Final Operations and Maintenance Plan

Lendrum Court

Presidio of San Francisco, California

THE PRESIDIO TRUST
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This report has been prepared for:

The Department of Toxic Substances Control

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Project No. 229649

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ACRONYMS

AB	aggregate base
AC	asphalt concrete
ARAR	Applicable or Relevant and Appropriate Requirements
BMP	best management practice
CCR	Construction Completion Report
COC	constituent of concern
CUL	cleanup level
DTSC	Department of Toxic Substances Control
ECBs	erosion control blankets
ECTC	Erosion Control Technology Council
HASP	Health and Safety Plan
LUC	land use control
LUCMRR	Land Use Control Master Reference Report
NOAA	National Oceanic and Atmospheric Administration
O&M	operations and maintenance
PAH	polycyclic aromatic hydrocarbon
Presidio	Presidio of San Francisco, California
RAO	remedial action objective
RAWP	Removal Action Workplan
RDIP	Remedial Design and Implementation Plan
Site	Lendrum Court Site
TCDD TEQ	tetrachlorodibenzo-p-dioxin toxic equivalent
Trust	Presidio Trust
TRC	TRC Solutions, Inc.

1.0 INTRODUCTION

The Lendrum Court Site (Site) is located in the Presidio of San Francisco, California (Presidio) and is managed by the Presidio Trust (Trust). The Site was remediated by the Trust in conformance with the *Final Removal Action Work Plan* (RAWP; TRC, 2015b). The following Operations and Maintenance (O&M) Plan describes activities that will be implemented to ensure that the remedy remains protective of human health and the environment at the Site and the incinerator area to the south of the Site. Site remediation and O&M are conducted under the oversight of the California Department of Toxic Substances Control (DTSC) while activities conducted at the incinerator area will be performed by the California Department of Transportation (Caltrans) that area remains under DTSC oversight per the Site Specific LUCMRR Addendums.

1.1 PROJECT OVERVIEW

The Final RAWP presents the selected remedy for the Site. The remedy included consolidation and capping of waste fill, implementation of land use controls (LUCs), and post-remediation monitoring and maintenance. Construction of the engineered cover elements was performed in accordance with the *Final Remedial Design and Implementation Plan* (Final RDIP; TRC, 2016). Documentation of remedial construction is presented in the *Construction Completion Report* (CCR) (TRC, 2019). The RAWP also includes the incinerator area, identifies the selected remedy, and summarizes the implementation of the remedy which had already occurred at the time of the RAWP preparation. Additionally, Appendix A of the RAWP includes detailed documentation of implementation of the investigation and implementation of the remedy by Caltrans as part of the Presidio Parkway construction. Due to the incinerator area being separate from the Lendrum Court Site, within the Caltrans Highway Easement Deed Area (HEA), and managed by Caltrans, the Trust chose to prepare two separate LUCMRR Addendums as follows:

- Lendrum Court Land Use Control Site Specific Addendum to the Presidio Trust Land Use Controls Master Reference Report LUC Areas A and B
    - Area A includes the Lendrum Court Capped Area
    - Area B includes the North of Building 1255/1256 Forest Area
- Lendrum Court Land Use Control Site Specific Addendum to the Presidio Trust Land Use Controls Master Reference Report LUC Area C
    - Area C includes the Incinerator Area

While these areas are separated into two LUCMRR addendum documents this O&M plan has been prepared to address all three LUC areas.

1.2 DESCRIPTION OF LENDRUM COURT

Lendrum Court is located within Area B of the Presidio, where the Trust has cleanup authority and administrative jurisdiction. Lendrum Court is a small residential neighborhood in the northwest corner of the Presidio, north of Doyle Drive and in the North Fort Scott Area (***Figure 1***). Army-era debris and incinerator ash were determined to be present in subsurface soils in the areas surrounding Buildings 1255, 1256, 1257, 1258, 1259, 1278, 1279, 1280, and 1282. The area generally slopes to the northeast in a series of terraces, originally graded to facilitate construction of building pads for the residential units and parking lot area. The sloping areas between the terraces are generally landscaped with grass and shrubs. The northeastern slope, behind buildings 1259, 1278, and 1279, consists of historic forest.

Prior to 1936, an incinerator was located approximately 150 feet south of the present-day Lendrum Court site. The incinerator, ash, and debris-impacted soils were discovered and excavated in 2015 during construction of the Doyle Drive Replacement Project. Residual debris and soil containing elevated lead within the Doyle Drive Replacement Project were left in place and capped with new highway pavement or with a soil cap.

At Lendrum Court, investigation activities were conducted between 2014 and 2015. The nature and extent of contamination at the Site was summarized in the *Lendrum Court Investigation Summary Report and Screening Risk Evaluation* (EKI, 2015). Army-era debris, including glass, ceramics, and ash, was encountered from the ground surface to approximately 2.5 feet and was up to 5 feet in thickness. Chemicals detected in the soil were identified as constituent of concern (COCs) based on comparison of the calculated exposure point concentrations to conservative Remedial Investigation screening levels (EKI, 2015). The COCs for the Site are summarized in **Section 1.3.1**.

1.3 REMEDIAL ACTION SUMMARY

The Final RAWP analyzed remedial alternatives for Lendrum Court. Based on the findings of the investigation activities and site-specific criteria, Alternative #3: Consolidation and Capping with LUCs and Post-Remediation Monitoring was selected as the preferred remedy.

As previously described, in advance of the preparation of the RAWP Caltrans worked with DTSC to select a remedy (Capping with LUCs and Post-Remediation Monitoring) for the incinerator area and implement it as detailed in Appendix A of the RAWP.

1.3.1 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the site included protection of human health and the environment, cost-effective cleanup of the Site, and compliance with Applicable or Relevant and Appropriate Requirements (ARARs). Site-specific cleanup levels (CULs) were derived based on the applicable Presidio-wide CULs developed in the *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco, California* (EKI, 2002; with updates through 2013), *Recreational Soil Cleanup Level for Lead* (TRC, 2015a), *Human Health Soil Preliminary Remediation Goals and Toxic Equivalency Values for Dioxins and Furans* (MACTEC, 2007), and the Final RAWP. The following compounds were identified as COCs in soil at the Site:

- Debris Fill Area
    - Metals – Arsenic, barium, copper, lead and zinc
    - Polycyclic Aromatic Hydrocarbon (PAHs) – Benzo(a)pyrene, benzo(a)pyrene equivalents and dibenzo(a,h)anthracene
    - Dioxins and Furans – Expressed as tetrachlorodibenzo-p-dioxin toxic equivalent (TCDD TEQ)
- Outside Debris Fill Area
    - Metals – Lead
    - Dioxins and Furans – TCDD TEQ

The RAOs were addressed through implementation of the selected remedy.

1.3.2 Remedial Action Design and Implementation

The Final RDIP described the processes used to implement the selected remedy at the Site. The selected remedy included consolidation and capping of impacted soils, clean closure excavation, and implementation of LUCs. Construction elements essential to the long-term success of the remedy include the integrity of cap, storm water and erosion controls, tree and plant health, and irrigation system performance. A summary of the closure design elements is provided below:

- **Cap Integrity** – Soils with COC impacts were consolidated and capped with an engineered clean soil cap, as well as hardscape elements, including concrete patios, stairs, and drains, aggregate base (AB) pads, and asphalt concrete (AC) paths. Additionally, existing sidewalks, streets, and buildings are considered part of the cap. The integrity of all cap elements is imperative for ongoing protection of human health and the environment.
- **Storm Water and Erosion Control** – Site grades were developed to primarily facilitate overland flow of storm water north and east through the historic forest area and towards the San Francisco Bay. In several locations where overland flow grades could not be

met, grades were constructed to drain storm water to drain inlets that connected either to the existing storm water piping system or to constructed discharge points draining into the historic forest. Following completion of construction, final erosion control measures, including Posi-Cube® stabilization product, straw, erosion control blankets, and straw wattles, were installed to control erosion until revegetation plants and trees have been established.

- **Tree and Plant Health** – Following remedial construction, the Site was revegetated to stabilize the new soil slopes and to restore the character of the Lendrum Court and historic forest areas. Additionally, a heavily vegetated area identified as North 1255/1256 Forest Area on ***Figure 2*** has been identified as a LUC area, being safe in its current configuration. As described in Section 7.4 of the CCR, the forested areas are approximately 0.025 acres and is densely vegetated and is determined inaccessible. TRC evaluated the ecological receptors that would potentially be exposed to the detected levels of lead present within the highly vegetated forest area. The ecological receptors would primarily include terrestrial plants and invertebrates as well as various wildlife such as birds and mammals that forage on plants and/or invertebrates. Due to the small exposure area as well as the existing presence of a highly vegetated forest environment that provides valuable ecological habitat, the risk to plants is considered negligible. Risks to terrestrial invertebrates are also considered negligible as the maximum detected lead concentration within the forest area is well below the United States Environmental Protection Agency (USEPA) ecological soil screening level. Given the small size of the forest vegetation area relative to the home ranges of potential wildlife receptors, the risks to wildlife that forage within this area is likely to be very low.
- **Irrigation System Performance** – An irrigation system consisting of drip lines for trees and large shrubs and stick-up sprinklers for landscape plants was installed during remedial construction. The irrigation system is integral to establishing vegetation of the Site. Once vegetation has been established, much of the irrigation system will be abandoned, and the remaining irrigation system will be maintained to serve the enhanced planting area vegetated with exotic species plants.

Post-construction Site conditions are shown on ***Figure 2***, the detailed sections of the specific cap elements are presented in ***Figure 3,*** and the Site drainage system is shown on ***Figure 5***. Additional details regarding the elements listed above are provided in the CCR.

1.4 LAND USE CONTROLS AT LENDRUM COURT

Areas of the Site in which contamination remains above the applicable screening levels will be addressed with three specific LUC Area. These include:

- LUC Area A – Lendrum Court Capped Area including:

  - Clean soil cap;
  - Hardscape and AB caps;
  - Existing roads and buildings
- LUC Area B – North of Building 1255/1256 Forest Area including:
  - Dense vegetation acting as a barrier within the North 1255/1256 Forest Area, including signage to limit landscaping and vegetation removal activities.
  - Signage posted around the North 1255/1256 Forest Area will include the following:
    DO NOT ENTER
    RESTRICTED LAND USE CONTROL AREA
    FOR MORE INFORMATION CONTACT
    TRUST REMEDIATION: 415-561-5300
- LUC Area C – Incinerator Area including:
  - Clean soil cap

A description of the three LUC areas, including figures depicting the locations, a summary of remaining COCs, and site-specific land use restrictions, is provided in the *Lendrum Court Land Use Control Site-Specific Addendum to the Presidio Trust Land Use Controls Master Reference Report* (LUCMRR Addendum; TRC, 2018a).

2.0 INSPECTIONS, MAINTENANCE, AND REPAIR

A post-closure inspection and maintenance program is required at the Site to verify that containment and monitoring components retain their integrity. Qualified personnel will inspect LUC areas to assess conditions. Due to the inaccessible nature of the incinerator area, this area will be inspected remotely, on a monthly basis to ensure that no work has been performed to compromise the Cap, no erosion has occurred that could compromise the Cap, that the area remains inaccessible to the public, and that there are no signs of trespassing. In the event that evidence of the Cap being compromised is observed the Trust will coordinate access with Caltrans to do a more detailed boots on the ground inspection. Inspections should be performed under the supervision of a qualified professional. The Trust remediation manager will select parties responsible for monitoring the integrity of the cap. Inspectors will be experienced in reviewing and inspecting caps, which include staff level geologists, engineers, or scientists working under the direction of a California licensed Professional Geologist (PG) or Engineer (PE) with experience in reviewing and inspecting caps.

During the Site inspections of LUC Areas A and B, the inspector will walk the Site and document conditions that may compromise the integrity of the cap system or indicate that the cover is not functioning as designed. For all LUC Areas inspectors will complete the Site Inspection Log and take photographs to document Site conditions at the time of the inspection. A

report will be prepared for each inspection, maintained by the Trust, and submitted to DTSC as part of the Annual O&M Report. Reports will include recommendations for maintenance or repairs if needed. DTSC will be notified within 48 hours of the observation of significant breaches, failures, or repairs of the cap system.

A sample Site Inspection Log that cover all three LUC areas are included in ***Appendix A***. The inspection log includes sections for documentation of the condition of the soil cap and hardscape elements, erosion control measures, vegetation, drainage systems, and irrigation system. The log also includes a section to note recommended maintenance or repairs. Alternate forms may be developed by the Trust and/or contractor as the frequency and scope of the inspections change over time. The alternate forms will be submitted to DTSC for approval prior to implementing the changes.

The key remedy features of the Site are summarized in ***Table 1*** along with their respective inspection, maintenance, monitoring elements and schedule. The features are also summarized in the Site Inspection Log in ***Appendix A***. Inspections should be performed on a quarterly basis for the first year following completion of construction activities. After one year, the results of the initial inspections will be reviewed and changes to the inspection program may be proposed. Inspections will also be performed after the following events to verify integrity of the cover system, The Trust remediation manager shall ultimately determine the need for these event specific inspections but my delegate this task to a consultant with the responsible partly being a registered PE or PG in California:

- **Significant storm events.** For the Site, a significant storm event will be defined as a 25-year rainfall event, as determined by the National Oceanographic and Atmospheric Administration (NOAA) website (https://hdsc.nws.noaa.gov/hdsc/pfds/). Total precipitation amounts will vary based on the storm duration; e.g., 1.06 inches in 1 hour; 2.57 inches in 6 hours; 4.77 inches in 24-hours, etc. Rainfall will be verified by the nearest rain gauge found on the NOAA website, located near Clement Street and Funston Avenue in San Francisco: http://www.wrh.noaa.gov/mesowest/timeseries.php?sid=D8008&num=48.

  Please note that erosion control measure inspections will also be conducted after 0.5-inch rain events (see **Section 2.2**).

- **Significant seismic events.** Significant seismic events are defined as M=5.5 or greater within 100 miles of the Site, as verified at http://www.ncedc.org/ncedc/catalog-search.html.

- **Significant fire events.** Significant fire events are defined by the occurrence of fire that requires mobilization of additional resources from outside the fire event area.

- **Significant flooding events.** Significant flooding events are defined by the extensive inundation of structures and roads within the Site.

- **Utility line breach.** Utility line breaches that result in disturbance of a cap.

2.1 CAP INTEGRITY

The soil cap constructed at Lendrum Court includes a minimum of 18-inches of soil underlain by gopher wire, with slopes ranging from near flat to 3H:1V, though some limited areas are as steep as 1.5 to 1. During inspections, the soil cap will be observed for signs of degradation, including but not limited to:

- Excessive soil erosion;
- Cracking in soil cap materials;
- Significant depressions indicative of excessive settlement;
- Slope failure; and
- Excessive rodent activity/burrowing.

Hardscape elements, including existing roadways and buildings and new patios, sidewalks, AB walking paths, stairs, and drains, also act as a cap at the Site. During the cap inspections, hardscape elements will be observed for signs of settling or deterioration, including:

- Cracking in concrete or asphalt surfaces;
- Excessive AB erosion;
- Excessive ponding of water;
- Obstructions in drain inlets or outlets;
- Soil erosion around the edges of hardscape elements; and
- Eroded hardscape elements.

The North 1255/1256 Forest Area has been determined to be safe in its current configuration. As described in Section 7.4 of the CCR, the forested areas are approximately 0.025 acres and is densely vegetated and is determined inaccessible. TRC evaluated the ecological receptors that would potentially be exposed to the detected levels of lead present within the highly vegetated forest area. The ecological receptors would primarily include terrestrial plants and invertebrates as well as various wildlife such as birds and mammals that forage on plants and/or invertebrates. Due to the small exposure area as well as the existing presence of a highly vegetated forest environment that provides valuable ecological habitat, the risk to plants is considered negligible. Risks to terrestrial invertebrates are also considered negligible as the maximum detected lead concentration within the forest area is well below the United States Environmental Protection Agency (USEPA) ecological soil screening level. Given the small size of the forest vegetation area relative to the home ranges of potential wildlife receptors, the risks to wildlife that forage

within this area is likely to be very low. During inspections the health of the vegetation will be observed for signs of sickness or excessive plant dieback. (see **Section 2.3** below)

Inspection reports shall note cap conditions and recommend maintenance or repairs to ensure ongoing protectiveness of the soil and hardscape cap. Maintenance activities may include:

- Placement and compaction of additional clean soil, AB, or other materials;
- Filling of rodent burrow holes;
- Removal of unwanted vegetation from soil cap areas;
- Drainage line, inlet and outlet cleanout or repair;
- Placement of additional erosion control measures (see **Section 2.2**);
- Filling of hardscape cracks; or
- In extreme scenarios, demolition and reconstruction of hardscape surfaces.
- Supplemental planting (see **Section 2.3** below).

Repairs or maintenance activities will be made in accordance with approved specifications, the design presented in the Revised RDIP, and the as-built documentation provided in the CCR. Repairs and maintenance in LUC Area C, located within the Caltrans HEA, will be performed primarily by Caltrans. Repairs will be documented and records will be maintained with this O&M Plan.

2.2 STORM WATER AND EROSION CONTROL

Following completion of construction, final erosion control measures and best management practices (BMPs) were implemented at the Site, as depicted on ***Figure 4***. These measures included erosion control blankets (ECBs) and straw wattles in the landscaped and historic forest areas to protect exposed soil until the Site is revegetated.

Erosion controls will be inspected quarterly for the first year following construction, as well as following qualifying storm events of 0.5 inches within a 24-hour period. During inspections, existing BMPs will be observed for signs of wear and deterioration. The inspector will note additional exposed areas that may require installation of BMPs. Maintenance of specific erosion control measures are summarized below:

- **Erosion Control Blankets** – ECBs were installed across the majority of the landscaped and historic forest area following completion of earthwork. The ECBs were Erosion Control Technology Council (ECTC) Type 4, with different anchoring patterns depending on the steepness of the area being covered. Maintenance of damaged or degraded ECBs may include repair and replacement of the fabric, in accordance with manufacturer's instructions and the Site's original erosion control plan.

- **Fiber Rolls –** Fiber rolls (straw wattles) were placed throughout the landscaped area and historic forest perpendicular to the slope of the graded soil. Maintenance of damaged or degraded fiber rolls may include replacement of old rolls, in accordance with the manufacturer's instructions and the Site's original erosion control plan.

Repairs or maintenance activities will be made in accordance with approved specifications, the design presented in the Final RDIP, and the as-built documentation provided in the CCR. Repairs will be documented and records will be maintained by the Trust.

2.3 TREE AND PLANT HEALTH

The Site was replanted and reforested following completion of remedial construction. Planting consisted of the following:

- Historic Forest:
  - Native Blackberry
  - Native Toyon
  - Eucalyptus trees
  - Pine trees
- Landscaped Areas:
  - Native Plant Slopes:
    - Dwarf coyote brush
    - Blackberry
  - Enhanced Areas:
    - Ornamental plants
    - Turf
    - No-mow grass

During O&M inspections, the Site inspector will observe the general growth and health of the vegetated areas to assess tree and plant health. Inspectors will take note of deficiencies in vegetative health or environment such as:

- Excessive distressed or dead vegetation;
- Areas of slower plant growth; and
- Patches of bare earth or inadequate coverage where vegetation is the primary form of erosion control and land use control.

Deficiencies will be noted on the inspection form. Maintenance of the planted areas may include:

- Providing nutrients to enhance tree or plant establishment;
- Adding erosion control measures to newly seeded areas or areas of exposed soil (see **Section 2.2**);

- Checking performance of the irrigation system and performing necessary repairs to ensure adequate watering (see **Section 2.3**);
- If warranted, replacing distressed or dead vegetation.
- In vegetated LUC area (North 1255/1256 Forest Area), temporary fencing with signage may be needed until plants are re-established.

2.4 IRRIGATION SYSTEM PERFORMANCE

During construction of the soil cap, an irrigation system was installed to establish vegetation and maintain non-native plants in landscaped areas. The irrigation system consists of drip lines for trees and large shrubs and stick-up sprinklers for landscape plants. If, during inspections, areas of dead or low performing vegetation are observed, the irrigation system will be tested to confirm it is functioning properly and not experiencing blockages, outages, or other operating issues. Deficiencies will be noted on the inspection form. Maintenance or repairs will be completed as needed to ensure proper operation of the watering system. It is anticipated that, following the initial plant establishment period, certain sections of the irrigation system will be abandoned once they are no longer necessary.

2.5 EMERGENCY MONITORING AND MAINTENANCE

Regular visual inspections of the cap are to be performed quarterly (initial frequency only). Additional inspections will be performed after significant storms (25-year, 24-hour), significant seismic events (M=5.5 or greater within 100 miles of the Site), significant fire events (mobilization of additional resources), significant flooding events (inundation of structures and roads), and utility line breach (breach that results in cap disturbance). Occurrence of a significant event will be as documented by the following websites:

1. The Trust will monitor the nearest rain gauge found on NOAA's Mesonet Observations website, located near Clement Street and Funston Avenue in San Francisco: http://www.wrh.noaa.gov/mesowest/timeseries.php?sid=D8008&num=48.

   A 25 year rainfall event is considered to have occurred when 2 inches of precipitation occur in 6 hours or 4 inches of precipitation occur in 24 hours. These criteria are based on NOAA's Western US Precipitation Frequency Maps, which can be found at the following website: http://www.wrcc.dri.edu/pcpnfreq.html.

2. Following a significant seismic event with shaking felt at the Presidio, and at least quarterly, the Trust will check the Northern California Earthquake Catalog website to confirm whether a qualifying seismic event has occurred at: http://www.ncedc.org/ncedc/catalog-search.html.

The site inspection log in ***Appendix A*** can be used for emergency inspections to document any resulting slope movement, cover cracking, damage to surface water conveyance structures, excessive erosion, etc. Appropriate repairs will be developed based on the findings of the initial and any follow-up inspections performed.

The Trust remediation manager will select parties responsible for implementing the Emergency Monitoring and Maintenance. Inspections and maintenance will be performed by personnel that are experienced in reviewing and inspecting caps, which include which include staff level geologists, engineers, or scientists working under the direction of a California licensed Professional Geologist or Engineer with experience in reviewing and inspecting caps.

3.0 HEALTH AND SAFETY

Personnel involved in inspections, maintenance, and repair, or monitoring activities at Lendrum Court should be aware of health and safety considerations at the site and should perform their work under an appropriate Health & Safety Plan (HASP). A site specific HASP for Lendrum Court LUC Areas A and B is provided in ***Appendix B***. This HASP has been developed based on the Site conditions and the COCs, and should be considered a minimum standard for personnel performing O&M activities at the site and should be reviewed prior to any construction activities at the Site. If work is to be performed at the Site that is not discussed in this HASP or at LUC Area C, either a new HASP will be prepared, or the current Appendix B HASP will be amended to include the additional scope of work prior to the start of construction.

4.0 FUTURE DEVELOPMENT CONSIDERATIONS

The Site is anticipated to remain in its current condition for the foreseeable future. The Lendrum Court area will remain residential, forested areas will remain vegetated, and the incinerator area will continue to be covered by a two foot thick soil cap within the Caltrans right of way with restricted access. No additional development is anticipated within these areas. Given the anticipated uses of these areas, the LUC for the Site includes the following requirements:

- Personnel potentially exposed to soils below the cap within the LUC Area shall follow a site-specific HASP (all LUC areas);
- Soils excavated from the LUC Area shall be managed/disposed in accordance with applicable Presidio policies and applicable law and regulations (all LUC areas);
- Soil within capped areas shall remain covered, at a minimum, by the typical cap sections described in the CCR and depicted in ***Figure 3*** (Lendrum Court Capped Area, LUC Area A);
- Lendrum Court tenants will be informed of the LUC (Lendrum Court Capped Area, LUC Area A);
- Digging will continue to be prohibited by residents in the neighborhood;

- Incinerator area will remain restricted to the general public (Incinerator Area, LUC Area C);
- Vegetated LUC area will maintain its vegetative cover (North 1255/1256 Forest Area, LUC Area B) and informational signage.

The Lendrum Court tenants leasing from the Trust will be notified of the LUCs with updated lease agreements, which will provide information about the LUCs in place. Current and future lease agreements all prohibit digging in soil by residents, additionally, the Trust has a policy that any digging activity occurring within the Presidio requires a Dig Permit which allows the Trust permitting office to identify digging activities in LUCs in advance of the work and ensure proper protocols are followed. The only exception to this Dig Permit process is the HEA, in which the Incinerator Area falls. In this area, inspections will be done monthly, initially, and may be reduced in the future with DTSC approval. Annual LUC inspections as well as periodic informal site visits will check for evidence of unauthorized digging. If evidence is observed, Trust remediation will work with the residential property management group to notify residents and take necessary action to ensure compliance with the lease agreements.

Please refer to the LUCMRR Addendums for additional details regarding site restrictions for the Site LUC. Site-specific land use restrictions for the incinerator area are provided in the *Lendrum Court Incinerator Area Land Use Control Site-Specific Addendum to the Presidio Trust Land Use Controls Master Reference Report* (Incinerator Area LUCMRR Addendum; TRC, 2018b).

5.0 SITE ACCESS

The majority of the Site is accessible to DTSC and its authorized representatives at reasonable times.

6.0 REPORTING REQUIREMENTS

The Trust will include O&M of the Site as part of the annual O&M report submitted to DTSC, as required under the 2012 Operations and Maintenance Agreement between DTSC and the Trust (DTSC, 2012). The annual O&M report documents Trust compliance with site specific O&M plans and informs DTSC of changes to the Site.

6.1 ANNUAL INSPECTION SUMMARY REPORTS

The results of inspection and monitoring activities will be presented in the Annual O&M Report submitted to DTSC. The report will include the Site Inspection Logs, description of inspection observations, maintenance and repair activities, and a Site map showing the containment area and any features requiring repair or maintenance.

After the first year of operations, the Trust will evaluate the frequency of inspections described in **Section 2.0** and shown on ***Table 1***. If a reduction in the frequency and scope of inspections is warranted, the Trust will include justification for the proposed change in the Annual O&M report submitted to DTSC for approval of the proposed change.

6.2 FIVE-YEAR REVIEW REPORTS

The first Five-Year Review Report for the site will be completed five years from the date DTSC approves the LUCMRR Addendum for the Site. All subsequent Five-Year Review Reports will be completed five years from the date of the prior Five-Year Review Report. Five-Year Review Reports will be maintained with the other Site documents at the Presidio.

The Five-Year Review Report will identify any incidents or problems with the cap systems, and will evaluate system performance, effectiveness, and protectiveness. The Five-Year Review Report will include a technical assessment and evaluation of the on-going protectiveness of the remedy, and make recommendations for any changes needed to maintain remedy protectiveness, if necessary. Five year reviews will follow guidance documents provided by the EPA at the following location: https://www.epa.gov/superfund/writing-five-year-reviews-superfund-sites.

6.3 DATA AND DOCUMENT AVAILABILITY

All data and documentation, including field reports, inspections, regular reports, and other relevant documents will be maintained by the Presidio Trust Remediation Department for a period of 6 years from the termination of the Lendrum Court Voluntary Oversight Agreement between DTSC and the Trust.

7.0 FINANCIAL ASSURANCE

As a Federal Agency, the Trust is not required to provide financial assurance. Operation and maintenance of the containment cover will be performed indefinitely, or until no longer required by DTSC. The cost of O&M activities and associated DTSC oversight activities will be covered by the Trust.

8.0 VARIANCE FROM OR MODIFICATION OF THE O&M PLAN

The Trust may seek variance from and/or modification to the O&M Plan at any time during the life cycle of the cap remedy. The Trust will submit a written request to DTSC for such variations from the O&M Plan. DTSC will evaluate the request, and will grant a variance request only after determining that the request would be protective of human health and the environment.

9.0 REFERENCES

DTSC, 2012. Operation and Maintenance Agreement. December 6.

Erler & Kalinowski (EKI), 2002. *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco, California.* October.

Erler & Kalinowski (EKI), 2014. *North Fort Scott Investigation Summary Report, Presidio of San Francisco, California.* July 8.

Erler & Kalinowski (EKI), 2015. *Remedial Investigation Summary Report and Screening Risk Evaluation, Presidio of San Francisco.* May.

MACTEC, 2007. *Technical Memorandum, Human Health Soil Preliminary Remediation Goals and Toxic Equivalency Values for Dioxins and Furans, Presidio of San Francisco, California,* 28 March 2007.

TRC, 2015a. *Recreational Soil Cleanup Level for Lead, Presidio of San Francisco, California.* April 6.

TRC, 2015b. *Removal Action Work Plan, Lendrum Court, Presidio of San Francisco, California.* July.

TRC, 2016. *Final Remediation Design and Implementation Plan, Lendrum Court, Presidio of San Francisco, California*. May.

TRC, 2018a. *Lendrum Court Land Use Control Site-Specific Addendum to the Presidio Trust Land Use Controls Master Reference Report.* In Progress.

TRC, 2018b. *Lendrum Court Incinerator Area Land Use Control Site-Specific Addendum to the Presidio Trust Land Use Controls Master Reference Report.* In Progress.

TRC, 2019. *Construction Completion Report.* In Progress.

