Petra Cliffs
75 Briggs Street
Burlington, Vermont 05401

VT DEC SMS# 2017-4731
KAS #510170465

CORRECTIVE ACTION PLAN

January 18, 2019 (Revised May 6, 2019)

Prepared for:

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CERTIFICATION PAGE:

This Corrective Action Plan for the future Petra Cliffs facility, located at 75 Briggs Street, Burlington, Vermont, Vermont Department of Environmental Conservation Site #2017-4731, has been prepared by the following personnel.

We certify that this plan is, to the best of our knowledge, true and accurate.

Prepared By:

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Reviewed By:

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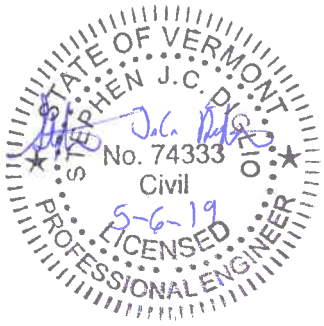


EXECUTIVE SUMMARY

This Corrective Action Plan (CAP) has been prepared by KAS Inc. (KAS), on behalf of the Charest Alpinism LLC DBA Petra Cliffs Climbing Center (Petra Cliffs), to address environmental and human health risks from the presence of contaminated soils and soil gas at 75 Briggs Street, Burlington, Vermont (Site). This CAP has been prepared in accordance with the Vermont Department of Environmental Conservation (VT DEC) *Investigation and Remediation of Contaminated Properties Rule* (IRule). The Site is enrolled in Vermont's Brownfields Reuse and Environmental Liability Limitation Act (BRELLA) program.

The Site consists of a 1.684-acre parcel, which is currently owned by Onion River Cooperative, and under a Purchase and Sale Agreement with Petra Cliffs. The parcel was subdivided from the 207 Flynn Avenue property, which has been redeveloped into the City Market South End. One single-story metal building that is used for storage exists at the Site. The Site will serve as the proposed home for the Petra Cliffs Climbing Center. Redevelopment plans include the construction of a proposed ±13,000 square foot building and other site improvements such as stormwater management facilities, parking, utility service connections, and landscaping.

The industrial history and use of Site has resulted in subsurface contamination of soil and soil gas at levels that exceed applicable screening values. Specifically, the contaminants of concern include polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH), benzene, naphthalene, and lead in soils. Also, elevated levels of tetrachloroethene (PCE), trichloroethene (TCE), and naphthalene in soil gas present a vapor intrusion risk to building indoor air quality.

Prior Site environmental investigations for both the contiguous properties (75 Briggs Street and 207 Flynn Avenue) have included the following:

- In 1988, a Site assessment by Wagner, Heindel, and Noyes, Inc. found four areas of contamination: a solvent plume, fuel oil plume, Gulf Oil plume, and foundry waste/metal debris.
- In 1988, a hydrogeological investigation by the Johnson Company Inc. found that PCE was the primary contaminant of concern in the soil and groundwater impacted by the solvent plume, which likely resulted from the dumping of spent cleaning solvent onto the ground. It was determined that contamination was not likely migrating off-site due to the very low hydraulic conductivity of the saturated sediment.
- In 1988, approximately 100 tons of solvent contaminated soil was excavated and disposed off-site, as documented by the Johnson Company 1989 Hazardous Waste Remediation Report. The area of excavation targeted soils with PCE concentrations in excess of 1,000 parts per billion based on previously collected soil sample data. Groundwater monitoring wells were installed as part of ongoing, post remediation monitoring. Groundwater quality data collected between 1989 and 1990, indicated a significant decline in PCE but residual contamination remained above regulatory standards. Nonetheless, in 1991, the VT DEC terminated the groundwater monitoring program since the contamination appeared to be localized, with no off-site impacts.
- A Phase I Environmental Site Assessment (ESA) conducted by Stone Environmental in October 2015, identified several recognized environmental conditions (RECs) for the

contiguous properties. The following RECs have been deemed by KAS to be relevant to the Site:

  - Past use of Building #6 for machining, fuel storage, and blast cleaning;
  - Evidence of releases and past industrial use of Building #8;
  - Past operation of the Site by Gulf Oil Refinery for petroleum bulk storage;
  - Past use of two historic underground storage tanks (USTs) by Vermont Structural Steel Corporation;
  - Past and current use of the Site for vehicle and equipment maintenance;
  - Proximity of the Site and past use of the Site for rail conveyance; and,
  - Potential for vapor intrusion in existing and future Site buildings.

- A Phase II ESA conducted by Stone Environmental in January 2016 found the following findings, which have been deemed by KAS to be relevant to the Site:
  - PCE, TCE, and naphthalene in soil gas above the applicable screening values;
  - Petroleum VOCs, naphthalene and benzene, in soil above soil screening values; and,
  - PAHs in soil above soil screening values.
- A Phase II ESA conducted by KAS in July 2018, specific to the Site, found the following:
  - An additional REC was identified for a floor drain located inside the existing metal building. The floor drain was determined to discharge directly soil beneath the building slab. A soil assessment indicated that the historical use of the floor drain did not appear to have adversely impacted the soil beneath the building;
  - The presence of naphthalene and PCE in the existing building sub-slab soil gas presents a vapor intrusion risk. The presence of PCE, TCE, and naphthalene in soil gas data, as documented in Stone's Phase II ESA, presents a vapor intrusion risk for the proposed building; and,
  - PAHs, TPH, and lead were present in soils above soil screening values.

Based on the findings of previous environmental investigations, the evaluation of cleanup alternatives, and the proposed redevelopment goals for the Site, KAS recommends the following corrective actions to mitigate potential exposure to contaminants by Site users:

- Installation of sub-slab depressurization (SSD) system for the proposed and existing building;
- Implementation of engineering controls, such as physical barriers, to mitigate the potential for direct contact with contaminated soil. Elements of the redevelopment (e.g., building foundation, paving, soil capping) will serve as the engineering control. Construction activities will be conducted in a manner to reuse contaminated soils as fill beneath the barriers and minimize the need to dispose of excess material in an off-site landfill; and,

- Implementation of an institutional control on the property in the form of land use restriction to help minimize potential future human exposure to residual contamination, and to ensure that engineered controls remain protective over time.

Implementation of the CAP will be concurrent with Site redevelopment, which is estimated to occur within the 2019 construction season. CAP activities will be conducted in approximately 8 to 12 months and will be dependent on excavation activities associated with the construction of the building foundation and Site improvements.

I. INTRODUCTION AND SCOPE

This Corrective Action Plan (CAP) has been prepared by KAS Inc. (KAS), on behalf of Petra Cliffs, to address environmental and human health risks from the presence of contaminated soil and soil gas at 75 Briggs Street, Burlington, Vermont (Site). This CAP has been prepared in accordance with the Vermont Department of Environmental Conservation (VT DEC) *Investigation and Remediation of Contaminated Properties Rule* (IRule). An IRule Corrective Action Plan Checklist is provided in Appendix G. The Site is enrolled in the Brownfields Reuse and Environmental Limitation Act (BRELLA) program. Therefore, as a participant in BRELLA, the requirements codified at 10 V.S.A. §6641-6656 must be followed.

A. OBJECTIVES OF CORRECTIVE ACTION

The objectives of the corrective action are to:

1) Minimize the potential exposure and migration of contaminated soil and groundwater during excavation/construction activities;
2) Mitigate exposure risk to Site users from vapor intrusion of VOCs in the soil gas;
3) Mitigate potential for direct contact to future Site users via the use of engineered and institutional controls.

B. APPLICABLE ENVIRONMENTAL MEDIA SCREENING VALUES

The VT DEC has established soil screening values for contaminant concentrations that have the potential to adversely affect human health or the environment. The contaminants of concern for the Site, and the basis for corrective actions, are summarized in the following tables and compared to the applicable screening values:

Table 1(a): Contaminants of Concern in Soil and Soil Screening Values

Contaminant	Media	EPA Regional Screening Levels Residential (mg/kg)	Vermont Screening Levels Residential (mg/kg)	VT DEC Background Soil Concentration Urban (mg/kg)
Lead	Soil	400	-	-
Naphthalene	Soil	-	1.42	-
Benzene	Soil	-	0.442	-
Total Petroleum Hydrocarbons (TPH)	Soil	82	-	-
Polycyclic Aromatic Hydrocarbons (PAHs)*	Soil	-	-	0.58

Notes: * Expressed as benzo(a)pyrene (BaP) total equivalent quotient (TEQ)

Table 1(b): Contaminants of Concern in Soil Gas and Indoor Air/Soil Gas Screening Values

Contaminant	Media	Vermont Air Screening Levels Residential (ug/m3)	Vapor Intrusion Screening Values – Sub-Slab Soil Gas Residential (ug/m3)
Tetrachloroethene (PCE)	Soil gas	0.63	21
Trichloroethene (TCE)	Soil gas	0.2	6.7
Naphthalene	Soil gas	0.03	1.0

C. REDEVELOPMENT AND REUSE PLAN

The Site is planned for redevelopment and will serve as the future home for the Petra Cliffs Climbing Center. A rendering of the proposed building (by Studio B Architecture) and Layout and Materials Plan (by Wagner Hodgson Landscape Architecture) are provided in Appendix A. A proposed three-story ±13,000 square foot building will be constructed, along with other proposed Site improvements such as parking areas, new stormwater management features, and landscaping.

An existing ±4,000 square foot single story metal building is situated on the south end of the Site and is currently used for storage. This building will remain onsite and may be used for other purposes in the future (e.g., workspace, art studio, etc.).

The redevelopment plans include preliminary/conceptual plans for onsite power from solar panels (see On-Site Solar Power Concept in Appendix A). An impact of the solar concept to the CAP would be the excavation of impacted soils for the footings required for the carports (see Foundation Details in Appendix A), which would span to a depth of approximately 12 feet below grade. This solar plan is simply a concept at this time, and should the plans progress by the time Site development occurs, there is the possibility that the footings alone will be installed to finish grade in order to accommodate installations of the carport(s) in the future. This way, the engineered barriers/soil caps will not be impacted. Alternatively, if the solar project is not considered until the future (e.g., post-CAP implementation), soil management and restoration of any CAP features that are damaged during construction would be required at that time.

D. CORRECTIVE ACTION PLAN

KAS has evaluated the effectiveness, ease of implementation, and cost of several remedial alternatives in the context of an Analysis of Brownfields Cleanup Alternatives, which was submitted to the VT DEC under separate cover. The selected and proposed remediation as detailed in Section IV Corrective Action Plan, includes the following components:

- Installation of sub-slab depressurization (SSD) system for the proposed and existing building to protect the indoor air quality from vapor intrusion;
- Implementation of engineering controls, such as physical barriers, to mitigate the potential for direct contact with contaminated soil. Elements of the redevelopment (e.g., building foundation, paving, soil capping) will serve as the engineering control;
- Soil management during excavation activities. Construction activities will be conducted in a manner to reuse contaminated soils as fill beneath the barriers and minimize the need to dispose of excess material in an off-site landfill;

- Groundwater management during excavation activities. Dissolved phase contaminants do not appear to exceed Vermont Groundwater Enforcement Standards (VGES) based on existing data. Nonetheless, during excavation work, surficial/stormwater will likely need to be managed in manner that either allows for re-infiltration into the ground or undergo treatment in order to minimize impacts to surface water/Lake Champlain; and,
- Implementation of an institutional control on the property in the form of land use restriction to help minimize potential future human exposure to residual contamination, and to ensure that engineered controls remain protective over time.

E. PUBLIC NOTICE AND CAP APPROVAL

Once the CAP is deemed complete by the VT DEC, a public comment period will be held for 30 days. A notice of the CAP will be mailed to all adjoining property owners (Appendix B). The adjoining parcels are illustrated in the parcel boundary map provided in Appendix A. The notice will consist of a completed VT DEC form (Appendix B).

F. IMPLEMENTATION OF THE CORRECTIVE ACTION PLAN

Following receipt of the CAP approval letter, implementation of the CAP will begin. Since the Site is in the BRELLA program, the CAP approval letter will be recorded in the Burlington Land Records. Following completion of the CAP, a Corrective Action Construction Completion Report, per Subchapter 5, §35-507 of the IRule will be prepared and submitted to the VT DEC.

G. CERTIFICATE OF COMPLETION AND INSTITUTIONAL CONTROL

After the objectives of the CAP has been met and documented in a CAP completion report, a certificate of completion (COC) will be issued, which serves as a release from liability from the State of Vermont. The COC will likely include land use restrictions and long term monitoring to help ensure the continued protection of future site users (e.g., periodic inspection of engineered barriers) and periodic SSD system monitoring and maintenance. The COC will also dictate that the VT DEC be contacted prior to excavation or construction activities that could potentially impact remedies implemented as part of this CAP.

II. SITE BACKGROUND

A. SITE HISTORY

In 2016, Onion River Cooperative purchased the ±4.5-acre parcel at 207 Flynn Avenue and subsequently subdivided the parcel into two lots, with the south parcel being 75 Briggs Street/subject property (see Plat of Subdivision City Market South End, Appendix A). During the redevelopment of the 207 Flynn Avenue parcel, into the City Market South End, all buildings existing at the time, on the contiguous ±4.5-acre parcels, were demolished with the exception of the 4,000 square foot metal building on the subject property. An Existing Conditions & Demolition Plan (by Lamoureux & Dickinson) is provided in Appendix A.

The contiguous parcels have a long history of industrial use since the late 1800s, as detailed in the following Section B.

B. SUMMARY OF ENVIRONMENTAL RECORDS AND SITE ASSESSMENTS

1. A Brownfields Phase I ESA was completed for the property by Stone Environmental, Inc. (Stone) in October 2015. The Phase I ESA identified several Recognized Environmental Conditions (RECs), the following of which are deemed relevant to the subject property:
    - Past use of Building #6 for machining, fuel storage, and blast cleaning;
    - Evidence of releases and past industrial use of Building #8;
    - Past operation of the Site by Gulf Oil Refinery for petroleum bulk storage;
    - Past use of two historic underground storage tanks (USTs) by Vermont Structural Steel Corporation;
    - Past and current use of the Site for vehicle and equipment maintenance;
    - Proximity of the Site and past use of the Site for rail conveyance; and,
    - Potential for vapor intrusion in existing and future Site buildings.

2. A Phase II ESA, conducted by Stone in January 2016, resulted in the following conclusions, which are deemed relevant to the subject property:
    - PCE and TCE (chlorinated VOCs) and naphthalene (petroleum VOC) are present in the soil vapor phase at concentrations that may result in vapor intrusion into existing and future buildings;
    - PAHs are present in soil at levels above the Vermont urban background concentration;
    - Naphthalene and benzene are present in soil, near the former bulk petroleum storage area/Gulf petroleum plume, at levels above the soil screening values; and,
    - PCBs are not present in soils.

3. Based on the Phase II ESA, which was conducted by KAS in July 2018 for the subject property, the following conclusions were made:
    - A floor drain inside the existing building was identified as an additional REC. The floor drain was found to discharge to soils directly beneath the slab. A soil assessment indicated that the historical use of the drain has not adversely impacted the soils beneath the building.
    - Naphthalene and PCE are present in the existing building sub-slab soil gas at levels that exceed the applicable screening values;
    - A review of soil gas data obtained during Stone's Phase II ESA in January 2016 indicates that the proposed Petra Cliffs building is at risk for vapor intrusion of PCE, TCE, and naphthalene;
    - PAH, lead, and TPH are present in soils at levels above the applicable screening values; and,
    - Pesticides and herbicides are not present in soils.

Information on historical environmental assessments conducted before 2015 are included in the above Phase I ESAs and are also available upon request from the VT DEC.

C. COMPILATION OF SOIL DATA

A tabular presentation of the contaminant data, from the 2018 Phase II ESA, is included in Appendix C.

III. CONCEPTUAL SITE MODEL

A. SITE CONDITIONS

The property is located in the south end of Burlington within an area zoned as Enterprise-Light Manufacturing (see Site Location Map in Appendix A). The property has road frontage on Briggs Street. The topography of the property is generally flat. Locally, terrain slopes east to west, towards Lake Champlain, which is located approximately a half a mile west of the property. Exterior surfaces are largely gravel and asphalt pavement. The property is developed with one single-story metal building, which is currently used for storage space by the City Market.

B. APPARENT SOURCE OF IMPACTED SOIL

The contaminants found at the Site include petroleum VOCs, chlorinated VOCs, PAHs, and lead. The apparent source of these subsurface contaminants includes historical waste management practices, leaks from petroleum bulk storage tank systems, and combustion sources. The source of the chlorinated VOCs (PCE and TCE) are believed to be from the historical dumping of spent solvent degreasers, associated with steel fabrication and machining processes. TPH, lead, benzene, and naphthalene are likely the result of the historical use of the Site as a bulk petroleum storage facility. Naphthalene is also considered to be part of the PAH group, which are released from incomplete combustion processes. Therefore, the historical use of the Site as a foundry (e.g., core ovens and blast furnaces) may have been a source of naphthalene and PAHs. Lead and PAHs in soils are also likely attributable to coal ash and foundry waste that was historically buried/disposed of onsite. Finally, historical records for the Site also indicate a fire had erupted in 1902 that severely damaged onsite buildings, and likely created another source of PAHs.

C. GEOLOGY

The soils beneath the Site are mapped as pebbly marine sand according to the *Surficial Geologic Map of Vermont.*[1] Bedrock beneath the Site is mapped as Monkton Quartzite, a reddish-brown pebbly, thin to thick-bedded sandstone, orange-gray and buff-weathering, well-bedded dolostone, and reddish-brown weathering dolomitic quartzite.[2]

Based on subsurface investigations and geotechnical engineering evaluations conducted at the Site, the subsurface soil conditions are generally comprised of gravel and sand fill to

[1] Doll, Charles G., ed., 1970, *Surficial Geologic Map of Vermont*, Vermont Geological Survey
[2] Doll, Charles G., ed., 1961, *Centennial Geologic Map of Vermont*, Vermont Geological Survey

depths ranging from approximately 1.2 – 4 feet below grade,[3] with native fine-grained silt-clay soils below the fill soils. Shallow bedrock, around 2 to 4 feet below grade, was encountered on the western part of the Site. Bedrock dips towards the east and may be deeper than 32 feet below grade southeast of the proposed building.

D. HYDROGEOLOGY

The nearest surface water body is a small tributary stream known as the Oakledge Tributary, which is an intermittent stream channel west of the rail line that discharges to Lake Champlain (see Vicinity Map, Appendix A). This stream channel travels north, parallel with the rail line drainage swale, before turning west and eventually discharging to Lake Champlain at the western terminus of Flynn Avenue. One stormwater catch basin, located near the southern corner of the former Building #6, as well as a stormwater line from Briggs Street which runs east to west across the Site, discharges into the rail line drainage swale.

Based on subsurface investigations conducted in March and April 2018, groundwater depths ranged between approximately 1.9 and 13.6 feet below surface grade. The observed groundwater may also be perched groundwater on top of the clay layer.

E. CONTAMINANT FATE AND TRANSPORT

Petroleum products released into the soil can remain as free-phase liquid (light non-aqueous phase liquid or LNAPL), sorb to the soils, dissolve into groundwater, or volatize into a vapor phase. Data collected to date indicate that petroleum releases at the Site have primarily impacted soil, and to a lesser extent groundwater and soil gas. Historical data also suggests petroleum impacted groundwater has not migrated off-site to the west. Elevated naphthalene and benzene have been found in soils in the area of the Gulf petroleum plume, at approximately 4 feet below grade. Elevated naphthalene was also detected in soil gas near the location of the proposed building and in the soil gas beneath the existing building. Elevated TPH were detected in soils generally throughout the Site, from shallow soils down to 8 feet below grade, which indicates that some downward migration into the native silt-clay layer has occurred.

Chlorinated VOC contaminants in the soil gas (PCE and TCE) have resulted from the historical release of solvent materials into the subsurface. Contaminant vapors continue to be released from dissolved phase in water and sorbed phase in soils. The shallow and/or perched groundwater at the Site, as well as the coarse-grained fill material overlying the silt-clay soils, likely promote the migration of the contaminant vapors. Unlike petroleum VOCs, the exposure risk and mitigation of chlorinated VOCs can be more complex because of their greater mobility, the lack of good warning properties such as low odor thresholds, and limited potential to undergo biodegradation. Vapors migrate through the vadose (unsaturated) zone above groundwater through diffusion, which is a function of concentration gradients (vapors diffuse from high to low concentrations). Vapors also migrate via pressure gradients (e.g., "stack effect" near building foundations) and can enter into structures, potentially causing human health risk to building occupants. Data collected to date suggests that soil gas/vapor contaminants present a vapor intrusion risk into the existing and proposed building.

[3] Sanborn Head, Geotechnical Engineering Report, May 2018

PAHs are a group of chemicals that are found in coal, crude oil, and gasoline. PAHs can be a by-product of incomplete combustion, and can also be manufactured to produce other chemicals. In general, PAHs do not easily dissolve in water and are more likely to partition into soil and, therefore, are slow to migrate and degrade under natural conditions. Naphthalene is the lightest PAH and tends to partition to the vapor phase. Elevated PAHs in Site soils have generally been found in the upper 3 feet of soil.

Lead is a heavy metal that can be both naturally occurring and from anthropogenic sources. Metals are relatively immobile and persistent in the environment. Elevated lead in soils, in the vicinity of the Gulf petroleum plume, were detected in the upper 3 feet of soil.

F. SENSITIVE RECEPTOR RISK ASSESSMENT

Buildings in the Vicinity

The property is developed with one single-story metal building, which is currently used for storage space. An evaluation of the soil gas beneath the building slab has shown that vapor intrusion of PCE and naphthalene potentially exists for future occupants of the building.[4] The current redevelopment plan includes the construction of a proposed building, which will serve as the Petra Cliffs climbing center. Based on the location of the proposed building and soil gas sampling conducted in January 2016 by Stone, PCE, TCE, and naphthalene are present in the soil vapor phase at levels that present a vapor intrusion risk for the proposed Petra Cliffs building.

At this time, it is unknown whether nearby residential and industrial buildings are at risk of exposure via the vapor intrusion pathway.

Groundwater

Historical data and the 2016 Phase II ESA[5] identified the presence of an overburden aquifer impacted by chlorinated VOCs at the Site. However, the extent of the dissolved phase chlorinated VOC plume appears to have been attenuated (e.g., no exceedance VGES) and does not appear to be migrating off-site, based on existing data.

Petroleum VOCs have also been found to be present in Site groundwater, but were not detected at concentrations above VGES during the Phase II ESA.[6]

Surface Water

Surficial water, and potentially groundwater, from the Site drain towards the drainage swale along the Vermont Railway right-of-way that discharges to an intermittent stream and ultimately to Lake Champlain. During excavation work, surficial/stormwater will likely need to be managed in manner that either allows for re-infiltration into the ground or undergo treatment in order to minimize impacts to surface water/Lake Champlain.

No wetlands have been identified on the property. The nearest known wetlands are about 0.3 miles to the northwest towards Lake Champlain.

[4] KAS, Phase II ESA, September 2018
[5] Stone, Phase II ESA, January 2016
[6] Ibid.

Proposed stormwater management facilities (bioretention ponds) designed to minimize the adverse impacts of stormwater runoff from impervious surfaces (i.e., building roof and parking lot) are proposed as part of Site redevelopment and will improve the surface water quality from the Site. The bioretention ponds are designed to prevent the infiltration of water into the underlying soil. As shown in the Stormwater Details Plan (Appendix A), the base of each bioretention area will be lined with a polyethylene geomembrane.

Utility Corridors

Several subsurface utility corridors, including municipal water, sewer, natural gas, and electrical exist on the property. These subsurface utilities may act as preferential pathways for the migration of contaminants in groundwater and soil gas.

Site Users

Exposure pathways for humans through impacted soils include dermal absorption (via direct contact), ingestion, and inhalation. Construction workers may be at risk of exposure to contaminated soil during excavation activities. Future Site users will not be exposed to contaminant concentrations in the soils beneath the property following CAP implementation. Current Site users are at minimal risk of exposure to the contaminated soil given that these soils are generally covered by asphalt pavement and/or gravel.

G. RISK FACTOR DEFINITION AND ANALYSIS

This section of the Corrective Action Plan presents analysis of the risk factors present as a result of the environmental findings and based on the proposed uses of the Site.

Categories of Risk

Redevelopment of the corrective action area poses construction related risks during excavation of soils.

Routes of Potential Exposure

Human exposure to contaminants can theoretically occur via the following pathways: inhalation of vapors or contaminated dust; ingestion of soil and/or liquids; absorption via dermal contact; and, injection of contaminants. However, the nature and occurrence of contamination at this Site discounts most of these potential exposure pathways as explained below. The residual potential exposure pathways to be addressed at this Site are: inhalation of dust and vapors; dermal contact with contaminated soil; and ingestion of contaminated soil. These residual exposure pathways will be effectively addressed with appropriate construction management techniques, engineering and institutional controls as is described in Section IV.

<u>Inhalation Pathway</u>

Inhalation of vapors and/or dust constitutes the inhalation pathway. Inhalation of dust containing VOCs, PAHs, and/or metals is a potential route of exposure and will be addressed via construction practices outlined in Section IV. Implementation of the engineering and institutional controls outlined in Section IV will mitigate the potential for inhalation of the contaminants after the construction is complete.

Ingestion Pathway

Ingestion of VOC, PAH, and metal contaminated soil is a potential route of exposure. During construction, intrusive activities will be conducted under the jurisdiction of a Health and Safety Plan (HASP) as defined by 40 CFR Part 1910.120 for hazardous sites. The HASP will contain detailed instructions on worker conduct within the contaminated area including ingestion issues. All intrusive work within the contaminated area will take place under the supervision of the Site Safety Officer (SSO) who will be responsible for training workers about HASP requirements and for enforcing those requirements. The engineering and institutional controls described in Section IV will address ingestion issues following construction. The new development will have a municipal water supply and sewer system, which removes ingestion of contaminated groundwater as a risk pathway.

Absorption Pathway

Absorption of VOCs, PAHs, and metals through direct contact with skin is a potential route of exposure. In order to minimize human health risk during construction, the HASP will contain provisions relating to personal protective equipment (PPE) designed to minimize dermal contact, likely in the form of protective clothing to cover exposed skin. Potential risk to human health posed by long-term uses following construction will be addressed by the measures outlined in Section IV.

Injection Pathway

Injection of VOCs, PAHs, and metals into the body due to contamination at this Site during construction is not likely as long as the HASP provisions are followed. Measures to minimize dermal contact will also be effective at minimization of injection potential. Potential risk to human health posed by long-term uses following construction will be addressed by the measures outlined in Section IV.

IV. CORRECTIVE ACTION PLAN

VOCs, PAHs, and lead contaminated soil and VOC impacted soil gas are present in the subsurface of the Site. The future development of the property includes the new Petra Cliffs climbing facility. A proposed ±13,000 square foot building will be constructed, along with other proposed Site improvements such as parking areas, new stormwater management features, and landscaping. Building vapor intrusion is a potential human health exposure risk for future Site occupants. Direct contact with contaminated soils is also a risk to future occupants and construction works during earthwork/excavation activities during Site redevelopment.

The corrective action chosen is the mitigation of impacts to a receptor by implementing engineering controls. Elements of the redevelopment (e.g., building foundation, paving, soil capping) will serve as the engineering control by providing physical barriers to ensure future Site occupants cannot come in direct contact with contaminated soil. Vapor intrusion mitigation will include sub-slab depressurization systems (SSD).

A. ENGINEERED BARRIERS

Engineered barriers, which will be installed as part of the redevelopment of the Site, will be used to cap contaminated soils in accordance with IRule requirements. Per §35-510 of the IRule, engineered soil barriers must be:

a) A minimum of 18-inches thick, if not covered by an impervious surface; or

b) If covered by an impervious surface, 6-inches of fill or sub-base material under the impervious surface.

c) Alternate cap thicknesses may be utilized, providing additional institutional controls are placed on the property to ensure protection of human health and the environment, and pre-approval is granted by the Secretary of the Vermont Agency of Natural Resources.

The following engineered barriers are proposed for the Site as shown in the Layout and Materials Plan and Erosion Prevention & Sediment Control Plan (Appendix A):

- Concrete caps (proposed building foundation and sidewalks);
- Asphalt, concrete, and aggregate cap (proposed parking lot and sidewalks); and
- Soil and geotextile fabric cap (proposed green-spaces).

The proposed engineered soil caps associated with impervious surfaces comply with the following IRule's 6-inches of fill or sub-base material requirement. An alternate engineered soil barrier thickness is proposed for landscaped or impervious surfaces associated with the proposed green space areas. Specifically, 12-inches of soil is proposed based on the Site being fairly level and that 12-inches is considered to be a sufficient thickness in providing stable protection once vegetative cover is established. Also, the alternative soil barrier thickness is deemed protective based on the relatively shorter duration recreational users will occupy the Site when compared to a residential or industrial scenario.

Clean fill that has not been impacted by release of oil or hazardous materials will imported to the Site to construct the engineered barriers. If clean fill is stockpiled after being delivered to the Site, it will be stockpiled on pavement or on geotextile fabric to prevent mixing with contaminated soil.

The following provides a description of each of the engineered barriers.

Concrete Cap

Construction activities for the proposed building will include the installation of a concrete slab-on-grade foundation, with typical piers at the foundation walls. Concrete slabs on grade will poured over a minimum of 12-inches of imported clean drainage fill, which will also accommodate the sub-slab depressurization (SSD) building protection system. The slab and sub-base will serve as a barrier between Site users and contaminated soil. A geotextile fabric will be installed directly over compacted fill, which may include contaminated soils.

Concrete sidewalks may be utilized as a physical barrier between Site users and underlying contaminated soil. Following grading to the required construction elevation, a minimum of 6-inches of compacted crushed gravel will be installed above compacted subgrade, which may

include contaminated soils. Concrete will be poured over the compacted crushed gravel, the thickness of which will be increased in areas where sidewalks cross driveways. Concrete sidewalk details are provided in the Sitework & Water Details & Specifications plan (Appendix A).

Asphalt Cap

Asphalt for the parking lot may be utilized as a physical barrier between Site users and underlying contaminated soil. Construction activities for the proposed parking lot include the installation of a minimum of 6-inches of clean imported base material underlying the asphalt (typically 3-inches thick). A geotextile fabric will be installed directly over compacted subgrade, which may include contaminated soil. Parking area details are provided in the Sitework & Water Details & Specifications plan (Appendix A).

Soil Cap

Soil capping may be utilized as a physical barrier between Site users and underlying contaminated soil. The engineered barrier in these areas would include grading sub grade soils to allow for subsequent installation of at least 12-inches of clean imported fill while allowing for final grade elevations. The type of clean fill used within green spaces will be determined by Petra Cliffs' landscape architect. Following grading and any necessary soil removal, a geotextile fabric will be installed over remaining soils. Clean fill, will then be installed over the geotextile fabric. Soil cap details are provided in the Planting Details plan (Appendix A).

B. BUILDING PROTECTION SYSTEM

The purpose of an SSD system is to minimize the potential of soil gases from infiltrating the building. An SSD system creates a negative pressure field directly under a building foundation. This negative pressure field becomes a "sink" for any gases present in the vicinity of the structure. VOCs caught in the advective sweep of this negative pressure field are collected and piped to an ambient air discharge point.

For the proposed building, the SSD system will be incorporated into the building foundation design. The main components include 1) a permeable sub-slab material (e.g., crushed stone/gravel), 2) sub-slab perforated ventilation pipes that connect to vertical riser piping and transports soil gasses to vents above the roof line, and 3) a sealed vapor barrier (part of the building construction design). Soil probes should be embedded into the crushed stone during construction to allow testing of system effectiveness (e.g., differential pressure monitoring) after the slab has been poured. The design goal is to create a minimum sub-slab negative pressure of -0.008 inches of water column (or 2 Pascals).

The SSD system will be constructed within the new building under the foundation sub-base and below the building vapor barrier as shown on Sub-Slab Depressurization System Design ENV.1 (Appendix A). The SSD system will consist of three lengths of 4-inch diameter perforated PVC sub-slab piping. Surrounding the sub-slab piping will be a minimum of 12 inches of pea stone or other course rounded material (e.g., ASTM #6 stone). The horizontal piping will be manifolded to one 6-inch diameter PVC solid, riser pipe which will extend above roof line. A fan assembly (e.g., Radonaway RP260 or equivalent blower) will be installed upstream of the exhaust point. The fan will be activated if a minimum negative pressure of -

0.008 inches of water column beneath the concrete slab cannot be achieved with a passive SSD system. The final layout of the sub-slab piping will be coordinated with final foundation and plumbing/utility plans.

The ventilation piping is connected to a blower that depressurizes the sub-slab and vents the vapor above the roof line and directly to the atmosphere. A vacuum gauge will be installed at the SSD header and will provide vacuum gauge measurements directly below each fan. In addition to the gauge, a visible and/or audible alarm will be installed indicating loss of system vacuum or power.

For the existing building, one or two suction points/pits will be created by drilling a hole into the concrete slab and removing a small amount of soil from beneath the slab. Pre-installation diagnostics will be required in order to ensure the number of such points required. Piping above the slab connects each suction point to an exhaust fan or regenerative blower so that vapors can be pulled to the outdoor area. Given that the slab is likely underlain by less pervious material, a high pressure/low flow blower may be required in order to create high vacuum level.

Once the SSD systems are in place, the following performance standards which will be used to confirm effective SSD system operation. It is presumed that the SSD system for the existing building will be an active system from the start.

1. Demonstration of a negative pressure field under the entire slab. After system startup, a digital manometer reading of minimum negative pressure of -0.008 inches of water column indicates that successful depressurization is being achieved;
2. If the fan must be operational, the fan gauge and desired vacuum range will be documented;
3. Collect a sub-slab soil gas sample from the riser piping (two rounds) and analyze for VOCs via EPA Method TO15 or equivalent to verify the effectiveness of the SSD system establish baselines conditions for future comparison; and,
4. Measure relative sub-slab soil gas contaminant levels using a PID.

C. SOIL MANAGEMENT PLAN

Impacted soils will be managed and maintained onsite wherever possible, which will minimize off-site landfill disposal. As such, excavated soils will be temporarily stockpiled onsite and strategically reused onsite to raise grades to desired final elevations (see Appendix A, Utility and Grading Plan). Contaminated soils will not be reused within a cover soil layer, or as backfill for subsurface utilities. The location of the temporary stockpiles and final location of the backfilled contaminated soil will be determined by the construction manager during construction activities.

Excavated contaminated soil will stockpiled separately onsite and will be segregated from clean soil and construction materials. Excavated soils will be stockpiled on asphalt, if feasible; alternatively, double layers of 8-mil minimum sheeting will be used. Stockpiles will be kept covered at all times with appropriate anchors to keep the cover in place. Stockpiles will be routinely inspected and damaged covers will be promptly replaced. Stockpiles will be continuously encircled with silt fences. Impacted soil stockpile areas will be appropriately graded to control run-off and will be located in areas not subject to flooding or excessive

sheet flow during storm events. Stockpiles will be placed within an area designed and constructed to contain the materials from all sides and prevent runoff and dispersion.

Sediment stabilization measures will be followed, as specified in the Erosion Prevention & Sediment Control Plan (Appendix A) and discussed in more detail in Section E.

It is estimated that approximately 1,550 cubic yards (or 2,325 tons) of excess soil will require land fill disposal. Waste characterization sampling and analysis will be required in order to obtain a waste profile for the soil to be used as landfill alternative daily cover. This soil estimate conservatively includes a contingency of 25%, which is deemed adequate to help account for unknowns. A summary of cut/fill estimates is provided in the following table:

Table 2: Petra Cliffs Cut/Fill Estimates

Redevelopment Element	Cubic Yards
Proposed Site Grading:	
Fill	4,360
Cut	280
Net Fill:	4,080
Imported Materials:	
Pavement Section	2,120
Grass Soil Caps (12")	1,220
Building Foundation	1,150
Bio-retention Media	250
Sidewalks/Concrete Sections	250
Utility Trenches	250
Landscaping Trees	80
Total Imported Materials:	5,320
Soil Disposal Estimate	
Net Cut = 5,320 – 4,080	1,240
Contingency = 1,240 x 25%	310
Total Estimated Net Cut:	1,550
Estimated Soil Disposal: 1,550 cubic yard x 1.5 tons/cubic yard = 2,325 tons	

Should grossly contaminated soil be encountered during excavation, as determined via visual and/or olfactory methods, these soils will be segregated into a separate stockpile. This will help prevent excess soil requiring land fill disposal from being disqualified as alternative daily cover. Grossly contaminated soil may not qualify for alternative daily cover or landfill disposal altogether (e.g., if classified as hazardous waste). Alternative disposal options will be evaluated at that time.

