Occupational Health and Safety Programs

TRENCHING AND EXCAVATION PROGRAM

September 2022

Table of Contents

1.0 PURPOSE

The purpose of the Trenching and Excavation Program is to specify requirements that will protect St. Francis Xavier University (StFX) workers required to enter trenches and excavations, and to ensure the safety of StFX-contractors who perform trenching and excavation activities on university property.

2.0 SCOPE

This program applies to all StFX work sites, including contractor operations. All legislative jurisdictional, StFX and contractor requirements will be reviewed, and the more stringent requirements will be applied.

3.0 RESPONSIBILITY

3.1 Mangers

- Verify implementation and enforcement of this program.
- Verify that equipment related to trenching and excavation specified in this program is available and utilized.
- Verify all required trenching and excavation procedures are developed and implemented.

3.2 Supervisors (includes Project Managers)

- Evaluate maintenance and project activity to determine if any trenches and excavations are required on university property.
- Verify that when excavations and trenches are required, StFX employees are informed of the location of, and the danger posed by excavations and trenches.
- Know and understand how to implement this procedure.
- Verify trenching and excavation procedures exist to address trenching and excavation hazards.
- Implement the excavation and trenching procedures when workers are required to enter any excavations and trenches as required by the Nova Scotia trenching and excavation regulations.
- Ensure contractors complete a trenching and excavation hazard assessment to determine actual and potential hazards and required corrective actions.
- Verify contractors complete permit before authorization.
- Verify that contractor trenching and excavation supervisors and workers are properly trained.
- Verify that all university workers are qualified and properly trained in all aspects of the program.
- Prior to entry into trenches or excavations verify that all appropriate safeguards are in place and provide written notice to the FM Manager and OH&S Officer.
- Monitor trenching and excavation operations for compliance.

- Provide assistance as requested to implement all elements of this procedure.
- Ensure contractors conduct initial atmospheric testing for any potential hazardous atmosphere.
- Advise contractors who need to complete a provided hazard assessment and excavation permit.
- Verify emergency procedures are available.
- Remove unauthorized or untrained workers.
- Verify procedures remain consistent, effective, and are followed.
- Ensure permit is reviewed and signed off by the OHS Advisor. and
- Sign off on the permit prior to breaking ground on all trenches or excavations.

3.3 Workers

- Be familiar with the trenching and excavation procedure and strictly adhere to all procedures to provide for workers' safety.
- Sign off on the hazard assessment and permit prior to starting work.
- Participate in all training and emergency preparation required for safe entry of trenches or excavations. and
- Follow the direction provided by the Supervisor assigned to monitor the trenches or excavations.

4.0 DEFINITIONS

4.1 Competent Person

Means a person who is:

1. Qualified because of that person's knowledge, training and experience to do the assigned work in a manner that will ensure the health and safety of every person in the workplace. and
2. Knowledgeable about the provisions of the Nova Scotia Occupational Health and Safety Act and regulations that apply to the assigned work, and about potential or actual danger to health or safety associated with the assigned work.

4.2 Designated Competent Person

A Designated Competent Person means a competent person designated in writing, by the employer. The designation must be in writing and must be clear on a person-by-person basis who is covered and who is not.

4.3 Hazardous Trench

A hazardous trench means a trench at least 1.2 meters in depth in which the trench depth exceeds the trench width.

4.4 Hazardous Atmosphere

A hazardous atmosphere is an atmosphere prohibiting entry that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury or acute illness from one or more of the following:

- Flammable gas, vapor, or mist in excess of 10% of its lower flammability limit (LFL).
- Airborne combustible dust at a concentration that meets or exceeds its LFL.
- Atmospheric oxygen concentrations below 19.5% or above 22.5%.
- Atmospheric concentrations of any substance for which a dose or occupational exposure limit published in applicable standards or regulations.
- Any other atmospheric condition that is immediately dangerous to life or health.

4.5 Hazardous Excavation

A hazardous excavation means an excavation at least 1.2 meters in depth in which the excavation width exceeds the excavation depth and where workers must approach the wall of the excavation a horizontal distance that is equal to or less than the height of the walls.

4.6 Trench Cage

A metal shield, box, cage lowered into the trench or excavation that will protect workers from trench collapses and cave-ins while they remain inside the cage. It is not designed to support the trench walls unless back filled between the cage and the trench wall.

5.0 PROCEDURE

5.1 General

This procedure must be followed during all open trench or excavation work activity. Strict adherence with this procedure is necessary. Failure to follow this procedure will be considered a serious violation of StFX Occupational Health and Safety Policy and will result in disciplinary action. Contractors shall meet or exceed this procedure based on legislative jurisdictional requirements.

Before mobilization, all trenches and excavations identified by management as hazardous must be adequately assessed.

A sketch of all trenches and excavations shall be developed as part of the hazard assessment and permitting process. (NEW November 2018)

Stakes shall be placed around the perimeter of trenches and excavations, which indicate the required area to allow room for sloping or other safety measures. (NEW November 2018)

No person, under any circumstances, may enter any trench or excavation containing a hazardous atmosphere.

