

**Idaho National Laboratory**

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| <b>EXCAVATION AND SURFACE PENETRATIONS</b> | Identifier: RD-2014  |
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| Subcontractors | Program Requirements Document | eCR Number: 630091 |
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Manual: INL Subcontractor Requirements

**1. PURPOSE**

This document provides requirements for work in and around excavations and surface penetrations in order to ensure worker safety. This document highlights requirements referenced in the “Source Documents” of this document, as well as contractor requirements. Any applicable regulatory or contractor requirements shall be followed, with the most stringent requirement being met.

**2. APPLICABILITY**

This document applies to all subcontractors working in and around excavations and surface penetrations at the INL, as specified in their contract with contractor. Stricter requirements may be imposed by subcontractors upon their employees or lower tier contractors. The requirements of this document shall be followed by subcontractors; however, the means of implementation may vary as determined by the subcontractor and the contractor Point-of-Contact (POC).

**3. REQUIREMENTS**

Trenching and excavation activities shall meet the requirements of 29 CFR 1926 Subpart P Excavations. Additional requirements specific to trenching, excavations and subsurface penetrations are specified below.

**3.1 General Requirements**

- 3.1.1 The subcontractor superintendent shall monitor the work to ensure it is in compliance with this document and shall inform all affected employees of the SI survey results and conduct a pre-job briefing for excavations.
- 3.1.2 Before performing any soil disturbance/excavation work, a subsurface investigation shall be performed by the Contractor Subsurface Investigator (SI). The contractor POC shall be contacted to obtain the results of any applicable subsurface investigation.

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**Exception:** *A subsurface investigation is **not** required for penetrating or disturbing soil less than 12 in. manually or 6 in. mechanically, after accounting for all possible utilities or anomalies at that depth.*

3.1.3 The contractor POC and the subcontractor shall perform a walk down of the excavation area(s) looking for additional above ground features such as light poles, manholes, transformers, and utility vaults that may indicate potential unidentified hazards. Consideration shall also be given to situations where electric current may be present, however, undetectable due to items such as photo-voltaic sensors, or equipment that may not be powered.

**NOTE:** *When locating underground utilities a reasonable attempt shall be made to identify the actual location, including the elevation of the utility within the area to be excavated. This step is to ensure that the utilities do not change in location or elevation, which would change the areas of allowable machine excavation.*

3.1.4 When required, the subcontractor shall support the contractor POC and the Contractor Subsurface Investigator (SI) to determine the exact location of the excavation. This may include survey support in the form of flagging or marking the excavation area, walk downs, or other site identification activities.

**NOTE:** *The SI will mark interferences with red, blue, or orange paint, or if the layout markings are found to be unacceptable during the subsurface investigation, the team will mark them out with one of the interference colors used by the SI. It may be necessary to utilize different colors depending upon the visibility of the markings on the surface. If different colors are used, it shall be noted on the investigation report.*

## 3.2 Excavations

3.2.1 Prior to the start of work each day and after every rainstorm or other occurrence that may affect the safe condition of the excavation; a subcontractor excavation competent person shall inspect excavations, adjacent areas, support systems, and protective systems for evidence of a situation that could result in a possible cave-in or a hazardous condition or atmosphere. (Competent Person to complete Form 432.57 “Excavation Checklist”)

3.2.2 A subcontractor registered professional engineer shall evaluate an excavation that could endanger the stability of an existing building, wall, road, or related structures.

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3.2.3 If an evaluation indicates that a structure is endangered or potentially endangered, then the work shall be stopped and the contractor POC shall be notified.

**NOTE:** *All soils located at the INL are classified as type “C” soils unless otherwise determined by a subcontractor registered professional engineer or excavation competent person trained in soil classification and testing.*

3.2.4 Type “C” soils excavated 5 ft deep or more shall be sloped with an angle of incline not steeper than 1.5 ft horizontal to 1-ft vertical (34 degrees from horizontal).