The following soils are considered to be outside the scope of the CAP soil management plan and will be managed under typical earthwork activities as part of the general construction and redevelopment of the Site:

- Soil beneath existing sidewalks and roads within the city right-of-way; and,
- Existing asphalt, concrete, and gravel sub-base that will be excavated and recycled at a batch plant.

D. DEWATERING & WATER TREATMENT

Due to the shallow groundwater, it is anticipated that dewatering will be required during excavations. Furthermore, due to the silt-clay soils temporary water storage and infiltration back into the ground will not be sufficient (e.g., the required flow rate would be too low). Therefore, use of at least one 21,000-gallon Frac Tank is recommended for temporary groundwater storage. The groundwater would then be treated by granular activated carbon (GAC) drums prior to discharge to the stormwater catch basin / culvert located near the railroad bed west of the Site. A Notice of Intent (NOI) would be required to discharge groundwater in accordance with General Permit #3-9004 for discharges from petroleum related remediation activities. As required by the General Permit, an influent (non-treated) and effluent (treated) sample will be collected and analyzed for VOCs EPA Method 8021B.

E. EROSION CONTROL

An Erosion Prevention and Sediment Control (EPSC) Plan has been prepared by Lamoureux & Dickinson (Appendix A) to address runoff during demolition, excavation, and construction activities. Per the EPSC Plan, the maximum area of soil disturbance will be less than 1 acre. As such, a Construction General Permit under the National Pollution Discharge Elimination System is not required. However, standard erosion control measures, per the VT DEC Low Risk Site Handbook, will be used to minimize soil migration from the Site during CAP implementation. Costs associated with the EPSC Plan and its implementation are considered part of Site construction activities and are not within the scope of this CAP.

Steps will be taken to ensure that trucks departing the Site will not track soil, fill or debris off-site. Such actions may include use of cleaned asphalt or concrete roads or use of stone or other aggregate-based egress paths between the truck loading area and the property point of entry/egress. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.

Generation of dust from the contaminated area will be addressed as follows to minimize the inhalation pathway during construction. All excavated surfaces will be wetted with water as needed to minimize dust. Calcium chloride may also be used to control dust on exposed excavation surfaces.

F. HEALTH AND SAFETY PLAN (HASP)

A HASP for the corrective action area has been prepared by KAS and implemented to govern the safety aspects associated with the installation of the barrier system in accordance with OSHA requirements. A 40-hour OSHA 1910.120 trained personnel must be appointed as the Site Safety Officer with a backup also designated. A copy of the HASP will be kept onsite and will be available to other parties upon request. A copy of the HASP is included in Appendix D.

G. CORRECTIVE ACTION MAINTENANCE PLAN

Maintenance activities required to ensure the continued effectiveness of the engineered barriers will depend on the final location of the backfilled impacted soil, and may include:

- Periodic vegetation control to minimize encroachment and degradation to the soil cap;

- Periodic inspection of the soil and asphalt caps for visual indications of erosion or other physical damage, to evaluate its continued effectiveness as an engineered barrier; and,
- Prompt repair of damage to the soil and asphalt caps and building foundations as noted in the periodic inspections.

Long-term monitoring of the SSD system will include the following:

- Annual inspection of the concrete slab for potential preferential vapor intrusion pathways, such as cracks or other perforations. Any potential vapor intrusion pathways should be sealed immediately; and;
- Recording of the fan gauge to verify the fan is inducing the desired applied vacuum.

H. INSTITUTIONAL CONTROLS

Institutional controls are intended to help minimize potential future human exposure to residual contamination, and to ensure that engineered controls remain protective over time. It is expected that land use restrictions will be incorporated into the COC after CAP completion. Documentation of the long-term monitoring requirements are outlined in the VT DEC Land Use Restrictions - Annual Institutional Control Inspection Form (Appendix E).

V. PERMITTING, MONITORING AND REPORTING

A. PERMITS / APPROVALS

The following permits are likely needed to accomplish the remedial work only as described above. These are identified below along with any applicable contact names and telephone numbers of the permit issuing entities.

- Dig Safe;
- VT DEC Approval (Ms. Sarah Bartlett, 802-249-5641);
- Burlington Building/Zoning Permit (David E. White, Director of Planning & Zoning, 802-864-7194); and,
- Stormwater Runoff from Construction Sites Permit (VT DEC Watershed Management Division, 802-828-1535).

Additional permits for redevelopment activities outside of the remedial cleanup will also be required including, but not limited to, an Act 250 Minor Permit Application, and zoning permit. These permits and approvals are in progress or have already been obtained.

B. CONTRACTORS AND SUB-CONTRACTORS

Contractors and sub-contractors are to yet to be determined. Depending upon contractor availability, the following is a partial list of contractors:

Table 3: Contractors and Sub-Contractors

Excavation and Site Restoration		
S.D. Ireland	Contact: Randy LaFramboise Williston, VT 05495	(802) 658-0201
Engineers Construction Inc	Contact: Ken Pidgeon Williston, VT 05495	(802) 863-6389
Waste Disposal Facilities		
ESMI	Contact: Mike Phelps Louden, NH 03307	(800) 950-7645
New England Waste Services of Vermont	Contact: Scott Sampson Coventry, VT	(802) 334-5795
Laboratories		
Eastern Analytical, Inc	Contact: Jennifer Laramie Concord, NH 03301	(603) 410-3881
Endyne, Inc	Contact: Harry Locker Williston, VT	(802) 879-4333
TestAmerica, Inc	Contact: Kristine Dusablon Burlington, VT	(802) 660-1990
EMSL, Inc	Contact: Ellen Podell Cinnaminson, New Jersey	(800) 220-3675

C. REPORTING

Following the completion of the CAP implementation, a Corrective Action Construction Completion Report will be prepared per the IRule. The report will describe the work performed during construction and note deviations, if any, from the approved Corrective Action Plan.

D. SCHEDULE

Work may begin on this project following Petra Cliffs and VT DEC approval, the required public comment period, and acquisition of all required construction permits. Implementation of the CAP will be concurrent with Site redevelopment, which is estimated to be within the 2019 construction season. CAP activities will be conducted in approximately 8 to 12 months and will be dependent on excavation activities associated with the construction of the building foundation and Site improvements. Time to complete the above tasks assumes fair weather and good access; frozen ground or unfavorable weather conditions could lengthen the time periods.

E. COST

KAS has prepared a cost estimate for the corrective actions specified herein, contaminated soil management, use of engineered barriers, and subsequent CAP completion report. The estimated costs are representative of the remedial system design elements, as described within this CAP, that are necessary to mitigate exposure to Site contaminants. Structural, architectural, and other components of the Site's redevelopment design are not included within these costs.

KAS used past project experience and the VTrans two-year averaged price list to estimate the cost of the proposed remedies. The estimated cost to implement the corrective actions as

described within this CAP is approximately $262,423. A detailed cost estimate is provided in Appendix F.

VI. REFERENCES

KAS, *Phase I Environmental Site Assessment*, Petra Cliffs, 75 Briggs Street, Burlington, Vermont, October 17, 2018.

KAS, *Phase II Environmental Site Assessment*, Petra Cliffs, 75 Briggs Street, Burlington, Vermont, September 11, 2018.

KAS, *Analysis of Brownfields Cleanup Alternatives*, 75 Briggs Street, Burlington, Vermont, January 17, 2019.

Lamoureux & Dickinson Consulting Engineers, Inc., *Stormwater Narrative Conceptual Design*, Proposed Petra Cliffs Facility, 75 Briggs Street, Burlington, March 14, 2018.

Sanborn Head, Geotechnical Engineering Report, Petra Cliffs Climbing Center, Burlington, Vermont, May 2018.

Stone Environmental, *Phase I Environmental Site Assessment*, Draft Report, Former Vermont Structural Steel Property, Flynn Avenue/Briggs Street, Burlington, Vermont, October 13, 2015.

Stone Environmental, *Phase II Environmental Site Assessment*, Draft Report, Former Vermont Structural Steel Property, Flynn Avenue/Briggs Street, Burlington, Vermont, March 10, 2016.

Vermont Agency of Transportation, VTrans Estimating Resources, http://vtransestimating.vermont.gov/sites/aot_estimating/files/documents/2YearEnglishAveragedPriceList11.pdf, 2011 Specification.

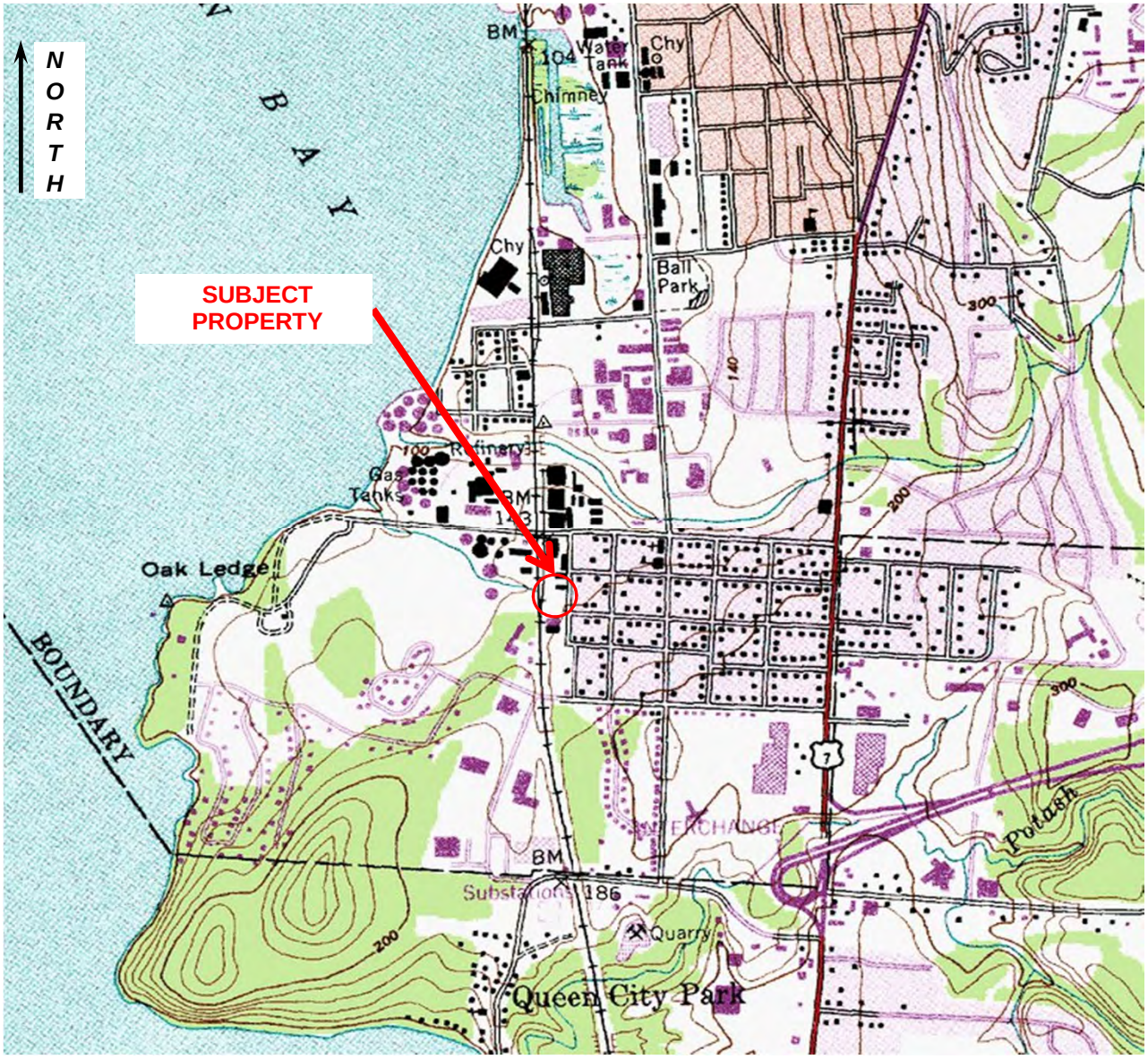
Vermont Department of Environmental Conservation, *Investigation and Remediation of Contaminated Properties Rule*, July 27, 2017.

Vermont Department of Environmental Conservation, *A Guide to Navigating Brownfield Redevelopment Projects*, April 2018.

Appendix A

Maps & Plans

1) Site Location Map
2) Vicinity Map with 1000-Foot Radius
3) Plat of Subdivision City Market South End
4) Existing Conditions & Demolition
5) Layout and Materials Plan
6) Planting Details
7) Rendering of Proposed Building
8) Utility and Grading Plan
9) Sitework & Water Details & Specifications
10) Stormwater Details
11) Erosion Prevention & Sediment Control Plan
12) Sub-Slab Depressurization System Design ENV.1
13) On-site Solar Power Concept
14) Foundation Details (for Carports)



KAS Job Number: 510170465

Source: Topoquest

Proposed Petra Cliffs

75 Briggs Street, Burlington, VT

Site Location Map

Date: 01/24/18	Drawing No. 0	Scale: 1:24,000	By: ES

Vicinity Map with 1,000-Foot Radius

Vermont Agency of Natural Resources

vermont.gov

LEGEND

- Wetland Projects
- Wetland - VSWI
  - Class 1 Wetland
  - Class 2 Wetland
  - Buffer
- Hazardous Site
- Hazardous Waste Generators
- Brownfields
- Salvage Yard
- Underground Storage Tank (working)
- Dry Cleaner
- Rare Threatened Endangered Species
  - Threatened or Endangered
  - Rare
- Private Wells
  - GPS Location
  - screen digitized
  - E911 Address
  - Welldriller/Clarion
  - Unknown
- Public Water Sources
  - Active
  - Proposed
  - Inactive
- Roads
  - Interstate
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
  - Not part of function Classification System
- Waterbody
- Stream
- Parcels (where available)
- Town Boundary

1: 3,907

1in = 326 ft.
1cm = 39 meters

198.0 0 99.00 198.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere

NOTES

Petra Cliffs, 75 Briggs Street, Burlington, VT
Map created using ANR's Natural Resources Atlas

Certificate of the City Engineer:

I, NORMAN BALDWIN, City Engineer, do hereby certify that the subject plat has been examined by me and found to comply with the engineering requirements set forth in the regulations governing plats of subdivided land adopted by the city council, with the following exceptions:

_____

_____

_____ 6/2/16
City of Burlington Engineer *Date*

Certificate of the City Fire Marshal:

I, JR GORDY J. SIMMS, Fire Marshal do hereby certify that the subject plat has been examined by me and found to comply with the fire prevention requirements set forth in this chapter governing plats of subdivided land adopted by the city council with the following exceptions:

_____

_____

_____ 10/20/16
City Fire Marshal *Date*

Certificate of the Superintendent of City Parks:

I, Jesse Bridges, Superintendent of Parks do hereby certify that the subject plat has been examined by me and found to comply with the street planting requirements and park area requirements set forth in the regulations governing plats of subdivided land adopted by the city council with the following exceptions:

_____

_____

_____ 10/20/16
City Superintendent of Parks *Date*

- Reference Plats & Maps -

A. "*Ferguson & Scarff's Addition to Burlington, VT*", dated January 1891 by A. Row, C.E. City Volume 28, Page 286.

B. "*Location Plans of the Rutland Railroad - Volume 1*", circa 1893. State of Vermont Archives.

C. "*Right of Way & Track Map(s) - Rutland Railroad ...*", Sheet V2-121, re-dated Jan. 1, 1964. Not of Record.

D. "*Central Vermont Railway, Inc Land Sold to Vt. Structural Steel Corp.*" dated July 25, 1957. City Volume 148, Page 566.

E. "*Vermont Structural Steel - Subdivision on Briggs Street*", dated March, 1988 by F.C. Koerner, C.E. City Plat Slide 193-E.

F. "*Burlington Electric Department - Change from Primary Service - Cliffside Leasing Co. ...*", dated May 10 & July 7, 1993 by Burlington Electric Department. City Plat Slides 268-B&C.

G. "*Final Plat - Two Lot Subdivision - Property of Cliffside Leasing Co.*", last revised dated October 26, 1994 by Civil Engineering Associates, Inc. City Plat Slide 286-D.

H. *"R.O.W. Plan for Signage & Striping - Salt Crossing, Burlington, Private Drive"* last revised March 13, 2000 by Systra Consulting. City Plat Slide 34-B.

- Key RR Deeds -

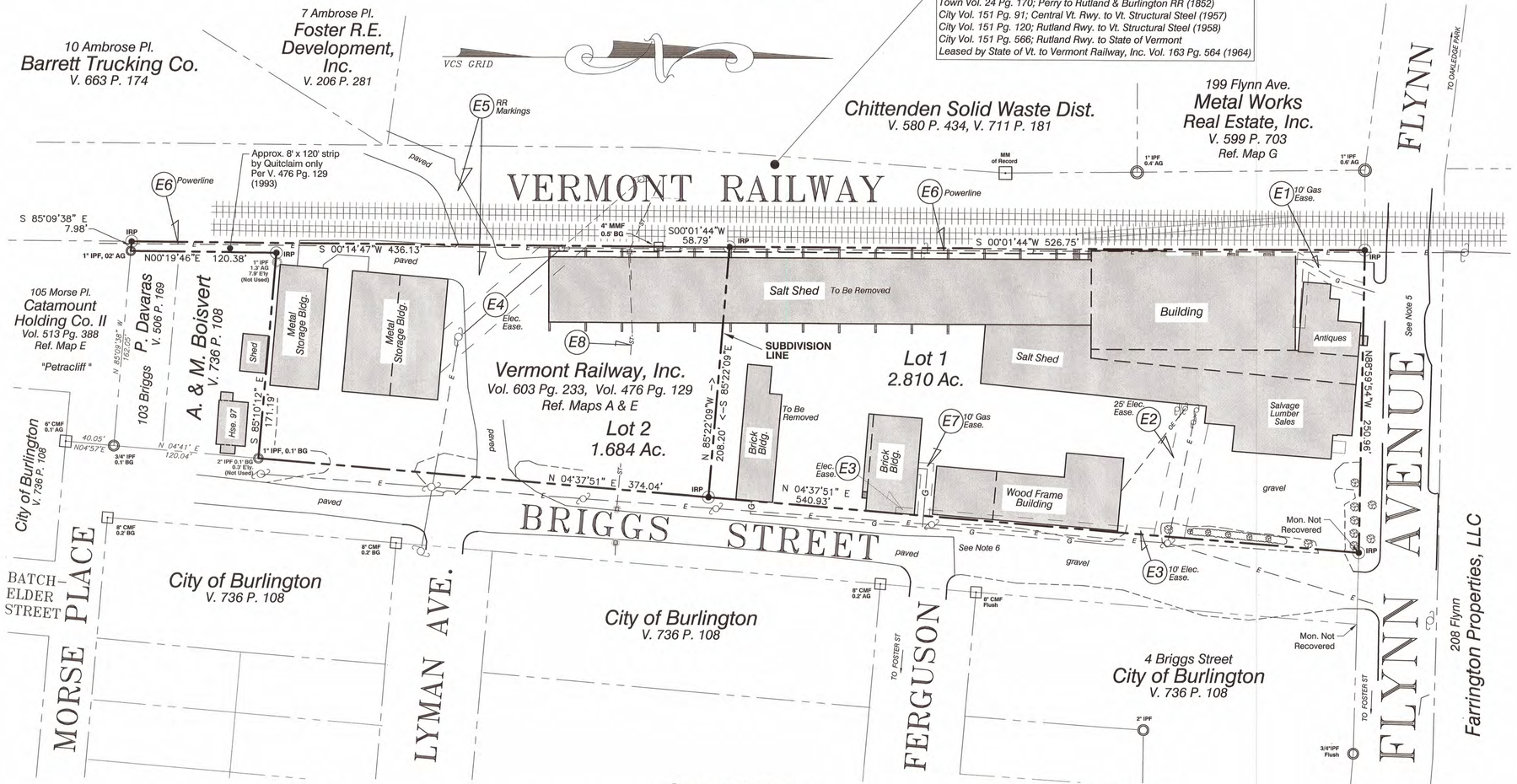
Town Vol. 24 Pg. 170; Perry to Rutland & Burlington RR (1852)
City Vol. 151 Pg. 91; Central Vt. Rwy. to Vt. Structural Steel (1957)
City Vol. 151 Pg. 120; Rutland Rwy. to Vt. Structural Steel (1958)
City Vol. 151 Pg. 566; Rutland Rwy. to State of Vermont
Leased by State of Vt. to Vermont Railway, Inc. Vol. 163 Pg. 564 (1964)

- Legend of Symbols -

- SUBJECT PROPERTY LINE
- OTHER PROPERTY LINE (APPROX.)
- IRP / IPF — IRON ROD/PIPE FOUND
- MMF / CMF — MARBLE / CONC. MONUMENT FOUND
- IRP — IRON ROD PROPOSED
- E6 — EASEMENT NOTE NUMBER
- UTILITY POLE & GUY ANCHOR
- E — ELECTRIC
- W — WATER LINE (APPX.)
- G — GAS LINE (APPX.)
- ST — STORM DRAIN (APPX.)

- Location Map -

NOT to SCALE



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

ORIGINAL INK on MYLAR
REDUCED for RECORDING

RECEIVED FOR RECORDING IN THE LAND RECORDS OF THE CITY OF BURLINGTON, VERMONT, AT_____ O'CLOCK ON THE _____ DAY OF _____, 20____.

ATTEST: _____, CITY CLERK

APPROVED BY RESOLUTION OF THE DEVELOPMENT REVIEW BOARD OF THE CITY OF BURLINGTON, VERMONT, ON THE _____ DAY OF _____, 20____, SUBJECT TO THE REQUIREMENTS AND CONDITIONS OF SAID RESOLUTION. SIGNED THIS _____ DAY OF _____, 20_____.

BY _____, CHAIRPERSON

Applicant's Certification:

The owner of the land shown on this plat and whose name is subscribed hereto, in person or through a duly authorized agent, certifies that this plat was made from an actual survey.

_____ 10/24/2016
Owner / Agent *Date*

- Survey Notes -

1. Purposes of this survey and plat are to, a.) retrace and document the existing boundaries of a parcel of land conveyed to Cliffside Leasing Company (now Vermont Railway, Inc.) by deed of Howard Bank, N.A. dated March 19, 1993 and recorded in Volume 476 at Page 129 of the City of Burlington Land Records; and b.) to subdivide the subject parcel into two (2) lots as shown.
2. The subject property is a portion of lands depicted on Reference Map A (Ferguson & Scarff's Addition) plus lands Quitclaimed by the Rutland Railroad and Central Vermont Railway, Inc.
3. Field survey was conducted during December 2015 and consisted of a closed-loop traverse conducted with an electronic total station instrument. Bearings shown are from Grid North, Vermont Coordinate System of 1983, derived from GPS (OPUS) observations (NAD 83 (2011)) on or adjacent to the site.
4. Iron pipes found are described hereon with inside diameters; iron rods with outside diameters. Proposed markers shall consist of either ⅝" rebar or 4" square concrete monuments with aluminum disks stamped "Civil Engineering Assocs. - VT LS 597".
5. Flynn Avenue is a public right-of-way with a nominal width of 66 feet. It was formerly known as "Park Avenue" per Reference Highway Vol. 2, page 129. Prior to 1881 it was called "Proctor Street" per Reference Highway Vol. 2, page 129.
6. Briggs Street is a public right-of-way with a nominal width of 60 feet per Reference Highway Vol. 2, page 130 (circa 1891). See also Reference Map A.
7. Utilities shown hereon do not purport to constitute or represent ALL utilities located upon or adjacent to the surveyed premises.

- Easement Notes -

E.1. Gas line easement(s) serving Vermont Gas Systems, Inc. (VGS). Ten feet wide, centered on lines as installed, from Flynn Avenue to 207 Flynn Ave. Volume 502 Page 176 (12/01/1993). APPROX. ONLY

E.2. Power line easement, 25 feet wide, serving Burlington Electric Department (BED) for line running approximately 112 feet westerly from Briggs Street to "structural shop", per Reference Map F.

E.3. Power line easement, 5 feet wide X 215 feet long, serving Burlington Electric Department (BED) for line running along westerly side of Briggs Street per Reference Map F.

E.4. Power line easement, 25 feet wide, serving Burlington Electric Department (BED) for line running approximately 140' southwesterly from railway R.O.W. to "truss shop" per Reference Map F.

E.5. Easement to State of Vermont for signs, markings, etc., related to Transportation Project "Burlington-Charlotte Passenger Rail" per Volume 663 Page 180 (June 20, 2000).

E.6. No record of easement was found recorded for the power transmission line of Green Mountain Power Corp. (GMP).

E.7. Gas line easement(s) serving Vermont Gas Systems, Inc. (VGS). Ten feet wide, centered on line(s) as installed, from Briggs Street to buildings across from Ferguson Ave. Volume 502 Page 174 (12/01/1993). APPROX. ONLY

E.8. Existing storm drain(s) run from Briggs Street, through Lot 2 and beneath railway. No record of easement found.

Engineer's Certification:

It is hereby certified that this plat fully complies with all engineering requirements set forth in the subdivision regulations of the City of Burlington and all other engineering requirements of Burlington, VT.

By: _____
(Seal Above Right)

To the best of my knowledge and belief this plat depicts the results of a survey conducted by me as described in "Survey Notes" hereon, based upon our analysis of land records and evidence found in the field. Existing boundaries shown are in substantial conformance with the records, except as noted. This plat is in substantial compliance with 27 VSA 1403, "*Recording of Land Plats*". This statement valid only when accompanied by my original signature and seal.

_____
Timothy R. Cowan *VT LS 597*

STATE OF VERMONT — TIMOTHY R. COWAN — No. 597 — LICENSED LAND SURVEYOR

SURVEYORS:

CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cea-vt.com

DRAWN: CEA
CHECKED: TRC
APPROVED: TRC

STATE OF VERMONT — STEPHEN A. YOUNG — No. 8226 — REGISTERED PROFESSIONAL ENGINEER

DATE	CH'CK'D.	REVISION
10.10.16	TRC	ADD SIGNATURE BLOCKS
04.21.16	TRC	ALTER EASEMENT NOTE 8

PLAT of SUBDIVISION

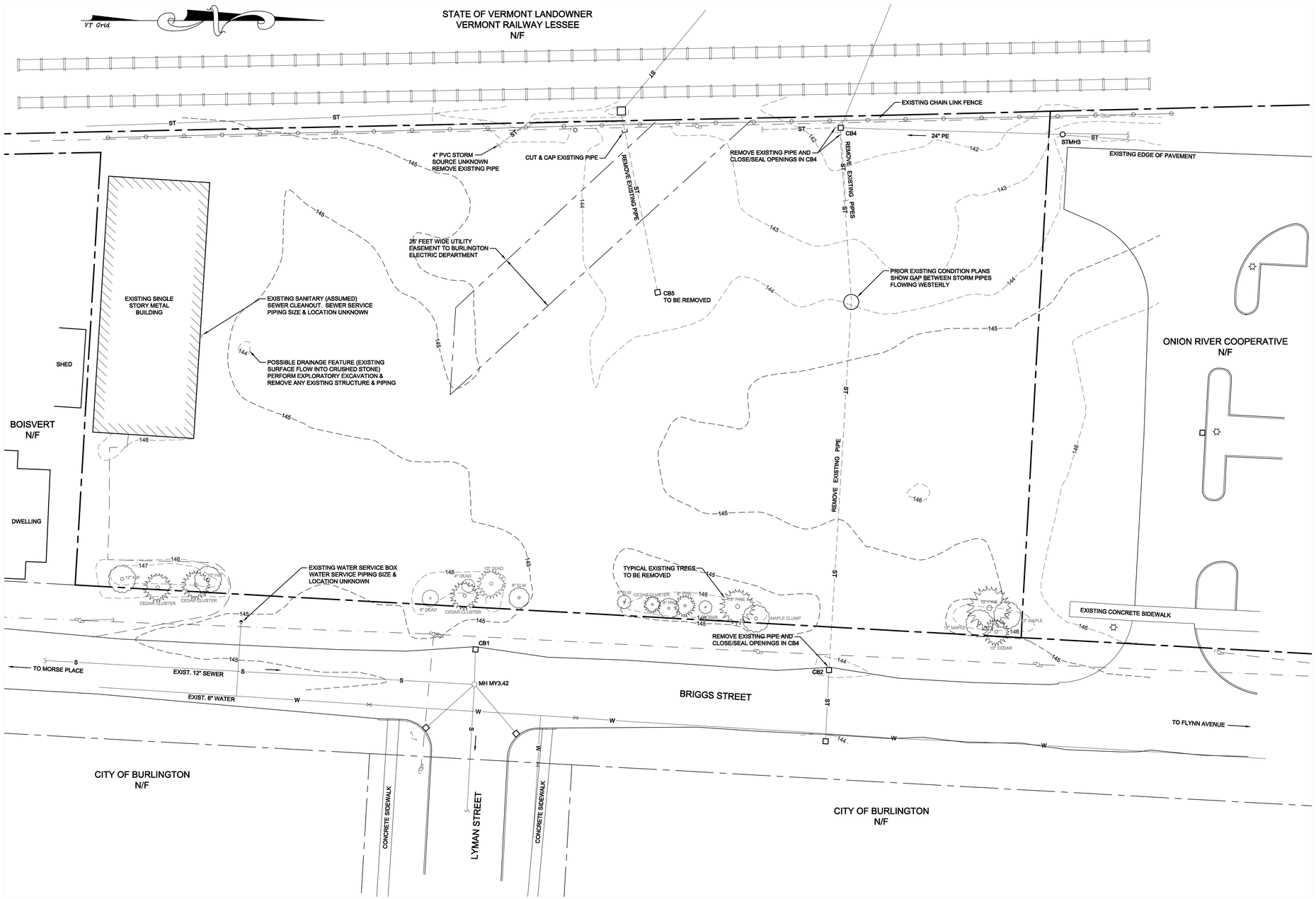
City Market South End

207 Flynn Avenue
City of Burlington, Vermont

DATE: Feb. 25, 2016
ORIGINAL SCALE: 1" = 50'
PROJ. NO.: 15253

DRAWING NUMBER: P1

SHEET 1 of 1



THE CONTRACTOR SHALL
NOTIFY DIG SAFE® AT 811
PRIOR TO ANY EXCAVATION.

DEMOLITION NOTES:

1. THE CONTRACTOR SHALL COORDINATE THE REMOVAL OF THE EXISTING SURFACES, STRUCTURES, AND UTILITIES WITH THE OWNER, UTILITY COMPANIES, AND THE CITY OF BURLINGTON.

2. THE RELOCATION AND/OR TERMINATION OF EXISTING UTILITIES SHALL BE COMPLETED IN COORDINATION WITH THE UTILITY COMPANY AND OWNER, WITH WORK IN ACCORDANCE WITH THE UTILITY COMPANY'S SPECIFICATIONS FOR CONSTRUCTION.

3. EXISTING FOUNDATIONS AND STRUCTURES, NOT SHOWN ON THIS PLAN, MAY EXIST BELOW GRADE ON THE SITE. IF ENCOUNTERED, THEY SHALL BE IMMEDIATELY REPORTED TO THE OWNER AND STRUCTURAL ENGINEER. AT A MINIMUM, EXISTING FOUNDATIONS AND STRUCTURES SHALL BE REMOVED TO A DEPTH OF AT LEAST 2 FEET BELOW THE BOTTOM OF THE SUBGRADE OR ANY TRENCH BEDDING.

3. WHERE REQUIRED, EXISTING UTILITY SERVICE AND ACCESS SHALL BE MAINTAINED DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION AND PROVISION OF TEMPORARY UTILITY SERVICES AND ACCESS AS REQUIRED. PAYMENT FOR THIS WORK SHALL BE INCIDENTAL TO THE CONSTRUCTION OF THE NEW SITE IMPROVEMENTS.

4. EXISTING STRUCTURES, PAVEMENT, SURFACES, AND UTILITIES SHALL BE REMOVED WHERE INDICATED ON THE PLANS, AND AS NECESSARY TO CONSTRUCT AND COMPLETE THE IMPROVEMENTS SHOWN ON THE PLANS. THE EXCAVATION, REMOVAL, AND DISPOSAL OF MATERIALS SHALL BE IN ACCORDANCE WITH APPLICABLE LAWS, RULES, REGULATIONS, AND PROTOCOLS. THE WORK SHALL INCLUDE THE EXCAVATION, DISPOSAL, BORROW, AND PLACEMENT OF SUITABLE MATERIAL IN CONFORMANCE WITH THE LINES, GRADES, AND TYPICALS SHOWN ON THE PLANS.

UTILITY CONSTRUCTION NOTES:

1. THE LOCATIONS AND PIPE MATERIAL OF THE WATER AND SEWER SERVICES AND MAINS ARE BASED UPON RECORD INFORMATION PROVIDED BY THE PUBLIC WORKS DEPARTMENT AND FIELD OBSERVATIONS. THE ACTUAL LOCATION OF THE EXISTING MAINS AND SERVICES MAY VARY FROM THAT SHOWN ON THIS PLAN.

2. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL PERFORM EXPLORATORY TEST PITS TO VERIFY THE HORIZONTAL LOCATION AND AND ELEVATION OF THE WATER AND SEWER SERVICES TO THE EXISTING BUILDING. TIES FOR, AND THE ELEVATION OF, EACH SERVICE SHALL BE REPORTED TO THE ENGINEER.

3. ALL UTILITY WORK SHALL BE PERFORMED IN A MANNER THAT MINIMIZES INTERRUPTIONS IN SERVICE TO OTHER ADJACENT USERS.

4. WHERE TEMPORARY INTERRUPTIONS IN UTILITY SERVICES ARE REQUIRED, THE CONTRACTOR SHALL COORDINATE WITH THE DEPARTMENT OF PUBLIC WORKS AND SHALL PROVIDE WRITTEN NOTICE TO AFFECTED USERS IN ACCORDANCE WITH THE DEPARTMENT REQUIREMENTS.

CITY RIGHT OF WAY REQUIREMENTS:

1. AUTHORIZATION FROM THE DEPARTMENT OF PUBLIC WORKS SHALL BE OBTAINED PRIOR TO PERFORMING ANY WORK WITHIN THE CITY'S RIGHT OF WAY.

2. THE SITE CONTRACTOR SHALL IMPLEMENT TRAFFIC CONTROL MEASURES IN ACCORDANCE WITH THE REQUIREMENTS OF THE DEPARTMENT OF PUBLIC WORKS AND THE MUTCD. WORK SHALL CONFORM WITH THE VTRANS STANDARD SPECIFICATIONS FOR CONSTRUCTION AND THE "T-STANDARDS" OF THE VTRANS CONSTRUCTION STANDARDS.

3. ALL WORK AND DISTURBANCE WITHIN THE CITY RIGHT OF WAY SHALL BE LIMITED TO THAT SPECIFIC AREA APPROVED. WORK SHALL NOT EXTEND BEYOND THE APPROVED LIMITS OF DISTURBANCE.

4. NO VEHICLE PARKING OR STORAGE OF MATERIALS SHALL BE ALLOWED WITH THE CITY RIGHT OF WAY, INCLUDING GREEN STRIPS, EXCEPT WHERE APPROVED BY THE CITY.

CORRECTIVE ACTION PLAN

SEE THE CORRECTIVE ACTION PLAN BY KAS CONSULTING FOR SOIL MANAGEMENT REQUIREMENTS PRIOR TO, AND THROUGHOUT CONSTRUCTION..

COMBINED SEWER DATA

EXIST. MH MY3.42
RIM = 144.66
12" CLAY OUT = 136.6

STORM DATA

EXIST. CB 1
RIM = 144.32
10" PVC OUT = 141.23

EXIST. CB 2
RIM = 143.76
15" OUT = 141.4

EXIST. STMH 3
RIM =143.87
24" OUT = 135.87

EXIST CB 4
RIM =140.43
24" IN = 134.67 (N)
15" CMP IN = 129.7 (S)
15" IN = 138.0 (E)
OUT = 129.9

EXIST. CB 5
RIM = 143.16
8" OUT = 141.6
STRUCTURE TO BE REMOVED

LEGEND

- EXISTING PROJECT BOUNDARY
- ABUTTING PROPERTY LINE
- BUILDING SETBACK
- W — EXISTING WATER LINE
- ST — EXISTING STORM & CATCHBASIN
- S — EXISTING COMBINED SEWER & MANHOLE
- EXISTING UTILITY POLE AND OVERHEAD WIRE
- EXISTING TREES

GRAPHIC SCALE
20 0 20 40 80
(IN FEET)
1" = 20 ft.

