

M&M EXCAVATING **SAFETY PROGRAM**

SAFETY & QUALITY
PRIDE & INTEGRITY
FAMILY & COMMUNITY

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Introduction

It is the policy of M&M Excavating Company to provide a safe workplace for its employees. To this end, the company, in concert with employees, will seek to comply with all applicable standards promulgated pursuant to the Michigan Occupational Safety and Health Act. Since the most important component of any safety policy or program is implementation, it is our intent to communicate the contents of this program to our employees. In turn, all employees are expected to comply with this document and will be disciplined if found to be in non-compliance. Any questions regarding this document should be addressed to:

Safety Manager: Mathew Southwick

Management Commitment To Safety

M&M Excavating is dedicated to ensuring the safety and well-being of all employees and individuals on our work sites. We prioritize worker safety above all else, recognizing that no job is more important than the health and safety of our team. Our commitment to safety is unwavering.

We strive to plan and execute work in a manner that minimizes accidents and near misses. We adhere to all rules and regulations outlined in the Michigan Occupational Safety and Health Act (MIOSHA), with strict enforcement by our management team. Employee involvement is key. Team members are encouraged to help create and implement safety policies and procedures. Employees may address and report unsafe conditions or potential hazards to management without fear of reprisal.

How we put that into practice

- Designate a qualified safety officer to coordinate the program.
- Pre-plan for safety and health (JSA, pre-task analysis).
- Provide ongoing safety and health training (classroom and toolbox talks).
- Engage employees in problem solving and hazard reporting.
- Follow safety rules and procedures.
- Conduct regular job-site inspections and monitoring.
- Enforce safety and health rules and use appropriate discipline.

Organization & Management Responsibility

- Safety is prioritized for every task, every day.
- Mitigate hazards by providing adequate staffing, funding, time, and equipment so personnel can work safely and efficiently.
- Implement and monitor compliance with the company's safety goals.

M&M Excavating Company Safety Standards

It is the policy of this company to keep employees informed of all safety rules contained in the Construction Safety Standards and the Occupational Health Standards.

Any employee may obtain a copy of those standards by contacting the company Safety Manager.

Safety Manager Responsibilities

Mathew Southwick is the designated Company Safety Manager and is responsible for coordinating, implementing, and administering this program.

General responsibilities include:

- **Employee training.** Coordinate safety and health training and keep employees informed of MIOSHA Construction Safety Standards and Occupational Health Standards that apply to the work. Provide copies of standards on request.
- **Safety and health procedures.** Understand potential job hazards and how to eliminate them by establishing procedures.
- **Employee engagement.** Encourage participation on job-sites — procedure ideas, training topics, work-area inspections, and reporting of concerns and near misses to the Superintendent.
- **Job-site inspections.** Conduct periodic inspections to confirm Superintendent responsibilities are being implemented.
- **Documentation.** Document classroom training, toolbox talks, pre-task analysis, job-site inspections (see Superintendent Safety Checklist), and other proactive safety records. Keep copies at the main office.
- **Postings.** Keep a safety bulletin with required postings at the main office and on every job-site that has a company trailer.
- **Incident investigations.** Participate in investigations that involve serious bodily harm or high financial impact (injuries, illnesses, property damage). Confirm each investigation is documented on the Incident Investigation Report and that corrective actions are complete before work continues.
- **Record-keeping.** Ensure fatality and injury recording requirements are being implemented.

M&M Excavating Company Responsibilities of Superintendent / Qualified Employee

The Superintendent or other designated qualified person is responsible for overall safety on the job-site.

Duties include:

1. Provide periodic safety instruction (weekly toolbox talks, daily huddles) covering operating procedures, hazards and safeguards of tools and equipment, and how to recognize and avoid hazards.
2. Inspect the site, tools, and equipment so unsafe conditions are eliminated. Use the Superintendent Safety Checklist. Make sure required protective equipment is on hand and used.
3. Instruct all employees in safe procedures and job safety requirements, then follow up and insist on compliance.
4. Where harmful plants, reptiles, animals, or insects are present, instruct employees on the hazard, how to avoid injury, and first aid.
5. Instruct employees who handle poisons, toxic materials, caustics, or other harmful substances on hazards, safe handling, hygiene, protective measures, and first aid.
6. Ensure employees know the incident and emergency steps for that job-site (see Incident Response / Investigation).
7. See that injuries are cared for properly and reported promptly.
8. Investigate job-site incidents that result in a recordable injury or illness or high financial impact. Investigate serious near misses. Inform the Safety Manager immediately and provide a copy of the Inform & Claimant Incident Investigation Report.
9. Complete corrective actions before work continues, or remove employees from the hazard.
10. Apply the company disciplinary policy when employees do not follow this program. Have each employee complete a sign-off sheet.
11. Do not knowingly allow an employee to work under the influence of alcohol or substances that would impair safe performance.
12. Know the safety rules and implement this program on the job.

13. Keep a copy of this Safety and Health Program on the job-site and maintain a bulletin board with required posters in job-site trailers

M&M Excavating Superintendent Safety Checklist

Superintendent	Job number	Location
Date inspected	Inspector	Page ____ of ____

Check Y or N. Leave blank only if the item does not apply to this job.

