



Tampa Electric Safety Management System
EXCAVATION SAFETY PROGRAM

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1. Purpose

The purpose of this program is to provide guidance for excavation and trenching in accordance with the OSHA Construction Standards for Excavation – 29 CFR 1926.650-652. Refer to Appendix's A - F of OSHA - Excavation (OSHA 29 CFR 1926 Subpart P) when determining soil types, sloping designs and specific details.

2. Introduction

Tampa Electric Energy Supply provides a safe and healthy workplace for its employees and contractors by communicating information concerning excavating and trenching. This program applies to Tampa Electric Energy Supply employees and contractors who have potential occupational exposure to risks associated with excavating and trenching.

The written program contains the following elements, which are incorporated into the training materials:

- Roles and Responsibilities
- Permits
- Soil Types
- Hazard determination and mitigation

3. Responsibility

The **Facility Director** is responsible for the implementation and maintenance of the Excavation and Trenching Program.

Duties supporting this objective may be assigned to the Plant Safety Professional or others as designated. Safety Professional or designee shall monitor that the contractors performing excavation work are maintaining OSHA compliance.

At any Energy Supply location where excavations are less than four (4) feet, a competent person will be designated to identify the appropriate methods to safely perform the excavation.

At any Energy Supply location where excavations exceed four (4) feet, an excavation competent person will be designated who can identify existing and predictable excavation hazards, as well as the authority to promptly abate those hazards. The excavation competent person will be a jobsite supervisor who has been trained in OSHA Trenching and Excavation Requirements, including:

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- Documentation requirements.
- Monitoring hazardous atmospheres.
- Means of access/egress.
- Sloping, benching, and shoring.

Where excavations exceed twenty (20) feet in depth at any point, protective systems must be designed by a registered professional engineer.

4. Training

Target Audience - All Energy Supply employees and/or contract workers working on projects where excavation/trench/hole hazards exist are to be trained in the installation, identification, and maintenance of warning systems, barricades, and/or covers.

Frequency - Initial training shall be provided to each affected employee prior to the assignment of tasks which may result in exposure to excavations

Training required will be based on the work-tasks the employee will perform with respect to trenching and excavations.

Retraining shall be conducted as needed and documented.

Methods - Training shall be accomplished through Computer-Based Training (CBT), by PowerPoint presentation with video, or other training materials determined adequate by the Energy Supply Safety Department.

For competent persons, the training requirements shall at a minimum meet the OSHA requirements.

For persons entering excavations to perform work, training requirements shall at a minimum include:

- Basic understanding of Excavation and Trenching standards and this Energy Supply Program
- Recognition of excavation hazards and methods of protection
- Emergency Procedures

Documentation – All employee training will be documented electronically in the Cority database. Classroom training will require the attendees to sign a roster and that information will later be transferred into the Cority database. If CBT is utilized, the training may be documented in the separate CBT program database or transferred into the Cority database, where practical.

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5. Periodic Program Evaluation

The Energy Supply JDC is responsible for periodically performing evaluations of the elements outlined in this document so that the effectiveness of the program may be maintained. Responsibilities supporting this objective may be assigned to others as designated.

6. General Requirements

Soil Type

Any excavation at an Energy Supply location will be considered Type C soil.

Surface Encumbrances

All surface encumbrances, i.e., boulders, buildings, trees, roadbeds, etc., that are located so as to create a hazard to workers shall be removed or supported, as necessary, to safeguard workers.

Underground Installations

The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations expected to be within fifty feet of excavation work, shall be determined prior to opening an excavation.

When excavations are performed outside of the confines of the immediate secured property of the facility, or the activities are within fifty (50) feet of any marked right-of-way, easement or other utility operator permitted use property the utility operators shall be contacted.

- Call 811 a minimum of three (3) full business days in advance of such planned excavation. The following website must be referenced for further information: <http://www.callsunshine.com/>.
- When marking is not completed in 48 hours or the exact locations of the installations cannot be determined, excavation may proceed. Caution shall be used and detection equipment or other acceptable means to locate utility installations may be used.

Soft dig field locates shall be employed to verify underground facilities, unless underground facilities are located at a depth greater than eight (12) feet.

While the excavation is open, underground installations shall be protected, supported, or removed as necessary to safeguard workers.

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Access and Egress

A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are four (4) feet or more in depth to require no more than 25 feet of lateral travel from workers.

Structural ramps that are built of steel or wood and are used solely as a means of worker access or egress from excavations are to be designed by a competent person.

Structural ramps that are built of steel or wood used for access or egress of equipment shall be designed by a person qualified in structural design.

Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.

Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

Exposure to Vehicular or Mobile Equipment Traffic

Workers exposed to vehicular or mobile equipment traffic involved in excavations shall be provided with and shall wear warning vests or other suitable garments marked with or made of reflective or high-visibility material.