FIGURES

LEGEND

- LENDRUM COURT AREA
- APPROXIMATE FORMER INCINERATOR AREA
- AREA A / B BOUNDARY

N

0 500 1000

SCALE IN FEET

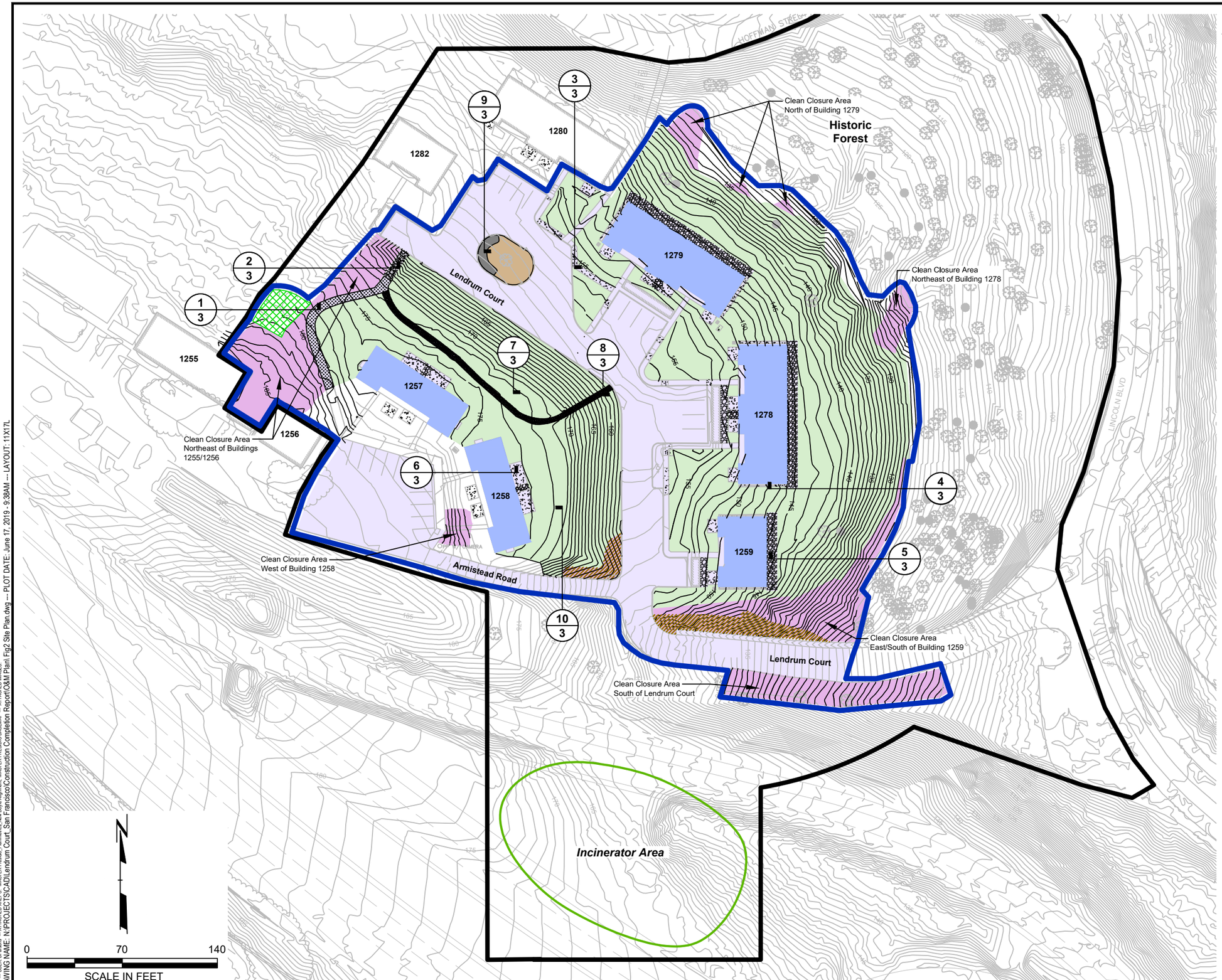
PROJECT:
THE PRESIDIO TRUST
LENDRUM COURT AND INCINERATOR AREA
SAN FRANCISCO, CALIFORNIA

TITLE:
SITE LOCATION MAP

DRAWN BY:	K. LI	PROJ NO.:	229649.00005A.00000D
CHECKED BY:	A. ANG		
APPROVED BY:	J. H-D		**FIGURE 1**
DATE:	JANUARY 2018		

TRC
505 Sansome Street
Suite 1600
San Francisco, CA 94111
Phone: 415.434.2600

FILE NO.: Fig1 Site Location Map.dwg



LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE REMEDIAL ACTION AREA
- 140 SURFACE CONTOURS (OUTSIDE PROJECT AREA)
- 140 FINAL PROJECT SURFACE CONTOURS
- APPROXIMATE LIMITS OF VEGETATED SOIL CAP (LUC AREA A)
- APPROXIMATE AREAS OF BUILDING THAT SERVE AS CAP (LUC AREA A)
- AREAS OF ASPHALT, PAVEMENT, AB PADS, AND HARDSCAPE THAT SERVE AS CAP (LUC AREA A)
- APPROXIMATE AREAS EXCAVATED AND CLEAN CLOSED
- APPROXIMATE AREAS EXCAVATED TO EXPOSED BEDROCK (CLEAN CLOSURE AREA)
- TREE ISLAND CAP COMPACTED AGGREGATE BASE (LUC AREA A)
- TREE ISLAND CAP WOOD MULCH (LUC AREA A)
- NEW CONCRETE PATIOS, SIDEWALKS AND STAIRS
- RECYCLED CONCRETE AGGREGATE BASE PATH AND BOX STEPS
- NEW ASPHALT PATH
- NEW AGGREGATE BASE CAP
- VEGETATED LUC AREA B (NORTH 1255/1256 FOREST AREA)
- APPROXIMATE TREE LOCATION
- APPROXIMATE TOYON LOCATION
- 1/3 DETAIL NUMBER
- FIGURE NUMBER WHERE DETAIL CAN BE FOUND

SOURCE: Base map by Towill, Oct.- Nov. 2015, Apr. 2016, May 2017, and Jan. 2018

PROJECT:
THE PRESIDIO TRUST
LENDRUM COURT AREA
SAN FRANCISCO, CALIFORNIA

TITLE:
SITE PLAN

DRAWN BY:	K. LI	PROJ NO.:	229649.00005A.00000D
CHECKED BY:	A. ANG		
APPROVED BY:	J. H-D		**FIGURE 2**
DATE:	APRIL 2019		

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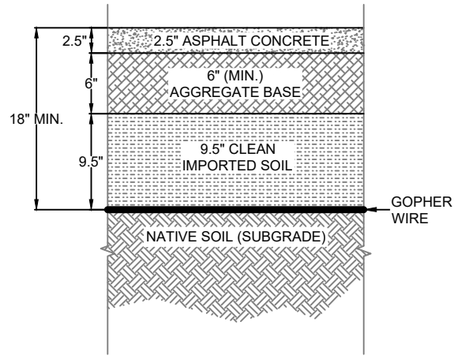
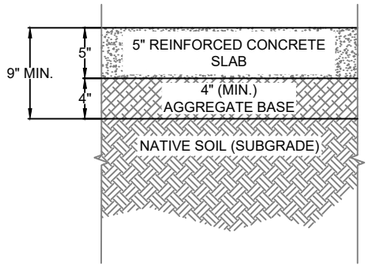
Suite 1600
San Francisco, CA 94111
Phone: 415.434.2600

FILE NO.: Fig2 Site Plan.dwg



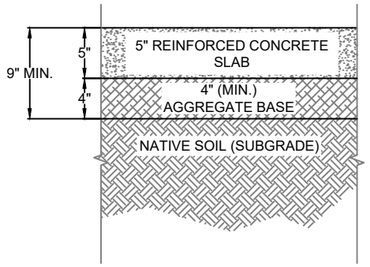
1/3 SECTION

ASPHALT CONCRETE PATH



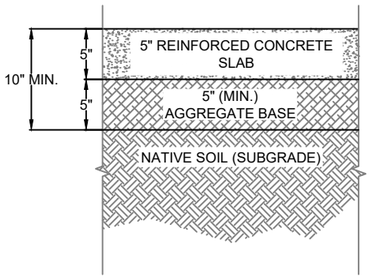
2/3 SECTION

CONCRETE STAIRCASE



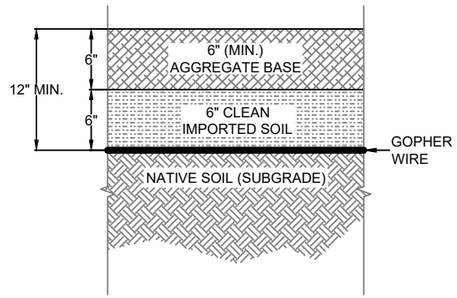
3/3 SECTION

CONCRETE SIDEWALK



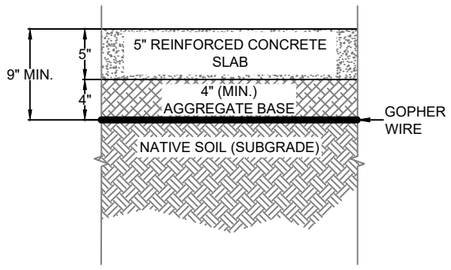
4/3 SECTION

CONCRETE DRAIN



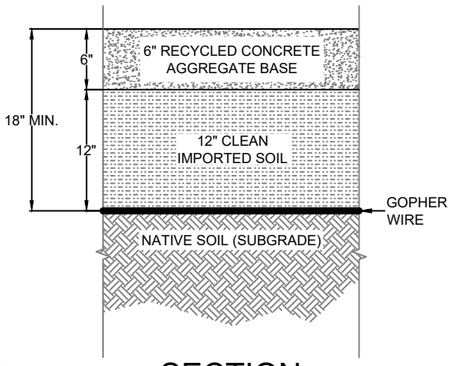
5/3 SECTION

AGGREGATE BASE PAD



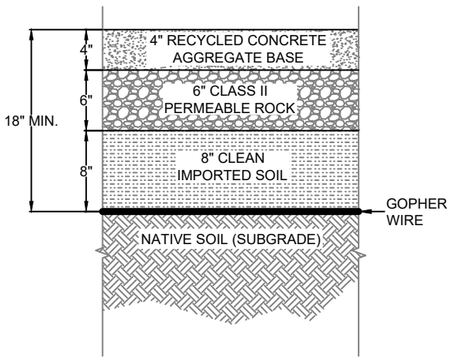
6/3 SECTION

CONCRETE PATIO



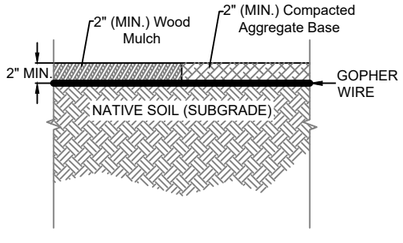
7/3 SECTION

RECYCLED CONCRETE
AGGREGATE BASE PATH



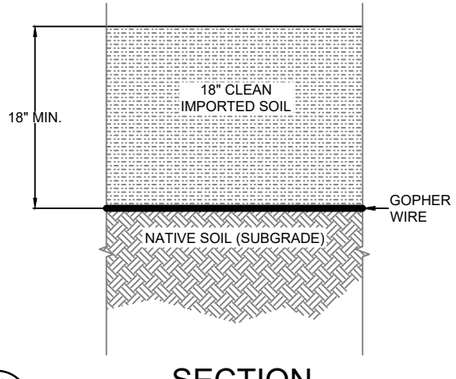
8/3 SECTION

RECYCLED CONCRETE
AGGREGATE BASE STAIRS



9/3 SECTION

TREE ISLAND CAP



10/3 SECTION

SOIL CAP

PROJECT:

THE PRESIDIO TRUST
LENDRUM COURT AREA
SAN FRANCISCO, CALIFORNIA

TITLE:

CAP CROSS-SECTIONS

DRAWN BY:	K. LI	PROJ NO.:	229649.00005A.00000D
CHECKED BY:	A. ANG		
APPROVED BY:	J. H-D		**FIGURE 3**
DATE:	JANUARY 2018		

TRC
505 Sansome Street
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San Francisco, CA 94111
Phone: 415.434.2600

FILE NO.: Fig3 Cap Cross-Sections.dwg

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE REMEDIAL ACTION AREA
- 140 — FINAL SURFACE CONTOURS (OUTSIDE PROJECT AREA)
- 140 — FINAL SURFACE CONTOURS
- APPROXIMATE LIMITS OF VEGETATED CAP
- APPROXIMATE AREAS OF BUILDING THAT SERVE AS CAP
- AREAS OF ASPHALT, PAVEMENT AND HARDSCAPE THAT SERVE AS CAP
- APPROXIMATE AREAS EXCAVATED AND CLEAN CLOSED
- APPROXIMATE AREA EXCAVATED TO EXPOSED BEDROCK (CLEAN CLOSURE AREA)
- TREE ISLAND CAP COMPACTED AGGREGATE BASE
- TREE ISLAND CAP WOOD MULCH
- NEW CONCRETE PATIOS, SIDEWALKS AND STAIRS
- RECYCLED CONCRETE AGGREGATE BASE PATH
- NEW ASPHALT PATH/ROADWAY
- NEW AGGREGATE BASE CAP
- VEGETATED LUC
- ECTC TYPE 4 EROSION CONTROL BLANKET ANCHORING PATTERN A, SEE DETAIL 2, C-116 (AS-BUILT)
- ECTC TYPE 4 EROSION CONTROL BLANKET ANCHORING PATTERN B, SEE DETAIL 2, C-116 (AS-BUILT)
- FIBER ROLL (STRAW WATTLE)
- SITE TREE PROTECTED DURING REMEDIAL CONSTRUCTION
- TOYON (HETEROMELES ARBUTIFOLIA) PROTECTED DURING REMEDIAL CONSTRUCTION

SOURCE: Base plan by Towill, October 29-November 4, 2015

PROJECT:
THE PRESIDIO TRUST
LENDRUM COURT AREA
SAN FRANCISCO, CALIFORNIA

TITLE:
FINAL EROSION CONTROL PLAN

DRAWN BY:	K. LI	PROJ NO.:	229649.00005A.00000D
CHECKED BY:	A. ANG		**FIGURE 4**
APPROVED BY:	J. H-D		
DATE:	JANUARY 2018		

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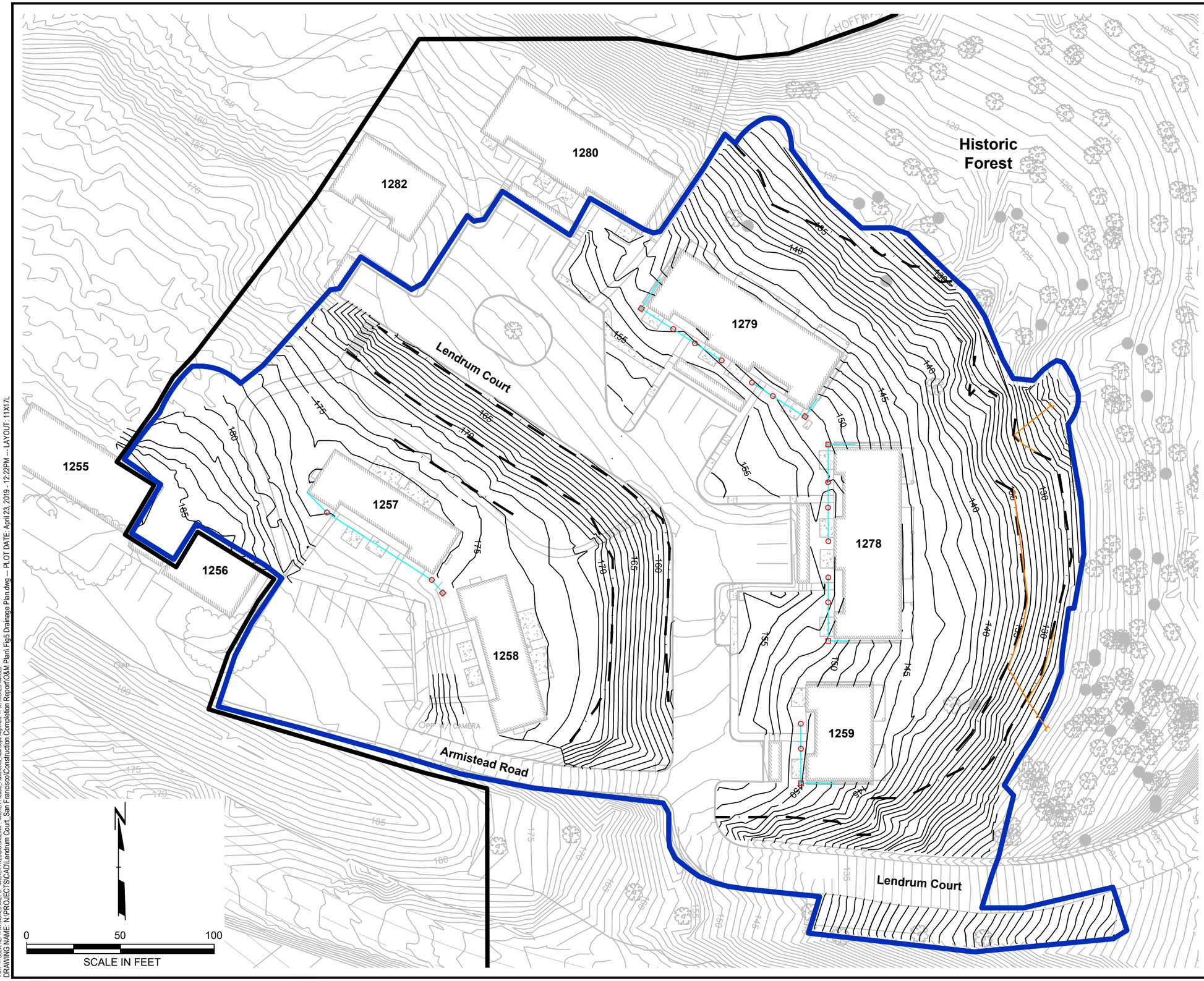
San Francisco, CA 94111
Phone: 415.434.2600

FILE NO.: Fig4 Final Erosion Control Plan.dwg

11x17 --- USER: KLi --- ATTACHED XREFS: C106-Post Construction Grading Plan-PII_90_03.17.16; Contours&Spots_New Topo-Final Grade Trim REV 11.09.2017; Presidio_Planimetrics_ROADS_BLDGS ONLY_REV Lendrum Ct; Final Surface Contours --- ATTACHED IMAGES: image008;
DRAWING NAME: N:\PROJECTS\CAD\Lendrum Court_San Francisco\Construction Completion Report\O&M Plan\ Fig4 Final Erosion Control Plan.dwg --- PLOT DATE: January 16, 2018 - 4:49PM --- LAYOUT: 11X17L
Version: 2017-10-21



LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE REMEDIAL ACTION AREA
- 140 SURFACE CONTOURS (OUTSIDE PROJECT AREA)
- 140 FINAL PROJECT SURFACE CONTOURS
- KEY TRENCHES
- DRAINAGE LINES
- APPROXIMATE TREE LOCATION
- APPROXIMATE TOYON LOCATION
- DRAIN LINE CLEANOUT
- SURFACE DRAIN INLET
- APPROXIMATE KEY TRENCH SUBDRAIN AND DISCHARGE POINT LOCATIONS

NOTES

1. FIGURE DOES NOT SHOW IRRIGATION LINES.
2. ALL IRRIGATION LINES WERE CONSTRUCTED WITHIN CAP.

SOURCE: Base map by Towill, Oct.- Nov. 2015, Apr. 2016, May 2017, and Jan. 2018

PROJECT:
THE PRESIDIO TRUST
LENDRUM COURT AREA
SAN FRANCISCO, CALIFORNIA

TITLE:
DRAINAGE PLAN

DRAWN BY:	K. LI	PROJ NO.:	229649.00005A.00000D
CHECKED BY:	A. ANG		
APPROVED BY:	J. H-D		**FIGURE 5**
DATE:	APRIL 2019		

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FILE NO.: Fig5 Drainage Plan.dwg

TABLES

Table 1. Inspection and Monitoring Schedule
Lendrum Court O Plan
Presidio of San Francisco, California

Inspection/Monitoring Requirement	Site Area			Frequency[2]	Description *Inspection and maintenance of the cover system are required to identify the following conditions.*	Maintenance/Repair *Based on findings of the inspection/monitoring tasks, maintenance or repairs may be required to ensure ongoing protectiveness of the selected remedy.*	Reporting
	Lendrum Court	Vegetated LUC Area	Incinerator Area[1]				
Cap Inspection	X	X	X	Quarterly; after qualifying storm/seismic events	**Soil Cover:** • Excessive soil erosion; • Cracking in soil cap materials; • Significant depressions indicative of excessive settlement; • Slope failure; • Rodent activity/burrowing; and • Vegetation Health. **Hardscape:** • Cracking in concrete or asphalt surfaces; • Excessive AB erosion; • Excessive ponding of water; • Operation of drainage systems • Soil erosion around the edges of hardscape elements; and • Eroded hardscape elements.	**Soil Cover:** • Placement and compaction of additional clean soil or other materials; • Filling of rodent burrow holes; • Removal of unwanted vegetation from soil cap areas; • Placement of additional erosion control measures (see Section 2.2); • Planting (see Section 2.3); **Hardscape:** • Filling of hardscape cracks; • Placement and compaction of additional clean AB or other materials; • Demolition and reconstruction of hardscape surfaces; and/or • Drainage system cleanout or repair.	Quarterly inspections and maintenance/repairs are to be documented on Site Inspection Forms (Appendix A) and submitted with the Presidio's Annual O&M Report.
Storm Water/Erosion Control Inspection	X			Quarterly; after qualifying rain events	• Erosion control blankets may show signs of wear or deterioration; • Straw wattles may show signs of wear or deterioration; and • Exposed areas that may require BMPs.	• Repair/replace erosion control blankets; • Repair/replace straw wattles that are degraded; and/or • Install additional BMPs where needed.	
Tree/Plant Health Inspection	X	X		Quarterly	• Distressed or dead vegetation; • Areas of slower plant growth; and • Patches of bare earth or inadequate coverage where vegetation is the primary form of erosion control.	• Providing nutrients to enhance tree or plant establishment; • Adding erosion control measures to newly seeded areas or areas of exposed soil (see Section 2.2); • Checking performance of the irrigation system and performing necessary repairs to ensure adequate watering (see Section 2.3); • Replace distressed or dead vegetation, if warrented; and/or • Temporary fencing with signage until plants are re-established in LUC areas.	
Irrigation System	X			Quarterly	• Observe irrigation system to ensure proper function.	• Make necessary repairs to drip lines, sprinkler heads, electric, etc.	
LUC Inspection	X	X	X	Annually	Sitewide inspection for all of the above elements of the Site that affect the Site's LUC.	Maintenance or repairs for any of the above elements shall be made as soon as feasible and documented.	Results of the annual LUC inspection will be included in the Presidio's Annual O&M Report

Notes:

[1] Due to its location beneath US Highway 101, the Incinerator area is not generally accessible and is therefore not subject to regular inspections. The area is protective in its current configuration.

[2] After the first year of quarterly inspections, the frequency of inspection may be reviewed and potentially reduced.

AB = aggregate base
BMP = best management practice
LUC = land use control
O&M = operations and maintenance

APPENDIX A

SITE INSPECTION LOG

Appendix A
Site Inspection Log
Lendrum Court Operations & Maintenance Plan
Presidio of San Francisco, California

Date: _____ Weather: _____

Inspector: _____ Signature: _____

Instructions for Completing Site Inspection Log: Features listed in the inspection log at the Lendrum Court Site will be visually inspected for any deficiencies. Integrity of site features will be detailed in the Site Inspection Log. A photographic log of site features will be included as an attachment to the Site Inspection Log. A figure markup will be included as an attachment to the Site Inspection Log if any deficiencies are identified. Features locations and details are detailed on Figures C-114 and C-115 in Appendix D of the Construction Completion Report.

Due to the inaccessible nature of the incinerator area, this area will be inspected remotely once a year to ensure that the area is not accessible and that there are no signs of trespassing.

Inspectors will be experienced in reviewing and inspecting caps, which include staff level geologists, engineers, or scientists working under the direction of a California licensed Professional Geologist or Engineer with experience in reviewing and inspecting caps.

Clean Soil Cap

- Landscaped Cap North/Northeast of Buildings 1257/1258
- Landscaped Cap South/West of Buildings 1259/1278/1279
- Historic Forest Cap North/East of Building 1259/1278/1279

General Soil Cover Condition (cracking, erosion, slope movement, etc.):

Surface Water Ponding:

Burrowing Animals:

Recommended Actions/Maintenance:
Hardscape Elements • Concrete patios, sidewalks, and stairs • Asphalt paths • Aggregate base paths/caps • Existing paved roadways/parking areas
General Hardscape Condition (cracking, erosion, etc.):
Surface Water Ponding:
Erosion around Hardscape Edges:
Eroded Hardscape Elements:
Recommended Actions/Maintenance:
Temporary Erosion Control Measures
Erosion Control Blankets:

Fiber Rolls/Straw Wattles:
Exposed Areas Potentially Requiring BMPs:
Recommended Actions/Maintenance:
Tree and Plant Health • Landscaped areas around Lendrum Court • Vegetated LUC Area • Historic Forest behind Buildings 1279/1278/1259
Distressed Vegetation:
Areas of Slower/Struggling Growth:
Patches of Exposed Earth:
Irrigation System:
Recommended Actions/Maintenance:

Appendix A
Site Inspection Log
Lendrum Court Operations & Maintenance Plan
Presidio of San Francisco, California

Incinerator Area
General Soil Cover Condition:
Site Accessibility/Signs of Trespassing:
Tree and Plant Health:
Overall Observations/Recommendations

APPENDIX B

SITE-SPECIFIC HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN

Lendrum Court Site
Presidio of San Francisco, California
June 2019

Prepared for:
Presidio Trust
103 Montgomery St.
P.O. Box 29052
San Francisco, CA 94129

Prepared by:
TRC Environmental Corporation
41 Spring Street
New Providence, NJ 07974

TRC Project Number: 229649

Table of Contents

Tables

Appendices

1. Introduction

This Health and Safety Plan (HASP) was prepared by TRC Environmental Corporation (TRC) for the Presidio Trust as a guidance document for the Lendrum Court site in the Presidio of San Francisco, California (the "Project" or "Job Site"). This HASP shall only be used to address operations and maintenance (O&M) activities, including repair, at the capped and/or LUC areas of the Lendrum Court Site. Use of this HASP for any other purpose is strictly prohibited, and TRC disclaims any and all liability for any such use. By preparing this HASP, TRC does not assume responsibility or liability for job site safety, unknown or unforeseen hazards at the Job Site, or for the implementation of this HASP. This HASP in no way relieves Presidio Trust, or its contractors or subcontractor companies/employees of legal obligations to any local, state or federal regulations or requirements. Contractors and subcontractors are responsible for developing and implementing their own safety programs in accordance with Cal/OSHA regulations.

In addition, any changes or modifications to the scope of work will require the site work to cease and the hazards associated with the revised scope of work be re-examined and documented. This HASP was prepared based on hazards reasonably anticipated when performing field activities listed in the scope of work. If during the course of performing field work, additional hazards are identified which are not addressed in this HASP, the site work must cease, and the hazards re-examined.

1.1 Site Information

Lendrum Court is located within Area B of the Presidio, where the Trust has cleanup authority and administrative jurisdiction. Lendrum Court is a small residential neighborhood in the northwest corner of the Presidio, north of Doyle Drive and in the North Fort Scott Area (***Figure 1***). Army-era debris and incinerator ash were determined to be present in subsurface soils in the areas surrounding Buildings 1255, 1256, 1257, 1258, 1259, 1278, 1279, 1280, and 1282. The area generally slopes to the northeast in a series of terraces, originally graded to facilitate construction of building pads for the residential units and parking lot area. The sloping areas between the terraces are generally landscaped with grass and shrubs. The northeastern slope, behind buildings 1259, 1278, and 1279, consists of historic forest.

Prior to 1936, an incinerator was located approximately 150 feet south of the present-day Lendrum Court site. The incinerator pad, ash, and debris-impacted soils were discovered and excavated in 2015 during construction of the Doyle Drive Replacement Project. Residual debris and soil containing elevated lead within the Doyle Drive Replacement Project were left in place and capped with new highway pavement or with a soil cap.

At the Lendrum Court site, investigation activities were conducted between 2014 and 2015. The nature and extent of contamination at the site was summarized in the *Lendrum Court Remedial Investigation Summary Report and Screening Risk Evaluation* (EKI, 2015). Army-era debris, including glass, ceramics, and ash, was encountered from the ground surface to approximately 2.5 feet below ground surface and was up to 5 feet in thickness. During remediation, debris fill soils were either excavated, consolidated and capped with 18-inches of clean soil underlain with steel wire mesh or hardscape, or disposed off-site.

Chemicals detected in the soil were identified as constituents of concern (COCs) based on comparison of the calculated exposure point concentrations to conservative Remedial Investigation screening levels (EKI, 2015).

The following compounds were identified as COCs in soil at the Site:

- Debris Fill Area (LUC Area A)
  - Metals – Arsenic, barium, copper, lead and zinc
  - Polycyclic Aromatic Hydrocarbon (PAHs) – Benzo(a)pyrene, benzo(a)pyrene equivalents and dibenzo(a,h)anthracene
  - Dioxins and Furans – Expressed as tetrachlorodibenzo-p-dioxin toxic equivalent (TCDD TEQ)
- Outside Debris Fill Area (LUC Area B)
  - Metals – Lead

1.2 Emergency Contact Information

Table 1 - Emergency Telephone Numbers

Service	Emergency	Direct Telephone Numbers
Presidio Park Police	**Emergency:911**	Emergency: (415) 561-5656 Non-emergency: (415) 561-5505
Police		(415) 561-5656
Fire:		(415) 561-5656
Ambulance:		(415) 561-5656
Poison Control: (use applicable local number)		800 222-1222
CHEMTREC:		800-424-9300 (Customer No. CCN 671126)

1.3 Medical Facility Identification and Directions

Hospitals or clinics identified for emergency medical care should be contacted in advance of fieldwork, to verify that emergency care is provided at that location. Verify the exact location of the medical facility during this call.

Drive the emergency route as defined below before the fieldwork begins to verify that the planned route is feasible.

Nearest Hospital: California Pacific Medical Center

Hospital Address: Castro Street &, Duboce Ave, San Francisco, CA 94114

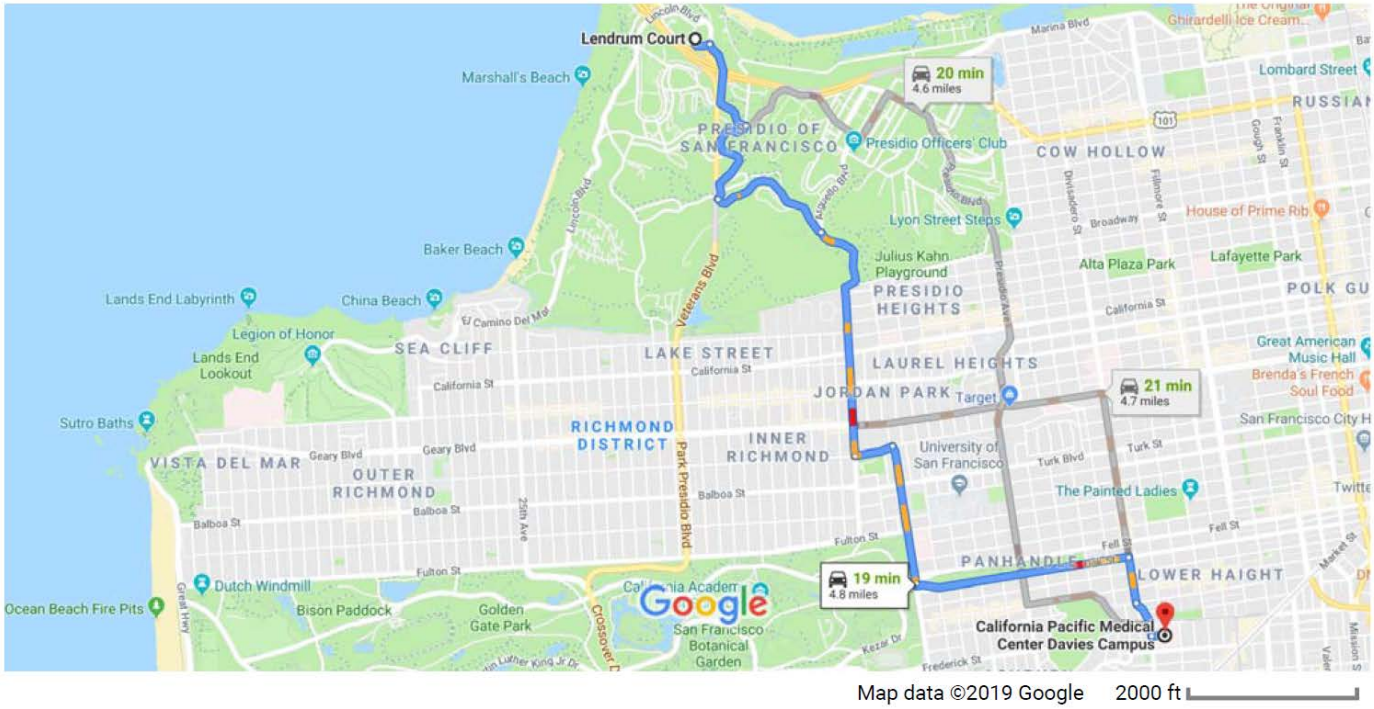
Hospital Telephone Number: General Line: (415) 600-6000

Directions to Hospital (see attached Map):

1. Head south on Lendrum Court towards Armistead Road
2. Turn right onto Lincoln Boulevard
3. Turn right onto Park Boulevard
4. Turn left on Washington Boulevard
5. Turn right onto Arguello Boulevard
6. Turn left onto Anza Street
7. Turn right onto Stanyan Street
8. Turn left onto Oak Street
9. Turn right after Chase Bank
10. Use right lane to turn slightly left onto Castro Street

Map to Hospital:

Google Maps Lendrum Ct, San Francisco, CA 94129 to California Pacific Medical Center Davies Campus Drive 4.8 miles, 19 min



1.4 Work Scope Summary

This HASP documents site-specific guidelines for Presidio Trust workers and any contractor/subcontractor who performs maintenance and/or repairs at the Lendrum Court site as part of ongoing operations and maintenance of the site including:

- Cap maintenance to assure continued performance of engineered cap areas;
- Maintenance and repair of stormwater systems;
- Maintenance of hardscape covers, including patios, sidewalk and asphalt roadway;
- Maintenance of vegetative cover including shrubs and trees; and
- Maintenance of the irrigation system

This HASP addresses general hazards that could be encountered during routine repair work that may be needed in both uncontaminated areas (i.e, in the clean cap) and in potentially impacted areas of the site. Larger repair work such as excavating to re-build the cap may require modification of the HASP depending on contaminant levels encountered and extent of construction activites.

