

<b>Midland Engineering Co., Inc.</b> Safety Management System			Doc No:	TRENEXCA
			Initial Issue Date	12/14/15
<b>Chapter 36-Trenching, Shoring, Excavations</b>			Revision Date:	Initial Version
			Revision No.	0
			Next Review Date:	
Preparation: Safety Mgr	Authority: President	Issuing Dept: Safety	Page:	Page 1 of 10

## PURPOSE

To provide guidelines to ensure the safety of all employees who are required to work in and around excavations.

## SCOPE

At no time shall any Midland Engineering Co., Inc. employees be involved in digging operations of excavating/trenching. However, some work must be completed in or around excavations/trenches and if so then this procedure applies to all operations involving Midland Engineering Co., Inc.

## REFERENCES

29 CFR 1926.650 – 652  
1926 Subpart P App A

## RESPONSIBILITY

Project Supervision, the site supervisor and/or the designated competent person is in charge of the excavation work is responsible for ensuring the following:

- All preparatory work is conducted as set forth in this procedure prior to any excavating.
- Excavation work is performed within the guidelines as set forth in this procedure.
- An Excavation Permit has been issued and properly completed by the appropriate personnel before work begins.
- Locating any utilities in the vicinity of the excavation before work begins. If electrical lines are present, the company must communicate their exact location to the person in charge of the excavation work.
- Locating any acid, steam, water, fuel-gas and/or other process/service type underground line in the vicinity of the excavation to be dug. If pipelines as those described above are present, the company must communicate their exact location to the person in charge of the excavation work.

<b>Midland Engineering Co., Inc.</b> Safety Management System			Doc No:	TRENEXCA
			Initial Issue Date	12/14/15
<b>Chapter 36-Trenching, Shoring, Excavations</b>			Revision Date:	Initial Version
			Revision No.	0
			Next Review Date:	
Preparation: Safety Mgr	Authority: President	Issuing Dept: Safety	Page:	Page 2 of 10

- The company will ensure that prior to assigning any employee to perform trenching and excavation work, all safeguards are in place and a completed Excavation Permit has been posted in the area where excavation and trenching operations will be constructed.
- The site supervisor is the designated competent person and will continuously evaluate excavations that are next to adjacent structures for displacement.

### UNDERGROUND UTILITIES

- Before any excavation can begin Midland Engineering Co., Inc. will determine the estimated location of utility installations- sewer, telephone, fuel, electric, water, or any other underground installations that might be encountered during excavation operations.
- Midland Engineering Co., Inc. will contact the utility companies or owners involved to inform them within established or customary local response times (minimum of 24 hour), of the proposed work.
- If the utility companies or owners involved are unable or fail to respond by the end of the established response time or cannot establish existing lines, then work may proceed with caution and use of an acceptable detection device are used.

### INSPECTIONS

- A competent person must perform inspections.
- Before any excavation can be made, an Excavation Permit must be filled out and approved by the company. In addition, a site-specific trench safety plan is developed and implemented for each job.
- Trench Inspection Log will be completed and maintained by the competent person.
- The competent person will determine the soil type by a visual and manual test.
- All shoring for excavations over 20-feet are designed by a registered professional engineer and all shoring installed must be approved and signed off by a registered professional engineer.

Midland Engineering Co., Inc. Safety Management System			Doc No:	TRENEXCA
			Initial Issue Date	12/14/15
Chapter 36-Trenching, Shoring, Excavations			Revision Date:	Initial Version
			Revision No.	0
			Next Review Date:	
Preparation: Safety Mgr	Authority: President	Issuing Dept: Safety	Page:	Page 3 of 10

- All spoils must be placed a minimum of three (3) feet from the edge of the excavation.
- All excavations shall be inspected at the start of each shift, after heavy rains, and after freezing and/or thawing temperatures occur.
- The supervisor will inspect the excavation throughout the work period and stop operations when unsafe conditions exist.
- The number of workers in the excavation is to be limited to the number needed to perform the work.
- Depending on the job specifics and the type of trench or excavation, site-specific safety planning addresses the installation and removal of protective systems such as sloping, benching, shielding or shoring.

#### PROTECTIVE SYSTEMS

- Soil classifications must be determined by testing and protective systems designed according to soil classifications. Soil definitions located in **Appendix A**.
- A qualified person shall make soil classification. Unclassified soil will be sloped 1 ½ : 1 or shored when the excavation exceeds 4 feet in depth.
- All sloping/benching, shielding, shoring shall be completed in accordance with 29CFR 1926.650-1926.652.

#### ACCESS & EGRESS

- Excavations four (4) feet in depth or greater, must have a stairway, ladder, ramp or other safe means of egress that shall not exceed 25 feet of lateral travel for any employee.
- Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.
- Cleats or other appropriate means to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent a tripping hazard.

