
- Total petroleum hydrocarbons (gasoline, diesel and oil ranges) by EPA test Method 8015B;
- VOCs by EPA test Method 8260B;
- Semi-volatile organic compounds by EPA test Method 8270C;
- PAHs by EPA test Method 8270C with Select Ion Monitoring;
- Polychlorinated biphenyls by EPA test Method 8082; and

3.6 Unexpected Discoveries During Soil Management

Due to the uncertainty associated with soil management, especially during grading activities completed in urban areas of the San Francisco Bay Area and on properties that have formerly housed one or more USTs and have had prior plating shop related activities, potential contaminant conditions may vary from what is described in this SMP. Following discovery of an unexpected condition that requires modification to the methods and protocols described in this SMP, the ACDEH will be informed and plan amendments will be submitted for review and approval.

If any undocumented USTs are encountered during the remediation activities, the ACDEH will be notified and the UST(s) will be removed under a proper permit and in accordance with ACDEH guidelines. Upon such a discovery, work in the vicinity of the UST(s) will stop, the area will be cordoned off with caution tape and the agencies will be notified immediately. Initial contact with the ACDEH regarding any tank related discoveries will be to Ms. Barbara Jakub (510.567.6737), the ACDEH staff member who is currently handling “non-inventory” USTs in the City of Oakland.

Formal documentation regarding the abandonment of the former groundwater monitoring well that was present at the Site was not noted in ACDEH files. As such, the potential exists for this former well to be encountered during Site grading activities. In such an event, a permit for the proper destruction of the well would be procured with the Alameda County Public Works Agency and the well would be subsequently destroyed under said permit. If said well is encountered, it would be destroyed using conventional drilling equipment (hollow-stem auger drill rig) and appropriate backfill materials. Documentation of the well destruction would be provided to both the Alameda County Public Works Agency and the ACDEH.

3.7 Record Keeping

3.7.1 Chain-Of-Custody and Sample Tracking

Chain-of-custody procedures will be followed to establish a written record of sample handling and movement between the Site and the analytical laboratories. All soil samples will be delivered to the analytical laboratories on ice to maintain the samples at a target temperature of 4°C +/- 2°C. The chain-of-custodies will contain the following information:

- Project Location;
- Sample identification number;
- Date and time of collection;
- Sample collector's printed name and signature;
- Sample matrix;
- Analyses requested; and
- Signatures of individuals involved in the chain of possession.

3.7.2 Waste Manifesting

Any soil transported to off-Site regulated landfill or treatment facilities will be done so under proper manifesting protocol to track the movement of soil from the point of generation to the final disposal point. In the unlikely event that contaminated soil is removed from the Site to regulated receiving facilities, it is anticipated to be profiled as a non-hazardous waste. Such soil would be tracked under a non-hazardous waste manifest. In the highly unlikely event that hazardous waste is identified at the Site, such soil would be removed and tracked via the uniform hazardous waste manifest. The excavation contractor would maintain one copy of all waste manifests on-Site and a copy to be submitted to the ACDEH. All manifests would be provided by the designated receiving facilities or transporter subcontractor and would be signed by the land owner as generator.

3.7.3 Field Reports

In order to provide complete documentation of the fieldwork activities, detailed records will be maintained by field personnel. At a minimum, these records will include the following information:

- Site name and address;
- Date;
- Name of field log recorder;
- Team members present on-Site and associated duties;
- Other persons on-Site (i.e. subcontractors, regulatory personnel, etc.);
- A brief summary of meeting(s) held at the Site;
- Weather conditions;
- Calibration readings for field monitoring equipment (if used);
- PID readings (if applicable);
- Maps showing the locations of excavations and descriptions of observations relative to such areas;
- Any other relevant information.

3.7.4 Equipment Decontamination and Calibration

Any non-dedicated sampling equipment will be decontaminated between uses by washing with a non-phosphate detergent solution followed by successive rinses in deionized water. Disposable field equipment will not be decontaminated but will be placed into plastic trash bags for proper disposal. As stated previously, an organic vapor monitor MiniRAE® 2000 PID or equivalent will be used as-needed during the fieldwork activities for the field screening of soil. Field instruments used during the field sampling/screening activities will be calibrated at least once per day in accordance with manufacturer's guidelines.

4.0 VAPOR BARRIER

Although VOC detections in soil gas were not considered to be significant relative to potential exposures to the users of the future planned Site development, as a conservative measure and at the suggestion of the ACDEH, the developer has elected to install a vapor barrier in the two future elevator pit/shaft areas to prevent any residual VOCs at the Site from venting into such shaft areas. The vapor barrier will be installed by Ralph Ray Construction of Moorpark, California and will consist of two primary components as follows:

- Viper® Vaporcheck high density polyethylene
- Tremco® VaporLock-m spray applied compound

Technical information pertaining to the two products as provided by the manufacturers of said products are included in Appendix D of this SMP. Please note that while some of the materials provided by Tremco® for the VaporLock-m product focus on its use as a methane gas barrier, the product is also commonly used for VOC suppression purposes. The results of permeance/diffusion testing of the VaporLock-m product (also included in the materials provided) demonstrate that the membrane is totally impermeable to the VOC tetrachloroethene and is only slightly permeable to other VOCs evaluated including benzene, toluene, trichloroethene and others.

Also included in Appendix D is an installation related plan/drawing depicting how the product will be installed at the elevator pit areas. The referenced plan/drawing has been included in the most recent set of building plans submitted to the City of Oakland and no comments regarding said plan/drawing were issued by the City. Further, the City of Oakland Plan Check Engineer confirmed on April 24, 2017 in an email to the project architect that the proposed vapor barrier design is approvable with regards to applicable building codes for the project. A copy of this email is also included in Appendix D.

The vapor barrier will be installed under the oversight of a California licensed Civil Engineer as follows:

- Russell Nester
California Professional Engineer (Civil) #26324
GeoScience Analytical
608 Hailey Court
Simi Valley, CA 93065
805.526.6532

Upon completion of the vapor barrier installation and field inspections, Mr. Nester will issue a written certification that the vapor barrier was installed per the building plans and manufactures' specifications. O&M of the vapor barrier will not require frequency inspections or other evaluations. It will be made known to Site ownership (if the property is sold in the future) and property management, that the barriers in the elevator pits areas are not to be disturbed, and in the event that future repairs in such areas require the disturbance of the barrier(s), they must be repaired and/or reinstalled by a qualified contractor and certified by a California Registered Professional Engineer (preferably the parties referenced above in this section).

5.0 WORKER HEALTH AND SAFETY

As stated previously, no contaminated soil is anticipated to be encountered during the course of the project. Regardless, potential health risks to construction workers and the public resulting from the soil management activities will be addressed by developing and implementing a project health and safety program. The general contractor will be responsible for maintaining proper health and safety procedures to minimize potential worker and public exposures during the course of Site construction activities. The general contractor will be responsible for providing all Site information (including this SMP) to its employees and subcontractors. A Site specific Worker Health and Safety Plan will be prepared for the Site and a Site Health and Safety Officer will be designated by the general contractor. The Site Health and Safety Officer will be present on-Site during soil management activities to oversee implementation of the health and safety plan. The Site Health and Safety Officer will also have authority to direct and stop construction activities to maintain compliance with the health and safety plan.

The purpose of the health and safety plan will be to establish procedures to address potential chemical and physical hazards to field personnel and off-Site receptors that may result from soil management activities conducted at the Site. The plan will include numerous components including general health and safety requirements, establishment of work zone controls, conducting health and safety meetings, use of proper personal protective equipment, personal hygiene guidelines, equipment decontamination procedures and emergency response procedures. The general contractor will be responsible for verifying that project personnel have read and will comply with the procedures established in the health and safety plan. A copy of the plan will be kept on-Site at all times and will be reviewed and updated as necessary during implementation of the soil management activities. Before demolition and earthwork activities begin at the Site, a pre-construction meeting will be held on-Site with AEC, the general contractor and its subcontractors who will be displacing soil during the course of the project to review this SMP and the worker health and safety plan.

6.0 COMMUNITY HEALTH AND SAFETY

The implementation of the SMP will be conducted in a manner that will promote a safe work environment relative to the public by reducing the potential for community exposures to potential hazards and nuisances from the work required for the project. The protection of human and public health during the course of the project is of the utmost importance. There are no significant public health hazards and exposure pathways expected to result from the forthcoming construction work. However, for contingency related purposes, potential public hazards and exposures resulting from vapors, dust, noise and physical hazards are evaluated herein as there is always that potential for previously unforeseen conditions to arise during the course of construction project.

6.1 Identification of Potential Hazards

Exposure to metals in ambient dust and petroleum hydrocarbon vapors (while highly unlikely to occur during the project) are discussed herein as potential chemical hazards. The above referenced substances can enter the unprotected body by skin absorption, eye contact and/or inadvertent ingestion. Chemical exposures are generally divided into two categories: acute and chronic. Symptoms resulting from an acute exposure usually occur during or shortly after exposure to a sufficiently high concentration. Symptoms resulting from a chronic exposure generally occur following prolonged or repeated exposures to lower concentrations. The concentrations required to produce symptoms of exposure depend upon the medium in which the compounds occur, the duration of exposure, and the number of exposures. Generally, symptoms resulting from an exposure to metal and petroleum hydrocarbon dusts and petroleum hydrocarbon vapors include, but are not limited to, irritation of mucous membranes and pharynx, nasal perforation, irritation of the eyes and/or skin.

Potential physical hazards to the public associated with soil displacement include explosion, fire, electrical shock, and noise exposure.

- **Fugitive dust** can arise during construction activities. While contaminated soil is not expected to be encountered during the course of the proposed construction activities, dust will still require proper suppression and there will be a zero dust policy in force during the course of the project.
- **Explosions and fires** often arise spontaneously. However, they more commonly result from activities where an ignition source (such as a spark from equipment) is introduced to an explosive or flammable environment. Workers will use spark resistant equipment and tools (when feasible), and fire extinguishers will be made available during the Site activities to assist in preventing such a situation.
- **Electrical hazards** include buried cables which pose a danger of shock or electrocution if workers or equipment contact or sever them during site operations. In accordance with State law, Underground Service Alert will be notified at least 48 hours prior to any demolition or excavation activities. A private utility locating company will also likely be retained by the general contractor as part of the construction activities.
- **Noise hazards** can be created by equipment that generates noise in excess of auditory capacity thresholds. Noise in excess human auditory thresholds can result in physical damage to the ear.

6.2 General Control Methods

Control measures for the potential hazards are as follows:

- **Site Security.** To assist in excluding the public from the Site, an exclusion zone (using signs, delineators, temporary fencing, caution tape and/or other acceptable methods) around areas subject to construction activity will be established. Perimeter fencing will also serve as a barrier to prevent unauthorized entry to the site.
- **Vapors.** Engineering and construction practices will be used to reduce vapor emissions including covering off-gassing excavations or temporary stockpiles, misting excavations or stockpiles with water or other vapor suppressing agents, locating stockpiles away from and/or downwind of public receptors and stopping work until mitigation measures are in place.
- **Dust Control.** Dust control methods will be taken to minimize potential public exposure to dust generated as a result of the planned construction activities. Dust suppression measures to be employed include, covering stockpiled soil with 8-mil plastic sheeting, reducing the pace of the excavation as required until effective mitigation measures are in place, and/or maintaining levels of soil moisture by means of continuous moistening/watering. A source of water will be available on-Site.
- **Noise.** Noise is considered to be a potential public nuisance for the project, but not a significant community health and safety concern. As such, noise monitoring is not proposed for the project. The contractor will however make best efforts to minimize noise during the course of the project. Work hours for the project will vary, but are not anticipated to occur outside of the days of Monday through Saturday, between 7:00AM and 7:00PM.
- **Open Excavations.** Any open excavations will be secured from public access by placing barricades or fencing at the perimeter of the excavations and securing an open excavations (if applicable) at the conclusion of each work shift's field activities. In accordance with 29 Code of Federal Regulations 1926.652, the walls and faces of excavations and trenches over four feet deep will be guarded by a shoring system, sloping of the ground, or some other equivalent means, such as trench boxes, shields, or other approved movable shoring systems. Trenches less than four feet deep where hazardous ground movement is likely will also require protection. Any area to be subjected to excavation will be secured with fencing or other appropriate barrier. The barrier will be placed at such a distance from the excavation so as to inhibit viewing in the excavation, and thus reduce the potential for public and transient curiosity. A competent person will make daily inspections of trenches and excavations to assure adequate slopes, shoring, and bracing, and to check for evidence of potential slides or cave-ins. More frequent inspections may be necessary after a rain event.
- **Stockpiled Soil.** Displaced soil will be temporarily stockpiled and covered with 8-mil plastic sheeting to reduce the potential for vapor migration, odors and runoff.

6.3 Stormwater Monitoring and Drainage

All construction activities will be conducted in accordance with a project Stormwater Pollution Prevention Plan or equivalent document. Stockpiles will be protected from storm water run-on

by fiber rolls, gravel bags, or other appropriate methods. Soil stockpiles will be protected from wind erosion by application of water and by placing on and covering with 8-mil plastic sheeting.

6.4 Air Monitoring

In the unlikely event that soil impacted with petroleum hydrocarbons or other organic contaminants is encountered during the construction activities, air monitoring will be performed utilizing a hand-held PID and benzene meter to assess potential levels of organic vapors possibly resulting from diesel/gasoline vapors releasing from excavated soil. Fugitive organic chemical vapors would be monitored continuously by qualified field personnel along the perimeter of the exclusion zone throughout each work day in which such soil were encountered and being managed. All monitoring equipment would be field calibrated on a daily basis according to the manufacturer's instructions, and will be recorded on an instrument calibration log.

AEC does not propose conducting dust monitoring utilizing field instruments during the course of the project. There is a zero dust policy for the project in place and soil will be continuously moistened to minimize dust generated during construction activities. However, in the event that impacted soil is identified on-Site during grading activities, dust monitoring by way of the use of field instrumentation may be initiated at the discretion of the environmental consultant. In such an event, air will be monitored using Thermo® branded PDR-1000 instruments (or equivalent). Action levels for dust in air will vary depending on what contaminant or contaminants of potential concern is/are identified. However, a common conservative action level for total dust within the work zone and along property boundaries is 0.050 milligrams per cubic meter. If dust monitoring utilizing field instrumentation is deemed warranted, the ACDEH will be notified and action levels will be discussed with the ACDEH prior to the implementation of a monitoring program.