1.5 Project Site Policy

This HASP is tailored as guidance for the various types of O&M tasks that will be conducted at the Lendrum Court site. It is available to, and is to be followed by, all workers conducting any O&M task at the Lendrum Court site. All contractor and subcontractors shall prepare their own HASP that satisfies the requirements set forth in this HASP and employees shall be trained by their companies on the contents of their company's HASP.

All site personnel, including contractors and subcontractors, will familiarize themselves with the contents of this HASP and apply it during work activities. Furthermore, all project personnel are required to participate in required safety orientation training and provide appropriate documentation of the training prior to performing any work on the project. Safety is the responsibility of everyone on site, requiring every person to work together to achieve a safe workplace.

1.6 General Liability Policy

All contractors and subcontractors shall take all necessary precautions to protect the public, the facilities, the personnel and the neighbors of the Lendrum Court site from hazards involving safety and health arising from any ongoing maintenance and repair work. All operations shall be isolated from the public to the greatest extent possible.

2. Program Administration

Program administration is one of the key elements in communicating and coordinating construction activities and safety and health obligations. For this reason, activities and procedures have been established to ensure all persons on site shall work in a safe and healthful environment where activity is coordinated and organized.

2.1 Use of This HASP by Subcontractors

Copies of this HASP must be included in contractor/subcontractor bid packages for work at this site. Each contractor/subcontractor shall keep a copy of this HASP on-site. The contractor shall thoroughly train and

familiarize their employees and their subcontractor's employees with the minimum requirements set forth in this manual and any changes which are made to it.

2.2 Health and Safety Coordination Meetings

A regular Project Health and Safety coordination meeting will be coordinated by the Presidio Trust Project Manager that all contractors and subcontractors will attend. This meeting shall serve as an allotted time specifically to address safety, health and coordination concerns with the subcontractors. This time shall also serve as a forum for subcontractors to discuss safety and health concerns as related to each other's work activities and the project. The contractor will facilitate any concerns between subcontractors and will assist in finding adequate solutions.

2.3 Cal/OSHA Policy

Cal/OSHA inspections will occur because of one of three situations which are outlined as follows:

- Scheduled Visit
- Employee Complaint
- As a result of notification of an occupational death or hospitalization of one or more employees.

In the event of a death or hospitalization of employees, contractors or subcontractors will immediately notify the Presidio Trust Project Manager.

The following procedures shall be taken upon the arrival of a Cal/OSHA inspector on site by all subcontractors:

2.3.1 Cal/OSHA Inspection Procedure List

Contact the Presidio Trust Project Manager, Trust Health and Safety Officer or representative. If these persons are not available, request a postponement of the inspection. If this is not possible, continue through the Cal/OSHA inspection procedure list as follows:

- Respectfully ask for the inspector's credentials and identification.
- Inform subcontractors of the inspector's presence and request that a craft employee from each trade is made available if necessary to assist the inspector during the inspection process. At this time, a team of persons who are capable of immediately remedying any deficiencies regarding safety and health shall be assembled for each of the trade's work areas. These persons shall be ready to correct any deficiencies documented by the inspector.
- Attend the opening conference at which time the inspector will inform the Presidio Trust Project Manager of the nature of the visit and the scope of the inspection.
- The Presidio Trust Project Manager shall accompany the inspector at all times and duplicate all actions taken by the inspector (This could include notes, photographs, coordinating potential sampling and monitoring if needed, etc.).
- Provide any documentation or written programs that the inspector requests.
- A request shall be made at the end of the on site inspection for the closing conference to be postponed until the Presidio Trust Project Manager canbe in attendance.
- Immediately document all information and findings concerning the inspection.
- Note if the inspector indicates a return to the site at a later date.

3. Safety and Health Monitoring and Enforcement

3.1 Policy

Presidio Trust workers are responsible for working under this HASP. However, each contractor/subcontractor is responsible for managing its own HASP and related programs. Presidio Trust, and all contractors/subcontractors are also responsible for monitoring and enforcing the project disciplinary procedures, or disciplinary procedures which are more stringent, for employees performing non-conformance work in relation to safety and health. Presidio Trust and all contractors/subcontractors shall monitor the work of their employees to assure the employee's actions do not create an unsafe condition which may result in harm to themselves, other persons on site or result in property damage.

Failure of contractor/subcontractor management to enforce the disciplinary policies established in this HASP may result in disciplinary action taken against contractor/subcontractor management.

3.2 Monitoring

The enforcement of this HASP and all related local, state, federal or otherwise stated safety and health rules, regulations and policies is a vital aspect to achieving a safe and healthful work environment. For this reason, Presidio Trust will monitor the activities of the contractors/subcontractors on site and enforce all aspects of the Project HASP.

Project Health and Safety audits will be performed by Presidio Trust. Findings shall be immediately corrected with written verification of the corrections submitted to the Presidio Trust Onsite Health and Safety Officer (OHSO).

3.3 Enforcement

Subcontractors are responsible for enforcing all Health and Safety policies adopted on this project. Presidio Trust will take disciplinary action against subcontractor management for failing to enforce such policies. The following actions may be taken against subcontractor management and personnel for non-compliance issues:

Verbal instruction may be used at the discretion of the designated safety supervisor for conditions or practices which are less than serious and are not likely to cause an accident or incident. Violations may fit into four classes defined as follows:

- Non-serious – Any condition or practice which is not likely to cause death or serious physical harm to any person.

- Serious – Any condition or practice which is causing or likely to cause death or serious physical harm to any person.

- Stop Work/Imminent Danger – The existence of any condition or practice which would reasonably be expected to cause death or serious physical harm before such condition or practice can be corrected. This is a "stop work" situation. All persons shall be withdrawn from the affected area, and no one is allowed in the area except those people deemed necessary to correct the condition or practice and whom are using the necessary controls to guard themselves from the hazard.

- Repeat – Violations which have been verbally stated or written to an employee or subcontractor more than once.

Abatement of Health and Safety violation notices shall take place within the allotted time given to abate the unsafe condition. If the subcontractor fails to comply with the abatement policy within the allotted time period, without submittal of an alternate solution, then disciplinary action may be taken by Presidio Trust up to and including removal of personnel or contractor/subcontractor firms.

All subcontractors on site shall have a violation policy and procedures that shall meet, at a minimum, the following standards:

3.4 Violation Policy

Violations issued are subject to the Cal/OSHA regulations which regulate construction and general industry sites and this HASP. The possible consequences subjective to the violation are as follows:

Non-Serious Violations
- First Offense is verbal warning. With log book documentation for future reference.
- Second Offense is written warning.
- Third Offense is time off project or dismissal.

Serious Violations and Repeat Violations
- First Offense is subject to time off project or dismissal at the discretion of the Presidio Trust Project Manager.
- Presidio Trust reserves the right to request the dismissal of project personnel who commit serious or repeat safety or health violations.

4. Subcontractor Project Safety and Health Coordination

Presidio Trust will coordinate measures and submittal requirements in order to assure the protection of all persons on site and to communicate construction activities which are being performed on the project. For this reason, those requirements are outlined in the following section so that all subcontractors are keenly aware of this HASP's Minimum Requirements. These requirements are to be adhered to by all project employees. The following policies shall be developed and implemented into the subcontractor HASP for this project.

Presidio Trust shall be responsible for coordination of its work and that of its subcontractors so that safe work practice is achieved. The subcontractor shall coordinate all work provided under this agreement with all contiguous contracts and work activities whether provided by facility staff or subcontractors. Subcontractor shall arrange and schedule the operation of its own work and the work of all subcontractors so that delays will be avoided when safe work measures are implemented. No extra payment shall be made for any delays incurred from improper coordination of this work with other trade work and compensation for any such delays and all extra work related thereto is considered as having been included in the contract price.

4.1 General Site Safety Rules/Minimum Requirements

This section presents general safety rules for all persons working at the project site. Failure to follow safety protocols and/or continued negligence of health and safety policies will result in expulsion of a worker or firm from the site and may result in termination of employment.

1. Horseplay, fighting, gambling, or the possession of firearms is not permitted.
2. Work shall be well-planned and supervised to prevent injuries. Supervisors shall assure that employees observe and obey safety rules and regulations.
3. An employee reporting for work who, in the opinion of his supervisor, is unable to perform his assigned duties in a safe and reasonable manner shall not be allowed on the job.
4. No employee shall be assigned a task without first having been instructed on proper methods, including safety training, of carrying out the task. Any employee who feels they have not received proper instruction shall notify their supervisor prior to carrying out the task.
5. Injuries and accidents and near misses, regardless of their severity, shall be reported immediately to the immediate supervisor, who will then report it to the OHSO.
6. There shall be no consumption of food or drink in operational areas of the site. Hands should be thoroughly cleansed prior to eating.
7. Smoking is not permitted on the site.
8. When personnel are conducting hazardous operations, there shall be at least one other person (buddy system) on duty in the immediate area as a backup in case of emergency.
9. Wear required PPE in the workplace when appropriate and/or when specified in the site specific health & safety plan. Loose clothing and jewelry should not be worn when operating machinery.
10. Do not operate any machinery if you are not authorized or qualified to do so. If unsure how to operate a machine or perform any assigned task, ask the Project Manager/Supervisor before proceeding.
11. Do not operate motorized equipment until proper training and certification has been provided (e.g. forklifts, etc.)
12. No one shall knowingly be permitted or required to work while the employee's ability or alertness is so impaired by fatigue, illness or other causes that it might unnecessarily expose the employee or others to injury.
13. Alcohol and drugs are strictly prohibited on premises, customer property, and/or in Company vehicles. Employees shall not report to work under the influence of drugs or alcohol. Employees are prohibited from possessing, using, manufacturing, distributing, dispensing, selling or purchasing illegal drugs or other controlled substances (as defined under federal and state law).

4.2 Pre-Construction Submittals – Prior to Site Mobilization

The following requirements shall be submitted to the Presidio Trust Project Manager prior to the start of activities at Lendrum Court. Program submittals are necessary to coordinate the requirements established in the subcontractor's Safety Program along with this. It is also necessary for Presidio Trust to know who will carry out the functions required by this HASP and the designated competent persons for each of the areas of construction. Appendix A includes an example of project safety rules and selected forms.

4.2.1 Subcontractor HASP

Submittal of subcontractor's written HASP to Presidio Trust shall be done prior to the start of work. The HASP shall include the requirements outlined in this document as minimum standards. In addition to the written HASP, the following programs shall also be established, submitted, and implemented on the project by

the subcontractor, when applicable, if not already included in the subcontractor HASP:

- HAZWOPER (if applicable)
- Lockout/Tagout Procedures
- Excavation design and related safe work procedures
- Confined Space Entry Procedures
- Hazard Communication Program
- Fall Protection Plan
- Heat Stress Management Plan

Subcontractors that do not have a written HASP may adopt the verbiage in this HASP as subcontractor's HASP for the exclusive use of this project. Presidio Trust is in no way responsible for use and/or interpretation of this HASP when utilized by its contractors or subcontractors. Contractors and subcontractors must submit in writing to the Presidio Trust Project Manager of the intent for subcontractor to utilize this HASP as their own for the project. Presidio Trust is not responsible for administering the contractor/subcontractor HASP(s) or safety training any contractor/subcontractor personnel after adoption for the project.

4.3 Pre/Post Activity Coordination and Submittal Requirements

Certain construction activities pose hazards that require safe work considerations prior to the activity being conducted. For this reason, Presidio Trust has established pre/post-activity requirements to assure that subcontractors consider these key hazards prior to the start of such activity. These requirements are outlined below.

4.3.1 Permit Required Confined Space

Confined Space entry procedures shall be established by the Subcontractor for entry of their personnel. All confined spaces shall be presumed to initially be permit required unless they can be re-classified to non-permit required spaces in accordance with Cal/OSHA standards. A confined space entry notice shall be completed and may be required to be submitted or audited to/by Presidio Trust. It is pertinent for Presidio Trust to know this information at least one week in advance of entry activities so that coordination efforts may be properly conducted for any other Subcontractor personnel to enter the confined space.

4.3.2 Crane Inspections and Lift Plan Submittals

Crane inspections shall be conducted and required to be submitted or audited to/by the Presidio Trust prior to the use of any crane on site. This inspection shall be performed by a qualified crane inspector or by a certified inspection service.

This policy shall in no way eliminate any requirements set forth for crane inspections in the OSHA Standard 29 CFR 1926 Subpart CC and CalOSHA Title 8 CCR1616.

Lift plans shall be written for all lifts that are over 20 tons, lifts that occur over spaces where workers are, involve more than one crane or the load to be lifted exceeds 85% of the manufacturer's load rating chart for configuration of the crane. At a minimum, the plan, which is constructed by the competent person, shall include:

- Make and model of cranes or hoist.
- Applicable lift radius, boom angle, and boom length.

- Lifting capacity of crane or hoist for configuration
- Size and capacity of all rigging.
- Weight of object to be lifted including all rigging.
- Diagram of lift layout.
- Weather conditions.
- Ground stability
- Competent person and crane or hoist operator signature verifying all information.

4.3.3 Excavations and Trenching

Trenching notices shall be completed by the subcontractor and may be required to be submitted or audited to/by Presidio Trust prior to the start of the operation. For trenches and excavations over 20 feet in depth, the subcontractor shall have a Professional Engineer, who is registered in California, design the sloping, shoring or shielding method used.

Soil shall be treated as Class C with regards to the dimensions for sloping, shielding, shoring and benching unless the procedures outlined in 29 CFR 1926 Subpart P(c)/Title 8 CCR 1541(k) are explicitly used by a competent person to determine the classification of the soil.

4.3.4 Hot Work

Hot work permits shall be issued by Presidio Trust before commencing any welding or other hot work and must be posted in the immediate area where the work is being done. The subcontractor must provide a fire watch stand-by person during all welding and other hot work. Hot work consists of any flame or spark producing equipment. Examples include but are not limited to: welding, torching, brazing, grinding, sand blasting. The fire watch shall be a dedicated individual who shall stand watch for one hour after the hot work has ended, shall have no other duties except for fire watch and shall be trained to recognize fire hazards, respond to small excipient stage fires and implement emergency procedures as needed.

4.3.5 Lockout/Tagout Procedures

Subcontractors are responsible for administering own lockout/tagout (LOTO) procedures and program while equipment is under control of the subcontractor. Subcontractors shall coordinate any work that involves equipment systems that potentially contain hazardous energy. Equipment or system specific LOTO procedures will be developed to safely de-energize such equipment or system. This procedure shall include verification of zero energy. Equipment that has not been completely de-energized will not be worked live unless a specific procedure has been developed for this and approved by the Presidio Trust Project Manager.

4.4 Housekeeping

Subcontractors are responsible for housekeeping of their work areas and cleaning of the debris and/or surplus materials accumulated as a result of the work process. Subcontractors shall monitor craft activities to assure housekeeping clean-up is performed throughout the work process.

Accumulation of debris and waste materials slow the construction process, create disorganization and it contributes to unsafe work conditions. For this reason, all contracts have been structured to require subcontractors to remedy such problems as assigned on the notification within the allotted abatement period. Failure to meet such conditions may result in charges to the Subcontractor for removal of trash or waste material by others from the work area or for clearing or moving tools, materials or equipment from

aisles, walkways or work areas.

4.5 Fire Prevention

Each subcontractor shall be responsible for fire protection throughout all phases of construction as required by the National Fire Protection Code and the 29 CFR 1926 Subpart F.

Only work procedures which minimize fire hazards to the extent practical shall be used. A fire extinguisher shall be present in the immediate vicinity of any hot work. Verification shall be made to assure no fire hazards exist at the conclusion of the hot work activity. In addition, the following outline summarizes when fire extinguishers are required in the 29 CFR 1926:

Standard	Location	Type	Distance
150(c)(1)(i)	Building Area	2A	100 Foot Radius
150(c)(1)(vi)	5 Gallons of Flammable/Combustible Liquids or 5 Gallons of Flammable Gas	2A or Suitable for Hazard	Within 50 Feet
150(c)(6)	Open Yard Storage	2A or Suitable for Hazard	100 Foot Radius
152(d)(1)	Flammable Liquid Storage Room	20B	10 Feet Outside
152(d)(2)	Outside Flammable Liquid Storage Area	20B	25-75 Feet
152(d)(4)	Vehicles Used for Dispensing or Transporting Flammable or Combustible Liquids	20B:C	On Vehicle
152(g)(11)	Service or Fuel Area	20B:C	Within 75 Feet
153(l)	Liquefied Petroleum Gas Storage Area	20B:C	In Location
352(d)	Welding, Cutting or Heating Areas	Suitable	In Area
550(a)(14)(i)	Crane Cabs	5B:C	On Crane

4.6 Hazard Communication

All contractors and subcontractors will assure that all products or chemicals purchased that require an SDS shall have one obtained at the time of the order and prior to that chemical being brought on site. A job specific log shall be constructed. This log should include all products or chemicals bought onsite that require an SDS as well as a title sheet listing these chemicals. All employees shall be made aware of the location of the SDS compilation for the project. All subcontractors shall be made aware by Presidio Trust of the location to the SDS log and shall be granted free access to review the information if desired.

At the time of the pre-job safety briefing, subcontractors shall be informed that all chemicals and products brought onto the project by the subcontractor shall have a copy of the SDS submitted to Presidio Trust prior to that chemical being brought onsite for the first time.

All containers for products or chemicals that require an SDS shall be labeled with the product or chemical identity. This is necessary so the chemical information may be accessed by locating the SDS. Containers that contain material transferred from the original container shall be labeled with the product or chemical identity

unless it will be under the immediate control of the person who transferred the product or chemical from the original container.

4.6.1 Lawn and Vegetative Cover Chemicals

Lawn and vegetative care products sometimes require special handling, certain PPE and need to be stored when not in use, in accordance with the label requirements. All handling, storage and use shall conform to the SDS and product label requirements. Do not store or use around food or food storage areas.

5. Client/Personnel Contact, Emergency Contacts and Utility Clearance Information

5.1 Client/Personnel Contact Information

Table 2 - Site Name/Location, Project Number, Client and Contractor Contact Information			
Site Name:	**Lendrum Court at Presidio**	**TRC Project Number:**	**229649**
Site Address:	**103 Montgomery St. P.O. Box 29052 San Francisco, CA 94129**		
Client Contact/Title		**Office Phone Number**	**Cellular Phone Number**
Nina Larsen/Trust Project Manager		(415) 561-5421	
June Palladino/ Trust Health and Safety Officer		(415) 561-4141	
Presidio Trust Main Line		(4150 561-5300	
Contractor Contact/Title		**Office Phone Number**	**Cellular Phone Number**

Table 3 - Personnel and Project Role		
Name / Project Role	**Office Phone Number**	**Cellular Phone Number**
TBD / Field Lead	Specify	Specify
TBD / OHSO*	Specify	Specify
TBD / Field Staff	Specify	Specify
TBD / Field Staff	Specify	Specify
TBD / Project Manager	Specify	Specify

Notes:
*OHSO – On-Site Health & Safety Officer. The OHSO is 40-hour OSHA certified, is current on refresher training, and has OSHA 8-hour supervisor training. The OHSO can be Field Lead or a member of the Field Staff as suits the work at hand and/or the availability of qualified personnel.

5.2 Utility Clearance Information

Table 4 – Utility Clearance Information		
Clearance Organization, Number and Utilities Covered	**Clearance Numbers (or Other Documentation) and Date Obtained**	**Expiration Dates/Other Notes**
USA North (https://usanorth811.org/) /Underground Service Alert ▪ Water ▪ Sewer ▪ Natural gas ▪ Electric	Dial 811 or (800) 227-2600 48 hours prior to digging	Specify Date, Other
Local/Municipal/Other – Specify #s	Specify # or other documentation, Specify Date	Specify Date, Other
Local/Municipal/Other – Specify #s	Specify # or other documentation, Specify Date	Specify Date, Other
Notes:		

6. Roles/Responsibilities

6.1 Stop Work Authority

All client, contractor and subcontractor employees have the authority and obligation to stop any project if they observe a condition that could put people or equipment at risk. The Stop Work Authority policy is summarized below.

What is Stop Work Authority: Stop Work Authority is the ability to stop work if there is a potential safety issue. Employees will not be reprimanded for issuing a stop work and all project employees will adhere to the stop work condition and no work will continue until the issues have been resolved. The Stop Work Process includes appropriate training, stopping the work, notifying Project Manager of the stop work condition, correcting the condition and resuming operation once the condition has been corrected.

Policy Understanding and Management Responsibility: Employees are required to read and understand the Stop Work Authority policy in order to recognize conditions that could warrant a stop work injunction. Project Managers will encourage employees to initiate stop work authority when necessary and notify other employees and the client of the stop work condition. The Project manager will conduct an investigation into the conditions that led to the stop work order and verify that the unsafe condition has been corrected before work can recommence. Work can only continue when it is safe to do so.

Stop Work Related Reporting: A written report will be prepared by the Project Manager that documents the reason for the stop work, the corrective measures taken and the lessons learned from the incident. These reports will be reviewed by the Safety Department and Senior Management and also shared with the client. Once work has resumed after the stop work condition has been closed the Project Manager or

designee will conduct a follow-up inspection to verify that the safety concerns have been addressed and corrective measures implemented.

6.2 Project Manager

The Presidio Trust Project Manager is responsible for controlling the technical work in an environmentally safe manner, assuring that operational hazards are minimized and that appropriate precautionary actions are implemented this during project work. Specific responsibilities include but are not limited to:

- Implementing and confirming that all subcontractors are prequalified to conduct the work included in their Contract, including health and safety pre-qualifications.
- Verifying that all personnel involved with this project have the required training and medical clearance for the work and environment they will be assigned.
- Verifying that all personnel involved with this project have read and understand this HASP and have signed the HASP.
- Assuring that all personnel involved with this project have attended a briefing or a tailgate safety meeting regarding the contents of the HASP and site-specific hazards prior to performing work.
- Determining that sufficient personal protective equipment (PPE), air monitoring equipment and other equipment, as required by this HASP, are available and that the personnel are training in the proper use of PPE as well as other administrative and/or engineered controls.
- Assuring that all subcontractor personnel submit documentation of employee participation in a medical, training and drug & alcohol programs (when applicable).
- Promoting and maintaining a high level of health and safety consciousness among the field personnel.

6.3 On-Site Health & Safety Officer

The On-Site Health & Site Safety Officer (OHSO) is responsible for ensuring the Health & Safety guidelines are followed, in addition to monitoring for airborne contaminants when necessary and evaluating new hazards and operational changes. The OHSO has the authority to correct all noncompliance situations immediately and to stop work in cases of immediate danger. Specific responsibilities include but are not limited to:

- Performing daily safety meetings prior to commencement of work, commencement of a new task and whenever new personnel arrive.
- Obtaining the air monitoring instrumentation required and conducting or directing the necessary air monitoring.
- Verifying that all PPE and other health and safety equipment are in proper working condition.
- Advising the Project Manager and field personnel on matters relating to health and safety.
- Recommending appropriate PPE and air monitoring instrumentation to protect personnel from site hazards and coordinating the upgrading and downgrading of PPE as specified in the HASP.

- Establishing and maintaining the work zones per the HASP.
- Conducting field observations to monitor the effectiveness of the HASP and to assure compliance with the HASP and regulatory requirements.
- Performing personal exposure monitoring where required and to determine the adequacy of protective measures and PPE specified by this HASP. Working with the Project Manager to ensure that sufficient PPE is available onsite.
- Conducting briefing meetings and apprising personnel of the contents of the HASP and site hazards.
- Supervising and monitoring the safety performance of all field personnel to ensure required safety and health procedures are followed and correct any deficiencies.
- Planning for and initiating emergency response procedures
- Notifying the Project Manager and Office Safety Coordinator of all noncompliance and dangerous situations.
- Investigating and reporting all accidents/incidents/near misses to the Office Safety Coordinators and/or Project Manager.
- Responding to inquiries from government safety and health agencies.

6.4 General Contractor Superintendent

The General Contractor Superintendent is responsible for the following:

- Providing managerial and executive level support for all matters regarding project health and safety.
- Assisting the Project Manager in developing the HASP and identifying task-specific Job Safety Analyses (JSAs) to incorporate in the plan.
- Safety Observations.
- Accident/incident/near miss investigations.

6.5 General Contractor Foreman

The General Contractor Foreman is responsible for the field operations needed to complete the project. Specific responsibilities include but are not limited to:

- Leading by example.
- Ensuring that all activities are performed in compliance with applicable occupational safety regulations.
- Ensuring all equipment needed for the project is available and properly maintained.

- Ensuring field personnel have received the necessary training and health & safety briefings before work begins.
- Correcting any deficiencies regarding health, safety or operating procedures.
- Communicating newly identified hazards or noncompliance issues with the OHSO, General Contractor Superintendent and Management
- Reporting any injuries and illnesses.

6.6 Field Personnel/Staff

All field personnel are responsible for following the health and safety procedures specified in this HASP and work practices specified in applicable operating procedures. Some specific responsibilities include but are not limited to:

- Maintaining an awareness of their training status and demonstrating that they have the required training and medical clearance for the work and environment they will be assigned.
- Reporting all accidents, incidents, injuries, illnesses, or near misses to the Foreman.
- Complying with the requests of the OHSO and Foreman.
- Immediately communicating newly identified hazards or noncompliance issues to the OHSO and Foreman.

7. Hazard Assessment

This HASP assumes that an ongoing hazard assessment process with Project Management and the General Contractor Safety Department will take place as needed when repair work has been identified (via meetings/teleconferences), supplemented by ad hoc communication on project safety needs, to ensure the project work is conducted at a high level of technical excellence both safely and efficiently. Where the on-going hazard assessment indicates the presence of hazards, tasks, or other activities that are not adequately covered by the HASP and supporting documentation and/or staff training levels, supplemental planning will be conducted and documented in a revised or higher level HASP document and appropriately trained personnel assigned.

7.1 Chemical Hazards

The following compounds were identified as COCs in soil at the Site:

- Debris Fill Area (LUC Area A)
  - Metals – Arsenic, barium, copper, lead and zinc
  - Polycyclic Aromatic Hydrocarbon (PAHs) – Benzo(a)pyrene, benzo(a)pyrene equivalents and dibenzo(a,h)anthracene
  - Dioxins and Furans – Expressed as tetrachlorodibenzo-p-dioxin toxic equivalent (TCDD TEQ)

- Outside Debris Fill Area (LUC Area B)
- Metals – Lead

See Figure 1 for the locations of LUC Areas A and B, areas where impacted soil remains in place and covered by a clean soil cap, hardscape or dense vegetation. See Figure 2 for details on the constructed cap section overlaying contaminated soils, note that LUC Area B has no soil cap.

7.1.1 Munitions and Explosives (MEC)

Historic training trenches dating to World War I have been identified and delineated at the Site (**Figure 1**). Additionally, a softball sized cannon ball was discovered during remedial construction activities. As such, there may be an increased likelihood of munitions and explosives (MEC), or unexploded ordnance (UXO) being present at the Site. Per the Presidio's Unexploded Ordnance Procedure, the following steps shall be taken if MEC/UXO or potential MEC/UXO is discovered during the construction activities:

1) Upon discovery of the MEC/UXO, the individual should back away at least 300 feet. **Under no circumstances should the MEC/UXO be touched or moved.**

2) Contractors should **cease work** in the affected area and **remove all personnel** from the affected area.

Contact information for the Presidio Trust listed in **Table 2**.
TRC's Program or Project Manager should contact the Presidio Trust Project Manager. The Presidio Trust Project Manager will contact the following authorities in the order shown:

- The United States Park Police (USPP) Communications Section (CommSec)
- Trust Safety and Occupational Health Manager;
- US Army; and
- Park Dispatch.

The Trust Project Manager will coordinate with the US Army, in accordance with the May 1999 Memorandum of Agreement (MOA) between the Army, Trust, and the Department of Interior (NPS). Work will be resumed only upon authorization from the Presidio Trust.

Do not proceed with work or leave the item unattended until directed by the Trust.

7.2 Key Physical Hazards

Key physical hazards are outlined below. If a Job Safety Analysis (JSA; see Section 12 and supporting appendix) has been included, this is signified below in first column.

Table 5 - Key Physical Hazards Matrix			
JSA	**APPL.**	**KEY PHYSICAL HAZARDS**	**GENERAL CONTROL MEASURE**
☐	☒	Sharp, jagged, or abrasive edges/material handling	Cut resistant gloves are required to be worn at all times while performing all tasks. A glove selection guideline is presented in Appendix B.
☐	☒	Weather	Heat and cold stress are a potential concern for on-site workers. Please refer to Appendix C for the signs, symptoms and precautions for cold and heat stress, and required breaks. Work will also occur during a time of year when thunderstorms are possible/likely. If thunder or lightning is noted by onsite personnel, work will cease until the storm passes (thunder and/or lightning ceases and is not observed over at least a 15-minute period). Personnel will seek shelter in buildings or vehicles
☐	☒	Energized Sources (electrical equipment or hookups, lines, etc.)	Personnel engaged in electrical activities, and any facility equipment with moving parts must follow proper lock-out/tag-out procedures, and only properly trained employees will perform the work. Heed any caution signs or labels.
☐	☒	Excavations	Stay clear of excavation walls. Jobsite personnel will not enter an excavation, in accordance with 29 CFR 1926 Sub Part P unless they are involved with the actual excavation work. Subcontractor must provide a competent person on site, if one is required by the planned activities. Side cuts should conform to 1926 Subpart P requirements, or shoring should be used. Excavation must be inspected daily by the competent person and not entered where water has accumulated. Excavations over 6 feet deep will require a written rescue plan detailing how a trapped or downed worker in the excavation will be safely rescued. Note: reliance on volunteer rescue team does not assure that team will be available to provide a timely rescue. All open excavations should be secured using traffic cones, barrier tape, or barricade signs stating “Do Not Enter Excavations”, especially if left open overnight. Excavated soils must be placed at least 2 feet from the excavation to avoid wall collapse. See Appendix E for an Excavation Hazard Recognition Guide for Trenching and Shoring and Site Assessment Questions to facilitate your understanding of potential hazards and other guidance.
☐	☒	Slips, Trips, Falls	Be aware of uneven ground, and buried debris (metal, plastic, etc.), to avoid potential slip/trip/fall hazards, and use caution near open excavations. Maintain good housekeeping practices to eliminate physical hazards. Use proper lifting techniques to avoid injury and obtain help when lifting greater than 50 lbs. Be aware of uneven ground to avoid potential slip/trip/fall hazards and also of buried debris (metal, plastic, etc.). Sites with unprotected edges >6’ require barricades and/or fall protection equipment. A fall protection plan will be required if there is leading edge work including excavations >6’ deep.
☐	☒	Heavy Equipment	Use caution around construction equipment and emergency response vehicles. Ensure the operator of the construction/emergency equipment is aware of the location of onsite personnel at all times to avoid potential injury to onsite workers (e.g., maintain eye contact with the equipment operator). If full visibility is not possible during movement of equipment a spotter should be used to direct the movement of heavy equipment. A swing zone should be established with cones behind any excavators to prevent injury during movement of equipment. Exercise caution and wear protective equipment as noted herein (e.g., safety toe boots, hard hat, Class 3 reflective safety vest, ear plugs, etc.) around the heavy equipment to prevent crushing and pinching hazards.
☐	☒	Underground or Overhead Utilities	Existing underground utilities are present at the project site. Prior to conducting active excavation, the Site will be visually observed for potential overhead hazards (e.g., tree branches and wires), and drilling/excavation locations will be selected that are located at safe distances from the hazard. Call USA North or Underground Service Alert – dial 811 or (800) 227-2600. Use caution when heavy equipment may come in contact with utilities. Maintain a minimum distance of 10 feet from overhead utilities at all times. Proceed cautiously and with due diligence to minimize the possibility of contacting underground or overhead utilities.