Exposure to Falling Loads

No worker shall be permitted underneath loads handled by lifting or digging equipment. Workers shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.

Warning System for Mobile Equipment

When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand, or mechanical signals, or stop logs. If possible, the grade shall be away from the excavation.

Hazardous Atmospheres - Testing and Controls

Where an excavation is greater than or equal to 4 feet in depth and personnel will enter,

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the potential of a hazardous atmosphere shall be considered. Where a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the Energy Supply Confined Space Entry Policy shall be followed.

Protection From Hazards Associated with Water Accumulation

Workers are not to work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect workers against the hazards posed by water accumulation. The precautions necessary to protect workers adequately vary with each situation, however, may include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation. Prior to discharging any accumulated water from an excavation, contact the site Environmental Coordinator.

If excavation work interrupts the natural drainage of surface water (such as streams), contact the site Environmental Coordinator to determine if permitting is required. Diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation.

Excavations subject to runoff from heavy rains will require an inspection by a competent person to ensure the integrity of the excavation.

Stability of Adjacent Structures

Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of workers.

Where an excavation is occurring with a depth within 1-1/2 times the distance to the nearest structure, consult a registered professional engineer to determine appropriate guidelines to support the adjacent structure. For example, an excavation 10 feet in depth that is at least 15 feet away from the closest structure does not require an engineer review. Refer to Appendix C - Required Excavation Clearances.

Excavation within the 1-1/2 times distance to the nearest structure, including; footing of any foundation, retaining wall, tanks, utility poles, etc. shall not be permitted unless:

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- A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation to be unaffected by the excavation activity; or,
- A registered professional engineer has approved the determination that such excavation work will not pose a hazard to workers or the structure.
- A registered professional engineer has determined the appropriate support system or other method of protection, and it has been provided.

Sidewalks or pavements shall not be undermined unless a support system or other method of protection is provided.

Protection for Workers from Loose Rock or Soil

Adequate protection shall be provided to protect workers from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material, installation of protective barricades at intervals as necessary on the face to stop and contain falling material, or other means that provide equivalent protection.

Workers shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least two feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both, if necessary.

Inspections

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a hazardous condition. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other event that could increase the hazard. These inspections are only required when worker exposure can be reasonably anticipated. Daily inspections shall be documented using the Tampa Electric Energy Supply Excavation and Trenching Compliance Checklist or equivalent Contractor Company checklist.

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

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Fall Protection

Where workers or equipment are required or permitted to cross over excavations, where the fall hazard into the excavation is 4 feet or greater, walkways or bridges with standard guard rails shall be provided. Adequate physical barrier protection shall be provided at all excavations where the fall hazard into the excavation is 4 feet or greater.

7. Protective Systems

Protection of Workers in Excavations

Each worker in an excavation shall be protected from cave-ins by an adequate protective system unless the excavation is less than 4 feet in depth.

Protective systems shall have the capacity to resist all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

Design of Sloping and Benching Systems

The slopes and configurations of sloping and benching systems shall be selected and constructed using one of the three options below.

- Option 1 - Allowable configurations and slopes - Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical (34° measured from the horizontal), unless the employer uses one of the other options listed below. See Appendix B.
- Option 2 - Designs using other tabulated data - Designs of sloping or benching systems shall be selected from, and be in accordance with, tabulated data such as tables and charts. The tabulated data shall be in written form and shall include all the following:
 - Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;
 - Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;
 - Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data; and
 - At least one copy of the tabulated data which identifies the registered professional engineer who approved the data shall be maintained at the jobsite during construction of the protective system.
- Option 3 - Design by a registered professional engineer - Sloping and benching systems not utilizing Options 1 or 2 shall be approved by a registered professional

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engineer. Designs shall be in written form and shall include at least the following:

- o The magnitude of the slopes that were determined to be safe for the particular project;
- o The configurations that were determined to be safe for the particular project; and
- o The identity of the registered professional engineer approving the design.

At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. Changes to original design must be reviewed and approved by a registered professional engineer.

Design of Support Systems, Shield Systems, and other Protective Systems

Designs of support systems, shield systems, and other protective systems shall be selected and constructed as follows:

- Option 1 - Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in the OSHA standard; or
- Option 2 - Designs using manufacturer's tabulated data - Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.
- Designs by a registered professional engineer shall be in written form and shall include the following:
- A plan indicating the sizes, type, and configurations of the materials to be used in the protective system; and
- The identity of the registered professional engineer approving the design. At least one copy of the design shall be maintained at the jobsite during construction of the protective system.

Materials and Equipment

Materials and equipment used for protective systems shall be properly maintained and free from damage or defects that might impair their proper function. When material or equipment that is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be

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removed from service and shall be evaluated and approved by a registered professional engineer before being returned to service.

Installation and Removal of Supports

Support system components shall be securely connected to prevent sliding, falling, kickouts, or other predictable failure.