Section	Y	N	Item
Emergency & first aid	☐	☐	Emergency phone numbers posted
	☐	☐	First aid / CPR certified employee on each jobsite
	☐	☐	First-aid kits available
	☐	☐	CPR mask available
	☐	☐	Rubber gloves available
	☐	☐	HazMat disposal bag available
	☐	☐	Drinking water with cups available
	☐	☐	Toilet facilities provided or available
PPE in use	☐	☐	Hard hats
	☐	☐	Eye protection
	☐	☐	Ear protection
	☐	☐	Hand protection
	☐	☐	Foot protection
	☐	☐	Clothing protection
Fuel storage	☐	☐	Fuel storage area marked NO SMOKING
	☐	☐	Appropriate extinguisher available in the area
	☐	☐	Fuel cans are safety-type for transport only
Traffic & pedestrians	☐	☐	Construction signs in use
	☐	☐	Proper barricades
	☐	☐	Traffic cones
	☐	☐	Flag persons with six-foot staff, red flags, and orange vest
	☐	☐	Flag persons properly instructed
	☐	☐	Flag persons used to assist trucks and vehicles in and out of traffic

Tools	☐	☐	Air-tool connections secured with whip checks
	☐	☐	Portable electric tools have approved double insulation and GFCI
	☐	☐	Extension cords are three-wire and in good condition
	☐	☐	Portable lights equipped with bulb guards
	☐	☐	Protective guards on portable saws in good order
	☐	☐	Ladders in good condition
	☐	☐	Hand tools in good condition — no cracked or splintered handles
Trucks & equipment	☐	☐	Parking brakes set when not in use
	☐	☐	Type ABC fire extinguishers available in trucks
	☐	☐	Horns and lights in good working order
	☐	☐	Seats firmly secured on vehicles used to transport employees
	☐	☐	Most recent equipment inspection checklist on site or in the Clue app
	☐	☐	Rollover protection and seat belts in good order
	☐	☐	Equipment safety chains in good order and in use
	☐	☐	Registration cards in all trucks
	☐	☐	Equipment and vehicles properly lubricated and maintained
	☐	☐	All drivers have valid licenses
	☐	☐	Backup alarms in good working order
	☐	☐	Windshield free of cracks; wipers and defoggers operable
Excavation & trenching	☐	☐	Qualified person inspects soil conditions and shoring systems
	☐	☐	Underground installations located by inspection and MISS DIG
	☐	☐	Excavated material stored at least 2 feet from the edge
	☐	☐	Shoring materials in good condition; trench box inspected for broken welds
	☐	☐	Walls over 5 feet deep are shored, sloped, or otherwise protected
	☐	☐	Ingress/egress every 25 feet in trenches over 4 feet deep
	☐	☐	Warning signs on cranes/excavators; 10-foot clearance from electrical lines
Confined spaces	☐	☐	Confined space tested for gas before entry
	☐	☐	Confined space ventilated with blowers before entry
	☐	☐	No smoking or open flame within 25 feet
	☐	☐	Upstream utilities tagged and locked out
Materials handling	☐	☐	Rigging inspected at the beginning of each shift
	☐	☐	Alloy steel chains tagged with size, grade, capacity, and manufacturer

	☐	☐	Material secured against sliding, falling, or collapse
	☐	☐	Hooks inspected for stretching or twisting
	☐	☐	Slings in good condition and built properly
Site administration	☐	☐	MIOSHA safety poster displayed
	☐	☐	Accident report completed promptly and phoned into the office
	☐	☐	Safety manual on the jobsite
	☐	☐	New employees given a brief orientation to company policies
	☐	☐	One 20-minute JSA with the crew each week
	☐	☐	One 10-minute safety meeting each day; topic and attendance turned in
	☐	☐	SDS booklet and poster on site

Remarks

Superintendent signature _____ Date _____

Accident Prevention Program

1. It is the policy of M&M Excavating Company to furnish each employee employment free from recognized hazards that are causing or are likely to cause death or serious physical harm.
2. M&M Excavating Company designates Mathew Southwick as corporate Safety Manager. This person is responsible for implementation of the company safety program. Any employee who needs to know who the Safety Manager is may ask any superintendent.
3. When practical, employees will participate in safety seminars sponsored by MITA, Inc. and/or other organizations.
4. The Safety Manager shall designate a qualified employee on each crew or project with the responsibilities listed below.
5. M&M Excavating Company shall not knowingly permit an employee to work under the influence of intoxicating beverages or substances that would impair safe performance. No employee shall possess or use intoxicating beverages or controlled substances at any company facility. Violation is subject to immediate dismissal.
6. The job superintendent will inspect machines, tools, and equipment on a regular basis so no defect is present that will affect employee safety.
7. All employee complaints or concerns regarding safety shall be brought immediately to the Safety Manager.
8. Periodic meetings will be held to inform employees of the company safety program.
9. This safety program shall be made available to all employees.
10. A safety bulletin board will be located at the main office and at each job trailer. The board will include the required safety postings. An EEO Manual is available for review in the main office.

Qualified employee on each crew

- a. Instruct each employee on operating procedures, hazards, and safeguards of tools and equipment needed for the job.
- b. Inspect the site, tools, and equipment so unsafe conditions are eliminated.
- c. Instruct each employee in the recognition and avoidance of hazards.
- d. Where harmful plants, reptiles, animals, or insects are present, instruct employees on the hazard, avoidance, and first aid.
- e. Instruct employees who handle poisons, toxic materials, caustics, or other harmful substances on hazards, safe handling, hygiene, protective measures, and first aid.
- f. Instruct employees required to enter a confined space on the hazards, precautions, PPE, and emergency procedures.
- g. Instruct all employees in the steps to take in case of an injury or accident.