Date	Revision	By

These plans shall only be used for the purpose shown below:

- ☐ Sketch/Concept
- ☐ Preliminary
- ■ Final Local Review
- ☐ Act 250 Review
- ☐ Construction
- ☐ Record Drawing

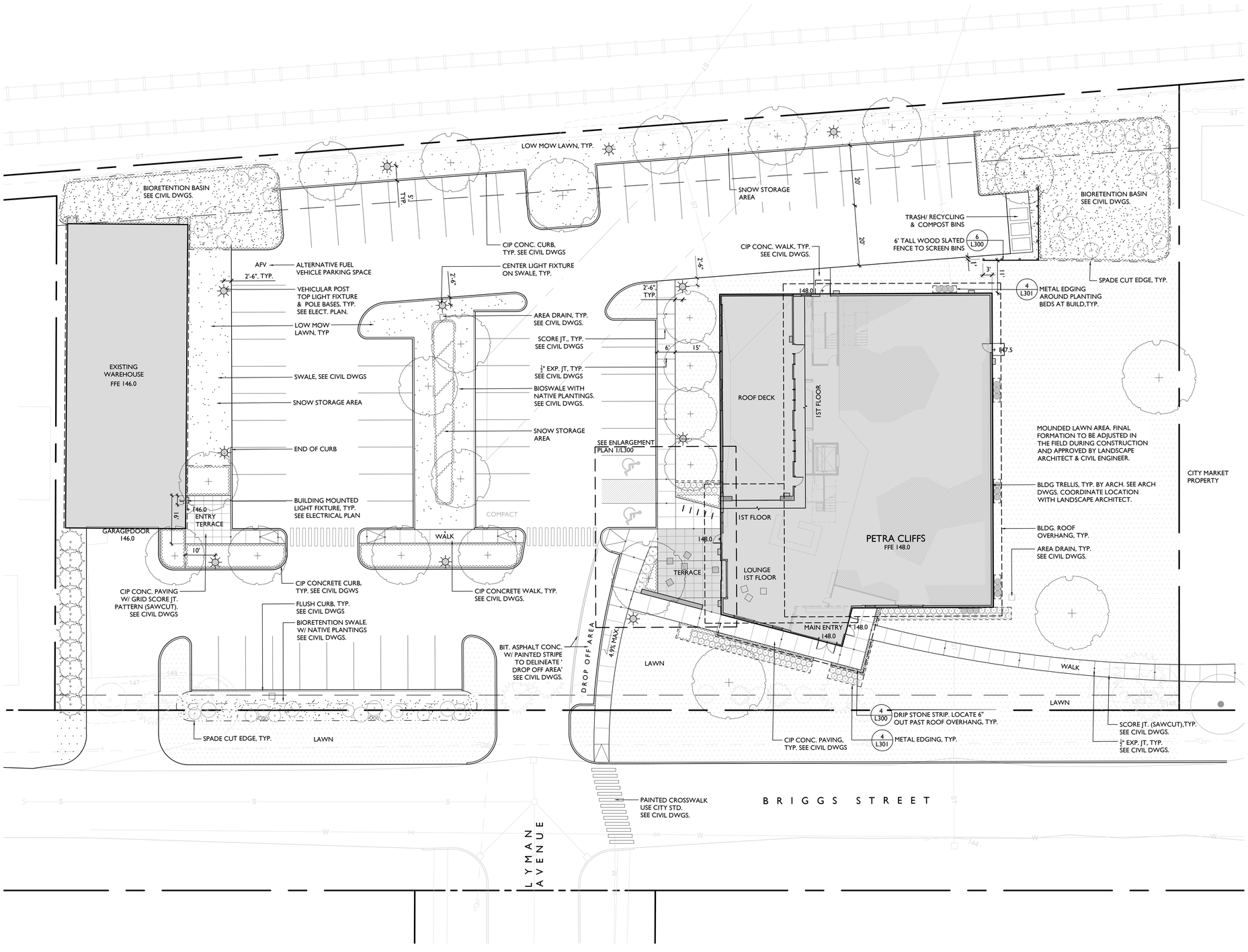
PETRA CLIFFS

75 BRIGGS STREET BURLINGTON, VT 05401

EXISTING CONDITIONS & DEMOLITION PLAN

Lamoureux & Dickinson
Consulting Engineers, Inc.
14 Morse Drive, Essex, VT 05452
802-878-4450
www.LDengineering.com

Project No.	17023
Survey	L&D
Design	ABR
Drawn	L&D
Checked	DJG
Date	06-21-18
Scale	AS NOTED
Sheet number	C4



GENERAL NOTES

1. Contractor is responsible for all damage due to his operations inside and outside the contract limit line.
2. Contractor is responsible for checking spot elevations and verifying proposed grades by providing grade stakes. Grades must be approved by Landscape Architect prior to proceeding.
3. Contractor shall blend new work smoothly with existing grades at contract limit line and/or limit of construction line.
4. Contractor to verify that subgrades are 6 inches below finished grade prior to spreading top soil for seeded areas.
5. All walks shall have 2% cross pitch, and all step treads and wall caps shall have 1% cross pitch unless otherwise noted.
6. Light fixture locations may be field adjusted with prior Landscape Architect approval.
7. Walkway layout to be approved by Landscape Architect prior to construction.
8. Site furniture and wall locations to be verified by Landscape Architect prior to installation.
9. General Contractor is responsible for all erosion control measures during construction.
10. It is the intent of this contract to avoid any disturbance to existing trees or shrubs on site other than those specifically designated for transplant or removal.
11. Liquidated damages for trees damaged by construction operation shall be $500 per caliper inch. Shrubs shall be $100 each.
12. Base survey prepared by Lamoureux & Dickinson
13. See Civil Engineer drawings for standard paving, curbs stormwater and utility details.
14. Existing subgrade to be loosened 6"-8" as approved by the Civil Engineers to improve soil drainage (infiltration) so that standing water does not occur at the interface of the planting soil and existing subgrade.
15. All planting soil shall be imported, teested and approved by Landscape Architect prior to installation. See Landscape Specifications for requirements.
16. Contractor shall perform percolation tests as outlined in the Landscape Specifications to assure planting bed soils will drain adequately.
17. Notify the Landscape Architect in writing of all soil or drainage conditions which are considered detrimental to growth of plant material, as outlined in the specifications
18. Existing on-site soil are known to be of poor quality, therefore if a hardpan soil layer exists the contractor shall implement the following: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material, as outlined in the specifications.
19. See Corrective Action Plan for Soil Cap details.
20. See Planting Plan (L200) and Details (L301) for soil depth requirements per plant type with respect to the Soil Cap.

WAGNERHODGSON
LANDSCAPE ARCHITECTURE
VT 802.864.0010 NY 518.567.1791 wagnerhodgson.com

NO.	DESCRIPTION	DATE
	BID SET	12.20.2018

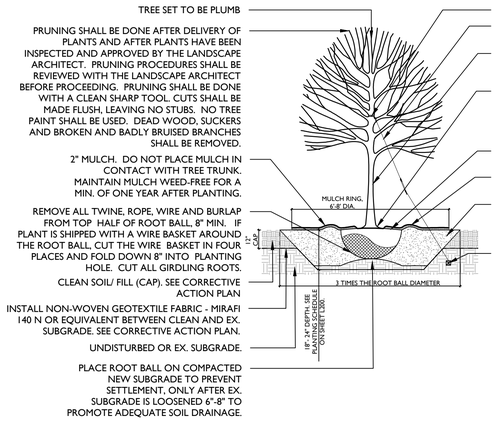
PETRA CLIFFS
75 BRIGGS STREET,
BURLINGTON, VERMONT

LAYOUT AND MATERIALS PLAN

JOB NO.	807
SCALE:	1/16"=1'-0"
DRAWN BY:	AH
DATE:	12.20.2018

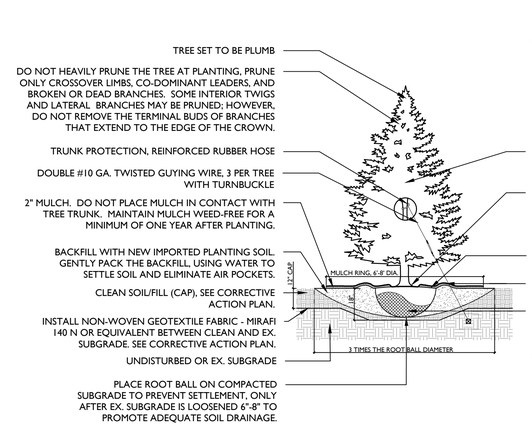
L100

16 0 16 32
SCALE OF FEET



NOTES:
1. REMOVE ALL NON - BIODEGRADABLE MATERIAL FROM PLANT PIT.
2. REMOVE ALL PLANT MATERIAL TAGS, FLAGGING, AND EXTRANEOUS LABELS, ETC.
3. EACH TREE TO BE PLANTED WITH AT LEAST 2 CU YARDS OF PLANTING SOIL AS APPROVED BY LANDSCAPE ARCHITECT. PROVIDE 4" OF PLANTING SOIL SEPARATION BETWEEN GEOTEXTILE FABRIC (SOIL BARRIER) & BOTTOM OF ROOT BALL. OVER EXCAVATE IF NECESSARY TO MEET FINISHED GRADES INDICATED ON THE GRADING PLAN
4. CONTRACTOR SHALL PERFORM PERCOLATION TESTS AS OUTLINED IN THE LANDSCAPE SPECIFICATIONS TO ASSURE ALL PLANTING BEDS WILL DRAIN ADEQUATELY.

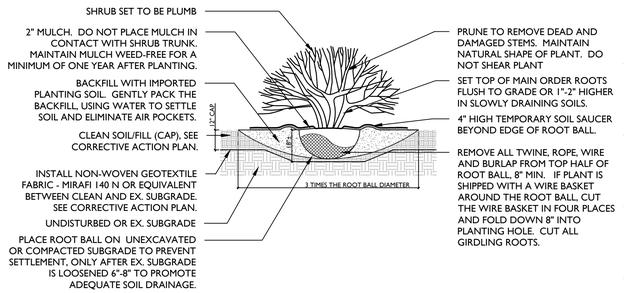
1 DECIDUOUS TREE
1/2"=1'-0"



NOTES:
1. REMOVE ALL NON - BIODEGRADABLE MATERIAL FROM PLANT PIT.
2. REMOVE ALL PLANT MATERIAL TAGS, FLAGGING, AND EXTRANEOUS LABELS, ETC.
3. EACH TREE TO BE PLANTED WITH AT LEAST 2 CU YARDS OF PLANTING SOIL AS APPROVED BY LANDSCAPE ARCHITECT. PROVIDE 4" OF SEPARATION BETWEEN GEOTEXTILE FABRIC (SOIL BARRIER) & BOTTOM OF ROOT BALL. OVER EXCAVATE IF NECESSARY TO MEET FINISHED GRADES DESIGNATED ON THE GRADING PLAN
MARK THE NORTH SIDE OF THE TREE IN THE NURSERY, AND ROTATE TREE TO FACE NORTH AT THE SITE WHENEVER POSSIBLE.
EACH TREE MUST BE PLANTED SUCH THAT THE TRUNK FLARE IS VISIBLE AT THE TOP OF THE ROOT BALL. TREES WHERE THE TRUNK FLARE IS NOT VISIBLE SHALL BE REJECTED. DO NOT COVER TOP OF THE ROOT BALL W/ SOIL.
SET TOP OF MAIN ORDER ROOTS FLUSH TO GRADE OR 1"-2" HIGHER IN SLOWLY DRAINING SOILS.
4" HIGH TEMPORARY SOIL SAUCER BEYOND EDGE OF ROOT BALL.
REMOVE ALL TWINE, ROPE, WIRE AND BURLAP FROM TOP HALF OF ROOT BALL, 8" MIN. IF PLANT IS SHIPPED WITH A WIRE BASKET AROUND THE ROOT BALL, CUT THE WIRE BASKET IN FOUR PLACES AND FOLD DOWN 8" INTO PLANTING HOLE. CUT ALL GIRDLING ROOTS.

2 EVERGREEN TREE
1/2"=1'-0"

NOTES:
1. REMOVE ALL NON - BIODEGRADABLE MATERIAL FROM PLANT PIT.
2. REMOVE ALL PLANT MATERIAL TAGS, FLAGGING, AND EXTRANEOUS LABELS, ETC.
3. FOR PLANTINGS IN BIORETENTION SWALES OR BASINS, TOP DRESS WITH COMPOST AT TIME OF PLANTING IN ADDITION TO THE 2" OF MULCH INDICATED ABOVE.
4. CONTRACTOR SHALL PERFORM PERCOLATION TESTS AS OUTLINED IN THE LANDSCAPE SPECIFICATIONS TO ASSURE ALL PLANTING BEDS WILL DRAIN ADEQUATELY.



3 SHRUBS
1/2"=1'-0"

4 METAL EDGING
1/2"=1'-0"

SPACING "D"	ROW "A"	NUMBER OF PLANTS/SQ.FT.
60" O.C.	51.96"	0.04
48" O.C	41.52"	0.07
42" O.C.	36.52"	0.10
36" O.C.	31.20"	0.12
30" O.C.	26.00"	0.18
24" O.C.	20.76"	0.28

NOTE:
QUANTITY OF SHRUBS AND SPACING AS NOTED IN PLANTING SCHEDULE

5 PLANT SPACING
1/2"=1'-0"

NOTES:
1. REMOVE ALL PLANT MATERIAL TAGS, FLAGGING, AND EXTRANEOUS LABELS, ETC.
2. FOR PLANTINGS IN BIORETENTION SWALES OR BASINS, TOP DRESS WITH COMPOST AT TIME OF PLANTING IN ADDITION TO THE 2" OF MULCH INDICATED ABOVE. SEE SPECIFICATIONS

6 PERENNIAL / ORNAMENTAL GRASSES / VINE PLANTING
1/2"=1'-0"

7 LAWN OR NO-MOW LAWN
1/2"=1'-0"

WAGNERHODGSON
LANDSCAPE ARCHITECTURE
VT802.864.0010 NY518.567.1791 wagnerhodgson.com

NO.	DESCRIPTION	DATE
	BID SET	12.20.2018

PETRA CLIFFS
75 BRIGGS STREET,
BURLINGTON, VERMONT

PLANTING DETAILS

JOB NO. 807
SCALE: VARIES
DRAWN BY: AH
DATE: 12.20.2018

L301

7.28.18
SMC.

PETRA C LIFFS CLIMBING CENTER

75 BRIGGS STREET   BURLINGTON, VERMONT

DESIGN DEVELOPMENT DRAWINGS
AUGUST 24, 2018

PROJECT DESIGN TEAM

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studio b architecture
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802-318-1309

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Burlington, VT 05401
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Engineering Ventures PC
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802-863-6225

MEP ENGINEER:
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69 Union St.
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OWNER:
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GEOTECHNICAL ENGINEER:
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Burlington, VT 05401
802-522-9789

CIVIL ENGINEER:
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Lamoureux & Dickinson Inc.
14 Morse Drive
Essex Jct. Vermont 05452
802-878-4450

ENVIRONMENTAL ENGINEER:
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KAS Consulting
368 Avenue D
Williston, VT 05495
802-383-0486

INDEX OF DRAWINGS:

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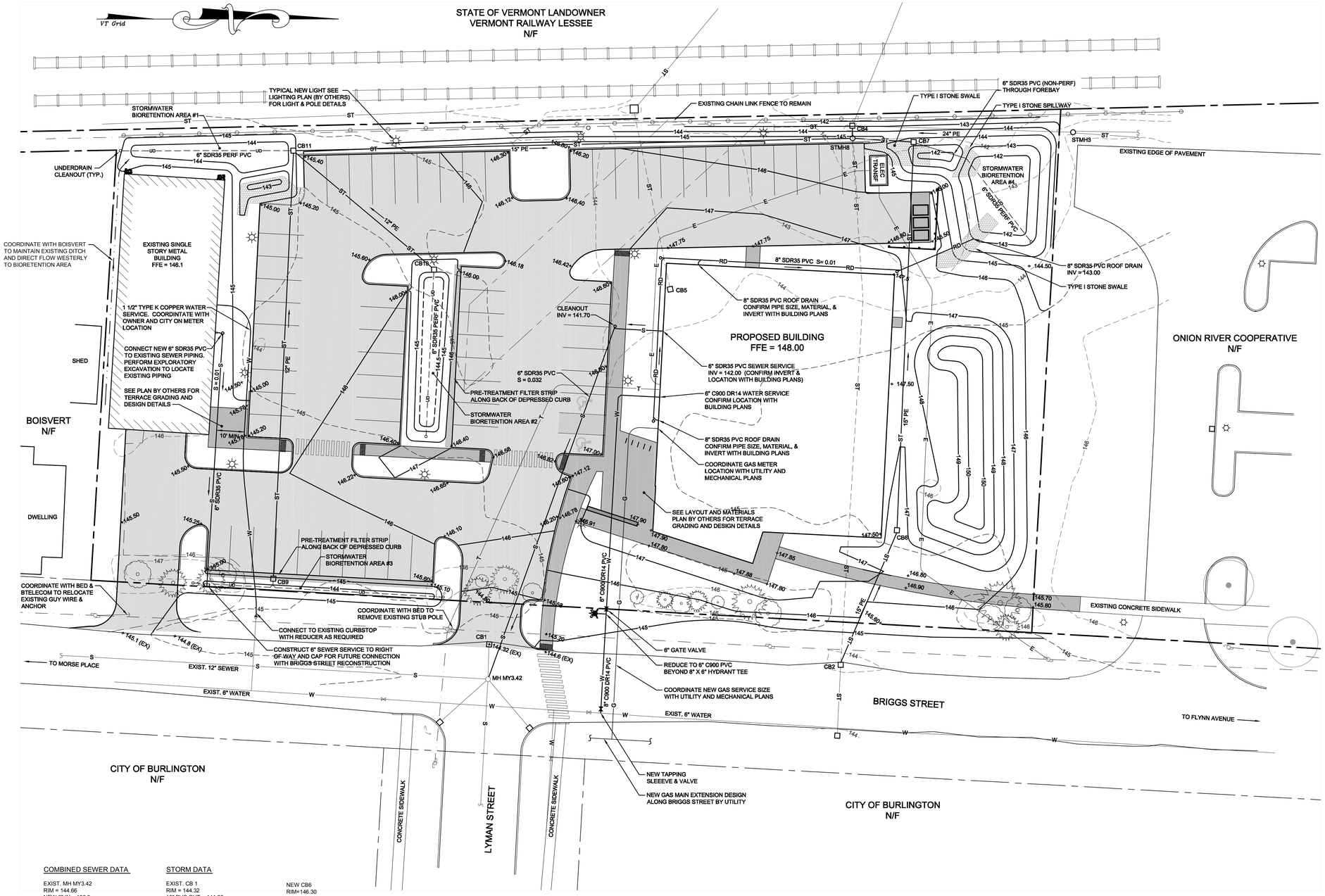
architecture
114 meadow lane
dorset, vermont
802.318.1309
www.studiobvt.com



THE CONTRACTOR SHALL NOTIFY DIG SAFE® AT 811 PRIOR TO ANY EXCAVATION.

LEGEND

- EXISTING PROJECT BOUNDARY
- ABUTTING PROPERTY LINE
- BUILDING SETBACK
- W — EXISTING WATER LINE
- ST — EXISTING STORM & CATCHBASIN
- S — EXISTING COMBINED SEWER & MANHOLE
- EXISTING UTILITY POLE AND OVERHEAD WIRE
- 146 — PROPOSED FINISH GRADE CONTOUR
- W — PROPOSED WATER LINE, GATE VALVE & HYDRANT
- ST — PROPOSED STORM PIPE AND CATCHBASIN
- S — PROPOSED SEWER PIPE AND CLEANOUT
- UD — PROPOSED UNDERDRAIN AND CLEANOUT
- E — PROPOSED ELECTRIC CONDUIT(S)
- T — PROPOSED TELECOM CONDUIT(S)
- PROPOSED POLE MOUNTED LIGHT
- EXISTING TREES

NOTES:

1. PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL VERIFY ALL BUILDING DIMENSIONS AND THE LOCATION AND ELEVATION OF ALL ENTRANCES AND UTILITY SERVICES WITH THE ARCHITECTURAL & MECHANICAL PLANS.

2. SEE ARCHITECTURAL PLANS FOR BUILDING CONSTRUCTION DETAILS, INCLUDING WALKWAY AND PAVEMENT FROST HEAVE PREVENTION MEASURES AT BUILDING ENTRANCES.

3. SEE OTHER SHEETS OF THESE PLANS FOR ADDITIONAL SITE IMPROVEMENTS, DETAILS AND SPECIFICATIONS. SEE PLANS BY OTHERS FOR RAILING, STEPS, RETAINING WALL, LIGHTING, AND CONCRETE PATIO/WALK DETAILS.

4. ALL WORK WITHIN THE CITY RIGHT OF WAY AND WORK ON THE EXISTING WATER AND SEWER SERVICES SHALL BE COORDINATED WITH THE CITY PUBLIC WORKS DEPARTMENT.

5. AT THE END OF ALL NEW SIDEWALKS AND RAMPS, CAST IRON DETECTABLE WARNING PLATES SHALL BE INSTALLED THE FULL WIDTH OF THE SIDEWALK.

6. SEE LIGHTING PLAN (BY OTHERS) FOR LIGHT FIXTURE AND POLE DESIGN DETAILS. SEE ELECTRICAL DESIGN PLAN (BY OTHERS) FOR ELECTRICAL DISTRIBUTION AND CONDUIT REQUIREMENTS FOR NEW LIGHTING.

7. PIPE SLOPES ARE IN FEET PER FEET UNLESS OTHERWISE NOTED.

CONSTRUCTION NOTES:

1. UNLESS OTHERWISE NOTED, A MINIMUM 5 FT BY 5 FT LANDING AREA SHALL BE PROVIDED AT EACH BUILDING ENTRY WITH A MAXIMUM SLOPE OF 1:50.

2. A MINIMUM 5 FT BY 5 FT LANDING AREA SHALL BE PROVIDED AT EACH TURN AND AT THE BOTTOM OF EACH SIDEWALK RAMP. THE CROSS SLOPE OF THE LANDING AREA SHALL HAVE A MAXIMUM SLOPE OF 1:50

3. THE PREFERRED MAXIMUM SLOPE OF ALL NEW WALKS IS 5% (1:20). THE MAXIMUM CROSS SLOPE OF NEW WALKS SHALL BE 1:50. THE MAXIMUM SLOPE OF ANY NEW WALK OR RAMP SHALL BE 1:12 (8%). EXCEPT FOR CURB RAMPS, WHERE RAMPS EXCEED 5% WITH A RISE GREATER THAN 6", A COMPLIANT HANDRAIL IS REQUIRED ALONG THE RAMP.

4. ALL TRANSITIONS BETWEEN EXISTING PAVEMENT OR CONCRETE AND NEW WALKS SHALL BE SMOOTH. IN NO CASE SHALL THERE BE A TRANSITION WITH A VERTICAL EDGE GREATER THAN 1/4".

5. ALL GRASS AND LANDSCAPED AREAS ADJACENT TO THE NEW WALKS AND BUILDINGS SHALL BE GRADED TO MAINTAIN POSITIVE DRAINAGE AWAY FROM THE BUILDING OR WALK. LOW AREAS SHALL BE FILLED WITH TOPSOIL, SEEDED AND MULCHED AS REQUIRED.

6. SEE OTHER SHEETS OF THESE PLANS FOR ADDITIONAL SITE IMPROVEMENTS, DETAILS AND SPECIFICATIONS.

COMBINED SEWER DATA

EXIST. MH MY3.42
RIM = 144.66
NEW 6" IN = 136.9
12" CLAY OUT = 136.6

STORM DATA

EXIST. CB 1
RIM = 144.32
10" PVC OUT = 141.23
RESET EXIST. FRAME & GRATE

EXIST. CB 2
RIM = 143.76
15" OUT = 141.4

EXIST. STMH 3
RIM =143.87
24" OUT = 135.87

EXIST CB 4
EXIST RIM =140.43
NEW RIM = 143.00
24" IN = 134.67 (N)
15" CMP IN = 129.7 (S)
TO BE REMOVED
15" IN = 138.0 (E)
TO BE REMOVED
NEW 18" IN = 138.0
OUT = 129.9

EXIST. CB 5
RIM = 143.16
8" OUT = 141.6
STRUCTURE TO BE REMOVED

NEW CB6
RIM=146.30
15" IN = 141.12
15" OUT = 141.07

NEW CB7
RIM=143.25
6" UD IN = 139.17
15" IN = 140.30
15" OUT = 139.10

NEW STMH8
RIM=145.50
15" IN = 138.95 (N)
15" IN = 139.10 (S)
18" OUT = 138.30

NEW CB9
RIM=144.5
6" UD IN = 141.17
12" OUT = 141.10

NEW CB10
RIM=145.5
6" UD IN = 141.67
12" OUT = 141.60

NEW CB11
RIM=144.75
6" UD IN = 141.17
12" IN = 140.25
12" IN = 140.25
15" OUT = 140.20

GRAPHIC SCALE
20 0 20 40 80
(IN FEET)
1" = 20 ft.

Date	Revision	By
12-18-18	REVISE BLDG FOOTPRINT AND WALKWAYS	NDS
08-16-18	REVISED PRE-TREATMENT FILTER STRIPS	NDS
07-13-18	ADD ELEC TRANSFORMER, ELIM PARKING SPACE, ADJUST CB7	ABR
07-12-18	ADD 6" GATE VALVE ON WATER SERVICE	ABR

These plans shall only be used for the purpose shown below:

- ☐ Sketch/Concept
- ☐ Preliminary
- ■ Final Local Review
- ☐ Act 250 Review
- ☐ Construction
- ☐ Record Drawing

PETRA CLIFFS

75 BRIGGS STREET BURLINGTON, VT 05401

UTILITY & GRADING PLAN

Project No.	17023
Survey	L&D
Design	ABR
Drawn	L&D
Checked	DJG
Date	06-21-18
Scale	AS NOTED
Sheet number	C2

Lamoureux & Dickinson
Consulting Engineers, Inc.
14 Morse Drive, Essex, VT 05452
802-878-4450
www.LDengineering.com

STANDARD EPSC PLAN REQUIREMENTS

THIS SECTION CONTAINS THE MINIMUM REQUIRED ELEMENTS FOR THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN. THESE ELEMENTS ARE IN ADDITION TO THE SITE SPECIFIC EROSION PREVENTION AND SEDIMENT CONTROL PRACTICES SHOWN ON THE PLANS

EROSION PREVENTION

1. THROUGHOUT CONSTRUCTION, THE AREA OF SOIL DISTURBANCE SHALL BE LIMITED TO THOSE AREA(S) THAT CAN BE ACTIVELY WORKED AND MANAGED WITH THE FORCES AVAILABLE. AREAS THAT ARE NOT ACTIVELY BEING WORKED FOR A PERIOD OF 5 DAYS OR MORE, SHALL BE TEMPORARILY STABILIZED.

2. THE MAXIMUM AREA OF SOIL DISTURBANCE AT ANY ONE TIME ON THE ENTIRE PROJECT PARCEL SHALL BE 1.0 ACRE .

3. SEDIMENT BASINS, SEDIMENT TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS, AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.

4. CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME, OR SLOPE DRAIN STRUCTURE.

5. WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.

6. BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS OR PIPES ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE CHANNEL AND THE RECEIVING CHANNEL.

7. UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE CRITERIA:
A. NO MORE THAN 200 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.
B. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.

8. ALL SEDIMENT REMOVED FROM SEDIMENT CONTROL PRACTICES AS A PART OF MAINTENANCE SHALL BE DISPOSED OF IN AN AREA THAT IS:
A. LESS THAN 5% IN SLOPE.
B. AT LEAST 100 FT. FROM ANY DOWNSLOPE WATER BODY OR CONVEYANCE TO A WATER BODY (INCLUDING STORM DRAIN INLET OR DITCH).
C. VEGETATED.
PERMANENT STABILIZATION OF SEDIMENT SHALL BE IMMEDIATELY IMPLEMENTED FOLLOWING DISPOSAL.

9. FOR ANY AREA TO BE STABILIZED FOR WINTER BY VEGETATIVE COVER, SEEDING MUST BE COMPLETED NO LATER THAN SEPTEMBER 15.

10. ANY AREA TO BE STABILIZED FOR WINTER THAT DOES NOT HAVE ESTABLISHED VEGETATION BY OCTOBER 15 MUST BE STABILIZED BY ANCHORED MULCH AT THE WINTER APPLICATION RATE OF 4 TONS PER ACRE, OR OTHER APPROVED STABILIZATION MEASURES (E.G. ROLLED EROSION CONTROL PRODUCT). DORMANT SEEDING (E.G. WITH WINTER RYE) IS RECOMMENDED.

11. DISTURBED AREAS BORDERING AND DRAINING TO THE STREET MUST HAVE AN APPROPRIATE SEDIMENT BARRIER SPANNING THE EDGE OF THE DISTURBANCE TO PREVENT WASHING OF SEDIMENT ONTO SIDEWALKS OR STREETS AND GUTTERS .

12. HAY MULCH SHALL BE APPLIED AT A MINIMUM RATE OF 2 TONS PER ACRE. HAY MULCH APPLICATION DURING WINTER CONSTRUCTION SHALL BE AT A RATE OF 4 TONS PER ACRE. WHERE SUBJECT TO BLOWING, MULCH SHALL SECURED IN PLACE BY TRACKING WITH EQUIPMENT (WITH TRACK RUNNING PARALLEL TO SLOPE), A TACKIFIER, NETTING, OR COVERED/REPLACED WITH PROPERLY ANCHORED EROSION MATTING.

13. PLACEMENT OF SEED AND MULCH SHALL OCCUR WITHIN 48 HOURS OF PLACEMENT OF TOPSOIL AND COMPLETION OF FINAL GRADING (NOT WITHSTANDING STABILIZATION REQUIREMENTS ELSEWHERE IN THIS PLAN).

14. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED.

STABILIZATION

15. ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY OR PERMANENT STABILIZATION WITHIN 14 CALENDAR DAYS . AFTER THIS TIME, ANY DISTURBANCE IN THE AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY.

THE FOLLOWING EXCEPTIONS APPLY:
A. STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN THE NEXT 24 HOURS AND THERE IS NO PRECIPITATION FORECAST FOR THE NEXT 24 HOURS.
B. STABILIZATION IS NOT REQUIRED IF THE WORK IS OCCURRING IN A SELF-CONTAINED EXCAVATION (I.E. NO OUTLET) WITH A DEPTH OF 2 FEET OR GREATER (E.G. BUILDING FOUNDATION EXCAVATION, UTILITY TRENCHES).

16. MAINTENANCE MUST BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION. EXCEPT AS NOTED BELOW, ALL SITES SHALL BE SEEDED AND STABILIZED WITH EROSION CONTROL MATERIALS, SUCH AS MULCH OR ROLLED EROSION CONTROL PRODUCTS, INCLUDING AREAS WHERE CONSTRUCTION HAS BEEN SUSPENDED OR SECTIONS COMPLETED.
A. ON THE CUT SIDE OF STREETS/DRIVES, DITCHES SHALL BE STABILIZED IMMEDIATELY WITH ROCK RIP-RAP OR OTHER NON-ERODIBLE LINERS (E.G. RECP), OR WHERE APPROPRIATE, VEGETATIVE MEASURES SUCH AS SOD.
B. FOR ACTIVE CONSTRUCTION AREAS SUCH AS BORROW OR STOCKPILE AREAS, STREET IMPROVEMENTS AND AREAS WITHIN 50 FT. OF A BUILDING UNDER CONSTRUCTION, A DOWNSLOPE PERIMETER SEDIMENT CONTROL SYSTEM CONSISTING, FOR EXAMPLE, OF SILT FENCE, SHALL BE INSTALLED AND MAINTAINED TO CONTAIN SOIL. EXPOSED DISTURBED AREAS ADJACENT TO A CONVEYANCE THAT PROVIDES RAPID OFFSITE DISCHARGE OF SEDIMENT, SUCH AS A CUT SLOPE AT AN ENTRANCE, SHALL BE COVERED WITH PLASTIC OR GEOTEXTILE TO PREVENT SOIL LOSS UNTIL IT CAN BE STABILIZED. STABILIZED CONSTRUCTION ENTRANCES WILL BE MAINTAINED TO CONTROL VEHICLE TRACKING MATERIAL OFF SITE.
C. TEMPORARY SEDIMENT TRAPPING DEVICES SHALL NOT BE REMOVED UNTIL PERMANENT STABILIZATION IS ESTABLISHED IN ALL CONTRIBUTING DRAINAGE AREAS. SIMILARLY, STABILIZATION SHALL BE ESTABLISHED PRIOR TO CONVERTING SEDIMENT TRAPS/BASINS INTO PERMANENT (POST-CONSTRUCTION) STORMWATER MANAGEMENT PRACTICES.
D. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES, AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
E. ALL SLOPES STEEPER THAN 3:1 (H:V), OR 33.3%, AS WELL AS PERIMETER DIKES, SEDIMENT BASINS OR TRAPS, AND EMBANKMENTS SHALL, UPON COMPLETION, BE IMMEDIATELY STABILIZED WITH SOD, SEED AND ANCHORED STRAW MULCH, OR OTHER APPROVED STABILIZATION MEASURES (RECP). AREAS OUTSIDE OF THE PERIMETER SEDIMENT CONTROL SYSTEM SHALL NOT BE DISTURBED.

WINTER CONSTRUCTION REQUIREMENTS

THE FOLLOWING REQUIREMENTS APPLY DURING THE WINTER CONSTRUCTION PERIOD, WHICH IS FROM OCTOBER 15 TO APRIL 15.

17. ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY OR PERMANENT STABILIZATION AT THE END OF EACH WORK DAY.

THE FOLLOWING EXCEPTIONS APPLY:
A. STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN THE NEXT 24 HOURS AND THERE IS NO PRECIPITATION FORECAST FOR THE NEXT 24 HOURS.
B. STABILIZATION IS NOT REQUIRED IF THE WORK IS OCCURRING IN A SELF-CONTAINED EXCAVATION (I.E. NO OUTLET) WITH A DEPTH OF 2 FEET OR GREATER (E.G. BUILDING FOUNDATION EXCAVATION, UTILITY TRENCHES).

18. STABILIZED ACCESS POINTS SHALL BE ENLARGED TO PROVIDE FOR SNOW STOCKPILING WHILE STILL MAINTAINING EFFECTIVE SEDIMENT CONTROL. PACKED SNOW AND ICE MAY NEED TO BE REMOVED AND ADDITIONAL STONE PLACED TO MAINTAIN THE LOOSE STONE SURFACE AT STABILIZED CONSTRUCTION EXITS.

19. THE LIMITS OF DISTURBANCE MAY NEED TO BE REPLACED OR DRAWN IN TO REFLECT THE BOUNDARY OF WINTER WORK. THE LIMITS OF DISTURBANCE SHALL BE DRAWN IN TO EXCLUDE ALL AREAS TEMPORARILY STABILIZED FOR THE WINTER, AND AREAS WHERE DISTURBANCE DURING THE WINTER IS NOT PLANNED.

20. BASED UPON THE WINTER ACTIVITIES PROPOSED, THE ON-SITE PLAN COORDINATOR SHALL DEVELOP A SNOW MANAGEMENT PLAN THAT SHALL INCLUDE AT A MINIMUM
A. ADEQUATE SIZE FOR SNOW STORAGE AREAS
B. SNOW STORAGE AREAS LOCATED DOWN GRADIENT OF AREAS OF PLANNED DISTURBANCE
C. CONTROL OF SNOWMELT RUNOFF
D. PROHIBITING STORAGE OF SNOW IN STORMWATER TREATMENT STRUCTURES.
E. A MINIMUM 25 FOOT BUFFER BETWEEN PERIMETER CONTROLS (SUCH AS SILT FENCE) TO ALLOW FOR SNOW CLEARING AND MAINTENANCE.

21. SILT FENCE SHALL BE REINFORCED OR REPLACED WITH PERIMETER DIKES, SWALES, OR OTHER PRACTICES RESISTANT TO THE FORCES OF SNOW LOADS.

22. THE ONSITE PLAN COORDINATOR INSPECTIONS SHALL INCLUDE MAINTENANCE OF DRAINAGE STRUCTURES TO INSURE THAT THEY ARE OPEN AND FREE OF SNOW AND ICE DAMS.