Table 5 - Key Physical Hazards Matrix			
JSA	**APPL.**	**KEY PHYSICAL HAZARDS**	**GENERAL CONTROL MEASURE**
☐	☒	Driving/Traffic Hazards	Driving to and from the Site each day is considered a physical hazard. Directions and travel time to the Site should be determined in advance (a.k.a. Journey Management Planning) and adequate time should be allocated to drive safely. The use of cellular phones while driving is prohibited, and distracted driving should be avoided. Seatbelts must be worn at all times while the vehicle is moving. Use caution around traffic flow. Ensure proper traffic control (e.g., signs, traffic cones, jersey barriers, etc., or where jurisdictionally required, police details) are in place prior to and throughout the work day where work takes place in or near traffic. Work personnel must wear ANSI-rated class 3 reflective traffic vests at all times. A site-specific traffic management plan describing procedures to be employed, including barriers, signage, and police detail, will be used for tasks taking place in areas of vehicular traffic.
Notes: APPL. – Abbreviation for "Applicable." JSA – Job Safety Analysis			

7.3 Other Common Physical Hazards Potentially Present

Other common physical hazards that might be encountered during the course of the work are outlined below. If a JSA (see Section 10 and supporting appendix) has been included, this is signified below in the first column.

	Table 6 – Other Common Physical Hazards Matrix		
JSA	**APPL.**	**PHYSICAL HAZARD**	**GENERAL CONTROL MEASURE**
☐	☒	Arcing, welding, open flame work	Personnel will clear the area when work of this kind is undertaken by the client/subcontractor unless properly trained and equipped with PPE. Welding shields or other similar barriers will be erected around the area where welding is occurring. Depending on the type of welding (e.g., galvanized metal or stainless steel), welding fumes may require mechanical ventilation and/or an upgrade in respiratory protection to control inhalation hazards.
☐	☒	Business Traffic	Be aware of traffic patterns associated with local businesses near the work site. Allow traffic to enter and exit the businesses in such a manner to avoid creating traffic hazards, back-ups, delays, or potential accident situations. Review directions before all business travel.
☐	☒	Cement (i.e., silica) Dust	Stay clear of mixing operations and avoid contact with, or breathing of the dust. Air sampling may be needed to assess whether an upgrade to respiratory protection. If workers are required to wear respiratory protection, they will need to be medically cleared and fit tested for an appropriate respirator (i.e., NIOSH N95 or P100).
☐	☒	Chain Saws/Power Saws	Stay clear of any chain saw/power saw operations. Subcontractor is responsible for the safe use of chain saws/power saws on site.
☐	☒	Cleaning Agents	Use caution of applying cleaning agent to equipment. Use chemical-resistant gloves, safety glasses, splash shields, and protective clothing as needed.
☐	☒	Client Activities	Be aware of client activities at or adjacent to the site. Work activities should be coordinated with other site activities to avoid conflicts.
☐	☒	Compressed Air or Gas Cylinders	Compressed air or gas cylinders should be clearly marked, and they should be stored, transported, and secured in accordance with Compressed Gas Association (CGA) requirements (i.e., Publication P-1 - Safe Handling of Compressed Gases in Containers).
☐	☒	Compressed Air/Gas, Pressurized Liquids Hoses, Lines & Fittings	Compressed air or gas, or pressurized liquid lines or hoses should be inspected at least daily, or in the event a leak develops, or if a line or hose is run over or crimped. Safety cables will be used to prevent pressurized hose ends from becoming a struck by hazard should they separate.

	Table 6 – Other Common Physical Hazards Matrix		
JSA	**APPL.**	**PHYSICAL HAZARD**	**GENERAL CONTROL MEASURE**
☐	☒	Concrete/Masonry/ Foundations	No construction loads shall be placed on a concrete structure or portion of a concrete structure unless a person who is qualified in structural design has determined that the structure or portion of the structure is capable of supporting the loads. All protruding reinforcing steel, onto and into which employees could fall, shall be guarded to eliminate the hazard of impalement. No employee shall be permitted to work under concrete buckets while buckets are being elevated or lowered into position. To the extent practical, elevated concrete buckets shall be routed so that no employee, or the fewest number of employees, are exposed to the hazards associated with falling concrete buckets. A limited access zone shall be established whenever a masonry wall is being constructed. All masonry walls over eight feet in height shall be adequately braced to prevent overturning and to prevent collapse unless the wall is adequately supported so that it will not overturn or collapse. The bracing shall remain in place until permanent supporting elements of the structure are in place.
☐	☒	Confined Spaces (tanks, vaults, vessels, trenches, manholes, some excavations, etc.)	The scope of this project does not entail entry into confined spaces. Confined spaces will not be entered unless a confined space entry permit or other planning has been completed, signed, and approved, and all participating personnel are trained in confined space entry procedures, including safety, and rescue procedures. Real and potential hazards of confined space are not addressed by this hazard assessment, and Health and Safety Plan.
☐	☒	Cutting Tools	Stay clear of contractors' cutting tools, especially saws and torches. Be aware that cutting operations could create other hazards, such as falling objects, or shifting materials, etc. All cutting tools must be inspected and saw blade type reviewed prior to starting work. Appropriate hand protection and safety glasses should be worn while using cutting tools. Spark-proof tools should be used when working in areas of potential explosive or flammable conditions.
☐	☒	Dim Lighting	If electrical power has been disrupted causing dim/low lighting conditions and or work is required to be performed through the evening hours. Use a suitable flashlight and/or portable lighting in low lighting areas. Do not operate heavy equipment without adequate illumination.
☐	☐	Drilling Operations	Drilling operations involve boring, augering or directionally pushing into soil or other surfaces. Various types of mechanical equipment may be used to provide the force of drilling. Drilling may be on a small scale, such as during the installation of monitoring wells, or a large scale project such as oil or gas well drilling. Drilling operations present physical and mechanical hazards as well. The equipment used in drilling can cause injury if not operated properly. Combustion engines are often used as a power source, and these also present hazards in terms of flammability, and as sources of vapors. Typical injuries that could result include eye injuries, burns, scrapes, and cuts from mechanical equipment. Chemical hazards could also be present in the water or soil resulting from drill cuttings.
☐	☒	Downed electrical wires	Downed wires can energize other objects, including fences, water pipes, bushes and trees, buildings, telephone/CATV/fiber optic cables and other electric utilities. Even manhole castings and reinforcement bars (re/bar) in pavement can become energized by downed wires. During storms, wind-blown objects such as canopies, aluminum roofs, siding, sheds, etc., can also be energized by downed wires. See Appendix D for an OSHA Fact Sheet on working safely around downed electrical wires.

	Table 6 – Other Common Physical Hazards Matrix		
JSA	**APPL.**	**PHYSICAL HAZARD**	**GENERAL CONTROL MEASURE**
☐	☒	Drums	If drums are used on-site, they should be clearly labeled with the name of the contents. Drums should only be handled with the appropriate equipment. Drums discovered during excavations, etc., shall not be opened or moved until appropriate identification can be performed. ***At a minimum, Level B protection is required for sampling any unlabeled drums discovered during remediation procedures. This HASP does not contemplate an upgrade to Level B.***
☐	☒	Dust/Particulates	For general dust, work should be performed up-wind if possible. If conditions warrant it, monitoring should be done with PM-10 monitor as described herein. For hazardous dusts, a detailed air monitoring plan and a respiratory protection plan should be developed in consultation with a Certified Industrial Hygienist (CIH) for the site activities before proceeding.
☐	☒	Ground Fault Circuit Interrupters (GFCI) and Electrical Cords	GFCIs will be used on all 120 volt, single phase, 15 and 20-ampere receptacle outlets when electrical equipment is used on-site. Electrical cords will be protected from damage, inspected for cracks, tears, or general wear to the outer protective casing. If the wiring of the cord is exposed, the cord will be repaired, if possible, or discarded. All extension cords will contain a grounding prong. If the grounding prong is missing, or if the cord was designed to contain only two prongs, the cord will not be allowed for use. These cords are dangerous and cannot be grounded through the use of a GFCI.
☐	☐	Elevated Work	For any construction work activities elevated 6 feet or more, or other non-construction activities elevated 4 feet or more, fall protection must be provided. Caution should be taken on catwalks and ladders because of potential slippery conditions, or the potential for footwear to catch on the surfaces.
☐	☒	Equipment Exhaust	Equipment exhaust should be ventilated away from the work area while using internal combustion engines inside structures. Industrial fans can be used to move exhaust out of the area.
☐	☒	Ergonomic Issues	Ergonomic hazards will be addressed on a site-specific basis once mobilization to the field has occurred.
☐	☒	Evening Work	If work is performed during the evening hours, work shall be limited by the availability and the quality of artificial lighting. Care should also be taken to avoid slip, trip, and fall hazards that are not as easy to identify during low light conditions.
☐	☐	Explosives	Be aware of potential explosive materials and how to identify them. No smoking is allowed on-site or near where potential explosive materials may be present.
☐	☒	Fall Hazard	Proper tie-off, harnesses, railings, etc. should be used when performing work on ladders, scaffolding, man-lifts, or on the roof of buildings, etc. Stay clear of the edges of pits, trenches, quarries, etc.
☐	☒	Falling Objects	Be aware of any potential falling objects or materials on site. Stay clear of any areas identified as potential falling object areas.
☐	☒	Fences	Be aware of fences in disrepair that may be trip hazards, or may have materials that could cause punctures or cuts. Use caution when crossing over or under fences.
☐	☒	Field Equipment	If field equipment is heavy or awkward to carry, get assistance or use carts to help move around the site.

	Table 6 – Other Common Physical Hazards Matrix		
JSA	**APPL.**	**PHYSICAL HAZARD**	**GENERAL CONTROL MEASURE**
☐	☒	Field Vehicle	All personnel shall follow all applicable state and federal traffic laws while traveling to and from the site, and while working on the site. In particular the following laws should be followed: speed limits, parking restrictions, use of wipers and lights during precipitation events, etc. The use of cellular phones while driving is prohibited, and distracted driving should be avoided. It is the responsibility of the driver to verify that all safety equipment on the vehicle is working properly before they drive the vehicle. In particular the following items should be checked prior to use: tire pressure, tire tread, windshield wipers, windshield washer, headlights, tail lights, brake lights, spare tire, fire extinguisher, first aid kit, etc. Be aware of tracking mud and dirt from the site onto the roads.
☐	☒	Fire Extinguisher Chemicals	To the extent practicable, minimize exposure to potentially toxic fire extinguishing chemicals. See Appendix F (Common Fire Extinguishing Agent Guide) for more information.
☐	☒	Fire Hazards	Eliminate sources of ignition in work areas that have ignitable materials. Provide an ABC fire extinguisher in close proximity to the support zone.
☐	☒	Flooded Areas	Do not drive through flooded areas or standing water. Do not wade into moving water, or water deeper than 2 feet without adequate assistance.
☐	☒	Flying Debris/ Eye Injuries	Be aware of any flying debris on site and wear protective eyewear when necessary.
☐	☒	Gas Cylinders	See above.
☐	☒	Hand Tools	Use only the appropriate tool for the task at hand. Use the tool(s) as designed, described, and intended by the manufacturer. Hand tools will meet the manufacturer's safety standards. Hand tools will not be altered in any way. Makeshift tools will not be used. At a minimum, hand and eye protection will be used when working with hand tools (see glove selection guide provided herein). Wrenches, including adjustable, pipe, end and socket wrenches, will not be used when jaws are sprung to the point that slippage occurs. Impact tools such as drift pins, wedges and chisels, will be kept free of mushroom heads. Wooden handles will be free of splinters or cracks and secured tightly to the tool. At all times use appropriate hand protection when utilizing hand tools.
☐	☒	Heavy Lifting	Use proper lifting procedures and equipment when handling heavy objects such as drums, manhole covers, tank covers, etc. If a load is greater than 50 lbs, at least two people must be used.
☐	☒	High Pressure Gas Lines, etc.	Be aware of high pressure gas lines, and follow approved safety precautions when working with or around the lines.
☐	☒	Highway Traffic	Traffic control within the right-of-way will be in accordance with local highway department protocols. Work may be restricted within specific lanes during peak traffic times. Verify peak traffic times, and review planned activities with local highway department, so that appropriate lane closures can be coordinated.
☐	☒	Housekeeping	All field vehicles, job trailers, and field offices will be properly cleaned and organized to prevent cluttered work and storage areas.
☐	☒	Ladders	Ladders should only be used if they are in good condition, conform to OSHA requirements, and if they will be used in an appropriate manner. Be especially cautious of slipping on ladders when the ladder or footwear is wet or dirty.
☐	☒	Lead	Wear gloves when in contact with lead contaminated soil, etc. Thoroughly wash hands and arms before eating and when daily work is completed.

	Table 6 – Other Common Physical Hazards Matrix		
JSA	**APPL.**	**PHYSICAL HAZARD**	**GENERAL CONTROL MEASURE**
☐	☒	Lighting	Lighting will be provided so that a sufficient amount of light will illuminate the work area. All electrical lighting will be protected with a Ground Fault Circuit Interrupter (GFCI). In areas were flammable or combustible vapors or dust are encountered, all lighting will be approved for use in Class 1, Division 1 hazardous locations.
☐	☒	Long Hours/Fatigue	Long work hours can lead to fatigue, and fatigue can lead to the physical inability to perform the work in a safe manner, or travel to, or from, a work site in a safe manner. If long work hours or off-shift work is scheduled, or if the scheduled work takes longer than planned, field staff should determine if fatigue is, or will be, an issue. Field staff should evaluate whether they are able to complete the work in a safe manner, or whether they are able to travel in a safe manner. If fatigue is an issue, appropriate breaks should be planned or taken, including overnight stays when necessary.
☐	☒	Material Handling	Move containers and heavy material only with the proper equipment, and secure them to prevent dropping, falling, or loss of control during transport. Stay clear of material handling operations, especially near slopes. Do not stand down the slope from equipment, supplies or materials being moved above on the slope, or being deployed onto the slope.
☐	☐	Material Storage	Stored material may be a falling hazard, or a crush hazard. Do not stand adjacent to materials stacked up, such as pipes, geosynthetic rolls, etc., or in the area of deployment.
☐	☐	Natural Gas	Natural gas is flammable and explosive. Keep ignition sources away from gas sources. Use spark proof tools when working with gas lines, etc.
☐	☒	Noise	Hearing protection must be worn when noise levels exceed 85 dBA in the work area. If you need to raise your voice to be heard at the work site, then hearing protection should be worn.
☐	☒	Overhead Hazards	Pay attention to overhead equipment, piping, and structures. A hard hat must be worn at all times when overhead hazards are present on site.
☐	☒	Overhead Wires	If contact is possible (i.e., equipment, drill rig, excavator, etc.) one or more of the following will be done: ✧ Power sources will be disconnected by the utility. ✧ Power sources will be shielded by the utility. ✧ For overhead power lines of <50,000 volts, object will get no closer than 10 feet to prevent arcing, unless site specific conditions or weather conditions warrant greater separation per best professional judgment, or as directed by utility representatives. ✧ Evaluate the need for shielding and coordinate with local utility representatives.
☐	☒	Pedestrian Traffic (public, client, workers)	Be aware of pedestrian traffic patterns and, route traffic around the exclusion zone(s), as necessary, to avoid distractions and the potential for exposures or accidents. Use appropriate barricades and caution tape to mark work areas.

	Table 6 – Other Common Physical Hazards Matrix		
JSA	**APPL.**	**PHYSICAL HAZARD**	**GENERAL CONTROL MEASURE**
☐	☒	Power Tools	All power tools will be inspected regularly (at least on a daily basis) and used in accordance with the manufacturer's instructions and its capabilities. Electrical tools will not be used in flammable areas, unless they are approved for that purpose. Portable electric tools will be used only with a GFCI. Proper hand, eye and hearing protection will be used when working with power tools and all appropriate safety guards must be in place. Personnel will be trained in the proper use of the specific tool. Any defective power tools will be immediately tagged and removed from service. Tools will be stored properly after use.
☐	☒	Power Washing Equipment	Stay clear of the power washing nozzles and equipment.
☐	☐	Propane Tanks	Be aware of propane tank locations, and any gas lines leading to or from the tanks.
☐	☐	Rock Blasting	Contractor is responsible for following safe blasting protocol. Heed all contractor warnings at time of blasting and stay well clear until safe to return to area, as indicated by the contractor.
☐	☒	Sample Preservative Chemicals	Wear safety glasses, cut resistant, and nitrile gloves or equivalent when adding preservative chemicals to sample bottles or vials. Have clean wash water nearby.
☐	☒	Slippery Ground/Surfaces	Exercise caution, especially on slopes, field trailer floors and stairs, after a precipitation event. Use slip resistant boots, or implement surface preparations to eliminate the slippery nature of the surface prior to accessing the area. Spill control measures and general housekeeping should be utilized to help prevent slipping on wet floors, wet pavement, and general work areas.
☐	☒	Steam Cleaning Equipment	Stay clear of the steam cleaning nozzles and equipment. All personnel performing this task must wear a face shield.
☐	☐	Steel Erection	All materials, equipment, and tools, which are not in use while aloft, shall be secured against accidental displacement. The controlling contractor shall bar other construction processes below steel erection unless overhead protection for the employees below is provided. Employees engaged in steel erection activities on a walking/working surfaces with an unprotected side or edge more than 15 feet above a lower level shall be protected from fall hazards by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.
☐	☒	Steep Slopes or Banks	Pay attention to footing and walking. Stay a safe distance from unstable or extremely steep slopes. Wear appropriate footwear. Be aware of potential slope or bank failures. Heavy equipment should not be operated on or near unstable slopes or banks.
☐	☒	Strong Nuisance Odors	Strong odors should be ventilated before entering a work area, or a respirator shall be worn as needed. Identify the source of the odors and determine offsite impact.
☐	☒	Sunburn	For extended periods of time outdoors on sunny days, sunglasses, long-sleeved shirts and long pants should be worn to help prevent sunburn and eye problems. Wear sunscreen as appropriate for the project. See Heat Stress below.
☐	☒	Surface Water	Working next to or on, bodies of water shall be done using the buddy system. Staff shall wear USCG-approved personal floatation devices when on or adjacent to bodies of water.

	Table 6 – Other Common Physical Hazards Matrix		
JSA	**APPL.**	**PHYSICAL HAZARD**	**GENERAL CONTROL MEASURE**
☐	☒	Terrain	Uneven or steep terrain can cause hazardous conditions for walking and transporting equipment around the site. Site personnel should use caution when working on uneven surfaces, and they should avoid working down-slope from heavy equipment, or materials being moved or stored.
☐	☒	Traffic (client, contractors, public, semi-trucks, forklifts, etc.)	Obey all posted speed limits. Park in designated areas only. Be aware of traffic patterns on site, and during access to the site. Use orange traffic cones and barrier warning tape, as needed, or if within 25 feet of the right-of-way. All personnel working construction on the site must wear safety vests when working in or near traffic areas. For work in public roadways/highways, coordination with local officials and prepare a traffic safety plan.
☐	☐	Transporting Hazardous Materials	Personnel who transport hazardous materials shall have the required DOT and/or IATA training prior to transporting materials, and will comply with all applicable DOT regulations and requirements and IATA guidance for labeling, packaging, etc. See also the Required Personnel Training section of this HASP to review/specify if DOT/IATA training is required for this project.
☒	☒	Trenching	Personnel will not enter trenches not in accordance with 1926 Sub Part P. Be aware that some trenching conditions may result in a confined space condition. See Appendix E (Excavation Hazard Recognition Guide [Trenching/Shoring], Site Assessment Questions, and Related Guidance) for additional guidance.
☐	☒	Trip Hazards (wires, cords, hoses, debris, corn stubble, uneven surfaces, etc.)	Temporary wires, cords, hoses, etc., should be properly located, marked, and protected to help prevent tripping and disruption to work activities. Trip hazards are particularly a problem early in the morning, late in the day, or under other poor lighting conditions.
☒	☐	Under Ground Storage Tanks (USTs) (Septic Tanks)	If any unknown UST's are encountered, drilling or excavations will be terminated in that location until a new scope of work, Risk Assessment and Health & Safety Plan can be developed.
☐	☒	Uneven Surfaces	Be aware of uneven walking or driving surfaces and exercise caution when moving around the site.
☐	☒	Welding Tools	Stay clear of welding operations, and do not look directly at the welding process without appropriate eyewear and shield.
Notes: APPL. – Abbreviation for "Applicable." N/A – Not applicable JSA – Job Safety Analysis			

7.4 Biological Hazards

	Table 7- Common Biological Hazards Matrix		
JSA	**APPL.**	**BIOLOGICAL HAZARD**	**GENERAL CONTROL MEASURE**
☐	☐	Animals (dogs, etc.)	Be aware of any animals on site or adjacent to the site. Appropriate care should be taken if any feral (wild) animals are encountered. Dogs often are not leashed and may be unfriendly. Bites from dogs and wild animals can cause infections or transmit disease. In general, it is best to not approach dogs even if they appear to be friendly, and wild animals should never be approached. If bitten, the area should be washed with soap and water. If the bite resulted in puncturing or tearing of the skin, the wound should be covered with a sterile dressing and medical attention should be sought immediately. A description of the dog should be noted and if possible, the dog's owner.
☐	☒	Blood-Borne Pathogens	Injuries received in the field may require assistance from a field team member to perform first aid. Contact with blood and certain body fluids can contain pathogens that may be transmitted by contact with an open wound by the caregiver. The following precautions should be used when giving first aid: ✧ Use nitrile gloves to avoid contact with blood/fluids. Spent bandages and gloves used to perform first aid should be placed in a plastic bag and properly disposed. ✧ Blood/fluid should be cleaned from surfaces that may be contacted by other individuals. ✧ Use an appropriate barrier if required to perform rescue breathing.
☐	☐	Briars or Thistles	Be aware of any briars or thistles on site. Wear appropriate clothing and gloves. Avoid contact with briars or thistles whenever possible.
☐	☒	Heat Stress	The work schedule may be modified if the ambient temperature is more than 85° F. Take breaks as necessary, and drink plenty of fluids. If necessary, wear sunscreen and sunglasses on bright days. Monitor site personnel for signs of heat stress symptoms (heat rash, heat cramps, heat exhaustion, or heat stroke). See Appendix D for more information.
☐	☒	Insects (ticks, bees, spiders, etc.)	Site workers with known allergies to insect bites should carry their own medication. In case of emergencies, inform fellow workers of any severe allergies. Use insect repellant as necessary, and as specifically allowed on site. If possible, wear long-sleeved shirts and pants. If appropriate, check for ticks at the end of each day. Have other appropriate first aid supplies handy for bites. **Ticks -** Avoid wooded and bushy areas with high grass and lots of leaf litter. If you do go into areas like this, try to stay in the center of a cleared trail to avoid contact with overgrown grass, brush, and leaf litter. Use effective tick repellants and apply according to the label instructions. For more information on repellants see the EPA Insect Repellants: Use and Effectiveness site. Wear long sleeves, long pants, and long socks to keep ticks on the outside of clothing. Light clothing will help spot ticks. Tuck shirts into pants and pants into shoes or socks to keep ticks on the outside of clothing. If outside for an extended period of time then tape pant legs where pants and socks meet so that ticks cannot crawl under clothes. Perform daily tick checks after being outdoors in areas where ticks are present, even in one's own yard. Remove ticks from clothing, gear, and pets before going inside. Inspect all parts of the body carefully, especially the armpits, scalp, and groin. Shower or bathe as soon as possible to wash off any ticks that still remain on you. Tumble clothes in a dryer on high heat for an hour to kill remaining ticks. Attached ticks should be immediately removed with fine-tipped tweezers. To remove an attached tick, grasp it with narrow-bladed tweezers or forceps as close as possible to attachment (skin) site, and pull upward and out with a firm and

	Table 7- Common Biological Hazards Matrix		
JSA	**APPL.**	**BIOLOGICAL HAZARD**	**GENERAL CONTROL MEASURE**
			steady tension. If tweezers are not available, use fingers shielded with tissue paper or rubber gloves. Do not handle with bare hands. Be careful not to squeeze, crush or puncture the body of the tick which may contain infectious fluids. After tick removal, thoroughly disinfect the bite site and wash hands. Seek medical attention if there is a concern about incomplete tick removal. It is important that a tick be properly removed as soon as it is discovered. Seek medical attention if you develop a rash or fever within several weeks of removing a tick. **Mosquitos -** Reduce the risk of being bitten by mosquitoes. Minimize time spent outdoors around dusk and dawn when mosquitoes are most active. Wear shoes, socks, long pants, and a long-sleeved shirt when outdoors for long periods of time, or when mosquitoes are most active. Clothing should be light colored and made of tightly woven materials that keep mosquitoes away from the skin. Consider the use of an EPA-registered insect repellent. Follow the directions on the package. Be sure to use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours. **Spiders -** Spiders typically seek cover in dark protected areas. Common areas where spiders may be encountered are heavy vegetation and trees or infrequently used buildings and structures. Spiders also are found in basements and enclosed spaces where sampling may be performed. Spider bites may cause swelling, pain and respiratory problems. Avoid dense vegetation, and use caution when sampling in dark or poorly illuminated locations. If bitten, wash the area and use ice on the bite area to reduce swelling. If respiratory stress, significant pain or swelling is noted, or discoloration around the bite area occurs, seek immediate medical attention. **Stinging Insects -** Like spiders, wasps and yellow jackets often nest in dense vegetation and in the ground, in long-standing protective casings on monitoring wells and shielded gate locks, or in infrequently used buildings and structures. An insect sting can cause pain, swelling, and respiratory problems that may be life-threatening to certain individuals. If stung, remove stinger if present using tweezers or similar, and wash the area and use ice on the sting area to reduce swelling. If respiratory stress, significant pain or swelling is noted, or discoloration around the sting area occurs, seek immediate medical attention.
☐	☐	Poisonous Plants	Be able to identify any local poisonous plants and avoid them if possible, or wear protective clothing as necessary. When removing potentially exposed clothing or PPE, the clothing or PPE should be carefully and thoroughly washed or decontaminated.
☐	☐	Snakes	Be aware of the potential for snakes in the area and wear snake boots, snake chaps, gaiters, or leggings as needed.
Notes: APPL. – Abbreviation for "Applicable." JSA – Job Safety Analysis			

7.5 Radiological Hazards

No radiological hazards are expected onsite. If any new condition is encountered during this activity, the HASP will be adjusted accordingly.

Table 8 - Radiological Hazards Matrix

JSA	APPL.	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☐	☐	Radiation (ionizing)	Exposure to ionizing radiation can be controlled by one of three methods. Time, distance, or shielding. Limit your time near the radioactive source. Keep your distance from the radioactive source. Shield yourself from the radioactive source with appropriate shielding material. Update contact information for TRC subject matter expertise and regulatory authorities.
☐	☐	X-Ray Fluorescence Instruments (a.k.a., XRF Guns)	XRF units for field metals analysis are only to be used by trained employees with radiation safety training. Licensing requirements can vary by state. Coordinate with a CIH before utilizing in the field to set up dosimetry protocols and instrument specific safety procedures.

Notes:
APPL. – Abbreviation for "Applicable."
XRF – X-ray fluorescence
JSA – Job Safety Analysis

8. Air Monitoring

8.1 Air Monitoring Equipment and Use Recommendations

The following table outlines potential project air monitoring equipment requirements and rationale. Note that an upgrade to a higher level of respiratory protection (Level C or higher) will warrant revision or addendum to this HASP and consultation with a Certified Industrial Hygienist (CIH) before work recommences.

Table 9 - Air Monitoring Equipment Use Recommendations

Instrument	Use Code	Action Levels	Notes/Rationale
PID	O	5 ppmv*	Recommended for VOC screening to monitor airborne VOC concentrations in breathing zone levels. If PID readings are sustained above 5 ppmv in the breathing zone for at least 5 minutes, move to an upwind location for 15 minutes. After 15 minutes, measure again. If PID readings are still above 5 ppmv in the breathing zone, contact the OSHO to evaluate suitable response actions. Withdraw from area if PID readings exceed 50 ppmv. Any upgrade in respiratory protection will be coordinated with the health and safety department and/or the OSHO and reviewed by a CIH.
TSI DustTrak™ (or equivalent)	O	> 150 µg/m^3; 15 minute average**	Use where contaminants could adhere to fugitive dust, and where fugitive dust migration could potentially serve as a significant exposure pathway. Perform air monitoring initially and every hour when working with impacted soils. Half-faced APR for particulates to be used intermittently/temporarily where dust control measures cannot maintain dust levels below action level. Use is optional for dust levels below the action level. Use of a half-face APR for dust does not require CIH approval where dust action level excursions are limited in duration and where dust control measures will be implemented until below the action level. However, personnel must be trained, medically certified and fit tested for half-face APR use.
O_2 ***	C	> 19.5% or < 23.5%	Recommended safe level for excavation/confined space work.
H_2S ***	C	1 ppm	Recommended for excavation and confined space entry, sewer gases, anaerobic degradation sites.
CO ***	C	25 ppm	½ of the PEL (PEL = 50 ppm)
LEL ***	C	10% LEL	Recommended safe level to prevent explosive conditions.
DustTrak, MINIRAM (or equivalent)	O		Supplement operation of DustTrak™ stations for work near sensitive receptors.
Radiation meters	N/A		Not known or anticipated to be a Contaminant of

Table 9 - Air Monitoring Equipment Use Recommendations			
Instrument	**Use Code**	**Action Levels**	**Notes/Rationale**
			Concern.
Other _____			Coordinate all additional instrumentation with the OHSO.

Notes:
* Site/project specific action levels for VOCs may be established in consultation with the Presidio Trust Project Manager or OHSO..
** Above background upwind levels
*** These will be measured using an intrinsically safe four-gas meter.
PID – Photoionization detector LEL – Lower Explosive Limit O_2 – Oxygen
H_2S – Hydrogen Sulfide CO – Carbon Monoxide ppm – Parts per Million
CGI – Combustible Gas Indicator VOC – Volatile organic compound

Use codes: R – Required, C – Condition specific, O – Optional, N/A – Not applicable

8.2 Air Monitoring Procedures

If conditions warrant, the OHSO and/or the Presidio Trust Project Manager can implement dust or organic vapor monitoring using either (or both) a TSI Dustrak™ (or equivalent) and a PID during excavations. When required, air monitoring will be performed using a combination of real-time dust monitoring upwind and downwind of the work area, worker breathing zone and at a point near the closest downwind towards occupied space.

8.3 Exposure Limits for Potential Airborne Contaminants

The following table summarizes anticipated concentrations and accepted exposure limits of chemicals potentially present within the project site.