All procedures will be reviewed with all involved workers prior to the entry. Any deviations from this procedure will require the approval of the StFX Supervisor.

Trench walls must be sloped at an angle of 45 degrees after 1.2m in depth before a person enters the trench, unless a Professional Engineer certifies in writing that a trench sloped at an angle of greater than 45 degrees is not a hazard to workers in the trench.

Shoring or bracing systems in use must comply with a design certified by a Professional Engineer or be commercially manufactured and installed, and used in such a way that workers are not exposed to a hazard.

Shoring and bracing systems must be installed, erected, maintained and dismantled according to the manufacturer's specifications or an engineer's specifications.

Where possible, open trenches should be back filled before end of day and adequately graded to remove surface trip hazards.

Open excavations with walls exceeding 1.2 m in height must be sloped at 1-1 if work activity requires that a worker approach the wall of the excavation within a horizontal distance that is equal to the overall height of the wall of the excavation.

An inspected CSA grade 2 or 1 portable ladder must be located no more than 6 m from all workers in open trenches and excavations.

All trench cages in use must have a safe means of access and egress that ensures workers do not leave the protected area while transiting.

All trench cages in use must be certified by an Engineer and inspected by a Designated Competent Person before use.

All trench cages must have a name plate attached in a location visible when the cage is in use, the name plate must identify the Engineer who certified the cage and the depth at which the cage may be used

Trench cages must be as close to the bottom of the trench as possible, never more than 0.5m above the bottom unless designed to be used higher off the bottom of the trench.

Where the top of the trench cage is below the surface, the trench wall must be sloped at 45 degrees starting 0.5 m below the top edge of the cage

All trenches and excavations must be inspected prior to entry and on a regular basis by designated Supervisors for surface or face cracking, loose rock or soil, surface subsidence,

water entry, thawing, proper placement of support systems, ladders, trench cage placement, damage, defects, missing parts and name plate.

Fences, barricades or covers must be installed at or near the sides of all trenches or excavations to prevent people from falling into the openings.

Rigging and rigging hardware used must be properly inspected and shall have clearly legible working load limits and must never be substituted with load binding chain or soft line.

All mobile equipment must have an operating back up alarm that operates automatically when the equipment is in reverse gear, and that is clearly heard above the background noise at the workplace.

All rubber tired mobile equipment must have the park brake engaged and wheel chocks installed, as required, when parked and left unattended.

Operators of mobile equipment must wear seat belts at all times when equipment is in motion.

5.1.1 Excavation Hazard Assessment and Permit

An Excavation Hazard Assessment and Permit shall be completed prior to any workers entering hazardous trenches and excavations.

This Excavation Hazard Assessment and Permit shall be available at the work location and shall be authorized by StFX Supervisor.

The Supervisor is responsible for the safety of workers involved and shall evaluate, plan and implement the procedures necessary to safeguard workers assigned to the job.

5.2 Control Measures

The following control measure shall be considered when trenching or excavating:

- Hazard assessment of the area.
- Utility locates by authorized personnel.
- Temporary workplace signing and traffic control.
- Contractor training in safe trenching and excavation principles.
- Designate Competent Trench Cage Inspector.
- Designated Competent Signalers for mobile equipment and riggers.
- Specific emergency plan, complete with required rescue procedure.
- Completed Excavation Hazard Assessment and Permit.
- **All Supervisors and workers trained in safe trenching and excavation principles.**
- Ground rules for workers on foot near operating mobile equipment.
- Communication procedure.

- First aider must be present.
- Appropriate PPE made available.
- Authorization from the Supervisor.

5.3 Coordination of Work

When workers of more than one employer perform work in the same hazardous trench or excavation, the Supervisor controlling the site activities must coordinate operations. The Supervisor controlling the site must prepare a Pre-Job Toolbox Meeting to verify that the various employers perform their duties in a way that protects the health and safety of all workers in or near the trench or excavation.

The Supervisor must conduct the prepared Pre-Job Toolbox Meeting with all employees who perform work in or near the hazardous trench or excavation. Each employer is responsible for the health and safety of their own workers and for verifying compliance with Nova Scotia legislative requirements.

5.4 Fall Protection

Anyone who is at risk of falling into a trench or excavation 3 m or deeper must have appropriate fall protection. All workers must have completed fall protection training.

5.5 Energy Isolation

Before entering any trench or excavation, workers will take sufficient steps to verify that steam pressure piping or potentially hazardous products do not enter the trench while workers are present. This is accomplished by validating that the trench or excavation is completely isolated from all steam or pressurized piping systems by physical disconnection, or by disconnecting, blinding, or capping any linkage, valves, water/stream lines, chaining controls or systems which enter, feed or impact the trench or excavation.

5.6 Initial Atmosphere Testing

Prior to entry, all trenches and excavations will be initially tested for carbon monoxide, flammable vapors and oxygen deficiency, plus toxic vapor or gases (based on the potential for toxics being present).

The supervisor shall know how to operate the atmospheric monitor and will verify that the atmospheric monitor is properly calibrated.