Employee safety rules

- a. Follow the guidelines in this Safety Program.
- b. Perform work in a manner that prioritizes safety.
- c. Take ownership of personal safety and the safety of colleagues.
- d. Promptly report accidents, injuries, near misses, safety successes, or hazardous conditions.
- e. Engage in accident inquiries as required.
- f. Attend and contribute to weekly safety talks and stand-down meetings.

General Rules

Safety and accident prevention are vital. It is M&M Excavating's intent to prevent personal injury to our employees. It is our goal that:

- a. Safety hazards be eliminated.
- b. Unsafe acts or conditions be detected, reported, and corrected.
- c. Safety consciousness be instilled in all employees.

The list below is a starting point. No set of rules can ever ensure safe operations by itself. That only happens when people follow the procedures.

- Unsafe conditions and acts. Report any unsafe condition, malfunction of a safety device, or safety hazard immediately to management.
- Good housekeeping. Keep work areas clean, orderly, and free of objects that may cause accidents or injuries.
- Lifting. Lift with the legs. Ask for assistance rather than force a load and cause an injury.

Violation of any company safety rule may result in disciplinary action, up to and including termination. The following rules must be obeyed by all employees.

Safe practices

1. Do not engage in horseplay or other unsafe behavior that would endanger you or a coworker.
2. Watch where you are walking. Don't run. Keep your mind on your work.
3. Lift the right way — with your legs, not your back. Get help if a load is too heavy.

Reporting responsibilities

1. If you see an unsafe condition, correct it immediately when it is safe to do so, and inform your superintendent. Do not hesitate to bring safety concerns forward.
2. Report all injuries — yours or a coworker's — immediately to your superintendent, no matter how small they seem.
3. Illegal drugs or alcohol, or being under the influence during working hours, will be cause for termination. Tell your superintendent if you are taking prescription drugs that warn against driving or using machinery.
4. Know the emergency procedures at your job-site: emergency phone, job-site address, first-aid kit, fire extinguishers, and evacuation plan. Ask your superintendent if you are unsure.

Housekeeping

1. Maintain the floors of your work area. Pick up debris and sweep daily.
2. Remove or secure material in open areas that could be picked up and blown away by the wind.

Hazardous Atmospheres

Never enter a manhole, well, shaft, sewer, excavation, tunnel, or other confined space that could have a hazardous atmosphere from lack of oxygen, toxic or flammable gases, or possible engulfment by solids or liquids. If you come across these types of spaces, inform your superintendent and wait for further direction. See the Confined Space Program section for additional information.

Personal Protective Equipment Policy

It is the policy of M&M Excavating Company that all employees comply with Michigan Occupational Safety and Health Act standards for personal protective equipment. Violation of this policy is subject to discipline as outlined in this section.

1. If instructed to wear personal protective equipment — wear it.
2. Wear a hard hat that meets MIOSHA standards whenever there is a potential of being struck by an object or having an object fall on you (for example: excavations, mobile equipment, directing traffic, aerial lifts, tunneling). Hard hats are recommended whenever you are outside a cabbed vehicle. If a project mandates a 100% hard-hat or PPE policy, all employees must comply. There are no exceptions to a project-mandated rule.
3. Wear required hand protection when exposed to hazards such as radiation, alkalies, acids, adhesives, and temperature extremes other than weather. The company will supply appropriate hand protection other than ordinary work gloves.
4. Wear appropriate eye protection (goggles, safety glasses, or welding shields) when cutting, grinding, welding, chipping, jackhammering, applying chemicals, flagging, or doing similar work.
5. Wear hearing protection (earplugs or noise-cancelling earmuffs) when working around loud noise.
6. Always wear a safety vest, hard hat, and boots when directing traffic.
7. Wear proper clothing on job-sites. Minimum is work boots, shirt, and long pants. Some operations also require safety-toe boots, gloves, reflective vests, or rubber boots. Use sunblock to prevent sunburn.
8. Report defective personal protective equipment immediately to the Safety Manager or a qualified person.

Field Dress Code

Attire, grooming, and safety standards affect morale and the professional image M&M Excavating presents to the community. In accordance with MIOSHA requirements and this Safety Manual, employees are expected to dress for safe work.

General work attire for field staff:

1. T-shirts with a minimum of 4-inch sleeves are allowed. Tank tops are not acceptable.
2. Wear work pants such as jeans, Carhartt, or Dickies. No sweatpants, jogging pants, or shorts.
3. Clothing must be free of holes and major wear or damage. Loose clothing is not permitted.
4. Loose jewelry is not permitted, except single-band rings and small earring studs. No necklaces or dangling earrings.
5. Work boots are required. Safety-toe boots with ankle support are recommended.
6. No tennis shoes.
7. Anytime you are on a job-site, in the work zone, and outside a vehicle, wear a safety vest. If overhead danger exists, wear a hard hat. If flying debris or particles are a hazard, wear safety glasses. If hearing danger exists, wear hearing protection.
8. Wear an appropriate respirator when exposed to excessive dust or other air contaminants (for example: cutting block, painting, chemical applications). Your superintendent will determine which respirator to use. See the MITA Respirator Protection Program for voluntary use or employee-provided respirators.

