**11-22-GO-12**

**RESOLUTION NO. 465-22 11/22/22 COL HWY Excavation and Trenching Policy rev**

**Adopting the Cayuga County Excavation and Trenching Safety Policy**

BY: Chris Petrus, Chair, Government Operations

WHEREAS, the County Legislature has adopted numerous policies and procedures for conducting County business and others which are mandated by Federal and State governments; and

WHEREAS, the Cayuga County Highway Department wishes to adopt the Excavation and Trenching Policy; now therefore be it

RESOLVED, The Cayuga County Legislature does hereby adopt above policies; and be it further

RESOLVED, that the policy be posted to the County Website, and e-mailed to all Department Heads by the Clerk of the Legislature's Office; and it is further

RESOLVED, that each Department will review their policies annually and all changes/revisions will be brought by Resolution through the Government Operation Committee to the Legislature for its consideration; and it is further

RESOLVED, that this resolution will take effect immediately upon its adoption.

*State of New York }*
*County of Cayuga }*

*I do hereby certify, that I have compared the forgoing copy of a Resolution duly passed and adopted by the Cayuga County Legislature at a meeting held on the 22nd day of November 2022 with the original Resolution, and that the same is a true and correct copy and transcript thereof, and the whole thereof.*

*Given under my hand and official seal November 23, 2022*

Sheila Smith

*Clerk, Cayuga County Legislature*

**DEPARTMENT: Highway Department**

**POLICY TITLE: Excavating/Trenching Safety Policy**

**EFFECTIVE DATE: TBD (Supersedes 12/2/13)**

**RESOLUTION NO.: TBD (Supersedes 414-13**

**SUPERSEDES POLICY OF: Excavating/Trenching Safety Policy 9/20/2013**

## OBJECTIVE

Excavation and trenching activities are recognized as some of the most hazardous construction operations, especially when people are required to enter the excavation/ trench to perform work duties. Because of the numerous hazards associated with this type of work, this policy has been prepared to communicate those hazards to workers, and to define the specific responsibilities and work practice controls to be used in order to prevent injury or death.

Of the various hazards, cave-ins pose the greatest risk and are much more likely than other excavation/trenching-related accidents to result in worker fatalities. Other potential hazards include: encountering underground facilities (e.g., electric, natural gas, water or sewer lines, or structures such as underground fuel storage tanks), falling from elevation (into an excavation/trench), being struck by falling loads, encountering potentially hazardous atmospheres, and being struck by heavy/mobile equipment.

As such it is Cayuga County's policy that:

- Excavation/trenching may not begin until potential underground hazards (subsurface utilities or structures) have been identified and marked,

- Employees may not enter excavations/trenches greater than 4-feet in depth unless a competent person (CP) has evaluated the site conditions and

    - Verified that hazardous and/or oxygen-deficient atmospheres do not exist, and will not develop during the work,

    - Installed safe means of access and egress (ladders, steps, ramps) situated within 25 feet of persons entering the excavation/trench,

    - Employees may not enter excavations/trenches greater than 5-feet in depth unless a protective system is implemented (sloping, shoring, or shielding) as deemed appropriate by a CP (a Professional Engineer must design systems for excavations/trenches deeper than 20 feet).

This Policy is applicable to all County employees, volunteers, and contractors, working for the County who may be exposed to hazards associated with working in or near excavations/trenches. The Policy shall be maintained by each County Department to which the policy applies, in a location that is accessible to all affected employees, volunteers, and contractors.

## GENERAL

29 CFR 1926 Subpart P – Excavations - establishes the requirements for trenching and excavation operations.

## DEFINITIONS

**Accepted engineering practices** - the standards of practice required by a registered Professional Engineer.

**Aluminum Hydraulic Shoring** - a manufactured shoring system consisting of aluminum hydraulic cylinders (cross braces) used with vertical rails (uprights) or horizontal rails (wales).

**Benching (Benching system)** - a method of protecting employees from cave-ins by excavating the sides of an excavation/trench to form one or more horizontal steps, usually with vertical or near-vertical surfaces between levels.

**Cave-in** - the movement of soil or rock into an excavation/trench, or the loss of soil from under a trench shield or support system, in amounts large enough to trap, bury, or injure and immobilize a person.

**Competent Person (CP)** – one who is capable of identifying 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.

**Cross braces** - the horizontal members of a shoring system installed from side to side of the excavation/trench. The cross braces bear against either uprights or Wales.