23. SILT FENCE AND OTHER PRACTICES REQUIRING EARTH DISTURBANCE SHALL BE INSTALLED AHEAD OF GROUND FREEZING. IF PRACTICES MUST BE INSTALLED OR MAINTAINED AFTER GROUND FREEZING, NO FROZEN MATERIAL SHALL BE USED IN THE CONSTRUCTION OF BERMS OR DIKES, OR INSTALLATION OF SILT FENCE.

INSPECTION & MONITORING

24. THE ONSITE COORDINATOR IS TO BE DETERMINED

25. THE PERIMETER OF THE SITE AND ALL EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED AT THE END OF EACH WORKDAY. IF SEDIMENT HAS TRAVELLED BEYOND THE SITE BOUNDARY, IT SHALL BE SWEPT UP OR OTHERWISE REMOVED AND DEPOSITED ONSITE IN AN UPGRADIENT AREA AT THE END OF EACH WORK DAY.

THE ON-SITE COORDINATOR SHALL INSPECT, AND DOCUMENT IN WRITING, THE STATUS OF CONSTRUCTION ON THE PROJECT SITE AND EROSION AND SEDIMENT CONTROL STRUCTURES AND MEASURES AT THE END OF EACH WORK DAY. INSPECTIONS SHALL ALSO BE CONDUCTED PRIOR TO PREDICTED STORM EVENTS, AND AS SOON AS POSSIBLE, BUT NO LATER THAN 24 HOURS AFTER ANY STORM EVENT WHICH GENERATES A DISCHARGE OF STORMWATER FROM THE CONSTRUCTION SITE.

26. THE OWNER, THE SITE CONTRACTOR / PRINCIPAL OPERATOR, AND THEIR REPRESENTATIVES SHALL ABIDE BY THE BEST MANAGEMENT PRACTICES PRESENTED ON THESE PLANS, REQUIRED BY THE PERMIT CONDITIONS, AND PRESENTED IN THE *VT DEC LOW RISK SITE HANDBOOK FOR EROSION PREVENTION AND SEDIMENT CONTROL*.

27. DURING EACH INSPECTION, THE ONSITE COORDINATOR SHALL VISUALLY MONITOR AND RECORD THE TURBIDITY OF ALL STORMWATER RUNOFF FROM THE CONSTRUCTION SITE IN ACCORDANCE WITH THE SAMPLING & TESTING REQUIREMENTS AND PROTOCOL OF THE VERMONT GENERAL PERMIT.

28. INSPECTION FREQUENCY MAY BE REDUCED TO NOT LESS THAN ONE PER WEEK IF THE ENTIRE SITE IS TEMPORARILY STABILIZED AND ALL CONSTRUCTION ACTIVITY HAS BEEN SUSPENDED. INSPECTIONS SHALL RESUME PRIOR TO RESUMING CONSTRUCTION ACTIVITY IN ACCORDANCE WITH THE REQUIREMENTS LISTED ABOVE.

29. IN ADVANCE OF A PREDICTED RAINFALL OR SNOWMELT EVENT, ALL MANAGEMENT PRACTICES APPROPRIATE TO CURRENT AREAS OF DISTURBANCE MUST BE CHECKED AND REPAIRED AS NECESSARY TO ENSURE PROPER OPERATING CONDITION. IF NECESSARY TO PREVENT SEDIMENT DISCHARGE FROM THE CONSTRUCTION SITE, THIS WILL INCLUDE THE TEMPORARY STABILIZATION OF ALL DISTURBED SOILS ON THE SITE IN ADVANCE OF THE ANTICIPATED RUNOFF PERIOD.

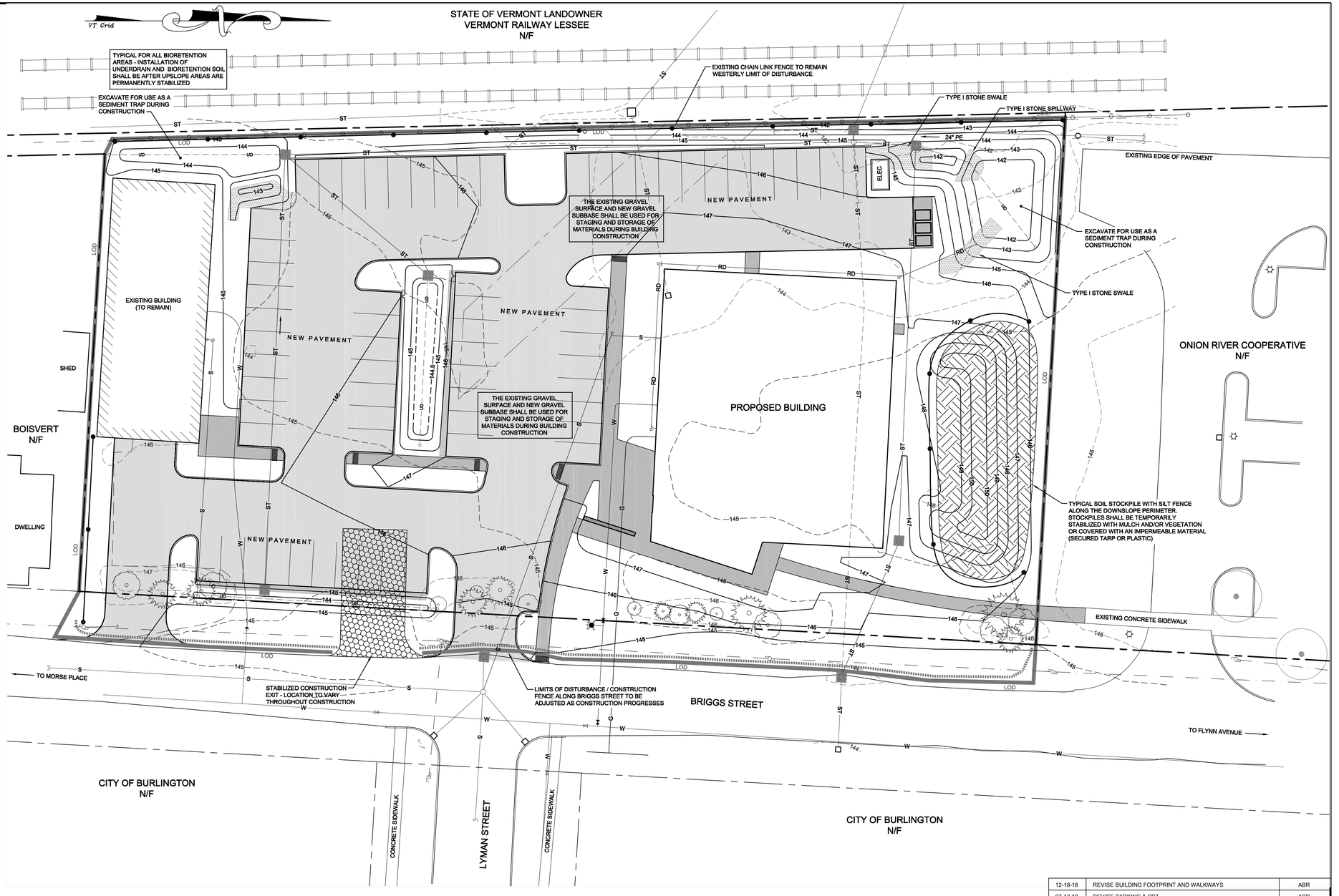
PUBLIC NOTICE AND DPW COORDINATION

30. A COPY OF THE CITY EPSC PLAN APPROVAL, THE STATE DISCHARGE PERMIT AND THE AUTHORIZATION TO DISCHARGE, A BRIEF DESCRIPTION OF THE PROJECT, AND THE LOCATION WHERE THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN IS AVAILABLE SHALL BE POSTED AT A LOCATION ON THE PROJECT SITE THAT IS VISIBLE TO THE PUBLIC.

31. THE LANDOWNER OR SITE CONTRACTOR SHALL CONTACT THE CITY STORMWATER ADMINISTRATOR AT 540-1748 OR GJOHNSON@BURLINGTONVT.GOV AT LEAST 24 HOURS PRIOR TO ANY EARTH DISTURBANCE, AND SHALL PROVIDE THE NAME AND CONTACT INFORMATION FOR THE ONSITE PLAN COORDINATOR.

32. THE ONSITE PLAN COORDINATOR SHALL NOTIFY THE CITY STORMWATER ADMINISTRATOR PRIOR TO OCTOBER 15 IF THE SITE WILL NOT BE STABILIZED BY NOVEMBER 1 OR ADDITIONAL WORK IS PROPOSED DURING THE WINTER CONSTRUCTION PERIOD.

33. THE LANDOWNER OR ONSITE PLAN COORDINATOR SHALL CONTACT THE CITY STORMWATER ADMINISTRATOR TO SCHEDULE A STABILIZATION INSPECTION WHEN SITE WORK IS FINISHED AND STABILIZATION MEASURES HAVE BEEN INSTALLED.



LEGEND

- STABILIZED CONSTRUCTION EXIT
- LOD — CONSTRUCTION FENCE / LIMIT OF DISTURBANCE
- TEMPORARY SILT FENCE
- EROSION LOG (MIN 9"Ø)
- INLET PROTECTION

GRAPHIC SCALE

20 0 20 40 80

(IN FEET)

1" = 20 ft.

Date	Revision	By
12-18-18	REVISE BUILDING FOOTPRINT AND WALKWAYS	ABR
07-13-18	REVISE PARKING & CB7	ABR

These plans shall only be used for the purpose shown below:

- ☐ Sketch/Concept
- ☐ Preliminary
- ■ Final Local Review
- ☐ Act 250 Review
- ☐ Construction
- ☐ Record Drawing

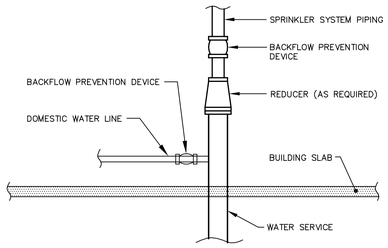
PETRA CLIFFS

75 BRIGGS STREET BURLINGTON, VT 05401

EROSION PREVENTION & SEDIMENT CONTOL PLAN

Lamoureux & Dickinson
Consulting Engineers, Inc.
14 Morse Drive, Essex, VT 05452
802-878-4450
www.LDengineering.com

Project No.	17023
Survey	L&D
Design	ABR
Drawn	L&D
Checked	DJG
Date	06-21-18
Scale	AS NOTED
Sheet number	C3

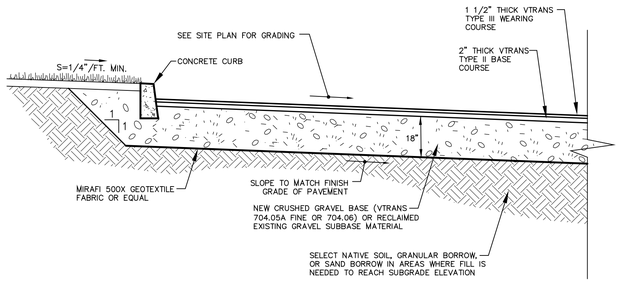


NOTE:
ALL DOMESTIC SERVICES AND FIRE SPRINKLER SYSTEMS THAT ARE CONNECTED TO THE PUBLIC WATER SYSTEM SHALL BE PROTECTED WITH A BACKFLOW PREVENTION ASSEMBLY, AND AN APPROPRIATE THERMAL EXPANSION SYSTEM IN COMPLIANCE WITH THE REQUIREMENTS OF THE BURLINGTON WATER DEPARTMENT.

WATER SERVICE BACKFLOW PREVENTION DETAIL

NTS

SEE SHEET D6 AND THE CITY OF BURLINGTON WATER DEPARTMENT STANDARDS FOR ADDITIONAL DETIALS AND SPECIFICATIONS



NOTES:
1. AREAS OF EXISTING PAVEMENT AND GRAVEL SUBBASE MAY BE RECLAIMED AND STOCKPILED FOR RE-USE. EXISTING PAVEMENT SHALL BE RECLAIMED SUCH THAT THE BITUMINOUS CONCRETE IS PULVERIZED TO A MAXIMUM PARTICLE SIZE OF 3 INCHES AND MIXED WITH THE UNDERLYING GRAVEL SUBBASE. PRIOR TO PAVING, THE RECLAIMED MATERIAL SHALL BE FINE GRADED WITH A MINIMUM OF 2" ADDITIONAL CRUSHED GRAVEL (VTRANS 704.05A FINE) PLACED AS NEEDED TO ACHIEVE THE PROPOSED GRADES SHOWN ON THE PLANS.

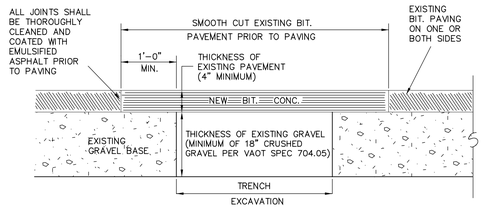
2. IN AREAS WHERE THERE IS NO EXISTING PAVEMENT, NEW CRUSHED GRAVEL SUBBASE MATERIAL, OVER GEOTEXTILE FABRIC SHALL BE PLACED PRIOR TO PAVING.

3. IN ALL AREAS WHERE UNSTABLE/UNSUITALBE SUBGRADE SOILS ARE PRESENT, THE SUBGRADE SHALL BE OVER-EXCAVATED TO REMOVE THE UNSUITABLE MATERIAL AND BACKFILLED WITH SAND BORROW OR SELECT NATIVE MATERIAL.

4. SUBGRADE SOIL, NEW CRUSHED GRAVEL, AND RECLAIMED MATERIAL SHALL BE ADEQUATELY COMPACTED TO NOT LESS THAN 95% OF THE OPTIMUM DENSITY AS DETERMINED BY THE STANDARD PROCTOR TEST (ASTM D698).

TYPICAL NEW DRIVE & PARKING CROSS SECTION

NTS



1) SET UP AND MAINTAIN SIGNS AND OTHER SAFETY CONTROL DEVICES.

2) RESHAPE HOLE AND PATCH AREA BY CUTTING WITH A CONCRETE SAW INTO SQUARE OR RECTANGULAR SHAPE AND CUT SIDE FACES VERTICALLY. RESHAPE DOWNWARD TO SOLID MATERIAL AND AROUND HOLE TO SOUND PAVEMENT.

3) BACKFILL TRENCH IN 6" LIFTS AND COMPACT EACH LIFT TO 95% OF MAXIMUM DENSITY OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D698 STANDARD PROCTOR.

4) REMOVE ALL LOOSE MATERIAL AND THOROUGHLY SWEEP THE HOLE AREA CLEAN OF MUD AND STANDING WATER.

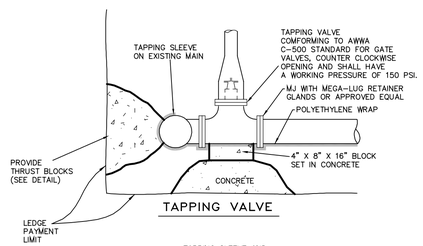
5) APPLY LIQUID ASPHALT TACK TO VERTICAL FACES IN A UNIFORM MANNER. DO NOT PUDDLE TACK COAT ON BOTTOM OF HOLE.

6) FILL TOP OF HOLE WITH TYPE III BITUMINOUS CONCRETE. PLACE AND COMPACT IN LIFTS NO MORE THAN 2" THICK. FINAL TYPE III LIFT PRIOR TO COMPACTING SHOULD BE 1/2" TO 3/4" ABOVE ADJOINING PAVEMENT SO THAT AFTER COMPACTION THE PATCH IS LEVEL WITH THE ORIGINAL PAVEMENT. EACH LIFT SHOULD BE THOROUGHLY COMPACTED WITH A VIBRATORY PLATE COMPACTOR OR A PORTABLE ROLLER. HAND TAMP SHOULD ONLY BE USED FOR SMALL AREAS (LESS THAN 1 S.F.) .

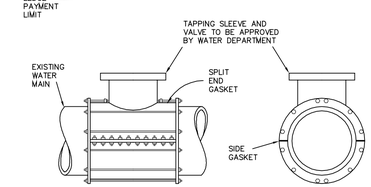
7) CLEAN UP AREA. DO NOT LEAVE EXCESS FILL OR EXCAVATED MATERIAL ON THE PAVEMENT. REMOVE SAFETY SIGNS.

REPLACEMENT of EXISTING BITUMINOUS PAVEMENT

N.T.S.



TAPPING VALVE



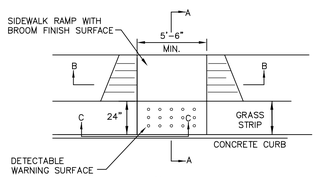
ALL EXTERIOR NUTS & BOLTS SHALL BE 18-8 STAINLESS STEEL.

TAPPING SLEEVE

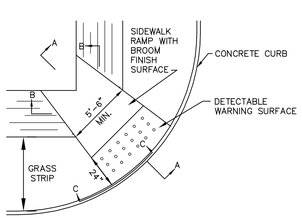
NOTES:
1. SLEEVES SHALL HAVE WORKING PRESSURE OF 150 PSI.
2. ALL EXTERIOR EXPOSED SURFACES SHALL BE FUSION BOUNDED, EPOXY-COATED TO A MIN. 10 MIL. THICKNESS.
3. ALL NUTS AND BOLTS SHALL BE 18-8 STAINLESS STEEL.
4. UPON FINAL TIGHTENING AND TESTING ALL BOLTS SHALL BE BRUSH COATED WITH BITUMASTIC COLD APPLIED MATERIAL TO ALL EXPOSED NUTS & BOLTS.

TAPPING VALVE and SLEEVE DETAIL

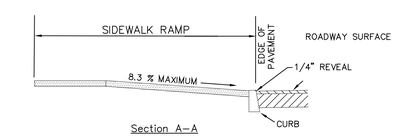
NTS



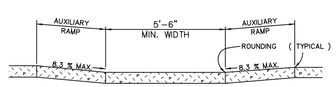
SINGLE RAMP ON TANGENT, NARROW OR NO GRASS STRIP



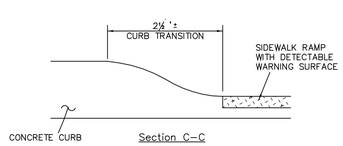
SINGLE RAMP ON CORNER RADIUS, NARROW GRASS STRIP BETWEEN SIDEWALK AND CURB.



Section A-A



Section B-B

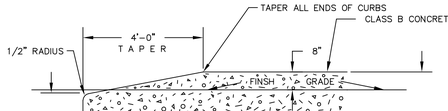


Section C-C

NOTE: THE TYPE, COLOR AND MANUFACTURER OF THE DETECTABLE WARNING SURFACE SHALL BE APPROVED BY THE CITY AND OWNER.

SIDEWALK RAMPS

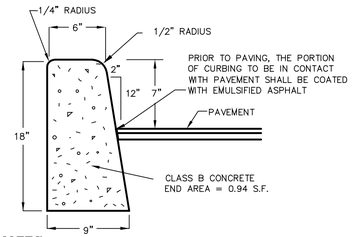
NTS



NOTE: TAPERED CURB SHALL BE LOCATED AT ALL CURB ENDS

TYPICAL TAPERED CURB

N.T.S.



NOTES:
1) CURBING SHALL BE CONSTRUCTED IN 10' SECTIONS WITH 1/8" JOINT BETWEEN SECTIONS.
2) CURBING EXPANSION JOINTS SHALL BE CONSTRUCTED EVERY 20' AND SHALL BE CONSTRUCTED OF MATERIAL CONFORMING TO AASHTO DESIGNATION M-153 (1/2" SPONGE RUBBER OR CORK.)
3) ALL CONCRETE SHALL BE AIR ENTRAINED NOT LESS THAN 5% AND NOT MORE THAN 7%

CONCRETE CURB

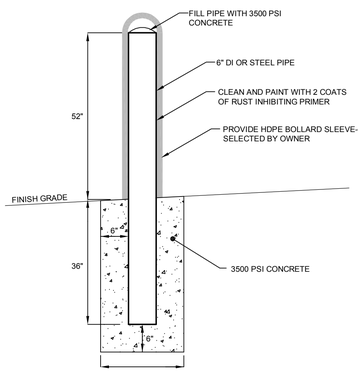
N.T.S.

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 4,000 PSI AT 28 DAYS, AIR ENTRAINED WITH AN ADMIXTURE PRODUCING AN AIR CONTENT OF BETWEEN 5% AND 7% BY VOLUME.
2. HALF INCH (1/2") TRANSVERSE EXPANSION JOINTS SHALL BE PLACED AT INTERVALS NOT EXCEEDING TWENTY FEET (20'). SIDEWALKS SHALL BE SCORED TO A DEPTH OF ONE INCH (1") EVERY FIVE (5') FEET. CURB AND SIDEWALK SECTIONS SHALL BE SEPARATED BY ASPHALT TREATED FELT.
3. AFTER THE INITIAL CURING PERIOD IS OVER (APPROXIMATELY 28 DAYS), ALL EXPOSED SURFACES SHALL RECEIVE TWO COATS OF ANTI-SPALLING COMPOUND.
4. SEE ARCHITECTUAL PLANS AND DETAILS AT BUILDING ENTRANCE LOCATIONS FOR ADDITIONAL SIDEWALK FOUNDATION AND SUPPORT DETAILS.

CONCRETE SIDEWALK DETAIL

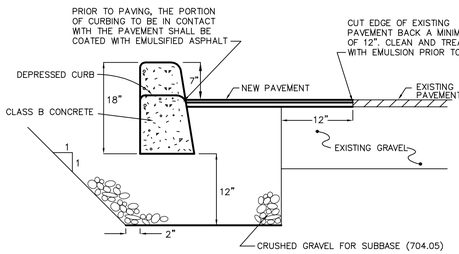
N.T.S.



THE ABOVE DETAIL SHALL BE USED FOR BOLLARDS AT THE LOADING AREA ENTRY

TYPICAL BOLLARD

NTS



NOTES:
THE NEW PAVEMENT DEPTH SHALL MATCH THE EXISTING PAVEMENT DEPTH. AT A MINIMUM, 4" OF TYPE III PAVEMENT SHALL BE PLACED IN 2 LIFTS.

CONCRETE CURB AND PAVEMENT REPLACEMENT

NTS

GENERAL CONSTRUCTION SPECIFICATIONS

1. ALL WORK AND MATERIALS SHALL BE APPROVED BY THE OWNER OR ENGINEER AND IN ACCORDANCE WITH THE LATEST VERMONT AGENCY OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CITY OF BURLINGTON PUBLIC WORKS REQUIREMENTS, AND THESE PLANS.
2. THE CONTRACTOR SHALL CONTACT ALL UTILITIES BEFORE EXCAVATION TO VERIFY THE LOCATION OF ANY UNDERGROUND LINES. THE CONTRACTOR SHALL NOTIFY "DIGSAFE" AT 1-888-DIGSAFE PRIOR TO ANY EXCAVATION.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEMOLITION AND REMOVAL OF ALL EXISTING VEGETATION, PAVEMENT AND STRUCTURES NECESSARY TO CONSTRUCT THIS PROJECT UNLESS OTHERWISE NOTED ON THESE PLANS. THE CONTRACTOR SHALL REMOVE ALL EXCESS OR UNSTABLE MATERIAL, DEBRIS AND TRASH FROM THE SITE UPON COMPLETION OF CONSTRUCTION.
4. THE CONTRACTOR SHALL BE RESPONSIBLE AT HIS OR HER OWN EXPENSE FOR ENSURING THAT THE DUST CREATED AS A RESULT OF CONSTRUCTION DOES NOT CREATE A NUISANCE OR A SAFETY HAZARD. WHERE AND WHEN DEEMED NECESSARY BY THE ENGINEER, THE CONTRACTOR SHALL BE REQUIRED TO WET SECTIONS OF THE CONSTRUCTION AREA WITH WATER, APPLY CALCIUM CHLORIDE OR SWEEP ASPHALT ROADS WITH A POWER BROOM AS DUST CONTROL.
5. ANY SURFACES, LINES, OR STRUCTURES WHICH HAVE BEEN DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO THE CONDITION AT LEAST EQUAL TO THAT IN WHICH THEY WERE FOUND IMMEDIATELY PRIOR TO THE BEGINNING OF OPERATIONS.
6. THE WORK SHOWN ON THESE PLANS SHALL BE INSPECTED BY LAMOUREUX & DICKINSON CONSULTING ENGINEERS, INC., ESSEX JUNCTION, VERMONT, TO ENSURE COMPLIANCE WITH THE PLANS AND REQUIREMENTS. LAMOUREUX & DICKINSON WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS THAT MAY ARISE FROM THE FAILURE OF THE CONTRACTOR TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THAT THE PLANS CONVEY, AND FROM FAILURE TO HAVE BEEN NOTIFIED TO INSPECT THE WORKS AND TESTS IN PROGRESS.
7. FOR ANY WORK WITHIN A HIGHWAY OR STREET RIGHT-OF-WAY, A MINIMUM OF ONE-WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES. CONTINUOUS TWO-WAY TRAFFIC WILL BE REQUIRED AT NIGHT, DURING PEAK-HOURS, AND WHENEVER POSSIBLE DURING ACTUAL CONSTRUCTION ACTIVITIES. UNIFORMED TRAFFIC CONTROL OFFICERS SHALL DIRECT TRAFFIC DURING PEAK HOURS WHEN THERE IS ONE-WAY TRAFFIC OR WHEN DEEMED NECESSARY BY THE CITY.
8. TEMPORARY CONSTRUCTION SIGNS AND TRAFFIC CONTROL SIGNS SHALL BE ERECTED BY THE CONTRACTOR IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, VTRANS E-STANDARDS AND CITY REQUIREMENTS.
9. TO ASSURE COMPLIANCE WITH THE PLAN(S), THE CONTRACTOR SHALL NOTIFY THE ENGINEER 24 HOURS IN ADVANCE OF STARTING ANY WORK, CUTTING THE PAVEMENT, BEGINNING THE INSTALLATION OF ANY UTILITIES, TESTING THE UTILITIES, BRINGING IN ANY NEW GRAVEL FOR THE NEW BASE, PAVING, AND FINAL INSPECTION. PRIOR TO BEGINNING CONSTRUCTION ALL MATERIALS SHALL BE APPROVED BY THE ENGINEER.
10. AT COMPLETION OF GRADING, SLOPES, DITCHES, AND ALL DISTURBED AREAS SHALL BE SMOOTH AND FREE OF POCKETS WITH SUFFICIENT SLOPE TO ENSURE DRAINAGE.
11. UTILITY INFORMATION SHOWN HEREON WAS OBTAINED FROM BEST AVAILABLE SOURCES AND MAY OR MAY NOT BE EITHER ACCURATE OR COMPLETE. CONTRACTOR SHALL VERIFY EXACT LOCATION OF EXISTING UTILITIES AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY UTILITY, PUBLIC OR PRIVATE, SHOWN OR NOT SHOWN HEREON. CONTRACTOR SHALL VERIFY NEW TAP LOCATIONS AND SHALL CONNECT ALL UTILITIES TO NEAREST SOURCE THROUGH COORDINATION WITH THE UTILITY COMPANY AND OWNER.
12. SEE OTHER DETAIL SHEETS OF THESE PLANS FOR ADDITIONAL DETAILS, REQUIREMENTS AND SPECIFICATIONS.

Date	Revision	By

These plans shall only be used for the purpose shown below:

- ☐ Sketch/Concept
- ☐ Preliminary
- ■ Final Local Review
- ☐ Act 250 Review
- ☐ Construction
- ☐ Record Drawing

PETRA CLIFFS

75 BRIGGS STREET BURLINGTON, VT 05401

SITEWORK & WATER DETAILS & SPECIFICATIONS

Project No.	17023
Survey	L&D
Design	ABR
Drawn	L&D
Checked	DJG
Date	06-21-18
Scale	AS NOTED
Sheet number	C5

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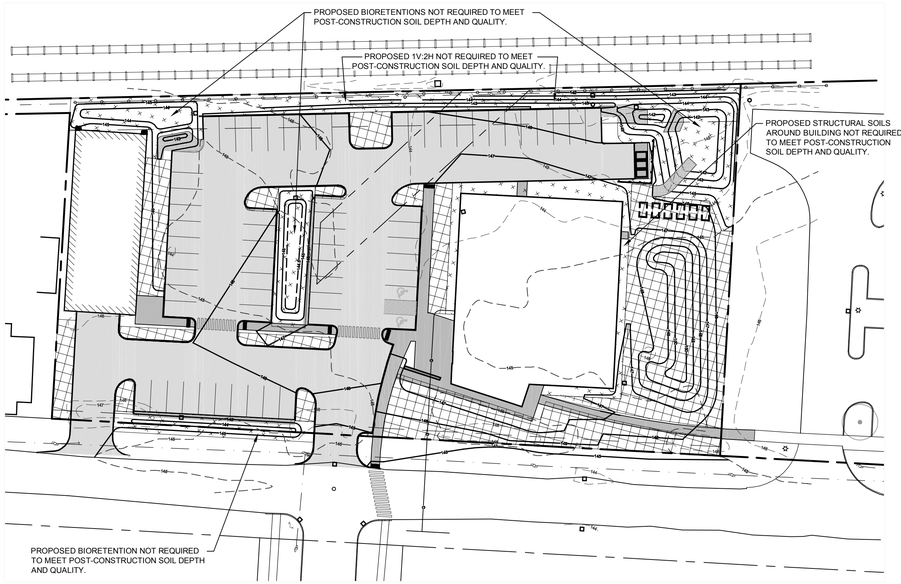


GRAPHIC SCALE

40 0 40 80 160

(IN FEET)

1" = 40 ft.

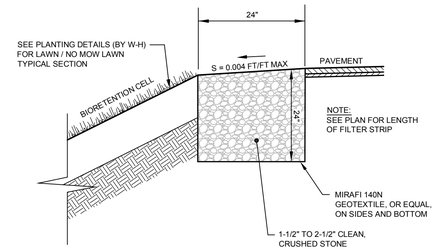
POST-CONSTRUCTION SOIL DEPTH & QUALITY PLAN

DEPTH AND QUALITY TREATMENT TOTAL AREA = 0.35 ACRES

AREAS NOT REQUIRED TO MEET THE POST-CONSTRUCTION SOIL DEPTH AND QUALITY TREATMENT

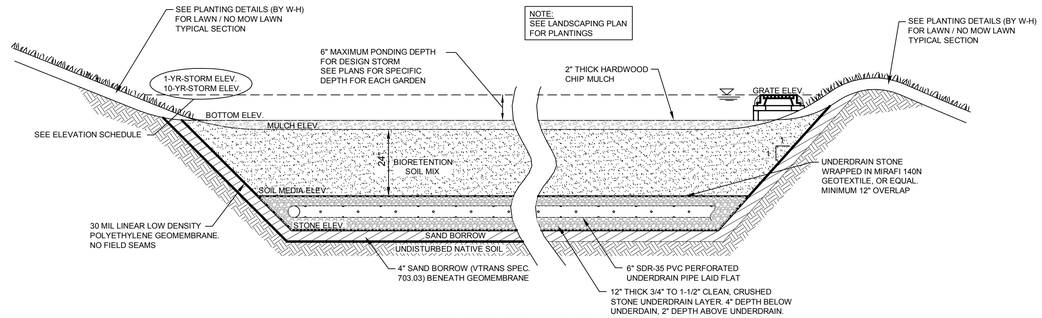
POST-CONSTRUCTION SOIL DEPTH & QUALITY TREATMENT NOTES

1. POST-CONSTRUCTION SOIL DEPTH AND QUALITY TREATMENT SHALL CONFORM TO SECTION 3 OF THE "2017 VERMONT STORMWATER MANAGEMENT MANUAL RULE AND DESIGN GUIDANCE", AT A MINIMUM, ALL AREAS IDENTIFIED ON THIS PLAN ARE SUBJECT TO THESE RULES AND THE OUTLINED TREATMENT AS INDICATED BELOW. ANY ADDITIONAL AREAS THAT ARE DISTURBED BY CONSTRUCTION ACTIVITIES, INCLUDING THE COMPACTION OF SOIL DUE TO THE TRACKING OF HEAVY EQUIPMENT, ARE ALSO SUBJECT TO THE STANDARDS.
2. TOPSOIL SHALL CONTAIN A MINIMUM OF 4% DRY WEIGHT ORGANIC MATTER, AND SHALL BE PLACED A MINIMUM OF 4" OF DEPTH AS INDICATED ON THE PLANS. SEE ALSO PLANTING DETAILS (BY W-H) FOR LAWN / NO MOW LAWN TYPICAL SECTION .
3. THE COMPOST USED TO MEET ORGANIC REQUIREMENTS SHALL CONSIST OF THE FOLLOWING:
   - A CARBON TO NITROGEN RATIO BELOW 25:1.
   - COMPOST SHALL MEET THE DEFINITION OF "COMPOST" IN THE AGENCY'S SOLID WASTE MANAGEMENT RULES OR THE CONTAINMENT STANDARDS IN THE VERMONT SOLID WASTE MANAGEMENT RULES §6-1104(g)(6-7), §6-1105(e)(8-9), AND §6-1106(e)(7-9).
   - A MAXIMUM OF 35% OF THE TOTAL SOIL VOLUME MAY CONTAIN EXCEPTIONAL QUALITY BIOSOLIDS AMENDMENTS, AND SHALL BE WELL MIXED.
4. THE SOIL QUALITY REQUIREMENTS SHALL BE MET BY USING THE FOLLOWING METHOD:
   - IMPORT TOPSOIL MIX, OR OTHER MATERIALS FOR MIXING, INCLUDING COMPOST, OF SUFFICIENT ORGANIC CONTENT AND DPETH.
   - SCARIFY OR TILL SUBGRADE TO A DEPTH OF 4 INCHES. EXCEPT FOR WITHIN THE DRIP LINE OF EXISTING TREES, THE ENTIRE SURFACE SHALL BE DISTURBED BY SCARIFICATION;
   - PLACE 4 INCHES OF IMPORTED TOPSOIL MIX ON SURFACE. THE IMPORTED TOPSOIL MIX SHALL CONTAIN 4% ORGANIC MATTER. SOILS USED IN THE MIX SHALL BE SAND OR SANDY LOAM AS DEFINED BY THE USDA.
   - RAKE BEDS TO SMOOTH AND REMOVE SURFACE ROCKS LAGER THAN 2 INCHES IN DIAMETER; AND WATER OR ROLL TO COMPACT SOIL IN TURF AREAS TO 85% OF MAXIMUM DRY DENSITY.
5. SOIL DEPTH SHALL BE ESTABLISHED AT THE END OF CONSTRUCTION AND ALL AREAS IDENTIFIED SHALL BE PROTECTED FROM COMPACTION.
6. TEST HOLES SHALL BE PERFORMED BY THE CONTRACTOR BY USING A SHOVEL DRIVEN SOLELY BY THE CONTRACTORS WEIGHT. THE TEST HOLES SHALL BE 8" IN DEPTH AND USED BY THE CONTRACTOR FOR SELF VERIFICATION THAT ALL REQUIREMENTS OF THE POST-CONSTRUCTION SOIL DEPTH AND QUALITY PLAN HAVE BEEN MET.
7. TEST HOLES SHALL BE PERFORMED IN LOCATIONS NOTED ON THIS PLAN OR AS SELECTED BY THE CONTRACTOR. TEST HOLES SHALL BE SPACED AT A MINIMUM OF 50' APART. THE CONTRACTOR SHALL PROVIDE NINE (9) TEST HOLES PER ACRE OF IDENTIFIED AREA SUBJECT TO THE POST-CONSTRUCTION SOIL DEPTH AND QUALITY TREATMENT.
8. A DENSE AND VIGOROUS VEGETATIVE COVER SHALL BE ESTABLISHED OVER ALL TURF AREAS. SEE LANDSCAPING PLAN FOR ADDITIONAL NOTES, PLANTING SCHEDULE AND SEEDING SPECIFICATIONS.