3.2.5 If the subsurface survey locates a utility or indicates an anomaly, the following action is required to locate the utility or determine a utility does “**not**” exist before mechanical excavating equipment can be used:

3.2.5.1 Excavating by hand digging, OR

3.2.5.2 “Pot-holing”, using non-obtrusive excavation equipment such as vacuum excavation and/or air lances. This technique shall be considered an acceptable alternative to hand digging where conditions allow.

3.2.5.3 As a minimum, hand digging or pot-holing shall be performed to 1 ft below the depth of the planned excavation and shall be performed 5 ft in each direction perpendicular to the line of the subsurface survey indications in an attempt to locate the utility or determine utility does not exist. (see Appendix A, “Excavation Diagram”).

3.2.6 Once the utility has been located:

3.2.6.1 Pot-hole or hand dig under the utility to 1 ft below the planned excavation depth to look for possible “shadowed” utilities.

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**NOTE :** *Locating potentially “shadowed utilities could be a hazardous work activity and shall be evaluated and controlled because of the possibility of personnel working under suspended utilities.*

3.2.6.2 Pot-holing shall continue throughout the length of the planned excavation at a minimum of every 50 ft or as determined by the subcontractor and Contractor POC to ensure linear and depth dimensions are in accordance with known pot-holing and/or drawing dimensions.

3.2.7 Mechanical excavating will only be allowed if the distance of 2 ft vertically and 5 ft horizontally is maintained from all verified utility locations.

3.2.8 Excavating planned inside the 2 ft–5 ft rule of a utility can “ONLY” be performed by hand digging and/or vacuum excavating techniques.

**NOTE:** *The objective of this document is to ensure excavation work and surface penetration activities are performed safely. Assume utilities are in an energized hazardous condition or any damage sustained would be unacceptable in terms of cost, loss of service, etc. It is recognized, energized utilities can be rendered non-hazardous by lockout and tagout, purging of process lines, etc. Further, it may be the intent to excavate a utility for repair, replacement, or to remove an abandoned system. Therefore, mechanical excavation methods may be evaluated for use inside the 2 ft × 5 ft buffer zone by the contractor Construction Manager (for construction projects), Subcontract Field Representative (for service type subcontracts) and Facility Complex Manager when the system can be de-energized or rendered into a safe condition.*

3.2.9 After underground utilities are located, conditions such as deep frost may cause unpredictable soil behavior and shall be considered prior to mechanical excavating.

3.2.10 In the case where there are known underground utilities and/or the SI shows an anomaly located “**outside**” the planned excavation area but the anomaly is within 5 ft horizontally of the planned excavation area, the utility and/or the anomaly shall be located to determine its exact location.

3.2.10.1 Locating the utility and/or anomaly shall be done by excavating by hand digging and/or using vacuum excavation techniques.

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- 3.2.10.2 Once the utility's and/or an anomaly's exact location has been determined and the utility's location is within 2 ft vertically or 2 ft horizontally of the planned excavation, then that area of the planned excavation shall be excavated by hand digging and/or vacuum excavation techniques.
- 3.2.11 If unidentified utilities or unexpected items of archeological interest are encountered during excavation activities, then the work shall be stopped and the contractor POC shall be notified.
- 3.2.12 If an excavation blocks a doorway, ramp, or other exit or entrance to a building, the contractor POC shall be contacted to determine whether an Outage Permit is required.
- 3.2.13 If an excavation blocks a doorway, ramp, or other exit or entrance to a building, the entrance shall be locked or barricaded and posted with a Danger or Caution sign(s).
- 3.2.14 Excavation areas shall be barricaded and properly marked before the excavation operations begin.
- 3.2.14.1 Barriers shall be maintained, at a minimum, of 6 ft from the edge of any open excavation, OR
- 3.2.14.2 Barricades will be installed.
- 3.2.15 Slip-resistant walkways, with standard railings, shall be provided wherever personnel are required or permitted to cross an excavation.
- 3.2.16 In all trench excavations 4 ft or more in depth, a stairway, ladder, ramp, or other safe means of egress shall be provided and shall be located to require no more than 25 ft of lateral travel for employees. A ramp with a slope no greater than 34 degrees from horizontal may be used as a means of egress.
- 3.2.17 The swing radius of heavy equipment shall be adequately barricaded to prevent employees from entering into the swing radius.
- 3.2.18 Backfilling
- 3.2.18.1 Contact the CFR/POC one week prior to backfilling to allow the installation of the utility identification marker balls to be installed by the Contractor.