Electrical

1. Do not use a portable tool or extension cord unless it is plugged into a ground fault circuit interrupter (GFCI). Test the GFCI before plugging in the tool or cord.
2. Use only extension cords with 3 prongs. Do not use a cord if the ground prong is broken off.
3. Inspect extension cords and tool trailing cords for damage. Do not use damaged cords — repair them or throw them away.
4. Lock out and tag all electrical power and other energy sources before working on equipment, machinery, or tools.
5. Make sure underground lines are de-energized before jackhammering or using any tool or equipment that may contact the line.
6. Do not install, replace, or repair electrical systems unless you are qualified. Tell your superintendent if your work may expose you to energized parts or equipment.

Equipment Grounding Conductor Program

This program covers inspection and testing of electrical cords, plugs, and tools to prevent injuries. The superintendent, with the shop, is responsible for implementing it.

1. Visually inspect all extension cords, plugs, electrical tools, and equipment before each day's use for external defects and possible internal damage. Do not use damaged or defective items. Send them to the shop for repair.
2. For generators equipped with ground fault interrupters:
 - a. Check all ground fault interrupters every time the generator is started.
 - b. If the reset button pops out, the interrupter is good.
 - c. If the reset button does not pop out, the interrupter is bad.
 - d. A bad interrupter can cause shock.
 - e. Call the shop to repair or replace a bad interrupter.
 - f. Do not wire the throttle. That will cause the interrupter to go bad.
 - g. The frame of all welders must be grounded.

3. Tests required:

- a. Test all equipment grounding conductors for electrical continuity.
- b. Test each receptacle or plug for correct attachment of the equipment grounding conductor. The conductor shall be connected to its proper terminal.

4. Perform those tests:

- a. Before first use.
- b. Before equipment is returned to service after any repairs.
- c. Before equipment is used after any incident that may have caused damage.
- d. At intervals not exceeding 3 months. Extension cords and receptacles that are fixed and not exposed to damage shall be tested at intervals not exceeding 6 months.

Tests required by MIOSHA shall be recorded. The record shall identify each extension cord or piece of electrical equipment that passed, and the last test date or test interval. Keep the current record until it is replaced. Make it available at the job-site for inspection by a MIOSHA representative and any affected employee.

Overhead Powerlines

1. Keep yourself, tools, and equipment at least 10 feet away from overhead power-lines that are 50 kV and below. The minimum distance increases for lines over 50 kV. Inform your superintendent if you have questions or cannot maintain clearance.
2. Do not store material near or under power lines. If that is not feasible, keep stored material a minimum of 10 feet plus the length of the material away from overhead lines that are 50 kV or less. The minimum distance increases for lines over 50 kV.

See Figure 1 in Appendix — Figures for storage clearance examples under overhead lines.

Lockout Program

This policy sets the minimum requirements for locking out energy sources whenever maintenance or servicing is done on machines, equipment, or circuits. Use it so the machine, equipment, or circuit is stopped, isolated from all potentially hazardous energy sources, and locked out before anyone services or maintains it — where unexpected energization, startup, or release of stored energy could cause injury.

General requirements

1. Disconnecting means shall be rendered inoperable. If the design does not permit that, tag the means to show that employees are at work.
2. An authorized employee locks out machines and equipment to service or maintain that machine, circuit, or equipment, and is trained to perform lockout procedures.
3. An affected employee operates a machine or equipment that is being serviced under lockout, or works in an area where that servicing is being performed.
4. Authorized employees trained in lockout will be issued a lock from the safety department before lockout work begins.
5. Lockout locks will be individually keyed. Only the employee performing the lockout shall have the key.
6. Each lockout lock shall have a durable tag showing the lockout condition and the name of the employee who attached the lock.
7. When lockout must follow a specific order because of equipment design, document that order in a site-specific lockout plan.

What to lockout

During servicing or maintenance, lock out any equipment that uses a hazardous energy source — electrical, pneumatic, steam, hydraulic, gravity, and/or air — when unexpected energization, startup, or release of stored energy could injure employees. The lockout must render the machine inoperative and immovable.

When to lockout

1. Cleaning or jam-clearing. When a normally moving piece of equipment is stopped for cleaning, clearing, or adjustment, and a startup could cause injury.
2. Equipment repair. Whenever a repair is being performed on or near equipment where starting it could cause injury. This includes any equipment from which a guard or other safety device has been removed.
3. Installation. If part or all of an installation can be operated before the job is complete, take precautions during test periods and lock the equipment out again when the test is finished or interrupted.
4. Electrical repair. For any work other than testing on an electrical circuit, de-energize the wiring and lock it out so it cannot be reactivated during the work.

Group lockout

1. Before work begins, review the lockout procedure with each group member. Designate one authorized employee as responsible for the lockout.
2. If more than one company or work group is involved, one authorized employee will coordinate the lockout so all control measures stay in place and the group stays protected.
3. Each authorized employee will put their lock on the group lockout box and remove it when they stop working on the machine or equipment.

Shift change

Keep machines and equipment safeguarded during personnel changes, shift change, or long intervals. Oncoming shift applies their lock to the equipment or group lockout box before the outgoing shift removes theirs.

When lockout methods are not required

1. Minor tool changes (for example, changing a drill bit) are not covered when a stop button controls unexpected motion and the start button is visible and under the employee's immediate control.
2. Cord-and-plug equipment must be unplugged and under the exclusive control of the employee doing the work. The plug must be in the employee's possession, or within arm's reach and in their line of sight.
3. Repair, troubleshooting, and set-up adjustments may be performed on energized equipment only when it is necessary to leave the machine energized. Troubleshooting ends and lockout is required when:
 - a. Power is shut off.
 - b. A particular problem has been located and repairs start.
 - c. Individual machine components are being replaced.
 - d. Circuit changes are being made.