PRE-TREATMENT FILTER STRIP

NTS



BIORETENTION SECTION

NTS

BIORETENTION MONITORING AND MANAGEMENT

WHAT TO LOOK FOR	PROBLEMS	YES//NO	POSSIBLE CAUSES	ACTIONS
AESTHETICS	ARE WEEDS PRESENT?	YES	YOUNG PLANTS HAVE NOT YET COVERED THE GROUND.	REMOVE WEEDS. IRRIGATE IF NECESSARY TO INCREASE VIGOR OF DESIRED SPECIES. REPLACE ANY PLANTS THAT ARE MISSING BECAUSE OF MORTALITY. APPLY A THIN LAYER OF WOOD CHIP MULCH OVER ANY BARE SOIL.
			THERE ARE NEARBY SOURCES OF WEED SEEDS.	REMOVE SEED SOURCES.
		NO		CHECK AGAIN NEXT TIME.
	IS THE PLANTING ATTRACTIVE?	YES		CHECK AGAIN NEXT TIME.
		NO	THE MIX OF SPECIES HAS DEVIATED FROM ORIGINAL DESIGN.	CONTACT DESIGNER TO DEVELOP ENHANCEMENT PLAN. INSTALL RECOMMENDED PLANTINGS.
	IS LITTER PRESENT?	YES		REMOVE LITTER. INVESTIGATE POSSIBLE SOURCES AND REMOVE, OR IMPROVE LITTER COLLECTION PRACTICES.
		NO		CHECK AGAIN NEXT TIME.
LOSS OF SPECIES DIVERSITY	HAS MORTALITY CAUSED THE DISAPPEARANCE OF SPECIES?	YES	THE ADAPTATIONS OF THE PLANT SPECIES DO NOT MATCH THE HYDROLOGY.	CONTACT DESIGNER TO ASSESS HYDROLOGY AND SUITABILITY OF SPECIES. INSTALL RECOMMENDED SPECIES TO FILL GAPS.
		NO		CHECK AGAIN NEXT TIME.
HEALTH OF PLANTS	DO PLANTS EXHIBIT LOW VIGOR?	YES	THE SOIL HAS INADEQUATE NUTRIENTS.	COLLECT AND SUBMIT SOIL SAMPLES FOR ANALYSIS. CORRECT NUTRIENT DEFICIENCIES OR IMBALANCES. BECAUSE RAIN GARDEN PLANTS DO NOT HAVE HIGH NUTRIENT REQUIREMENTS, BE CONSERVATIVE WITH FERTILIZER APPLICATION.
			SOIL pH IS OUT OF THE ACCEPTABLE RANGE.	COLLECT AND SUBMIT SOIL SAMPLES FOR ANALYSIS. CORRECT pH LEVEL USING SULFUR OR GROUND LIMESTONE, AS PRESCRIBED.
			PLANTS ARE NOT ADAPTED TO THE HYDROLOGY OF THE RAIN GARDEN.	CONTACT DESIGNER TO ASSESS HYDROLOGY AND MAKE RECOMMENDATIONS FOR MORE SUITABLE SPECIES. INSTALL RECOMMENDED SPECIES.
			SUBSTANCES TOXIC TO PLANTS HAVE ENTERED THE RAIN GARDEN.	CONTACT DESIGNER TO ASSESS PLANT AND SOIL SYMPTOMS AND DEVELOP STRATEGY FOR ADDRESSING TOXINS.
		NO		CHECK AGAIN NEXT TIME.
	ARE PLANTS OVERLY VIGOROUS OR FALLING OVER?	YES	THE SOIL HAS EXCESSIVE NUTRIENTS.	FERTILIZER SHOULD NEVER BE APPLIED TO A RAIN GARDEN UNLESS THE NEED IS DEMONSTRATED. CHECK THE CONTRIBUTING WATERSHED FOR SOURCES OF EXCESS NUTRIENTS AND REMOVE IF POSSIBLE. ASSESS SPECIES SUITABILITY IN LIGHT OF HIGH NUTRIENT LEVELS.
		NO		CHECK AGAIN NEXT TIME.
	ARE ONE OR MORE SPECIES ENCROACHING ON OTHERS?	YES	CONDITIONS ARE IDEAL FOR THE OVERLY VIGOROUS SPECIES.	IN EARLY SUMMER, CUT STEMS OF THE OVERLY VIGOROUS PLANTS TO THE GROUND WHERE THEY ENCROACH ON NEARBY SPECIES. CONTINUED ISSUES MAY REQUIRE THAT THE EXCESS PLANT CROWNS BE DUG OUT.
			SPECIES THAT ARE BEING CROWDED OUT ARE NOT WELL SUITED TO THE SOIL OR HYDROLOGY.	CONTACT THE DESIGNER TO ASSESS THE SUITABILITY OF THE LOW-VIGOR SPECIES AND MAKE RECOMMENDATIONS.
		NO		CHECK AGAIN NEXT TIME.
BIORETENTION FUNCTION	IS STANDING WATER ABSORBED WITHIN 48 HOURS AFTER A RAIN EVENT?	YES		CHECK AGAIN NEXT TIME.
		NO	OUTLET DRAIN IS BLOCKED.	CLEAR OR UNCLOG DRAIN.
			SOIL IS NOT PERMEABLE ENOUGH.	CONTACT DESIGNER TO ASSESS INFILTRATION RATE AND DEVELOP STRATEGY TO IMPROVE IT.
			EXCESSIVE WATER IS BEING DIRECTED INTO RAIN GARDEN.	CONTACT DESIGNER TO INVESTIGATE WATER FLOW AND DEVELOP PLAN TO MODIFY INLET IF NECESSARY.
	IS BIORETENTION RARELY INUNDATED OR INUNDATED FOR ONLY SHORT PERIODS OF TIME?	YES	INLET IS BLOCKED.	CLEAN DEBRIS FROM INLET.
			ADEQUATE WATER IS NOT FLOWING TOWARDS INLET.	MODIFY THE INLET OR FLOW PATHS OVER CONTRIBUTING IMPERVIOUS SURFACES.
			OUTLET STRUCTURE IS LEAKING BELOW THE RIM.	REPAIR THE OUTLET STRUCTURE.
		NO		CHECK AGAIN NEXT TIME.
	IS EROSION, SEDIMENTATION, OR BARE SOIL PRESENT?	YES	GAPS BETWEEN PLANTS ARE NOT STABILIZED BY ROOTS.	CONTACT DESIGNER TO EVALUATE WHETHER MORE OR ALTERNATIVE SPECIES ARE NECESSARY TO STABILIZE SOIL. INSTALL ADDITIONAL PLANTINGS.
			OTHER INFLOW(S) OF WATER BESIDES THE PLANNED ONE EXPOSES SOIL TO EROSION.	BLOCK THE EXTRA INFLOW OR ARMOR THE ROUTE OF INFLOW WITH STONES TO KEEP SOIL IN PLACE.
			SEDIMENT IS BEING CARRIED WITH RUN-OFF INTO THE RAIN GARDEN.	STABILIZE OR REMOVE SEDIMENT SOURCE. DETERMINE THE CAUSE AND PREVENT IT FROM HAPPENING. REPLACE ANY MISSING PLANTS AS SOON AS POSSIBLE. MULCH WITH A THIN LAYER OF WOOD CHIPS.
		NO		CHECK AGAIN NEXT TIME.
	DOES BIORETENTION VEGETATION ATTRACT BIRDS AND POLLINATORS?	YES		CHECK AGAIN NEXT TIME.
		NO	NOT ENOUGH OF THE RIGHT KINDS OF PLANTS ARE PRESENT.	CONTACT DESIGNER TO INVENTORY SPECIES AND MAKE RECOMMENDATION FOR SUPPLEMENTING WITH ONES THAT ARE MORE BENEFICIAL. INSTALL NEW PLANTS.
			FLOWERS ARE NOT BLOOMING AT THE PROPER TIME TO BENEFIT DESIRED SPECIES.	ADD MORE FUNCTIONAL SPECIES.
ACCUMULATION OF PLANT DEBRIS	IS THERE A SUBSTANTIAL AMOUNT OF DEAD STEMS PRESENT?	YES	THE END OF THE GROWING SEASON RESULTS IN DEAD HERBACEOUS STEMS.	LEAVE STEMS STANDING OVER THE WINTER TO PROVIDE SEEDS AND COVER FOR BIRDS, PROTECTION FOR SOIL. CUT DEAD STEMS TO 6 - 12" ABOVE THE SOIL IN LATE APRIL. REMOVE STEMS FROM RAIN GARDEN.
			SHRUB STEMS LOSE VIGOR WITH AGE.	AFTER SHRUBS HAVE REACHED MATURITY, REJUVENATE BY PERIODICALLY PRUNING AWAY LESS VIGOROUS STEMS, CLEANLY CUTTING AT GROUND LEVEL. RETAIN ADEQUATE TOP GROWTH TO SUPPORT ROOTS.
		NO		CHECK AGAIN NEXT TIME.

BIORETENTION - EROSION PREVENTION AND SEDIMENT CONTROL SEQUENCING

1. INSTALL SILT FENCE AND/OR OTHER APPROPRIATE TEMPORARY SEDIMENT AND EROSION CONTROL DEVICES TO PREVENT SEDIMENT FROM ENTERING THE BIORETENTION DURING CONSTRUCTION.
2. RUNOFF SHALL NOT BE DIRECTED INTO THE BIORETENTION FACILITY UNTIL:
   A. ALL UPGRADIENT CONTRIBUTING AREAS HAVE BEEN PERMANENTLY STABILIZED.
   B. THE BIORETENTION FACILITY IS COMPLETE AND ALL AREAS SUBJECT TO RUNOFF HAVE BEEN PERMANENTLY STABILIZED.
4. REMOVE TEMPORARY EROSION PREVENTION AND SEDIMENT CONTROL DEVICES AFTER THE BIORETENTION IS PLACED ONLINE AND IS RECEIVING RUNOFF.
5. IN THE EVENT THAT SEDIMENT IS INTRODUCED INTO THE BIORETENTION, THE SEDIMENT AND ALL CONTAMINATED MATERIAL (SUCH AS MULCH OR SOIL MIX) SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER.

BIORETENTION - GENERAL CONSTRUCTION SPECIFICATIONS

1. THE BIORETENTION SHALL BE EXCAVATED TO THE DIMENSIONS, SIDE SLOPES, AND ELEVATIONS SHOWN ON THE DRAWINGS. THE METHOD OF EXCAVATION SHALL MINIMIZE THE COMPACTION OF THE SUBGRADE SOIL WITHIN THE FOOTPRINT OF THE BIORETENTION AREA.
2. THE BIORETENTION SOIL MIXTURE SHALL BE PLACED AND GRADED USING LOW GROUND CONTACT PRESSURE EQUIPMENT. TO THE EXTENT POSSIBLE, WORK SHALL BE PERFORMED BY EQUIPMENT OPERATING ON THE ADJACENT SLOPES.
3. ALL WORK RELATED TO PLACEMENT OF MULCH AND PLANT INSTALLATION SHALL BE ACCOMPLISHED WITH METHODS AND EQUIPMENT THAT DO NOT RESULT IN FURTHER COMPACTION OF THE BIORETENTION SOIL MIX.

BIORETENTION - MATERIAL SPECIFICATIONS:

HARDWOOD CHIP MULCH
MULCH SHALL CONSIST OF RAW WOOD MATERIAL FROM ONLY HARDWOOD TIMBER AND SHALL BE A PRODUCT OF A MECHANICAL CHIPPER, HAMMERMILL, OR TUB GRINDER. MULCH CONSISTING OF SOFTWOOD TIMBER, MANUFACTURED BOARDS, AND/OR CHEMICALLY TREATED WOOD IS UNACCEPTABLE. THE MATERIAL SHALL BE UNIFORM IN COLOR AND SUBSTANTIALLY FREE OF MOLD, DIRT, SAWDUST, WEEDS, SEED AND FOREIGN MATERIAL. THE MATERIAL SHALL BE AGED A MINIMUM OF 12 MONTHS, BUT SHALL NOT BE IN AN ADVANCED STATE OF DECOMPOSITION.

THE MULCH MATERIAL, WHEN DRIED, SHALL ALL PASS A FOUR (4) INCH SCREEN AND NOT MORE THAN 20 PERCENT BY MASS SHALL PASS A ONE TENTH (0.1) INCH SCREEN. GRASS CLIPPINGS ARE UNSUITABLE FOR MULCH.

BIORETENTION SOIL MIX
THE BIORETENTION SOIL SHALL CONSIST OF USDA SAND TO LOAMY SAND CLASSIFICATION, OR A WELL BLENDED, HOMOGENOUS MIXTURE OF THE FOLLOWING COMPONENTS:

SAND	85-88%
SILT	8-12%
CLAY	0-2%
*ORGANICS	3-5%

*ORGANICS SHOULD CONSIST OF COMPOST THAT MEETS THE DEFINITION OF "COMPOST" IN THE AGENCY'S SOLID WASTE MANAGEMENT RULES OR THE CONTAINMENT STANDARDS IN THE VERMONT SOLID WASTE MANAGEMENT RULES §6-1104(g)(6-7), §6-1105(e)(8-9), AND §6-1106(e)(7-9).

THE BIORETENTION SOIL MIX SHALL BE FREE OF STONES, STUMPS, OR ROOTS LARGER THAN TWO (2) INCHES IN ANY DIMENSION. THE SOIL MIX SHALL BE FREE OF NOXIOUS WEEDS

EACH BIORETENTION SOIL MIX MATERIAL COMPONENT SHALL HAVE THE FOLLOWING PROPERTIES:

TOPSOIL: SANDY LOAM OR LOAMY SAND TEXTURE PER USDA TEXTURAL TRIANGLE, HAVING LESS THAN 5% CLAY CONTENT.

COMPOST: SHALL BE FREE OF WEED SEEDS AND COMPLY WITH EPA REQUIREMENTS FOR COMPOST. THE COMPOST SHALL HAVE A LOOSE AND GRANULAR TEXTURE. THE COMPOST SHALL POSESS NO OBJECTIONABLE ODORS AND SHALL NOT RESEMBLE THE RAW MATERIAL FROM WHICH IT WAS DERIVED.

BIORETENTION - RECOMMENDED MAINTENANCE SCHEDULE

ACTIVITY	SCHEDULE
• PRUNE OR WEED TO MAINTAIN APPEARANCE	AS NEEDED
• REPLACE MULCH DUE TO EROSION	AS NEEDED
• REMOVE TRASH AND DEBRIS	AS NEEDED
• INSPECT VEGETATED SWALE/FOREBAY/PRETREATMENT FOR EROSION	SEMI-ANNUALLY
• INSPECT SHRUBS AND PERENNIALS, REMOVE DEAD OR DISEASED PLANTS	SEMI-ANNUALLY
• INSPECT AND REMOVE SEDIMENT AND DEBRIS IN PRETREATMENT AREAS	ANNUALLY
• INSPECT INFLOW POINTS AND RAIN GARDEN SURFACES FOR BUILD-UP OF SEDIMENT. REMOVE AND REPAIR AS NECESSARY.	ANNUALLY
• REPLACE MULCH OVER BIORETENTION SURFACE	2-3 YEARS
• REPLACE/CLEAN PRETREATMENT STONE	3-5 YEARS

Date	Revision	By
01-15-19	REV TOPSOIL REF. TO LAWN/NO MOW LAWN PLANTING DETAILS	NDS
08-16-18	REVISED FILTER STRIP DETAIL	NDS

These plans shall only be used for the purpose shown below:

- ☐ Sketch/Concept
- ☐ Preliminary
- ☐ Final Local Review
- ☐ Act 250 Review
- ■ Construction
- ☐ Record Drawing

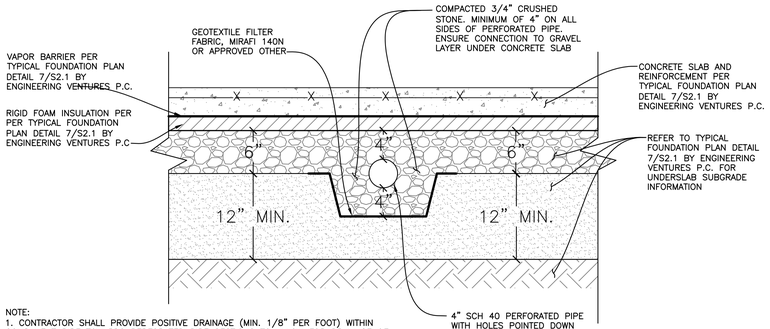
PETRA CLIFFS

75 BRIGGS STREET BURLINGTON, VT 05401

STORMWATER DETAILS

Project No.	17023
Survey	L&D
Design	ABR
Drawn	L&D
Checked	DJG
Date	06-21-18
Scale	AS NOTED
Sheet number	C8

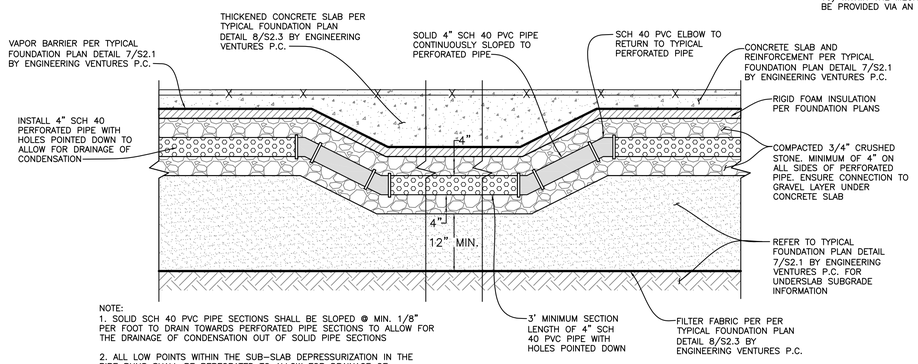
Lamoureux & Dickinson
Consulting Engineers, Inc.
14 Morse Drive, Essex, VT 05452
802-878-4450
www.LDengineering.com



NOTE:
1. CONTRACTOR SHALL PROVIDE POSITIVE DRAINAGE (MIN. 1/8" PER FOOT) WITHIN SOLID VENT PIPE TOWARDS PERFORATED PIPE SECTIONS TO ALLOW FOR DRAINAGE OF CONDENSATION.

2. ALL LOW POINTS IN THE SUBSLAB DEPRESSURIZATION PIPE NETWORK SHALL BE PERFORATED PIPE WITH A MINIMUM 3' LENGTH TO ALLOW FOR DRAINAGE OF CONDENSATION INTO 3/4" CRUSHED STONE

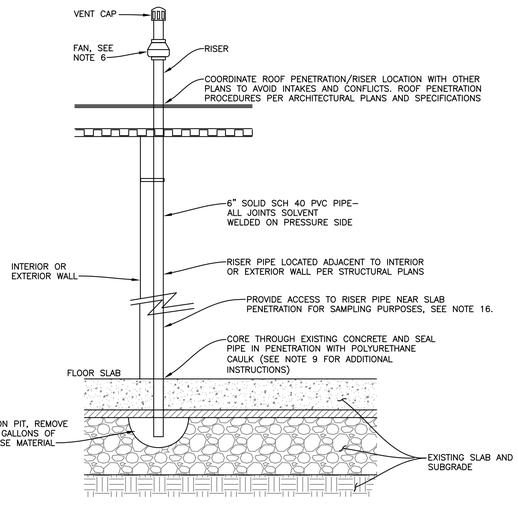
1 ENV.1 — SUB-SLAB PERFORATED PIPE TRENCH TYPICAL SECTION
SCALE: N.T.S.



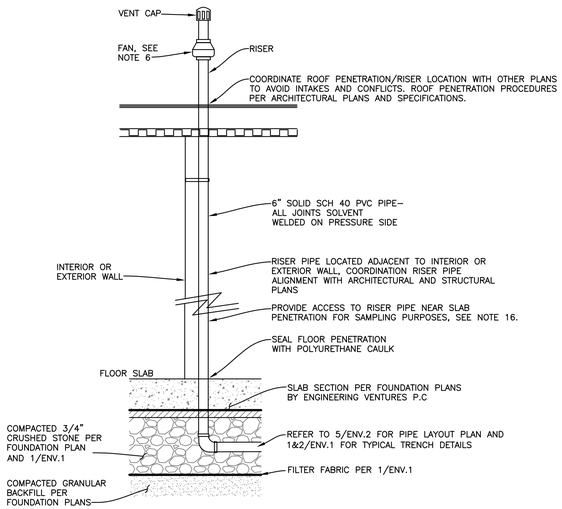
NOTE:
1. SOLID SCH 40 PVC PIPE SECTIONS SHALL BE SLOPED @ MIN. 1/8" PER FOOT TO DRAIN TOWARDS PERFORATED PIPE SECTIONS TO ALLOW FOR THE DRAINAGE OF CONDENSATION OUT OF SOLID PIPE SECTIONS

2. ALL LOW POINTS WITHIN THE SUB-SLAB DEPRESSURIZATION IN THE PIPE RUNS SHALL BE PERFORATED TO ALLOW FOR DRAINAGE OF CONDENSATION.

2 ENV.1 — SUB-SLAB PERFORATED PIPE TRENCH AT THICKENED SLAB SECTION
SCALE: N.T.S.



3 ENV.1 — TYPICAL VENT STACK INSTALLATION TO SUB-SLAB SUCTION PIT (WAREHOUSE)
SCALE: N.T.S.



4 ENV.1 — TYPICAL VENT STACK INSTALLATION TO SUB-SLAB PIPING (PROPOSED CLIMBING CENTER)
SCALE: N.T.S.

ENVIRONMENTAL PLAN NOTES:

1) PLAN SHEET ENV.1 FOR ENVIRONMENTAL COMPONENTS ONLY. SPECIFICALLY, BUILDING PROTECTION PLAN ONLY. REFER TO CONTRACT DOCUMENTS FOR DETAILS REGARDING OTHER BUILDING COMPONENTS.

2) ALL PVC PIPE JOINTS TO BE SOLVENT WELDED.

3) DIMENSIONS ARE APPROXIMATE. CONTRACTOR SHALL VERIFY LOCATIONS IN FIELD.

4) SUBSLAB PIPING SHALL BE COORDINATED WITH FOUNDATION PLANS AND PLUMBING PLANS.

5) ALL CONCRETE SLAB PENETRATIONS SHALL BE COMPLETELY SEALED.

6) THE FAN ASSEMBLY DELINEATED IN DETAIL 3&4/ENV.1 SHALL BE A RADONAWAY RP260 OR EQUIVALENT BLOWER(S) TO ACHIEVE >0.01" WC VACUUM BELOW ALL SLAB LOCATIONS IN AREAS TO BE PROTECTED. ALL OTHER SYSTEM COMPONENTS SHALL BE COMPATIBLE WITH THE FAN.

7) WITH THE FAN INSTALLATION, USE A CHECKPOINT 11A RADON MITIGATION ALARM OR EQUIVALENT. COORDINATE WITH BUILDING OWNER REGARDING THE LOCATION OF THE ALARM.

8) COORDINATE LOCATION OF SUBSLAB PIPING AND RISER PIPING WITH OTHER UTILITIES IN THE BUILDINGS. THE RISER PIPE ALIGNMENT THROUGH THE BUILDING SHALL BE COORDINATED WITH THE STRUCTURAL AND ARCHITECTURAL PLANS.

9) TO DETERMINE THE LOCATION AND NUMBER OF SUCTION PITS IN THE WAREHOUSE BUILDING, THE CONTRACTOR SHALL FIRST COORDINATE WITH THE OWNER ON THE PREFERRED FINAL LOCATION OF TWO SUCTION PITS APPROXIMATELY AS DEPICTED IN 5/ENV.1. THE CONTRACTOR SHALL THEN CREATE ONE SUCTION PIT. KAS, INC. WILL THEN PERFORM DIAGNOSTICS TO DETERMINE THE EFFECTIVENESS OF ONE PIT. THE CONTRACTOR SHALL CONSTRUCT THE SECOND PIT IF DIAGNOSTIC TEST RESULTS DICTATE. KAS, INC. WILL PERFORM ANOTHER DIAGNOSTIC TEST FOLLOWING THE INSTALLATION OF A SECOND SUCTION PIT.

10) IN THE PROPOSED PETRA CLIFFS CLIMBING CENTER BUILDING, COORDINATE THE LOCATION OF THE RISER PIPING THROUGH THE SUBSLAB IN THE MECHANICAL ROOM ON THE SOUTHERN WALL. COORDINATE FINAL RISER LOCATION WITH THE OWNER AND GENERAL CONTRACTOR PRIOR TO CONSTRUCTION.

11) COORDINATE WITH KAS, INC. P.O. BOX 787, WILLISTON, VT 05495 802-383-0486 FOR INTERIM DIAGNOSTIC TESTING DURING CONSTRUCTION (PER NOTE 9) AND FOR FINAL INSPECTION AND TESTING OF THE BUILDING PROTECTION SYSTEM.

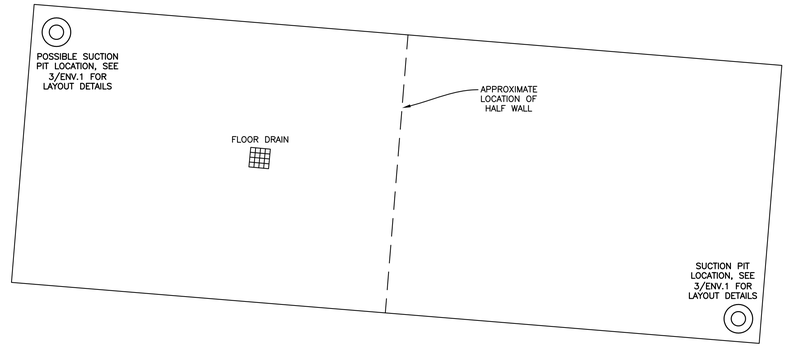
12) LABEL ALL VISIBLE SYSTEM COMPONENT "SOIL GAS MITIGATION" INCLUDING RISER PIPES AND FANS. IN PARTICULAR, THIS SHALL BE DONE AT ANY LOCATION NEAR BUILDING PLUMBING, REST ROOMS, SHOWERS, OR KITCHEN OR WHERE AN ACCIDENTAL SEWER CONNECTION MAY OCCUR.

13) SEAL ALL SLAB OPENINGS WITH POLYURETHANE CAULK, INCLUDING BUT NOT LIMITED TO, CONTROL AND EXPANSION JOINTS, PLUMBING PENETRATIONS, SEWER PENETRATIONS, SUMPS, FLOOR DRAINS, ELECTRICAL PENETRATIONS, ETC. EXPOSE THE ENTIRE WAREHOUSE FLOOR AND SEAL ALL GAPS AND CRACKS THAT ARE OBSERVED. SEAL WITH POLYURETHANE CAULK.

14) SUPPORT ALL RISER PIPING EVERY 6 FEET ON HORIZONTAL RUNS. VERTICAL RUNS SHALL BE SECURED EITHER ABOVE OR BELOW THE POINTS OF PENETRATION THROUGH FLOORS, CEILINGS, AND ROOFS, OR AT LEAST EVERY 8 FEET.

15) OPENINGS, CHANNEL DRAINS, JOINTS (INCLUDING FLOOR-WALL JOINTS) SHALL BE SEALED WITH URETHANE CAULK OR EQUIVALENT MATERIAL FOR ALL PROTECTED AREAS.

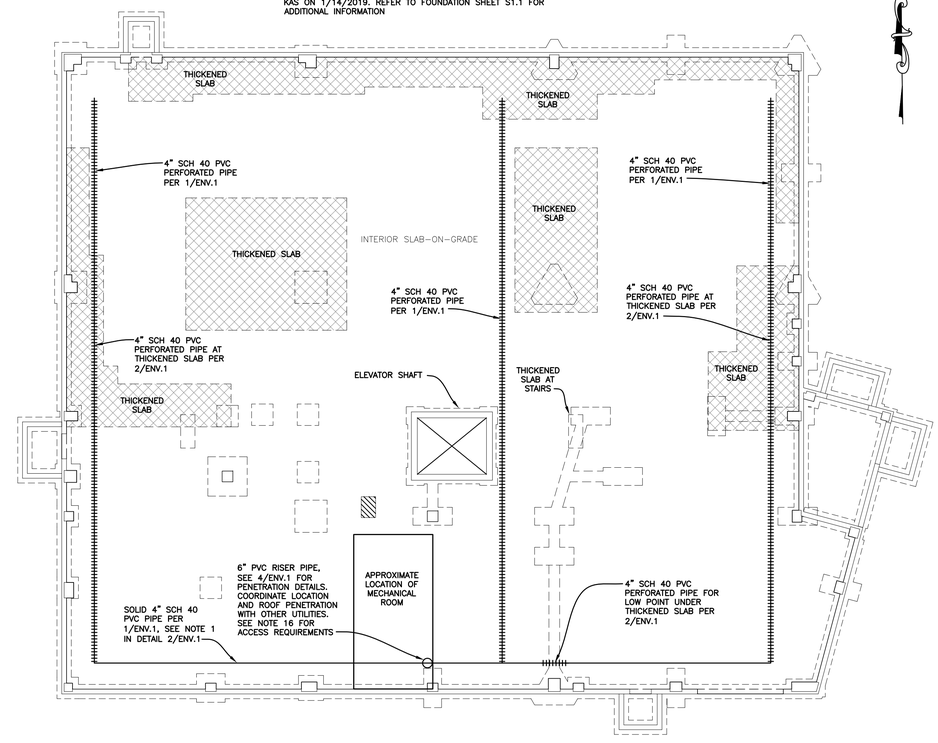
16) WITHIN THE MECHANICAL ROOM OR NEAR THE SLAB PENETRATION, ACCESS TO THE RISER PIPE MUST BE PROVIDED VIA AN ACCESS DOOR OR HAVING THE PIPE EXPOSED FOR SAMPLING PURPOSES.



5 ENV.1 — EXISTING WAREHOUSE SUB-SLAB DEPRESSURIZATION SYSTEM LAYOUT
SCALE: 1"=10'

GRAPHIC SCALE
10' 0 5' 10' 20'
1 INCH = 10 FEET

NOTE: FOUNDATION PLAN PROVIDED BY ENGINEERING VENTURES TO KAS ON 1/14/2019. REFER TO FOUNDATION SHEET S1.1 FOR ADDITIONAL INFORMATION



6 ENV.1 — PROPOSED PETRA CLIFFS CLIMBING CENTER BUILDING SUB-SLAB DEPRESSURIZATION SYSTEM LAYOUT
SCALE: 1"=10'

GRAPHIC SCALE
10' 0 5' 10' 20'
1 INCH = 10 FEET

PRELIMINARY DESIGN PLAN
SUB-SLAB DEPRESSURIATION SYSTEM DESIGN

REVISIONS	BY

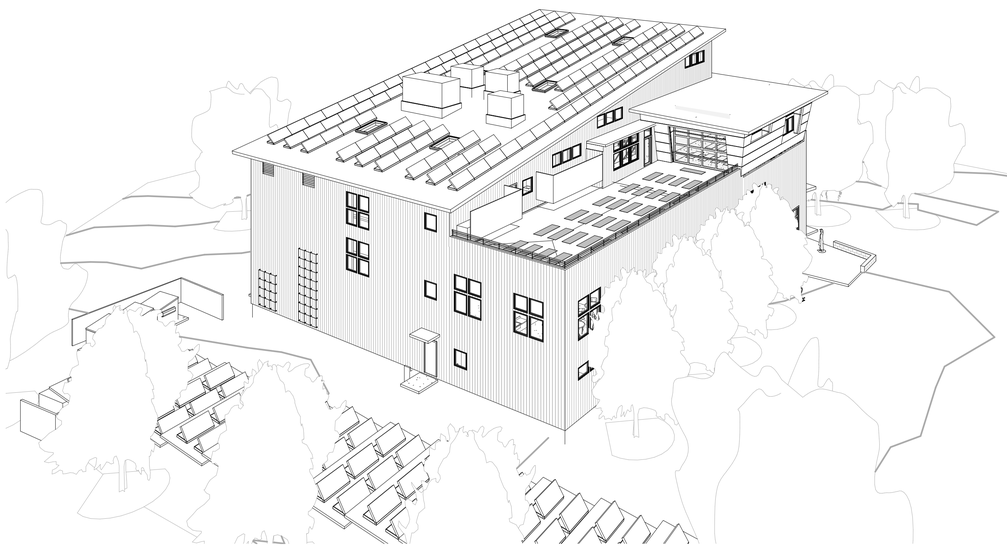
Environmental Science and Engineering
589 Avenue D, Suite 10
PO Box 787
Williston, VT 05495
www.kas-consulting.com
802 383 0486 p
802 383 0490 f

kas

PROPOSED PETRA CLIFFS CLIMBING CENTER
CORRECTIVE ACTION PLAN
SMS #2017-4731
75 BRIGGS STREET
BURLINGTON, VT 05401

DRAWN	TB
CHECKED	ES/SJD
DATE	1/18/19
SCALE	AS NOTED
JOB NO.	510170465
SHEET	

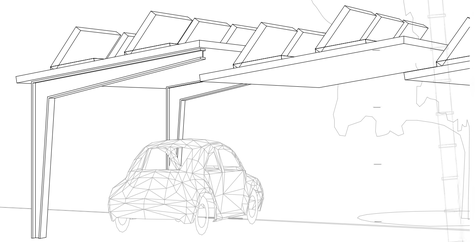
ENV.1



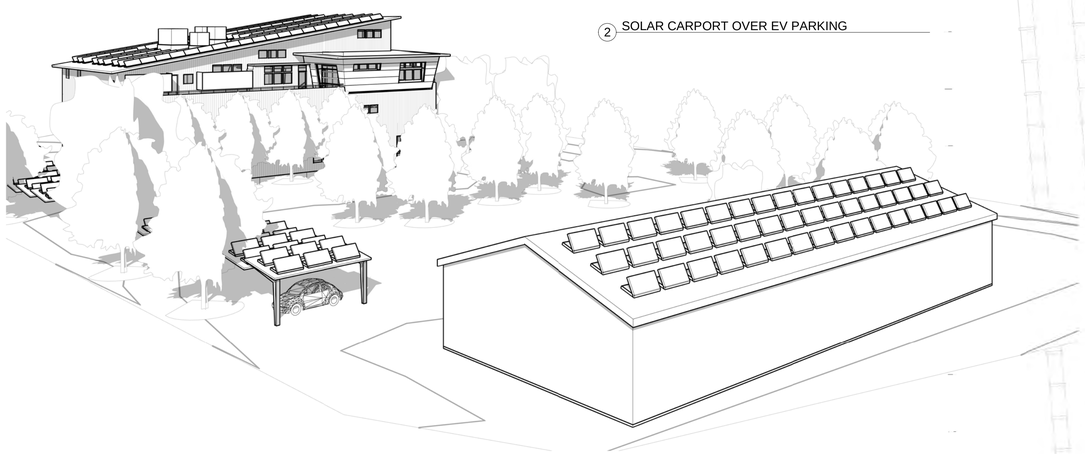
4 BIRDSEYE VIEW- ROOFTOP SOLAR PV

NOTES FOR SOLAR POWER DESIGN:

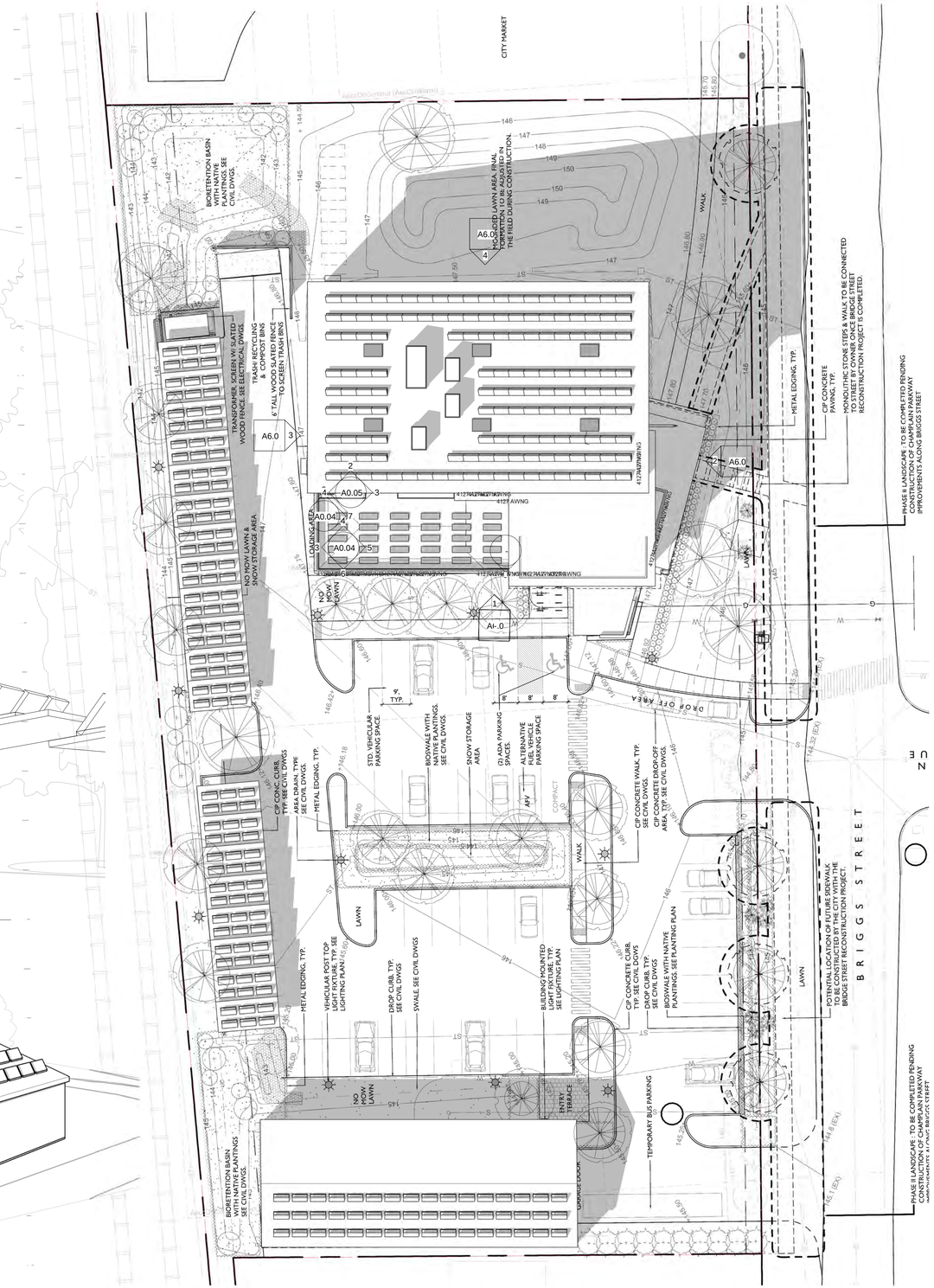
BUILDING ELECTRIC DEMAND:	50 kW	
@ CAPACITY PER PANEL:	335 W	panel
# PANELS TO POWER BUILDING:	150	panels
# PANELS, SPACE ON MAIN ROOFTOP:	150	
# PANELS, SPACE ON WAREHOUSE:	48	
# PANELS, SPACE @ SOLAR CHARGING (6 per):	120	
TOTAL # PANELS	318	
POSSIBLE ON SITE GENERATION:	105 kW array	