Midland Engineering Co., Inc. Safety Management System			Doc No:	TRENEXCA
			Initial Issue Date	12/14/15
Chapter 36-Trenching, Shoring, Excavations			Revision Date:	Initial Version
			Revision No.	0
			Next Review Date:	
Preparation: Safety Mgr	Authority: President	Issuing Dept: Safety	Page:	Page 4 of 10

## HAZARDOUS ATMOSPHERES

- For all excavations four (4) feet in depth or greater, the atmosphere in the excavation must be tested to ensure that no hazardous atmosphere exists. Ventilation equipment will be used when necessary.
- Midland Engineering Co., Inc. will provide rescue equipment when needed. This equipment will be attended when used.

## FALL PROTECTION

- Appropriate fall protection is implemented on each job depending on the type of trench. Different forms of fall protection are used to protect against falls around the excavation. These include temporary guardrail systems and limiting access by using temporary fence systems. Crossing and walkways are considered on a case-by-case basis and designed according to site-specific conditions.
- Keep materials or equipment that might fall or roll into an excavation at least 2 feet from the edge of the excavation or have retaining devices that will prevent materials or equipment from falling or rolling in.
- Employees will not work under suspended load or other digging equipment that has the potential where loads could fall.

## WATER ACCUMULATION

Midland Engineering Co., Inc. prohibits any employee from working in an excavation where water has or is accumulation. Midland Engineering Co., Inc. will take proper measures for water accumulation n excavation.

- If water removal equipment is used to control or prevent water from accumulating, the equipment and operation of the equipment will be monitored by a competent person to ensure proper use.
- Midland Engineering Co., Inc. requires that diversion ditches, dikes, or other suitable means be used to prevent surface water from entering an excavation and to provide adequate drainage of the area adjacent to the excavation.

<b>Midland Engineering Co., Inc.</b> Safety Management System			Doc No:	TRENEXCA
			Initial Issue Date	12/14/15
<b>Chapter 36-Trenching, Shoring, Excavations</b>			Revision Date:	Initial Version
			Revision No.	0
			Next Review Date:	
Preparation: Safety Mgr	Authority: President	Issuing Dept: Safety	Page:	Page 5 of 10

## EXPOSURE TO VEHICULAR TRAFFIC

- Traffic control procedures must be incorporated to each job.
- All employees exposed to vehicular traffic will wear standardized highly visible vests and/or clothing.
- Midland Engineering Co., Inc. will place barricades and stop logs between the excavation site and any nearby materials, construction, or traffic. This will prevent equipment and debris from rolling into the excavation or injury to pedestrians or motorists.

## TRAINING & INFORMATION

- The supervisor will receive additional competent person trenching and excavating safety work practice training on an annual basis.
- All company employees receive annual trenching safety awareness training.
- Trench & Excavation Safety Awareness Course Outline Trench/Excavation OSHA regulations, how trenches collapse, competent person, protective systems, soil classification, sloping, shoring, shields, the daily permit, and hazardous atmospheres.

## RECORDS

A copy of the excavation permit will be maintained in the safety file.

Midland Engineering Co., Inc. Safety Management System			Doc No:	TRENEXCA
			Initial Issue Date	12/14/15
Chapter 36-Trenching, Shoring, Excavations			Revision Date:	Initial Version
			Revision No.	0
			Next Review Date:	
Preparation: Safety Mgr	Authority: President	Issuing Dept: Safety	Page:	Page 6 of 10

## DAILY TRENCH/EXCAVATION PERMIT

Date: \_\_\_\_\_

Job Site: \_\_\_\_\_ Work Location: \_\_\_\_\_

Description of work task: \_\_\_\_\_

Is a sketch of location available? Yes \_\_\_ No\_\_\_ If yes, attach.

Size of Trench, Pit, or Wall Opening: \_\_\_\_\_ Ft. Long x \_\_\_\_\_ Ft. Wide x \_\_\_\_\_ Ft. Deep

Is there proper access and egress? Yes\_\_\_ No\_\_\_ Is there any signs of cracks? Yes\_\_\_ No\_\_\_

Is there excessive vibration? Yes\_\_\_ No\_\_\_ Is there presence of water seepage and rainfall? Yes\_\_\_ No\_\_\_

Where is equipment relative to the trench? \_\_\_\_\_

Lines in Vicinity of Work:

Electrical \_\_\_ Steam \_\_\_ Telephone \_\_\_ Alarm \_\_\_ Water \_\_\_ Drain \_\_\_ Sewer \_\_\_  
Other: \_\_\_\_\_

Other Obstructions: Footings\_\_\_ Pilings\_\_\_ Concrete Encasement\_\_\_ Other \_\_\_\_\_

Additional precautions to take:

De-energized Lines \_\_\_\_\_  
Operator \_\_\_\_\_  
GroundTools \_\_\_\_\_  
Hand Excavate \_\_\_\_\_  
Other (specify) \_\_\_\_\_

Is Shoring or Sloping Necessary? Yes\_\_\_ No\_\_\_ If yes, describe: \_\_\_\_\_

\_\_\_\_\_

If used, what is the condition of trench shield box? \_\_\_\_\_

The above data has been checked with blueprints on file. When close clearances are indicated, hand excavation must be used to determine the exact location. Stakes indicating location and depth prior to excavation must mark existing lines and interferences in the vicinity of work.