Application of lockout control

1. **Preparation for shutdown.** Personal safety locks and keys stay with each operator, mechanic, or electrician. Supervisors have their own locks and keys. Authorized employees shall review the written lockout procedure so they understand the type and magnitude of the energy, the hazards, and how to control it.
2. **Notify affected employees** that the machine or equipment is going to be locked out.
3. **Shut down** the machine or equipment using the energy control procedures established for it.
4. **Isolate** all energy-isolating controls (steam, pneumatic, hydraulic, air, electrical). Prove a zero energy state. If a standard lock will not fit, use another method such as a wire cable and lock.
5. **Apply the lockout device.** Affix the multiple-lock adapter and lock so the energy isolation devices stay in a safe or off position.
6. **Notify affected personnel** that the machine or equipment is locked out. Use a tag with each lock, in addition to verbal notice.
7. **Verify isolation** before starting work. Each authorized employee shall test the lockout by attempting to cycle or start the equipment, or by verifying the absence of electrical energy with the proper tester.
8. Notify other authorized and affected people in the area before attempting to cycle the machine. Make sure everyone is clear of it first.
9. If the controls activate the machine or cause any movement, start over at Step 1.
10. If stored energy could re-accumulate to a hazardous level, keep verifying isolation until the work is done or that possibility no longer exists. Relieve, restrain, or otherwise make stored energy safe.
11. **Begin work** only after each authorized employee has verified that hazardous energy is controlled.

Testing or positioning machines, equipment, or components

When lockout devices must come off so the machine can be energized for a test or to position a component:

1. Clear the machine of tools and materials.
2. Remove employees from the machine area.
3. Notify affected employees that the lockout devices are going to be removed.
4. Each authorized employee who applied a lock removes their own lock.
5. Notify affected employees that the locks are off and the machine is going to be energized.
6. Energize and test.
7. De-energize all systems and reapply energy control measures.

Lock removal

1. Each lock shall be removed by the authorized employee who applied it, except for the emergency procedure below.
2. If that employee is not available, their supervisor may request removal. Follow this procedure:
 - a. Attempt to contact the employee who owns the lock and see if they can remove it.
 - b. If the employee is available, only that employee may decide whether the lock can come off, based on the lockout plan.
 - c. If the employee is not on site, make a reasonable effort to reach them. Ask whether the work is complete and the equipment is ready to be activated. Advise them that their lock may be removed.
 - d. If they say the equipment is not ready, arrange another lock as soon as the existing lock comes off.
 - e. If they say it is ready, the supervisor shall inspect the work area, confirm there is no danger in re-energizing, remove the lock, and tell all affected employees the equipment is operational.
 - f. If contact is not made, the supervisor will inspect the equipment for complete work and authorize removal. Notify the employee whose lock was removed immediately when they return.
 - g. If the equipment is ready to be activated, inform all affected employees that it is operational, then authorize removal.
 - h. The person removing the lock is responsible for completing all restore-energy steps before the lock comes off.
 - i. Contact the M&M Excavating safety department if an employee's lock is removed when that employee is not present.

Training

1. Authorized employees will be trained to recognize applicable hazardous energy sources and the methods to isolate and control them.
2. Affected employees shall be instructed in the purpose and use of the energy control procedure.
3. Employees shall be instructed not to restart or re-energize machines or equipment that are locked out.
4. Retrain authorized and affected employees when job assignments change, when machines or processes present a new hazard, or when energy control procedures change.
5. Retrain also when a periodic inspection finds gaps in knowledge or use of the procedure.
6. Document all training.

Periodic inspection

1. At least annually, the M&M Excavating safety department will audit a lockout plan on a job while lockout is being performed.
2. Correct any deviations or gaps found and communicate them to all employees.
3. The inspection will include a review of each employee's responsibilities under the energy control procedure.

Fire Protection

1. Fire extinguishers
 - a. At least one 2A-rated fire extinguisher must be available on every job-site.
 - b. Keep at least one 5 BC-rated extinguisher in the cab or within 25 feet of a crane or excavator, and one within 75 feet of diesel and gasoline refueling areas.
 - c. Inspect extinguishers every 12 months and label them with an inspection tag.
2. Portable fuel containers. Store and transport flammable liquids (for example, gasoline) in approved safety cans with a spring-closing lid, flashback arrestor screen, spout cover, and a design that safely relieves internal pressure.
3. Smoking and storage
 - a. Do not smoke around flammable or combustible materials, or in any area posted No Smoking (including refueling stations).
 - b. Do not place or store flammable or combustible material near open flames, sparks, or other ignition sources.
4. Gasoline-powered equipment
 - a. Shut engines off during refueling.
 - b. Do not use gasoline-powered equipment inside closed buildings.
5. Propane / LP storage
 - a. Store tanks and cylinders upright with caps on.
 - b. Secure cylinders with a chain, wire, or suitable rack. Small portable propane tanks that cannot fall over do not have to be secured.
 - c. Do not store tanks or cylinders in buildings or poorly ventilated areas.