2 SOLAR CARPORT OVER EV PARKING



3 BIRDSEYE VIEW- ON-SITE SOLAR PV



1 0- SOLAR PV FEASABILITY STUDY
1" = 20'-0"

studio b
architecture
114 meadow lane
dorset, vermont
802.318.1309
www.studiobvt.com

PETRA CLIFFS CLIMBING CENTER
75 BRIGGS STREET BURLINGTON, VERMONT

CLIENT:
CHAREST ALPINISM LLC

DESIGN PHASE:
PERMIT DRAWINGS

ON-SITE SOLAR POWER CONCEPT

SCALE: As indicated

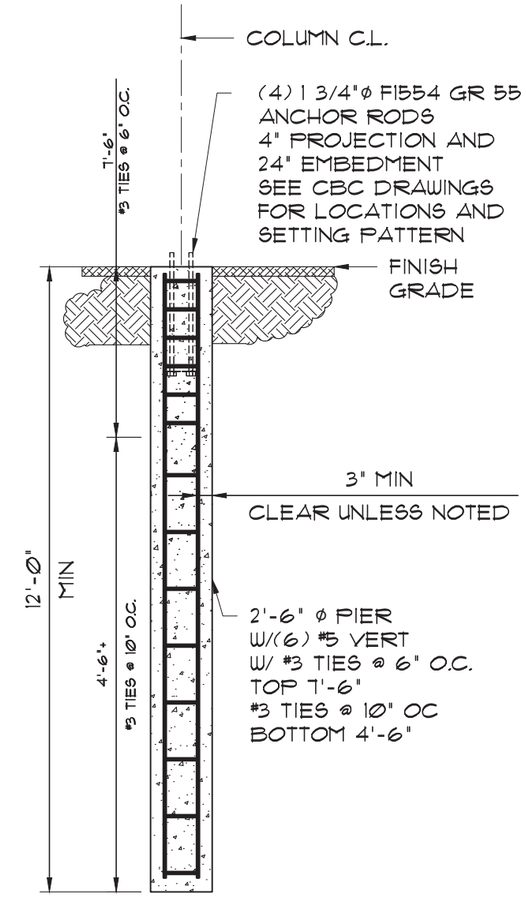
A0.1

DATE: OCT 9, 2018

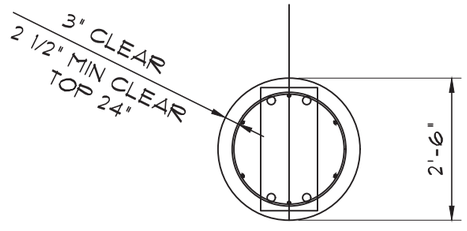
GENERAL FOUNDATION NOTES

1). DRILLED PIERS ARE DESIGNED TO BE PLACED IN MATERIAL WITH A MINIMUM BEARING CAPACITY OF 1500 PSF. MINIMUM LATERAL BEARING CAPACITY OF 297 PSF/FT. UNSUITABLE SOIL SHALL BE UNDERCUT AND REPLACED WITH STRUCTURAL ENGINEERED FILL COMPACTED AS REQUIRED BY THE SOILS ENGINEER TO LIMIT SETTLEMENT TO A MAXIMUM OF 1 INCH. THE BOTTOM OF ALL EXTERIOR FOOTINGS SHALL BE PLACED A MINIMUM OF 2'-6" BELOW THE LOWEST ADJACENT FINISHED GRADE.
2). EXPOSED CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI. ALL OTHER CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI. CONCRETE MIX SHALL BE DESIGNED USING EITHER TYPE II CEMENT. MAXIMUM WATER CEMENT RATIO SHALL BE 0.51 FOR NONAIR-ENTRAINED AND 0.40 FOR AIR-ENTRAINED 3000 PSI CONCRETE.
3). REINFORCING SHALL CONFORM TO ASTM A615 GRADE 60.
ALL REINFORCING SIZE #3 REBAR AND SMALLER SHALL HAVE 60 KSI MIN. YIELD.
ALL REINFORCING SIZE #4 REBAR AND LARGER SHALL HAVE 60 KSI MIN. YIELD.
WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A1064.
4). PROVIDE ONE (1) INCH CHAMFER ON ALL EXPOSED CONCRETE EDGES.
5). CONCRETE WHICH IS EXPOSED TO WEATHER SHALL BE AIR ENTRAINED TO PROVIDE AN AIR CONTIENT BETWEEN 5% AND 6%.
6). REINFORCEMENT LAP SPLICES SHALL BE 36" UNLESS OTHERWISE INDICATED.
7). PROVIDE THREE (3) INCHES OF CONCRETE COVER OVER REINFORCEMENT WHERE CONCRETE IS PLACED ON GROUND. PROVIDE 2" OF COVER ELSEWHERE UNLESS OTHERWISE SHOWN.
8). CONCRETE WORK SHALL CONFORM TO APPLICABLE PROVISIONS OF ACI 318 AND ACI 301.
9). PLASTIC USED AS A VAPOR RETARDER/BARRIER SHALL COMPLY WITH ASTM E1745. PLASTIC INSTALLATION SHALL COMPLY WITH ASTM E1643.
10). THE TOP OF THE FOUNDATION SHALL BE SQUARE, LEVEL, AND SMOOTH WITH ANCHOR RODS ACCURATELY SET.
11). ANY BACKFILL AS REQUIRED SHALL BE FREE DRAINING GRANUALAR MATERIALS.
12). CONTRACTOR SHALL "PROOF ROLL" NATURAL SOIL AND/OR COMPACTED FILL BASE FOR SLAB, PRIOR TO POURING, WITH A LOADED DUMP TRUCK MAKING SUFFICENT PASSES TO ASCERTAIN THAT THE ENTIRE SLAB AREA DOES NOT "PUMP". IF "PUMP" OCCURS, CUT OUT EXISTING SOIL/FILL AS REQUIRED AND FILL WITH APPROVED FILL MATERIAL, THEN "PROOF ROLL" AREA AGAIN.
13). ANCHOR ROD DESIGN IS BASED UPON THE USE OF 3000 PSI CONCRETE, F1554 GRADE 55 STEEL, AND ANCHOR ROD (BOLT) QUANTITIES AND REACTIONS PROVIDED BY THE METAL BUILDING MANUFACTURER.
ANCHOR RODS ARE TO BE GALVANIZED.
14). ALL FOOTINGS SHALL EXTEND BELOW LOCAL FROST ZONE AND A MINIMUM OF 12" INTO NATURAL SOIL OR PROPERLY COMPACTED FILL.
15). ALL FOOTINGS AND SLAB ARE TO BE TREATED WITH A TERMITE CONTROL PESTICIDE.
16). SEE CBC STEEL BUILDINGS DRAWINGS FOR THEIR JOB C18C0341 DRAWINGS DATED 09/27/18 FOR BUILDING REACTIONS AND COLUMN ANCHORAGE.
17). SOILS ALLOWABLES ARE TAKEN FROM SOILS REPORT BY MATERIALS TESTING & INSPECTION THEIR REPORT B181224 DATED AUGUST 13, 2018

BUILDING CODE: 2015 INTERNATIONAL BUILDING CODE



SECTION A
FOOTING TYPE A
NTS



PLAN VIEW
3/8" = 1'-Ø"

REGISTERED PROFESSIONAL ENGINEER 3560 STATE OF IDAHO J. WALTER LEWIS

10/10/18

CUSTOMER: US SOLAR
PROJECT: ROCKET EXPRESS CAR WASH NO. 3
LOCATION: 1717 WEST ISLAND GREEN DRIVE MERIDIAN, ID

J. WALTER LEWIS, P.E.
CONSULTING ENGINEER
113 STONECREST AVE
WAYNESBORO, VA 22980-9646
PH: (239) 565-7849
FAX: (239) 481-6124
WALTLEWISPE@GMAIL.COM

ENGINEER'S SEAL

REV	DESCRIPTION	BY	DATE
0	PERMIT/APPROVAL	WL	10/10/18

DRN.BY: WL DATE: 10/10/18
CKD.BY: JWL DATE: 10/10/18
JOB NO.: 18184
DRAWING TITLE: FOUNDATION DETAILS
DRAWING NUMBER: F1 OF 2

Appendix B

Adjacent Property Owner Information & Public Notice Form

Adjacent Property Owners

Direction / Description	Parcel Number & Address	Property Owner Contact Information
East / Vacant lots	0572-2-063-000 0 Ferguson Avenue 0572-2-086-000 0 Briggs Street	City of Burlington – Assessor's Office 149 Church Street, Room 17 Burlington, Vermont 05401 802-865-7114
North / City Market South End (Grocery Store)	0572-2-122-000 207 Flynn Avenue	Onion River Cooperative Inc. John Tashiro, General Manager 82 South Winooski Avenue, Burlington, Vermont 05401 802-540-6400
South / Residence	0572-2-121-000 97 Briggs Street	Andre A. Boisvert, Marie C. Boisvert 97 Briggs Street Burlington, Vermont 05401
West / Railway Right of Way	0 Flynn Avenue	State of Vermont Building & General Services Department Christopher Cole, Commissioner 2 Governor Aiken Avenue Montpelier, Vermont 05663-5801 802-828-3519

Notes:

- Information obtained from: 1) Burlington, VT Tax Parcel Maps (https://www.burlingtonvt.gov/Assessor/Tax-Parcel-Maps); 2) Burlington, VT Land Records (https://www.burlingtonvt.gov/CT/Land-Records); and 3) Burlington, VT Property Database (https://property.burlingtonvt.gov/).
- Refer to the Plat of Subdivision City Market South End (Appendix A) for the adjacent parcels identified above.

VERMONT

State of Vermont
Department of Environmental Conservation
Waste Management & Prevention Division
Davis Building - 1st Floor, One National Life Drive
Montpelier, VT 05620-3704

OFFICIAL NOTICE

Dear _____,

This is an official notice that a draft Corrective Action Plan (CAP) has been prepared by KAS, Inc. on behalf of Petra Cliffs for the future Petra Cliffs site. Vermont law requires that adjoining and/or impacted property owners receive notice of this CAP, as well as being provided a 30 day public comment period.

The CAP approval process includes a public comment period and an opportunity to request a public meeting. Note that in order to appeal a final CAP approval, comments must be submitted during the public comment period.

To view the draft CAP, please visit the Environmental Notice Bulletin (ENB) at ENB.VERMONT.GOV, and enter the site number: 20174731 in the "Permit #" space. Do not include spaces or dashes.

For further information, please visit the following website:
DEC.VERMONT.GOV/PERMITS/ENB/GENERAL.

FOR QUESTIONS CONTACT:
Waste Management & Prevention Division, Sites Management Section (SMS)
SMS Site Manager: Sarah Bartlett
SMS Site Manager email address: Sarah.Bartlett@vermont.gov
(802) 828-1138

SITE NUMBER

2017-4731

NAME OF POTENTIALLY RESPONSIBLE PARTY

Petra Cliffs

LOCATION OF CORRECTIVE ACTION STREET ADDRESS/ROUTE

75 Briggs Street

TOWN(S) WHERE PROPOSED CORRECTIVE ACTION WILL TAKE PLACE

Burlington, Chittenden County

Appendix C

Contaminant Summary Tables

Summary of Soil Analytical Data
Petra Cliffs
Burlington, Vermont

Soil Boring ID (depth in feet):	DW-1	SB6-6-9 (6-9')	SB5-3-6 (3-6')	SB1-3-6 (3-6')	SB4-0-3 (0-3')	SB2-3-6 (3-6')	SB3-3-6 (3-6')	Duplicate (SB2-3-6 (3-6'))	EPA Regional Screening Levels		VTDEC I-Rule Screening Levels (Residential)	VTDEC I-Rule Background Soil Concentrations	
Sample Date:	7/13/18	7/13/18	7/13/18	7/13/18	7/13/18	7/13/18	7/13/18	7/13/18	Residential	Industrial		Rural	Urban
VOCs (mg/kg)													
Dichlorodifluoromethane	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	87	370	-	-	-
Chloromethane	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	110	460	-	-	-
Vinyl chloride	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.059	1.7	-	-	-
Bromomethane	< 0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	6.8	30	-	-	-
Chloroethane	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	14,000	57,000	-	-	-
Trichlorofluoromethane	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	23,000	350,000	-	-	-
Diethyl Ether	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	16,000	230,000	-	-	-
Acetone	< 3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	670,000	39,900	-	-
1,1-Dichloroethene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	230	1,000	-	-	-
Methylene chloride	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	57	1,000	-	-	-
Carbon disulfide	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	770	3,500	-	-	-
Methyl-t-butyl ether(MTBE)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	47	210	-	-	-
trans-1,2-Dichloroethene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	23,000	1,460	-	-
1,1-Dichloroethane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	3.6	16	-	-	-
2,2-Dichloropropane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	-	-	-	-
cis-1,2-Dichloroethene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	2,300	146	-	-
2-Butanone(MEK)	< 0.7	< 0.5	< 0.5	< 0.6	< 0.5	< 0.6	< 0.5	< 0.5	-	190,000	26,000	-	-
Bromochloromethane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	630	129	-	-
Tetrahydrofuran(THF)	< 0.7	< 0.5	< 0.5	< 0.6	< 0.5	< 0.6	< 0.5	< 0.5	18,000	94,000	-	-	-
Chloroform	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	0.32	1.4	-	-	-
1,1,1-Trichloroethane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	8,100	36,000	-	-	-
Carbon tetrachloride	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	2.9	0.247	-	-
1,1-Dichloropropene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	-	-	-	-
Benzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	5.1	0.442	-	-
1,2-Dichloroethane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	2.0	0.175	-	-
Trichloroethene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	6.0	0.442	-	-
1,2-Dichloropropane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	2.5	11	-	-	-
Dibromomethane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	24	99	-	-	-
Bromodichloromethane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	0.29	1.3	-	-	-
4-Methyl-2-pentanone(MIBK)	< 0.7	< 0.5	< 0.5	< 0.6	< 0.5	< 0.6	< 0.5	< 0.5	33,000	140,000	-	-	-
cis-1,3-Dichloropropene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	1.8	8.2	-	-	-
Toluene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	47,000	4,640	-	-
trans-1,3-Dichloropropene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	1.8	8.2	-	-	-
1,1,2-Trichloroethane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	1.1	5.0	-	-	-
2-Hexanone	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	200	1,300	-	-	-
Tetrachloroethene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	100	1.46	-	-
1,3-Dichloropropane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	1,600	23,000	-	-	-
Dibromochloromethane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	8.3	39	-	-	-
1,2-Dibromoethane(EDB)	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	0.036	0.16	-	-	-
Chlorobenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	1,300	273	-	-
1,1,1,2-Tetrachloroethane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	2.0	8.8	-	-	-
Ethylbenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	25	2.21	-	-
mp-Xylene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	2,400	575	-	-
o-Xylene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	2,800		-	-
Styrene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	6,000	35,000	-	-	-
Bromoform	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	19	86	-	-	-
IsoPropylbenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	1,900	9,900	-	-	-
Bromobenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	290	1,800	-	-	-
1,1,2,2-Tetrachloroethane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	0.6	2.7	-	-	-
1,2,3-Trichloropropane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	0.11	0.00324	-	-
n-Propylbenzene	< 0.07	0.060	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	3,800	24,000	-	-	-
2-Chlorotoluene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	1,600	23,000	-	-	-
4-Chlorotoluene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	1,600	23,000	-	-	-
tert-Butylbenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	7,800	120,000	-	-	-
1,3,5-Trimethylbenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	1,500	264	-	-
1,2,4-Trimethylbenzene	< 0.07	**0.064**	< 0.05	**0.080**	< 0.05	< 0.06	< 0.05	< 0.05	-	1,800		-	-
sec-Butylbenzene	< 0.07	**0.13**	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	7,800	120,000	-	-	-
1,3-Dichlorobenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	-	-	-	-
p-Isopropyltoluene	< 0.07	**0.19**	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	-	-	-	-
1,4-Dichlorobenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	2.6	11	-	-	-
1,2-Dichlorobenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	1,800	9,300	-	-	-
n-Butylbenzene	< 0.07	0.14	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	3,900	58,000	-	-	-
1,2-Dibromo-3-chloropropane	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	-	0.064	0.00327	-	-
1,2,4-Trichlorobenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	24	11	-	-	-
Hexachlorobutadiene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	1.2	5.3	-	-	-
Naphthalene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	17	1.42	-	-
1,2,3-Trichlorobenzene	< 0.07	< 0.05	< 0.05	< 0.06	< 0.05	< 0.06	< 0.05	< 0.05	63	930	-	-	-
CVOCs/PAHs (mg/kg)													
alpha-Terpineol	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	-	-	-	-	-
Phenol	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	19,000	250,000	-	-	-
2-Chlorophenol	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	390	5,800	-	-	-
2,4-Dichlorophenol	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	190	2,500	-	-	-
2,4,5-Trichlorophenol	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	6,300	82,000	-	-	-
2,4,6-Trichlorophenol	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	49	210	-	-	-
Pentachlorophenol	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	-	4.0	0.504	-	-
2-Nitrophenol	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	-	-	-	-	-
4-Nitrophenol	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	-	-	-	-	-
2,4-Dinitrophenol	< 0.9	< 0.8	< 0.9	< 0.9	< 0.8	< 0.9	< 0.8	< 0.8	130	1,600	-	-	-
2-Methylphenol	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	3,200	41,000	-	-	-
3/4-Methylphenol	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	-	-	-	-	-
2,4-Dimethylphenol	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	1,300	16,000	-	-	-
4-Chloro-3-methylphenol	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	6,300	82,000	-	-	-
4,6-Dinitro-2-methylphenol	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	5.1	66	-	-	-
Benzoic Acid	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	250,000	3,300,000	-	-	-
N-Nitrosodimethylamine	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	2.0E-03	3.4E-02	-	-	-
n-Nitroso-di-n-propylamine	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	7.8E-02	3.3E-01	-	-	-
n-Nitrosodiphenylamine	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	110	470	-	-	-
bis(2-Chloroethyl)ether	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	2.3E-01	1.0	-	-	-
bis(2-chloroisopropyl)ether	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	-	47,000	2,920	-	-
bis(2-Chloroethoxy)methane	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	190	2,500	-	-	-
1,3-Dichlorobenzene	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	-	-	-	-	-
Acetophenone	< 0.9	< 0.8	< 0.9	< 0.9	< 0.8	< 0.9	< 0.8	< 0.8	7,800	120,000	-	-	-
1,4-Dichlorobenzene	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	2.6	11	-	-	-
1,2-Dichlorobenzene	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	1,800	9,300	-	-	-
1,2,4-Trichlorobenzene	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	24	110	-	-	-
2-Chloronaphthalene	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	4,800	60,000	-	-	-
4-Chlorophenyl-phenylether	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	-	-	-	-	-
4-Bromophenyl-phenylether	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	-	-	-	-	-
Hexachloroethane	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	1.8	8.0	-	-	-
Hexachlorobutadiene	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	1.2	5.3	-	-	-
Hexachlorocyclopentadiene	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	1.8	7.5	-	-	-
Hexachlorobenzene	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	-	0.96	0.0918	-	-
4-Chloroaniline	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	2.7	11	-	-	-
2,3-Dichloroaniline	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	-	-	-	-	-
2-Nitroaniline	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	630	8,000	-	-	-
3-Nitroaniline	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	-	-	-	-	-
4-Nitroaniline	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	27	110	-	-	-
Aniline	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	95	400	-	-	-
Benzyl alcohol	< 0.9	< 0.8	< 0.9	< 0.9	< 0.8	< 0.9	< 0.8	< 0.8	6,300	82,000	-	-	-
Nitrobenzene	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	5.1	22	-	-	-
Isophorone	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	570	2400	-	-	-
2,4-Dinitrotoluene	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	1.7	7.4	-	-	-
2,6-Dinitrotoluene	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	0.36	1.5	-	-	-
Benzidine (estimated)	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	5.3E-04	1.0E-02	-	-	-
3,3'-Dichlorobenzidine	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	1.2	5.1	-	-	-
Pyridine	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	78	1,200	-	-	-
Azobenzene	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	5.6	26	-	-	-
Carbazole	< 0.09	< 0.08	< 0.09	< 0.09	0.42	< 0.09	< 0.08	< 0.08	-	-	-	-	-
Dimethylphthalate	< 0.09	< 0.08	< 0.09	< 0.09	< 0.08	< 0.09	< 0.08	< 0.08	-	-	-	-	-
Diethylphthalate	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	51,000	660,000	-	-	-
Di-n-butylphthalate	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	**0.49**	< 0.4	< 0.4	6,300	82,000	-	-	-
Butylbenzylphthalate	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	290	1,200	-	-	-
bis(2-Ethylhexyl)phthalate	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	-	160	20.7	-	-
Di-n-octylphthalate	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	630	8,200	-	-	-
Dibenzofuran	< 0.09	< 0.08	< 0.09	< 0.09	**0.19**	< 0.09	< 0.08	< 0.08	73	1,000	-	-	-
Naphthalene	**0.024**	< 0.008	< 0.009	< 0.009	**0.11**	**0.013**	**0.0082**	**0.018**	-	17	1.42	-	-
2-Methylnaphthalene	**0.015**	**0.013**	< 0.009	**0.011**	**0.13**	< 0.009	< 0.008	< 0.008	240	3,000	-	-	-
1-Methylnaphthalene	**0.011**	**0.016**	< 0.009	**0.0093**	**0.12**	< 0.009	< 0.008	< 0.008	18	73	-	-	-
Acenaphthylene	< 0.009	**0.019**	< 0.009	< 0.009	**0.18**	< 0.009	**0.0082**	**0.022**	-	-	-	-	-
Acenaphthene	**0.028**	**0.015**	< 0.009	< 0.009	**0.29**	< 0.009	< 0.008	< 0.008	3,600	45,000	-	-	-
Fluorene	**0.031**	**0.050**	< 0.009	< 0.009	**0.24**	< 0.009	< 0.008	**0.011**	2,400	30,000	-	-	-
Phenanthrene	**0.32**	**0.17**	**0.018**	**0.019**	**2.7**	**0.043**	**0.054**	**0.14**	-	-	-	-	-
Anthracene	**0.061**	**0.022**	< 0.009	< 0.009	**0.70**	< 0.009	**0.012**	**0.041**	18,000	230,000	-	-	-
Fluoranthene	**0.33**	**0.049**	**0.015**	< 0.009	**3.6**	**0.049**	**0.11**	**0.31**	2,400	30,000	-	-	-
Pyrene	**0.29**	**0.051**	**0.012**	< 0.009	**3.3**	**0.041**	**0.096**	**0.27**	1,800	23,000	-	-	-
Benzo(a)anthracene	**0.12**	**0.023**	**0.0093**	< 0.009	**2.0**	**0.018**	**0.050**	**0.13**	1.1	21	-	-	-
Chrysene	**0.13**	**0.027**	< 0.009	< 0.009	**2.6**	**0.025**	**0.057**	**0.14**	110	2,100	-	-	-
Benzo(b)fluoranthene	**0.13**	**0.034**	**0.012**	< 0.009	**2.6**	**0.029**	**0.072**	**0.17**	1.1	21	-	-	-
Benzo(k)fluoranthene	**0.048**	**0.011**	< 0.009	< 0.009	**0.98**	**0.0098**	**0.025**	**0.062**	11	210	-	-	-
Benzo(a)pyrene	**0.11**	**0.023**	< 0.009	< 0.009	**1.8**	**0.022**	**0.052**	**0.14**	-	-	0.076/1.54[1]	-	-
Indeno(1,2,3-cd)pyrene	**0.076**	**0.023**	**0.014**	< 0.009	**1.1**	**0.021**	**0.051**	**0.13**	1.1	21	-	-	-
Dibenzo(a,h)anthracene	**0.018**	**< 0.008**	< 0.009	< 0.009	**0.27**	< 0.009	**0.011**	**0.026**	0.11	2.1	-	-	-
Benzo(g,h,i)perylene	**0.068**	**0.023**	< 0.009	< 0.009	**0.82**	**0.022**	**0.049**	**0.13**	-	-	-	-	-
TEQ as Benzo(a)pyrene*	**0.16**	**0.031**	**0.0035**	ND	**2.65**	**0.029**	**0.081**	**0.21**	-	-	-	0.026	0.58

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Summary of Soil Analytical Data
Petra Cliffs
Burlington, Vermont

Soil Boring ID (depth in feet):	DW-1	SB6-6-9 (6-9')	SB5-3-6 (3-6')	SB1-3-6 (3-6')	SB4-0-3 (0-3')	SB2-3-6 (3-6')	SB3-3-6 (3-6')	Duplicate (SB2-3-6 (3-6'))	EPA Regional Screening Levels		VTDEC I-Rule Screening Levels (Residential)	VTDEC I-Rule Background Soil Concentrations	
Sample Date:	7/13/18	7/13/18	7/13/18	7/13/18	7/13/18	7/13/18	7/13/18	7/13/18	Residential	Industrial		Rural	Urban
PRIORITY POLLUTANT METALS (mg/kg)													
Total Antimony	< 0.5	< 0.5	< 0.5	< 0.5	**1.0**	< 0.5	< 0.5	**0.71**	-	470	27.1	-	-
Total Arsenic	**5.6**	**4.7**	**7.5**	**7.5**	**9.5**	**7.3**	**7.0**	**5.5**	-	-	-	16	
Total Beryllium	**1.7**	0.89	**1.9**	**1.6**	**0.63**	**1.5**	< 0.5	< 0.5	-	2,300	36.0	-	-
Total Cadmium	< 0.5	< 0.5	**0.62**	< 0.5	**0.85**	< 0.5	< 0.5	< 0.5	-	980	7.15	-	-
Total Chromium	**71**	**33**	**59**	**78**	**46**	**80**	**25**	**26**	-	-	-	-	-
Total Copper	**33**	**25**	**17**	**37**	**25**	**34**	**22**	**20**	3,100	47,000	-	-	-
Total Lead	**12**	**23**	**26**	**30**	**750**	**18**	**86**	**76**	400	800	-	-	-
Total Mercury	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**0.10**	-	46	10.9	-	-
Total Nickel	**53**	**30**	**51**	**56**	**25**	**56**	**23**	**21**	-	22,000	980	-	-
Total Selenium	**2.6**	1.9	**3.9**	**1.9**	**0.8**	**3.0**	**1.8**	**1.1**	-	5,800	382	-	-
Total Silver	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	5,800	247	-	-
Total Thallium	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**0.52**	< 0.5	< 0.5	-	12	0.764	-	-
Total Zinc	**98**	**77**	**150**	**130**	**220**	**110**	**92**	**94**	-	350,000	22,900	-	-
TPH (mg/kg)													
C9-C40	< 100	**110**	< 30	**170**	**110**	< 100	< 20	**24**	82 to 230,000	420 to 3,500,000	-	-	-
PCBs (mg/kg)													
PCB-1016	< 0.02	-	-	-	-	-	-	-	4.1	27	-	-	-
PCB-1221	< 0.02	-	-	-	-	-	-	-	0.20	0.83	-	-	-
PCB-1232	< 0.02	-	-	-	-	-	-	-	0.17	0.72	-	-	-
PCB-1242	< 0.02	-	-	-	-	-	-	-	0.23	0.95	-	-	-
PCB-1248	< 0.02	-	-	-	-	-	-	-	0.23	0.95	-	-	-
PCB-1254	< 0.02	-	-	-	-	-	-	-	-	0.97	0.120	-	-
PCB-1260	< 0.02	-	-	-	-	-	-	-	0.24	0.99	-	-	-
PCB-1262	< 0.02	-	-	-	-	-	-	-	-	-	-	-	-
PCB-1268	< 0.02	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides (mg/kg)													
Aldrin	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	-	0.18	0.0202	-	-
alpha-BHC	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	0.086	0.36	-	-	-
beta-BHC	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	0.3	1.3	-	-	-
Lindane(gamma-BHC)	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	0.57	2.5	-	-	-
delta-BHC	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	-	-	-	-	-
Chlordane	< 0.03	< 0.02	< 0.03	< 0.03	< 0.02	< 0.03	< 0.02	< 0.02	-	-	-	-	-
4,4'-DDT	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	1.9	8.5	-	-	-
4,4'-DDE	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	2.0	9.3	-	-	-
4,4'-DDD	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	1.9	9.6	-	-	-
Dieldrin	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	0.034	0.14	-	-	-
Endosulfan I	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	-	-	-	-	-
Endosulfan II	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	-	-	-	-	-
Endosulfan Sulfate	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	-	-	-	-	-
Endrin	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	-	-	-	-	-
Endrin Aldehyde	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	19	250	-	-	-
Endrin Ketone	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	-	-	-	-	-
Heptachlor	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	0.13	0.63	-	-	-
Heptachlor Epoxide	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	0.070	0.33	-	-	-
Methoxychlor	< 0.006	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007	< 0.006	< 0.006	320	4,100	-	-	-
Toxaphene	< 0.06	< 0.06	< 0.07	< 0.07	< 0.06	< 0.07	< 0.06	< 0.06	0.49	2.1	-	-	-
Herbicides (mg/kg)													
2,4,5-T	< 100	< 98	< 110	< 110	< 90	< 110	< 97	< 93	630	8,200	-	-	-
2,4,5-TP (Silvex)	< 100	< 98	< 110	< 110	< 90	< 110	< 97	< 93	510	6600	-	-	-
2,4-D	< 210	< 200	< 220	< 220	< 180	< 220	< 190	< 190	700	9600	-	-	-
2,4-DB	< 1000	< 980	< 1100	< 1100	< 900	< 1100	< 970	< 930	510	6600	-	-	-
Dalapon	< 100	< 98	< 110	< 110	< 90	< 110	< 97	< 93	1900	25000	-	-	-
Dicamba	< 100	< 98	< 110	< 110	< 90	< 110	< 97	< 93	1900	25000	-	-	-
Dichloroprop	< 160	< 150	< 160	< 160	< 140	< 160	< 150	< 140	-	-	-	-	-
Dinoseb	< 100	< 98	< 110	< 110	< 90	< 110	< 97	< 93	63	820	-	-	-
MCPA	< 31000	< 29000	< 33000	< 32000	< 27000	< 32000	< 29000	< 28000	32	410	-	-	-
MCPP	< 31000	< 29000	< 33000	< 32000	< 27000	< 32000	< 29000	< 28000	-	-	-	-	-
pH													
pH	7.69	8.03	7.04	8.24	7.56	7.40	8.07	8.09	-	-	-	-	-

NOTES:

All values reported in mg/kg, dry, unless otherwise indicated.

EPA = Environmental Protection Agency; Screening Levels from May 2018 EPA Regional Screening Level Summary Table

VTDEC = Vermont Department of Environmental Conservation

I-Rule = Investigation and Remediation of Contaminated Properties Rule (July 27, 2017)

<xx = Not Detected< Detection Limit; ND = Not Detected

Results reported above detection limits are indicated in bold

Detection limits and reported concentrations at or above the the applicable screening level (e.g., residential/urban) are shaded

"-" indicates not analyzed or that a screening level is not provided in the I-Rule/EPA

[†] Includes residential and industrial benzo(a)pryrene soil screening values

* Total Equivalent Quotient (TEQ) calculated per method for Polyaromatic Hydrocarbons as defined by Florida Department of Environmental Protection in their "Dose Additivity Guidance", August 3, 2016.

Summary of Soil Vapor Analytical Data
Petra Cliffs
Burlington, Vermont

Soil Vapor ID:	SSD-1	OUT-1	VTDEC I-Rule Vapor Intrusion Screening Value Sub-Slab Soil Gas	
Sample Date:	5/15/18	5/15/18	Residential	Industrial
VOCs (ug/m^3)				
Acetone	<0.82	**10**	1,100,000	4,500,000
Acetonitrile	<0.58	0.58	2,100	8,800
Acrylonitrile	<0.75	0.75	1.4	6
3-Chloropropene(Allyl chloride)	<1.1	1.1	-	-
Benzene	<1.1	1.1	4.3	35
Benzyl chloride	<1.8	1.8	1.9	8.3
Bromodichloromethane	<2.3	2.3	2.5	11
Bromoethane(Ethyl bromide)	<1.5	1.5	-	-
Bromoethene(Vinyl bromide)	<1.5	1.5	2.9	13
Bromoform	<3.6	3.6	85	370
Bromomethane	<1.3	1.3	170	730
1,3-Butadiene	<0.76	0.76	-	-
n-Butane	<0.82	**1.0**	-	-
Chlorobenzene	<1.6	<1.6	1,700	7,300
Chloroethane	<0.91	<0.91	-	-
Chloroform	<1.7	<1.7	4.1	18
Chloromethane	<0.71	**1.2**	3,100	13,000
Carbon disulfide	<1.1	<1.1	24,000	100,000
Carbon tetrachloride	<2.2	<2.2	16	68
2-Chlorotoluene	<1.8	<1.8	-	-
Cyclohexane	<1.2	<1.2	210,000	880,000
Dibromochloromethane	<2.9	<2.9	-	-
1,2-Dibromoethane	<2.6	2.6	0.16	0.68
1,2-Dichlorobenzene	<2.1	<2.1	7,000	29,000
1,3-Dichlorobenzene	<2.1	<2.1	-	-
1,4-Dichlorobenzene	<2.1	<2.1	8.5	37
Freon 12(Dichlorodifluoromethane)	<1.7	**2.2**	3,500	15,000
1,1-Dichloroethane	<1.4	<1.4	58	260
1,2-Dichloroethane	<1.4	<1.4	3.6	16
1,1-Dichloroethene	<1.4	<1.4	-	-
cis-1,2-Dichloroethene	<1.4	<1.4	-	-
trans-1,2-Dichloroethene	<1.4	<1.4	-	-
1,2-Dichloropropane	<1.6	<1.6	9.4	41
cis-1,3-Dichloropropene	<1.6	<1.6	-	100
trans-1,3-Dichloropropene	<1.6	<1.6	-	-
Freon 114(1,2-Dichlorotetrafluoroethane)	<2.4	<2.4	-	-
1,4-Dioxane	<1.2	<1.2	19	82
Ethyl acetate	<1.2	**12**	2,400	10,000
Ethanol	<0.65	**27**	-	-
Ethylbenzene	<1.5	<1.5	37	160
4-Ethyltoluene	**1.8**	<1.7	-	-
n-Heptane	<1.4	<1.4	-	-
Hexachloro-1,3-butadiene	<3.7	<3.7	-	-
n-Hexane	<1.2	<1.2	24,000	100,000
Isopropyl alcohol(2-Propanol)	<0.85	**17**	-	-
Isopropylbenzene (cumene)	<1.7	<1.7	-	-
Methylene chloride	<1.2	<1.2	3,400	41,000
2-Hexanone(MBK)	<1.4	<1.4	1,000	4,400
2-Butanone(MEK)	<1.0	**2.4**	170,000	730,000
4-Methyl-2-pentanone(MIBK)	<1.4	**60**	100,000	440,000
Methyl Methacrylate	<1.4	<1.4	24,000	10,000
Methyl-tert-butyl ether(MTBE)	<1.2	<1.2	360	1,600
Naphthalene	**2.7**	<1.8	1.0	8.0
Propylene	<1.2	<1.2	100,000	440,000
Styrene	<1.5	<1.5	35,000	150,000
Tertiary butyl alcohol(TBA)	<1.0	<1.0	-	-
1,1,2,2-Tetrachloroethane	<2.4	<2.4	13	55
Tetrachloroethene	**31**	<2.3	21	170
Tetrahydrofuran	<1.0	<1.0	70,000	290,000
Toluene	<1.3	**3.0**	170,000	730,000
1,2,4-Trichlorobenzene	<2.6	<2.6	-	-
1,1,1-Trichloroethane	<1.9	<1.9	170,000	730,000
1,1,2-Trichloroethane	<1.9	<1.9	5.8	26
Trichloroethene	<1.9	<1.9	6.7	23
Freon 11(Trichlorofluoromethane)	<1.9	<1.9	-	-
Freon 113(1,1,2-Trichlorotrifluoroethane)	<2.6	<2.6	-	-
1,2,4-Trimethylbenzene	**2.3**	<1.7	240	1,000
1,3,5-Trimethylbenzene	<1.7	<1.7	-	-
2,2,4-Trimethylpentane(Isooctane)	<1.6	<1.6	-	-
Vinyl acetate	<1.2	<1.2	7,000	29,000
Vinyl chloride	<0.88	<0.88	3.7	62
Xylene (p,m)	**3.1**	3.0		
Xylene (Ortho)	<1.5	<1.5	3,500	15,000

NOTES:

All values reported in ug/m^3 unless otherwise indicated.