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

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

**Failure** - the movement or damage of a structural member or connection that makes it unable to support loads.

**Hazardous atmosphere** - an atmosphere that is explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, which may cause death, illness, or injury.

**Kickout** - the accidental movement or failure of a cross brace.

**Protective System** - a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face 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** - an inclined walking or working surface that is used to gain access to one point from another. A ramp may be constructed from earth or from structural materials such as steel or wood.

**Sheeting** - 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 or Trench box)** - a structure used in an excavation to withstand cave-ins and which will protect employees working within the shield system. Shields can be permanent structures or portable units moved along as work progresses. Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

**Shoring (Shoring system)** means a structure that is built or put in-place to support the sides of an excavation to prevent cave-ins.

**Sloping (Sloping system)** means sloping the sides of the excavation away from the excavation to protect employees from cave-ins. The required slope will vary with soil type, weather, and surface or near surface loads that may affect the soil in the area of the trench (such as adjacent buildings, vehicles near the edge of the trench and so forth).

**Stable rock** means natural solid mineral material that can be excavated with vertical sides that will remain intact while exposed.

**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/trench.

**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 (measure at the bottom) is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation so as to reduce the excavation to 15 feet or less, the excavation is also considered to be a trench.

**Uprights** - 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** - horizontal members of a shoring system placed in the direction of the excavation face whose sides bear against the vertical members of the shoring system or earth (the uprights or sheeting).

**TRAINING**

All personnel involved in excavation/trenching work shall be trained in the requirements of this program and applicable regulations. Training shall be provided before the employee is assigned duties in excavations/trenches.

The CP must be trained in accordance with the OSHA Excavation Standard and all other programs that may apply (examples Hazard Communication, Confined Space, and Respiratory Protection), and must demonstrate a thorough understanding and knowledge of the programs and the hazards associated.

Retraining will be performed whenever work site inspections conducted by the CP indicate that an employee does not have the necessary knowledge or skills to safely work in or around excavations/trenches.

Training records shall include the date(s) of training program, the instructor(s) of the training program, a copy of the written material presented, and the names of the employee(s) who were trained.

**RESPONSIBILITIES AND AUTHORITY**

The following identifies some of the responsibilities for various parties affected by this policy.

**County Management (County Legislature, Compliance Officer, and/or their Appointed Risk Management Committee)**

County Management is responsible for:

- Developing, maintaining, and distributing County policies that are in accordance with all applicable Federal and State regulations, and best industry practices,
- Conducting periodic safety inspections of work locations, and
- Assisting Department Heads in implementing and enforcing this Excavation/Trenching Safety Policy and assuring availability of funding for employee training and appropriate protective systems.

**Department Heads**

Department Heads are responsible for:

- Ensuring the implementation and enforcement of this Excavation/Trenching Safety Policy
- Requiring that contractors, subcontractors, and volunteers working for, or on behalf of, the County meet the minimum requirements stipulated in this policy, and that their excavation and shoring program meets the requirements of 29 CFR 1926 Subpart P and all other applicable state or federal regulations.
- Identifying the specific jobs or individuals to whom this policy applies,
- Designating and empowering the CP in their department,

**Supervisors**

It is the Supervisors responsibility to:

- Ensure that affected employees are aware of the requirements of this policy,
- Ensure that excavation/trenching activities comply with this policy,
- Monitor for hazardous atmospheres in excavations/trenches where they could accumulate.

**Competent Person**

It is the CP's responsibility to:

- Classify and document soil type(s) through visual and manual testing of soils – classifications must be made upon starting the work, every 100 feet of trenching/excavation work or when soil conditions change.

- Determine the protection system requirements

- Determine and document inspections for indications of possible cave-ins, failure of protective systems, hazardous atmospheres, and other hazardous conditions.

- Inspect excavations prior to start of work, as needed throughout the shift, after rainstorms, and after other hazard-increasing occurrences.

- Test for hazardous atmospheres when such atmospheres exist or are reasonably likely to exist.

- Inspect materials or equipment, if damaged, to determine if it is usable.

- Monitor water removal equipment and operations.

- Stop work if unsafe conditions exist, until they are corrected

**Employees (Working at or near excavation/trenching sites)**

It is each affected employee's responsibility to:

- Review and understand this policy.

- Attend appropriate training as recommended by their Supervisor/Department Head

- Understand the risks associated with excavations/trenches.

- Be aware of signs of failure, and to immediately notify the CP of any concerns.