Table 10 - Summary of Exposure Limits – Known/Suspected Potential Airborne Contaminants								
Contaminant	ACGIH TLV-TWA	NIOSH REL	OSHA PEL	STEL	IDLH	Routes of Exposure	Known/ Suspected Carcinogen	Symptoms
Benzo(a) pyrene (Coal tar pitch volatiles)	0.2 mg/m^3	1.0 mg/m^3	0.2 mg/m^3	n/a	80 mg/m^3	Inhalation, skin and/or eye contact	Yes	Dermatitis, bronchitis, potential carcinogen
Arsenic (inorganic compounds)	0.01 mg/m^3	0.002 mg/m^3 [15-minute]	0.01 mg/m^3	n/a	5 mg/m^3	Inhalation, skin absorption, skin and/or eye contact, ingestion	Yes	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, potential carcinogen

Table 10 - Summary of Exposure Limits – Known/Suspected Potential Airborne Contaminants

Contaminant	ACGIH TLV-TWA	NIOSH REL	OSHA PEL	STEL	IDLH	Routes of Exposure	Known/ Suspected Carcinogen	Symptoms
Barium	0.5 mg/m^3	0.5 mg/m^3	0.5 mg/m^3	n/a	50 mg/m^3	Inhalation, ingestion, skin and/or eye contact	No	Irritation eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia
Copper	1 mg/m^3	1 mg/m^3	1 mg/m^3	n/a	100 mg/m^3	Inhalation, ingestion, skin and/or eye contact	No	Irritation eyes, nose, pharynx; nasal septum perforation; metallic taste; dermatitis
Lead	0.05 mg/m3	0.050 mg/m^3 (8-hour)	0.05 mg/m^3	n/a	100 mg/m^3	Inhalation, ingestion, skin and/or eye contact	No	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension
Dioxin (2,3,7,8-Tetrachloro-dibenzo-p-dioxin)	n/a	n/a	none	n/a	100 mg/m^3	Inhalation, skin absorption, ingestion, skin and/or eye contact	Yes	Irritation eyes; allergic dermatitis, chloracne; porphyria; gastrointestinal disturbance; possible reproductive, teratogenic effects; in animals: liver, kidney damage; hemorrhage; potential carcinogen
Naturally Occurring Asbestos (NOA) (serpentinite bedrock)	0.1 $fiber/cm^3$	0.1 $fiber/cm^3$	0.1 fiber/ cm3 TWA 1.0 fiber/ cm3	1 $fiber/cm^3$	n/a	Inhalation, ingestion, skin and/or eye contact	Yes	NOA (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger

Table 10 - Summary of Exposure Limits – Known/Suspected Potential Airborne Contaminants

Contaminant	ACGIH TLV-TWA	NIOSH REL	OSHA PEL	STEL	IDLH	Routes of Exposure	Known/ Suspected Carcinogen	Symptoms
			Excursion Limit (30 mins)					clubbing; irritation eyes; potential carcinogen

Source: NIOSH Pocket Guide to Chemical Hazards

Table 11 - Preservatives and Decontamination Products

Chemical of Concern	On-Site Usage and Potential Exposures	Control Method/Other Notes
Hydrochloric Acid (HCl)	Less than 20 ml quantities used for sample preservation. Air phase exposure is expected to be minimal and incidental to sample containerization.	5 ppm (OSHA PEL)
Nitric Acid (HNO_3)	Less than 20 ml quantities used for sample preservation. Air phase exposure is expected to be minimal and incidental to sample containerization.	5 mg/m^3 (OSHA PEL)
Isobutylene	100 ppm gas for use during calibration of PID instruments	No specific exposure limits for isobutylene (simple asphyxiant). Maintain oxygen levels above 19.5%. Before attaching regulator to cylinder, verify that the regulator is off. Before opening regulator, make sure that tubing connecting regulator to monitoring device/tedlar bag is secure. To use a tedlar bag, put bag control valve in an open position and close after filling. Before disconnecting gas from the instrument and/or tedlar bag, verify the regulator is closed. Empty bag of contents after calibration in a downwind position and/or to avoid inadvertent inhalation.

Notes:

ppm – parts per million
ml – milliliters
ug/m3 – micrograms per cubic meter

Table 11 - Preservatives and Decontamination Products		
Chemical of Concern	**On-Site Usage and Potential Exposures**	**Control Method/Other Notes**
OSHA – Occupational Safety and Health Administration PEL – Permissible Exposure Limit		

9. Personal Protective Equipment (Non-Respiratory)

Personnel working on the site will use Level D PPE as noted/modified below. Disposable Tyvek® coveralls and double gloves (nitrile inner gloves with cut resistant outer gloves) may be needed where the OHSO determines it is necessary.

Table 12 - Level D Personal Protective Equipment	
Item	**Rationale/Notes**
Hardhat	Appropriately rated hard hats will be worn by personnel for protection against overhead hazards, including electrical.
Hearing protection	Hearing protection will be worn by all personnel exposed to at least 85 dB of sound during the workday.
Safety boots (steel toe/steel shank)	Steel-toe safety boots will be worn by all personnel during project work described in this HASP and at all times on site.
Eye protection (safety glasses)	Eye protection will be worn when personnel are exposed to flying debris, chemical vapors or particulates. Chemical splash goggles will be worn for protection against chemical gases, vapors, liquids or particulates. Safety glasses will be worn for protection against flying objects.
Safety vest	Utilize in areas in or near vehicular traffic of any kind on or off property.
Chemical Protective Clothing (CPC) and Gloves	CPC and gloves will be inspected regularly. CPC will be chosen with assistance from the OHSO according to the chemical hazards present. When working in contaminated soil including LUC Area A below the protective Cap and LUC Area B, Nitrile gloves shall be worn for the duration of the work. Nitrile gloves to be changed between samples or work activities to avoid cross-contamination. Disposable Tyvek® or similar coveralls and booties will be used if necessary, as determined by the OHSO. Typically, in excavation work where suspected skin contact with contaminated soils is expected.
Cut resistant work gloves	As indicated herein, use cut and abrasion resistant gloves when necessary for hand protection during field tasks. See Appendix C for a Glove Selection Guide. ***Leather work gloves are expressly prohibited as a means of cut protection.***

Fire extinguisher must be available on the excavation equipment. All personnel working on or around the equipment rig should know the location of and how to operate the fire extinguisher.

10. Personal Protective Equipment (Respiratory)

10.1 Evaluating the Need for a Respiratory Protection Upgrade

The project's overall health and safety goal is to avoid using respiratory protection unless it is absolutely necessary or required. Administrative controls or engineering controls should always be considered as a means to reduce potential exposures before PPE is required or considered consistent with the hierarchy of control philosophy (elimination/substitution > engineering controls > administrative controls > personal protective equipment).

For operations that require the use of a respirator, the Project Manager (and Contractor equivalent) must verify that Field Personnel are medically approved to use respiratory equipment, fit tested, and trained in the proper use of respirators. Only respirators that are NIOSH/MSHA[1] approved are to be used.

Air monitoring for airborne dusts or chemicals may be required to verify the presence or absence of a hazardous atmosphere (see Section 8.). Conduct air monitoring whenever a situation or condition arises that could reasonably result in a hazardous atmosphere.

Any worker wearing a respiratory protective device in a potentially or known hazardous atmosphere must demonstrate a proper fit test with that device. Fit test records for all personnel using respirators should be maintained by the General Contractor. The proper fitting of respiratory protective devices requires the use of a fit test. The fit test is needed to determine a proper match between the face piece of the respirator and the face of the user. Fit testing will be conducted after medical approval has been obtained. Qualitative fit-tests involve the use of a test atmosphere that employees can sense. If they are not responsive to the test material then other test methods must be deployed. Quantitative fit-tests provide a respirator specific protection factor.

10.2 Air-Purifying Particulate Respirators

Field work involving construction and earthmoving operations that result in nuisance dust and particulates may use air-purifying respirators. Particulate respirators can be used in situations where nuisance dust and particulates are the only contaminants posing an inhalation hazard. Particulate respirators are not to be used in oxygen deficient atmosphere or if hazardous levels of gas/vapor contaminants are also present.

High efficiency particulate air (HEPA) N95 or P100 respirators should be used in place of commercially available "dust masks", which should not be used. Magenta is the color code for HEPA cartridges for dust control/exposure. Select other cartridges based on the type of other airborne contaminants. A CIH should be consulted prior to performing work in a potentially hazardous atmosphere to make sure contaminant levels will be within the fit factor range of the respirator to avoid over exposure.

10.3 Air-Purifying Gas/Vapor Respirators

Employees and Contractors are required to wear half-face, air-purifying respirators with the appropriate chemical cartridge under the following circumstances:

- When concentration of a known contaminant continuously exceeds permissible exposure limit (PEL) time-weighted average or the threshold limit value (TLV) time-weighted average.

1 NIOSH – National Institute for Occupational Safety and Health; MSHA – Mine Safety and Health Administration

- When volatile organic compound (VOC) vapors in the work area continuously exceed the threshold limit value-time-weighted average (TLV-TWA).
- When, at any time, VOC vapors in the work area exceed the threshold limit value - short-term exposure limit (TLV-STEL).

See Table 10 for site-specific or additional information on regulatory exposure limits for chemicals/exposures of concern at this site.

Air purifying respirators (APRs) with chemical cartridges can be used under the following conditions:

- If the oxygen concentration is between 19.5-percent and 23.5-percent.
- If chemical contaminants have been identified, the toxic concentrations are known and the respirator cartridges are effective in removing the contaminants.
- The respirator and cartridges are NIOSH/MSHA approved.
- The contaminants have noticeable warning qualities such as odor and visibility characteristics including color.

In the event workers are required to wear APRs with chemical cartridges, the following requirements must be met:

- The Project Manager or Contractor's SSO must verify that workers are:
  - ✧ Medically approved (within one year) to use respiratory protection,
  - ✧ Fit-tested for the specific respirator to be used, and
  - ✧ Trained in the proper care, use and limitations of the respirator to be used.
- Contractors must provide proof of the above to the Project Manager, upon request.
- If an employee or contractor has not cleared by the Project Manager to use a respirator, they will not be assigned tasks that may potentially expose them to contaminants.
- Personnel with interfering facial hair are not permitted to wear respirators and shall not be permitted in areas where respiratory protection is required.
- Respirators must be sized to the employee
- Qualitative fit tests conducted by trained employees

Note that the protection factor (PF) on a ½ face APR is 10. If air concentrations/ levels are more than 10-times the PEL/TLV, the upgrade would require a full face APR (which has a PF of 50). All APR selections for a project are subject to CIH review.

10.4 Supplied Air Respirators

Supplied-air respirators, such as a Self-Contained Breathing Apparatus (SCBA) or airline-equipped full-face respiratory protection, are not anticipated to be required at the site. This level of respiratory protection is utilized in oxygen deficient atmospheres or atmospheres considered to be at or above immediately dangerous to life and health (IDLH) levels. These conditions will only occur in rare, if any, circumstances such as confined space entry or emergency situations. The use of air-supplied respiratory protection is not permitted without approval and guidance from the OSHO and CIH.

11. Site Control/Work Zones (Optional)

In the unlikely event that Work Zones (i.e., clean area, decontamination area, work area) are established, these areas will be demarcated, as appropriate. Access to the work area, , will be limited to authorized personnel only.

Table 13 - Site Control/Work Zones Matrix		
APPL.	**CONTROL ELEMENT**	**SPECIFY/DESCRIBE [1]**
☒	**Site Specific Controls**	N/A
☐	Facility Alarms or Signals	N/A
☐	Work Permitting	N/A
☐	Work Area Traffic	N/A
☐	Parking Issues/Restrictions	N/A
☐	Railway Traffic/Activity	N/A
☐	Other	N/A
☒	**Support Facilities/Zones**	Noted below.
☒	Field vehicle	Fleet Vehicle Number _____, Registration Number_____
☐	On-site office trailer	
☐	Other	
☒	**Contaminant Reduction Zone**	Noted below.
☐	Field vehicle	
☐	Facility restroom/utility room	
☒	Other	Secure, fenced substation property
☒	**Exclusion Zone(s)**	Noted below.
☒	Immediate vicinity of work area	Delineate per OHSO.
☐	Other	
☒	**Site Entry Procedures**	Noted below.
☒	Notify Site OSHO	Contact information in Section 1.
☒	Read/sign HASP	Note tailgate briefing below.
☒	Check in with facility contact	Contact information in Section 1.
☐	Check in with security guard	
☒	Wear PPE called for in HASP	See Sections 7, 8 and 9.

Table 13 - Site Control/Work Zones Matrix		
APPL.	**CONTROL ELEMENT**	**SPECIFY/DESCRIBE [1]**
☒	**On-Site Orientation**	Noted below.
☐	Attend facility orientation / tail gate safety meeting	No formal facility orientation anticipated. Follow HASP defined tailgate briefing checklist and documentation procedure noted below.
☒	Daily tailgate safety briefing	Document briefing per HASP/checklist (see Section 14).
☐	**Other** (specify)	
☐	**Other** (specify)	

Notes:
1- Where applicable, summarize or reference relevant plan, procedure, etc.
APPL. – Abbreviation for "Applicable."
HASP – health and safety plan
N/A – Not applicable
OSHO – On-Site Safety and Health Officer
PPE – Personal Protective Equipment

11.1 Decontamination

The objective of decontamination is to prevent tracking soil offsite. All reusable equipment, tools and equipment must be cleaned if contaminated before leaving the site. As stated in Table 6, be aware of tracking uncontaminated mud and dirt offsite onto adjoining roadways as this may be considered a nuisance by local residents.

11.1.1 Personal PPE

In the event that work zones are established to minimize track out of soil during excavation activities, personnel working in the exclusion zone will enter and exit this area through designated routes. They will don disposable Tyvek® booties and coveralls, including protective gloves prior to entering such and an area. Workers exiting an exclusion zone will doff their disposable PPE in designated drums for disposal.

11.1.2 Equipment and Vehicles

A designated cleaning area should be established to assure any hand or power tools and heavy equipment that will be used in an area that is known to be contaminated. Such equipment will be visibly cleaned to remove all residual soil that has come from work in the exclusion zone. Once cleaned, it will be visually inspected and allowed to drip dry prior to being released offsite. Any residues or water collected from cleaning operations will be characterized per the site's waste management procedures.

12. Job Safety Analyses

A Job Safety Analysis (JSA) is a safety management tool in which the risks or hazards of a specific job in the workplace are identified, and then measures to eliminate or control those hazards are determined and implemented. More specifically, a job safety analysis is a process of systematically evaluating certain jobs, tasks, processes or procedures and eliminating or reducing the risks or hazards to as low as reasonably practical (ALARP) in order to protect workers from injury or illness. The JSA process is documented and the JSA

document is used in the workplace or at the job site to guide workers in safe job performance. The JSA document is also a living document that is adjusted as conditions warrant.

The JSA process begins with identification of the potential hazards or risks associated with a particular job. Once the hazards are understood, the consequences of those hazards are then identified, followed by control measures to eliminate or mitigate the hazards.

Please refer to Appendix G for a Job Safety Analysis template.

13. Required Personnel Training

Field personnel will have the training outlined below before on-site work activities:

Table 14 - Project Training Requirements

Check "A" if training required for everyone, and check "T" if training required for specific task or per notations.

A	T	SUBJECT	REFERENCE	
			29 CFR 1910	29 CFR 1926 or Other
☐	☒	HAZWOPER 40 hour [1]	1910.120	1926.65
☐	☒	3-Day HAZWOPER [2]	1910.120	1926.65
☐	☒	8-Hour HAZWOPER Refresher [1]	1910.120	1926.65
☐	☒	8-Hour Supervisor HAZWOPER [1]	1910.120	1926.65
☐	☒	First Aid, CPR[,3]	1910.151	1926.23,.50
☒	☐	Hazard Communication (HAZCOM)	1910.1200	1926.59
☐	☐	DOT / IATA Shipping Training	1910.1201	49 CFR 172.704
☐	☒	Respiratory Protection Training	1910.134	ANSI/CGA G-7.1-1989
☐	☒	Excavation Safety		1926.651
☒	☐	Hand Protection Policy	1910.138	--
☒	☐	Lead awareness training		
Client-specific training: ☐ Not Applicable ☐ Specify				
Client-specific training: ☐ Not Applicable ☐ Specify				
Client-specific training: ☐ Not Applicable ☐ Specify				

Notes:

[1] This level of training will only be required for all workers involved in activities that are within LUC Area A, penetrate the cap, and disturb more than 50CY of soil. This level of training will also be required for supervisors overseeing workers performing activities in LUC Area B.

[2] This level of training will only be required for activities that are within LUC Area A, penetrate the cap, and disturb less than 50CY of soil.

[3] Contractor will have at least one certified CPR/first aid trained person on site at all times. All Project Managers and anyone acting as the on-OSHO must be current in First Aid/CPR.

14. Medical Monitoring

Medical monitoring will apply routinely to all employees who are or may be exposed to hazardous substances or health hazards at or above the established permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year (29 CFR 1910.120[f][2][i]). Field personnel will have the medical surveillance outlined in the table below prior to commencing on-site work activities.

Table 15 - Medical Surveillance Required

*Baseline is minimum recommended.

	29 CFR 1910	29 CFR 1926 or Other	Notes
☒ HAZWOPER Physical - Baseline*	1910.120	1926.65	
☒ HAZWOPER Physical – Annual	1910.120	1926.65	
☒ HAZWOPER Physical - Biennial*	1910.120	1926.65	
☒ Medical clearance for respirator use	1910.134	N/A	
Client-specific drug testing[1]	☐ Not Applicable ☐ Specify		
Client-specific medical monitoring[1]	☐ Not Applicable ☐ Specify		
Site-specific medical monitoring:	☐ Not Applicable ☐ Specify		

Note:
N/A – Not applicable.
[1] Client required drug testing or medical monitoring should be coordinated through the Project Manager and OSHO.

15. Tailgate Safety Meetings

A tailgate safety meeting will be conducted daily prior to commencement of the work day (see checklist provided in Appendix H) or if site conditions change.

Topics covered by the tailgate safety meeting will include, but not be limited to:

- Scope of work and who will conduct each task
- Potential hazards for the scope of work
- Weather forecast
- PPE
- Emergency procedures and the route to the medical facility
- Site conditions and features
- Communication guidelines related to stakeholder engagement and visitors

Safety meetings will be held to address modifications to this HASP and any addenda prepared to supplement the HASP. Subcontractors and personnel present at the tailgate safety meeting shall be required to sign an acknowledgement form after each meeting.

16. Emergency/Contingency Plan

Before commencing any on-site operations, the OSHO will advise all personnel of potential emergencies. Personnel will be advised on their roles in the event of an emergency, and the steps to take for a timely and controlled response.

Communication networks/chain of command - All on-site personnel will communicate any accident, injury or near miss to the OHSO who will provide instruction on how to proceed further.

First Aid / Safety Equipment - First aid equipment should be periodically inspected and readily available in the event of an emergency. First aid equipment should include a well-stocked first aid kit, fire extinguisher and emergency eye wash.

Evacuation Plans and Refuge Area - All personnel should safely remove themselves from danger in the event of an emergency and safely access the refuge area. The refuge area should be in an upwind location a safe distance from the work zone. The refuge area will be determined during the daily safety briefing.

Notifications of Fire, Police and Emergency Facilities - In the event of an emergency that cannot be controlled by on-site personnel, the appropriate emergency contact shall be notified. All personnel shall remove themselves from the area of danger and wait for the arrival of help in the predetermined refuge area. The following is a list of local emergency contacts:

16.1 Non-Emergency Medical Assistance

If an injury does occur and it is not life threatening, then the employee or employee's supervisor/project manager should contact the client's/contractor's designated occupational medical service as soon as possible, but within the first hour after an injury. This information will help assist the injured employee by connecting them with instant access to a medically qualified professional in order to provide guidance on appropriate first aid measures and medications.

Table 16 - Non-Emergency Telephone Number

Service	Telephone Numbers	Notes

17. Observations

Performance of periodic safety observations of work activities helps to identify at risk or unsafe behaviors. Safety observations, as listed in Section 6.4, are the responsibility of the General Contractor Superintendent. The results of the observations should be shared with all affected site workers during the tailgate safety meetings and documented.

18. Incident/Near Miss Reporting

In case of an accident, field personnel must report the incident or near miss immediately to their project manager/supervisor, and client's representative.

19. Acknowledgement

All personnel working under this HASP must read the HASP and sign the acknowledgment in Appendix I.

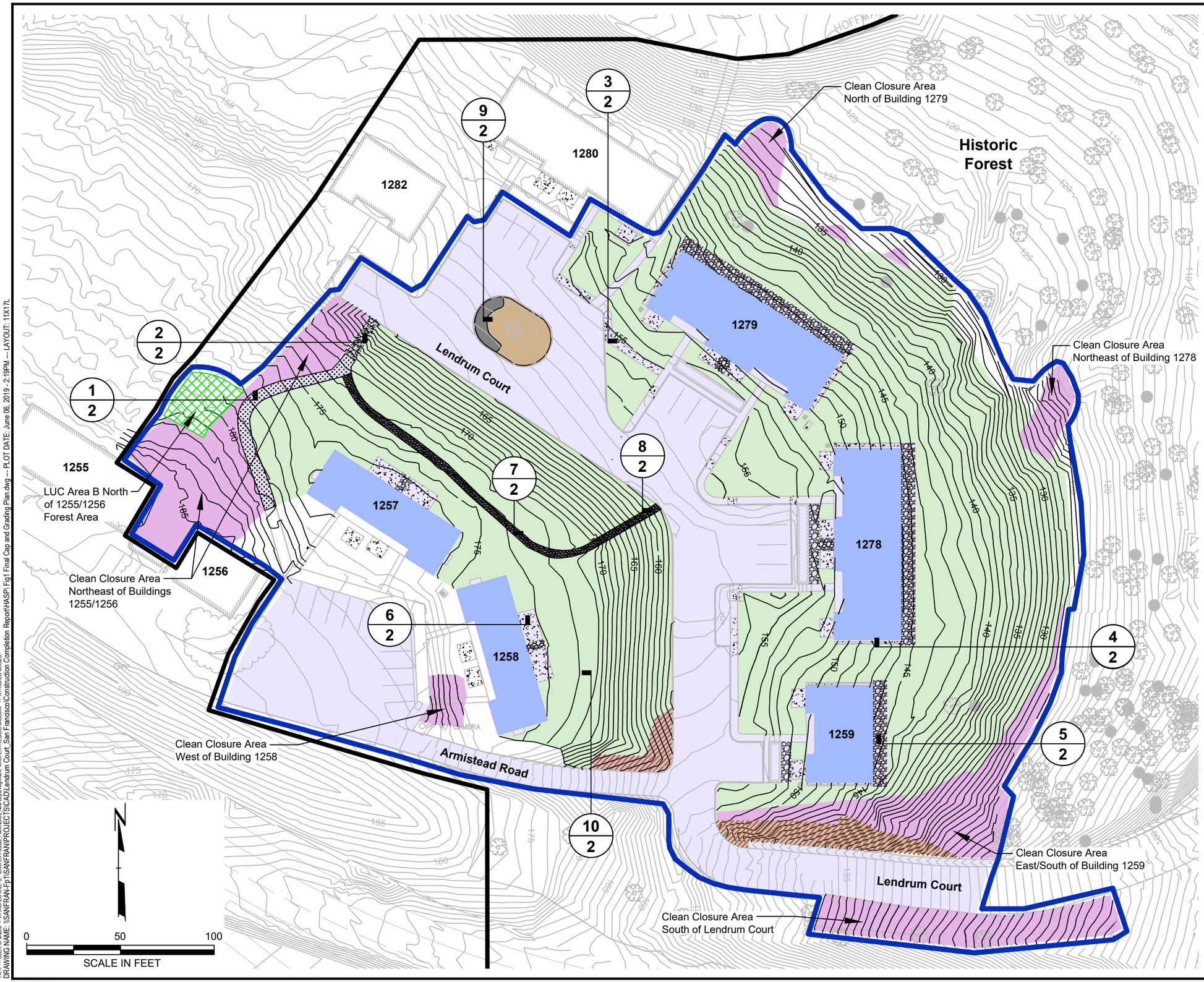
20. Subcontractors and Health and Safety Planning

The client or general contractor must provide the complete HASP to all subcontractors for their reference in advance of the work. Subcontractors must prepare their own HASP and provide evidence of HASP preparation before the start of site work to ensure that the subcontractor has an understanding of the safety hazards associated with the work that they are performing. Subcontractor HASPs are not required to be included unless contractually/client required, of is so desired by the Project Manager.

21. Other Supporting Documentation

Supporting documentation and plans may be appended per the discretion of the Project Manager.

Figure 1
Lendrum Court Site Map



LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE REMEDIAL ACTION AREA
- 140 — SURFACE CONTOURS (OUTSIDE PROJECT AREA)
- 140 — FINAL PROJECT SURFACE CONTOURS
- APPROXIMATE LIMITS OF VEGETATED SOIL CAP (LUC AREA A)
- APPROXIMATE AREAS OF BUILDING THAT SERVE AS CAP (LUC AREA A)
- AREAS OF ASPHALT, PAVEMENT, AB PADS, AND HARDSCAPE THAT SERVE AS CAP (LUC AREA A)
- APPROXIMATE AREAS EXCAVATED AND CLEAN CLOSED
- APPROXIMATE AREAS EXCAVATED TO EXPOSED BEDROCK (CLEAN CLOSURE AREA)
- TREE ISLAND CAP COMPACTED AGGREGATE BASE (LUC AREA A)
- TREE ISLAND CAP WOOD MULCH (LUC AREA A)
- NEW CONCRETE PATIOS, SIDEWALKS AND STAIRS
- RECYCLED CONCRETE AGGREGATE BASE PATH AND BOX STEPS
- NEW ASPHALT PATH
- NEW AGGREGATE BASE CAP
- VEGETATED LUC AREA B (NORTH 1255/1256 FOREST AREA)
- APPROXIMATE TREE LOCATION
- APPROXIMATE TOYON LOCATION
- 1/2 — DETAIL NUMBER
- FIGURE NUMBER WHERE DETAIL CAN BE FOUND

SOURCE: Base map by Towill, Oct.- Nov. 2015, Apr. 2016, May 2017, and Jan. 2018

PROJECT:
THE PRESIDIO TRUST
LENDRUM COURT AREA
SAN FRANCISCO, CALIFORNIA

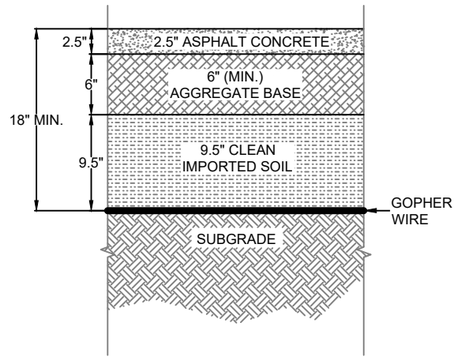
TITLE:
FINAL CAP AND GRADING PLAN

DRAWN BY:	K. LI	PROJ NO.:	229649.00005A.00000D
CHECKED BY:	A. ANG		**FIGURE 1**
APPROVED BY:	J. H-D		
DATE:	APRIL 2019		

TRC
505 Sansome Street
Suite 1600
San Francisco, CA 94111
Phone: 415.434.2600

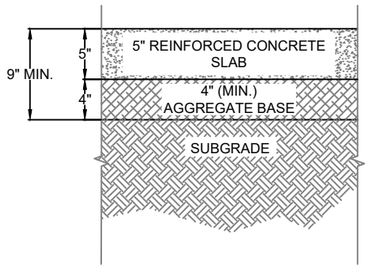
FILE NO.: Fig1 Final Cap and Grading Plan.dwg

Figure 2
LUC Area A Constructed Cap Details



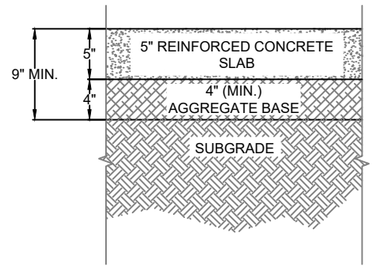
1/2 SECTION

ASPHALT CONCRETE PATH



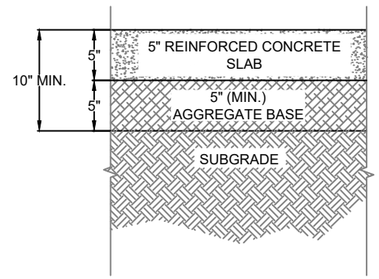
2/2 SECTION

CONCRETE STAIRS



3/2 SECTION

CONCRETE SIDEWALK



4/2 SECTION

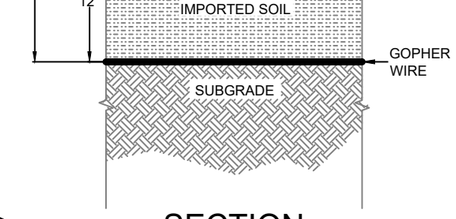
CONCRETE DRAIN

5/2 SECTION

AGGREGATE BASE PAD

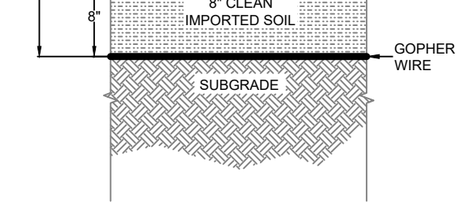
6/2 SECTION

CONCRETE PATIO



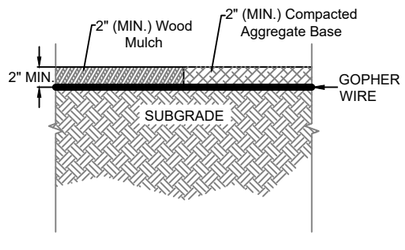
7/2 SECTION

RECYCLED CONCRETE
AGGREGATE BASE PATH



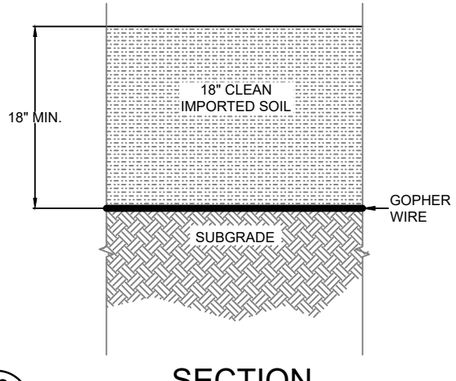
8/2 SECTION

RECYCLED CONCRETE
AGGREGATE BASE STAIRS



9/2 SECTION

TREE ISLAND CAP



10/2 SECTION

VEGETATED SOIL CAP

LEGEND

1/2 DETAIL NUMBER

FIGURE NUMBER WHERE DETAIL CAN BE FOUND

PROJECT:
THE PRESIDIO TRUST
LENDRUM COURT AREA
SAN FRANCISCO, CALIFORNIA

TITLE:
CAP CROSS-SECTIONS

DRAWN BY:	K. LI	PROJ NO.:	229649.00005A.00000D
CHECKED BY:	A. ANG		
APPROVED BY:	J. H-D		**FIGURE 2**
DATE:	APRIL 2018		

TRC
505 Sansome Street
Suite 1600
San Francisco, CA 94111
Phone: 415.434.2600

FILE NO.: Fig2 Cap Cross-Sections.dwg

Appendix A
Example Project Safety Rules

EXAMPLE PROJECT SAFETY AND HEALTH RULES

General

If a situation arises where the HASP requires revision, the following option are available:

Rules have been adopted for the project in order to address some of the more common construction activities. These rules in no way alleviate any subcontractor or their employees or Presidio Trust personnel from the applicable Occupational Safety and Health Administration standards and regulations or rulings made by government authorities. These rules apply to all persons on site including the subcontractors, Presidio Trust and all visitors or vendors. The most restrictive rule, regulation or policy shall apply in the event of a conflict between project, subcontractor, local, state and federal regulations.