VTDEC = Vermont Department of Environmental Conservation

I-Rule = Investigation and Remediation of Contaminated Properties Rule (July 27, 2017)

ND<xx = Not Detected< Detection Limit

Results reported above detection limits are indicated in bold

Detection limits and reported concentrations at or above the the applicable screening value (e.g., residential) are shac

"-" indicates not analyzed or that a screening value is not provided in the I-Rule

Appendix D

Health and Safety Plan

HEALTH AND SAFETY PLAN

FOR PETROLEUM / HAZARDOUS WASTE CONTAMINATED SITES

Prepared for:

Petra Cliffs
75 Briggs Street
Burlington, VT

Project #: 510170465

KAS, INC.
P.O. Box 787
589 Avenue D, Suite 10
Williston, VT 05495

Date: July 5, 2018

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INDEX (cont.)

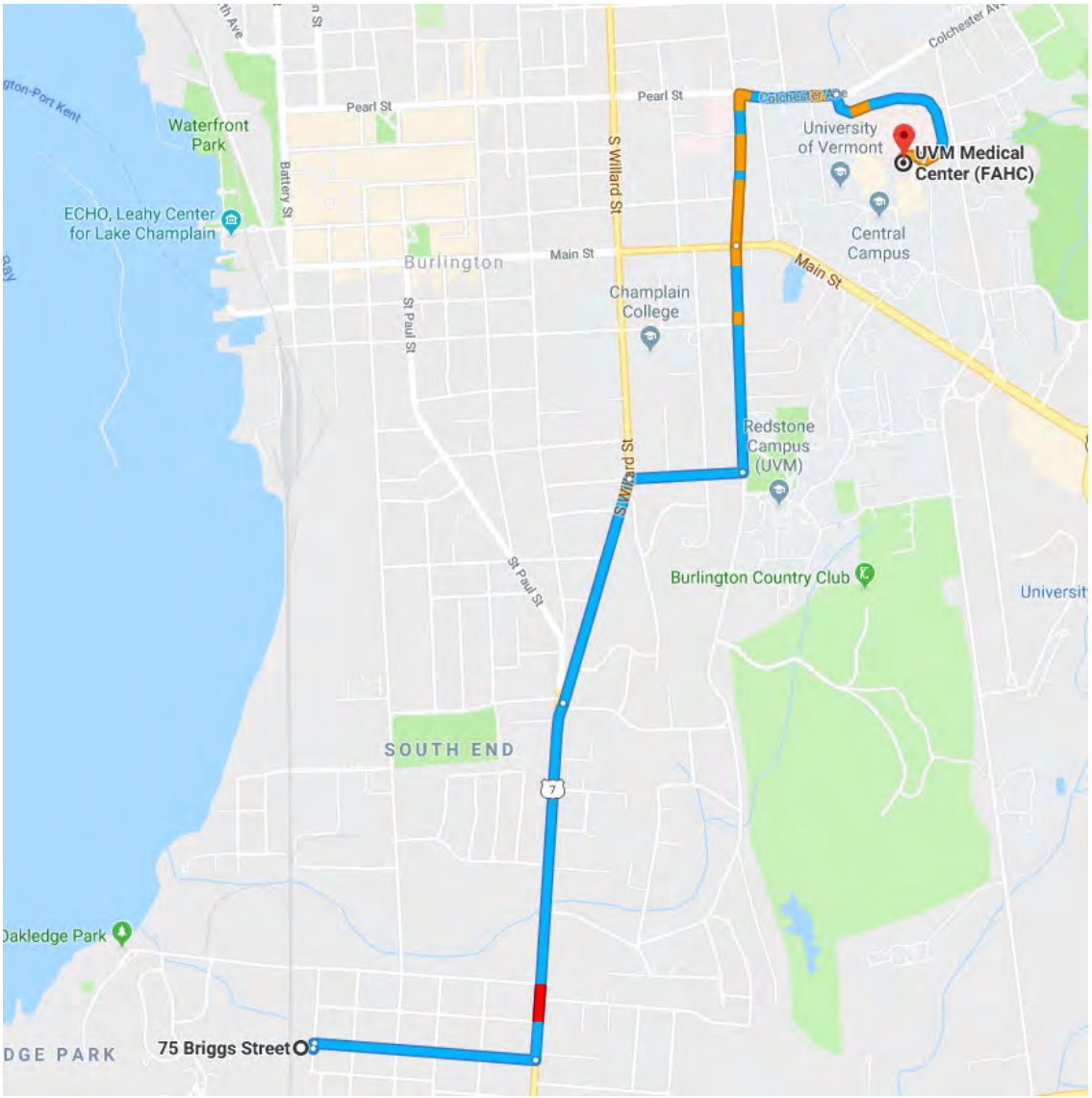
KAS, INC.

EVACUATION MAP

DIRECTIONS TO THE HOSPITAL: Nearest hospital is The University of Vermont Medical Center, 111 Colchester Avenue, Main Campus, West Pavilion, Level 1, Burlington, VT

UVM Medical Center is located 3.2 miles from the Site:

- Take Lyman Ave to Shelburne St. (Rte. 7)
- Turn right onto Cliff St.
- Turn left onto S. Prospect St.
- Turn right onto Colchester Ave.



SITE EVACUATION MAP:

KAS, INC.
HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT LOG

I have read this Health and Safety Plan and understand its contents. I agree to fully comply with it.

Name	Organization	Date	Time

KAS, INC.
WORKER/VISITOR LOG

NAME	ORGANIZATION	DATE	TIME IN	TIME OUT

GENERAL

This site-specific Health and Safety Plan has been developed for site investigations and monitoring at petroleum-contaminated sites. This plan (and subsequent revisions) shall be in effect throughout the duration of the project. All personnel, regardless of their professional affiliation, are subject to the requirements of this plan when they are in the area defined as the site.

1. OPERATIONAL INFORMATION

1.A. Chain of Command - Responsible Individuals

Clare Santos ,	Project Manager
On-Site KAS Personnel ,	Project Supervisor
On-Site KAS Personnel ,	Site Safety Officer
On-Site KAS Personnel ,	Assistant Site Safety Officer

Non KAS Personnel:

The chain of command for this project is as follows:

Immediate job coordination issues and/or scheduling will be brought to the attention of the Project Manager. If the project is of a size where there is no Project Manager assigned, issues will be brought to the attention of the Project Supervisor.

Issues relative to personnel health and safety will be brought to the attention of the Site Safety Officer.

Job progress meetings and issues requiring Corporate coordination and KAS input will be coordinated by the Project Manager or Project Supervisor.

1.B Emergency Notification

A list of all State and Local Police, Ambulance, and Rescue Departments and a listing complete with routes to hospitals and emergency facilities shall be maintained by the Site Safety Officer. The list must include phone numbers and quickest routes to areas facilities. The Site Safety Officer shall also contact the hospitals or emergency treatment center and inform them of an injured worker. Advice on the transportation method, and if necessary, decontamination or treatment shall be offered.

Facilities to be posted on the site are listed below, including telephone numbers.

Police Department: Phone 911

Address _____

Fire Department: Phone 911

Address _____

EMS Unit: Phone 911

Address _____

Hospital: 911

Address:

1.C. Site Personal Protective Equipment (PPE)

Personal Protection Equipment (PPE) for this site will be Level D or Level D Plus, as described in Section 4 of this plan, and as dependent upon the task(s) to be conducted.

Task	Level of Protection
Water/product level monitoring	D
Water sampling	D
Soil screening/ sampling	D
Product bailing	D
O & M of Remedial Systems	D
Drilling/ Soil Borings/ Monitoring Well Installation	D Plus
Trenching	D Plus
Tank Pull Inspection	D Plus
Drum changes	D Plus (hard hat optional)

PPE will be automatically upgraded to higher levels if the action limits for Level D are exceeded (see Section 4.C). The Site Supervisor or the Site Safety Officer has the authority to change the PPE level to suit the site conditions in accordance with the prescribed limits contained in this plan.

1.D. Fire Extinguisher Location

At least one fire extinguisher shall be kept in an accessible location on the KAS support vehicle. In addition, a fire extinguisher must be kept in an accessible location on any drill rig used on site.

1.E. First Aid

A first aid kit is located in the KAS support vehicle on-site.

1.F. Worker/Visitor Log

The attached logs must be completed for each worker or visitor to the site.

1.G. Plan Acknowledgment Form

Each worker or visitor must read and understand this plan and then sign the attached acknowledgment form before being allowed on-site.

1.H. Daily Air Monitoring Record

The attached Daily Air Monitoring Record must be completed by the end of each work day.

1.I EMERGENCY CONTINGENCY PLANS

The following Emergency Contingency Plans represent the most likely emergencies to be encountered on-site. These Emergency Plans shall be followed if they have to be activated. The Site Supervisor has senior authority to implement and modify the plans to suit particular situations until a higher authority is physically on-site. All workers also carry the responsibility to initiate emergency plans if the situation presents and the Site Supervisor is not in the immediate area.

EMERGENCY CONTINGENCY PLAN

1.I.1. EVACUATION

It is possible that a site emergency could necessitate evacuating all personnel from the site. If such a situation develops, the Site Safety Officer, or designated representative, shall notify the Project Supervisor, or vice versa, of the event and they shall ensure that the evacuation is carried out in a calm, controlled fashion.

All personnel shall exit the site and congregate in an area designated by the Project Supervisor and/or Site Safety Officer during the daily tailgate safety meeting. The route of evacuation will be dependent on wind direction, severity and type of incident, etc.

The Project Supervisor and/or Site Safety Officer shall ensure that all personnel are accounted for. If someone is missing the Site Safety Officer shall alert emergency personnel.

EMERGENCY CONTINGENCY PLAN

1.I.2. MEDICAL EMERGENCY

The following procedures should be followed in the event of a medical emergency involving illness or injury to on-site personnel.

EMS units should be called immediately, unless the injury or illness is determined to be minor, not requiring emergency care.

Site operations should be shut-down and the site should be immediately secured. The area in which the injury or illness occurred shall be considered off-limits until the cause of the illness or injury is known.

Assess the nature of the injury or illness and insure the site is safe for additional personnel to enter and provide care to the injured/ ill person(s).

Assess the victim's condition, noting the level of consciousness and any cardiac or respiratory involvement. Administer first aid treatment to the injured person(s).

1) Check to see if the victim is conscious by talking loudly to them and gently jostling their shoulders.
2) If the victim is unconscious, check to see if they are breathing. Place an ear directly above their mouth and nose, at the same time looking toward the abdomen to watch for rise and fall of the chest cavity.
3) If the victim is not breathing, notify an EMS unit immediately, if one has not already been contacted. Administer rescue breathing if trained in this procedure, and check for a pulse.
4) If the victim is not breathing but maintains a pulse, continue rescue breathing (if trained) until the victim breathes on their own or until EMS rescue staff arrives.
5) If the victim is not breathing and has no pulse, administer Cardiopulmonary Resuscitation (if trained in this procedure) until EMS staff arrives and takes over, or until the victim recovers.

If site work has been conducted at Personal Protective Level C or higher, the victim should be decontaminated as soon as possible after removal from the contaminated environment. This should be done in a non-contaminated area well away from the source of the problem. Extreme care should be used to avoid cross-contamination to rescuer personnel. The victim should be washed by water spray or safety shower. Contaminated protective clothing should be removed after washing. The victim should be covered with plastic or fitted with a Tyvek suit. The SCBA or respirator should be removed last, except in the case of a critical injury where the victim requires respiratory support. The victim should not be transported until decontamination is performed to the degree that other personnel will not be unduly subjected to cross-contamination.

Instantaneous real-time air monitoring with photoionization detectors should be performed to ascertain if the illness or injury was caused by potential exposure to hazardous materials. Monitoring should be done both upwind and downwind of the incident site.

The Fire Department should be notified if additional help is immediately needed, or if access to water for decontamination of the victim is not available at the site.

If the victim appears to be critically injured, transport them to the nearest Emergency Room as soon as possible. The victim should not be transported to the hospital in anything other than an EMS Unit staffed by qualified personnel.

If the victim's condition appears to be non-critical, and is anything more severe than minor cuts or bruises, they can be transported to the nearest hospital in a vehicle other than a EMS Unit staffed by qualified personnel.

If the victim has sustained extremely minor injuries or a minor illness, it will be up to the discretion of the Site Safety Officer whether or not the victim should be treated on-site, and whether the victim may resume work. If the Site Safety Officer determines that the victim may not continue to work, the victim should be decontaminated and relieved of duty for the day. A physician or the victim's family physician should be contacted by the victim.

Any incident shall be documented both in the project file and on an Injury/Illness Report Form available from KAS management personnel.

EMERGENCY CONTINGENCY PLAN

1.I.3. ACCIDENTAL CONTAMINATION

The following procedures shall be instituted immediately in the event of contamination of any person on-site by Hazardous Materials.

If emergency rescue is needed to remove the victim from the contaminated area, notify EMS, Police, and Fire units immediately.

Absolutely no emergency rescue is to be attempted without trained emergency rescuers.

If the victim is able to move under their own power, escort them to a non-contaminated area as soon as possible.

The site should be shut-down and immediately secured. The area in which the contamination occurred shall be considered off limits until the arrival of trained personnel who are properly equipped with the appropriate personal protective equipment and monitoring instrumentation.

Assess the victim's condition for the nature of injury or contamination. The victim should be considered symptomatic if they exhibit any evidence of abnormal symptoms. Monitor the level of consciousness and any cardiac or respiratory involvement. Use special care to insure that you do not become contaminated as well. If any abnormal symptoms are present, notify EMS, Police, and Fire Department units immediately.

Attempt to identify the exact type of material involved. If the material cannot be positively identified, attempt to acquire a grab sample. Use extreme caution if the danger of being contaminated exists.

The victim should be decontaminated as soon as possible after removal from the contaminated environment. This should be done in a non-contaminated area well away from the source of the problem. Extreme care shall be taken to avoid cross-contamination. The victim should be washed by water spray or safety shower. Contaminated protective clothing should be removed after washing. The victim should be covered with plastic or fitted with a Tyvek suit. The SCBA or respirator should be removed last, except in the case of critical injury where the victim requires respiratory support. The victim should not be transported until decontamination is performed to the degree that other personnel will not be unduly subjected to cross-contamination.

If the victim appears to be critically injured (i.e. unconscious, cardiac or respiratory abnormalities, seizures, etc.), support the victim's vital functions. Administer CPR if needed.

The Fire Department should be notified if additional help is immediately needed, or, if access to water to wash and decontaminate the victim is not available at the site.

If the victim appears to be symptomatic, the victim should be decontaminated and then transported to the nearest Emergency Room or appropriate medical assistance facility as soon as possible. The victim should not be transported other than by an EMS unit staffed by qualified personnel.

The incident shall be documented both in the project file and on an Injury/Illness report form.

EMERGENCY CONTINGENCY PLAN

1.I.4. FIRE

The following procedures shall be instituted immediately in the event of a fire on-site.

The site should be shut-down and immediately secured. The area in which the fire occurred should be considered off limits until the cause can be determined. All nonessential site personnel shall be evacuated from the site to a safe, secure area. Notify the Fire Department immediately.

The four classes of fire along with their constituents are as follows:

Class A - Wood, cloth, paper, rubber, many plastics,
ordinary combustible materials.
Class B - Flammable liquids, gases and greases.
Class C - Energized electrical equipment.
Class D - Combustible metals such as magnesium, titanium,
sodium, potassium.

Small fires on site may be actively attacked for control and extinguishing. Extreme care shall be taken while in this operation and protective clothing should be worn to protect personnel. If the fire involves hazardous materials, positive pressure self contained breathing apparatus is mandatory.

The Site Safety Officer, or his/her representative, shall be responsible for all fire fighting activities on the site until a Fire Department is present.

All approaches to the fire should be from the upwind side if possible. Distance from personnel to the fire should be close enough to ensure proper attack of the extinguishing material, but far enough away to ensure that personnel are safe. The proper extinguisher shall be utilized for the Class(es) of fire present on the site.

If possible, the fuel source should be cut off or separated from the fire. Care must be taken when performing operations involving shut-off of valves and manifolds, if present.

No attempt should be made against large fires. These should be handled by the Fire Department.

All fire extinguishers should be recharged and inspected by qualified personnel after any use. All equipment shall be properly decontaminated prior to repair/recharging.

EMERGENCY CONTINGENCY PLAN

1.I.5. RELEASE OF HAZARDOUS MATERIAL

The following procedures shall be instituted immediately in the event of a spill or air release of a hazardous material on site.

Site activities should be shut down and immediately secured. The area in which the spill or release occurred shall be considered off limits until the cause can be determined and site safety can be evaluated. All nonessential site personnel shall be evacuated from the site to a safe, secure area.

The spilled or released product should be immediately identified and appropriate measures, such as dikes or berms, instituted to halt and contain the flow. If the spill extends into waterways, the Coast Guard and the National Response Center (1-800-424-8802) and appropriate State and Local Agencies should be notified immediately. Spill booms should be put in place in an attempt to curb downstream contamination.

Instantaneous real-time air monitoring with ionization and combustible gas indicators should be started. Monitoring should be performed both upwind and downwind of the spill site or release point. Results of the air monitoring will determine the appropriate level of Personal Protective Equipment.

If the released material is unknown, Level B protection is mandatory. Samples of the material should be acquired to facilitate identification of the material.

If the results of the air monitoring show that the levels of contaminants exceed immediately dangerous to life or health (IDLH) values, the site shall be immediately evacuated and the appropriate Federal, State, County, and local regulatory authorities and emergency response personnel should be notified.

Notify the Police and Fire Department immediately if contaminants are found to have migrated off site into populated areas, a large spill of flammable products is involved, or, the material is considered acutely toxic or exceeding published IDLH values.

The procedures listed above shall be instituted if there is a discovery of an acutely toxic material in much larger quantities than expected. In this case, all personnel on the site should be cleared to a safe area and briefed in a tailgate safety meeting.

The spill or release shall be reported to the appropriate Federal, State, County and Local regulatory authorities per the reporting standards of those regulatory agencies.

2. SITE HISTORY AND TASK DESCRIPTION

The property consists of an approximately 1.68 acre parcel of land to be subdivided from a larger parcel currently occupied by the recently developed Onion River Co-op City Market South End (City Market). Previous ownership includes a long history of industrial use. All buildings on the Petra Cliffs parcel were demolished as part of the City Market redevelopment, with the exception of an existing 4,000 square foot single story metal warehouse building, which is located near the southern property boundary.

Historical use of the property has resulted in subsurface contamination. Foundry waste and coal ash have been observed to be widespread throughout both parcels. Stone's Phase II ESA characterized four distinct contaminant types including petroleum VOCs (e.g., naphthalene and benzene), chlorinated VOCs (e.g., tetrachloroethene (PCE)), polycyclic aromatic hydrocarbons (PAHs), and metals (e.g., arsenic).

The Phase II ESA will consist of the following components:

- **Building drain assessment;**
- **Soil vapor assessment; and**
- **Soils assessment.**

3. WORK AREAS

Work and support areas shall be established based on ambient air data at the work sites. They shall be established in order to contain contamination within the smallest areas possible and shall ensure that each person on the site has the proper personal protective equipment for the area or zone in which work is to be performed.

Adequate safety instruction signs shall be placed in areas where admittance is restricted due to a hazardous environment.

Personnel shall not be permitted on the site alone during the following site activities:

- all work conducted in Level C or above
- Confined Space Entry activities
- trenching and pipe installation for remedial system installation
- drilling activities

Personnel in these situations shall use the "Buddy System", in groups of two or more, while on site. Non-KAS personnel (i.e., drillers, excavators) may serve in the capacity of a "Buddy" while on site conducting the above-noted activities.

Personnel may be on-site alone for Level D site activities, if Confined Space Entry activities are not in progress.

4. PROTECTIVE EQUIPMENT

4.A. Protective Clothing

Protective clothing shall be worn by all persons on site as directed by the Site Supervisor and/or Site Safety Officer for the job.

4.B. Personnel Protection Requirements and Methods

Action levels are those concentrations of which an upgrade in protective clothing or equipment is required. Organic vapor concentrations are to be continuously monitored in the field by use of an HNu, or a device of similar capability, with readings being taken in the breathing space occupied by the field personnel to determine whether an action level has been exceeded.

The Site Safety Officer shall designate the appropriate level of protection for personnel entering the work area as determined by the predetermined action level. It shall be the responsibility of each contractor to supply their personnel with the required personal protective equipment and to ensure that they are knowledgeable and proficient in its use. The Site Safety Officer has the authority to reject the credentials of any person and

disallow their entry to the site if he/she feels that any person is insufficiently qualified or protected for the tasks at hand.

Respiratory protection shall be selected for use as warranted by breathing zone air monitoring and type of site work being performed. Levels of Protection are as follows, listed in order from highest to lowest protection:

Level A Protection

Level A should be selected when the highest level of respiratory, skin and eye protection is needed. Level A is generally used when extremely hazardous substances are known to be present in high atmospheric concentrations and were Level B splash gear does no offer adequate protection against any dermal-active substances present or where materials and concentrations are unknown. Level A is used where air-borne compound(s) exceeding the Immediately Dangerous to Life or Health limit may be encountered.

- Approved, positive pressure-demand, self contained breathing apparatus (SCBA) or airline
- Full encapsulating, chemical-resistant clothing
- Gloves (outer/inner), chemical resistant
- Chemical-resistant disposable outer-boot coverings,
- Boots with toe and shank protection
- Hard hat
- All seams between protective clothing items will be sealed with duct tape
- Two-way radio communications

Level B Protection

Level B should be selected when the type and atmospheric concentrations of substances have been identified and the highest level of respiratory protection is required, but a lesser level of skin protection is needed. Generally Level B protection is used in situations where the chemical(s) is known, the atmosphere is oxygen deficient (less than 19.5%), no IDLH concentrations of substances which pose a respiratory hazard are present, or where dermal contact with a hazardous substance is unlikely.

- Approved, positive pressure-demand, self contained breathing apparatus (SCBA) or airline
- Chemical-resistant clothing
- Gloves (outer/inner), chemical resistant
- Chemical-resistant disposable outer-boot coverings
- Boots with protective toe and shank
- Hard hat
- All seams between protective clothing items will be sealed with duct tape

Level C Protection

Level C should be selected when the type of air contaminants have been identified, concentrations have been measured, and the criteria for using air-purifying respirators are met, and skin-exposure to dermal-hazardous compounds are not expected. Appropriate cartridges must be available removal of the subject contaminant(s) to be encountered. The atmospheric concentration of oxygen must be greater than and equal to 19.5% (but not in-excess of 23%). Use of Level C requires continuing measurement of air contaminants to ensure that IDLH concentrations do no exist and that the concentrations of the contaminants present do not exceed the service limits of the respirator.

- Approved, full face or half-face air purifying, cartridge/canister-equipped respirator
- Chemical-resistant clothing
- Gloves (outer/inner), chemical resistant
- Chemical-resistant disposable outer-boot coverings,
- Boots with protective toe and shank
- Hard hat
- All seams between protective clothing items will be sealed with duct tape

Level D Protection:

Level D should be selected when the contaminants are known, when airborne contaminant levels are below appropriate TLV limits, and there is no hazard for direct skin contact. At a minimum, Level D protection shall require use of the following protective equipment.

- Standard work uniform
- Substantial boots
- Goggles or safety glasses w/ side shields
- Latex gloves
- Chemical resistant outer gloves are required for work tasks involving contact with pure petroleum products.

In addition, certain work site tasks will require additional personal protective equipment to protect against injury around heavy machinery and overhead hazards, as well as potential splash hazards. These tasks will be conducted in **Level D Plus protection**

Level D Plus

- all PPE listed for Level D above except boots must have protective toe and shank
- hard hat

No person may be assigned a task requiring the use of respiratory protection equipment without first being properly trained in its use and limitations and having passed the

appropriate OSHA physical. Before the wearing of any respiratory protection equipment is permitted, the wearer must first complete a fit test, and must be completely aware of fitting procedures.

No person may be assigned a task requiring the use of respiratory equipment where it has been determined that that person has a physical limitation which might result in injury in conjunction with respiratory equipment use.

All respiratory equipment shall be properly fitted to worker(s) who will be using such equipment. All equipment shall be properly cleaned and inspected for work parts as often as necessary. SCBA's should be inspected once a month at a minimum. All respiratory equipment shall be cleaned and a fit test shall be satisfactorily passed before being worn by a different operator.

Any persons wearing glasses who must wear respiratory equipment must wear short-templed or no-templed glasses which may be taped to the wearers face, to prevent interference with the respiratory face piece.

Applicable protective clothing shall be selected and worn at all times by personnel exposed to, or in areas suspected of, contamination.

4.C. Action Levels

All initial site access and activities will be done in Level D attire.

4.C.1. Photoionization Detector Response in breathing zone (ppm):

0 to 100: Level D
101 to 750: Level C
751 to 10,000: Level B or A
Above 3,000: Immediately vacate the area

4.C.2. Combustible Gas Response

0.0 to 20.0% LEL: Continue with normal activity
Above 20.0% LEL: Immediately vacate the area

Note: Confined Space activities have lower LEL levels.
See KAS Confined Space Plan for levels.

4.C.3. Oxygen Detector Response

0.0 to 19.5% Oxygen: Level B is mandatory
19.5% to 23.0% Oxygen: Continue with normal activity
Above 23.0% Oxygen: Immediately vacate the area

4.D. Decontamination Procedures

Where high levels of site contamination are discovered such that respiratory, skin and eye protection are necessary, decontamination will be required. The support area will be positioned so that no one is permitted to enter or leave without passing through the decontamination station. At the boundary between the work and support areas, decontamination processes for equipment and personnel are required. All access to and from the work area will be through this section of the support area.

Decontamination shall be performed to protect workers from exposure to dangerous materials and to eliminate the hazard of contamination on equipment.

All water used in decontamination procedures, which is not treated at the site, shall be stored in portable storage tanks, until disposal takes place.

At each work location reusable sampling and personal protective equipment shall be decontaminated prior to sampling, between each sample, and after sampling. Sampling equipment shall be decontaminated by steam cleaning or washing with a mixture of Alconox and water, then rinsed twice with distilled water and allowed to air dry. All decontamination solutions shall be disposed at the work station where they were generated. Disposable sampling and personal protective equipment will be placed in plastic bags and temporarily stored in designated drums. These drums shall be disposed of according to regulatory guidelines.

The sequence of steps for removing and cleaning personal protective equipment follows:

Wash gloves, boots, and outer disposable coveralls
Rinse work gloves, boots, coveralls
Remove outer boots (if used) and outer gloves
Remove hard hat
Remove disposable coveralls
Remove respirator or masks
Wash respirator
Package and/or dispose of respirator or filters
Dispose of all contaminated items in properly labeled drums
If necessary, copy notes from contaminated paper onto clean paper while wearing inner gloves (surgical gloves) at decontamination station area.
Remove latex gloves
Dispose of latex gloves and contaminated note paper
Wash hands and face.

5. SAFETY EQUIPMENT

5.A. Color Code

5.A.1. Red

Red shall be used to identify fire equipment; identify containers of flammable materials; stop bars/buttons on mechanical machinery used for emergency power disconnection.

5.A.2. Yellow

Yellow shall be used as the basic color for identifying caution. Physical hazards shall be marked by yellow signs.

5.B. Warnings and Notifications

Signs and tags shall be of a design in accordance with 29 CFR 1910.145.d. Specific signs designated in this section are danger, caution, slow-moving vehicle, biological hazard, and safety instruction. Signs shall be worded in a clear, concise manner.

Tags shall be used for temporary situations, to warn of broken equipment or other similar hazard. Temporary hazards should be remedied as quickly as possible. Tags will be designed in accordance with 29 CFR 1920.145.f-2.

5.C. Communications for Entry Into Hazardous Areas

Where large distances may separate workers or in extremely dangerous areas, a communication network shall be established. The use of hand signals may be employed in close areas where portable radios are inconvenient, or unavailable.

6. FIRE PREVENTION

6.A. General Considerations

Fire prevention and protection techniques shall be instituted on-site to minimize sparks. All smoking and utilization of tools requiring open flames will be used only with the express permission of the Site Safety Officer. A fire extinguisher must be maintained in the immediate vicinity of the open-flame work. Emergency procedures in case of fire shall be discussed with workers before every new work area location or new work activity begins. Diagrams of emergency routes shall be displayed in the work areas and in areas and any other areas where workers will break from work activities.

Only Fire Marshall approved metal safety cans will be used to transport and store flammable liquids.

All gasoline and diesel-driven engines requiring refueling must be shut down and allowed to cool before filling.

No open flame or spark is allowed in any area containing flammable liquids.

6.B. Explosive Gas Survey

Before new work locations are entered in which the there is a probability for the buildup of explosive vapors, an explosive gas survey shall be conducted. If there are no explosive gases or vapors, work activities may commence. If explosive levels are registered, then work activities shall stop and workers moved out of the immediate work area. Work shall not begin until explosive levels are no longer registering on the meter or the source of the explosive gases are found and corrected. During work activities, monitoring for explosive vapors shall be continuous.

7. ON-SITE MEDICAL PROVISIONS

7.A. Accident Reporting

When an emergency situation occurs, a warning procedure shall be initiated by the first person to recognize the situation. As appropriate, EMS, Fire, and Police Departments shall be notified immediately. In the event of an accident or injury of any type on-site, a report of the incident shall be completed immediately after appropriate first aid has been rendered. The Site Supervisor shall be responsible for remedial plan of action and for completing an injury report.

7.B. First Aid

A first aid kit shall be located on site. It shall be the responsibility of the Site Supervisor/Safety Officer to notify all personnel as to the location and proper use of these items.

Vehicles used for site work shall be equipped with a first aid/safety kit and safety equipment.

7.C. Heat Stress

Heat stress may be of concern depending upon the ambient temperature. The heat stress of personnel on-site shall be monitored continually when heat stress potential is evident.

One or more of the following control measures can be used to help control heat stress:

Adequate replacement of lost body fluids. Personnel must replace water and salt lost from sweating. Personnel must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.

Replacement fluids can be a 0.1% salt water solution, a commercial mix or a combination of these and fresh water.

Establishment of a work regimen that will provide adequate rest periods for cooling down.

All breaks are to be taken in cool areas.

Personnel shall remove impermeable protective garments during rest periods.

Personnel shall not be assigned other tasks during rest periods.

All personnel shall be informed of the importance of adequate rest, acclimatization and proper diet in the prevention of heat stress.

<u>Heat Stress Monitoring</u>

Heat stress may occur even in moderate temperatures and may present heat rash, heat cramps, heat exhaustion, and/or heat stroke.

Monitoring procedures shall be implemented to prevent heat stress arising from any of the following: environmental conditions, use of personal protective equipment, intensity of workload. Such procedures may include the following:

Signs and Symptoms of Heat Stress	Treatment
Heat rash - red rash on the skin	Increase fluid intake
Heat cramps - muscle spasms - pain in the hands, feet, and abdomen	Rest in cool areas
Heat exhaustion - pale, cool moist skin - heavy sweating - dizziness, nausea, fainting	Loosen clothing Apply cool water to skin surfaces
Heat stroke - red, hot, usually dry skin - lack of or reduced perspiration - nausea - dizziness and confusion - strong, rapid pulse - coma	Transport to nearest hospital if symptoms are not reversed by the above listed measures;

7.D. Cold Stress

If the project is conducted during cold weather, cold stress must be addressed.

Persons working outdoors in temperatures at or below freezing may become frostbitten. Extreme cold, even for a short time, may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body which have high surface-area-to volume ratios such a fingers, toes, and ears are the most susceptible.

Two factors heavily influence the development of a cold injury; ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with temperature. For instance, 10 degrees F., with a wind of 15 miles per hour is equivalent in chilling effect to still air at least 18 degrees below zero.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph is increased to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

Local injury resulting from cold is generally termed frostbite. Frostbite of the extremities can be categorized into:

Frost nip or initial frostbite: characterized by sudden blanching or whitening of the skin.

Superficial frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

Deep frostbite: tissues are cold, pale and solid; extremely serious injury.

Systematic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages: shivering, apathy/listlessness, unconsciousness/slow responses, freezing of the extremities, death.

Thermal socks, long poly or thermal underwear, hard hat liners and other cold weather gear can aid in the prevention of hypothermia. Cotton should be avoided due to its moisture retention characteristics.

Blankets, warm drinks (other than caffinated coffee) and warm break areas are essential.

The overall goal is to keep from getting wet. If one does get wet, he/she should dry off and change clothes.

7.E. Emergency Notification

A list of all State and Local Police, Ambulance, and Rescue Departments and a listing complete with routes to all hospitals and emergency facilities shall be maintained by the Site Safety Officer (see Section 1 of this HASP). The list must include phone numbers and quickest routes to appropriate emergency facilities. The Site Safety Officer shall also contact the hospitals or emergency treatment center and inform them of an injured worker. Advice on the transportation method, and if necessary, decontamination or treatment shall be offered.

Facilities to be posted on the site are listed below.

Police Department
Fire Department
EMS Unit
Hospital

8. AIR QUALITY/AMBIENT AIR MONITORING

8.A. Preliminary Survey

All air monitoring will be conducted by a trained professional. The professional shall have adequate working experience. He/she will have a sound working knowledge of State and Federal Occupational, Safety and Health regulations, and formal training in occupational safety and health. The preliminary survey will be conducted using one or more of the following portable real-time instrumentation:

Photoionization Detector
Explosimeter
Oxygen Meter
Draeger type tube

8.B. Daily Surveys

Ambient air monitoring shall be conducted throughout the duration of all operations on site. A minimum of five locations around the perimeter of the site will be established and actively monitored during operations.

In the event that daily air analyses determine that ambient air quality exceeds recommended levels for the respiratory equipment utilized, the Project Site Supervisor/Site Safety Officer shall be notified immediately. The Project Site Supervisor/Site Safety Officer shall immediately inspect operating conditions at the site and attempt to determine the cause of the elevated levels in the ambient air. The Project Site Supervisor/Site Safety Officer may require changes in the operating procedures in order to reduce or eliminate elevated conditions.

In the event elevated levels persist after several attempts to reduce such levels, the Project Site Supervisor shall immediately stop all operations at that location and either remove workers from the location until conditions are improved or a higher level of PPE is employed.

Ambient air monitoring will be continued until safe levels are assured.

This program will be conducted and monitored by the Site Safety Officer or his/her designee. All equipment utilized for sampling shall be maintained and calibrated and shall be documented and included in project record documents.

8.C. Records

Accurate records shall be kept of all air monitoring results. These records should include date, time, place of sample, air temperature, weather conditions, and a physical

description of any obvious hazards that may influence the results of the tests. These records shall be maintained as part of the permanent job records by KAS, Inc.

8.D. Hazard Assessment

Personnel present on-site shall be advised of all potential hazards associated with the substances that are present.