Welding and Cutting

1. Always wear the appropriate PPE when welding or cutting: apron, leggings, safety shoes, hard hat, and the proper goggles, shield, or safety glasses for the work.
2. Use back-flow devices on gas and oxygen hoses, or a cutting torch the manufacturer equipped with an internal back-flow device.
3. Do not weld or cut within 50 feet of explosives, stored cylinders, or stored fuel. Remove or cover with fire-resistant blankets any flammable or combustible material within 35 feet of the operation.
4. Keep a 2A-5BC portable fire extinguisher (minimum) in the immediate area during welding and cutting.
5. Never weld or cut in a confined space without the proper precautions.
6. Use welding and cutting equipment only if you have been trained and authorized.
7. Clean drums, barrels, and tanks of toxic, flammable, or combustible material before welding or cutting on them.
8. Cylinder storage
 - Separate oxygen cylinders and fuel-gas cylinders by at least 20 feet, or install a noncombustible barrier at least 5 feet high with a minimum one-hour fire rating.
 - Store cylinders (full or empty) valve-end up and secure them with a chain or bracket.
 - Place caps on cylinders when they are not in use.
9. Exception — single oxygen and fuel-gas cylinders
 - When in use, one oxygen cylinder and one fuel-gas cylinder (for example, acetylene) may be stored together on a cart designed for that purpose, or both may be secured to a wall or column.
 - Keep both cylinders upright and secured with straps, chains, or another device.
 - Set a cart on a firm, level surface.
 - Do not put cylinders or carts in heavy-traffic areas where they could be struck by vehicles or equipment.
 - Both cylinders must have valves closed with protection caps on, or be connected to a properly functioning regulator.
 - Use properly rated lifting gear (chains, shackles, and so on) when suspending carts from cranes or other lifting equipment.
 - Barricade the area below a suspended cart during active work hours.

Noise Exposure

General requirements

1. M&M Excavating shall provide protection against noise exposure when sound levels exceed the permissible exposure limit (PEL) of 90 dBA for an 8-hour day.
2. If administrative or engineering controls do not bring sound levels within Table 1, proper PPE is required.
3. Follow all manufacturer requirements for the equipment in use. Even if the sound level does not exceed Table 1, the manufacturer may still require hearing protection.
4. If the daily noise exposure is made up of two or more periods at different levels, consider their combined effect.

Table 1 — Permissible noise exposures

Protection is required when sound levels exceed these limits. Follow manufacturer requirements even if the reading is below the table.

Duration per day	Sound level (dBA, slow response)
8 hours	90
6 hours	92
4 hours	95
3 hours	97
2 hours	100
1½ hours	102
1 hour	105
½ hour	110
¼ hour or less	115

PEL for an 8-hour day is 90 dBA. Hearing conservation / action level is an 8-hour TWA of 85 dBA.

Hearing Protection

Situation	Requirement
Sound exceeds Table 1	Hearing protection required
Manufacturer requires protection	Hearing protection required even if below Table 1
8-hour TWA of 85 dBA or greater	Hearing protection required; employee is in the Hearing Conservation Program
Standard threshold shift	Hearing protection required
Company-provided selection	Employee chooses from suitable protectors supplied by M&M Excavating

Training

- Noise-awareness training shall be done before initial assignment and annually.
- Training shall stay current with changes in PPE and work processes and shall include proper use and fit of hearing protection.
- All employees exposed to an 8-hour TWA of 85 dBA or greater shall be trained before initial assignment and annually on the M&M Excavating Noise Exposure Program.
- Each employee shall be informed of:
 - The effects of noise on hearing.
 - The purpose of hearing protectors; advantages, disadvantages, and attenuation of various types; and how to select, fit, use, and care for them.
 - The purpose of audiometric testing and an explanation of the test procedures.
 - A review of hearing-protection regulations.
 - Locations on M&M Excavating property where hearing protection is required.
- Review the program at least annually for employee safety and for federal, state, and local requirements.

Audiograms and baseline testing

1. Employees in the Hearing Conservation Program with TWA noise exposures of 85 dBA or greater for an 8-hour shift shall have a baseline audiogram and an annual audiogram.
2. Within 6 months of an employee's first exposure at or above the action level, M&M Excavating shall establish a valid baseline audiogram for later comparison.
3. Baseline testing shall be preceded by at least 14 hours without workplace noise. Hearing protectors may be used to meet that requirement.
4. At least annually after the baseline, M&M Excavating shall obtain a new audiogram for each employee exposed at or above an 8-hour TWA of 85 dBA.

Evaluation of audiogram

1. Compare each annual audiogram to that employee's baseline to confirm it is valid and to see if a standard threshold shift has occurred. A technician may make this comparison.
2. If the annual audiogram shows a standard threshold shift, M&M Excavating may retest within 30 days and use the retest as the annual audiogram.
3. Notify the affected employee in writing of a standard threshold shift within 21 days of the determination.

Follow-up procedures

Unless a physician determines the standard threshold shift is not work-related or not aggravated by occupational noise:

- a. Employees not using hearing protection will be fitted, trained in use and care, and required to use it.
- b. Employees already using protectors shall be refitted and retrained, and given protection with greater attenuation if needed.

If later testing of an employee whose exposure is below an 8-hour TWA of 85 dBA shows the shift is not persistent, M&M Excavating may discontinue required use of hearing protection for that employee.