1. Compressed Gases 29 CFR 1926.350/Title8 CCR1743

- Care shall be exercised in handling all compressed gas cylinders. They shall not be dropped, jarred, or exposed to temperature extremes.
- Cylinders shall have the valve cap or valve protection device in place at all times, except when in actual use or connected to a welding set.
- Cylinders shall not be rolled and shall not be lifted by the valve or valve cap; a suitable cradle or other device shall be used.
- Cylinders shall have their contents properly identified.
- Compressed gas cylinders, whether full or empty, shall be stored and transported in an upright position and chained or otherwise secured so they cannot fall or be upset.
- Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials a minimum distance of 20 feet or by a 5 foot high non-combustible barrier.
- Cylinders shall not be placed where they might become part of an electric circuit or within 5 feet of an electrical outlet.
- Before the regulator is removed from a cylinder, the valve shall be closed and all pressure shall be released from the regulator.
- A leaking cylinder shall not be used. Such cylinders shall be taken outdoors away from sources of ignition. The supervisor shall be notified.
- A flame shall never be used to detect gas leaks.
- The recessed top of cylinders shall not be used as a place for tools.
- Oil, grease, or similar materials shall not be allowed to come in contact with any valve, fitting, regulator, or gauge of oxygen cylinders:
- Oxygen shall never be used as a substitute for compressed air.
- When an oxygen cylinder is in use, the valve should be opened fully in order to prevent leakage around the valve stem.
- Acetylene – Acetylene cylinders shall be properly secured and always used, transported or stored in a vertical position. Cylinders shall be protected from sparks, flames and contact with energized electrical equipment.
- An acetylene cylinder valve shall not be opened more than 1-1/2 turns of the spindle and preferably no more than ¾ of a turn.
- Employees shall not use acetylene in a free state at pressures higher than 15 psi.

2. Confined Spaces 29 CFR 1926.146/Title8 CCR 5158

Definitions:

Confined Space: Any space that:

1) Is large enough and so configured that an employee can bodily enter and perform assigned work: and
2) 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
3) Is not designed for continuous employee occupancy.

Non – Permit Required Confined Space – A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

Permit Required Confined Space - A confined space that has one or more of the following characteristics:
1) Contains or has a potential to contain a hazardous atmosphere;
2) Contains a material that has the potential for engulfing an entrant;
3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
4) Contains any other recognized serious safety or health hazard.

Entry Requirements:

1) Air Quality Testing - Before any person enters a confined space, the Subcontractor planning to enter the space shall do air quality testing for oxygen deficiency or abundance, flammable gases or chemical contamination.
2) Entry Without Notice – No notice is required if air testing reveals oxygen levels between 19.5% and 23.5% and Lower Explosive Limit (LEL) is below 10%, and if no other hazards are identified. Air testing results must be recorded by the person performing the air test.
3) Permit-Required Entry – If hazards are identified in the space or air testing results are outside the acceptable ranges given above, then prior to entry, hazards must be eliminated such as through the use of a ventilating fan, trench box, etc. The Subcontractor planning to enter the confined space must complete the Confined Space Entry Notice and submit the notice to the Presidio Trust Project Manager. The notice is valid for one working day only or the period of the activity (whichever is shorter) and will be posted at all access ways to the space.

All permit required confined spaces shall be continually monitored during entry for oxygen concentration, combustible or explosive vapors and toxic chemicals when necessary. If conditions in the space become different than those specified on the notice, the entrant shall be immediately notified to exit the space.

All means necessary to isolate a space from stored energy (electrical or otherwise) shall be performed to eliminate the threat of potential hazards and documented on the notice.

A trained attendant will be present outside the confined space during all entrance activities. The attendant shall not enter the confined space for any reason. Only specially trained rescuers shall be utilized for permit-required confined space rescue.

4) Training – All entrants, attendants, entry supervisors, and rescue teams must have received confined space safety training prior to entry. Persons testing the air quality must be trained to properly use air-testing meters.

- Only employees who have been properly trained on the hazards associated with confined space work shall be allowed to enter a confined space.
- Before entering a permit required confined space, a Confined Space Entry Notice shall be completed by the subcontractor and submitted to the Presidio Trust Project Manager.
- Before any entrance cover to a confined space is removed, it shall be determined that there are no temperature or pressure differences, or other hazardous conditions that may injure the employees removing the cover.
- When covers are removed from the confined spaces, the opening shall be guarded by a railing, temporary cover, or other temporary barrier.
- Prior to entering a confined space, all levels of the confined space shall be tested for the presence of flammable or toxic gases and vapors or an oxygen deficient atmosphere.
- If flammable or toxic gases or vapors are detected or if an oxygen deficiency is found, forced ventilation shall be used to maintain oxygen at a safe level and to prevent a hazardous concentration of flammable or toxic gases and vapors.

- Entry into a confined space with an unsafe atmosphere shall be avoided if at all possible. If entry into a permit required confined space cannot be avoided, the procedures outlined in the 29 CFR 1910.146(c) (5) (ii) shall be utilized.

3. Cranes, Derricks, Hoisting Equipment29 CFR 1926.1400/Title 8CCR 1610-1619

- The subcontractor shall designate a competent person who shall inspect all machinery and equipment prior to each use and, and during use, to make sure it is in safe operating condition. Any deficiencies shall be repaired, or defective parts replaced, before continued use.
- Hoisting of employees on a suspended work platform with a crane or derrick is prohibited, except when conventional means of reaching the work site would be more hazardous or is not possible because of workplace conditions.
- In the event a crane suspended work platform must be utilized, compliance with 29 CFR 1926.1431 shall be met and verification of regulation conformance must be submitted by subcontractor to the Presidio Trust Project Manager prior to the use of the man-basket.
- No person shall be permitted to ride the hook, sling, or load of any hoisting equipment.
- Load limits, as specified by the manufacturer, shall not be exceeded under any circumstances.
- Operating and maintenance procedures as specified by the manufacturer shall be followed.
- Signals to the equipment operator shall be given by one person designated to perform this task. The operator shall, however, obey a “Stop” signal given by anyone.
- Accessible areas within the swing radius of the rear of the rotating superstructure of the crane, either permanently or temporarily mounted, shall be barricaded in such a manner as to prevent an employee from being struck or crushed by the crane.
- No employee shall be under a suspended load or inside the angle of a hoist line. No employee shall stand or work near a cable, chain or rope under tension.
- Operators shall not leave their position at the controls of cranes, hoists, derricks or other lifting devices while the load is suspended.
- Operators of cranes, derricks, hoists and hoisting equipment shall exercise extreme caution when in close proximity to energized lines or equipment. The operator shall keep the equipment at least 10 feet away from all lines energized up to 50 kV and 50 feet away from all lines energized over 50 kV.
- Tag lines shall be used on all loads.
- All spreader bars shall be tagged with the rated capacity.
- Use of man-baskets and personnel hoists is strictly prohibited, unless it can otherwise be proven that all other means of access create a greater hazard.
- In the event a man-basket is used, it shall meet the standards outlined in 29 CFR 1926.1431(d).
- Anti-two-blocking devices must be used anytime personnel hoists are used.

4. Electrical 29 CFR 1926.400 and 1926.950

Subpart K

All electrical work shall be in compliance with the latest edition of the National Electrical Code, unless otherwise provided by OSHA regulations.

Work Near Electricity

- A trained electrician who is experienced with the National Electrical Code shall only make electrical repairs and/or installations.
- No work shall be performed on or near unguarded electrical circuits unless a qualified person has tested the circuit to assure there are no live parts.
- Lockout/Tagout procedures are to be followed when the potential for employee exposure to stored energy exists.
- Buried electrical lines shall be determined prior to excavation processes. Where the exact location of underground electric power lines is unknown, workers using jack hammers or hand tools that may contact electrical lines shall be provided with insulated gloves and other protective equipment such as

rubber boots.

Electrical Boxes/Panels

- Electrical receptacles shall be grounded.
- Circuit protectors, such as fuses or circuit breakers, shall be installed within the circuit to prevent excessive current flow.
- Security covers shall be installed on live electrical receptacle/panel boxes and the boxes shall be mounted and secured.

General

- Subcontractors shall use either ground fault circuit interrupters as specified in 29 CFR 1926.404 (b)(1)(ii) or an assured equipment grounding conductor program as specified in 29 CFR 1926.404 (b)(1)(iii).
- Fuses and circuit breakers shall be so located or shielded that employees will not be burned or otherwise injured by their operation.
- Circuit breakers shall clearly indicate whether they are in the open (off) or closed (on) position.
- Temporary wiring shall be removed immediately upon completion of construction or the purpose for which the wiring was installed.
- Flexible cords shall be used only in continuous lengths without splice or tap.
- Portable headlamps shall contain a metal shell. Pipelined lamp holders shall not be used.
- The operating voltage of exposed live parts of transformer installations shall be indicated by warning signs or visible markings on the equipment or structure.
- In work areas where the exact location of underground electric powerlines is unknown, employees using jack-hammers, bars, or other hand tools which may contact a line shall be provided with insulated protective gloves.
- Worn or frayed electric cords or cables shall not be used.
- Extension cords shall not be fastened with staples, hung from nails, or suspended by wire.
- Controls that are to be deactivated during the course of work on energized or de-energized equipment or circuits shall be tagged.
- Equipment or circuits that are de-energized shall be rendered inoperative and shall have tags attached at all points where such equipment or circuits can be energized.
- Tags shall be placed to identify plainly the equipment or circuits being worked on.

Subpart V

All Electric Power Transmission and Distribution work shall be performed in compliance with OSHA CFR 1926.950-1926.968.

General

- Each employee shall be trained in, and familiar with, the safety-related work practices, safety procedures, and other safety requirements in this subpart that pertain to his or her job assignments.
- Each qualified employee shall also be trained and competent in: the skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment, the nominal voltage of exposed live parts, the minimum approach distances corresponding to the voltages to which the qualified employee will be exposed and the skills and techniques necessary to maintain those distances, the proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electric equipment, and the recognition of electrical hazards to which the employee may be exposed and the skills and techniques necessary to control or avoid these hazards.

Grounding

- *Order of connection*. The employer shall ensure that, when an employee attaches a ground to a line or to equipment, the employee attaches the ground-end connection first and then attaches the other end by means of a live-line tool. For lines or equipment operating at 600 volts or less, the employer may permit the employee to use insulating equipment other than a live-line tool if the employer ensures that the line or equipment is not energized at the time the ground is connected or if the employer can demonstrate that each employee is protected from hazards that may develop if the line or equipment is energized.
- *Order of removal*. The employer shall ensure that, when an employee removes a ground, the employee removes the grounding device from the line or equipment using a live-line tool before he or she removes the ground end connection. For lines or equipment operating at 600 volts or less, the employer may permit the employee to use insulating equipment other than a live-line tool if the employer ensures that the line or equipment is not energized at the time the ground is disconnected or if the employer can demonstrate that each employee is protected from hazards that may develop if the line or equipment is energized.
- *Additional precautions.* The employer shall ensure that, when an employee performs work on a cable at a location remote from the cable terminal, the cable is not grounded at the cable terminal if there is a possibility of hazardous transfer of potential should a fault occur.
- *Removal of grounds for test.* The employer may permit employees to remove grounds temporarily during tests. During the test procedure, the employer shall ensure that each employee uses insulating equipment, shall isolate each employee from any hazards involved, and shall implement any additional measures necessary to protect each exposed employee in case the previously grounded lines and equipment become energized.

Guarding of energized parts

- *Type of guarding.* The employer shall provide guards around all live parts operating at more than 150 volts to ground without an insulating covering unless the location of the live parts gives sufficient clearance (horizontal, vertical, or both) to minimize the possibility of accidental employee contact.
- *Maintaining guards during operation.* Except for fuse replacement and other necessary access by qualified persons, the employer shall maintain guarding of energized parts within a compartment during operation and maintenance functions to prevent accidental contact with energized parts and to prevent dropped tools or other equipment from contacting energized parts.
- *Temporary removal of guards.* Before guards are removed from energized equipment, the employer shall install barriers around the work area to prevent employees who are not working on the equipment, but who are in the area, from contacting the exposed live parts.

5. Excavations 29 CFR 1926.650/Title 8 CCR1541

- Before excavation work begins, an excavation plan will be prepared and disseminated, and a Pre-Excavation Checklist will be completed. A separate notice must be obtained for each excavation.
- A competent person shall conduct daily inspections of excavations deeper than 5 feet in depth if persons are expected to enter or if water has accumulated or other hazard creating event has occurred.
- Prior to any excavation, trench work or drilling operations, all underground utilities shall be located and marked. If underground lines cannot be located, proper precautions shall be taken to protect employees while physically locating them.
- Excavated soils must be placed at least 2 feet from the edge of the excavation to help prevent collapse of the wall.
- All excavations deeper than 4 feet deep and containing a potential for a hazardous atmosphere or oxygen deficiency (less than 19.5% oxygen) must be tested to ensure safe working conditions. Testing shall be done before employees enter the excavation.
- No person(s) shall perform any work in a trench or excavation that contains accumulated water.

- Walkways or bridges with standard guardrails shall be provided where employees or equipment are required to cross over excavations.
- All excavations 5 feet or deeper, or less in unstable soil, shall be sloped, shored, or shielded to prevent cave-ins.
- All excavations 4 feet or deeper shall have a ladder for access into excavation with no more than 25 feet of travel in any direction.
- All excavated and available material shall be retained two feet or more from the edge of the excavation.
- All excavations shall be barricaded with the appropriate barrier tape and other protective devices as required.
- When entering an excavation that may be considered a hazardous environment by site safety representatives, proper personal protective equipment must be worn.

6. Fall Protection 29 CFR 1926.500/Title 8 CCR 1541, 1620, 1669, 1670

Unprotected Sides and Edges

- Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is six feet or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems or personal fall arrest systems.
- Each employee who is constructing a leading edge six feet or more above lower levels shall be protected from falling by the use of guardrail systems, safety net systems or personal fall arrest systems.
- Each employee in a hoist area shall be protected from falling six feet or more to lower levels by guardrail systems or personal fall arrest systems.

Protection from Falling Objects

- When an employee is exposed to falling objects, the subcontractor shall provide one of the following:
  (1) Toeboards, screens or guardrail systems to prevent objects from falling from higher levels; or
  (2) Erect a canopy structure and keep potential fall objects far enough from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced; or
  (3) Barricade the area to which objects could fall, prohibit employees from entering the barricaded area and keep objects that may fall far enough away from the edge of a higher level so that those objects would not go over the edge if they were accidentally displaced.
- Toeboards shall be a minimum of 3 ½ inches (9 cm) in vertical height from their top edge to the level of the walking/working surface. They shall have not more than ¼ inch clearance above the walking/working surface. They shall be solid or have openings not over 1 inch (2.5 cm) in greatest dimension.

Fall Protection System Criteria and Practices

- The top edge height of top rails or equivalent guardrail system members, shall be 42 inches (plus or minus 3 inches) above the walking/working level.
- Midrails, screens, mesh, intermediate vertical members or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working level.
- Midrails shall be installed at a height midway between the top edge of the guardrail system and the walking/working level when used.
- Guardrail systems shall be capable of withstanding, without failure, a force at least 200 pounds (890 N) applied within 2 inches (5.1 cm) of the top edge, in any outward or downward direction, at any point along the top edge.
- Top rails and midrails shall be at least one-quarter inch (0.6 cm) nominal diameter or thickness to prevent cuts and lacerations.
- If wire rope is used for top rails, it shall be flagged at not more than 6-foot intervals with high-visibility material.

Personal Fall Arrest Systems

- Full body harness with lanyards shall be used for personal fall arrest systems. Body belts are not acceptable for personal fall arrest systems.
- All components of a personal fall arrest system must be inspected by a competent person prior to use. All manufacturer recommendations for inspection, use and maintenance must be followed.
- Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2 kN).
- Lifelines shall be protected against being cut or abraded.
- Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2 kN) per employee attached.
- Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.
- The subcontractor shall provide for prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves.
- Positioning devices shall be rigged such that an employee cannot free fall more than 2 feet (0.9 m).

Fall Protection Training Program

- The subcontractor shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards.
- The subcontractor shall verify compliance with of fall protection training by preparing a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training and the signature of the person who conducted the training or the signature of the subcontractor.

7. Flammable and Combustible Liquids 29 CFR 1926.150/Title8 CCR 1930-1938

- Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.
- Flammable or combustible liquids shall not be stored in areas used for exits, stairways, or normally used for the safe passage of people.
- For portable containers, quantities of flammable and combustible liquid in excess of 25 gallons shall be stored in an acceptable or approved cabinet.
- Leakage or spillage of flammable or combustible liquids shall be disposed of promptly and safely.
- Flammable or combustible liquids shall be stored in approved closed containers, in tanks located underground or in above ground portable tanks.
- The dispensing hose shall be an approved type.
- The dispensing nozzle shall be an approved automatic-closing type without a latch-open device.
- Underground tanks shall not be abandoned.
- There shall be no smoking or open flames in the areas used for fueling, servicing fuel systems for internal combustion engines and receiving or dispensing of flammable or combustible liquids.
- Conspicuous and legible signs prohibiting smoking shall be posted.
- The motors of all equipment being fueled shall be shut off during the fueling operation.
- Each service or fueling area shall be provided with at least one fire extinguisher having a rating of not less than 20-B:C located so that an extinguisher will be within 50 feet of each pump, dispenser, underground fill pipe opening and lubrication or service area.

8. Hazardous Materials 49CFR, 29 CFR 1926.1101-1152

If hazardous or unknown potentially hazardous material are unexpectedly discovered during project work activities, evacuate, secure the area, and call for assistance being careful not get exposed to the material. Presidio Trust or designee shall be contacted for assistance. When required, a Hazardous Materials Response Team, such as located in certain fire departments, may need to be contacted to limit exposures to site personnel and/or the community.

Hazardous Materials Transportation
Hazardous materials (even as small as one ounce) must not be commercially shipped or transported without being properly packaged, labeled, marked, placarded, and accompanied by appropriate shipping papers. Persons who engage in packaging, labeling, marking, placarding, or transporting hazardous materials must be trained and aware of the Department of Transportation (DOT) requirements for hazardous material transportation. Hazardous materials include those materials, substances, and wastes listed in the Code of Federal Regulations Title 49.

Substance-Specific Regulations
Several substance-specific regulations exist which are enforced by the Occupational Safety and Health Administration. These regulations generally require specific training (which may be required quarterly), medical surveillance, development of written programs, exposure monitoring, enforcement of specific work practices, defining various job hazards, and implementation of engineering controls. Persons who have the potential to be exposed to the substance-specific regulations may require additional training.

9. Housekeeping 29 CFR 1926.25/Title 8 CCR1513

- During the course of construction, alteration, or repairs, form and scrap lumber with protruding nails and all other debris, shall be kept cleared from work areas, passageways and stairs, in and around buildings or other structures.
- Combustible scrap and debris shall be removed at regular intervals during the course of construction. Safe means shall be provided to facilitate such removal.
- Containers shall be provided for the collection and separation of waste, trash, oily and used rags and other refuse. Containers used for garbage and other oily, flammable or hazardous wastes, such as caustics, acids, harmful dusts, etc. shall be equipped with covers. Garbage and other waste shall be disposed of at frequent and regular intervals.

10. Ladders and Stairways 29 CFR 1926.1050/Title 8 CCR1629

General Requirements

- A stairway or ladder shall be provided at all personnel points of access where there is a break in elevation of 19 inches (48 cm) or more, and no ramp, runway, sloped embankment or personnel hoist is provided.
- A double-cleated ladder or two or more separate ladders shall be provided when ladders are the only means of access or exit from a working area for 25 or more employees or when a ladder is to serve simultaneous two-way traffic.

Stairways

- Stairways that will not be a permanent part of the structure on which construction work is being performed shall have landings of not less than 30 inches in the direction of travel and extend at least 22 inches in width at every 12 feet or less of vertical rise.
- Where doors or gates open directly on a stairway, a platform shall be provided, and the swing of the door shall not reduce the effective width of the platform to less than 20 inches.
- Stairways having four or more risers or rising more than 30 inches, whichever is less, shall be equipped with:

  (1) At least one handrail; and
  (2) One stair rail system along each unprotected side or edge.

- The height of handrails shall be not more than 37 inches not less than 30 inches from the upper surface of the handrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

Ladders

- Ladders shall not be tied or fastened together to provide longer sections unless they are specifically designed for such use.
- Wood ladders shall not be coated with any opaque covering, except for identification or warning labels which may be placed on one face only of a side rail.
- Fixed ladders shall be provided with cages, wells, ladder safety devices or self-retracting lifelines where the length of climb is less than 24 feet, but the top of the ladder is at a distance greater than 24 feet above lower levels.
- Where the total length of a climb equals or exceeds 24 feet, fixed ladders shall be equipped with one of the following;

  (1) Ladder safety devices; or
  (2) Self-retracting lifelines, and rest platforms at intervals not to exceed 150 feet; or
  (3) Cage or well, and multiple ladder sections, each ladder section not to exceed 50 feet in length. Ladder sections shall be offset from adjacent sections, and landing platforms shall be provided at maximum intervals of 50 feet.

- Ladders shall not be loaded beyond the maximum intended load for which they were built, not beyond their manufacturer's rated capacity.
- Ladders shall be used only for the purpose for which they were designed.
- Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.
- Ladders placed in any location where they can be displaced by workplace activities or traffic shall be secured to prevent accidental displacement or a barricade shall be used to keep the activities or traffic away from the ladder.
- Ladders shall not be moved, shifted or extended while occupied.
- Ladders shall have nonconductive side rails if they are used where they employee or the ladder could contact exposed energized electrical equipment.
- The top or top step of a stepladder shall not be used as a step.
- Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.
- Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats or steps, broken or split rails, corroded components or other faulty or defective components, shall either be immediately marked in a manner that readily identifies them as defective or be tagged with "Do Not Use" or similar language and shall be withdrawn from service until repaired.

Training Requirements

- The subcontractor shall provide a training program for each employee using ladders and stairways, as necessary. The program shall enable each employee to recognize hazards related to ladders and stairways, and shall train each employee in the procedures to be followed to minimize these hazards.
- The subcontractor shall ensure that each employee has been trained by a competent person in the following areas, as applicable:

  (1) The nature of fall hazards in the work area;
  (2) The correct procedures for erecting, maintaining and disassembling the fall protection systems to be used;
  (3) The proper construction, use, placement and care in handling of fall stairways and ladders;
  (4) The maximum intended load-carrying capacities of ladders used; and
  (5) The standards contained in 29 CFR 1926 Subpart X.

- Retraining shall be provided for each employee as necessary so that the employee maintains the understanding and knowledge acquired through compliance with Subpart X of the 29 CFR 1926.

11. Lockout/Tagout Requirements and Procedures 29 CFR 1926.417

Definitions:

1) Lockout – Involves using a device such as a padlock, blank pipe flange, chain key block, etc. to isolate energy from employee exposure.
2) Tagout – Involves applying a tag to the energy isolating device with written information concerning the date and name of person who applied the lock and tag.

Lockout/Tagout Policy

A lockout of equipment to isolate energy sources from employee exposure shall be the primary means of protection. A tagout alone does not provide the protection necessary to prevent unintentional operation of equipment and shall be used only in instances where placement of a lockout device is not achievable.

Lockout/Tagout procedures shall be used to prevent personal injury and/or property damage that could result from the unexpected start-up or shutdown of electrical, mechanical, hydraulic, pneumatic, thermal or chemical process energy. Lockout/tagout procedures shall be used prior to performing tie-in operations, maintenance, repair or adjustment of any device where exposure to hazardous energy sources may occur.

General

- Employees who are affected by lockout/tagout shall receive documented training provided by their employer on general lockout/tagout procedures and the documentation may be required to be submitted or audited to/by the Presidio Trust Project Manager prior to the start of the activity.
- Each person working under a lockout shall apply his/her personal lock and tag.
- Locks designated for use in lockout shall be used for no other purpose. The Subcontractor shall provide all locks for employee lockout.
- Locks used for lockout shall have one key only. Each lock shall be individually keyed. The key shall remain under the exclusive control of the authorized employee installing the lock.
- Prior to locking out any equipment, contact the Presidio Trust Project Manager for a copy of the energy isolation procedure for that piece of equipment.
- Tags shall be completely filled out prior to installation. Only tags approved by the Presidio Trust Project Manager or his/her designee shall be used.
- ***Multi-lock hasps*** shall be used to insure additional locks can be applied by others.
- Never fill the last available slot in an isolation point with your lock and tag. Use additional multi-lock hasps if necessary so others involved can lock and tag in.

Lockout Procedure

1) All affected employees in the area shall be notified that a lockout is being performed.
2) The equipment being locked out shall be shut down using normal shutdown procedures. (i.e. operator's control station, stop button, etc.)
3) Any residual energy shall be identified and dissipated at this time.
4) All equipment energy sources shall be neutralized. (i.e. electrical disconnects shall be opened, valves closed, blanks inserted in piping, springs returned to neutral position, other energy sources as required)
5) The employee performing the lockout shall place his/her personal lock and tag on EACH energy isolation point isolated in Step 4. If more than two isolation points are required to lockout the device, a group lockbox may be used. A tag indicating all persons who applied a lock, date, time, equipment type and number and duration of lockout shall also be applied at this time. A Subcontractor representative and a Presidio Trust shall also apply a lock at this time.
6) Test the lockout by clearing area and attempting to operate the machine.
7) Testing or Repositioning Machine or Equipment (Bump Test)
   7.1 Check the area to insure completeness of work.
   7.2 All nonessential items shall be removed from the area.

7.3 Safety guards shall be replaced.
7.4 Notify all affected employees that the machine is being tested/repositioned and clear the area.
7.5 Remove the necessary lockout devices to test/reposition the machine.
7.6 Follow steps 2-6 to reestablish the lockout of the machine.

8) Upon completion of the lockout an authorized employee must check the area for completeness of work. If the employee who initiated the lockout is available, he/she should conduct this inspection.
9) Remove all tools and nonessential items from the area.
10) Replace all guards.
11) Insure all employees are clear of the machine.
12) Notify all affected employees in the area that the lockout device(s) are being removed.
13) Remove lockout device(s).
14) Restart the machine to insure proper operation.

Group Lockout

1) When multiple isolation points, three or more, must be controlled during a lockout, or when multiple persons (craft) are involved, a group lockout shall be used.
2) Follow the steps for a normal lockout as documented in steps 1-6 above.
3) Each key for the locks used shall be placed in a group lockout box. The group lockbox shall be kept in view of the work being performed when practical.
4) A Job Control Lock shall be installed on the group lockbox by the Presidio Trust Project Manager. This lock shall remain in place until the lockout has been completed. The key for the Job Control Lock shall be kept in the Presidio Trust office.
5) Each employee covered by the lockout shall apply his/her lock and tag on the group lockout box.
6) Each employee shall remove their own lock when their portion of the work is completed or at the end of each shift.
7) Upon completion of the work, the Presidio Trust Project Manager shall inspect the work area for completeness.
8) When all of the conditions of the lockout termination procedures have been satisfied, the Job Control Lock shall be removed from the group lockbox.

Emergency Removal Lockout/Tagout Device

1) If an employee leaves the facility without removing his/her lock and tag, an effort shall be made to notify the employee that the supervisor in charge will authorize the removal of their lock. It must be deemed necessary that removal of the lock is required by at least two supervisory personnel, but only after confirming beyond any doubt it is safe to do so.
2) Verify the employee has left the site.
   a) Check with co-workers.
   b) Check the employee's time card.
   c) Attempt to reach him/her at home.
   d) Verify the employee is not in the equipment.
3) Visually confirm the completeness of work.
4) An authorized employee, under the direct supervision of the Presidio Trust Project Manager shall remove the lock.
5) Upon return to the site by the employee involved, he/she shall be informed of the removal. A review of the incident may be conducted by Presidio Trust to determine any disciplinary actions necessary.

12. Material Handling 29 CFR 1926.250/Title 8 CCR1613.3

General Requirements

- Aisles and passageways shall be kept clear to provide for the free and safe movement of material handling equipment or employees. Such areas shall be kept in safe condition.

Rigging Equipment for Material Handling

- Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service.
- Rigging equipment, when not in use, shall be removed from the immediate work area so as not to present a hazard to employees.
- Each day before being used, the sling and all fastenings and attachments shall be inspected for damage or defects by a competent person designated by the Subcontractor. Additional inspections shall be performed during sling use, where service conditions warrant. Damaged or defective slings shall be immediately removed from service.
- When used for eye splices, the U-bolt shall be applied so that the "U" section is in contact with the dead end of the rope.
- Slings shall be padded or protected from the sharp edges of their loads.
- The manufacturer's recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks.

13. Mobile Equipment 29 CFR 1926.602/TITLE 8 CCR3646

General Requirements

- All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, shall be locked, have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment.
- Heavy equipment suspended or held aloft by use of slings, hoists, or jacks shall be substantially blocked or cribbed to prevent falling or shifting before employees are permitted to work under or between them.
- Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment shall be either fully lowered or blocked when being repaired or when not in use.
- Whenever equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set.

Motor Vehicles

- Cabbed vehicles designed for public roadway usage must be equipped with operable brakes and emergency brakes, brake lights, two headlights and two taillights, an audible horn, and windshield wipers.
- If the vehicle has obstructed view to the rear, then the vehicle is backed up only when an observer signals that it is safe or the vehicle has a reverse signal alarm audible above the surrounding noise level.
- Tools and material shall be secured to prevent movement when transported in the same compartment with employees.
- All vehicles in use shall be checked at the beginning of each shift to assure the equipment is in safe operating condition. Vehicles, which are not in safe operating condition, shall not be used.

Earthmoving Equipment

- Use seat belts when provided, except in equipment that does not have roll over protection.
- All equipment brakes shall be capable of stopping and holding the equipment while fully loaded.
- All equipment shall be equipped with an audible horn, distinguishable from the surrounding noise level. Equipment with an obstructed view to the rear shall have a reverse signal alarm or the equipment may be backed if an employee signals that it is safe to do so.

Lifting and Hauling Equipment

- Clearly post the rated capacity on the vehicle.
- Do not lift or carry more than the rated capacity of the vehicle.
- Unauthorized personnel shall not be permitted to ride on powered industrial trucks.

14. Noise Exposure 29 CFR 1926.52/TITLE 8 CCR5095-5100

- Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table D-2 of 29 CFR 1926 Subpart D or Table N-1 in T8 CCR5096.
- When employees are subjected to sound levels exceeding those listed in Tabled D-2/N-1, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of the table, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table according to Subpart E of the 29 CFR 1926/.

15. Personal Protective Equipment 29 CFR 1926.95/ Title8 CCR3380

- Eye Protection – Safety glasses shall be worn at all times except while in vehicles with enclosed cabs or when additional eye protection is required.
- Full face shields shall be worn while grinding, chipping concrete or when possible eye and face hazards are present.
- Wherever it is not feasible to reduce the noise levels or duration of exposures to those specified in Table D-2, Permissible Noise Exposures, in 29 CFR 1926.52, ear protective devices shall be provided and used.
- Hard hats shall be worn at all times in the construction area.
- Work Shoes – Safety –toe footwear for employees shall meet the requirements and specifications in the ANSI Z41.1-1966.
- A respiratory protection program shall be utilized and must be administered by a suitably trained program administrator when hazardous substances in the atmosphere are present.
- When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to 29 CFR 1926 Subpart E.
- Respiratory protective devices shall be approved by the U.S. Bureau of Mines/National Institute for Occupational Safety and Health or acceptable U.S. Department of Labor for the specific contaminant to which the employee is exposed.
- Employees shall complete a medical questionnaire and be fit test prior to use.
- Employees shall not use respirators until he/she has been thoroughly trained in their use.
- Safety nets shall be provided when workplaces are more than 25 feet above the ground or water surface, or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines or safety belts is impractical.
- Employees working over or near water, where the danger of drowning exists, shall be provided with U.S. Coast Guard approved life jacket or buoyant work vests.