The following are physical and chemical parameters of typical gasoline:

Specific Gravity 60/60 deg. F	0.72 to 0.76
ODOR T. - Odor Threshold	Approximately 10 ppm
FL-P - Flash Point	- 50 F
Flammability Limit - Lower	1.3 %
Flammability Limit - Upper	6 %

Source: The Merck Index, 10th Ed., 1983, Merck & Co., Inc., Rahway, NJ.
Physical parameters of other petroleum products are presented in the Material Safety Data Sheets (MSDSs) included in Appendix A of this HASP.

The following are air quality limits for **gasoline** obtained from the MSDSs included in Appendix A.

TLV-TWA - Threshold Limit Value, Time-Weighted Average	300 ppm
TLV-STEL - Threshold Limit Value, Short-Term Exposure Limit	500 ppm
MUC – Maximum Use Concentration (OV Cartridge)	3,000 ppm

Sources: VOSHA Table Z-1-A Limits for Air Contaminants Final Rule Limits, at http://159.105.83.167/Portals/0/WP%20Safety/VTPELs.pdf; ACGIH 2004

Slippery Surfaces:

Skid proof soles are highly recommended.

Organic Vapors:

The inhalation of volatile organic vapors during any operation can pose a potential health hazard. Hazard reduction procedures include monitoring the ambient air with a PID and use of appropriate PPE. Workers should stand upwind of the source of contamination whenever possible. If ambient air levels in the breathing zone exceed the limits specified in Section 4C of this HASP, upgrades in PPE must be immediately undertaken.
Flammable Vapors:

Presence of flammable vapors can pose a potential fire hazard and health hazard. Hazard reduction procedures include monitoring the ambient air with an O2/LEL meter. If the LEL reading exceeds 20%, leave the site immediately and contact the Fire Department.

Oxygen:

Atmospheres that contain a level of oxygen greater than 23% pose an extreme fire hazard (the usual ambient oxygen level is approximately 20.5%). This hazard can be compounded by the fact that vapors typical of gasoline retailing facilities are highly flammable. All personnel encountering atmospheres that contain a level of oxygen greater than 23% must evacuate the site immediately and must notify the fire department. If oxygen level is less than 19.5%, do not enter the space.

Vehicular Traffic:

When working on or near traveled ways, all personnel will be required to wear a fluorescent safety vest. In addition, the following safety equipment procedures must be adhered to for day time work. To secure an ongoing work site overnight in a heavy traffic area, appropriate lighted barricades must be used.

TASK	TRAFFIC SAFETY EQUIPMENT
Soil boring samples	A
Drilling	A
Subsurface Entry	A
Well Installation	A
Well Maintenance	B
Well Survey	B
Well Gauging	B
Well Development	B
Sampling	B
Pump Test	B
Excavation	A

Safety Equipment Key :

A = Cones and barricades required- tapes and flags are recommended but optional.
B = Cones are required - flags are recommended but are optional.

Well Installation; Well Development; Well Gauging; Well Bailing; Soil & Groundwater Sampling:

Skin and eye contact with contaminated groundwater and/or soil may occur during these tasks. Nitrile or Viton gloves and approved safety goggles should be worn when contact with contaminated substance and/or splash is possible. This PPE will be worn at the discretion of the Site Safety Officer, dependent on the task.

Sample Preservation:

When hydrochloric acid is used, skin and eye contact can occur. This hazard can be reduced with the use of Nitrile or Viton gloves and the use of safety goggles or glasses.

Cleaning Equipment:

Skin and eye contact with methanol, Alconox, or other cleaning substances can occur while cleaning equipment. This hazard can be reduced with the use of Nitrile or Viton gloves and the use of goggles or glasses.

8.E. Engineering Controls

Where feasible, engineering controls shall be the primary means utilized to maintain containment exposure within the limits prescribed to be safe.

9. SITE SECURITY

The Project Site Supervisor shall be responsible for the management of any security implemented at the site. Access to the site shall be at the discretion of the Site Supervisor.

No visitors shall be allowed without the approval of the Project Supervisor. Visitors shall not be permitted to enter known or suspected active hazardous work areas without proper indoctrination by the Site Safety Officer and Project Supervisor.

10 . PROGRESS MEETINGS/PERSONNEL TRAINING

10.A. Tailgate Safety Meetings

Tailgate safety meetings shall be held at the beginning of each shift at a central location in a non-contaminated area. All ongoing activities shall be discussed, and air monitoring results will be presented. Safety measures shall be reviewed to ensure all employees are aware of all precautionary methods and emergency procedures.

10.B. Orientation/Indoctrination

Orientation and Indoctrination of all new personnel shall be conducted by the Project Site Supervisor/Site Safety Officer before new workers are allowed access to the work area. The indoctrination shall include discussion of work activities, chain of command, respiratory protection program, emergency work exits and any other applicable information governing everyday work activities.

10.C. Training

All personnel are required to be trained in the following areas of health and safety awareness:

Basic Safety: this includes cause and prevention of slip, trip and fall hazards, safe drum handling and opening techniques, safe lifting techniques, heat stress illness and its prevention, etc.

Hazardous Protection: dealing with the identification, recognition and safe work procedures for toxic materials. This would include having knowledge of the use and limitation of applicable protective clothing, respirators, and decontamination procedures. Respirator fit tests for all personnel required to use respirators fall under this category. Information pertaining to routes of exposure, toxic effects, and specific nature of the job which could result in exposure shall be conveyed at this time.

10.D. Worker and Community Right-To-Know

The following contaminants have been identified, or are suspected, in either groundwater or soil samples as being in excess of prescribed limits:

Unleaded Gasoline
Leaded Gasoline
Kerosene
Diesel Fuel
Waste Oil
Mineral Spirits
Polycyclic aromatic hydrocarbons (PAHs)
Priority Pollutant Metals
Tetrachloroethylene or Tetrachloroethene (Perchloroethylene, PCE)

Health Effects:

Potential health effects from a chemical exposure are dependent on several exposure factors such as: toxicity of substances, duration of exposure, concentration during exposure and the overall health of the person exposed.

The chemicals or chemical constituents potentially contaminating this site are: gasoline/petroleum fuels/oil (kerosene, diesel fuel, waste oil), benzene, toluene, ethyl benzene, xylene, methyl tert-butyl ether, mineral spirits, PAHs, metals and PCBs. The following is a health analysis of these chemicals. Additional information on these chemicals can be found in the generic Material Safety Data Sheets attached in Appendix A.

Gasoline/Petroleum Fuels/Oils constituents can be divided into five major groups: alkanes, alkenes, cycloalkanes, aromatics and additives. The aromatics are the constituents generally regarded to be of greatest toxic concern. The major aromatics are benzene, toluene, ethyl benzene and xylene. Of these, benzene is considered to be the most toxic. One characteristic effect of gasoline/petroleum fuels/oils and their aromatic constituents is their ability to irritate the skin when repeated or prolonged exposure occurs.

Benzene
Benzene can enter the body through inhalation, ingestion and skin contact. Studies have noted that chronic exposure to benzene vapor can produce neurotoxic and hematopoietic (blood system) effects. Other effects can include headache, dizziness, nausea, convulsions, coma and possible death if exposure is not reversed. One significant effect from chronic benzene exposure is bone marrow toxicity. There is also an association between chronic exposures to benzene and the development of certain types of leukemia. OSHA lists benzene as a human carcinogen.

Toluene
Inhalation exposure to toluene vapor can produce effects such as central nervous system depression. Depending on exposure factors signs and symptoms can include headache, dizziness, fatigue, muscular weakness, in coordination, drowsiness, collapse and possible coma. Toluene can be a skin and mucous membrane irritant and studies have shown that high levels of toluene exposure can cause liver and kidney damage.

Ethyl Benzene
Exposure to ethyl benzene at high vapor concentrations may produce irritation to the skin, eyes and upper respiratory tract. Overexposure to ethyl benzene vapors can produce central nervous system depression with symptoms of headache, nausea, dizziness, shortness of breath and unsteadiness. Prolonged skin exposure to ethyl benzene may result in drying and cracking of the skin (dermatitis).

Xylenes
Depending on exposure factors, inhalation exposure to xylene vapor may produce central nervous system excitation followed by depression. Exposure to xylene vapor may produce lung irritation, nausea, vomiting and abdominal pain. Xylene is not known to possess the chronic bone marrow toxicity of benzene, but liver enlargement and nerve-cell damage have been noted from chronic overexposure.

Methyl tertiary Butyl Ether (MTBE)
Exposure to ethyl benzene at high vapor concentrations may irritate respiratory tract. Causes central nervous system effects. Breathing high concentrations in air can cause lightheadedness, dizziness, weakness, nausea, headache. Liquid is slightly irritating to the skin.

Naphthalene
Acute (shortterm) exposure of humans to naphthalene by inhalation, ingestion, and dermal contact is associated with hemolytic anemia, damage to the liver, and neurological damage. Cataracts have also been reported in workers acutely exposed to naphthalene by inhalation and ingestion. EPA has classified naphthalene as a possible human carcinogen.

PAHs
PAHs are a class of chemicals that occur naturally in coal, crude oil and gasoline. They are produced from the burning of coal, oil, gasoline, trash, and tobacco are burned. Benzo(a)pyrene is the most toxic parent PAH and is thus widely used as a key marker for environmental assessments. Exposure to this chemical via eye contact, skin contact, inhalation or ingestion may cause an allergic reaction including rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing. Studies have shown exposure can cause an allergic reaction, genetic defects, cancer, fetal development issues, and fertility issues.

Priority Pollutant Metals
Priority pollutant metals are a class of 13 metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc). These metals are typically very hazardous if ingested or inhaled. Skin or eye contact can cause irritation; however, in the case of mercury, exposure via skin/eye is very hazardous. Studies have shown some of these metals are carcinogenic and repeated or prolonged exposure can produce target organs damage. Select metals are also toxic to the blood, kidneys, lungs, brain, nervous system (both peripheral and central), liver and mucous membranes.

Perchloroethylene, PCE
Effects resulting from acute (short term) high-level inhalation exposure of humans to tetrachloroethylene include irritation of the upper respiratory tract and eyes, kidney dysfunction, and neurological effects such as reversible mood and behavioral changes, impairment of coordination, dizziness, headache, sleepiness, and unconsciousness. Tetrachloroethylene exposure may also cause adverse effects in the kidney, liver, immune system and hematologic system, and on development and reproduction. EPA has classified tetrachloroethylene as likely to be carcinogenic to humans.

Any person needing specific information on any of the chemicals listed above should contact the Site Safety Officer. They will be provided in accordance with OSHA 29 CFR 1910.1200.

11. CONTRACTOR/VISITOR COMPLIANCE

All EPA, State and Federal regulations shall be adhered to by contractors and visitors during excavation, disposal and construction operations or any other site operation.

12. OCCUPATIONAL NOISE

Requirements set forth in the OSHA Hearing Conservation Amendment (OSHA 1910.95) shall be adhered to during work on-site. Hearing protection shall be provided where sound pressure levels exceed 85 dBA, 8 hours per day, 90 dBA, 4 hours per day. Hearing protection shall be required where sound pressure levels exceed 90dBA. Hearing Protection shall be worn during all rotary drilling operations.

13. HEAVY EQUIPMENT OPERATIONS AND HEAVY MATERIALS HANDLING SAFETY

The following information warrants extra attention regarding work around heavy equipment (drilling rigs, front and back hoe loaders, etc.) and heavy materials:

Use common sense

Hard hats shall be worn at all times on-site

Pay attention at all times

Maintain visual contact at all times

Establish hand signal communication when verbal communication is difficult. Designate one person per work group to give hand signals to equipment operators.

Be aware of footing at all times

All heavy equipment shall have backup alarms of some type

Only qualified people are to operate heavy equipment

Use chains, hoists, straps, and any other equipment to safely aide in moving heavy materials

Never walk directly in back of, or to the side of, heavy equipment without the operator's knowledge

Never use a piece of equipment unless you are familiar with its operation

Pipe sections and other materials to be removed during any project may be extremely heavy. Make sure all precautions have been taken prior to moving. Let the equipment, not your body, do the moving.

Be sure that no underground or overhead power lines, sewer lines, gas lines, or telephone lines will present a hazard in the work area

Get help whenever you are in doubt about a material's weight. Use the "Buddy System"

Ensure that compressed air bottles are secured properly at all times.

14. PLAN ACKNOWLEDGMENT

All on-site workers, regardless of their affiliation, are required to have read this entire Health and Safety Plan, and must sign the accompanying form to acknowledge this.

15. SITE SAFETY PERSONNEL RESPONSIBILITIES

The responsibilities of all personnel involved in health and safety operations are stated below:

KAS, Inc. will oversee and act accordingly during all phases of the project. The following management structure will be used.

Project Manager:(If required by work scope)
The Project Manager shall be responsible for implementing the project and obtaining any necessary personnel or resources for the completion of the project. Specific duties will include:

coordinating the activities of all subcontractors, to include informing them of the required personal protective equipment and insuring their signature acknowledging this Site Safety Plan,

selecting a Site Safety Officer and field personnel for the work to be undertaken on site,

ensuring that the tasks assigned are being completed as planned and on schedule, providing authority and resources to ensure that the Site Safety Officer is able to implement and manage safety procedures,

preparing reports and recommendations about the project to clients and affected KAS personnel,

ensuring that all persons allowed to enter the site (i.e., EPA, Contractors, State Officials, visitors) are made aware of the potential hazards associated with the substances known or suspected to be on site, and are knowledgeable as to the on-site copy of the specific site safety plan.

ensuring that the Site Safety Officer is aware of all of the provision of this site safety plan and is instructing all personnel on site about the safety practices and emergency procedures defined in the plan, and

ensuring that the Site Safety Officer or the Site Safety Officer's designee is making an effort to monitor site safety.

Site Safety Officer

The Site Safety Officer shall be responsible for the overall coordination and oversight of the site safety plan. Specifically:

approving the selection of the types of (PPE) to be used on site for specific tasks,

evaluating weather and chemical hazard information and making recommendations to the Project Manager/Site Supervisor about any modifications to work plans or personal protection levels in order to maintain personal safety,

coordinate upgrading or downgrading PPE with Site Safety Officer, as necessary, due to changes in exposure levels, monitoring results, weather, other site conditions,

approving field personnel for work on-site, taking into consideration their level of safety training, their physical capacity, and their eligibility to wear the protective equipment necessary for their assigned tasks,

overseeing the air monitoring procedures as they are carried out by site personnel for compliance with all company health and safety policies,

monitoring the compliance of field personnel for the routine and proper use of the PPE that has been designated for each task,

routinely inspecting PPE and clothing to ensure that it is in good condition and is being stored and maintained properly,

stopping work on the site or changing work assignments or procedures if any operation threatens the health and safety of workers or the public,

monitoring personnel who enter and exit the site and all controlled access points,

reporting any signs of fatigue, work-related stress, or chemical exposures to the Project Manager and/or Site Supervisor,

dismissing field personnel from the site if their actions or negligence endangers themselves, co-workers, or the public, and reporting the same to the Project Manager and/or the Site Supervisor,

reporting any accidents or violations of the site safety plan to the Project Manager and/or the Site Supervisor, and documenting the same for the project in the project records,

knowing emergency procedures, evacuation routes and the telephone numbers of the ambulance, local hospital, poison control center, fire and police departments,

ensuring that all project-related personnel have signed the acknowledgments form contained in this site safety plan,

coordinate upgrading and downgrading PPE , as necessary, due to changes in exposure levels, monitoring results, weather, and other site conditions, and

perform air monitoring with approved instruments in accordance with requirements stated in this Site Safety Plan.

Site Supervisor
In the event that the Project Manager and the Site Safety Officer are not on site, the Site Supervisor shall assume all their responsibilities and authority.

Other Field Personnel
All field personnel shall be responsible for acting in compliance with all safety procedures outlined in the Health and Safety Plan. Any hazardous work situations or procedures shall be reported to the Site Safety Officer so that corrective steps can be taken.

16. CONFINED SPACE ENTRY

The reader is referred to the KAS Permit-Required Confined Spaces Program on file at KAS offices for more details on confined space entry protocols. A confined space:

a) is large enough and so configured that a person can bodily enter and perform assigned work; and
b) has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and

c) is not designed for continuous occupancy.

Included within this definition are excavations, storage tanks, impoundment, soils, pipelines, pits and vaults.

All personnel are urged to use caution in identifying any of the area listed above to their immediate Supervisor, and, to plan their approach to operations conducted in these areas to be in compliance with KAS's Confined Space Plan.

All personnel are urged to use all engineering controls possible to avoid entering these areas. Examples of this would include using remote sampling equipment, or, using a contractors back hoe bucket to collect soils for sampling, rather than personnel entering the excavation. Entry into a confined space is defined as breaking the plane of the opening to the confined space with any part of the body.

17. DRILLING SAFETY

During the drilling operation (2) persons designated as "driller" and "helper" must be present on the rig at all times.

The immediate area around the rig shall be cordoned off with temporary barricades, fencing or cones to assist in preventing unauthorized entry.

Only personnel authorized by KAS are to be allowed within the area of drilling. If any unauthorized personnel enter the work area, KAS will shut down operations until the area is cleared.

The mast of the drilling rig must maintain a minimum clearance of 20 feet from any overhead electrical cables. The drilling rig must not be moved from its set up position without first putting down the mast.

All drilling operations shall cease immediately during any electrical storms.
KAS, Inc. retains sole authority to shut down the drilling operations at any time a hazardous situation is deemed present.

18. EXCAVATING/TRENCHING SAFETY

All excavation and trenching work must comply with all safety regulatory agency rules. Prior to any excavation work, the existence and location of underground pipe, electrical conductors, etc. must be determined. The walls and spaces of all excavations more than four (4) feet deep or excavated below a building footing or foundation shall be guarded properly by shoring, sloping of the ground, or equivalent means.

Maximum Allowable Slopes are specified by OSHA for various soil types in 29 CFR Part 1926, Subpart P.

Soil/ Rock Type	Maximum Allowable Slope (H:V) for Excavations less than 20 ft	
Stable Rock	Vertical	(90 degrees)
Type A	3/4:1	(53 degrees)
Type B	1:1	(45 degrees)
Type C	1.5:1	(34 degrees)

Type A soils: clays, silty clays, sandy clays, clay loam, and cemented soils (caliche, hardpan)
Type B soils: silt, silt loam, sandy loam, unstable dry rock
Type C soils: granular soils including gravel, sand, and loamy sand; submerged, unstable soil or rock

Daily inspections of excavations shall be made. If there is evidence of possible cave-ins or slides, all work in the excavation shall cease until the necessary safeguards have been taken.

Trenches more than four (4) feet deep shall have ladders or steps located so as to require no more than 25 feet of lateral travel between means of access.

All equipment such as pipe, tools, etc. shall be kept out of traffic lanes and access ways. Equipment shall be stored to prevent danger to personnel at any time.

Trenches shall be completely guarded on all sides in areas where pedestrian and vehicular traffic is expected. A minimum of two (2) feet from the edges will be maintained. Trench guarding shall consist of wooden, metal, or heavy plastic barricades. Such barricades shall not be less than 36 inches high when erected.

Battery-lighted barricades shall be used to secure trenched areas left open overnight, as follows:

A minimum of two (2) battery-lighted barricades shall be used at corners, one on either side of the barricades.

At least one (1) battery-lighted barricade shall be used where vehicular traffic approaches the trench at the right angles.

Where trenches parallel roadways the distance between battery-lighted barricades should not exceed 40 feet.

All battery-lighted units should be regularly serviced to ensure equipment is operating.

Protection between barricades shall consist of at least 3/4 inch wide nylon tape (yellow or yellow and black). The tapes shall be stretched between barricades.

All barricaded sections immediately adjacent to where pedestrians cross trenches shall be guarded with a minimum of 2 by 2 inch wooded rails from the bridge to the first adjacent barricade. This barricade shall not be less than eight (8) feet horizontally to the top of the first barricade.

All pedestrian bridges shall be of sufficient strength to prevent no greater vertical deflection than 1/2 inch when a 250 pound weight is applied to the center of the bridge.

Handrails shall consist of an intermediate and top rail on both sides of the bridge. The top rail shall be a minimum of 42 inches high and capable of withstanding a lateral force of 200 pounds against the center of the top rail.

All surfaces which a person could reasonably contact should be sufficiently free of splinters, nails, or protrusions which may cause injury.

All bridges intended for vehicular traffic shall be constructed to withstand twice the load of the heaviest vehicle anticipated.

All trenches shall be back filled as soon as practical after work is completed and all associated equipment removed.

19. ELECTRICAL SAFETY

All electrical equipment and power cables in and around wells or structures suspected of containing chemical contamination must be equipped with a three-wire, ground lead. In accordance with OSHA 29 CFR 1926.404, approved ground fault circuit interrupters (GFCI) must be used for all 120 volt, single phase, 15 and 20 ampere receptacle outlets on the site which are in use by personnel and which are not part of the permanent wiring as defined by the NEC 1987.

The GFCI is a fast-acting circuit breaker which senses small imbalances in the circuit caused by current leakage to ground, and in a fraction of a second shuts off the electricity. However, the GFCI will not protect personnel from line-to-line contact hazards (such as a person holding two "hot" wires or a hot and neutral wire in each hand). The GFCI provides protection against the most common form of electrical shock hazard, the ground fault.

GFCIs can be used successfully to reduce electrical hazards on construction sites. Tripping of GFCIs, interruption of current flow, is sometimes caused by wet connectors and tools. It is good practice to limit exposure of connectors and tools to excessive moisture by using watertight or sealable connectors. Providing more GFCIs or shorter circuits can prevent tripping caused by the cumulative leakage from several tools or by leafages from extremely long circuits. (Adapted from OSHA 3007; Ground-Fault Protection on Construction Sites, 1987).

Electrical cords shall be inspected thoroughly prior to each work day for fraying of or damage to the cord. Electrical cords which are frayed or damaged will be permanently removed from service.

APPENDIX A: MSDS

(See hard copies in KAS office)

Appendix E

Land Use Restrictions – Annual Institutional Control Inspection Form

VERMONT

LAND USE RESTRICTIONS – ANNUAL INSTITUTIONAL CONTROL INSPECTION FORM

Our records indicate that this property maintains institutional or engineering controls associated with a land use restriction. Please indicate the state of the following controls, as applicable, on the property.

SMS Site #: _____

Owner Name: _____

Site/Property Name: _____

Site/Property Address: _____

	YES	NO	COMMENTS
Paved Caps:			
1. Is there any cracking, fractures, or breaking of the pavement?	◯	◯	
2. Has the pavement been punctured, providing a risk of direct contact?	◯	◯	
Buildings/Structures:			
1. Are there visible cracks or fractures in the foundation?	◯	◯	
2. Have there been additions or improvements to the structure?	◯	◯	
3. Has there been standing water or flood in the basement of the structure (since receipt of the Certificate of Completion)?	◯	◯	
Sub-slab Depressurization System (SSD):			
1. Has the SSD been operational and appropriately maintained for the past year, as described in the Certificate of Completion?	◯	◯	
Soil/Grass Caps:			
1. Is there any evidence of erosion?	◯	◯	
2. Are monitoring wells at the site damaged, un-locatable, or otherwise in unacceptable condition?	◯	◯	
3. Have survey pins been repositioned or removed?	◯	◯	
4. Is there any evidence of burrowing wildlife?	◯	◯	
5. Are there bare spots larger than 3 square feet in grassy areas?	◯	◯	
6. Has there been any subsurface work conducted on the property?	◯	◯	

I certify that I have responded to each of the questions above to the best of my knowledge.

Signature: _____ **Date:** _____

Submit by email or submit original form to the SMS Project Manager at the address listed below:
Vermont Department of Environmental Conservation
Waste Management & Prevention Division/Sites Management Section
1 National Life Drive – Davis 1
Montpelier, VT 05620-3704

SMS Project Manager: _____

Clear Form

Appendix F

Cost Estimates

Budgetary Cost Estimate - Soil Management
Corrective Actin Plan Implementation
Petra Cliffs
Burlington, VT
January 2019

Cubic Yards Impacted Soil	1,550
Tons of Impacted Soil	2,325
Number of 22-ton trucks	78

Task	Category	Description	Qty	Per Unit Cost	Unit	Item Cost	Subtotals
1.0	**Corrective Action Plan**						
	KAS Plan Preparation	Scientist/Engineer	56	$95.00	/hr	$5,320.00	
	KAS Coordination with DEC	Scientist/Engineer	4	$95.00	/hr	$380.00	
	KAS Drafting	Engineer	24	$96.00	/hr	$2,304.00	
	KAS Principal Review	Principal	4	$115.00	/hr	$460.00	**$8,464**
2.0	**Final Design / Permitting / Site Planning**						
	KAS Project Coordination / Bid Support	Scientist/Engineer	20	$95.00	/hr	$1,900.00	
	KAS Final Design / Bid Support	Professional Engineer	12	$115.00	/hr	$1,380.00	
	KAS Principal Review	Principal	1	$115.00	/hr	$115.00	
	KAS Contractor Preparation / Coordination	Scientist/Engineer	12	$95.00	/hr	$1,140.00	**$4,535**
3.0	**CAP/Construction Inspection and Oversight (15 DAYS)**						
	KAS Construction Inspection (15 Visits)	Scientist/Engineer	120	$95.00	/hr	$11,400.00	
	KAS Travel (15 Visits)	Scientist/Engineer	15	$95.00	/hr	$1,425.00	
	KAS Mileage (15 Visits)	Expense	180	$0.535	/ea	$96.30	**$12,921**
4.0	**CAP Soil Management (Excavation, Temporary Stockpile, and Backfill) Additional to Normal Construction***						
	Excavator & Operator	Contractor	40	$185.00	/hr	$7,400.00	
	Dump Truck & Operator	Contractor	40	$75.00	/hr	$3,000.00	
	Laborer	Contractor	40	$45.00	/hr	$1,800.00	
	Polyethylene Plastic Liner (min 6 mils thickness)	Expense	3	$161.00	/2,800 sq.ft.	$483.00	
	Geotextile for silt fence	Expense	50	$4.28	/sq.yd	$214.00	
	Hay Mulch	Expense	0	$1,000.00	/ton	$0.00	
	Sandy loam fill	Expense	0	$37.50	/cy	$0.00	
	Top soil	Expense	0	$45.00	/cy	$0.00	
	KAS - Obtain Waste Profile Approval from Casella	Scientist/Engineer	3	$95.00	/hr	$285.00	
	KAS Project Coordination	Scientist/Engineer	1	$95.00	/hr	$95.00	
	KAS Soil Sample Kit	Expense	7	$15.00	/ea	$105.00	
	Waste Characterization - pH	Sub - Laboratory	8	$11.25	/ea	$90.00	
	Waste Characterization - Metals	Sub - Laboratory	8	$112.50	/ea	$900.00	
	Waste Characterization - TCLP Lead	Sub - Laboratory	8	$156.00	/ea	$1,248.00	
	Waste Characterization - TPH	Sub - Laboratory	8	$90.00	/ea	$720.00	
	Waste Characterization - SVOC	Sub - Laboratory	8	$263.00	/ea	$2,104.00	
	Waste Characterization - VOC	Sub - Laboratory	8	$124.00	/ea	$992.00	
	Transporation + Landfill Disposal as ADC	Sub - Casella	2,325	$62.00	/ton	$144,150.00	**$163,586**
5.0	**Dewatering, Water Treatment, and Permitting (Based on estimated duration of 8 consecutive weeks)***						
	KAS Project Coordination	Scientist/Engineer	3	$95.00	/hr	$285.00	
	KAS Travel (3 Visit)	Field Tech II	3	$65.00	/hr	$195.00	
	KAS Mileage (3 Visit)	Expense	36	$0.54	/ea	$19.26	
	KAS Labor Prep/Carbon Drum Pick up	Field Tech II	1	$65.00	/hr	$65.00	
	KAS Labor On-Site	Field Tech II	24	$65.00	/hr	$1,560.00	
	Discharge Permit Fee	Expense	1	$240.00	/ea	$240.00	
	Carbon Filter Drums	Filcorp	2	$585.00	/ea	$1,170.00	
	Carbon Drum Disposal	ENPRO	2	$375.00	/ea	$750.00	
	Carbon Drum Transportation	ENPRO	2	$125.00	/ea	$250.00	
	EPA Method 8021B	Sub - Laboratory	3	$90.00	/ea	$270.00	
	Frac Tank Rental Rate	Sub - Alder Tank Rentals	56	$30.00	/day	$1,680.00	
	Frac Tank Transport (delivery/pickup)	Sub - Alder Tank Rentals	2	$1,750.00	/ea	$3,500.00	
	Suction Pump/Setup	KAS	2	$120.00	Week	$240.00	
	Hose/Fittings	KAS	1	$250.00	/ea	$250.00	**$10,474**
6.0	**Clean Frac Tank**						
	KAS Project Coordination	Scientist/Engineer	2	$95.00	/hr	$190.00	
	Clean Frac Tank	Sub - Enpro	1	$2,000.00	/ea	$2,000.00	
	Vac Truck	Sub - Enpro	1	$525.00	/ea	$525.00	
	Drums	Sub - Enpro	10	$40.00	/ea	$400.00	
	Drum Disposal	Sub - Enpro	10	$145.00	/ea	$1,450.00	**$4,565**

Budgetary Cost Estimate - Soil Management
Corrective Actin Plan Implementation
Petra Cliffs
Burlington, VT
January 2019

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Number of 22-ton trucks	78

Task	Category	Description	Qty	Per Unit Cost	Unit	Item Cost	Subtotals
7.0	**Vapor Intrusion Building Protection / Supervision for New Building**						
	KAS Construction Inspection (2 Visit)	Professional Engineer	16	$115.00	/hr	$1,840.00	
	KAS Travel (2 Visit)	Professional Engineer	2	$115.00	/hr	$230.00	
	KAS Mileage (2 Visit)	Expense	24	$0.535	/ea	$12.84	
	Magnahelic Gauges	Expense	1	$15.00	/day	$15.00	
	PID	Expense	1	$80.00	/day	$80.00	
	4' Perforated Pipe	Expense	132	$10.00	/ft	$1,320.00	
	4" PVC Solid Pipe	Expense	310	$9.80	/ft	$3,038.00	
	Fittings / Supports	Expense	2	$90.00	/est	$180.00	
	Roof Penetration (Assembly)	Expense	2	$1,000.00	/ea	$2,000.00	
	Radonaway Fan	Expense	2	$250.00	/ea	$500.00	
	Sensor / Alarm	Expense	2	$80.00	/ea	$160.00	
	Fittings / Tubing	Expense	2	$25.00	/est	$50.00	
	Electrical / Installation	Expense	2	$500.00	/ls	$1,000.00	**$10,426**
8.0	**Vapor Intrusion Building Protecton - Existing Building**						
	A) DIAGNOSTICS/PRE-DESIGN (1 SITE VISIT)						
	KAS Project Coordination	Scientist/Engineer	2	$95.00	/hr	$190.00	
	KAS Site Visit/Testing	Professional Engineer	4	$115.00	/hr	$460.00	
	KAS Site Visit/Testing	Field Tech II	4	$65.00	/hr	$260.00	
	KAS Travel	Professional Engineer	1	$115.00	/hr	$115.00	
	KAS Travel	Field Tech II	1	$65.00	/hr	$65.00	
	Mileage	Expense	12	$0.535	/ea	$6.42	
	Hammer Drill & Bit Rental	Expense	1	$75.00	/ea	$75.00	
	PID	Expense	1	$90.00	/ea	$90.00	
	Survey Equipment	Expense	1	$75.00	/ea	$75.00	
	Micromanometer	Expense	1	$50.00	/ea	$50.00	
	Smoke Pen	Expense	1	$15.00	/ea	$15.00	
	B) SSD SYSTEM INSTALLATION (1 SITE VISIT)						
	KAS Site Visit/Construction	Professional Engineer	4	$115.00	/hr	$460.00	
	KAS Site Visit/Construction	Field Tech II	4	$65.00	/hr	$260.00	
	KAS Travel	Professional Engineer	1	$115.00	/hr	$115.00	
	KAS Travel	Field Tech II	1	$65.00	/hr	$65.00	
	Mileage	Expense	12	$0.535	/ea	$6.42	
	RadonAway RP-145 Fan	Expense	1	$113.50	/ea	$113.50	
	Radon Fan Housing	Expense	1	$99.00	/ea	$99.00	
	Electrical Connection & Parts	Sub - Electrical	1	$750.00	/ls	$750.00	
	4" Flexible Coupling	Expense	2	$11.00	/ea	$22.00	
	4" PVC Pipe	Expense	40	$3.00	/ft	$120.00	
	4" PVC Elbows	Expense	3	$10.00	/ea	$30.00	
	4" PVC TEE	Expense	1	$15.00	/ea	$15.00	
	4" x 6" PVC Reducer	Expense	2	$15.00	/ea	$30.00	
	4" PVC Pipe Hangers	Expense	1	$6.24	/pkg	$6.24	
	U-manometer	Expense	1	$7.99	/ea	$7.99	
	4" Pipe Cap	Expense	1	$10.00	/ea	$10.00	
	Plumbers Putty	Expense	1	$2.20	/ea	$2.20	
	Polyurethane caulk	Expense	4	$5.95	/tube	$23.80	
	System Labels	Expense	1	$11.00	/pkg	$11.00	**$3,549**
9.0	**SSD System Monitoring (2 Rounds)**						
	KAS Labor Task Coord	Scientist/Engineer	2	$80.00	/hr	$160.00	
	KAS Travel (2 Visits)	Scientist/Engineer	10	$80.00	/hr	$800.00	
	KAS SSV Monitoring (2 Visits)	Scientist/Engineer	5	$80.00	/hr	$400.00	
	KAS Mileage	Expense	24	$0.57	/ea	$13.68	
	PID	Expense	2	$80.00	/day	$160.00	
	Pack/Ship Canisters	Field Tech II	2	$60.00	/hr	$120.00	
	Magnahelic Gauges	Expense	2	$5.00	/day	$10.00	
	Temp/Humidity Pen Rental	Expense	2	$15.00	/day	$30.00	
	Miscellaneous Tubing	Expense	2	$20.00	/ea	$40.00	
	Calibrated Air Pump	Expense	2	$35.00	/day	$70.00	
	EMSL TO-15 (4 hr Sample)	Laboratory	6	$285.00	/ea	$1,710.00	
	Shipping	Expense	4	$100.00	/ea	$400.00	**$3,914**

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Number of 22-ton trucks	78

Task	Category	Description	Qty	Per Unit Cost	Unit	Item Cost	Subtotals
10.0	**Corrective Action Completion Report**						
	KAS Report	Scientist/Engineer	24	$95.00	/hr	$2,280.00	
	KAS Review	Senior	4	$115.00	/hr	$460.00	
	KAS Maps/Logs	Draftsman	10	$65.00	/hr	$650.00	
	KAS Administrative	Admin	1	$50.00	/hr	$50.00	**$3,440**
11.0	**Institutional Control/Notice to Land Records**						
	Attorney Fees	Contract	8	$250.00	/hr	$2,000.00	
	Paralegal	Contract	2	$100.00	/hr	$200.00	
	Administrative/filing	Contract	2	$60.00	/hr	$120.00	**$2,320**

Cleanup Cost	**$228,194**
15% Contingency	**$34,229**
Total Cost For Project	**$262,423**

* This budgetary cost estimate is for the additional costs associated with the environmental conditions of the site. Consequently, costs associated with the typical development of the site such as excavation and backfill are not included.

Appendix G

IRule Corrective Action Plan Checklist

Vermont Department of Environmental Conservation
Waste Management and Prevention Division
Sites Management Section
I-Rule CORRECTIVE ACTION PLAN Checklist

Site Number: **2017-4731**
Site Name: **Petra Cliffs**
Site Address: **75 Briggs Street**
Site City/Town: **Burlington**
Report Title: **Corrective Action Plan**
Report Date: **January 18, 2019 (Revised May 6, 2019)**
Consultant: **KAS, Inc.**
Report Author: **Clare Santos**

Deliverable	YES	N/A	Comments	WMPD Use Only	
				Adequate	Inadequate
Subchapter 5. Corrective Action					
§35-505. Corrective Action Plan					
Executive Summary					
Public Notice	✓				
Performance standards	✓				
Remedial Construction Plan	✓				
Waste Management Plan	✓				
Implementation schedule	✓				
Corrective Action Maintenance Plan	✓				
Institutional Control Plan	✓				
Redevelopment and Reuse Plan	✓				
QA/QC Plan	✓		Performance criteria for SSD systems.		
Cost estimate	✓				
Updated maps	✓				
Tabular contaminant concentrations	✓				
Cross-sections		✓	Depths of impacted soil are provided in the tabular contaminant concentration table (Appendix C)		
Proposed contractors and subcontractors	✓				
P.E. Signature and certification	✓				