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Brunel Energy, Inc.

Excavation Trenching

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1. Purpose

- 1.1. Brunel Energy, Inc., hereinafter referred to as, the “Company,” has established a program compliant with OSHA to set the minimum requirements for location, pre- and post-disturbance measures to minimize hazards associated with trenching.

2. Applicability

- 2.1. This policy applies to employees, subcontractors and/or visitor(s) of the Company. For the purposes of this policy, an employee shall be considered on the job whenever he/she is:
 - 2.1.1. On or in, any Company or client property, including parking areas; or
 - 2.1.2. On Company time even if off Company premises (including paid lunch, rest periods and periods of being on call).
- 2.2. As a condition of employment, Company employees are required to abide by additional governmental or customer policies and requirements that may be imposed at a worksite in addition to the requirements of these policies and procedures. Nothing set forth in this policy constitutes, construes, or interprets in any way as a contract of employment.

3. Definitions

- 3.1. **Benching** is a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels.
- 3.2. **Cave-In** is the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by failing or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.
- 3.3. **Competent Person** is one who can identify existing and predictable hazards in the surroundings or working conditions, which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
- 3.4. **Duration of Exposure** is the longer an excavation is open, the longer the other factors must work on causing it to collapse.
- 3.5. **Excavation** is any man-made cut, trench, or depression in an earth surface, formed by earth removal.
- 3.6. **Hazardous Atmosphere** is an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

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- 3.7. **Protective System** is a method of protecting employees from cave-ins, from material that could fall or roll from an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide necessary protection.
- 3.8. **Shield** is a structure that can withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. All shields must be in accordance with 29 CFR 1926.652(c)3 or (c)4.
- 3.9. **Sloping** is a method of protecting workers from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences such as soil type, length of exposure, and application of surcharge loads.
- 3.10. **Surcharge Loads** are generated by the weight of anything in proximity to the excavation, push starts for a cave-in (anything up top pushing down). Common surcharge loads:
 - 3.10.1. Weight of spoil pile.
 - 3.10.2. Weight of nearby buildings, poles, pavement, or other structural objects.
 - 3.10.3. Weight of material and equipment.
- 3.11. **Trench** is a narrow excavation below the surface of the ground, less than 15 feet wide, with a depth no greater than the width.
- 3.12. **Undermining** can be caused by such things as leaking, leaching, caving, or over-digging. Undermined walls can be very dangerous.
- 3.13. **Vibration** is a force that is present on construction sites and must be considered. The vibrations caused by backhoes, dump trucks, compactors and traffic on job sites can be substantial.

4. Responsibilities

- 4.1. Manager(s)
 - 4.1.1. Shall implement and maintain the procedures and steps set forth in this program.
- 4.2. HSE Supervisor(s)
 - 4.2.1. Shall assist management with implementing and maintaining the procedures and steps set forth in this program.
 - 4.2.2. Shall ensure the safety of the employees and public affected by the excavation by:
 - 4.2.2.1. Evaluating the work to be performed.
 - 4.2.2.2. Determining the means of protection that will be used and adherence to the provisions of this policy as appropriate.

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4.2.3. Ensure daily, or more often as required, that site conditions are safe for employees to work in excavations.

4.3. Employee(s):

4.3.1. Shall work in accordance with the provisions of this policy. No employees should enter an excavation meeting the scope of this policy until authorized by the competent person.

5. Requirements

- 5.1. The Company's trenching activities are normally limited to a 6" trench around the work site which is well above normal buried pipe and cable hazards. Consequently, many of the requirements of this policy do not apply to normal Company trenching operations.
- 5.2. Where deeper trenching is required, the Company shall engage an experienced trenching company to perform the work. The trenching contractor shall be required to comply with the requirements of this policy.
- 5.3. The Company shall locate any existing utilities above or below ground which could be impacted by shallow ground disturbance.