The following are action levels to be utilized (if required) during the community health and safety related monitoring to be conducted during the course of the project

Instrument or Visual/Olfactory Action Level	Action to be Taken
<p style="text-align: center;"><u>Undifferentiated VOCs</u></p> <p>>1 ppm for 30 seconds along the perimeter of the exclusion zone</p>	<p>Test the air for the presence of benzene with a benzene meter.</p>
<p style="text-align: center;"><u>Benzene</u></p> <p>>0.5 ppm benzene with a benzene meter along the perimeter of the exclusion zone</p>	<p>Stop work immediately and increase or modify control measures within the work zone/source area as needed until suitable benzene levels are achieved and sustained.</p>
<p style="text-align: center;"><u>Dust</u></p> <p>Any visible dust (pertains primarily to potential lead exposure/migration)</p> <p>0.050 milligrams per cubic meter total dust if field instrumentation is utilized (subject to change based on consultation with ACDEH)</p>	<p>Stop work immediately and increase or modify control measures within the work zone/source area as needed until no visible dust if noted.</p>

The following are additional protocols for the air monitoring and associated mitigating activities:

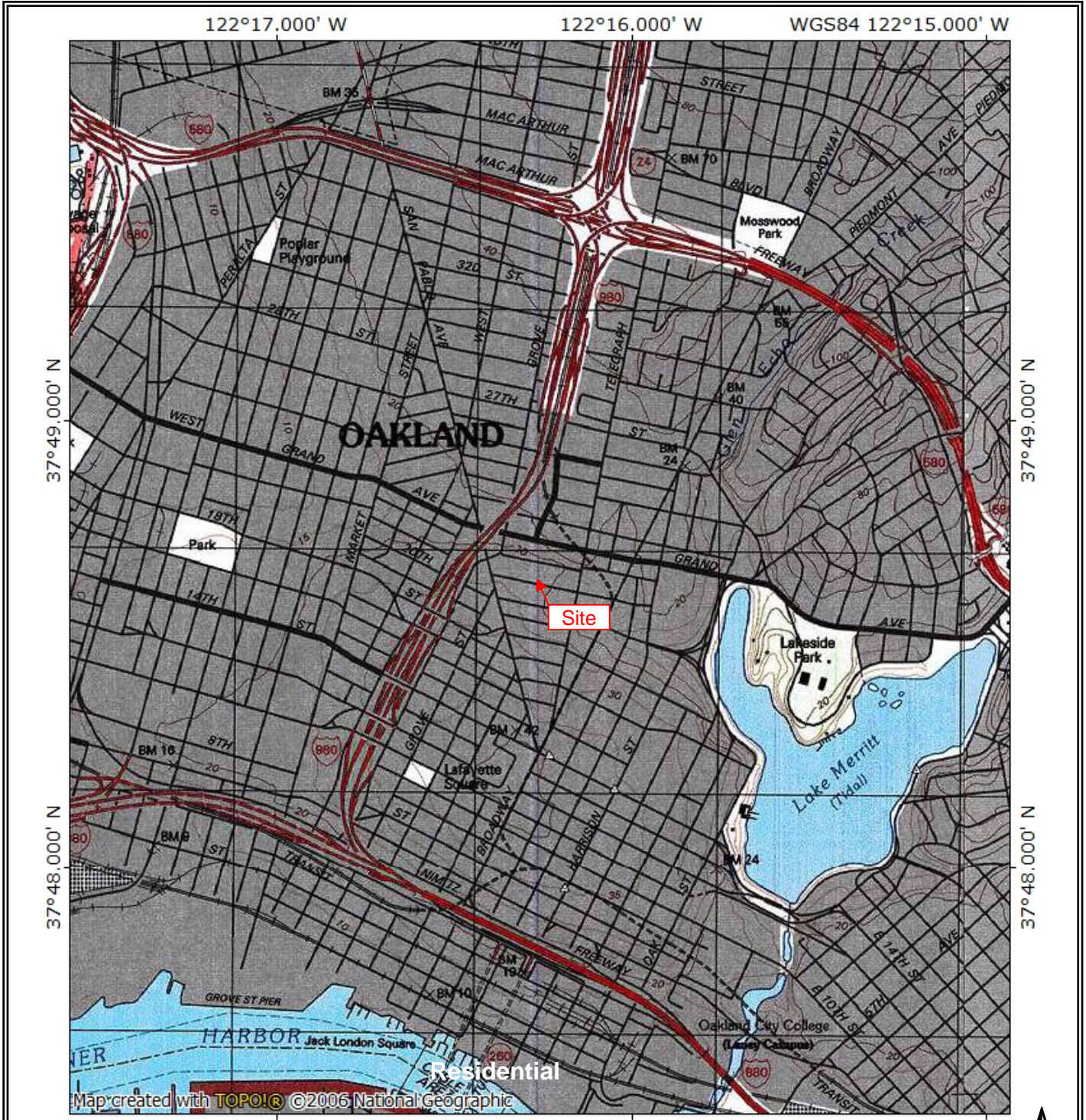
- Upwind PID and benzene readings could be recorded if potential off-site sources of volatile organic compounds are suspected.

- The time and range of concentrations and the locations of each instrument reading would be recorded.
- The frequency of the readings would be determined by the nature of the construction activities conducted on a given day/shift and could be modified at the discretion of the site safety manager.
- The location of the point sources of impacted soils will be identified and the generation of vapors and/or dust would be minimized using any or all of the methods described in this plan.
- A source of water will be kept on-site at all times.
- Dust emissions will be controlled by spraying soil with water to reduce dust emissions, and by keeping stockpiles covered as much as possible.

7.0 REPORTING

Following completion of Site grading and excavation activities and installation of the vapor barrier system in the elevator pit areas, a summary report of such activities will be prepared and submitted to the ACDEH. The report will be signed by a State of California licensed Professional Geologist. If no discoveries of suspect soil are made during the course of construction, the documentation will consist of a simple letter stating as such. If discoveries of contaminated soil are made, the summary report will be more comprehensive and would include the results of any waste profiling, stockpile and confirmation soil sampling and laboratory results, and documentation of the disposition of any contaminated soil that is exported from the Site. The report would also include plans that depict the locations of select soil samples, in addition to cross-section diagrams (as-needed), that would demonstrate that contaminated soil was adequately removed from the Site. Other supporting documentation would include copies of analytical laboratory reports and chain-of-custody documentation, copies of weight ticket reports and manifests from the regulated facilities receiving contaminated soil that is exported from the Site, copies of bills of lading for clean soil that is exported from the Site and other information as deemed warranted. The final report (regardless of whether contaminated soil discoveries are made or not) will include conclusions and recommendations regarding the Site. Further, the final report will include a copy of the certification letter to be provided by the California Registered Professional Engineer indicating that the vapor barrier was installed per the building plans and manufactures' specifications.

FIGURES



USGS Topographic Quadrangle Map
 Oakland West, CA (1997)



145 Vallecitos De Oro, Suite 201
 San Marcos, CA 92069
 Phone: 760-744-3363 Fax: 760-744-3383

Figure 1
 Vicinity Map
 585 22nd Street
 Oakland, California

Work Order No.: 16-046SD	Report Date: September 2016	Drawn By: SS
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— Site Boundary



145 Vallecitos De Oro, Suite 201
San Marcos, CA 92069
Phone: 760-744-3363 Fax: 760-744-3383

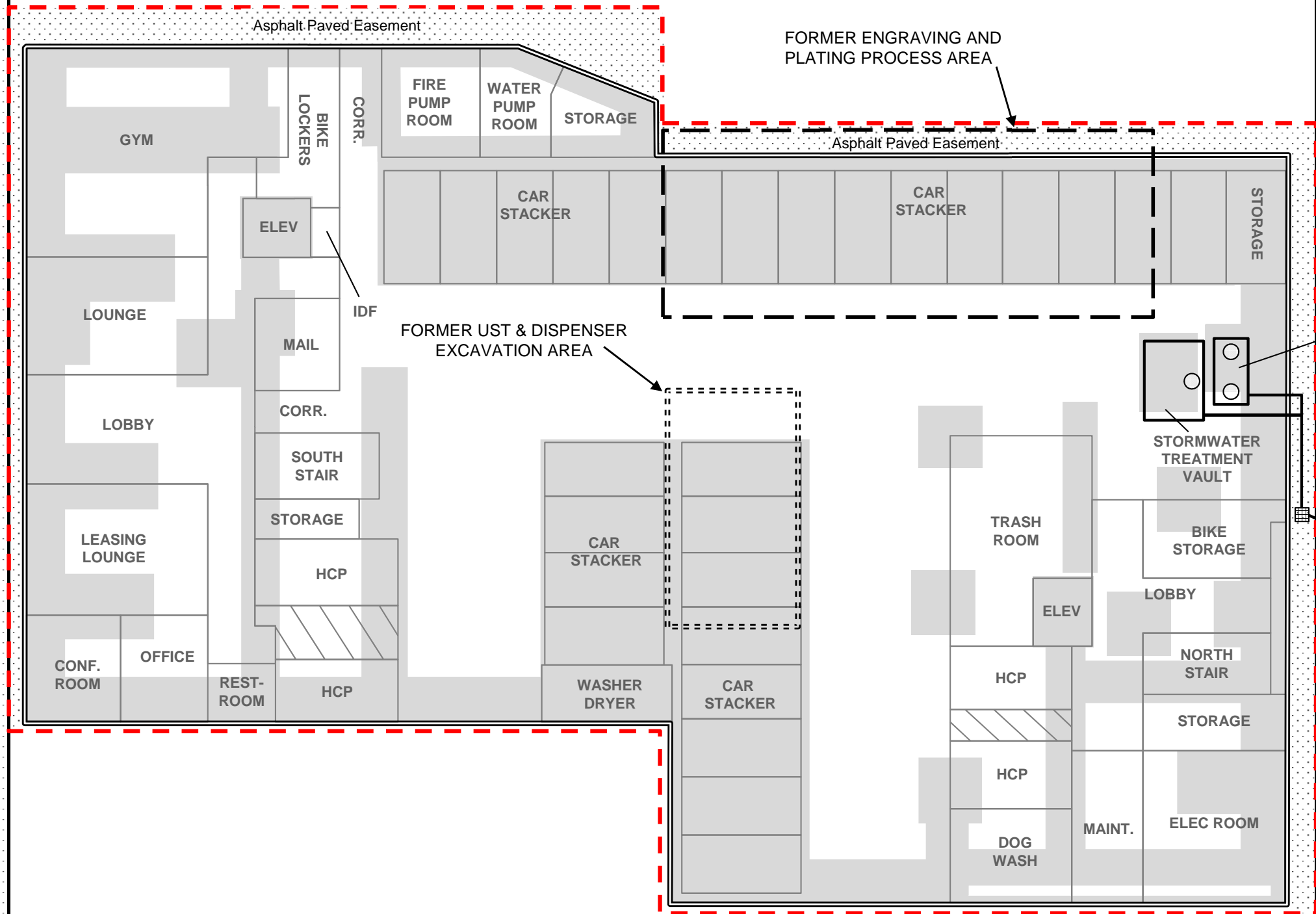
Figure 2
Aerial Photograph
585 22nd Street
Oakland, California

Work Order No.:
16-046SD

Report Date:
September 2016

Drawn By:
SS

21st Street

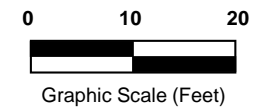


STORMWATER DETENTION VAULT

22nd Street

STORM DRAIN

Concrete Sidewalk



145 Vallecitos De Oro, Suite 201
San Marcos, CA 92069
Phone: 760-744-3363
Fax: 760-744-3383

- - - - - Site Boundary
- Footings

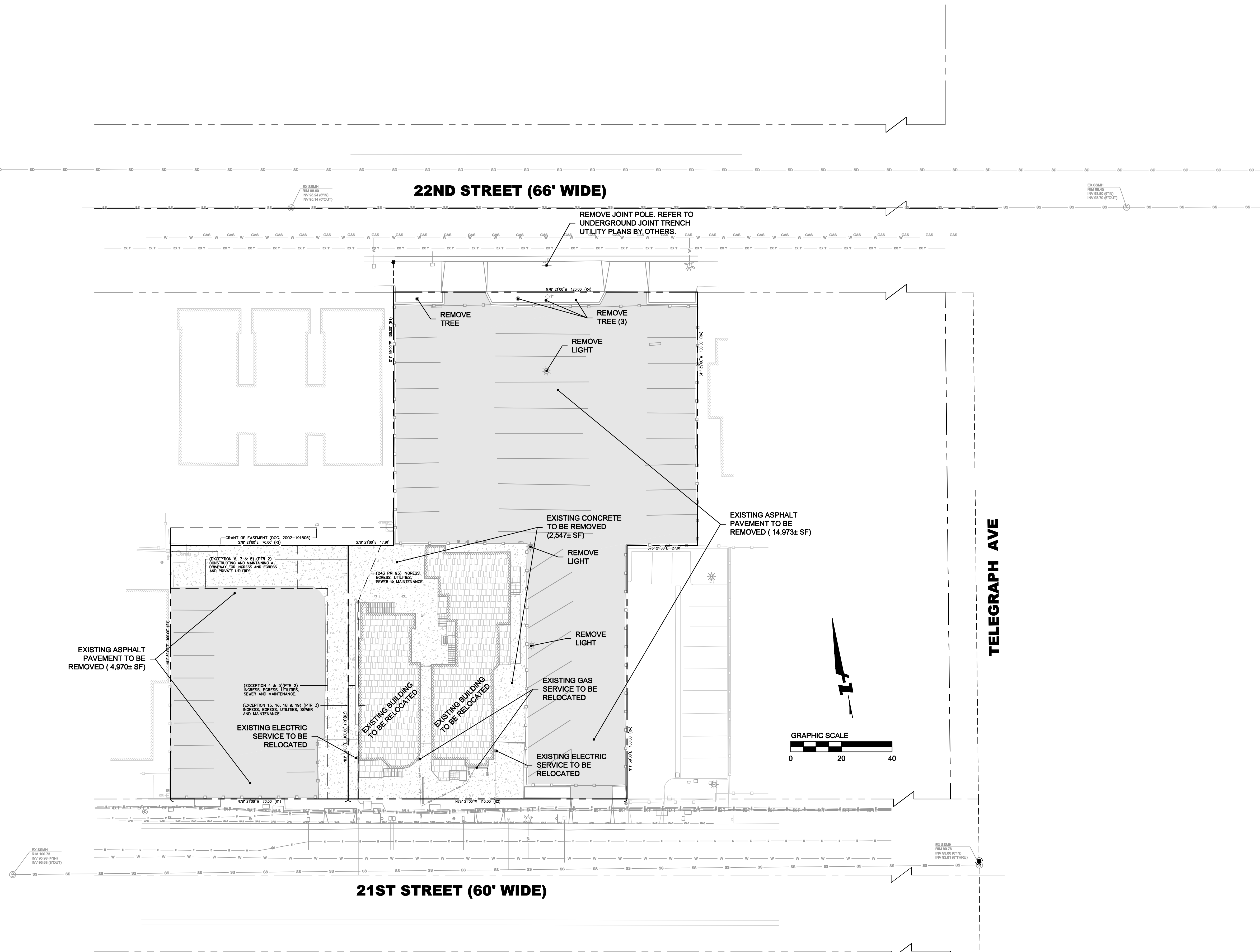
FIGURE 3
Site Plan – Ground Floor
585 22nd Street
Oakland, CA 94612

AEC Project No.:
16-046SD

Figure Date:
September 2016

Drawn By:
TJ

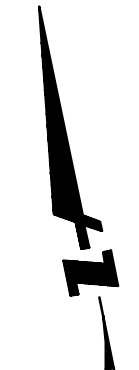
APPENDIX A
SITE DEMOLITION AND GRADING PLAN



- NOTES:**
- 1) THIS DEMOLITION PLAN IS NOT ALL-INCLUSIVE AND IS FOR REFERENCE ONLY. ADDITIONAL REMOVAL AND SITE PREPARATION MAY BE REQUIRED.
 - 2) CONTRACTOR SHALL CONTACT ALL UTILITY SERVICE PROVIDERS TO THE SITE AND CONFIRM TERMINATION OF UTILITY SERVICES PRIOR TO START OF DEMOLITION ACTIVITIES ON-SITE.