Before temporary removal of individual structural components begins, additional precautions shall be taken to ensure the safety of workers.

Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

Backfilling shall progress together with the removal of support systems from excavations.

Installation of a support system shall be closely coordinated with the excavation of trenches.

Sloping and Benching Systems

Workers shall not be permitted to work on the faces of sloped or benched excavations at levels above other workers except when workers at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

Shield Systems

Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

Workers shall not be allowed in areas protected by shields when the shields are being installed, removed, or moved vertically.

Additional Requirement for Shield Systems Used in Trench Excavation

Excavations of earthen material to a level not greater than 2 feet below the bottom of a shield shall be permitted if the shield is designed to resist the forces calculated for the full depth of the trench, and there are not indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

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8. Protective Systems for Excavations, Trenches & Holes/Caissons

Refer to the Energy Supply Work Area Protection Program for appropriate protection and warning measures for excavations and trenches.

When using barricade tape, it is to be placed at least 6 feet, but no more than 15 feet from the edge of an excavation or trench to warn of the hazard.

Covers shall be made of any material which is able to support twice the intended load, i.e., personnel or equipment. Covers must be secured from removal or displacement. All hole covers are to be clearly labeled: "DANGER – HOLE COVER - DO NOT REMOVE". To eliminate any uncertainty on how to address exposed openings or like thereof, refer to the *Protection of Floor Openings and Exposed Edges* section in Tampa Electric's [Work Area Protection Program](#).

9. Documentation & Record Keeping

Written documentation is not required to be retained by Tampa Electric.

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10. Record of Revisions

Summary of Revisions	Authorized By	Date of Authorization
Program Initiated	VP Safety Dept	August, 2010
JDC Periodic Review (Underground Installation wording, Appendix C & D)	VP Safety and Security, Heidi Whidden	May 3, 2024

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Appendix A – Glossary

Accepted Engineering Practices - means those requirements which are compatible with standards of practice required by a registered professional engineer.

Aluminum Hydraulic Shoring - means a pre-engineered shoring system comprised of aluminum hydraulic cylinders (cross braces) used in conjunction with vertical rails (uprights) or horizontal rails (wales). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

Bell-bottom Pier Hole - means a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

Benching (Benching system) - means 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.

Cave-in - means 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 falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent Person - One who has been trained to identify trenching and excavation hazards in the workplace and authorized to eliminate or control the hazards.

Cross Braces - means the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Encumbrance – Anything that creates a hazardous surcharge load on the sides of an excavation. Encumbrances include, but are not limited to equipment, vehicles, spoils, materials, adjacent structures, utilities, light poles, etc.

Entry – Placement of the entire body into an excavation.

Excavation - means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Faces or sides - means the vertical or inclined earth surfaces formed as a result of excavation work.

Failure - means the breakage, displacement, or permanent deformation of a structural member or connection to reduce its structural integrity and its supportive capabilities.

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Hazardous Atmosphere - means 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.

Kickout - means the accidental release or failure of a cross brace.

Protective System - means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into 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 the necessary protection.

Ramp - means an inclined walking or working surface that is used to gain access to one point from another and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer - means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

Scaling – means removal of loose materials from the face of the excavation.

Sheeting - means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system) - means a structure that can withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 29 CFR 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

Shoring (Shoring system) - means a structure such as a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sides. - See "Faces."

Sloping (Sloping system) - means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

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Stable rock - means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Structural Ramp - means a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

Support System - means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Surcharge - Excessive vertical load or weight caused by spoil, overburden, vehicles, equipment, or activities that may affect soil stability.

Tabulated Data - means tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench (Trench excavation) - means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Trench box - See "Shield."

Trench Shield - See "Shield."

Uprights - means the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."

Wales - means horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

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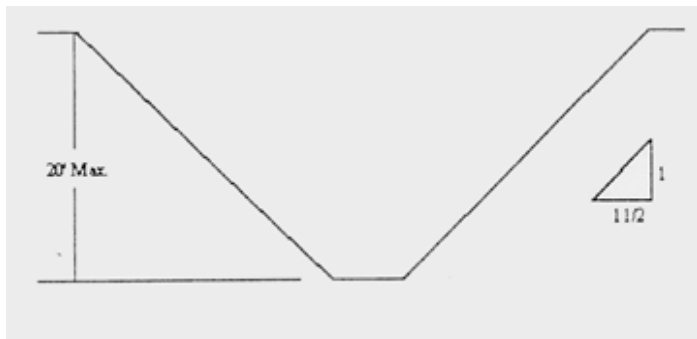
Appendix B – Type C Soil

TYPE C SOIL – MINIMUM STANDARDS

Includes:

- Cohesive soil with Unconfined Compressive Strength (UCS) less than one-half ton per square foot.
- Granular soils including gravel, sand, and loamy sand.
- Saturated or submerged soils.