- Refuse to enter any trench or excavation that is determined or suspected to be unsafe.

**Vendors and Contractors**

Vendors and contractors who conduct excavation/trenching for or on behalf of the County, are responsible for complying with all elements of this Policy and/or providing documentation of an excavation safety program that meets or exceeds the requirements presented in this policy.

**POLICY REQUIREMENTS**

Safe excavation/trenching requires appropriate planning prior to work, and continuous diligent attention to site conditions during the work, **especially when employees will be entering the excavation/trench**. Safe excavation/trench planning requires that the CP and/or the Supervisor:

1. Know the scope of work, including the depth and size of intended excavation/trench, how long the excavation/trench will remain open.

2. Identify and mark underground utilities and structures to prevent damage during excavation/trenching.
3. Identify encumbrances at the surface that will affect excavation/trenching.
4. Identify above-ground utilities or obstructions that might be encountered.
5. Evaluate the potential for hazardous atmosphere, and other confined space/permit required confined space conditions.
6. Determine soil types that will be encountered.
7. Determine appropriate excavation/trenching protection system (s) to be used.
8. Determine appropriate personal protective equipment and clothing.
9. Evaluate surface and subsurface water that might flood the excavation/trench, increase electrical hazards, or affect the stability of the excavation/trench.
10. Determine how the excavation/trench will be secured if left open after working hours.
11. Identify emergency procedures.
12. Follow all applicable OSHA Standards, this Excavation/Trenching Safety Policy, and any other applicable County safety programs.

A copy of this document, as well as job-specific documentation required of the CP (daily inspection checklists, soil type classification, atmosphere testing, etc.) shall be maintained at the project site (i.e., in the supervisor's vehicle, job trailer, etc.).

**Surface Encumbrances, Underground and Above-Ground Utilities/Facilities**

All surface encumbrances that are located at the excavation/trenching area so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees. In addition, awareness of underground and above-ground utilities/structures by persons operating excavation equipment is essential in preventing unwanted contact with these utilities/structures.

The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation/trenching work, shall be determined prior to opening an excavation.

All excavators must call Dig Safely New York at 1-800-962-7962 (or dial 811) at least two (2) but no more than 10 working days prior to the start of excavation. Dig Safely New York will notify their members of proposed excavation activities and have them mark their facilities near the excavation area. There are underground utility owners that are not members of Dig Safely New York. **These non-members must be identified and contacted separately by the County before excavation begins.**

Dig Safely New York will mark underground utilities/facilities on public Rights of Way, but will generally not mark utilities on a parcel or property. Private utility locating companies are often used to identify and mark utilities in these situations.

If utilities are not marked, or if a utility locator cannot establish a utilities exact location, cautious excavation may proceed provided detection equipment (for example a private utility locator) or other acceptable means. When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means. Depending on the specific situation, this may include hand-excavation, vacuum excavation or other "soft" digging methods.

**Confined Space Considerations**

A confined spaced is defined as a space that is:

1. Large enough and so configured that an employee can enter and perform assigned work;
2. Has limited or restricted means for entry or exit; and,
3. Is not designed for continuous employee occupancy.

Excavations/trenches of 4-feet or more in depth are considered confined spaces. Employees may not enter excavations/trenches of 4 or more feet in depth unless ladders or steps are provided and located within 25-feet of the person entering the excavation/trench.

A permit-required confined space has one or more of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere. Oxygen deficient, toxic, or flammable atmospheres can occur in trenches, displacing the normal air. Some of the most common gases of concern are carbon monoxide, methane, and hydrogen sulfide. These gases should be suspected whenever trenches are near combustion engines, sewage lines, landfills, swamps, leaking underground storage tanks, or when decomposing organic matter is nearby. Hydrogen sulfide is heavier than air and may fill the excavation/trench starting from the bottom.

If a hazardous atmosphere could reasonably be expected to exist, the atmosphere must be tested before employees can enter excavations/trenches greater than 4 feet in depth.

2. Contains a material that has the potential for engulfing an entrant. Collapsing soil has the ability to engulf and bury an occupant. Excavations/trenches greater than or equal to 5-feet in depth require a protective system to prevent sidewall collapse. Excessive rain water, groundwater, or liquid from leaking or damaged pipes also may create conditions for engulfing persons in the excavation/trench.
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. Trenches without adequate sloping, or other protection from collapse, create potential for entrants to be engulfed in a cave-in of the surrounding earth.
4. Contains any other recognized serious safety or health hazard.