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### 3.3 Surface Penetrations

**Exception 1.** *A subsurface investigation is **not** required for cutting into precast concrete.*

**Exception 2.** *A subsurface investigation is **not** required when inspecting for wires, pipes, etc., by removing or cutting out a section of plasterboard, drywall, sheetrock, or other wall surface materials where cutting does not exceed the depth of the inside of the material.*

**Exception 3.** *A subsurface investigation is **not** required if the SI and Contractor POC agree that no underground or embedded cables, piping, or utilities exist. This agreement must be based on reasonably obtainable facts and knowledge, drawings, a previous subsurface investigation, recent excavations, or surface penetrations in the immediate area and is to be noted on Form 432.A47 or the appropriate work control document.*

3.3.1 The safety review of surface penetration activities shall include the following to prevent unintended intrusions:

3.3.1.1 The subsurface investigation shall identify and mark the position of all embedded cables and piping.

3.3.1.1.1 The physical location/layout of embedded cables and piping shall be verified by the subcontractor.

3.3.1.2 If the SI determined the subsurface investigation was not adequate to identify all embedded cables or piping, or, if the surface penetration is to occur within 6 inches of embedded cables or piping, the following requirements shall be met.

3.3.1.2.1 De-energize and place into a safe work condition electrical circuits, cable and piping systems that serve the affected section of the building in accordance with contractor Lockout and Tagout processes,

A. The JSA shall describe how to avoid intrusion, including the use of shunt-trip devices and double insulated tools.

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B. Protective clothing and personal protective equipment will be worn to completely mitigate the potential hazards (i.e., electrical. Steam, etc.) of intrusion.

3.3.1.2.2 If it is infeasible to perform lockout and tagout, for reasons of increased hazards or operational limitations, the following requirements shall also be followed.

3.3.1.2.2.1 A detailed work plan prepared by the subcontractor shall be submitted to the POC. The detailed work plan shall describe safe work practices that will be followed to mitigate the hazards associated with intrusion.

The detailed work plan shall describe how to avoid intrusion.

Protective clothing and personal protective equipment will be worn to completely mitigate the potential hazards (i.e., electrical. Steam, etc.) of intrusion.

3.3.1.2.3 Equipment shall meet the following requirements.

3.3.1.2.3.1 Non-conductive equipment (e.g., fiberglass ladders, tools, etc.) shall be used.

3.3.1.2.3.2 Grounded or double insulated tools shall be used.

3.3.1.3 A shunt device shall be used when using grounded electric handheld tools (i.e., drills, saws, etc.) when cutting or drilling into concrete.

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**Exception 1.** *A shunt is not required when core drilling or cutting into precast concrete:*

**Exception 2.** *A shunt is not required for double insulated motors or battery operated motors.*

3.3.1.3.1 If the shunt device activates during drilling or sawing, the device shall be disengaged and the reason for activation shall be determined and:

3.3.1.3.1.1 An external grounding strap shall be attached and used with grounded electric handheld tools (i.e., drills, saws, jackhammers, etc.) for cutting into concrete.

## 4. DEFINITIONS

For definitions of terms used throughout the INL Subcontractor Requirements Manual, refer to LST-359.

## 5. REFERENCES

### 5.1 Source Documents

29 CFR 1926, Subpart P, Excavations, Trenching, and Shoring

ANSI D6.1, Manual on Uniform Traffic Control Devices for Streets and Highways.

### 5.2 Related Requirements

The following documents may also contain requirements that apply to this activity:

- RD-2012, “Lockouts and Tagouts”
- RD-2110, “Confined Space”

## 6. APPENDIX

Appendix A, Excavation Diagram

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**Appendix A**

**Excavation Diagram**