Who is the competent person? \_\_\_\_\_

Inspector's Name: \_\_\_\_\_

Midland Engineering Co., Inc. Safety Management System			Doc No:	TRENEXCA
			Initial Issue Date	12/14/15
Chapter 36-Trenching, Shoring, Excavations			Revision Date:	Initial Version
			Revision No.	0
			Next Review Date:	
Preparation: Safety Mgr	Authority: President	Issuing Dept: Safety	Page:	Page 7 of 10

## EXCAVATION & TRENCHING SAFETY QUIZ

Date: \_\_\_\_\_

Employee Name: \_\_\_\_\_

1. Asphyxiation is the primary cause of death in trenching fatalities. True False
2. Employees can be penalized for not reporting hazards. True False
3. The OSHA Trenching & Excavation Standards are in 29 CFR 1926.650-653. True False
4. One cubic yard of dirt weighs approximately \_\_\_\_\_ lbs. and one cubic foot of dirt weighs approximately \_\_\_\_\_ lbs.
5. An Excavation & Trench inspection must be conducted before each work shift. True False
6. Spoilage must be at least 2 feet from the trench edge. True False
7. Hazardous atmospheres must be controlled at all times. True False
8. During inclement weather a trench must be inspected hourly. True False
9. Protective systems must be inspected on a daily basis by a competent person. True False
10. All employees must be safety trained before working in excavations and trenches. True False

I acknowledge that I have received Excavation & Trenching Safety Awareness Training and agree to abide by the safety rules, policies, and procedures set forth by OSHA and the company. If I do not understand any instructions I will ask questions.

Employee Signature: \_\_\_\_\_

Instructor Signature: \_\_\_\_\_

Midland Engineering Co., Inc. Safety Management System			Doc No:	TRENEXCA
			Initial Issue Date	12/14/15
Chapter 36-Trenching, Shoring, Excavations			Revision Date:	Initial Version
			Revision No.	0
			Next Review Date:	
Preparation: Safety Mgr	Authority: President	Issuing Dept: Safety	Page:	Page 8 of 10

## APPENDIX A

**Reference** [https://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=10931](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10931)

OSHA defines soil classification as the "The definitions and examples given below are based on, in whole or in part, the following; American Society for Testing Materials (ASTM) Standards D653-85 and D2488; The Unified Soils Classification System; The U.S. Department of Agriculture (USDA) Textural Classification Scheme; and The National Bureau of Standards Report BSS-121".

"Cemented soil" means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

"Cohesive soil" means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

"Dry soil" means soil that does not exhibit visible signs of moisture content.

"Fissured" means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

"Granular soil" means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

"Layered system" means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

"Moist soil" means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

"Plastic" means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.



Midland Engineering Co., Inc. Safety Management System			Doc No:	TRENEXCA
			Initial Issue Date	12/14/15
Chapter 36-Trenching, Shoring, Excavations			Revision Date:	Initial Version
			Revision No.	0
			Next Review Date:	
Preparation: Safety Mgr	Authority: President	Issuing Dept: Safety	Page:	Page 9 of 10

## Appendix A Continued

"Saturated soil" means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or shear vane.

"Soil classification system" means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.

"Stable rock" means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

"Submerged soil" means soil which is underwater or is free seeping.

"Type A" means cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

- (i) The soil is fissured; or
- (ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- (iii) The soil has been previously disturbed; or
- (iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- (v) The material is subject to other factors that would require it to be classified as a less stable material.

Midland Engineering Co., Inc. Safety Management System			Doc No:	TRENEXCA
			Initial Issue Date	12/14/15
Chapter 36-Trenching, Shoring, Excavations			Revision Date:	Initial Version
			Revision No.	0
			Next Review Date:	
Preparation: Safety Mgr	Authority: President	Issuing Dept: Safety	Page:	Page 10 of 10

## Appendix A Continued

"Type B" means:

- (i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
- (ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- (iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.
- (iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
- (v) Dry rock that is not stable; or
- (vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

"Type C" means:

- (i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
- (ii) Granular soils including gravel, sand, and loamy sand; or
- (iii) Submerged soil or soil from which water is freely seeping; or
- (iv) Submerged rock that is not stable, or
- (v) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

"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, by thumb penetration tests, and other methods.

"Wet soil" means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.