All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1 ½ horizontal: 1 vertical.

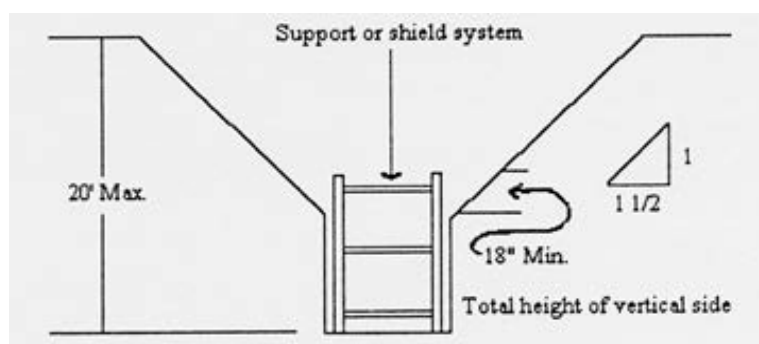


Top Width = (3 x depth) + bottom width

If bottom width is 4 feet, then:

<u>Depth</u>	<u>Width</u>
8 ft	28 ft
10 ft	34 ft
12 ft	40 ft
14 ft	46 ft
16 ft	52 ft
18 ft	58 ft
20 ft	64 ft

All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1 ½ horizontal: 1 vertical.



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Appendix C – Required Excavation Clearances

Depth of Excavation

Clearance to top of slope from structure.

4 ft.	4 ft.
5 ft.	7.5 ft.
6 ft.	9 ft.
7 ft.	10.5 ft.
8 ft.	12 ft.
9 ft.	13.5 ft.
10 ft.	15 ft.
11 ft.	16.5 ft.
12 ft.	18 ft.
13 ft.	19.5 ft.
14 ft.	21 ft.
15 ft.	22.5 ft.
16 ft.	24 ft.
17 ft.	25.5 ft.
18 ft.	27 ft.
19 ft.	28.5 ft.
20 ft.	30 ft.

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Appendix D – Excavation & Trenching Compliance Checklist



Energy Supply Excavation & Trenching Permit

TEC Work Order #:

Contractor Name:		Date Work Started:		
Station/Location:		Date Work Ended:		
Description of Work:				
Sketch of Location Attached?		Yes	No	Drawing # Used for Reference:
Size of Trench (Feet):	Length:	Top Width:	Bottom Width:	Depth:

***** If excavation depth exceeds 20' at any point, the protection systems must be designed by a registered professional engineer. *****

Lines in Vicinity of Work:

Electrical: (Overhead/Buried)	Water	Drain	Sewer
Telephone	Alarm	Steam	Local Utilities
Process (specify):		Other:	
Contact Local Authorities? Yes No		If Yes, Who?	
If no, Why?		Time/Date Contacted:	

Other Known Obstructions:

Footing:	Piling:
Concrete Encasements:	Other (specify):

Precautions To BE Taken:

De-Energize Lines	Insulate Operator	Ground Tools	Hand Excavate
Is Shoring or Sloping Necessary? Yes No			
Description:			

THE ABOVE DATA HAS BEEN CHECKED WITH THE BLUEPRINTSON FILE. WHEN CLOSE CLEARANCES ARE INDICATED, HAND EXCAVATION MUST BE USED TO DETERMINE THE EXACT LOCATION. EXISTING LINES AND INTERFERENCE IN THE VACINITY OF WORK MUST BE MARKED BY STAKES INDICATING LOCATION AND DEPTH PRIOR TO EXCAVATION.

Energy Supply Contractor Supervisor Signature:	Date Signed:
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Appendix E – Excavation & Trenching Compliance Checklist



Energy Supply Excavation & Trenching Compliance Checklist

TEC Work Order #:

*** This form is to be completed daily or "as needed". ***

Contractor Name: _____ Date: _____

Station/Location: _____

Competent Person: _____

Reclassify (circle one): Yes No	Reason for Reclassification:
---	------------------------------

Visual:

Water:	Surface	Seeping	Water	Table
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Backfill:	Cohesive	Granular
-----------	----------	----------

Trench Banks:	Cohesive/Granular	Crack/Spall	Fissure
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Previously Disturbed:	Yes	No	
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Layered Soil:	Yes	No	
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Vibration Potential:	Yes	No	
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Manual:

Plasticity:	Cohesive	Granular
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Dry Strength:	Cohesive	Granular
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Estimated Strength:	Thumb	Penetrometer	Shear Van
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Atmospheric Check:	Yes	No	Values:
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Classification / Protection:

Soil Type:	
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Trench Box	Shoring	Sloping
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Competent Person's Signature: _____ Date Signed: _____

Notes:

Developed by:
TEC Safety

Approved by:
VP, Safety and Security