**County employees are prohibited from entering permit-required confined spaces.**

Adequate ventilation can be used to eliminate the permit requirement for spaces that are considered permit-required because of hazardous or oxygen deficient atmosphere. It is up to the CP to ensure that an excavation/trench is free from any of the above-listed hazards, before anyone enters the excavation/trench.

## SOIL CLASSIFICATION AND IDENTIFICATION

The CP shall classify soil types in accordance with 29 CFR 1926 Subpart P Appendix A. This classification system consists of four (4) categories: Stable Rock, Type A, Type B, and Type C. Stability is greatest in Stable Rock and decreases through Type A and B to Type C, which is the least stable. Field tests used to determine soil classification are also described in Appendix A of the Standard.

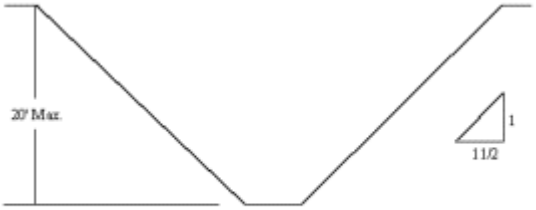
## EXCAVATION/TRENCH PROTECTION SYSTEMS

The three (3) basic protective systems for excavations/trenches are: sloping and benching systems, shoring, and shields (trench boxes). The protective system selected by the CP for the specific excavation/trench must have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied to or transmitted to the system, so that every employee in an excavation/trench will be protected from cave-ins.

**Sloping and Benching Systems**

Sloping and benching systems for excavations/trenches 5 to 20 feet in depth must be constructed under the instruction of a designated CP. Sloping and benching systems for excavations/trenches greater than 20 feet must be designed and stamped by a registered Professional Engineer.
The CP can assume the least stable soil type (Type C) and slope to the angle appropriate for Type C soils, or can determine the soil type specific to the excavation/trench and determine the maximum allowable angle for that soil type in accordance with appendix B of 29 CFR 1926 Subpart P.

Diagram depicting appropriate sloping for excavations in Type C soil.




**Shoring Systems**

Shoring is another protective system or support system. Shoring utilizes a framework of vertical members (uprights), horizontal members (wales), and cross braces to support the sides of the excavation/trench to prevent a cave-in. Metal hydraulic, mechanical or timber shoring's are common examples. Examples of timber and aluminum hydraulic shoring for trenches, and alternatives to timber shoring are provided in Appendixes C, D and E of 29 CFR 1926 Subpart P, respectively.

**Shield Systems (Trench Boxes)**

Shielding is the third method of providing a safe workplace. Unlike sloping and shoring, shielding does not prevent a cave-in. Shields are designed to withstand the soil forces caused by a cave-in and protect the employees inside the structure. Most shields consist of 2 flat, parallel metal walls that are held apart by metal cross braces.
Shields must be certified in design by a registered Professional Engineer and must have either a registration plate on the shield or registration papers from the manufacturer on file at the jobsite office. **Any repairs or modifications MUST be approved by the manufacturer!**

Safety precautions for shield systems include:

1. Shields must not have any lateral movement when installed.
2. Employees must be protected from cave-ins when entering and exiting the shield (examples – ladders shall be placed within the shield or a properly sloped ramp at the end).

3. Employees are not allowed in the shield during installation, removal, or during any vertical movement of the shield.

4. Shields can be 2 ft. above the bottom of an excavation/trench if they are designed to resist loads at the full depth and if there are no indications of caving under or behind the shield.

5. The shield must extend at least 18 inches above the point where proper sloping begins (the height of the shield must be greater than the depth of the excavation/trench).

6. The open end of the shield must be protected from the exposed excavation/trench wall. The wall must be sloped, shored, or shielded. Engineer designed end plates can be mounted on the ends of the shield to prevent cave-ins.

**HAZARDOUS ATMOSPHERES**

To prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

1. Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations/trenches in landfill areas or in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations/trenches greater than 4 feet in depth.

2. Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation.

3. Adequate precaution shall be taken such as providing ventilation to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 10 percent of the lower flammable limit of the gas.

4. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

5. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

**WATER ACCUMULATION**

Employees shall not work in excavations/trenches in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could 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 must be monitored by a CP to ensure proper operation.
Excavations/trenches subject to runoff from heavy rains will require an inspection by a CP before individuals are allowed to re-enter the excavation/trench.