HATCH LEGEND

	ASPHALT PAVEMENT
	CONCRETE
	BUILDING ROOF
	LANDSCAPE







No.	Revisions

No. _____
 Stamp:

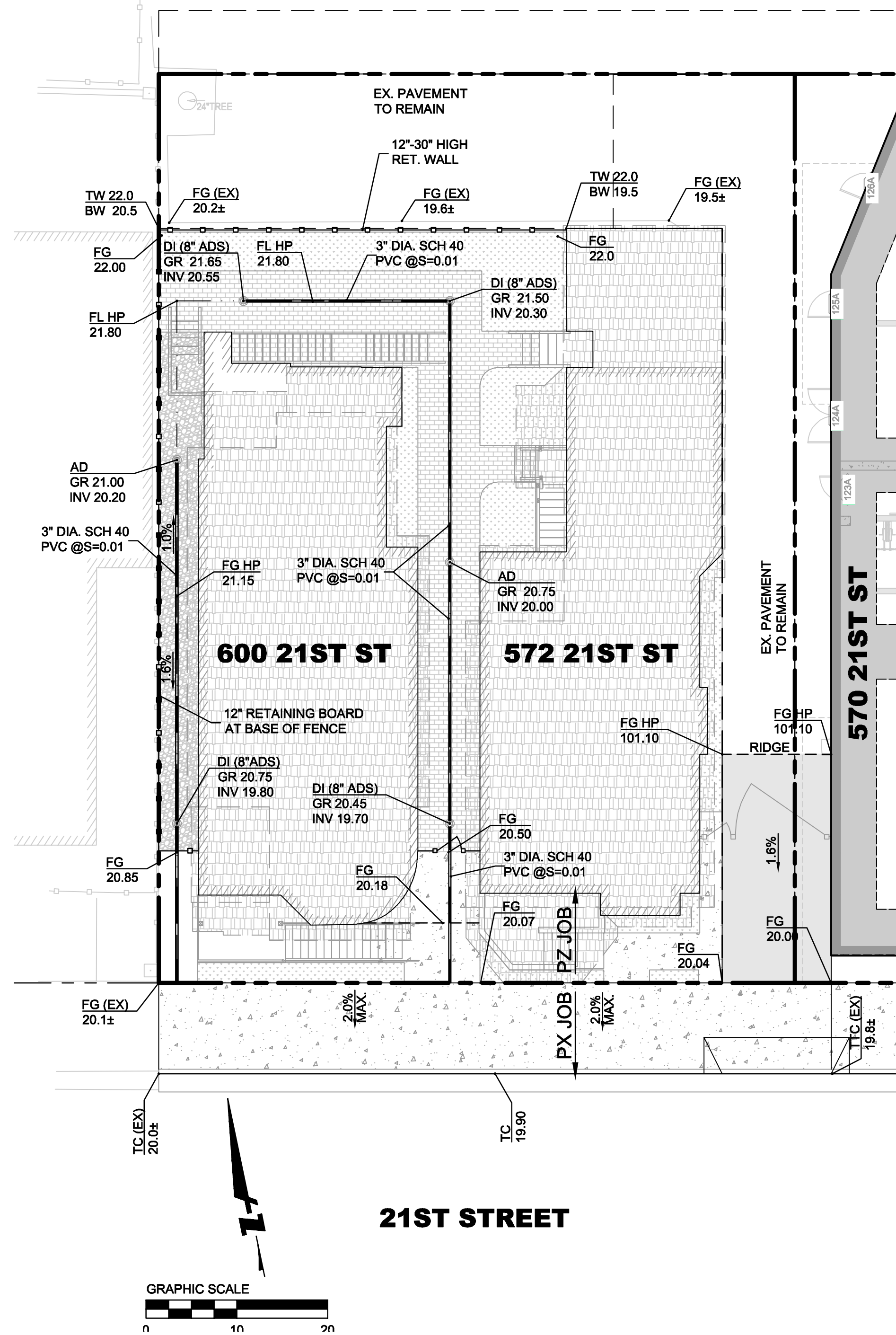
Date: 08/19/16
 Scale: 1" = 20'
 Job No.: 2015-07

HATCH LEGEND

-  BUILDING ROOF
-  LANDSCAPE
-  PREVIOUS PAVERS
-  GRAVEL



EARTHWORKS:

195 C.Y. EXPORT



572 & 600 21ST STREET - ON-SITE GRADING
SCALE: 1" = 10'

HATCH LEGEND

-  ELEVATOR / CAR STACKER PIT
-  FOUNDATION FOOTING

EARTHWORKS:

2,615 C.Y. EXPORT

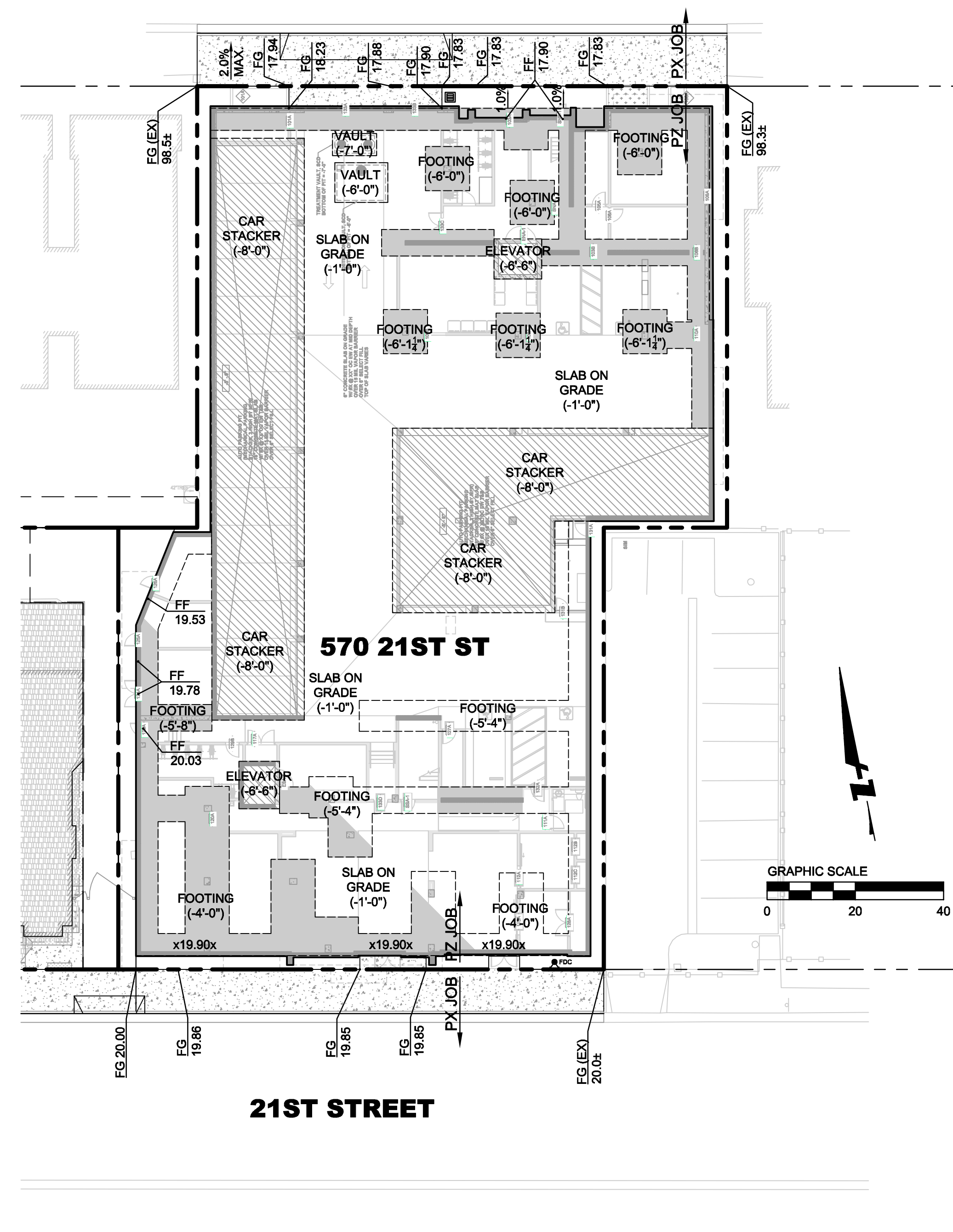
FOR REFERENCE ONLY:

THIS BUILDING FOUNDATION GRADING PLAN IS PROVIDED FOR BONDING AND PERMITTING REFERENCE ONLY.

CONTRACTOR TO REFER TO STRUCTURAL PLANS FOR ADDITIONAL DETAIL ON FOUNDATION DESIGN AND STRUCTURAL COMPONENTS.

CONTRACTOR TO REFER TO GEOTECHNICAL REPORT FOR RECOMMENDATION ON EXCAVATION AND SUBGRADE PREPARATION.

22ND STREET (66' WIDE)



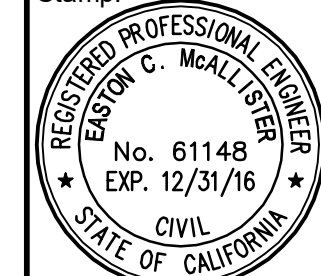
570 21ST STREET - ON-SITE GRADING
SCALE: 1" = 20'

DRAWING NAME: C:\Talus\15-07 22nd Street\CD\06_OKCDGD.dwg
PLOT DATE: 08-19-16 PLOTTED BY: Easton

Revisions

No.

Stamp:



Date: 08/19/16

Scale: AS SHOWN

Job No.: 2015-07

Drawing Number:

APPENDIX B
FIELD LOGS

Daily Log Completed By (print/signature):	Advantage Environmental Consultants, LLC
Project Name: 585 22nd Street	Project No.:
Location: Oakland, CA	Date:
Contractor/Subcontractors:	Start Time:
	Finish Time:
Field Personnel and PPE	Meteorological Conditions

Notes:

*Other possible content - Calibration readings, meetings summary, sampling IDs/locations, photo log, deviations

Advantage Environmental Consultants, LLC

PHOTO-IONIZATION DETECTOR (PID) MONITORING FORM

Project Name: 585 22nd Street

Onsite Environmental Scientist:

Project Activity:

Location: Oakland, CA

Date:

PID Calibration Date:

Wind Direction:

PID Calibration Gas:

Excavation Monitoring (soil)			Ambient Air Monitoring		
Time	Reading in ppm	Notes/Observations	Time	Reading in ppm	Notes/Observations
7:00 a.m.			7:00 a.m.		
7:15			7:15		
7:30			7:30		
7:45			7:45		
8:00			8:00		
8:15			8:15		
8:30			8:30		
8:45			8:45		
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5:15			5:15		

APPENDIX C
DTSC CLEAN FILL ADVISORY

Information Advisory

Clean Imported Fill Material



October 2001

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

It is DTSC's mission to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention.

State of California



California
Environmental
Protection Agency



Executive Summary

This fact sheet has been prepared to ensure that inappropriate fill material is not introduced onto sensitive land use properties under the oversight of the DTSC or applicable regulatory authorities. Sensitive land use properties include those that contain facilities such as hospitals, homes, day care centers, and schools. This document only focuses on human health concerns and ecological issues are not addressed.

It identifies those types of land use activities that may be appropriate when determining whether a site may be used as a fill material source area. It also provides guidelines for the appropriate types of analyses that should be performed relative to the former land use, and for the number of samples that should be collected and analyzed based on the estimated volume of fill material that will need to be used. The information provided in this fact sheet is not regulatory in nature, rather is to be used as a guide, and in most situations the final decision as to the acceptability of fill material for a sensitive land use property is made on a case-by-case basis by the appropriate regulatory agency.

Introduction

The use of imported fill material has recently come under scrutiny because of the instances where contaminated soil has been brought onto an otherwise clean site. However, there are currently no established standards in the statutes or regulations that address environmental requirements for imported fill material. Therefore, the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) has prepared this fact sheet to identify procedures that can be used to minimize the possibility of introducing contaminated soil onto a site that requires imported fill material. Such sites include those that are undergoing site remediation, corrective action, and closure activities overseen by DTSC or the appropriate regulatory agency. These procedures may also apply to construction projects that will result in sensitive land uses. The intent of this fact sheet is to protect people who live on or otherwise use a sensitive land use property. By using this fact sheet as a guide, the reader will minimize the chance of introducing fill material that may result in potential risk to human health or the environment at some future time.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.dtsc.ca.gov.

Overview

Both natural and manmade fill materials are used for a variety of purposes. Fill material properties are commonly controlled to meet the necessary site specific engineering specifications. Because most sites requiring fill material are located in or near urban areas, the fill materials are often obtained from construction projects that generate an excess of soil, and from demolition debris (asphalt, broken concrete, etc.). However, materials from those types of sites may or may not be appropriate, depending on the proposed use of the fill, and the quality of the assessment and/or mitigation measures, if necessary. Therefore, unless material from construction projects can be demonstrated to be free of contami-

nation and/or appropriate for the proposed use, the use of that material as fill should be avoided.

Selecting Fill Material

In general, the fill source area should be located in nonindustrial areas, and not from sites undergoing an environmental cleanup. Nonindustrial sites include those that were previously undeveloped, or used solely for residential or agricultural purposes. If the source is from an agricultural area, care should be taken to insure that the fill does not include former agricultural waste process byproducts such as manure or other decomposed organic material. Undesirable sources of fill material include industrial and/or commercial sites where hazardous ma-

Potential Contaminants Based on the Fill Source Area

Fill Source:	Target Compounds
Land near to an existing freeway	Lead (EPA methods 6010B or 7471A), PAHs (EPA method 8310)
Land near a mining area or rock quarry	Heavy Metals (EPA methods 6010B and 7471A), asbestos (polarized light microscopy), pH
Agricultural land	Pesticides (Organochlorine Pesticides: EPA method 8081A or 8080A; Organophosphorus Pesticides: EPA method 8141A; Chlorinated Herbicides: EPA method 8151A), heavy metals (EPA methods 6010B and 7471A)
Residential/acceptable commercial land	VOCs (EPA method 8021 or 8260B, as appropriate and combined with collection by EPA Method 5035), semi-VOCs (EPA method 8270C), TPH (modified EPA method 8015), PCBs (EPA method 8082 or 8080A), heavy metals including lead (EPA methods 6010B and 7471A), asbestos (OSHA Method ID-191)

**The recommended analyses should be performed in accordance with USEPA SW-846 methods (1996). Other possible analyses include Hexavalent Chromium: EPA method 7199*

Recommended Fill Material Sampling Schedule

Area of Individual Borrow Area	Sampling Requirements
2 acres or less	Minimum of 4 samples
2 to 4 acres	Minimum of 1 sample every 1/2 acre
4 to 10 acres	Minimum of 8 samples
Greater than 10 acres	Minimum of 8 locations with 4 subsamples per location
Volume of Borrow Area Stockpile	Samples per Volume
Up to 1,000 cubic yards	1 sample per 250 cubic yards
1,000 to 5,000 cubic yards	4 samples for first 1000 cubic yards + 1 sample per each additional 500 cubic yards
Greater than 5,000 cubic yards	12 samples for first 5,000 cubic yards + 1 sample per each additional 1,000 cubic yards

materials were used, handled or stored as part of the business operations, or unpaved parking areas where petroleum hydrocarbons could have been spilled or leaked into the soil. Undesirable commercial sites include former gasoline service stations, retail strip malls that contained dry cleaners or photographic processing facilities, paint stores, auto repair and/or painting facilities. Undesirable industrial facilities include metal processing shops, manufacturing facilities, aerospace facilities, oil refineries, waste treatment plants, etc. Alternatives to using fill from construction sites include the use of fill material obtained from a commercial supplier of fill material or from soil pits in rural or suburban areas. However, care should be taken to ensure that those materials are also uncontaminated.

Documentation and Analysis

In order to minimize the potential of introducing contaminated fill material onto a site, it is necessary

to verify through documentation that the fill source is appropriate and/or to have the fill material analyzed for potential contaminants based on the location and history of the source area. Fill documentation should include detailed information on the previous use of the land from where the fill is taken, whether an environmental site assessment was performed and its findings, and the results of any testing performed. It is recommended that any such documentation should be signed by an appropriately licensed (CA-registered) individual. If such documentation is not available or is inadequate, samples of the fill material should be chemically analyzed. Analysis of the fill material should be based on the source of the fill and knowledge of the prior land use.

Detectable amounts of compounds of concern within the fill material should be evaluated for risk in accordance with the DTSC Preliminary Endangerment Assessment (PEA) Guidance Manual. If

metal analyses are performed, only those metals (CAM 17 / Title 22) to which risk levels have been assigned need to be evaluated. At present, the DTSC is working to establish California Screening Levels (CSL) to determine whether some compounds of concern pose a risk. Until such time as these CSL values are established, DTSC recommends that the DTSC PEA Guidance Manual or an equivalent process be referenced. This guidance may include the Regional Water Quality Control Board's (RWQCB) guidelines for reuse of non-hazardous petroleum hydrocarbon contaminated soil as applied to Total Petroleum Hydrocarbons (TPH) only. The RWQCB guidelines should not be used for volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCS). In addition, a standard laboratory data package, including a summary of the QA/QC (Quality Assurance/Quality Control) sample results should also accompany all analytical reports.

When possible, representative samples should be collected at the borrow area while the potential fill material is still in place, and analyzed prior to removal from the borrow area. In addition to performing the appropriate analyses of the fill material, an appropriate number of samples should also be determined based on the approximate volume or area of soil to be used as fill material. The table above can be used as a guide to determine the number of samples needed to adequately characterize the fill material when sampled at the borrow site.

Alternative Sampling

A Phase I or PEA may be conducted prior to sampling to determine whether the borrow area may have been impacted by previous activities on the property. After the property has been evaluated, any sampling that may be required can be determined during a meeting with DTSC or appropriate regulatory agency. However, if it is not possible to analyze the fill material at the borrow area or determine that it is appropriate for use via a Phase I or PEA, it is recommended that one (1) sample per truckload be collected and analyzed for all com-

pounds of concern to ensure that the imported soil is uncontaminated and acceptable. (See chart on Potential Contaminants Based on the Fill Source Area for appropriate analyses). This sampling frequency may be modified upon consultation with the DTSC or appropriate regulatory agency if all of the fill material is derived from a common borrow area. However, fill material that is not characterized at the borrow area will need to be stockpiled either on or off-site until the analyses have been completed. In addition, should contaminants exceeding acceptance criteria be identified in the stockpiled fill material, that material will be deemed unacceptable and new fill material will need to be obtained, sampled and analyzed. Therefore, the DTSC recommends that all sampling and analyses should be completed prior to delivery to the site to ensure the soil is free of contamination, and to eliminate unnecessary transportation charges for unacceptable fill material.