A CGI (Calibrated Gas Instrument) will be span/bump checked prior to use and as per manufacturers' specifications to maintain proper operation and will be calibrated on a yearly basis as per manufacturers' specifications. CGIs will not be used for certifying an area "safe for entry" unless these requirements have been met.

If the initial atmospheric testing indicates that atmosphere is hazardous as defined in 4.4 the trench or excavation shall be considered a confined space and measures required by the confined space program must be followed

5.7 Standby Person

At least one (1) Standby Person must be readily available on site the entire time that trench or excavation operations are being conducted.

The Standby Person's primary responsibility is to maintain contact with personnel in the trench or excavation and to ensure the initiation of emergency response plan when required.

The Standby Person's cannot leave for any reason unless relieved by another trained standby person or the trench or excavation is evacuated.

Communication needs to be established for the Standby Person so immediate assistance can be summoned without the standby person's having to leave the area.

5.8 Emergency Response Plan

1. Sound the emergency alarm.
2. Evacuate the trench, do a head count.
3. Call Security who will contact 911.
4. Leave all the workers tools in the trench to assist in locating them.
5. Determine victim's location, mark with paint on soil or turf.
6. Shut off all heavy equipment.
7. Stop all traffic and shut off any sources of vibration (i.e., generators, trucks idling, etc.).
8. Start pumps if trench is taking water.
9. Get everyone back away from the trench wall.
10. Do not allow anyone to enter the trench.
11. If workers must approach the trench lay a sheet of plywood to distribute weight and approach from the short wall or end of the trench.
12. If worker is not buried or trapped but unconscious, ensure atmospheric testing takes place before rescue personnel are allowed in the trench.
13. Do not attempt to use heavy equipment to uncover a buried victim.
14. Ensure trench is adequately shored up before entering to uncover a victim.
15. Do not use sharp tools to uncover the victim.
16. Document the trench depth, type / amount of material covering the victim, approx. location of the victim, so that rescue personnel can adequately assess the situation.
17. Have had contacted local fire hall to determine what trench rescue capability they have.
18. Have had located known vacuum trucks in the area to assist with uncovering victim.

5.9 Hazard Assessment for Trenching and Excavation

The Excavation Hazard Assessment and Permit will include the following items:

- Hazardous atmospheres
- Buried utility locations
- Surface encumbrances
- Egress and entry ladders
- Isolation/lockout and tagout requirements
- Buried electrical hazards
- Crushing hazards
- Communications
- Spoil pile placement
- Vibration
- Surcharge on trench wall
- Dewatering equipment
- Trench wall sloping requirements
- Trench cage use
- Shoring systems
- Material handling
- Rigging
- Back-up alarms
- Trench barricades and cover plates
- Emergency Response Plan
- First Aid equipment and personnel

5.10 Training Requirements

All workers involved in trenching and excavation must be thoroughly trained in this procedure at least every two (2) years. Special emphasis must be placed on verifying contractor's competency so that workers can perform operations safely.

5.11 Supervisors

Supervisors shall know:

- Prior to breaking ground:
    - Identification and control of hazards.
    - Locations of all buried utilities near excavation.
    - Contractor's Safe Work Procedures.
    - Contractor's Safe Work Practices.
    - Contractor's mobile equipment condition.
- How to determine that operations remain consistent with Nova Scotia legislation.
- How to identify potentially unstable trench walls.
- How to determine that acceptable conditions are present.

5.12 Workers

Workers shall know:

- Hazards of trenching and excavating;
- Hazard controls;
- How to select, fit, use, and care for PPE;
- Communication procedures to signal the standby person if, a worker is injured, trench wall is unstable or unsafe atmosphere is detected;
- How to recognize hazards associated with heavy equipment and trucks;
- How to detect dangerous conditions such as cracking or loose rock on trench wall, exposed utilities; and
- How to properly enter work and exit a trench or excavation while staying in the protected areas.

5.13 Standby Person

Standby person should:

- Remain stationed outside trench or excavation.
- Maintain accurate count and location of workers in trench or excavation.
- Know potential hazards associated with trenches and excavations.
- Know the hazard controls.
- Monitor activities in trench or excavation without physically entering the trench or excavation.
- Monitor activities outside, which may negatively impact workers in the trench or excavation.
- Maintain effective and continuous contact.
- Summon rescue and other emergency services.
- Perform any assigned rescue and emergency duties without entering trench or excavation.
- Be trained to properly use gas testing equipment with sampling tubes.
- Be trained to perform assigned rescue functions at least annually.

6.0 SUPPLEMENTARY DOCUMENTS

- Excavation Hazard Assessment and Permit

REVISION SUMMARY		
DATE	**REVISION**	**SUMMARY**
21 Nov 17	0	New program
12 Nov 18	1	Added sketch and stakes requirement on page 3 and safety advisor sign-off on permit.
15 Apr 19	2	Formatting changes only.
16 Mar 20	3	Changed logo, add OH&S Officer to 10th bullet point under Supervisor's responsibility.
30 Sept 2022	4	Reformatted to new OHS programs format.