6. Procedure

6.1. Hazard Identification

6.1.1. Prior to excavation and trenching activities hazards shall be identified above and below ground, examples of typical hazards are:

- 6.1.1.1. Sewer, water, fuel, or product pipes.
- 6.1.1.2. Electric or telecommunication lines.
- 6.1.1.3. Potential release of fluids (i.e., gas or crude oil).
- 6.1.1.4. H2S release.
- 6.1.1.5. Fire or explosion.

6.2. Hazard Assessment

- 6.2.1. Hazards shall be assessed according to the existing conditions. Supervision shall ensure that there are no conditions that could cause soil or other material to move into the trench.
- 6.2.2. Supervisors shall be on location and ensure all hazards have been identified and mitigated prior to a The Company employee entering the excavation.
- 6.2.3. Supervisors shall inspect excavations after every rainstorm, earthquake, leaving the excavation unattended or other hazard-increasing occurrence, before allowing The Company employees to go back to work. The re-evaluation shall consider current

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control measures to determine if structural integrity is adequate to provide protection against slides and cave-ins in the new conditions.

6.3. Hazard Control Measures

6.3.1. Excavations of 4 ft (1.2 m) or more in depth shall be protected by:

- 6.3.1.1. Shoring.
- 6.3.1.2. Sloping the ground.
- 6.3.1.3. Benching.

6.3.2. A system for classifying and stabilizing soil shall be site specific. A competent person shall classify soil and rock deposits as:

- 6.3.2.1. Stable rock.
- 6.3.2.2. Type A soil.
- 6.3.2.3. Type B soil; or
- 6.3.2.4. Type C soil.

6.3.3. If excavations are less than 4 ft (1.2m), a qualified person must inspect to determine if soil conditions are stable.

6.3.4. All material shall be placed a minimum of 2 ft (60 cm) from the edge of excavation to prevent it from falling back into the excavation.

6.3.5. Unconfined compressive strength must be determined by laboratory testing or estimated in the field using.

- 6.3.5.1. a pocket penetrometer,
- 6.3.5.2. thumb penetration tests,
- 6.3.5.3. or other methods.

6.3.6. Barriers shall be provided:

- 6.3.6.1. To prevent mobile equipment from entering excavations.
- 6.3.6.2. To prevent personnel from falling into excavations.
- 6.3.6.3. To securely cover all wells, pits, shafts, and caissons, etc.
- 6.3.6.4. Personnel shall only cross trenches at designated areas.

6.3.7. Trenches shall be evaluated for hazardous atmosphere that may create a confined space hazard.

6.3.8. A competent person shall be specified, and their duties described. Duties can include, but are not limited to; inspection prior to entry, atmospheric testing, removal of workers if conditions dictate, etc.

6.3.9. A competent person should inspect excavation/trench daily.

6.4. Locate Existing Facilities

6.4.1. Identify any facilities within the area proposed and within 30 m (100 ft) in every direction from the outside perimeter of the ground disturbance.

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- 6.4.2. The location of underground installations shall be determined before excavation, utility companies should be contacted within 24 hours (unless a longer period is required by state or local law), when open, underground installations shall be protected, supported, or removed as necessary.
- 6.4.3. Note: Facilities include pipelines, powerlines and any other above-or-below ground utilities.
- 6.4.4. The following sources shall be contacted to obtain as much information as possible about existing facilities in the area:
 - 6.4.4.1. Land Titles for Deeds.
 - 6.4.4.2. Landowners.
- 6.4.5. Visible facility markers already placed in the area shall be identified.
- 6.4.6. The Local company Production Office shall be contacted and a review of the scope of work and crossings (using plot plans, surveys, and lease drawings) with area operations personnel.
- 6.4.7. Note: Personnel familiar with the area may know of pipelines or utilities not otherwise documented.
- 6.4.8. Company markers shall never be used to confirm locations; the owners of any marked facilities shall be contacted to confirm the locations of the facilities.
- 6.4.9. Where there are existing facilities, a copy of the survey drawing shall be acquired for the proposed ground disturbance area (e.g., well site or access road) from the last surveyor or line-locating company to survey the area.
- 6.4.10. Where survey drawings are old, updated surveys shall be required.
- 6.4.11. Where survey drawings are not available, ensure the proposed area of the disturbance and 30-meter (100 ft) buffer zone are electronically scanned.
- 6.4.12. A recent copy of the Land Title or Land Report shall be acquired from the contractor, surveyor, or line-locating company.
- 6.4.13. The most recent company pipeline baseline map shall be obtained from the contractor, surveyor, or line-locating company.
- 6.5. Mark and Document Facilities
 - 6.5.1. Mark buried facilities using the international color code as follows:
 - 6.5.1.1. Red – electrical.
 - 6.5.1.2. Yellow - gas, oil petroleum, steam, or gaseous material.
 - 6.5.1.3. Orange communications cables (e.g., telephone, TV).
 - 6.5.1.4. Blue - water, irrigation.
 - 6.5.1.5. Green - sewers, culverts, or drains.
 - 6.5.1.6. Pink - temporary survey marks.