Composite sampling for fill material characterization may or may not be appropriate, depending on quality and homogeneity of source/borrow area, and compounds of concern. Compositing samples for volatile and semivolatile constituents is not acceptable. Composite sampling for heavy metals, pesticides, herbicides or PAH's from unanalyzed stockpiled soil is also unacceptable, unless it is stockpiled at the borrow area and originates from the same source area. In addition, if samples are composited, they should be from the same soil layer, and not from different soil layers.

When very large volumes of fill material are anticipated, or when larger areas are being considered as borrow areas, the DTSC recommends that a Phase I or PEA be conducted on the area to ensure that the borrow area has not been impacted by previous activities on the property. After the property has been evaluated, any sampling that may be required can be determined during a meeting with the DTSC.

For further information, call Richard Coffman, Ph.D., R.G., at (818) 551-2175.

APPENDIX D
VAPOR BARRIER INFORMATION

Dan Weis

Subject: FW: 570 21st Street - Sheet A053 vapor barrier mitigation for the elevator shafts.
Attachments: 570 21st_A053.pdf

----- Forwarded message -----

From: **Wong, Jing** <JFWong@oaklandnet.com>
Date: Mon, Apr 24, 2017 at 5:32 PM
Subject: FW: 570 21st Street - SheetA053
To: Ana Blomeier <ana@studiokda.com>
Cc: Buddy Williams <buddy@studiokda.com>

Hi Ana,

The design use as shown on Sheet A053 is approvable with regards to the codes applicable in the 2013 CBC.

Thank you,

Jing Wong, P.E.

Plan Check Engineer

Planning and Building Department

City of Oakland

From: Ana Blomeier [mailto:ana@studiokda.com]
Sent: Monday, April 24, 2017 5:29 PM
To: Wong, Jing
Cc: Buddy Williams
Subject: 570 21st Street - SheetA053

Jing,

As a follow-up to our conversation/meeting, please find attached Sheet A053 for your review and approval regarding the vapor barrier mitigation for the elevator shafts.

Please let us know if you have any questions. If you can get back to us as soon as possible, we'd appreciate it.

Thank you,

Ana Blomeier
x 318

studioKDA

510.841.3555 | studiokda.com
1810 6th Street, Berkeley, CA 94710

From: Mike [<mailto:mike@ralphrayconstruction.com>]
Sent: Friday, August 26, 2016 1:16 PM
To: Joe Stamates <Joe@jsbuilders.com>
Cc: estimating@ralphrayconstruction.com; dennis@ralphrayconstruction.com
Subject: RE: JS Builders - 570 21st Street - Vapor Barrier SF price

Good Afternoon Joe,

I have put together a more complete submittal for this project that includes some additional information for VOC mitigation. Please take note of the addition of the letter from Tremco with regards to the types of VOC that have been tested on the membrane. Currently we are working on several VOC projects where this product is approved and is being installed. Here are two that we are currently on.

1. 5119 District Blvd, Vernon Ca 90058. Project Name : District Industrial Center. DTSC was involved.
2. Marriott Residence Inn San Carlos. Project address: 595 Industrial Rd, San Carlos Ca 94070.

Best Regards,

Michael Aldrich

Project Manager



RalphRay Construction

5384 Maricopa Drive

Simi Valley Ca. 93063

www.RalphRayConstruction.com

p. [805.624.7717](tel:805.624.7717)

f. [805.527.7090](tel:805.527.7090)

e. Mike@RalphRayConstruction.com



SUBMITTAL



-Project name here-

Prepared For:

-JS Builders-

Table of Contents

1. Impervious Carrier Fabric: Viper VaporCheck
2. Impervious Gas Membrane: VaporLock-m



1. Impervious Carrier Fabric: Viper VaporCheck



VIPER

VAPORCHECK
HD UNDER SLAB VAPOR BARRIERS

HD UNDER SLAB VAPOR BARRIER

VIPER VAPORCHECK is a triple ply, extrusion coated, virgin polyethylene membrane. VIPER VAPORCHECK is manufactured using woven, high-density fibers yielding the highest strength to weight ratio, tensile strength, tear resistance, bursting strength and puncture resistance of any product produced of its kind.

The outstanding strength qualities of VIPER VAPORCHECK allow it to hold up against harsh construction traffic. Along with the strength characteristics, VIPER VAPORCHECK has a superior water vapor permeance value that places it in the "VAPOR BARRIER" category.

VIPER VAPORCHECK provides an inexpensive insurance policy to protect floors and other moisture sensitive equipment within the building's interior. By inhibiting moisture and soil gas migration, VIPER VAPORCHECK greatly reduces condensation, mold growth and poor breathing conditions within a building and aids in controlling structural degradation.

The physical characteristics of a vapor retarder consist of high puncture resistance, high tensile strength and low water vapor permeance. VIPER VAPORCHECK has virtually zero water vapor permeance, making it a "VAPOR BARRIER" rather than a "vapor retarder."

PROTECT YOUR FLOOR

VIPER VAPORCHECK is designed to prevent moisture migration through slab-on-grade applications. Moisture migration has been known to cause the following:

- Poor indoor air quality (IAQ)
- Mold, mildew and fungus
- Failures to the flooring system
[Adhesive Failure, Distortion, Discoloration, Deterioration, Degradation, Rust Stains, Odors]
- Damage to the slab-on-grade and its components
- Heat loss through increased thermal conductivity caused by moisture in the slab

PRODUCTS

VAPORCHECK 16-MIL
VAPORCHECK 10-MIL

DIMENSIONS

12' X 200'
(2400 SQFT)

CLASSIFICATION

EXCEEDS ALL
ASTM E 1745 "CLASS A"
REQUIREMENTS

APPLICATIONS

UNDER SLAB
VAPOR BARRIER

CRAWL SPACES

WATERPROOFING
PROTECTION

RADON MITIGATION

FOR INQUIRIES OR TECH. SUPPORT CALL:

1.866.698.6562



FOR MORE INFO GO TO:

[WWW.INSOLUTIONS.COM](http://WWW.INSULATION SOLUTIONS.COM)





10-MIL REINFORCED "CLASS A" VAPOR BARRIER

SPECIFICATION INFORMATION VAPOR RETARDERS DIVISIONS: 033000, 072600

Revised: 03-01-10

1.0 PRODUCT NAME

VIPER® VAPORCHECK® 10-mil
ASTM E 1745 "CLASS A"
Reinforced Under-Slab Vapor Barrier

2.0 MANUFACTURER



Insulation Solutions Inc.
401 Truck Haven Road
East Peoria, IL 61611

Engineering Assistance
Toll Free: 866-698-6562
Fax: 309-698-0065

www.insulationsolutions.com

3.0 PRODUCT DESCRIPTION

3.1 Basic Use:

VIPER® VAPORCHECK® 10-mil is a unique high strength, high performance, cross-woven reinforced polyethylene based under-slab vapor barrier specifically designed for preventing moisture migration through concrete slabs-on-grade. The superior strength properties of **VIPER® VAPORCHECK® 10-mil** greatly restrict punctures and tears that come with extensive jobsite traffic. **VIPER® VAPORCHECK® 10-mil** reduces water vapor emission transfer and moisture migration from entering the building envelope on commercial, industrial and residential applications. **VIPER® VAPORCHECK® 10-mil** may be used to reduce radon and methane gas migration and is resistant to other adverse soil conditions.

VIPER® VAPORCHECK® 10-mil is also designed to control condensation, mold, mildew, degradation and prevents costly flooring failures and damage to moisture sensitive furnishings within a building's interior.

3.2 Composition & Materials:

VIPER® VAPORCHECK® 10-mil is manufactured using the latest generation of prime virgin (non-recycled) polyethylene resin, constructed in a triple-ply extrusion coated process and engineered with physical properties that maintain long term performance. The extrusion coated process bonds woven high-density fibers together, using HD molten polyethylene, creating an excellent balance of high puncture and tensile strength while maintaining very low water vapor permeance characteristics. The cross-woven high-density fibers, used as the reinforcing layer, yield the highest strength to weight ratio, tensile strength, tear resistance, bursting strength and puncture resistance of any product produced of its kind.

3.3 Product Dimensions & Weight:

VIPER® VAPORCHECK® 10-mil is available in 2400 sq. ft. rolls (12' X 200'). Each roll weighs approximately 98 lbs.

3.4 Benefits:

- Unsurpassed Puncture Resistance
- Maintains long term performance after exposure to adverse soil conditions
- Exceeds ASTM E 1745 "Class A" Requirements
- Vapor Barrier rather than Vapor Retarder
- Resistant to alkali salts, moisture & other soil degrading chemicals
- Greatly reduces moisture migration through slab-on-grade applications

4.0 TECHNICAL DATA

4.1 Applicable Standards:

- American Society for Testing & Materials (ASTM)
- American Concrete Institute (ACI)
- **ASTM E 1745** Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
- **ASTM E 154** Standard Test Methods for Water Vapor Retarders used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
- **ASTM D 1709** Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method
- **ASTM D 5602** Standard Test Methods for Static Puncture Resistance of Roofing/Under Slab Membrane Specimens
- **ASTM E 96** Standard Test Methods for Water Vapor Transmission of Materials
- **ASTM D 882** Standard Test Method for Tensile Properties of Thin Plastic Sheeting
- **ASTM D 751** Standard Test Method for Coated Fabrics
- **ASTM E 1643** Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
- **ACI 302.2R-06** Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials

PROPERTIES	TEST METHOD	VIPER® VAPORCHECK® 10-MIL	
		IP Units	SI Units
Test Procedure - Independent Test Facility	Applicable Standards		
Thickness, Nominal		10-mil	0.25 mm
Weight Per MSF		36 lbs.	16.3 kg
Classification	ASTM E 1745	CLASS A, B & C	
Puncture Resistance	ASTM D 1709	15839 grams	
Puncture Resistance	ASTM D 5602	76 lbs.	34,473 grams
Tensile Strength (New Material)	ASTM E 154, Sec. 9	136 lb/ft (MD), 134 lb/ft (TD)	23.8 kN/m (MD), 23.5 kN/m (TD)
Tensile Strength (After Soaking)	ASTM E 154, Sec. 9	140 lb/ft (MD), 133 lb/ft (TD)	24.5 kN/m (MD), 23.3 kN/m (TD)
Tear Strength	ASTM D 751, Tongue	54 lbs (Warp), 57 lbs (Weft)	24.5 kg (Warp), 25.8 kg (Weft)
Bursting Strength	ASTM D 751, Mullen	318 lbs.	144 kg
Operating Temperature Range		-70° F to 180° F	-57° C to 82° C
Water Vapor Permeance	ASTM E 96 / 154 Sec. 7	0.0016 perms (U.S.)	0.0010 perms (Metric)
Water Vapor Transmission Rate	ASTM E 96 / 154 Sec. 7	0.0006 grains/ft²/hr	0.0004 grams/m²/hr
Chemical Resistance	ASTM E 154	Unaffected	Unaffected
Life Expectancy	ASTM E 154	Indefinite	Indefinite

4.2 Environmental Considerations:

VIPER® VAPORCHECK® 10-mil can be used for controlling soil gas and poisons such as methane, radon, sulfates and petroleum contaminated soil.

4.3 Physical Properties:

VIPER® VAPORCHECK® 10-mil exceeds all ASTM E 1745 "Class A" requirements for under-slab vapor retarders.

5.0 INSTALLATION

5.1 Sub-Grade Preparation:

Level and tamp or roll granular base as specified by the architectural or structural drawings.



5.2 Vapor Barrier Placement:

Unroll VIPER® VAPORCHECK® 10-mil with the longest dimension parallel with the direction of the pour. Unfold VIPER® VAPORCHECK® 10-mil to full 12' width.

Lap VIPER® VAPORCHECK® 10-mil over the footings and seal to the vertical foundation walls with either **WHITE POLYETHYLENE TAPE**, **VIPER® DOUBLE BOND TAPE**, **VIPER® VAPORPATCH** or **VAPORCHECK® MASTIC**.



5.3 Seams and Penetrations:

Seal around pipes, support columns or any other penetration with **VIPER® VAPORPATCH**, **VAPORCHECK® MASTIC** or at minimum a combination of **VIPER® VAPORCHECK® 10-mil** and **WHITE POLYETHYLENE TAPE**. Doing so creates a monolithic membrane between the surface of the slab and moisture sources below.

Holes or openings through **VIPER® VAPORCHECK® 10-mil** should be effectively sealed with **WHITE POLYETHYLENE TAPE**, **VIPER® VAPORPATCH** or **VAPORCHECK® MASTIC** to maintain the integrity of the vapor barrier. Overlap joints a minimum of six inches. Seal overlap together with **WHITE POLYETHYLENE TAPE** and/or **VIPER® DOUBLE BOND TAPE**.

5.4 Protection:

When installing reinforcing steel and utilities, in addition to the placement of concrete, take precaution to protect **VIPER® VAPORCHECK® 10-mil**. Carelessness during installation can damage the most puncture-resistant vapor barriers. Provide for additional protection in high-traffic areas.

Place standard reinforcing bar supports on **VIPER® VAPORCHECK® 10-mil**. The strength characteristics of **VIPER® VAPORCHECK® 10-mil** will help guard against possible punctures caused by reinforcing bar supports.

Avoid driving stakes through **VIPER® VAPORCHECK® 10-mil**. If this cannot be avoided, each individual hole must be repaired.

If a cushion or blotter layer is required in the design between the vapor barrier and the slab, additional care should be taken, especially if sharp crushed rock is used. Washed rock will provide less chance of damage during placement.

These are very general installation instructions. Instructions on architectural or structural drawings should be reviewed and followed as well. Detailed installation instructions are available online at www.insulationsolutions.com. ASTM E 1643 also provides valuable installation information for under-slab vapor retarders.

6.0 AVAILABILITY & COST

VIPER® VAPORCHECK® 10-mil is sold through construction supply houses across the United States and Canada.

VIPER® VAPORCHECK® 10-mil current cost information can be obtained by calling our Corporate Office at 866-698-6562.

7.0 WARRANTY

INSULATION SOLUTIONS INC.® MAKES NO WARRANTIES AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS REFERRED TO, NO GUARANTEE OF SATISFACTORY RESULTS FROM RELIANCE UPON CONTAINED INFORMATION OR RECOMMENDATIONS AND DISCLAIMS ALL LIABILITY FOR RESULTING LOSS OR DAMAGE.

8.0 MAINTENANCE

VIPER® VAPORCHECK® 10-mil requires no maintenance once installed.

9.0 TECHNICAL SERVICES

Technical Information and detailed test results can be obtained by calling our Corporate Office at 866-698-6562.

10.0 FILING SYSTEMS

Additional Information can be obtained by calling our Corporate Office at 866-698-6562 or online at www.insulationsolutions.com.



Note: To the best of our knowledge, the specification chart on page one lists typical property values and are intended as guides only, not as specification limits. Insulation Solutions Inc.® makes no warranties as to the fitness for a specific use or merchantability of products referred to, no guarantee of satisfactory results from reliance upon contained information or recommendations and disclaims all liability for resulting loss or damage.

INSULATION SOLUTIONS, INC. (MOISTURE CONTROL DIVISION)

[401 Truck Haven Road] [East Peoria, Illinois 61611] [Toll Free: 866.698.6562] [P: 309.698.0062] [F: 309.698.0065]

WWW.INSOLUTIONSOLUTIONS.COM



An Affiliate of Meyer Enterprises

401 Truck Haven Rd.
East Peoria, Illinois 61611
Toll Free 866 698 6562
Phone 309 698 0062
Fax 309 698 0065

www.insulationsolutions.com

Material Safety Data Sheet

Product Name: Viper® Vapor Check® **HMIS Codes: H F R P**
Product: HDPE Yarn + LDPE Coating + Color Additive **0 1 0**

Section I - Manufacturer Identification

Manufacturer: Insulation Solutions, Inc.
Address: 401 Truck Haven Road, East Peoria, IL 61611
Emergency Phone: 309-698-0062
Date Prepared: January 25, 2007

Section II - Hazardous Ingredients/Identity Information

Under normal conditions of storage and handling, this product is not likely to cause adverse health effects.