Monitoring

1. The sampling strategy shall identify employees for the hearing conservation program and support proper PPE selection.
2. Where high worker mobility, big swings in sound level, or impulse noise make area monitoring impractical, M&M Excavating will use representative personal sampling unless area sampling can be shown to produce equivalent results.
3. The Safety Department coordinates monitoring. Superintendents and supervisors shall notify the Safety Department when monitoring may be needed.
4. Calibrate instruments used to measure employee noise exposure.
5. Repeat monitoring when a change in production, process, equipment, or controls increases noise so that:
 - additional employees may be exposed at or above the action level, or
 - the attenuation of current hearing protectors may no longer meet Table 1.
6. Notify each employee exposed at or above an 8-hour TWA of 85 dBA of the monitoring results.

Hearing protector attenuation

1. Evaluate attenuation for the specific noise environment where the protector will be used.
2. Re-evaluate whenever employee noise exposure increases enough that current protection may no longer be adequate. Provide more effective protectors where needed.

Record Retention

M&M Excavating shall retain records for at least:

Record	Keep for
Noise-exposure measurement records	2 years
Audiometric test records	Duration of the employee's employment

Portable Ladders

1. Use only Type IA or Type I ladders for construction work.
2. Do not use damaged or defective ladders (broken spreaders or steps, split side rails). Tag them and remove them from service.
3. Portable extension ladders shall have safety feet to prevent slippage. If a ladder does not have safety feet, tie it off, block it, or otherwise secure it.
4. Always secure both the top and the bottom of a ladder used with a scaffold or other temporary platform.

Heat-Illness Prevention Plan

This plan follows guidance from OSHA, NIOSH, and ACGIH. It is a resource for reducing heat-related illness in healthy, physically fit workers. It does not cover every job-site scenario, does not by itself meet every state or local heat rule, and is not designed to protect workers whose medical or preexisting conditions raise heat-stress risk.

Medically screen workers before heavy work in hot environments. Use OSHA heat-stress resources and applicable regulations for more detail.

The plan covers five areas:

1. Train workers and supervisors on prevention, and on recognizing and reporting heat-illness signs and symptoms.
2. Monitor weather and workplace conditions.
3. Assess environmental and work-related heat-stress factors when appropriate.
4. Put prevention strategies in place:
 - c. Reduce exposure to heat-stress conditions.
 - d. Use an acclimatization program so workers can adapt to working in the heat.
 - e. Provide adequate water, shade, and rest.
 - f. Watch workers for early signs of heat stress, including body temperature, recovery heart rate, and/or body weight when those measures are used.
5. Plan for heat-related medical emergencies so victims get prompt care.

Purpose

Give supervisors and workers the training and tools to protect them from heat-related exposures and illnesses.

Scope

Each site and task can present different heat-stress hazards. Assess those hazards before work starts and during the job. Supervisors and workers are responsible for taking corrective action.

Definitions

OSHA and NIOSH use the following terms in their heat-stress publications.

A–G

Acclimatization

Changes in the body after several days in environmental heat. Those changes cut the strain of the heat and let a person work more effectively with less chance of heat injury.

Body heat balance

Steady-state balance between heat the body makes and heat it loses to the environment.

Body heat balance equation

How heat gain and heat loss relate:

$$S = (M - W) \pm C \pm R \pm K - E$$

Body heat storage (S)

Change in the heat content of the body (plus or minus).

clo

Insulation value of clothing. 1 clo = 5.55 kcal·m²·h⁻¹·°C⁻¹. One clo is the insulation that keeps a sitting person comfortable at 21°C (~70°F). Also written 1 clo = 0.155 m²·°C·W⁻¹.

Conductive heat transfer (K)

Heat moving by direct contact between two materials (solid, liquid, or gas) at different temperatures.

Convective heat transfer (C)

Net heat exchange by convection between a person and the environment.

Evaporative heat transfer (E)

Heat lost when sweat evaporates, or gained when water condenses on the skin. Expressed as kcal·h⁻¹, W·m⁻², or W.

H–N

Heat cramp

Heat-related illness. Painful spasms of the voluntary muscles (mainly arms, hands, legs, and feet). Usually tied to low salt and heavy sweating without much body dehydration.

Heat exhaustion

Heat-related illness. Core temperature above 38°C (100.4°F) and one or more organ systems not working right, without injury to the central nervous system. May signal heat stroke is coming.

Heat strain

What the body does in response to a heat load (external or internal) as it tries to dump heat and hold a stable temperature.

Heat stress

The net heat load on the worker from metabolic heat, the environment, and clothing, which raises heat stored in the body.

Heat stroke

A medical emergency. Body temperature above 41.1°C (106°F) and the temperature-control system has failed. Central nervous system injury. Often a sudden, lasting loss of consciousness, preceded by dizziness, nausea, headache, confusion, odd behavior, and a very high body temperature.

Heat syncope

Collapse or loss of consciousness in the heat without a rise in body temperature and without stopping sweat. Like a faint, but caused by heat.

Heat tolerance

How well a person can endure heat and regulate body temperature compared with others. Affected by acclimatization and physical condition.

Humidity, relative (RH)

Water vapor in the air compared with the maximum the air can hold at the same temperature and pressure.

Hyperpyrexia

Core temperature above 40°C (104°F).

Hyperthermia

Core temperature above 37.2°C (99°F).

- Mild: 37.2–38.5°C (99–101.3°F)
- Moderate (heat exhaustion range): 38.5–39.5°C (101.3–103.1°F)
- Profound: above 39.5°C (103.1°F)
- Profound clinical / heat stroke: above 40.5°C (104.9°F)
- Death can occur without treatment above 45°C (113°F)

Metabolism (M)

Chemical energy turned into energy used for work and heat.