## PERSONAL PROTECTIVE EQUIPMENT

It is County policy to wear a hard hat, safety glasses, and work boots on construction jobsites. Because of the potential hazards involved with excavations/trenches, other personal protective equipment may be necessary (examples - goggles, gloves, safety harness and lifeline, etc.). Employees working at the jobsite that could be exposed to vehicular or equipment traffic are required to wear warning vests or other suitable garments marked with or made of reflective or high-visibility material.

## INSPECTIONS

Daily inspection of excavations/trenches, the adjacent areas, and protective systems shall be made by the CP for evidence of a situation that could result in a cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An excavation checklist is included as **Appendix A**. All inspections shall be conducted by the CP prior to the start of work and as needed throughout the shift. Inspections will be made after every rainstorm or any other event that potentially increases the hazard. All inspections will be documented and will be maintained at the project site. Upon completion, the documentation will be filed and maintained by the Department

Where the CP finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

## ADDITIONAL SAFE WORK PRACTICES

1. Spoil piles shall be stored a minimum of 2 feet from the sides of the excavation/trench. The spoil pile must not block the safe means of egress.

2. Heavy equipment must be kept away from unshielded excavation/trench edges.

3. Employees are prohibited from working under suspended loads.

4. Employees should not jump or step across excavations/trenches, but should walk around the end of the excavation/trench.

**Note:**
**Policy shall be reviewed annually by Highway Department. Revisions must be in Resolution form, go through the Government Operations Committee and approved by the Legislature.**

| DAILY INSPECTION OF TRENCHES & EXCAVATIONS | | | |
|---|---|---|---|
| Site Location: | | | |
| Project: | Date: | Weather: | Soil Type: |
| Trench Depth: | Length: | Width: | Type of Protective System: |
| Project Supervisor: | | | |

| | |
|---|---|
| Assigned *Competent Person*: | |
| Crew Members: | |
| | |
| | |
| Excavation equipment type(s): | |
| Equipment Operator(s): | |
| Yes No N/A | *Excavation* |
| □ □ □ | Excavations and Protective Systems inspected by *Competent Person* daily, before start of work. |
| □ □ □ | *Competent Person* has authority to remove workers from excavation immediately. |
| □ □ □ | Surface encumbrances supported or removed. |
| □ □ □ | Employees protected from loose rock or soil. |
| □ □ □ | Hard hats worn by all employees. |
| □ □ □ | Spoils, materials, and equipment set back a minimum of 2' from edge of excavation. |
| □ □ □ | Barriers provided at all remote excavations, wells, pits, shafts, etc. |
| □ □ □ | Ingress/egress within excavation provided at 25' intervals. |
| □ □ □ | Walkways and bridges over excavations 6' or more in depth equipped with guardrails. |
| □ □ □ | Warning vests, or other highly visible PPE provided and worn by all employees exposed to vehicular traffic. |
| □ □ □ | Employees prohibited from working or walking under suspended loads. |
| □ □ □ | Employees prohibited from working on faces of sloped or benched excavations above other employees. |
| □ □ □ | Warning system established and used when mobile equipment is operating near edge of excavation. |
| Yes No N/A | *Utilities* |
| □ □ □ | Utility companies contacted and/or utilities located. |
| □ □ □ | Exact location of utilities marked when near excavation. |
| □ □ □ | Underground installations protected, supported, or removed when excavation is open. |
| Yes No N/A | *Wet Conditions* |
| □ □ □ | Precautions taken to protect employees from accumulation of water. |
| □ □ □ | Water removal equipment monitored by *Competent Person*. |
| □ □ □ | Surface water controlled or diverted. |
| □ □ □ | Inspection made after each rainstorm. |
| Yes No N/A | *Hazardous Atmosphere* |
| □ □ □ | Atmosphere tested when there is a possibility of oxygen deficiency or build-up of hazardous gases. |
| □ □ □ | Oxygen content is between 19.5% and 21%. |
| □ □ □ | Ventilation provided to prevent flammable gas build-up to 20% of lower explosive limit of the gas. |
| □ □ □ | Testing conducted to ensure that atmosphere remains safe. |
| □ □ □ | Emergency Response Equipment readily available where a hazardous atmosphere could or does exist. |

| | |
|---|---|
| □ □ □ | Employees trained in the use of Personal Protective and Emergency Response Equipment. |
| □ □ □ | Safety harness and life line individually attended when employees enter deep confined excavation. |
| Comments: | |
| | |
| Signature of *Competent Person*: Date: | |