Section III - Physical/Chemical Characteristics

Boiling Point:	Not measured	Specific Gravity:	Available upon request
Vapor Density:	Not measured		
Evaporation Rate:	N/A	Solubility in Water:	None
Appearance and Odor:	Plastic sheeting, no odor		

Section IV - Fire and Explosion Hazard Data

Flash Point: > 300°C (572°F)

Flammable Limits in Air by Volume: Lower: Not Known Upper: Not Known

Extinguishing Media: Water spray, water fog, CO₂, dry chemical

Special Firefighting Procedures:

For fires involving this material do not enter any closed or confined space without proper protection equipment, including self-contained breathing apparatus.

Unusual Fire and Explosion Hazards:

In its present form, this product offers no unusual fire and explosion hazards.

Section V - Reactivity Data

Stability:	Stable
Conditions to Avoid:	Temperatures above 260°C (500°F)
Incompatibility (Materials to Avoid):	N/A
Hazardous Decomposition or Byproducts:	N/A
Hazardous Polymerization:	Will not occur.

Section VI - Health Hazard Data

This product, in plastic sheet form, is not expected to cause adverse health effects under normal handling and storage conditions.

Potential Acute Health Effects,

Inhalation Health Risks and Symptoms of Exposure: N/A

Skin and Eye Contact Health Risks and Symptoms of Exposure: Refer to Emergency & First Aid Procedures for more details.

Skin Absorption Health Risks and Symptoms of Exposure: Refer to Emergency & First Aid Procedures for more details.

Ingestion Health Risks and Symptoms of Exposure: N/A

Potential Chronic Health Effects Target Organs: N/A

Reproductive/Developmental Effects: N/A

Carcinogenicity:	NTP?	No
	IARC Monographs?	No
	OSHA Regulated?	No

Persistent Bioaccumulative Toxin (PBT)? No

Medical Conditions Generally Aggravated by Exposure: N/A

Toxicological Information:	Acute Oral LD50:	Not Tested
	Primary Skin Irritation Test:	Not Tested
	Primary Eye Irritation:	Not Tested
	Human Dermal Exposure:	Not Tested

Emergency and First Aid Procedures:

If hot melted material gets on skin, quickly cool in water. Consult a physician for extensive burns. Do not try to peel solidified material from the skin or use solvents or thinner to dissolve it.

Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled: N/A

Waste Disposal Method:

Place in suitable container or disposal. Ensure conformity to local, state and federal regulations.

Precautions to Be Taken in Handling and Storing:

Do not store near heat or flame.

Section VIII - Control Measures

Respiratory Protection:	Not Needed
Ventilation:	Normal
Protective Gloves:	Not Needed
Eye Protection:	Not Needed
Other Protective Clothing or Equipment:	Not Needed
Work/Hygienic Practices:	Wash thoroughly after handling & before eating/drinking or using tobacco products.

Section IX - Regulatory

TSCA:	All components of this product are exempt from the TSCA listing.
California Propositions 65:	This product does not contain any substance on the California List of Known Carcinogens and Reproductive Toxins.
SARA/Title III:	This product does not contain toxic chemical for routine annual toxic chemical release.
Transportation DOT Classification:	Not Regulated

This information must be included in all MSDS that are copied and distributed for this material.

Section X - Disclaimer

To the best of our knowledge, the information contained herein is accurate. It is obtained from sources such as raw material suppliers and is believed to be true. This material safety data sheet will supersede any that was previously received as it contains the most up to date information.

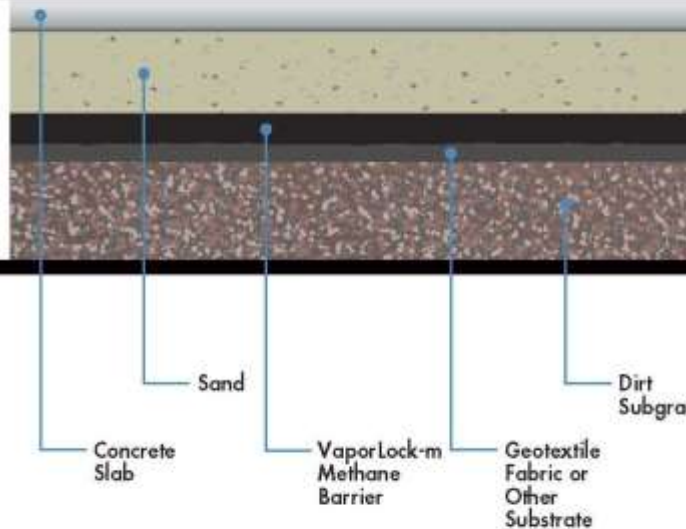


2. Impervious Gas Membrane : VaporLock-m

VAPORLOCK-m: YOUR SOLUTION TO METHANE MITIGATION

When soil reports indicate a need for methane mitigation for your site, VaporLock™ Methane Barrier [VaporLock-m] provides an impermeable, easy to install barrier solution to methane infiltration. What's more, VaporLock-m may help you remediate methane contamination at a lower installed cost than other applications available in your area - giving you greater opportunities for profitability or increased flexibility in your selling prices.

VaporLock-m
METHANE BARRIER



SEAMLESS METHANE BARRIER

- VaporLock-m is an independently-tested and City of Los Angeles approved (LA City #RR 25546) methane barrier membrane that is applied to a tough geotextile fabric or other substrate to prevent methane from entering the building through the foundation slab or other treated surfaces.
- VaporLock-m is a polymer-enhanced asphalt barrier that is seamlessly spray-applied to the substrate at a highly-protective thickness of at least 44 mils dry. The barrier's flexibility enables it to withstand thermal expansion and contraction with no compromise in performance.
- The impermeability and ease-of-application make VaporLock-m a reliable, cost-effective alternative for methane mitigation.

FROM THE LEADERS IN SPRAY-APPLIED BARRIER TECHNOLOGY

VaporLock-M comes to you from Tremco Barrier Solutions, with a heritage in spray-applied barrier technology stretching back more than 20 years. Since 1983, our team has sparked innovations in fluid membrane formulations and performance. And we offer more than two decades of experience installing spray-applied barriers – including TUFF-N-DRI® Basement Waterproofing System, the #1 brand of new basement waterproofing in North America.

INSTALLED BY TRAINED PROFESSIONALS

VaporLock-m is reliably installed by select contractors, trained by Tremco Barrier Solutions. Count on our contractors to professionally, promptly and courteously install VaporLock-m to your specifications and schedule.

SITE PREPARATION

- Provide a minimum 24 inches of clearance around the area to receive VaporLock-m.
- To avoid staining, apply masking or otherwise protect all adjacent areas or fixtures not to receive VaporLock-m.
- Moisture-condition and compact the subgrade to a minimum relative compaction of 90 percent or as specified by a civil engineer. Make sure the subgrade surface is free of debris and all dirt clods or stones larger than 1/4 inch, so that the finished surface is smooth and uniform.
- Properly secure all plumbing, electrical, mechanical and structural items that will penetrate VaporLock-m.

For more details about VaporLock-m™,
call your local Barrier Solutions Contractor:



VAPORLOCK-m SPECIFICATIONS

Barrier Membrane

Membrane Description

Type	Polymer-enhanced asphalt liquid-applied membrane
Color	Black
Solids	63 +/- 3 [percent by weight]
Density	8.1 lbs/gal
Application	Airless Spray
Application Temperature	Minimum 20°F
Coating Cure Time	16–24 hrs
Application Thickness	44 mils [dry] ¹ solid surface 60 mils [dry] ¹ geotextile fabric (including fabric)

Membrane Properties

Properties	Typical Results	Test Methods
Adhesion to Concrete	Exceeds	ASTM C-836
Elongation	>2000 percent	ASTM D-412
Low Temperature Flexibility	Flexible to -10°F	See ²
Crack Bridging Ability	Exceeds 10 cycles to 1/8" at -15°F	ASTM C-836
Water Vapor Permeance	0.08 perms for 40-mil dry coating [grain/sf/hr in Hg]	ASTM E-96 Dry Method
Liquid Water Absorption	0.3% [wt]	ASTM D-1228 ³
Resistance to Degradation in Soil	Good	ASTM E-154
Mold Growth and Bacterial Attack	No degradation	ASTM D-3273 ASTM D-3274

¹ Membrane mil thickness based upon local code or engineering consideration

² Bend membrane compound around 1" radius

³ 72 hour water soak, 1" x 2" x 0.40" samples of membrane compound

Geotextile Fabric

Mechanical [MARV] ¹	Typical Results	Test Methods	Endurance [MARV] ¹	Typical Results	Test Methods
Grab Tensile Strength	250 lbs	ASTM D-4632	UV Resistance @500 hrs	70%	ASTM D-4355
Grab Elongation	60%	ASTM D-4632	Physical [MARV]¹	Typical Results	
Trapezoidal Tear Strength	90 lbs	ASTM D-4533	Unit Weight	6.0 oz/sq yd	
Puncture Strength	81 lbs	ASTM D-4833			

¹ Minimum average roll values [MARV] in the weaker principal direction



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6402 East Main Street, Suite 201
Reynoldsburg, OH 43068

Attn: Michael Wait
(800) 876-5624

RESEARCH REPORT: RR 25546
(CSI # 07120)

Expires: May 1, 2017
Issued Date: June 1, 2015
Code: 2014 LABC

GENERAL APPROVAL – Renewal - VaporLock-m™ Methane Barrier System for
Below-Grade Water Proofing and Gas Barrier.

DETAIL

VaporLock-m™ Methane Barrier System is composed of Tuff-N-Dri or Tuff-N-Dri MV installed over a geotextile fabric or a Class A Vapor Barrier consisting a 10 mil thick polyolefin geomembrane. Tuff-N-Dri® or Tuff-N-Dri MV is a fluid-applied, single component, polymer-modified asphalt emulsion. The VaporLock-m-system is designed for applications on grade, over a sand substrate, or over unusually irregular substrata such as wood lagging. Tuff-n-Dri is applied directly to substrata such as cast in place (CIP) concrete or concrete masonry units (CMU), and on decks. The minimum thickness of the system is 60 mils total, when measuring the composite of geotextile fabric and applied cured polymer-modified asphalt emulsion; the thickness of the applied cured film shall be no less than 50 mils. The minimum thickness of the system is 55 mils, when measuring the composite of polyolefin membrane and applied cured polymer modified asphalt emulsion; the thickness of the applied cured film shall be no less than 50 mils. For applications directly to solid substrate, a 70 mil wet film thickness shall be applied as per the application instructions. Geotextile fabrics are adjoined by seams overlapping minimum 4 inches in which the bottom geotextile fabric is sprayed with 65 mil thick coating (40 mil dry, minimum) of the Tuff-N-Dri or Tuff-N-Dri MV, as applicable and the top (geotextile) press bonded to it manually. Polyolefin geomembranes are adjoined by seams overlapping minimum 5 inches in which the bottom polyolefin geomembrane is sprayed with 65 mil thick coating (40 mil dry, minimum) of the Tuff-N-Dri MV, as applicable and the top (Polyolefin geomembrane) press bonded to it manually.

RR 25546
Page 1 of 4

Tremco Barrier Solutions, Inc.

RE: VaporLock-m™ Methane Barrier System for Below-Grade Water Proofing and Gas Barrier.

The repair procedures for the VaporLok-m™ Methane Barrier System are outlined below:

1. Voids found after the membrane has cured may be repaired by spraying the void and 2 inches surrounding the void with Tuff-N-Dri (MV) the 70 mils wet (44 dry) required. Alternately, the Tuff-N-Dri (MV) membrane may be troweled or brushed into the void and the surrounding 2 inches. Multiple troweled or brushed coats may be required to achieve the required thickness.
2. Small areas (up to 8 inch square areas) of barrier membrane that have to be repaired due to faulty installation or because of thickness sampling shall be repaired in the following manner. First a tack coat of Tuff-N-Dri shall be applied to cover the repair area and a minimum of 3 inches beyond the borders of the repair area. Next, a piece of geotextile or polyolefin geomembrane, depending on the original carrier fabric used is placed so that it extends over the repair area and 2 inches beyond the borders of the area. Then apply a 70 mil wet (44 mil) dry coat of Tuff-N-Dri over the patch.
3. Large patches shall be handled in the same manner as the original installation of the methane barrier membrane, e.g. seams with 4 inch overlaps adhered with 60 wet mils of Tuff-N-Dri MV on installations using geotextile fabric, seams with 5 inch overlap adhered with 60 wet mils of Tuff-N-Dri MV for installations using polyolefin geomembranes, and the fabric field sprayed to achieve 44 dry mil membrane thickness

This product is approved for below-grade gas barrier subject to the following conditions:

1. VaporLock-m™ Methane Barrier System shall be supplied in clearly marked containers bearing the brand name and product identification.
2. The manufacturer shall provide quality assurance of the materials supplied as to their formulation.
3. Application of the product shall be accomplished by an applicator approved by the manufacturer. A written statement by the manufacturer stating that the applicator is an approved applicator is required prior to use of the product.
4. All surfaces to receive membrane shall be free of laitance, sharp projections, oil, dirt or other contaminants. Prepare surfaces in accordance with the manufacturer's instructions.
5. Installation of the materials shall be in accordance with the manufacturer's instructions, a copy of which shall be kept at the job site. All carrier materials (geotextile and polyolefin) used by the installer must meet the basic

Tremco Barrier Solutions, Inc.

RE: VaporLock-m™ Methane Barrier System for Below-Grade Water Proofing and Gas Barrier.

requirements in this report and be on the Approved Carrier Material List provided by Tremco Barrier Solutions.

6. Complete details for the membrane system are submitted for plan check and a building permit is obtained.
7. The following field tests in accordance with the Tremco Barrier Solutions Field Installation and Repair Procedure are required: (A copy of the Installation and Repair Procedures is on file with Engineering Research Section.)
 - a. Perform Thickness Sample Test at every 500 square feet.
 - b. Perform Smoke Test for the entire site at the interval not more than 50,000 sq. ft. each.
8. Protection for the membrane shall be provided in accordance with the written instructions by the engineer of the record.
9. Prior to placing the concrete slab over the membrane, the membrane installer shall certify the membrane to be installed and tested in accordance with the manufacturer's specifications and to be free of leaks.
10. The membrane is not to be placed under the building footings.
11. For gas membrane installation, continuous inspection by a registered deputy inspector certified by Tremco Barrier Solutions, Inc., and registered in accordance with the requirements specified in Section 1704.2 of the Los Angeles City Building Code for special inspection is required.

Tremco Barrier Solutions, Inc.
RE: VaporLock-m™ Methane Barrier System for Below-Grade Water Proofing and Gas Barrier.

DISCUSSION

The report is in compliance with the 2014 Los Angeles City Building Code.

The use of VaporLock-™ Methane Barrier System for water-proofing and gas barrier is based on tests in accordance with below-grade water proofing and the methane barrier test criteria.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

QUAN NGHIEM, Chief
Engineering Research Section
201 N. Figueroa St., Room 880
Los Angeles, CA 90012
Phone- 213-202-9812
Fax- 213-202-9943

AP
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05/06/15
7104/7105/1805

6402 East Main St., Suite 201
Reynoldsburg, OH 43068
GuaranteedDryBasements.com

Office: 614-322-4420
Fax: 614-322-4753
Toll Free: 800-876-5624

April 29, 2014

To Whom It May Concern,

Per our conversation, TBS has conducted testing to determine the effect of separate vapors of the following chemicals on our Tuff-N-Dri membrane (VaporLock-m): Hydrogen Sulfide, Benzene, Toluene, Ethylene, Xylene, Gasoline, Hexane, Perchloroethylene, per ASTM D-1434. The membrane was subjected to these chemicals and tested for permeance. Generally, a membrane is considered impermeable if the permeance rating is below 1.0. The permeance rating for the vapors of these chemicals is listed below:

Hydrogen Sulfide	N/D
Benzene	0.04
Toluene	0.06
Ethylene	0.09
Xylene	0.13
Gasoline	0.15
Hexane	0.05
Perchloroethylene	N/D
Trichloroethylene	0.01

As you can see our VaporLock-m membrane is totally impermeable to hydrogen sulfide and perchloroethylene (diffusion = 0.00), and only slightly permeable to the other hydrocarbons listed, i.e. very low diffusion rates.