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- 6.5.1.7. White - limits of proposed excavation.
- 6.5.2. Different colors or types of markers, fences or barricades shall be used to show existing facility rights-of-way or right-of-way outlines.
- 6.5.3. Different colors or types of markers, fences, or barricades shall be used to show the new facility right-of-way.
- 6.5.4. Marked facilities shall be documented on site plans and surveys.
- 6.6. Pre-Disturbance Site Inspection
 - 6.6.1. Buried pipelines and utilities shall be identified in the survey drawings and plan within 30 m (100 ft) of either side of the ground disturbance and clearly marked on the ground.
 - 6.6.2. Overhead power line caution signs shall be in place.
 - 6.6.3. A re-survey of the proposed working area shall be required if there are any signs of new activity or ground disturbances within the area or buffer zone that are not reflected in the survey drawing, including new:
 - 6.6.3.1. Pipelines
 - 6.6.3.2. Power lines
 - 6.6.3.3. Gas Co-op
 - 6.6.3.4. Utility cables
 - 6.6.3.5. Clearings
 - 6.6.3.6. Road construction
 - 6.6.3.7. Pipeline signs
 - 6.6.3.8. Settling or changes in the color or growth of vegetation
 - 6.6.4. Soil classification shall be determined by testing and protective systems designed according to soil classifications for the protection of employees.
 - 6.6.5. Documentation of the markings shall be provided to the person in charge of the ground disturbance.
- 6.7. Pre-Disturbance Notification and Review
 - 6.7.1. Ensure owners of facilities shall be notified before work begins.
 - 6.7.2. Facilities that will be crossed shall be verified.
 - 6.7.3. Conditions of crossing agreements shall be met.
 - 6.7.4. The minimum distance mechanical equipment can be safely operated from an underground facility shall be determined after the facility has been exposed by hand.
 - 6.7.5. Individuals involved in the task shall be properly trained and certified.
 - 6.7.6. Tests shall be conducted for air contaminants to ensure a safe working environment.
 - 6.7.7. Adequate means to prevent falls shall be in place and inspected prior to use.
 - 6.7.8. Pre-job task meetings shall be held with the Supervisors, Equipment Operators and all other workers involved in the task to review:

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- 6.7.8.1. Potential hazards.
 - 6.7.8.2. Safe work practices.
 - 6.7.8.3. Permit requirements.
 - 6.7.8.4. Restrictions on mechanical excavation.
 - 6.7.8.5. Trenching
 - 6.7.8.6. Precautions during hand exposing.
 - 6.7.8.7. Potential for encountering lines that were improperly installed or have shifted away from their marked position.
 - 6.7.8.8. Right to refuse work.
 - 6.7.8.9. Personal protective equipment.
 - 6.7.8.10. Policy for reporting accidents, injuries and near misses.
 - 6.7.8.11. Emergency response plan.
- 6.8. During Disturbance
- 6.8.1. Access to the site shall be controlled by erecting temporary fencing on the right-of-way. Guardrails are installed for crossings and walkways to protect against falls.
 - 6.8.2. Temporary fencing which allows for crossing of the pipeline right-of-way where necessary shall be provided.
 - 6.8.3. A safe work permit shall be completed.
 - 6.8.4. A ground disturbance checklist shall be completed to ensure all work phases are identified, new crew members are informed of hazards and work requirements, and changes to work procedures and job scope are communicated.
 - 6.8.5. Site drawings shall be double-checked for the placement of markers prior to mechanical excavation.
 - 6.8.6. Pipeline warning signs and markers shall be kept visible and legible for the duration of ground disturbance.
 - 6.8.7. The representative of the owner shall be present when the pipeline is being exposed, or they have agreed in writing not to be present.
 - 6.8.8. Employees shall not work under loads of lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.
 - 6.8.9. Hand expose or expose with a hydrovac shall be completed for all underground facilities within a 5 m (16 ft) radius of the ground disturbance area according to company requirements, crossing agreements and country specific regulations.
 - 6.8.10. Note: The exposed area shall be large enough to determine line size and alignment.
 - 6.8.11. Mechanical excavation equipment shall not be used within 600 mm (2 ft) of a located pipeline except under the direct supervision of the owner.

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- 6.8.12. Where a trench is narrower than its depth and is deeper than 1.5 m (5 ft), workers shall be protected from cave in.
- 6.8.13. Adequate protection shall be provided to protect employees from loose rock or soil or excavated or other materials or equipment that could pose a hazard by falling or rolling from into excavations.
- 6.8.14. Where a trench is left open, the area shall be barricaded, and warning signs posted.
- 6.8.15. Competent persons shall examine the possibility of cave-ins, failure, or protective systems daily. If problems are found, provisions shall be made for immediate personnel removal.
- 6.9. Hand Exposure and Mechanical Excavation
 - 6.9.1. Hand exposure shall be done if the ground disturbance crosses or is carried out within 5 m (16 ft) of an existing facility. Hand exposure shall occur before any mechanical excavation can begin. When exposing the underground facility, it shall be done sufficiently to identify the facility.
 - 6.9.2. Excavation techniques have been developed using water or air jets for hand exposure and have been accepted, although not all procedures may have specific regulatory approval. Care shall be taken to evaluate the best method of hand exposure, taking into consideration potential for damage to coatings and methods of soil disposal.
 - 6.9.3. Even after hand exposure, mechanical equipment shall not be used within the distance specified on the crossing agreement or, if a crossing agreement is not present, not closer than 60 cm (12 in) from the underground facility.
 - 6.9.4. There are a limited number of cases where a facility does not have to be exposed, including:
 - 6.9.4.1. Facility has been located and marked.
 - 6.9.4.2. Ground disturbance is hand excavated for 5 m (15 ft) on each side of the located and marked position to a depth of 15 cm (6 in) greater than required for the ground disturbance.
 - 6.9.4.3. The facility has been located and marked to the satisfaction of the owner.
- 6.10. Access / Egress
 - 6.10.1. Safe means of access/egress from excavations shall be provided and securely fastened in place, examples of access / egress means are:
 - 6.10.1.1. Stairways.
 - 6.10.1.2. Ladders.
 - 6.10.1.3. Ramps, etc.
 - 6.10.2. Trench excavations that are 4 feet or more in depth shall have a stairway, ladder, ramp, or other safe means of egress located at a lateral distance of no more than 25 feet of

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employees. Recovery and retrieval systems shall be available at the location in case of an emergency.

6.10.3. A stairway, ladder, ramp, or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

6.10.4. Employees shall have protection from public traffic, where necessary, and shall be provided with reflective vests.

6.11. Water Accumulation

6.11.1. Work shall not be performed in an excavation when water is present.

6.11.2. Ditches, dikes, or other effective means shall be provided to prevent surface water from entering an excavation.

6.11.3. Adequate drainage of the area adjacent to the excavation shall be provided.

6.12. Vibrations or Superimposed Loads

6.12.1. Additional bracing or other structural controls shall be provided in excavations when adjacent to:

6.12.1.1. Streets.

6.12.1.2. Railroads.

6.12.1.3. Other sources of vibrations such as moving equipment or vehicles.

6.12.1.4. Superimposed loads.

6.12.1.5. In areas that have been previously filled.

6.13. Post Construction

6.13.1. Before backfilling, the owner shall be notified so that a representative can inspect the facility before it is covered.