16. Tools 29 CFR 1926.300/Title 8 CCR 4189-4216

General Requirements

- When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use.
- Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive and splashing objects or exposed to harmful dusts, fumes, mists, vapors or gases shall be provided with the particular personal protective equipment necessary to protect them from the hazard.

Hand Tools

- The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

Power-Operated Hand Tools

- The use of electric cords or air hoses for hoisting or lowering tools shall not be permitted.
- Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected.

- All pneumatically driven nailers, staplers and other similar equipment provided with automatic fastener feed, which operate at more than 100 p.s.i. pressures at the tool, shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.
- The manufacturer's safe operating pressure for hoses, pipes, valves, filters and other fittings shall not be exceeded.
- The fluid used in hydraulic powered tools shall be fire-resistant fluids approved under Schedule 30 of the U.S. Bureau of Mines, Department of Interior, and shall retain its operating characteristics at the most extreme temperatures to which it will be exposed.
- Only employees who have been trained in the operation of the particular powder-actuated tool in use shall be allowed to operate it.
- No fastener shall be driven into a spalled area caused by an unsatisfactory fastening.
- All tools shall be used with the correct shield, guard or attachment recommended by the manufacturer.
- Powder-actuated tools used by employees shall meet all other applicable requirements of ANSI A10.3-1970, Safety Requirements for Explosive-Actuated Fastening Tools.

Abrasive Wheels and Tools

- Grinding machines shall be equipped with safety guards in conformance with the requirements of ANSI B7.1-1970, Safety Code for the Use, Care and Protection of Abrasive Wheels.
- Floor stand and bench mounted abrasive wheels, used for external grinding, shall be provided with safety guards (protection hoods).
- The work rest shall be adjusted as necessary to maintain the 1/8" clearance to the abrasive wheel.

Gears, Sprockets, and Chains

- Gears shall be guarded in accordance with 29 CFR 1926.307(f).
- All sprocket wheels and chains shall be enclosed unless they are more than 7 feet (2.128 m) above the floor or platform.

17. Welding and Cutting 29 CFR 1926.350/TITLE 8 CCR1739-1743

Gas Welding and Cutting

- Cylinders of compressed gases must be properly labeled.
- Valve protection caps shall be in place and secured.
- When cylinders are hoisted, they shall be secured on a cradle, sling board or pallet. They shall not be hoisted or transported by means of magnets or choker slings.
- When cylinders are transported by powered vehicles, they shall be secured in a vertical position.
- Unless cylinders are firmly secured on a special carrier intended for this purpose, regulators shall be removed and valve protection caps put in place before cylinders are moved.
- Compressed gas cylinders shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually being hoisted or carried.
- Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials a minimum distance of 20 feet or by a noncombustible barrier at least 5 feet high having a fire-resistance rating of at least one-half hour.
- Cylinders, whether full or empty, shall not be used as rollers or supports.
- Fuel gas shall not be used from cylinders through torches or other devices which are equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.
- Fuel gas and oxygen manifolds shall bear the name of the substance they contain in letters at least 1-inch high which shall be either painted on the manifold or on a sign permanently attached to it.
- Fuel gas hose and oxygen hose shall be easily distinguishable from each other.
- Torches in use shall be inspected at the beginning of each working shift for leaking shutoff valves, hose couplings and tip connections. Defective torches shall not be used.
- Oxygen and fuel gas pressure regulators, including their related gauges, shall be in proper working order while in use.

- Whenever practicable, all arc welding and cutting operations shall be shielded by noncombustible or flameproof screens which will protect employees and other persons working in the vicinity from the direct rays of the arc.

Operating Instructions

- Subcontractors shall instruct employees in the safe means of arc welding and cutting as follows:

  (1) When electrode holders are to be left unattended, the electrodes shall be removed and the holders shall be so placed or protected that they cannot make electrical contact with employees or conducting objects.
  (2) Hot electrode holders shall not be dipped in water.
  (3) When the arc welder or cutter has occasion to leave his/her work or to stop work for any appreciable length of time, or when the arc welding or cutting machine is to be moved, the power supply switch to the equipment shall be opened.
  (4) Any faulty or defective equipment shall be reported to the supervisor.
  (5) Additional requirements outlined in 29 CFR 1926.406(c).

Fire Prevention

- If the object to be welded, cut or heated cannot be moved and if all the fire hazards cannot be removed, positive means shall be taken to confine the heat, sparks and slag and to protect the immovable fire hazards from them. A fire watch may be required to monitor the work area for up to 30 minutes following the conclusion of the hot work.
- Suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for instant use.

Welding, Cutting and Heating in Way of Preservative Coatings

Before welding, cutting or heating is commenced on any surface covered by a preservative coating whose flammability is not known, a test shall be made by a competent person to determine its flammability and health impact (such as lead paint, etc.). Preservative coatings shall be considered to be highly flammable when scrapings burn with extreme rapidity.

A-14 Pre-Excavation Checklist

Project Name:	**Project #:**
Location:	**Date:**
Company:	**One Call #**
Submitted By:	

The following procedures are mandatory. Failure to complete this check list could result in disciplinary action or termination:

Complete a pre-excavation walk-out of the entire job site. Your objective is to visually inspect the dig area to ensure all utilities are marked. Look for obvious signs of utilities in the immediate work area that may not be marked such as, above-ground pedestals, gas meters, man-hole covers, drains, or utility poles with cable risers. If you find these indicators and suspect that there is an unmarked utility DO NOT PROCEED**. Call your General Foreman or Locate Ticket Coordinator immediately.**

When you have completed your walk-out, complete the following check list:

1. Verify that the One-Call ticket covers the 'Scope of work' and 'Work to begin' date:
   I have verified the One-Call ticket covers the 'Scope of work' &'Work to begin' date ☐
2. What marked utilities did you observe?
   ☐Gas (Yellow) ☐Electric (Red) ☐Telephone (Orange) ☐Cable TV (Orange) ☐Water (Blue) ☐Sewer (Green)
3. Based on visual observation, did you see any obvious signs of unmarked utilities in the immediate work area?
   ☐Yes ☐No If Yes, please identify?
   ☐Gas (Yellow) ☐Electric (Red) ☐Telephone (Orange) ☐Cable TV (Orange) ☐Water (Blue) ☐Sewer (Green)
4. I have notified my Supervisor and Locate Ticket Coordinator ☐
5. Photograph the entire proposed work area including all locate marks.
   I have photographed the entire site including existing locate/markings prior to excavation ☐
6. Advise your crew members of the following: If they have to cross a marked Utility they must HAND DIG ONLY within 18" of the locate marks. For gas lines add half the diameter of the buried facility to the 18''. If necessary, dig a test-hole (pothole) using hand tools to determine the location of the facility.
   I have advised my crew of this rule ☐
7. When possible, all directional boring / drilling routes must be potholed every 50-80 feet prior to drilling.
   I have advised my crew accordingly and test-holes (potholes) have been dug ☐

~~~~~~~~~~~~~~~~~~~~~~~~~~ RESPECT THE MARKS! ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

IN THE EVENT OF DAMAGE

- Notify your Supervisor and Locate Ticket Coordinator
- Complete the TRC Incident Notification Form
- Photograph entire area and damage location

PHOTOGRAPHY TIPS

- Make sure the correct date & time stamp is active on your camera
- Photograph the excavation itself (damage location) and cable depth (include tape measure in hole)
- Take photos from multiple vantage points and of surrounding area (360 degrees)
- If the utility was miss-marked, photograph the locate marks/flags (include tape measure in photo)
- If the utility was not marked, photograph the entire area and approaches to the cut site
- Show a quantifiable location/address (street sign, house number, mail box number etc.)
~~~~~~~~~~~~~~~~~~~~~~~~~~

A-18 Excavation Daily Inspection

Project Name: **Project #:**

Location: **Date:**

Company:

Submitted By:

Depth: _____ **Width:** _____ **Date Opened:** _____

Soil classification: ☐ A ☐ B ☐ C

Indicate how the classification was made:

Manual test(s)

a) plasticity	_____	_____	_____
b) dry strength	_____	_____	_____
c) thumb penetration	_____	_____	_____
d) pocket penetrometer	_____	_____	_____
e) other	_____	_____	_____

Visual test(s) **Do as many as possible**	**Cohesive Soil**	**Granular Soil**
a) Spoil pile	☐ **Remains in clumps**	☐ **Breaks up easily**
b) Trench Side	☐ **Stands vertical >2 hours**	☐ **Sloughs into trench**

The excavation is properly (circle one):

Shored/Shielded	**(indicate type of shoring)**	☐ **closed**	☐ **open**	☐ **wood**	☐ **metal**	☐ **shield**
Sloped/benched	**(indicate the slope)**	☐ **vertical sides**	☐ **3/4:1**	☐ **1:1**	☐ **1 1/2: 1**	☐ **2:1**

Excavation Checklist:	Morning	Mid-Day	Afternoon
Time:	_____	_____	_____
Weather:	_____	_____	_____
Was atmospheric testing required?	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
Was atmospheric testing done?	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
Is the spoil pile back 2' from the edge?	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
Have surface encumbrances been removed?	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
Are there any signs of sloughing or cave-in?	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
Is there water accumulation in the bottom?	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
Are there vibration sources near the excavation?	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
Is there adequate access/egress (ladder, ramp, etc.)	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
Has the soil been disturbed previously?	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
Sides	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
Top	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**
If the excavation is > 20 feet deep, have engineering designs been documented and complied with?	☐**yes** ☐**no**	☐**yes** ☐**no**	☐**yes** ☐**no**

SIGNATURES

Supervisor

General Supervisor

Project/Construction Manager

Safety Representative

A-27 Site Specific Excavation Plan

Project Name: **Project #:**

Location: **Date:**

Company:

Submitted By:

Surface Encumbrances

Have Surface encumbrances that may create a hazard been removed or supported?

☐ Yes

☐ N/A

Underground Installations

Have Utility companies or owners been contacted? ☐ Yes ☐ N/A

By whom: Work Order #: Date:

When excavation operations approach the estimated location of underground installations, how will the exact location of the installations shall be determined?

☐ Probing ☐ Hand digging ☐ Detecting equipment ☐ Other

How will underground installations be protected?

☐ Support ☐ Removal ☐ Other

Access and Egress

Will structural ramps be used? ☐ Yes ☐ N/A

Designed by a competent person? ☐ Yes ☐ N/A

Will excavations be 4 feet in depth or more? ☐ Yes ☐ N/A

Means of egress (requiring no more than 25 feet of lateral travel) ☐ Yes ☐ N/A

☐ Stairway(s) ☐ Ramp(s) ☐ Ladder(s) ☐ Other

Exposure to vehicular Traffic? ☐ Yes ☐ N/A (If yes workers shall wear warning vests or other suitable garments.)

Exposure to falling loads? ☐ Yes ☐ N/A

☐ No workers permitted underneath loads

☐ Workers shall be required to stand away from any vehicle being loaded or unloaded. (Operators may remain in cabs)

Warning System for Mobile Equipment

Will mobile equipment operated adjacent to, or approaching the edge of, excavations have a clear and direct view of the edge of the excavation?

☐ Yes ☐ N/A If yes what warning system will be utilized?

☐ Barricade(s) ☐ Hand Signals ☐ Stop logs ☐ Other

Hazardous Atmospheres

Can oxygen deficiency or a hazardous atmosphere reasonably be expected to exist? ☐ Yes ☐ N/A

If yes, how will atmospheres in excavations greater than 4 feet in depth be tested?

If atmospheres contain less than 19.5% oxygen or other hazardous substance how will it be remediated?

When controls are intended to reduce the level of contaminants to acceptable levels, testing shall be conducted:

☐ Continuously ☐ Periodically

Will emergency rescue equipment be utilized? ☐ Yes ☐ N/A If yes what type?

☐ SCBA ☐ Harness and line ☐ Basket stretcher ☐ Other

A-27 Site Specific Excavation Plan

Water Accumulation

Will workers work in excavations in which there is accumulated water? ☐ Yes ☐ N/A

If yes is water controlled or prevented from accumulating by water removal equipment? ☐ Yes ☐ N/A

Equipment type: Competent Person:

Does excavation work interrupt the natural drainage of surface water (such as streams)? ☐ Yes ☐ N/A

Method used to divert water:

Stability of Adjacent Structures

Will the stability of adjacent structures be endangered by excavation operations? ☐ Yes ☐ N/A

If yes, what type of support structure will be used?

☐ Shoring ☐ Bracing ☐ Underpinning ☐ Other

If yes, but support structures will not be used, one of the following must apply:

☐ The excavation is in stable rock

☐ A registered professional engineer has determined that such work will not pose a hazard.

Name of registered professional engineer:

Protection from Loose Rock or Soil

How will workers be protected from materials or equipment that could fall or roll into excavations?

☐ Material placed > 2 feet from edge Retaining devices

Inspections

☐ Inspections of all excavations, adjacent areas and protective systems shall be made by a competent person.

☐ Inspections shall be conducted by the competent person daily, prior to the start of work and as needed throughout the shift. Inspections shall be documented on a Daily Excavation Inspection Form.

☐ Inspections shall be made after every rainfall or other hazard increasing occurrence.

☐ Where the competent person finds evidence of hazardous conditions, workers shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Fall Protection

Will excavations be 6 feet or greater in depth? ☐ Yes ☐ N/A

If yes, fall protection will consist of:

☐ Barricades ☐ Fall restraint ☐ Harness ☐ Other

Will workers be required or permitted to cross over excavations? ☐ Yes ☐ N/A

If yes, guardrails shall be provided.

SIGNATURES

Supervisor	General Supervisor
Project/Construction Manager	Safety Representative

Appendix B
Glove Selection Guideline

GLOVE SELECTION GUIDELINE			
HAZARD	**EXAMPLE TASKS**	**ANSI CUT/ABRASION RATING***	**REPRESENTATIVE GLOVE**
Impact Hazards, Med/Heavy Duty Puncture Cut	Drilling/direct push activities. Construction. Heavy materials handling. Power tools. Air knifing. Excavation.	ANSI Cut and Abrasion Resistance **Level 5** **EN 388 4521**	Hexarmor®Chrome Hexarmor® GGT5 Hexarmor® L5 Hexarmor® SteelLeather III Ironclad® Kong Glove
Med/Heavy Duty Puncture Cut Oil/Solvent Resistant	Tasks where materials are treated with oil or solvents.	ANSI Cut and Abrasion Resistance **Level 3 - 4** **EN 388 4522**	Ansell Alpha-Tec ® Memphis® Ultra Tech Nitrile Cut & Splash Best® Neoprene 6780 Hexarmor™ TenX Threesixty
Medium Duty Cut/Puncture Gloves with Oily Surface Grip	Light materials handling, wet service	ANSI Cut and Abrasion Resistance **Level 3** **EN 388 44xx**	Best®Zorb-It Ultimate HV 4567 Ansell® Cut Protective Glove 97-505 Ansell HyFlex® 11-511 Ansell HyFlex® 11-624
Med/Heavy Duty Cut/Puncture	Light Materials Handling. System O&M. Use of Hand Tools. Hand Augering. Heavy Equipment Operator.	ANSI Cut and Abrasion Resistance **Level 2** **EN 388 33xx**	Perfect Fit® PF570 Hexarmor® Level Six 9010/9012 Ironclad® Cut Resistant Glove Ansell HyFlex® 11-511 Ansell HyFlex® 11-624 Ansell® Cut Protective Glove 97-505
Light Duty Cut/Puncture Abrasion Only	Handling soil and Groundwater Samples. Opening spoons. Well construction.	ANSI Cut and Abrasion Resistance **Level 2 - 4** **EN 388 21xx**	Memphis® Ninja Max N9676GL Memphis® UltraTech Dyneema 9676 Memphis® Ninja Ice (Cold Weather) Ansell HyFlex® 11-511 Ansell® Cut Protective Glove 97-505 Ansell® Powerflex 80-813 Ironclad™ Workforce
Light Duty Glove Cut/Abrasion (used under nitrile gloves)	Groundwater Sampling.	ANSI Cut and Abrasion Resistance **Level 2** **EN 388 21xx**	Ansell HyFlex® 11-500 Ansell HyFlex® 11-624 Ansell GoldKnit
* Reference to ANSI and EN 388 glove testing standards. Listed gloves meet the standards in the table but are not the only gloves that meet the standard.			
This selection chart is not intended to address all chemical hazards. Gloves used for chemical protection shall provide cut/puncture resistance or be used in tandem with cut/puncture protection. Nitrile gloves used for environmental sampling must be used in tandem with a cut/puncture resistant glove.			
Gloves available in high visibility colors have shown to be effective and are preferred.			

Appendix C
Heat & Cold Stress

COLD STRESS

Ambient air temperatures during site activities may create cold stress for on-site workers. Procedures for recognizing and avoiding cold stress must be followed. Cold stress can range from frostbite to hypothermia. The signs and symptoms of cold stress are listed below.

Frostbite is defined as the actual freezing of one or more layers of skin. In severe cases, organs and structures below the skin can become frozen. Usually, body areas exposed to the most cold, and least body warmth, are affected first. These areas include fingers, toes, ears, and the tip of your nose. Frostbite is characterized by pain and loss of dexterity in the affected limb. The tissue initially appears reddened, but may progress to white, blue, or black.

> **FIRST AID:** Bring the affected employee indoors and call the local emergency clinic. Rewarming of frostbitten parts is best left to a medical doctor in a controlled setting.

Hypothermia is the condition that occurs when the body's natural warming mechanisms (muscle activity and shivering) cannot counteract the loss of body heat to the environment. The onset of hypothermia is greatly hastened by being wet. Hypothermia is marked by severe, uncontrollable shivering. The patient will show signs of excessive fatigue, drowsiness, irritability, or euphoria. As hypothermia progresses, the patient will begin to lose consciousness, blood pressure will drop, shivering will cease, and the patient may slip into a coma and possibly die.

> **FIRST AID:** If these symptoms occur, remove the patient to a warm, dry place. If clothing is wet, remove and replace with dry clothing. Keep the patient warm, but not overheated. The patient should be gradually rewarmed to prevent shock. If the patient is conscious and alert, warm liquids should be provided. Coffee and other caffeinated liquids should be avoided because of diuretic and circulatory effects. Notify the emergency clinic if conditions worsen, the patient loses consciousness, or the patient has an altered mental status. Have the patient transported to an emergency facility.

General Precautions. The reduction of adverse health effects from cold exposure can be achieved by adopting the following work practices.

- Provide adequate insulating clothing to maintain core temperature at 98.6° F if work is to be performed in air temperatures below 40° F. Wind chill cooling rates and the cooling power of air are critical factors. The higher the wind speed and the lower the air temperature in the work area, the greater the insulation value of the protective clothing should be.
- If the air temperature is 32° F or less, hands should be protected by mittens/gloves.
- If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of clothing should be impermeable to water. With more severe work under such conditions, the outer layer should be water repellent, and the outer layer should be changed as it becomes wet. The outer garments should include provisions for easy ventilation in order to prevent wetting of the inner layer by sweat.
- If available clothing does not give adequate protection to prevent cold injury, work should be modified or suspended until adequate clothing is available, or until weather conditions improve.
- For prolonged work, heated shelters should be available. Workers should be encouraged to use these at regular intervals, with the frequency depending on the severity of the environmental exposure. When entering the shelter, the outer layer of clothing should be removed and the remainder of the clothing

loosened to permit heat evaporation, or a change of work clothing should be provided.

- Warm, sweet drinks, such as hot cocoa or soup, should be available at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of diuretic and circulatory effects.
- The weight and bulk of cold-weather gear should be included in estimating the required work performance and weights to be lifted in the field.

Workers should be instructed in safety and health procedures regarding cold work environments as part of the pre-work safety meeting. The training program should include instruction in preventing, recognizing, and treating cold stress conditions.

Wind Chill Chart

Wind (mph) \ Temperature (°F)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	29	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

HEAT STRESS

There is a potential for heat stress from the use of protective clothing and climate conditions. One or more of the following procedures may be employed to alleviate potential heat stress problems in the event that site conditions warrant the use of personal protective equipment (PPE), or ambient temperatures exceed 85° F. Heat stress training must be emphasized during the daily safety meetings, and adequate supplies of potable water must be provided to workers each day.

General Precautions. Provide plenty of liquids. To replace body fluids (water and electrolytes) lost because of sweating, use a 0.1 percent saltwater solution, more heavily salted foods, or commercial drink mixes. The commercial mixes may be preferable for those employees on a low sodium diet. Employees on low sodium diets, or other special diets, are advised to contact their personal physician for recommendations regarding appropriate electrolyte replacement fluids/beverages.

In extremely hot weather, conduct operations in early morning or evening and rotate shifts of workers wearing impervious clothing. Install mobile showers and/or hose-down facilities to reduce body temperature and cool protective clothing.

Ensure that adequate shelter is available for breaks to protect personnel against heat, which can decrease physical efficiency and increase the probability of accidents.

Acclimatization for workers not accustomed to working in elevated temperature environments will be considered and implemented as appropriate in accordance with American Conference of Governmental and Industrial Hygienists (ACGIH) Guidelines.

Heat Stress Monitoring.

For monitoring the body's recuperative ability toward excess heat, one or more of the following techniques should be used as a screening mechanism. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70° F or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceed 80° F, regardless of the use of Personal Protective Equipment (PPE), workers will be monitored as work progresses during the day. .

Good hygienic standards must be maintained by the employee to aid in the prevention of heat stress illnesses. At a minimum, frequent changes of clothing and daily showering should occur with clothing being allowed to dry during rest periods. Persons who notice skin problems should immediately inform their supervisor.

Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 25 percent. The HR is then measured again, once each minute for 2 minutes (a total of three measurements), after the initial rest period measurement. The HR should decrease by ten beats per minute between each measurement (a total reduction of 20 beats). If the HR does not decrease, the work period should be reduced by an additional 25 percent.

Body temperature can be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99°F. If it is greater than 99°F, the next work period should be shortened by 25 percent. The OT should be measured again at the end of the rest period to make sure that it has dropped below 99° F.

Effects of Heat Street

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat loading, a number of physical reactions can occur. The severity of these reactions ranges from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to severe (fatal).

Heat-related illnesses include:

Heat rash (also known as prickly heat rash) is caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Heat rash decreases the ability to tolerate heat as well as being a nuisance. Signs are not limited to, but may include, a red prickly rash.

FIRST AID: Employees exhibiting signs of heat rash will be directed to shower and change into clean, dry clothing.

Heat cramps are caused by profuse perspiration with inadequate fluid intake and electrolyte replacement (especially salts). Signs are muscle spasms and pain in the extremities and abdomen, and may occur several hours after work has stopped.

FIRST AID: Employees showing signs of heat cramps will be directed to lie in a cool, shady area, and drink cool fluids. If symptoms persist or worsen, the employee will be transported to an emergency facility.

Heat exhaustion is caused by increased stress on various organs to meet increased demands to cool the body. Signs are shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

FIRST AID: Employees with signs of heat exhaustion will be brought to a cool, shady location and given fluids. After recovering, the employee will be dismissed for the day. If employee is unconscious, or conditions persist, the employee will be transported to a hospital.

Heat stroke is the most severe form of heat stress. The body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; and/or coma.

FIRST AID: HEAT STROKE IS A MEDICAL EMERGENCY. Employees will be brought to a cool area, aggressively treated by removing constricting clothes and applying wet towels or ice packs, and transported without delay to an emergency facility.

Appendix D
OSHA Fact Sheet
Working Safely Around Downed Electrical Wires

OSHA FactSheet

Working Safely Around Downed Electrical Wires

Electrical hazards exist in some form in nearly all occupations. However, those hazards multiply for workers involved in cleanup and recovery efforts following major disasters and weather emergencies. One particular life-threatening danger exists around downed and low-hanging electrical wires.

Safety First

Above all else, always consider all equipment, lines and conductors to be energized. Be cautious and if you notice downed wires or damaged electrical equipment, contact appropriate utility personnel. Remember that circuits do not always turn off when a power line falls into a tree or onto the ground. Even if they are not sparking or humming, fallen power lines can kill you if you touch them or even the ground nearby.

Energy

Downed wires can energize other objects, including fences, water pipes, bushes and trees, buildings, telephone/CATV/fiber optic cables and other electric utilities. Even manhole castings and reinforcement bars (re/bar) in pavement can become energized by downed wires. During storms, wind-blown objects such as canopies, aluminum roofs, siding, sheds, etc., can also be energized by downed wires.

Backfeed

When electrical conductors are inadvertently energized by other energy sources, backfeed occurs. Some of those sources include:

- Circuit ties/switch points
- Lightning
- Generators
- Downstream events

Simply testing for energy sources is not sufficient since hazardous electrical events can happen without warning. Ensure that proper lockout/tagout procedures are always followed.

Rules to live by

- Do NOT assume that a downed conductor is safe simply because it is on the ground or it is not sparking.
- Do NOT assume that all coated, weather-proof or insulated wire is just telephone, television or fiber-optic cable.
- Low-hanging wires still have voltage potential even if they are not touching the ground. So, “don’t touch them.” Everything is energized until tested to be de-energized.
- Never go near a downed or fallen electric power line. Always assume that it is energized. Touching it could be fatal.
- Electricity can spread outward through the ground in a circular shape from the point of contact. As you move away from the center, large differences in voltages can be created.
- Never drive over downed power lines. Assume that they are energized. And, even if they are not, downed lines can become entangled in your equipment or vehicle.
- If contact is made with an energized power line while you are in a vehicle, remain calm and do not get out unless the vehicle is on fire. If possible, call for help.
- If you must exit any equipment because of fire or other safety reasons, try to jump completely clear, making sure that you do not touch the equipment and the ground at the same time. Land with both feet together and shuffle away in small steps to minimize the path of electric current and avoid electrical shock. Be careful to maintain your balance.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

DOC 7/2005

Appendix E
Excavation Hazard Recognition Guide (Trenching/Shoring), Site Assessment Questions, and Related Guidance

OSHA®
Occupational Safety and Health Administration
www.osha.gov

Trenching and Excavation Safety

OSHA 2226-10R 2015

www.osha.gov

Occupational Safety and Health Act of 1970

"To assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health."

This information will be made available to sensory-impaired individuals upon request. Voice phone: (202) 693-1999; teletypewriter (TTY) number: 1-877-889-5627.

This publication is intended to provide information about OSHA's Excavations standards at 29 CFR Part 1926, Subpart P. The *Occupational Safety and Health Act* requires employers to comply with safety and health standards promulgated by OSHA or by a state with an OSHA-approved state plan. However, this publication is not itself a standard or regulation, and it creates no new legal obligations.

Cover photo courtesy of Speed Shore Corp.

Trenching and Excavation Safety

U.S. Department of Labor
Occupational Safety and Health Administration

OSHA 2226-10R 2015

U.S. Department of Labor

Table of Contents

Introduction

Excavation and trenching are among the most hazardous construction operations. The Occupational Safety and Health Administration's (OSHA) Excavation standards, *29 Code of Federal Regulations (CFR) Part 1926, Subpart P*, contain requirements for excavation and trenching operations. This booklet highlights key elements of the standards and describes safe work practices that can protect workers from cave-ins and other hazards.

What is the difference between an excavation and a trench?

OSHA defines an excavation as any man-made cut, cavity, trench, or depression in the Earth's surface formed by earth removal. A trench is defined as a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth of a trench is greater than its width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m).

What are the dangers of trenching and excavation operations?

Trenching and excavation work presents serious hazards to all workers involved. Cave-ins pose the greatest risk and are more likely than some other excavation-related incidents to result in worker fatalities. One cubic yard of soil can weigh as much as a car. An unprotected trench can be an early grave. Employers must ensure that workers enter trenches only after adequate protections are in place to address cave-in hazards. Other potential hazards associated with trenching work include falling loads, hazardous atmospheres, and hazards from mobile equipment.

What do the OSHA Excavation standards cover, and how do they protect workers?

The standards apply to all open excavations made in the Earth's surface, including trenches. Following the requirements of the standards will prevent or greatly reduce the risk of cave-ins and other excavation-related incidents.

What are the soil classification categories?

Some of the compliance methods permitted under the Excavation standards require a competent person to classify soil and rock deposits as:

- *Stable rock;*
- *Type A soil;*
- *Type B soil; or*
- *Type C soil.*

See *Appendix A to Subpart P of Part 1926 – Soil Classification.*

Stable Rock – Natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

Type A – Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) (144 kPa) or greater. Examples include: clay, silty clay, sandy clay, and clay loam. Certain conditions preclude soil from being classified as Type A. For example, no soil is Type A if it is fissured or has been previously disturbed. See *Appendix A to Subpart P of Part 1926, paragraph (b) – Definitions* (*Type A),* for a detailed definition of Type A soil.

Type B – Includes cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa) and granular cohesionless soils (such as angular gravel, similar to crushed rock, silt, silt loam, sandy loam, and, in some cases, silty clay loam and sandy clay loam). See *Appendix A to Subpart P of Part 1926, paragraph (b) — Definitions (Type B)*, for a detailed definition of Type B soil.

Type C – Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less, granular soils (including gravel, sand, and loamy sand), submerged soil or soil from which water is freely seeping, submerged rock that is not stable, or material in a sloped, layered system where the layers dip into the excavation or with a slope of four horizontal to one vertical (4H:1V) or steeper. See *Appendix A to Subpart P of Part 1926, paragraph (b) — Definitions (Type C)*, for a detailed definition of Type C soil.

Note: Unconfined compressive strength means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing or estimated in the field using a pocket penetrometer, thumb penetration tests, or other methods.

See the video link below for additional guidance on classifying soil: www.osha.gov/dts/vtools/construction/soil_testing_fnl_eng_web.html.

What is a competent person?

A competent person is an individual, designated by the employer, who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to workers, and who is authorized to take prompt corrective measures to eliminate them.

Under the Excavation standards, tasks performed by the competent person include:

- Classifying soil;
- Inspecting protective systems;
- Designing structural ramps;
- Monitoring water removal equipment; and
- Conducting site inspections.

Preplanning

Why is preplanning important to excavation work?

No matter how many trenching, shoring, and backfilling jobs an employer has done in the past, it is important to approach each new job with care and preparation. Many on-the-job incidents result from inadequate initial planning. Waiting until after the

work starts to correct mistakes in shoring or sloping slows down the operation, adds to the cost of the project, and makes a cave-in or other excavation failure more likely.

What safety factors should be considered when bidding on a job?

Before preparing a bid, employers should know as much as possible about the jobsite and the materials they will need to have on hand to perform the work safely and in compliance with OSHA standards. A safety checklist may prove helpful when employers are considering new projects. Factors to consider may include:

- Traffic
- Proximity and physical condition of nearby structures
- Soil classification
- Surface and ground water
- Location of the water table
- Overhead and underground utilities
- Weather
- Quantity of shoring or protective systems that may be required
- Fall protection needs
- Number of ladders that may be needed
- Other equipment needs.

Employers can gather the information they need through jobsite studies, observations, test borings for soil type or conditions, and consultations with local officials and utility companies. This information will help employers determine the amount, kind, and cost of safety equipment they will need to perform the work safely.

How can employers avoid hitting underground utility lines and pipes during excavation work?

Before starting work, the Excavation standards require employers to do the following:

- Determine the approximate location(s) of utility installations — including sewer, telephone, fuel, electric, and water lines. One common industry practice is to call 811, the "Call Before You Dig" number, to establish the location of any underground utility installations in the work area.