The following should help put this into a realistic perspective:

Even if the site had soil gas concentrations of 100% of the hydrocarbons above, and the soil gas pressure was everywhere equal to the maximum observed at any probe site (0.5 inches of water), then the diffusion of the gas mixture through the VaporLock-m membrane would still only result in the transmission of 0.05 cubic feet of gas per 1,000 square feet of surface area per day. Adjusting the value above for the average soil gas pressure for all locations on the site, reduces the result to 0.006 cubic feet of gas per 1,000 square feet of surface area per day. Of course the actual concentration of the hydrocarbons is far less than 100%, which would further reduce the transmitted volume.

To further put this in perspective, consider a building having 1,000 square feet of floor area and an 8-foot ceiling. The tightest construction allowed by building codes with adding mechanical ventilation is 0.2 ACPH. The building would typically have 38,400 cubic feet of air passing through the structure daily. The 0.006 cubic feet of gas from the paragraph above, which is a significant overstatement, represents only 0.000016 percent of the daily air exchange volume (or 0.016 ppm). It could be stated that the VaporLock-m membrane is more than 99.9999 percent effective at preventing any accumulation of hydrocarbon gases due to diffusion through the VaporLock-m membrane.

Sincerely,

James R. Wells
Technical Director

Certificate of Approval

Ralph Ray Construction Corporation
5384 Maricopa Drive
Simi Valley, CA 93063
805-624-7717

This document is to certify that Ralph Ray Construction Corporation is hereby approved by Tremco Barrier Solutions, Inc. to install our products and systems including VaporLock-m® methane barrier system, Tuff-N-Dri® and Watchdog® waterproofing systems.

Tremco Barrier Solutions, Inc. has provided Ralph Ray Construction Corporation with the education and training, required for Raycon to provide the aforementioned services. Ralph Ray Construction Corporation employees approved to apply our products are listed below:

Antonio Espinosa
Jose Cortez
Jose Mejorada
Alberto Casillas
Ezequiel Flores
Martin Barajas
Michael Paynter
Raymond Pinon

Mauro Javana
Danny Gonzales
Jesus Soltero
Ralph Ray
Dennis Ray

Ryan Newth
Tremco Barrier Solutions
March 20, 2015

TUFF-N DRI BULKVersion 1.1
REVISION DATE: 08/31/2006

Print Date 08/06/2008

SECTION 1 - PRODUCT IDENTIFICATION / PREPARATION INFORMATION**Product Information**Trade name : TUFF-N DRI BULK
Product code : TBS100Supplier : Tremco Canada division
220 Wicksteed Avenue
Toronto, ON M4H 1G7Telephone : (416) 421-3300
Emergency Phone: : (613) 996-6666**Preparation Information**Prepared by: : Sewnauth Raghunandan
Date: : 08/31/2006
Telephone : (416) 421-3300**SECTION 2 - HAZARDS IDENTIFICATION****Emergency Overview**

Brown. Liquid. May cause slight irritation to the respiratory system. Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention.

Acute Potential Health Effects/ Routes of EntryInhalation : May cause slight irritation to the respiratory system.
Eyes : Direct contact may cause mild irritation.
Ingestion : May cause gastrointestinal irritation, nausea, and vomiting.
Skin : May cause mild irritation. May cause sensitization resulting in irritation, itching and redness. May cause a rash.**Aggravated Medical Conditions**

Pre-existing eye, skin and respiratory disorders may be aggravated by exposure.

Chronic Health Effects

Prolonged or repeated skin contact with asphalt may result in skin sensitivity, such as irritation, rashes, and dermatitis. Prolonged or repeated exposure to polycyclic aromatic hydrocarbons and other volatiles which are contained in trace amounts in asphalt have been shown to cause cancer or respiratory damage in animals. Fillers are encapsulated and not expected to be released from product under normal conditions of use. Prolonged or repeated exposure to mineral spirits (petroleum naphtha or stoddard solvent) may cause defatting, drying, and irritation of the skin, dermatitis, central nervous system (CNS) effects, and adverse liver, kidney, and lung effects.

Target Organs: Skin, Eye, Lung**SECTION 3 : HAZARDOUS INGREDIENTS**

Chemical Name	CAS-No.	Weight % Range
Asphalt	8052-42-4	40.0 - 70.0
Stoddard solvent (Mineral Spirits)	8052-41-3	5.0 - 10.0
1,2,4-Trimethylbenzene	95-63-6	0.1 - 1.0

The ingredients listed above are hazardous as defined in the controlled products regulation. (CPR).

TUFF-N DRI BULK

Version 1.1

REVISION DATE: 08/31/2006

Print Date 08/06/2008

SECTION 4 - FIRST AID MEASURES

Get immediate medical attention for any significant overexposure.

- | | | |
|--------------|---|---|
| Inhalation | : | Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention. |
| Eye contact | : | Flush with water for at least 15 minutes while holding eye lids apart. Get medical attention immediately. |
| Skin contact | : | Clean area of contact thoroughly using soap and water. If irritation, rash or other disorders develop, get medical attention immediately. |
| Ingestion | : | Do not induce vomiting unless advised by a physician. Call nearest Poison Control Center or Physician immediately. |

SECTION 5: FIRE / EXPLOSION HAZARDS

- | | | |
|---------------------------------------|---|---|
| Flash point | : | > 212 °F, > 100 °C |
| Method | : | Pensky-Martens Closed Cup |
| Lower explosion limit | : | Not available. |
| Upper explosion limit | : | Not available. |
| Autoignition temperature | : | Not available. |
| Extinguishing media | : | If water fog is ineffective, use carbon dioxide, dry chemical or foam. |
| Hazardous combustion products | : | Carbon monoxide and carbon dioxide can form. Oxides of sulfur can form. |
| Protective equipment for firefighters | : | Not applicable. Product is not expected to burn. |
| Fire and explosion conditions | : | Not applicable, not expected to burn. |

SECTION 6 - SPILLS / LEAKS / ACCIDENTAL RELEASE MEASURES

Use appropriate protective equipment. Avoid contact with material. Stop flow. Contain spill. Keep out of water courses. Absorb spill in sand, earth or other suitable material. Transfer to appropriate container for disposal.

SECTION 7 - HANDLING AND STORAGE

Prevent inhalation of vapor, ingestion, and contact with skin eyes and clothing. Keep container closed when not in use. Precautions also apply to emptied containers. Store in sealed containers in a dry, ventilated warehouse location above freezing.

SECTION 8 - PREVENTIVE MEASURES/EXPOSURE CONTROLS/PERSONAL PROTECTION**Personal protection equipment**

- | | | |
|------------------------|---|---|
| Respiratory protection | : | Not required under normal conditions of use. |
| Hand protection | : | Use suitable impervious rubber or vinyl gloves and protective apparel to reduce exposure. |
| Eye protection | : | Wear chemical safety goggles and/or face shield to prevent eye contact. Do |

TUFF-N DRI BULK

Version 1.1

REVISION DATE: 08/31/2006

Print Date 08/06/2008

not wear contact lenses. Do not touch eyes with contaminated body parts or materials. Have eye washing facilities readily available.

Protective measures : Use professional judgment in the selection, care, and use. Other equipment not normally required.

Engineering measures : General ventilation is sufficient. Use local exhaust when the general ventilation is inadequate.

Exposure Limits

Chemical Name	CAS Number	Regulation	Limit	Form
Asphalt	8052-42-4	ACGIH TWA: benzene solubles Ontario TWA: benzene solubles	0.5 mg/m ³ 0.5 mg/m ³	Inhalable fraction.as Inhalable fumeas
Stoddard solvent (Mineral Spirits)	8052-41-3	Ontario TWA: ACGIH TWA:	525 mg/m ³ 100 ppm	
1,2,4-Trimethylbenzene	95-63-6	Ontario TWA: ACGIH TWA:	123 mg/m ³ 25 ppm	

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State	: Liquid
Form	: Liquid
Color	: Brown
Odor	: Asphalt
pH	: 8 - 12
Vapour pressure	: Not available.
Vapor density	: Heavier than air
Melting point/range	: Not available.
Freezing point	: Not available.
Boiling point/range	: 212 °F, 100 °C
Water solubility	: Dispersible
Evaporation Rate:	: Not available.
Specific Gravity	: 1
% Volatile Weight	: 30 %

SECTION 10 - REACTIVITY / STABILITY

Substances to avoid	: Oxidizing agents.
Stability	: Material is stable under normal storage, handling, and use.
Hazardous polymerization	: Will not occur under normal conditions.

TUFF-N DRI BULK

Version 1.1
 REVISION DATE: 08/31/2006

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SECTION 11 - TOXICOLOGICAL INFORMATION

No Data Available

SECTION 12 - ECOLOGICAL INFORMATION

No Data Available

SECTION 13 - WASTE DISPOSAL CONSIDERATIONS

Disposal Method : Dispose as hazardous waste according to all local, state, federal and provincial regulations.

SECTION 14 - TRANSPORTATION / SHIPPING DATA

TDG / DOT Shipping Description:
 NOT REGULATED

SECTION 15 - REGULATORY INFORMATION

North American Inventories:

All components are listed or exempt from the TSCA inventory.

This product or its components are listed on, or exempt from the Canadian Domestic Substances List.

Canadian Regulations:

WHMIS Classification : D2A

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

Other Regulations:

Regulatory VOC (less water and exempt solvent) : 87 g/l

SECTION 16 - OTHER INFORMATION

HMIS Rating :

Health	2
Flammability	1
Reactivity	0
PPE	

0 = Minimum
 1 = Slight
 2 = Moderate
 3 = Serious
 4 = Severe

TUFF-N DRI BULK

Version 1.1

REVISION DATE: 08/31/2006

Print Date 08/06/2008

Further information:

For Industrial Use Only. Keep out of Reach of Children. The hazard information herein is offered solely for the consideration of the user, subject to their own investigation of compliance with applicable regulations, including the safe use of the product under every foreseeable condition.

Prepared by: Sewnauth Raghunandan

Legend

ACGIH - American Conference of Governmental Hygienists

DOT - Department of Transportation

DSL - Domestic Substance List

EPA - Environmental Protection Agency

HMS - Hazardous Materials Information System

IARC - International Agency for Research on Cancer

MSHA - Mine Safety Health Administration

NDSL - Non-Domestic Substance List

NIOSH - National Institute for Occupational Safety and Health

NTP - National Toxicology Program

OSHA - Occupational Safety and Health Administration

PEL - Permissible Exposure Limit

RCRA - Resource Conservation and Recovery Act

STEL - Short Term Exposure Limit

TLV - Threshold Limit Value

TSCA - Toxic Substances Control Act

TWA - Time Weighted Average

V - Volume

VOC - Volatile Organic Compound

WHMIS - Workplace Hazardous Materials Information System

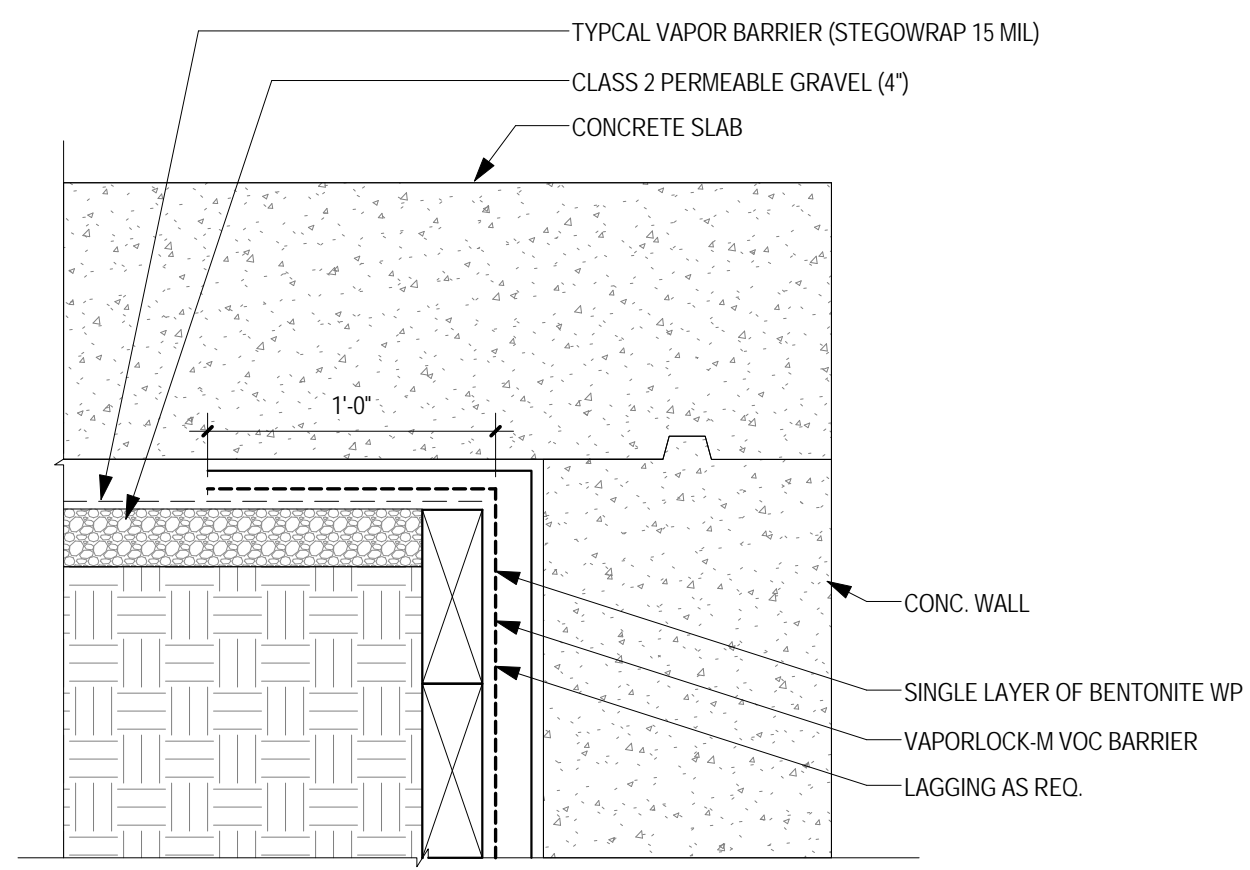
5. Seams, overlap joints, finishes or greater if required by vapor barrier manufacturer and seal with pressure sensitive tape.
6. Seal penetrations, including pipes, with pipe boot.
7. Single pipe penetrations must be sealed using pipe boot constructed from the product. Cut a piece of plastic 12 inches wide x 3-1/2 times the circumference of the pipe. With corners cut, slip half the width of the two Wrap boot around pipe, tape onto pipe and completely tape the base to the vapor barrier.
8. Multiple pipe penetrations in close proximity and very small pipes shall be sealed using mastic. Cut out a small area around pipes. Cut a patch of vapor barrier extending at least 6 inches past the cut out in all directions. Cut it to small circles in 1/4" increments, install over pipes. Compact in mastic 6 inches and tape. Build up 45 to 85 mils of mastic or as required to completely fill voids between the pipe and the vapor barrier.
9. Penetrations through vapor barrier sheathing except for reinforcing steel and permanent utilities are not permitted.
10. Repair damaged areas by patching patches of vapor barrier sheathing, overlapping damaged areas in three and taping all four sides with pressure sensitive tape.
11. Lay vapor barrier membrane smooth with no fasteners or bunches of material.
12. Inspect and repair vapor barrier prior to application of concrete slab; tape tears and repair damage.
13. Imperious Gas Membrane:
- Apply Tremco VaporLock-m in accordance with manufacturer's recommendations and installation instructions and in accordance with ASTM E1643, comply with most restrictive where conflicts occur.
 - Provide a minimum 24 inches of clearance around the area to receive VaporLock-m.
 - Measure condition and compact subgrade to a min. relative compaction of 90 percent or as specified by engineer. Make sure subgrade surface is free of debris and all dirt clods or stones larger than 1/2" so that the finish surface is smooth and uniform.
 - Properly secure all plumbing, electrical, mechanical, and structural items that will penetrate VaporLock-m.
 - Roll out geotextile fabric on prepared surface so that the head rolled side of the fabric is facing up. Overlap areas a minimum of five inches. Make sure the geotextile is flat on its entire corners.
 - Spray TUFF-4000 over the entire surface of geotextile at a rate not to exceed 20 sq. ft. per gallon coverage, or a min. of 70 mils wet thickness measured on top of the geotextile.