6.13.2. Damage to exposed facilities shall be repaired.

6.14. Terminating Work

6.14.1. Terminate all ground disturbance work and contact state one-call services and regulatory agencies if contact is made with underground facilities and results in:

6.14.1.1. Punctures, cracks, scratches, gouges, denting or flattening of the surface.

6.14.1.2. Damage to protective coatings.

6.15. Practice for Trenching and Excavation

6.15.1. Review and follow the Ground Disturbance Practice.

6.15.2. Review applicable drawings.

6.15.3. Locate all buried pipelines, structures (tanks), electrical cables and communications cables.

6.15.4. Conduct a pre-job meeting to discuss the hazards of the job and the required safe work practices and to review the safe work permit.

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- 6.15.5. Ensure all third-party Crossing Agreements are in place before the line is exposed.
- 6.15.6. Arrange for a utility representative to be present when the line is exposed.
- 6.15.7. Within a plant or operating area, and near roadways or populated areas, erect fences, barricades, signs, and warning lights around the excavation.
- 6.15.8. Trench or excavate according to state regulatory requirements and current site engineering drawings.
- 6.15.9. Before backfilling, inspect for and repair any damage to underground pipe and equipment coating.
- 6.16. Guidelines for Trenching and Excavation
 - 6.16.1. Do not start trenching or excavation until all required agreements and safe work permits have been completed and signage is in place.
 - 6.16.2. When trenching work is carried out in the vicinity of overhead powerlines, observe safe limits of approach.
 - 6.16.3. Do not reduce the original soil support provided for the power pole.
 - 6.16.4. When trenching work is carried out within 600 mm of an existing pipeline or 300 mm of an existing cable or conduit, ensure the pipeline, cable or conduit is exposed by hand digging before work can continue within these distances.
 - 6.16.5. Determine requirements for uprights and stringers by referencing state regulatory requirements.
 - 6.16.6. Ensure workers have a safe means of entering and leaving a trench or excavation.
 - 6.16.7. Ensure workers do not enter an excavation unless it is constructed in accordance with state regulations.
 - 6.16.8. Ensure workers do not begin working in an excavation unless it is protected from cave ins, sliding, or rolling materials by:
 - 6.16.9. Cutting back the walls of the excavation to reduce the height of the remaining vertical walls.
 - 6.16.10. Installing temporary protective structures.
 - 6.16.11. Using a combination of the above methods.
- 6.17. Maintaining Documentation
 - 6.17.1. Documentation shall be in place before the crossing or ground disturbance occurs.
 - 6.17.2. Documentation shall be kept on file for the disturbance.
- 6.18. Responsibility and Training
 - 6.18.1. Assign responsibility for each ground disturbance to a worker on site who has been certified through an approved ground disturbance training program.

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6.18.2. Workers who will participate in the ground disturbance work shall be provided with training appropriate to the risks associated with the ground disturbance being undertaken.

7. Training

- 7.1. Any employee required to dig or enter an excavation shall attend, at a minimum, trenching and excavation safety awareness training prior to beginning related work.
- 7.2. Additional training is required for any employee designated to be the competent person for a trenching and excavation job. Competent person training covers the following areas in detail:
 - 7.2.1. Hazards related to excavation work
 - 7.2.2. Work practices and selection of appropriate protective systems
 - 7.2.3. Methods of evaluating soil and the site
 - 7.2.4. Inspection procedures
 - 7.2.5. Specific requirements of the policy and of related policies
 - 7.2.6. Emergency procedures
- 7.3. Both the designated competent person and any other employee involved in trenching and excavating activities shall attend relevant health and safety training at least every two years or more often if necessary due to an observed disregard of the noted safety procedures.

8. Reference

- 8.1. 29 CFR 1926.650, Subpart P - Excavations