- Contact and notify the utility companies or owners involved to inform them of the proposed work within established or customary local response times.
- Ask the utility companies or owners to establish the location of underground installations prior to the start of excavation work. If they cannot respond within 24 hours (unless the period required by state or local law is longer) or cannot establish the exact location of the utility installations, employers may proceed with caution, which includes using detection equipment or other acceptable means to locate utility installations.
- Determine the exact location of underground installations by safe and acceptable means when excavation operations approach the approximate location of the installations.
- Ensure that while the excavation is open, underground installations are protected, supported or removed as necessary to safeguard workers.

Protective Systems

How can employers prevent cave-ins?

OSHA generally requires that employers protect workers from cave-ins by:

- Sloping and benching the sides of the excavation;
- Supporting the sides of the excavation; or
- Placing a shield between the side of the excavation and the work area.

What types of protective systems can employers use to protect workers from cave-ins?

In many cases the type of protective system needed is well known and simple to use. At other times employers will undertake the more complex process of designing a protective system. Designing a protective system requires consideration of many factors, including: soil classification, depth of cut, water content of soil, weather and climate, and other operations

in the vicinity. Employers are free to choose the most practical design that will provide the necessary protections. Any system used must meet the required performance criteria.

The Excavation standards describe various methods and approaches that can be used to design protective systems. Examples of protective systems that can be used to comply with the Excavation standards include:

- Sloping the sides of the excavation to an angle not steeper than 1½:1 (for every foot of depth, the trench must be excavated back 1½ feet). A slope of this gradation is safe for any type of soil.

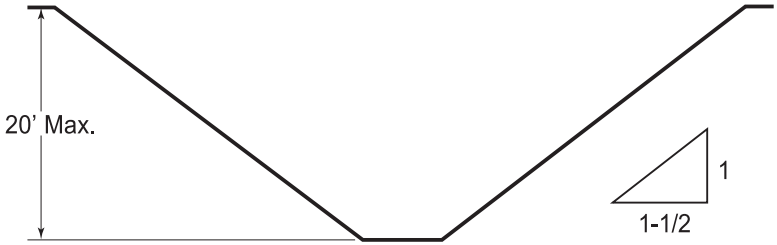


Figure 1. **Slope of 1½:1**

- Designing a sloping and benching system in accord with tabulated data, such as tables and charts, approved by a registered professional engineer. This data must be in writing and must include enough explanatory information (including the criteria for selecting a system and the limits on the use of the data) for the user to be able to select an appropriate protective system. At least one copy of the data, which identifies the registered professional engineer who approved it, must be kept at the worksite during construction of the protective system. After the system is completed, the data may be stored away from the jobsite, but a copy must be provided upon request to an OSHA compliance officer.
- Using a trench box or shield approved by a registered professional engineer or designed in accord with tabulated data approved by a registered professional engineer.

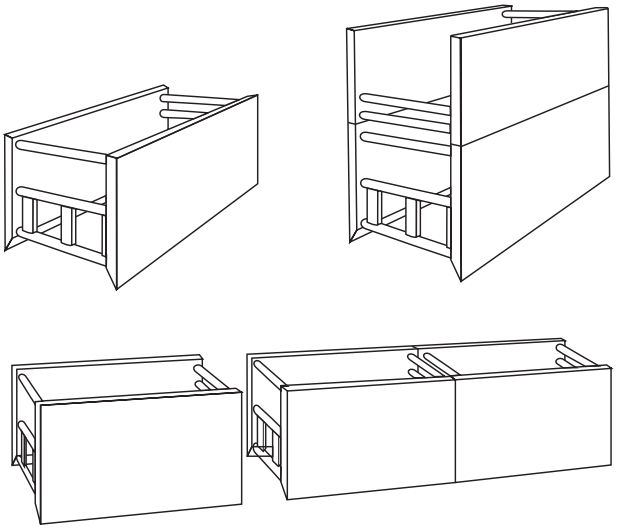


Figure 2. *Trench Shields*

The Excavation standards do not require a protective system when an excavation is made entirely in stable rock or when an excavation is less than 5 feet (1.52 meters) deep and a competent person has examined the ground and found no indication of a potential cave-in.

What other precautions do employers need to take to protect workers from cave-ins?

The Excavation standards require employers to provide support systems, such as shoring, bracing, or underpinning, when necessary to ensure that adjacent structures (including adjoining buildings, walls, sidewalks and pavements) remain stable for the protection of workers. The standards also prohibit excavation below the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to workers unless:

- The employer provides a support system, such as underpinning;
- The excavation is in stable rock; or

- A registered professional engineer determines that the structure is far enough away from the excavation that it would not be affected by the excavation activity or that the excavation work will not pose a hazard to workers.

Excavations that would undermine sidewalks, pavement, and appurtenant structures are prohibited unless the employer provides an appropriately designed support system or another effective method of protecting workers from the possible collapse of those structures.

What are the requirements for safely installing and removing protective systems?

The Excavation standards require employers to take certain steps to protect workers when installing and removing support systems. For example:

- Members of support systems must be securely connected to prevent sliding, falling, kickouts or predictable failure.
- Support systems must be installed and removed in a manner that protects workers from cave-ins and structural collapses and from being struck by members of the support system.
- Members of support systems must not be overloaded.
- Before temporary removal of individual members, additional precautions are required, such as installing other structural members to carry loads imposed on the support system.
- Removal must begin at, and progress from, the bottom of the excavation.
- Backfilling must progress together with the removal of support systems from excavations.

In addition, the standards permit excavation of 2 feet (0.61 meters) or less below the bottom of the members of a support system, but only if the system is designed to resist the forces calculated for the full depth of the trench and there are no indications, while the trench is open, of a possible loss of soil from behind or below the bottom of the support system. Employers must coordinate the installation of support systems with the excavation work.

What do employers need to do to maintain materials and equipment used for protective systems?

Employers are responsible for maintaining materials and equipment used for protective systems. Defective and damaged materials and equipment can cause protective systems to fail and lead to other excavation hazards. Employers must ensure that:

- Materials and equipment are free from damage or defects that might impair their proper function;
- Manufactured materials and equipment are used and maintained consistent with the manufacturer's recommendations and are used so as to prevent worker exposure to hazards;
- A competent person examines any damaged materials or equipment to evaluate its suitability for continued use; and
- If a competent person cannot assure that damaged material or equipment can support the intended loads or is otherwise suitable for use, the materials and equipment are removed from service until evaluated and approved by a registered professional engineer.

Additional Hazards and Protections

What other excavation hazards do employers need to address?

In addition to cave-ins and related hazards, workers involved in excavation work are exposed to hazards involving falling loads and mobile equipment. To protect workers from these hazards, OSHA requires employers to take certain precautions. For example, employers must:

- Protect workers from excavated or other materials or equipment that could pose a hazard by falling or rolling

inside the excavation by placing and keeping such materials or equipment at least 2 feet (0.61 meters) from the edge and/or by using a retaining device to keep the materials or equipment from falling or rolling into the excavation.

- Provide a warning system (such as barricades, hand or mechanical signals, or stop logs) when mobile equipment is operated adjacent to an excavation, or when such equipment must approach the edge of an excavation, and the operator does not have a clear and direct view of the edge.
- Protect workers from loose rock or soil that could fall or roll from an excavation face by scaling to remove loose material, installing protective barricades at appropriate intervals, or using other equivalent forms of protection.
- Institute and enforce work rules prohibiting workers from working on faces of sloped or benched excavations at levels above other workers unless the workers at the lower levels are adequately protected from the hazards of falling, rolling, or sliding material or equipment.
- Institute and enforce work rules prohibiting workers from standing or working under loads being handled by lifting or digging equipment.
- Require workers to stand away from vehicles being loaded or unloaded to protect them from being struck by any spillage or falling materials. (Operators may remain inside the cab of a vehicle being loaded or unloaded if the vehicle is equipped, in accord with 29 CFR 1926.601(b)(6), to provide adequate protection for the operator.)

What is the effect of water accumulation on excavation safety and what do employers need to do to protect workers from water-related excavation hazards?

Water in an excavation can undermine the sides of the excavation and make it more difficult for workers to get out of the excavation. The OSHA standards prohibit employers from allowing workers to enter an excavation where water has accumulated or is accumulating unless adequate precautions are taken to protect workers. Such precautions can include special

support or shield systems to prevent cave-ins, water removal to control the water level, or the use of a safety harness and lifeline. If an employer uses water removal equipment to control or prevent water accumulation, the equipment and operations must be monitored by a competent person to ensure proper use. If excavation work interrupts the natural drainage of surface water, the OSHA standards also require the use of diversion ditches, dikes, or other suitable means to prevent surface water from entering the excavation and to provide adequate drainage of the adjacent area. In addition, a competent person must inspect excavations subject to runoffs from heavy rains, and excavations subject to such runoffs are subject to the requirements described previously in this paragraph.

How can employers protect workers from hazardous atmospheres inside excavations?

Atmospheric testing is required before workers enter an excavation greater than 4 feet (1.22 meters) in depth where an oxygen deficiency or a hazardous atmosphere is present or could reasonably be expected, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby. If there are any hazardous conditions present, the employer must ensure that adequate precautions are taken to prevent employee exposure to those conditions. Such precautions include providing workers with proper respiratory protection or ventilation. In addition, when controls are used to reduce the level of atmospheric contaminants to acceptable levels, testing must be conducted as often as necessary to ensure that the atmosphere remains safe.

If hazardous atmospheric conditions exist or may reasonably be expected to develop in an excavation, the employer must ensure the ready availability of emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher. This equipment must be attended when in use.

Note: In addition to the Excavation standards' provisions on hazardous atmospheres in excavations, OSHA's Confined Spaces in Construction standard (29 CFR Part 1926, Subpart AA) applies to non-excavation work within a confined space located in an

excavation. These standards are intended to complement each other and address two distinct hazards: hazardous atmospheres in excavations and the additional hazards associated with confined spaces located within excavations. For example, the Confined Spaces in Construction standard covers entry into a prefabricated storm drain, other pipe, or manhole even if located at the bottom of an open excavation.

What means of access and egress must employers provide?

OSHA requires employers to provide ladders, steps, ramps, or other safe means of egress for workers working in trench excavations 4 feet (1.22 meters) or deeper. The means of egress must be located so as not to require workers to travel more than 25 feet (7.62 meters) laterally within the trench.

Any structural ramps used solely for worker access or egress must be designed by a competent person. Structural ramps used for access or egress of equipment must be designed by a competent person qualified in structural design. Also, structural members used for ramps or runways must be uniform in thickness and joined in a manner to prevent tripping or displacement.

What protective equipment are employers required to provide to workers in pier holes and confined footing excavations?

Employers must ensure that any worker who enters a bell-bottom pier hole or similar deep and confined footing excavation wears a harness with a lifeline. The lifeline must be attached securely to the harness and must be separate from any line used to handle materials. Also, the lifeline must be individually attended by an observer at all times when the worker wearing the lifeline is in the excavation.

When must employers conduct site inspections?

Employers must ensure that a competent person inspects all excavations, adjacent areas, and protective systems daily for possible cave-ins, indications of failures in protective systems and equipment, hazardous atmospheres, and other hazardous

conditions. Inspections must be done prior to the start of work and as needed throughout the shift. Inspections are also required after natural events, such as rainstorms, or other hazard-increasing occurrences, such as blasting work. If an inspector finds any unsafe conditions during an inspection, the employer must clear workers from the hazardous area until the necessary safety precautions have been taken.

Conclusion

When employers share the details of their safety and health programs with workers, they should emphasize the critical role workers play in keeping the jobsite safe. Employers also need to emphasize specific practices that will help reduce the risk of on-the-job injuries at excavation sites. Such practices can include the following:

- Know where underground utilities are located before digging.
- Keep excavated soil (spoils) and other materials at least 2 feet (0.61 meters) from trench edges.
- Keep heavy equipment away from trench edges.
- Identify any equipment or activities that could affect trench stability.
- Test for atmospheric hazards such as low oxygen, hazardous fumes, and toxic gases when workers are more than 4 feet deep.
- Inspect trenches at the start of each shift.
- Inspect trenches following a rainstorm or other water intrusion.
- Inspect trenches after any occurrence that could have changed conditions in the trench.
- Do not work under suspended or raised loads and materials.
- Ensure that personnel wear high-visibility or other suitable clothing when exposed to vehicular traffic.

Employers should consider establishing and maintaining safety and health management systems that provide systematic

policies, procedures, and practices for protecting workers from job-related safety and health hazards. See www.osha.gov/Publications/safety-health-management-systems.pdf.

Workers' Rights

Workers have the right to:

- Working conditions that do not pose a risk of serious harm.
- Receive information and training (in a language and vocabulary the worker understands) about workplace hazards, methods to prevent them, and the OSHA standards that apply to their workplace.
- Review records of work-related injuries and illnesses.
- File a complaint asking OSHA to inspect their workplace if they believe there is a serious hazard or that their employer is not following OSHA's rules. OSHA will keep all identities confidential.
- Exercise their rights under the law without retaliation, including reporting an injury or raising health and safety concerns with their employer or OSHA. If a worker has been retaliated against for using their rights, they must file a complaint with OSHA as soon as possible, but no later than 30 days.

For more information, see OSHA's Workers page.

OSHA Assistance, Services and Programs

OSHA has a great deal of information to assist employers in complying with their responsibilities under OSHA law. Several OSHA programs and services can help employers identify and correct job hazards, as well as improve their injury and illness prevention program.

Establishing an Injury and Illness Prevention Program

The key to a safe and healthful work environment is a comprehensive injury and illness prevention program.

Injury and illness prevention programs are systems that can substantially reduce the number and severity of workplace injuries and illnesses, while reducing costs to employers. Thousands of employers across the United States already manage safety using injury and illness prevention programs, and OSHA believes that all employers can and should do the same. Thirty-four states have requirements or voluntary guidelines for workplace injury and illness prevention programs. Most successful injury and illness prevention programs are based on a common set of key elements. These include management leadership, worker participation, hazard identification, hazard prevention and control, education and training, and program evaluation and improvement. Visit OSHA's Injury and Illness Prevention Programs web page at www.osha.gov/dsg/topics/safetyhealth for more information.

Compliance Assistance Specialists

OSHA has compliance assistance specialists throughout the nation located in most OSHA offices. Compliance assistance specialists can provide information to employers and workers about OSHA standards, short educational programs on specific hazards or OSHA rights and responsibilities, and information on additional compliance assistance resources. For more details, visit www.osha.gov/dcsp/compliance_assistance/cas.html or call 1-800-321-OSHA (6742) to contact your local OSHA office.

Free On-site Safety and Health Consultation Services for Small Business

OSHA's On-site Consultation Program offers free and confidential advice to small and medium-sized businesses in all states across the country, with priority given to high-hazard worksites. Each year, responding to requests from small employers looking to create or improve their safety and health

management programs, OSHA's On-site Consultation Program conducts over 29,000 visits to small business worksites covering over 1.5 million workers across the nation.

On-site consultation services are separate from enforcement and do not result in penalties or citations. Consultants from state agencies or universities work with employers to identify workplace hazards, provide advice on compliance with OSHA standards, and assist in establishing safety and health management programs.

For more information, to find the local On-site Consultation office in your state, or to request a brochure on Consultation Services, visit www.osha.gov/consultation, or call 1-800-321-OSHA (6742).

Under the consultation program, certain exemplary employers may request participation in OSHA's **Safety and Health Achievement Recognition Program (SHARP)**. Eligibility for participation includes, but is not limited to, receiving a full-service, comprehensive consultation visit, correcting all identified hazards and developing an effective safety and health management program. Worksites that receive SHARP recognition are exempt from programmed inspections during the period that the SHARP certification is valid.

Cooperative Programs

OSHA offers cooperative programs under which businesses, labor groups and other organizations can work cooperatively with OSHA. To find out more about any of the following programs, visit www.osha.gov/cooperativeprograms.

Strategic Partnerships and Alliances

The OSHA Strategic Partnerships (OSP) provide the opportunity for OSHA to partner with employers, workers, professional or trade associations, labor organizations, and/or other interested stakeholders. OSHA Partnerships are formalized through unique agreements designed to encourage, assist, and recognize partner efforts to eliminate serious hazards and achieve model workplace safety and health practices. Through the Alliance Program, OSHA works with groups committed to worker safety

and health to prevent workplace fatalities, injuries and illnesses by developing compliance assistance tools and resources to share with workers and employers, and educate workers and employers about their rights and responsibilities.

Voluntary Protection Programs (VPP)

The VPP recognize employers and workers in private industry and federal agencies who have implemented effective safety and health management programs and maintain injury and illness rates below the national average for their respective industries. In VPP, management, labor, and OSHA work cooperatively and proactively to prevent fatalities, injuries, and illnesses through a system focused on: hazard prevention and control, worksite analysis, training, and management commitment and worker involvement.

Occupational Safety and Health Training

The OSHA Training Institute partners with 27 OSHA Training Institute Education Centers at 42 locations throughout the United States to deliver courses on OSHA standards and occupational safety and health topics to thousands of students a year. For more information on training courses, visit www.osha.gov/otiec.

OSHA Educational Materials

OSHA has many types of educational materials in English, Spanish, Vietnamese and other languages available in print or online. These include:

- Brochures/booklets;
- Fact Sheets;
- Guidance documents that provide detailed examinations of specific safety and health issues;
- Online Safety and Health Topics pages;
- Posters;
- Small, laminated QuickCards™ that provide brief safety and health information; and

- *QuickTakes*, OSHA's free, twice-monthly online newsletter with the latest news about OSHA initiatives and products to assist employers and workers in finding and preventing workplace hazards. To sign up for *QuickTakes* visit www.osha.gov/quicktakes.

To view materials available online or for a listing of free publications, visit www.osha.gov/publications. You can also call 1-800-321-OSHA (6742) to order publications.

Select OSHA publications are available in e-Book format. OSHA e-Books are designed to increase readability on smartphones, tablets and other mobile devices. For access, go to www.osha.gov/ebooks.

OSHA's web site also has information on job hazards and injury and illness prevention for employers and workers. To learn more about OSHA's safety and health resources online, visit www.osha.gov or www.osha.gov/html/a-z-index.html.

NIOSH Health Hazard Evaluation Program

Getting Help with Health Hazards

The National Institute for Occupational Safety and Health (NIOSH) is a federal agency that conducts scientific and medical research on workers' safety and health. At no cost to employers or workers, NIOSH can help identify health hazards and recommend ways to reduce or eliminate those hazards in the workplace through its Health Hazard Evaluation (HHE) Program.

Workers, union representatives and employers can request a NIOSH HHE. An HHE is often requested when there is a higher than expected rate of a disease or injury in a group of workers. These situations may be the result of an unknown cause, a new hazard, or a mixture of sources. To request a NIOSH Health Hazard Evaluation go to www.cdc.gov/niosh/hhe/request.html. To find out more, in English or Spanish, about the Health Hazard Evaluation Program:

E-mail HHERequestHelp@cdc.gov or call 800-CDC-INFO (800-232-4636).

OSHA Regional Offices

Region I
Boston Regional Office
(CT*, ME*, MA, NH, RI, VT*)
JFK Federal Building, Room E340
Boston, MA 02203
(617) 565-9860 (617) 565-9827 Fax

Region II
New York Regional Office
(NJ*, NY*, PR*, VI*)
201 Varick Street, Room 670
New York, NY 10014
(212) 337-2378 (212) 337-2371 Fax

Region III
Philadelphia Regional Office
(DE, DC, MD*, PA, VA*, WV)
The Curtis Center
170 S. Independence Mall West
Suite 740 West
Philadelphia, PA 19106-3309
(215) 861-4900 (215) 861-4904 Fax

Region IV
Atlanta Regional Office
(AL, FL, GA, KY*, MS, NC*, SC*, TN*)
61 Forsyth Street, SW, Room 6T50
Atlanta, GA 30303
(678) 237-0400 (678) 237-0447 Fax

Region V
Chicago Regional Office
(IL*, IN*, MI*, MN*, OH, WI)
230 South Dearborn Street
Room 3244
Chicago, IL 60604
(312) 353-2220 (312) 353-7774 Fax

Region VI
Dallas Regional Office
(AR, LA, NM*, OK, TX)
525 Griffin Street, Room 602
Dallas, TX 75202
(972) 850-4145 (972) 850-4149 Fax
(972) 850-4150 FSO Fax

Region VII
Kansas City Regional Office
(IA*, KS, MO, NE)
Two Pershing Square Building
2300 Main Street, Suite 1010
Kansas City, MO 64108-2416
(816) 283-8745 (816) 283-0547 Fax

Region VIII
Denver Regional Office
(CO, MT, ND, SD, UT*, WY*)
Cesar Chavez Memorial Building
1244 Speer Boulevard, Suite 551
Denver, CO 80204
(720) 264-6550 (720) 264-6585 Fax

Region IX
San Francisco Regional Office
(AZ*, CA*, HI*, NV*, and American Samoa,
Guam and the Northern Mariana Islands)
90 7th Street, Suite 18100
San Francisco, CA 94103
(415) 625-2547 (415) 625-2534 Fax

Region X
Seattle Regional Office
(AK*, ID, OR*, WA*)
300 Fifth Avenue, Suite 1280
Seattle, WA 98104
(206) 757-6700 (206) 757-6705 Fax

* These states and territories operate their own OSHA-approved job safety and health plans and cover state and local government employees as well as private sector employees. The Connecticut, Illinois, Maine, New Jersey, New York and Virgin Islands programs cover public employees only. (Private sector workers in these states are covered by Federal OSHA). States with approved programs must have standards that are identical to, or at least as effective as, the Federal OSHA standards.

Note: To get contact information for OSHA area offices, OSHA-approved state plans and OSHA consultation projects, please visit us online at www.osha.gov or call us at 1-800-321-OSHA (6742).

How to Contact OSHA

For questions or to get information or advice, to report an emergency, fatality, inpatient hospitalization, amputation, or loss of an eye, or to file a confidential complaint, contact your nearest OSHA office, visit www.osha.gov or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

For assistance, contact us.
We are OSHA. We can help.

OSHA®
www.osha.gov

U.S. Department of Labor

For more information:

OSHA® Occupational Safety and Health Administration

www.osha.gov (800) 321-OSHA (6742)

Appendix F
Common Fire Extinguishing Agent Guide

Evacuation Plans and Procedures eTool

Extinguisher Basics

Fight or Flee? | Extinguisher Basics | Fire Extinguisher Use | Extinguisher Placement and Spacing
Hydrostatic Testing | OSHA Requirements | Test Your Knowledge

This section provides basic information on fire and fire extinguishers:

- Fire and extinguisher operation
- Types of fire extinguishers

Fire and extinguisher operation

Fire triangle

To understand how fire extinguishers work, you need to understand a little about fire. Fire is a very rapid chemical reaction between oxygen and a combustible material, which results in the release of heat, light, flames, and smoke.

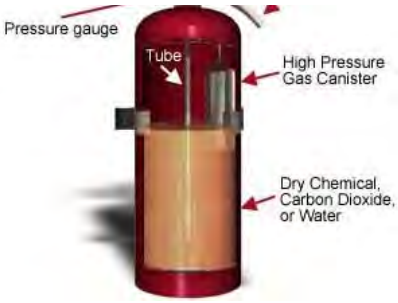
For fire to exist, the following four elements must be present at the same time:

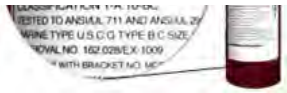
- Enough oxygen to sustain combustion,
- Enough heat to raise the material to its ignition temperature,
- Some sort of fuel or combustible material, and
- The chemical reaction that is fire.

How a fire extinguisher works

Portable fire extinguishers apply an extinguishing agent that will either cool burning fuel, displace or remove oxygen, or stop the chemical reaction so a fire cannot continue to burn. When the handle of an extinguisher is compressed, agent is expelled out the nozzle.

All portable fire extinguishers must be approved by a nationally recognized testing laboratory to verify compliance with applicable standards [29 CFR 1910.157(c)(2)]. Equipment that





passes the laboratory's tests are labeled and given an alpha-numeric classification based on the type and size of fire it will extinguish.

Let's take a look at the label pictured. The classification is:

1-A:10-BC

The letters (A, B, and C) represent the type(s) of fire for which the extinguisher has been approved.

The number in front of the A rating indicates how much water the extinguisher is equal to and represents 1.25 gallons of water for every unit of one. For example, a 4-A rated extinguisher would be equal to five (4 x 1.25) gallons of water.

The number in front of the B rating represents the area in square feet of a class B fire that a non-expert user should be able to extinguish. Using the above example, a non-expert user should be able to put out a flammable liquid fire that is as large as 10 square feet.

Types of fire extinguishers

Different types of fire extinguishers are designed to fight different types of fire. The three most common types of fire extinguishers are: air pressurized water, CO2 (carbon dioxide), and dry chemical. The following table provides information regarding the type of fire and which fire extinguisher should be used.

Extinguisher Type	Type of Fire
 Water	**Ordinary Combustibles** Fires in paper, cloth, wood, rubber, and many plastics require a water type extinguisher labeled A. 
 CO2	**Flammable Liquids** Fires in oils, gasoline, some paints, lacquers, grease, solvents, and other flammable liquids require an extinguisher labeled B. 
OR	
 Dry Chemical	**Electrical Equipment** Fires in wiring, fuse boxes, energized electrical equipment, computers, and other electrical sources require an extinguisher labeled C. 
	Ordinary Combustibles, Flammable Liquids, or Electrical Equipment

 Multi-Purpose	Multi-purpose dry chemical is suitable for use on class A, B, and C. 
Class D	**Metals** Fires involving powders, flakes or shavings of combustible metals such as magnesium, titanium, potassium, and sodium require special extinguishers labeled D.
Class K	**Kitchen Fires** Fires involving combustible cooking fluids such as oils and fats. **Note:** Your present fire extinguishing equipment may not put out a fire involving vegetable oil in your deep fat fryer. 

Water - Air-pressurized water extinguishers (APW)

Water is one of the most commonly used extinguishing agents for type A fires. You can recognize an APW by its large silver container. They are filled about two-thirds of the way with ordinary water, then pressurized with air. In some cases, detergents are added to the water to produce a foam. They stand about two to three feet tall and weigh approximately 25 pounds when full.

APWs extinguish fire by cooling the surface of the fuel to remove the "heat" element of the fire triangle.

APWs are designed for Class A (wood, paper, cloth, rubber, and certain plastics) fires only.

Important:

- **Never use water to extinguish flammable liquid fires.** Water is extremely ineffective at extinguishing this type of fire and may make matters worse by the spreading the fire.
- **Never use water to extinguish an electrical fire.** Water is a good conductor and may lead to electrocution if used to extinguish an electrical fire. Electrical equipment must be unplugged and/or de-energized before using a water extinguisher on an electrical fire.

CO2 or Dry Chemical - Carbon dioxide extinguishers

This type of extinguisher is filled with Carbon Dioxide (CO2), a non-flammable gas under extreme pressure. These extinguishers put out fires by displacing oxygen, or taking away the oxygen element of the fire triangle. Because of its

high pressure, when you use this extinguisher pieces of dry ice shoot from the horn, which also has a cooling effect on the fire.

You can recognize this type of extinguisher by its hard horn and absent pressure gauge.

CO2 cylinders are red and range in size from five to 100 pounds or larger.

CO2 extinguishers are designed for Class B and C (flammable liquid and electrical) fires only.

Important:

- CO2 is not recommended for Class A fires because they may continue to smolder and re-ignite after the CO2 dissipates.
- Never use CO2 extinguishers in a confined space while people are present without proper respiratory protection.

Locations:

Carbon dioxide extinguishers will frequently be found in industrial vehicles, mechanical rooms, offices, computer labs, and flammable liquid storage areas.

Multi-purpose - Dry chemical extinguishers

Dry chemical extinguishers put out fires by coating the fuel with a thin layer of fire retardant powder, separating the fuel from the oxygen. The powder also works to interrupt the chemical reaction, which makes these extinguishers extremely effective.

Dry chemical extinguishers are usually rated for class B and C fires and may be marked multiple purpose for use in A, B, and C fires. They contain an extinguishing agent and use a compressed, non-flammable gas as a propellant.

ABC fire extinguishers are red in color, and range in size from five pounds to 20 pounds.

Dry Chemical extinguishers will have a label indicating they may be used on class A, B, and/or C fires.

Locations:

These extinguishers will be found in a variety of locations including: public hallways, laboratories, mechanical rooms, break rooms, chemical storage areas, offices, commercial vehicles, and other areas with flammable liquids.

Class K - Dry and wet chemical extinguishers for kitchen fires

Due to the higher heating rates of vegetable oils in commercial cooking appliances NFPA 10, Portable Fire Extinguishers, now includes a Class K rating for kitchen fires extinguishers which are now required to be installed in all applicable restaurant kitchens. Once a fire starts in a deep fryer, it cannot always be extinguished by traditional range hoods or Class B extinguishers.

- Do not attempt to use a Class A extinguisher containing water or CO2 on a deep fat fryer fire. An explosive type reaction may result.
- Place a placard near the Class K fire extinguisher which states: "In case of appliance fire, use this extinguisher only after the fixed fire suppression system has been actuated". Class K fire extinguishers are only intended to be used after the activation of a built-in hood suppression system. If no commercial cooking system hood and fire suppression system exists, Class K extinguishers are not required.
- Extinguishing agents in many Class K extinguishers are electrically conductive and should only be used after electrical power to the kitchen appliance has been shut off. Class K extinguishers use a variety of agents. Potassium bicarbonate is used in some Class K dry chemical extinguishers, and there are also Class K wet chemical extinguishers which spray a fine mist.
- Travel distance to a Class K extinguisher shall not exceed 30 feet.
- Install a 2-A water-type extinguisher or 6L wet chemical fire extinguisher for solid fuel cooking appliances with fire boxes.
- Inspect, test and maintain Class K fire extinguishers yearly.

Locations:

These extinguishers will be found in commercial cooking operations such as restaurants, cafeterias, and other locations where food would be served.

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U.S. Department of Labor | Occupational Safety & Health Administration | 200 Constitution Ave., NW, Washington, DC 20210
Telephone: 800-321-OSHA (6742) | TTY
www.OSHA.gov

Appendix G
Job Safety Analysis (JSA)

JOB SAFETY ANALYSIS WORKSHEET

Department:	**Job Analyzed:**	**Date Completed:**
	Task Completed By:	**Supervisor:**
Location:	**Analysis By:**	**Reviewed By:**
	Approved By:	
Required Personal Protective and Emergency Equipment		

SEQUENCE OF JOB STEPS	POTENTIAL HAZARDS	CONTROLS/ PREVENTION MEASURES

Appendix H
Tailgate Meeting/Checklist

TAILGATE SAFETY MEETING FORM

Instructions

To be competed by supervisor prior to beginning of new job, when changes in work procedures occur, or when additional hazards are present. Reference related Job Hazard Analysis, Health & Safety Code Handbook direction, and ensure this form is maintained for the record.

NAME ,TYPE, LOCATION OF PROJECT OR WORK ACTIVITY:	**RMW(s) REFERENCED:**

TOPICS/HAZARDS DISCUSSED:

INFORMAL TRAINING CONDUCTED (Name, topics):

NAMES OF EMPLOYEES:

Supervisors Signature/Date: _____

Appendix I
Acknowledgement

PERSONAL ACKNOWLEDGEMENT

A component of the Health and Safety Plan (HASP), designed to provide personnel safety during this subsurface investigation requires that you receive training as described in the HASP prior to working at this site. Additionally, you are required to read and understand the HASP. When you have fulfilled these requirements, please sign and date this personal acknowledgement:

Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
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