07 25 19 - 3 Below-Grade Vapor Barriers

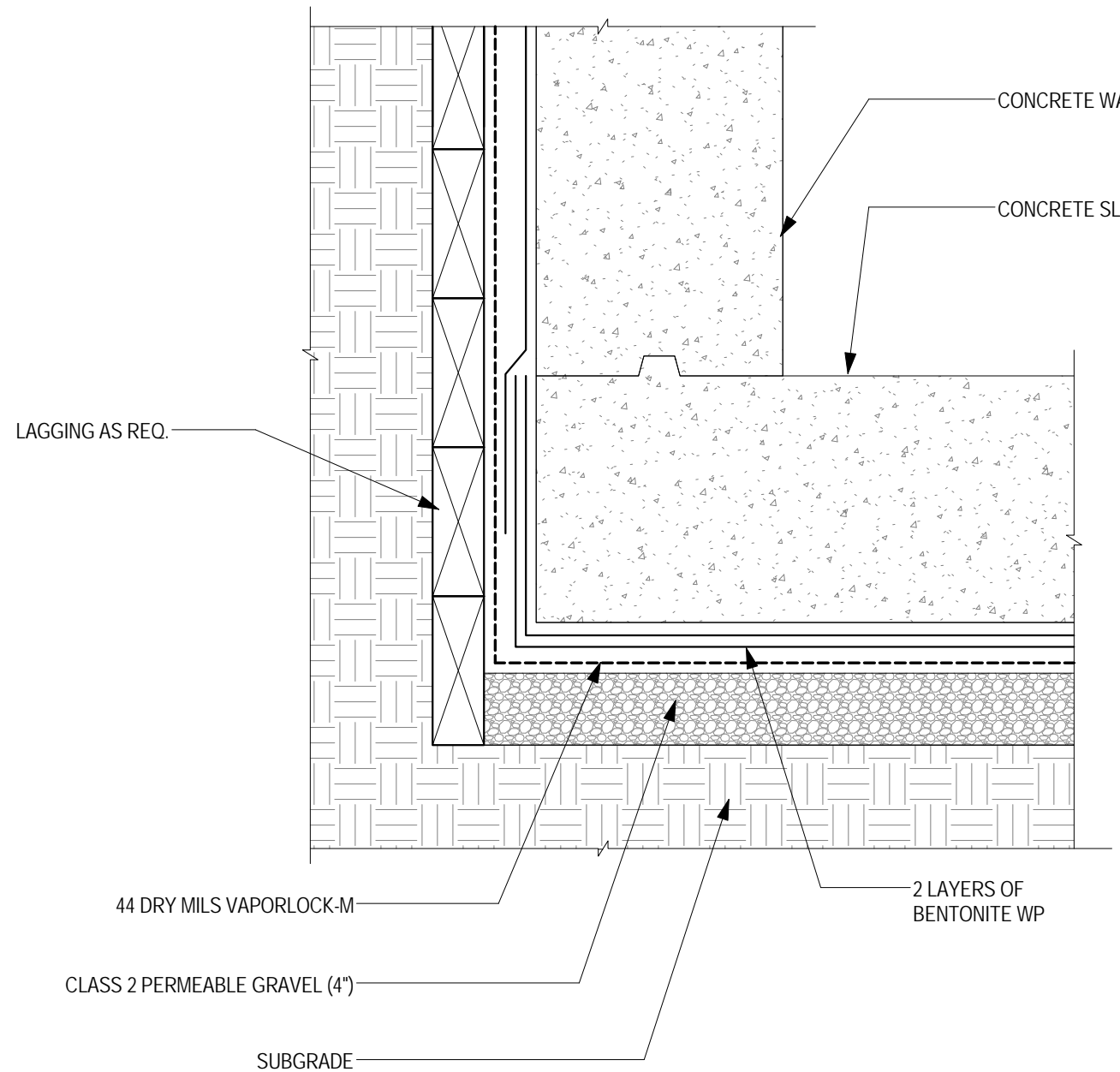
7. Careful attention must be taken during the application process to ensure a consistent homogeneous membrane.
8. Inspect for trapped moisture, geotextile compounds, voids, gas holes, blisters or other voids in the membrane. If any are detected, lightly re-spray until a smooth, cohesive coating is achieved.
33. CONSTRUCTION WASTE MANAGEMENT
- General: Comply with the requirements of Section 01 50 30 Temporary Facilities and Controls relating to waste management for removal and disposal of construction debris and waste.
 - Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

07 26 19 - 4 Below-Grade Vapor Barriers



8 TOP OF ELEVATOR PIT
1 1/2" = 1'-0"



7 BOTTOM OF ELEVATOR PIT
1 1/2" = 1'-0"

SECTION 07 26 19
BELOW-GRADE VAPOR BARRIER VOC BARRIER

PART 1 - GENERAL

1.1 SUMMARY

- Section Includes: Provide vapor barrier system for below grade and slab-on-grade concrete, including sealing joints and penetrations through vapor barrier. (Stegowrap 15mil)
 - At Elevator Pits: Install Imperious Gas Membrane following manufacturer's detailed application instructions. (Tremco VaporLock-m)
- 1.2 RELATED SECTIONS
- Section 01 74 10: Construction Waste Management
 - Section 09 30 00: Cast-In-Place Concrete
- 1.3 SUBPARTIAL
- General: Comply with Section 01 30 00.
 - Product Data: Include independent laboratory test results showing compliance with ASTM E1643 requirements, include manufacturer's installation instructions for placement, seaming, and pipe boot installation.
- 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING
- General: Comply with Section 01 61 00.
 - Protect products against damage during field handling and installation.

PART 3 - PRODUCTS

- 3.1 SYSTEMS MANUFACTURERS
- Vapor Barrier Sheeting [at all horizontal slab conditions excluding the elevator pits]: Stego Industries, Inc. Stego Wrap (15 mil), reinforced plastic, Class A.
 - Imperious Gas Membrane [to be used at elevator pits only]: Tremco VaporLock-m, methano barrier membrane applied to concrete slabs, at least 44 dry mils thick.
- 3.2 SUBSTITUTION: Refer to Section 01 25 00.
22. MATERIALS
- System Description Includes: Provide vapor barrier system for below grade and slab-on-grade concrete, including sealing joints and penetrations through vapor barrier and seal below vapor barrier.

07 26 19 - 1 Below-Grade Vapor Barriers

- Vapor Barrier Sheeting:
 - Water Airtight-Conditioning Water Vapor Permeance: 0.01 perms, ASTM E1745 Section 7.1 sub-paragraph 7.1.2.2
 - Water Vapor Barrier: Meets or exceeds Class A, ASTM E1643.
 - Thickness: Not less than 15-mils.
- Seam Tape: High density polyethylene tape with pressure sensitive adhesive, minimum 4 inches wide. Tape shall have a water vapor transmission rate of 0.3 perms or less in accordance with ASTM D36.
- Mastic: As recommended by vapor barrier manufacturer. Mastic shall have a water vapor transmission rate of 0.3 perms or less in accordance with ASTM D36.
- Pipe Boots: Construct from vapor barrier sheathing material and pressure sensitive tape in accordance with manufacturer's instructions.
- Perimeter/Edge Seal: Slaps "Clima Claw" or approved equal.
- At elevator pits, install Tremco VaporLock in accordance with manufacturer's detailed application instructions.

07 26 19 - 2 Below-Grade Vapor Barriers

PART 3 - EXECUTION

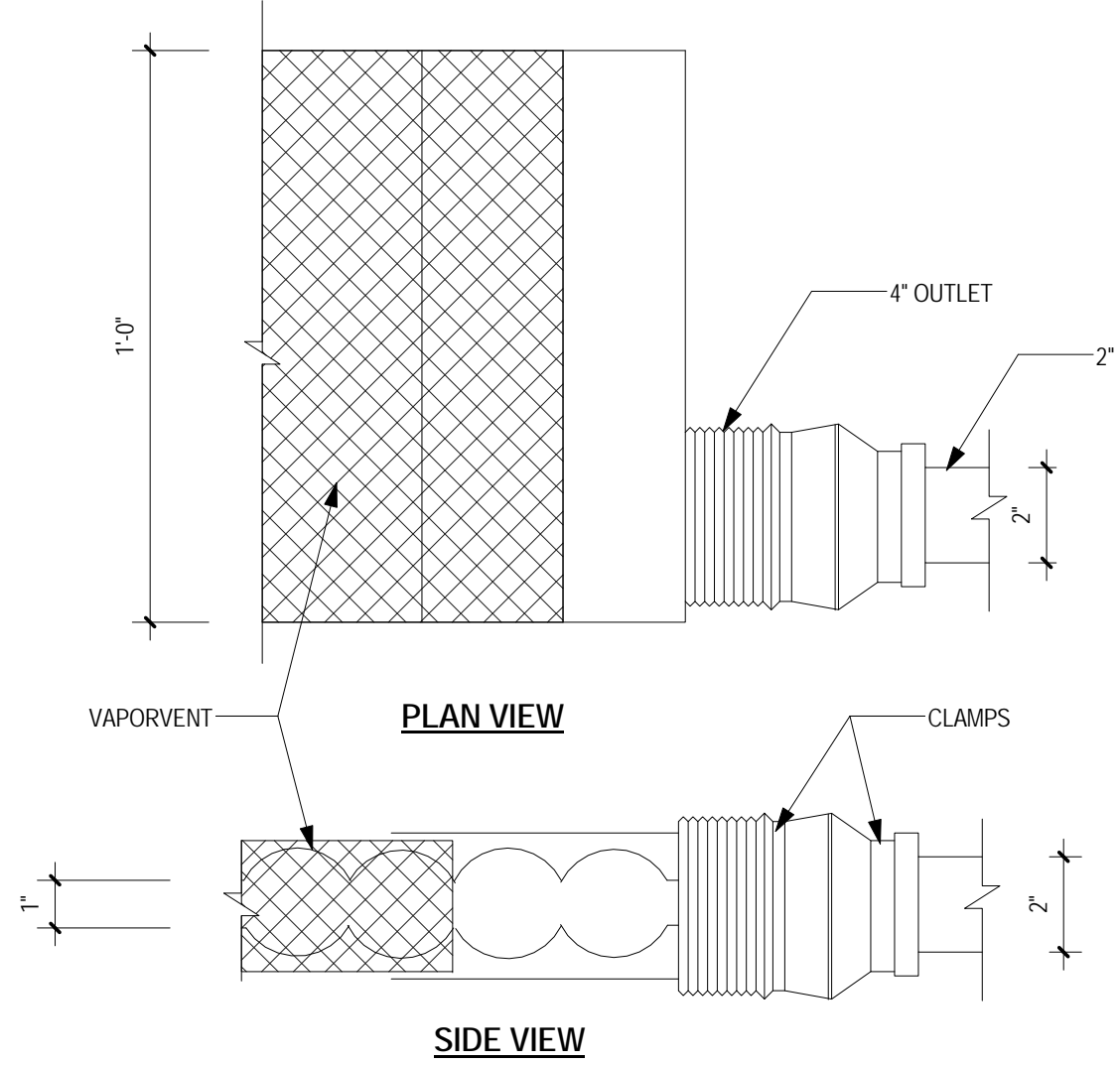
3.1 INSPECTION

- Below-grade and grating work and items penetrating vapor barrier shall be complete prior to start of installation.
- Ensure substrate is free of projections and irregularities that may be detrimental to proper installation of vapor barrier.

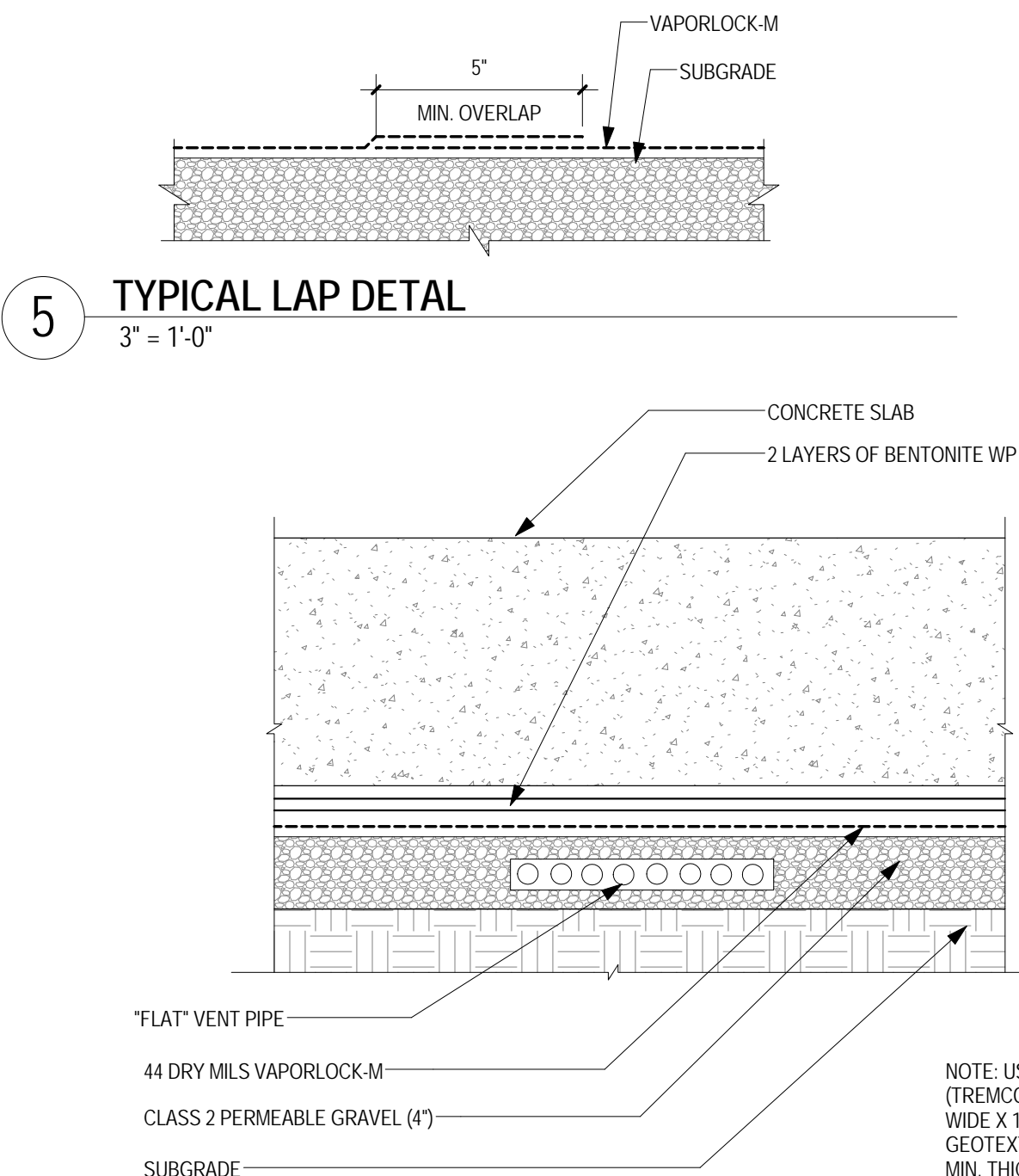
3.2 INSTALLATION

- Vapor Barrier Sheeting:
 - Apply vapor barrier in accordance with manufacturer's recommendations and installation instructions and in accordance with ASTM E1643, comply with most restrictive where conflicts occur.
 - Unroll with the longest dimension parallel with the direction of the pour.
 - Lap vapor barrier over footings and seal to foundation walls.
- Seal vapor barrier to slab penetrations using specified seal and remove dirt, debris, and mud from seal material prior to concrete placement. Seal vapor barrier to foundation beams with full-depth tape, termination bar, or pipe.

07 26 19 - 2 Below-Grade Vapor Barriers



6 FLAT TO ROUND PIPE CONNECTION
3" = 1'-0"



4 FLAT VENT PIPE DETAIL
1 1/2" = 1'-0"

NOTE: USE LOW PROFILE PERFORATED PIPE (TREMCO DRAIN-STAR FLAT VENT, OR EQUIV.; 12" WIDE X 1" THICK) PIPE SHALL BE WRAPPED IN GEOTEXTILE AND SURROUNDED BY GRAVEL OF 4" MIN. THICKNESS. (SEE DETAIL 6/A053)



6402 East Main St., Suite 201
Reynoldsburg, OH 43068
GuaranteedCryBasements.com
Office: 614-322-4420
Fax: 614-322-4753
Toll Free: 800-476-5624

April 29, 2014

To Whom It May Concern,

For our convenience, TRS has conducted testing to determine the effect of separate vapors of the following chemicals on our TUFF-IN-DRI membrane (VaporLock-m): Hydrogen Sulfide, Hexane, Toluene, Ethylene, Xylene, Gasoline, Hexane, Trichloroethylene, per ASTM D-1614. The membrane was subjected to these chemicals and tested for performance. Generally, a membrane is considered impermeable if the permeance rating is below 1.0. The permeance rating for the vapors of these chemicals is listed below:

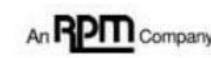
Chemical	Permeance
Hydrogen Sulfide	<0.01
Hexane	0.06
Toluene	0.09
Ethylene	0.13
Gasoline	0.15
Hexane	0.05
Perchloroethylene	<0.01
Trichloroethylene	0.03

As you can see our VaporLock-m membrane is totally impermeable to hydrogen sulfide and perchloroethylene (diffusion = 0.00), and only slightly permeable to the other hydrocarbons listed, i.e. very low diffusion rates.

The following should help put this into a realistic perspective:
Even if the site had soil gas concentrations of 100% of the hydrocarbons above, and the soil gas pressure was everywhere equal to the maximum observed at any probe site (0.5 inches of water), then the diffusion of the gas mixture through the VaporLock-m membrane would still only result in the transmission of 0.05 cubic feet of gas per 1,000 square feet of surface area per day. Adjusting the value above for the average soil gas pressure for all locations on the site, reduces the result to 0.006 cubic feet of gas per 1,000 square feet of surface area per day. Of course the actual concentration of the hydrocarbons is far less than 100%, which would further reduce the transmitted volume.

To further put this in perspective, consider a building having 1,000 square feet of floor area and an 8-foot ceiling. The tightest construction allowed by building codes with adding mechanical ventilation is 0.2 ACH50. The building would typically have 38,400 cubic feet of air passing through the structure daily. The 0.006 cubic feet of gas from the paragraph above, which is a significant overstatement, represents only 0.000016 percent of the daily air exchange volume (or 0.016 ppm). It could be stated that the VaporLock-m membrane is more than 99,999 percent effective at preventing any accumulation of hydrocarbon gases due to diffusion through the VaporLock-m membrane.

Sincerely,
James R. Wells
Technical Director



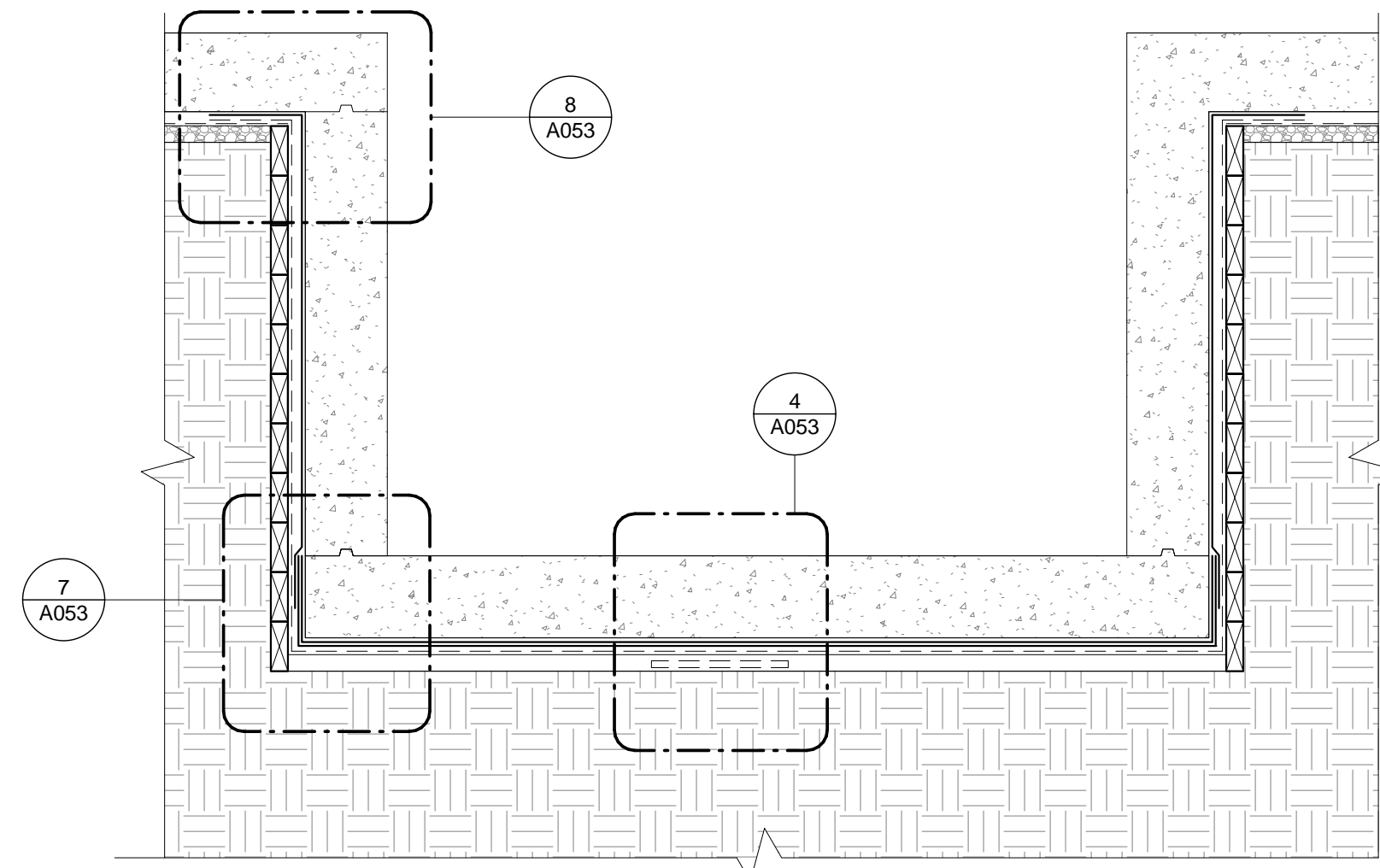
For more details about VaporLock-m, call your local Tremco Solutions Contractor.

VAPORLOCK-m SPECIFICATIONS

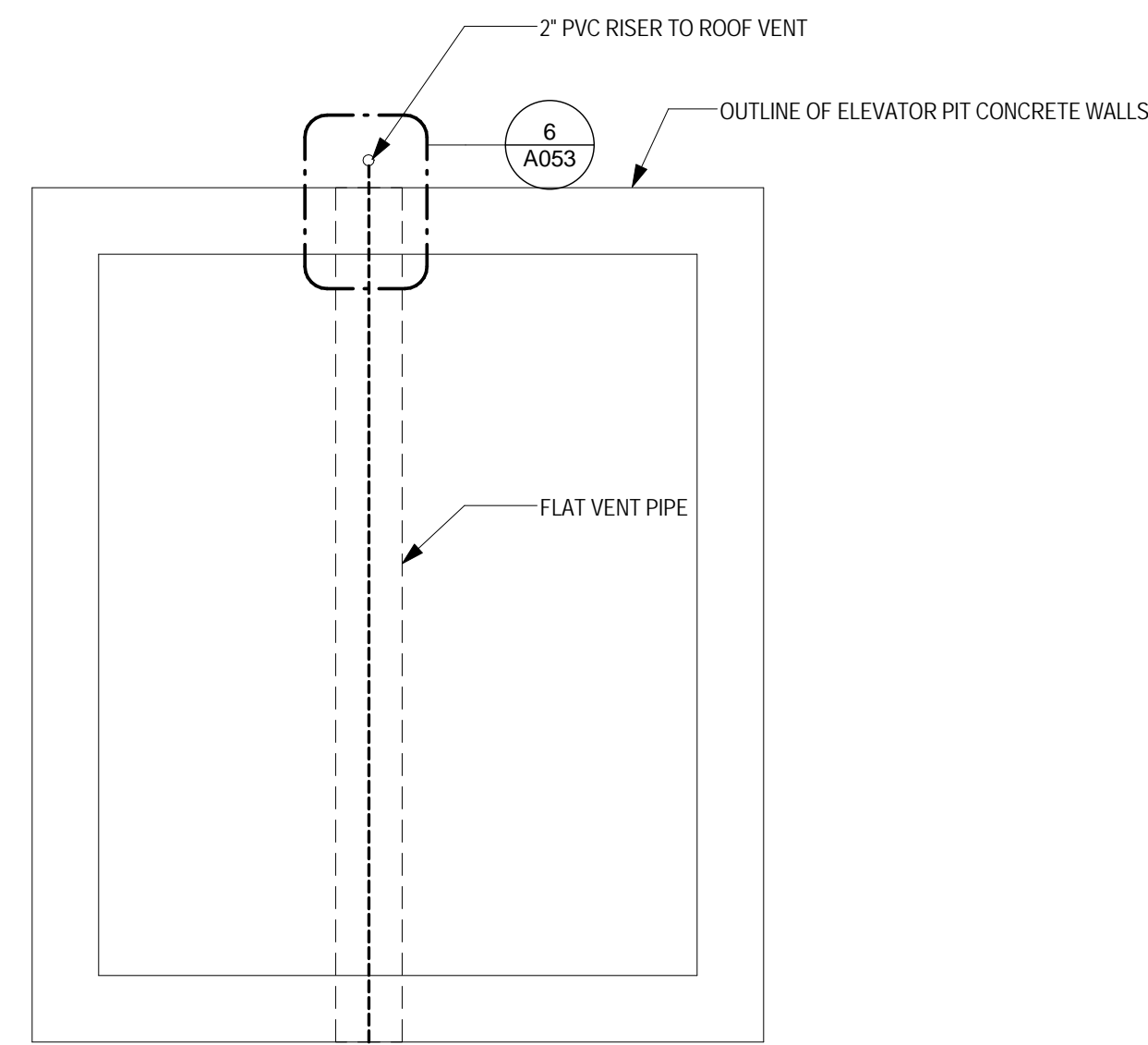
Barrier Membrane		Membrane Properties		
Type	Polymer-enhanced asphalt liquid applied membrane	Adhesion to Concrete	Exceeds	ASTM C-836
Color	Black	Elongation	>2000 percent	ASTM C-412
Density	8.1 lb/gal	Low Temperature Flexibility	Flexible to -10°F	See*
Solids	63 +/- 3 (percent by weight)	Crack Bridging Ability	Exceeds 10 cycles to 18" at -15°F	ASTM C-838
Application	Airless Spray	Water Vapor Permeance	0.03 perms for 40-mil dry coating [granular in Hg]	ASTM E-98 Dry Method
Temperature	Minimum 20°F	Liquid Water Absorption	0.3% [at]	ASTM D-1228†
Coating Cure Time	16-24 hrs	Resistance to Degradation in Soil	Good	ASTM E-154
Application Thickness	44 mils [dry] solid surface	Mold Growth and Bacterial Attack	No degradation	ASTM D-3273 ASTM D-3274
Application	60 mils [dry] geotextile fabric: (sealing tape)			
Geotextile Fabric:		Endurance [MARV]††	Typical Results	Test Methods
Mechanical [MARV]	Typical Results	UV Resistance @500 hrs	70%	ASTM D-4355
Grab Tensile Strength	250 lbs			
Grab Elongation	60%			
Trapezoidal Tear Strength	90 lbs			
Puncture Strength	81 lbs			



*See Manufacturer's Literature for details on application procedures.
†See Manufacturer's Literature for details on application procedures.
††See Manufacturer's Literature for details on application procedures.



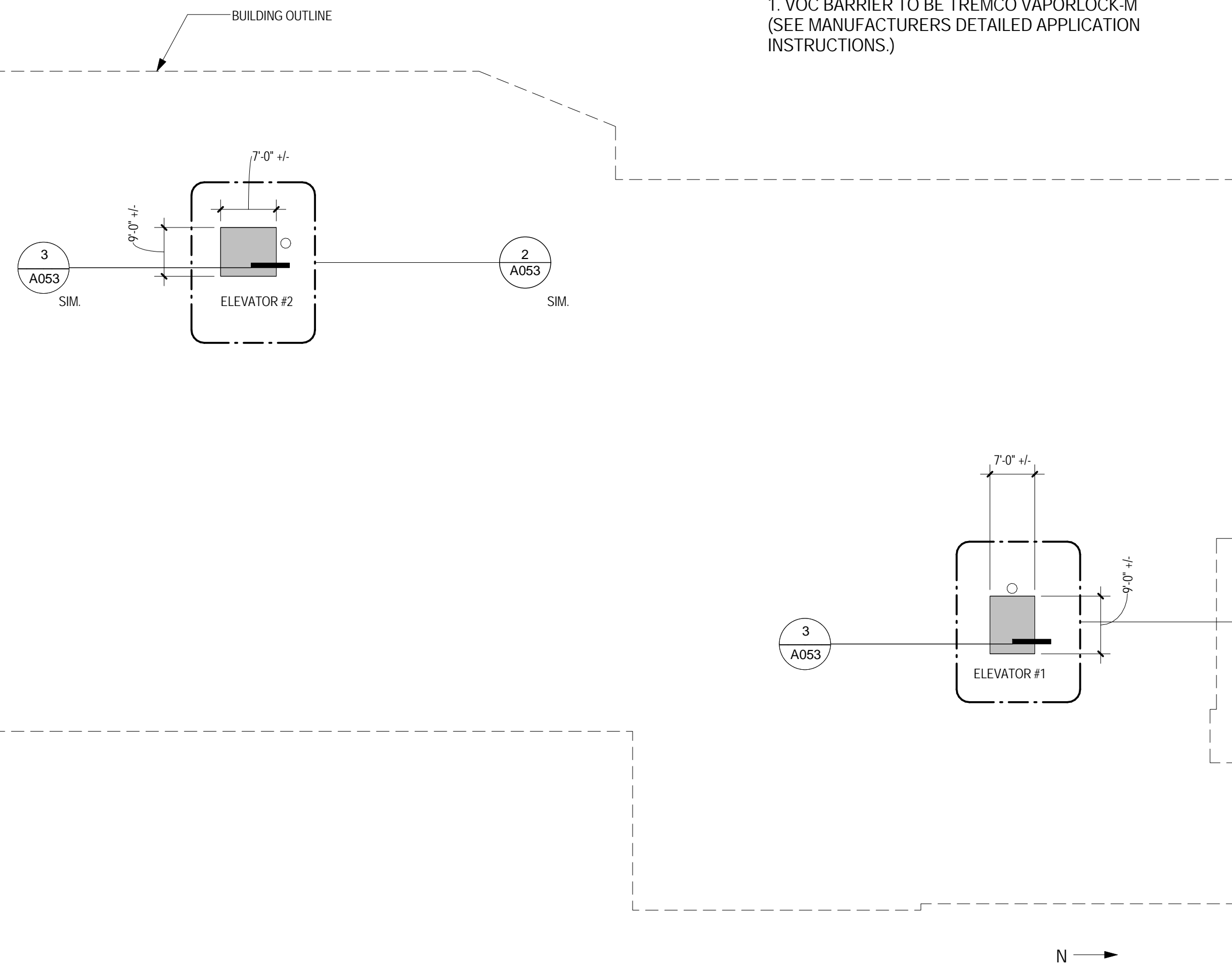
3 SECTION OF ELEVATOR PIT
1 1/2" = 1'-0"



2 PLAN OF UNDERSLAB VENT
3/8" = 1'-0"

GENERAL NOTES:

- VOC BARRIER TO BE TREMCO VAPORLOCK-M (SEE MANUFACTURER'S DETAILED APPLICATION INSTRUCTIONS.)



1 ELEVATOR LOCATIONS
3" = 1'-0"

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570 21ST STREET
OAKLAND, CA
94612

SEAL



CONSTRUCTION DOCUMENTS

PROJECT ISSUE REVIEW	
10/01/17	100% DCI
10/02/17	PERMIT SET
10/11/17	MODIFIED PERMIT SET
10/30/17	80% SET

CITY PERMIT RECORD	

PROJECT TLP01

UNDERSLAB BARRIER

SHEET

A053