O–S**Pressure, atmospheric (Pa)**

Pressure from the weight of the air. About 760 mmHg at sea level. Falls with altitude.

Pressure, water vapor (Pa)

Pressure from the water vapor in the air.

Qualified health care professional

A person qualified by education, training, and license or facility privileges who performs a professional service in an allied health discipline and reports that service independently.

Radiant heat exchange (R)

Net heat exchange by radiation between two surfaces at different temperatures.

Recommended Alert Limit (RAL)

NIOSH heat-stress alert limit for unacclimatized workers.

Recommended Exposure Limit (REL)

NIOSH heat-stress exposure limit for acclimatized workers.

Rhabdomyolysis

Muscle breakdown from heat stress and long, hard work. Muscle tissue ruptures and dies. Can damage the kidneys.

Sweating, thermal

Sweat glands responding to heat.

T-Z

Temperature, ambient (ta)

Temperature of the air around the body. Also called air temperature or dry-bulb temperature.

Temperature, core body (tcr)

Temperature of the tissues and organs. Also called core temperature.

Temperature, dew-point (tdp)

Temperature at which water vapor in the air starts to condense.

Temperature, globe (tg)

Temperature inside a blackened, hollow, thin copper globe, measured at the center.

Temperature, natural wet bulb (tnwb)

Wet-bulb temperature in the prevailing air movement.

Temperature, oral (tor)

Temperature with the sensor under the tongue for 3 to 5 minutes.

Temperature, psychrometric wet bulb (twb)

Lowest temperature the air can reach by evaporating water from a wet sensor with forced air movement.

Temperature, rectal (tre)

Temperature measured 10 cm into the rectal canal.

Temperature, skin (tsk)

Temperature with the sensor on the skin.

Temperature, tympanic (tty)

True tympanic temperature is measured on the eardrum. Estimates are usually from a device in the ear canal near the eardrum.

Temperature regulation

Keeping body temperature in a tight range under a heat load (environment and work) by body and behavior.

Thermal insulation, clothing

Insulation value of a clothing ensemble.

Wet bulb globe temperature (WBGT)

One environmental temperature from dry-bulb temperature, humidity, and radiant energy (usually sun on clothing). Used to judge the thermal load on the person.

Work

Physical effort paid for by the body's metabolic rate.

Company policy

M&M Excavating is dedicated to protecting employees from on-the-job illnesses and injuries. Every employee is responsible for working safely.

This plan supplements the Safety Program so employees recognize heat-stress hazards and act on them.

Control	What it means
Train supervisors and workers	Teach heat-illness prevention. Recognize and report signs and symptoms.
Monitor weather and workplace	Watch conditions and take preventive measures when temperatures exceed 80°F (27°C).
Heat hazard assessment above 80°F	Determine WBGT-effective. Use RAL for unacclimatized workers and REL for acclimatized workers to set the risk level.
Prevention strategies	Match water, shade, rest, acclimatization, and work changes to the established risk level.
Medical emergency plan	Keep adequate supervision, first aid, and medical services ready if a worker has a heat illness.

Employees. Complete heat-illness training and follow the practices, unless doing so would create a greater hazard. If that is the case, stop and tell the supervisor before going on.

Employer / Safety Manager. The Safety Manager implements this plan. Supervisors run continual checks and correct unsafe practices immediately. Employees shall bring unsafe conditions to management. The Safety Manager must approve changes to this plan.

Who does what

Role	Responsibility
Safety Manager	Implements this plan. Approves any changes. Mathew Southwick.
Supervisor	Runs continual checks. Corrects unsafe practices immediately.
Employee	Complete training. Follow the practices. Stop and tell the supervisor if following a practice would create a greater hazard. Report unsafe conditions.

Designated Safety Manager: Mathew Southwick

Training

All employees and supervisors who may be exposed to heat stress will be trained on this plan.

Cover these parts of the plan:

- Training
- Monitoring
- Hazard assessment
- Heat-illness prevention strategies
- Emergency preparedness

Risk factors

Environment: temperature, humidity, air movement, radiant heat (sun).

Work: physical exertion, clothing.

Personal: age, fitness, acclimatization, medical conditions, medications, alcohol or drugs, caffeine.

How the body handles heat

- Heart rate increases.
- More blood goes to the skin.
- Sweating cools by evaporation.

Acclimatization

- Sweating and evaporative cooling become more efficient; salt loss is better managed.
- Core temperature is held more efficiently.
- Less strain on the heart; skin circulation and recovery heart rate improve.
- Typical acclimatization takes 10–14 days. Increase exposure gradually over 7–14 days. Avoid long hard work in the hottest part of the day; put heavy work in cooler hours.
- If an acclimatized worker is off heat-stress work more than a week, they need 2–3 days of re-acclimatization.

Water during the shift

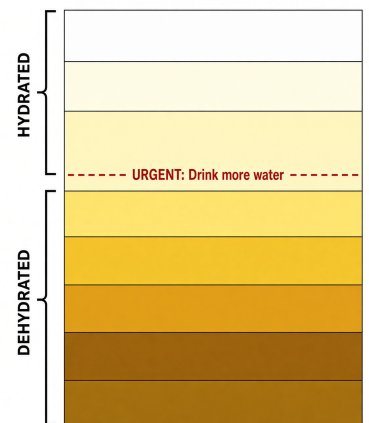
- About one cup (8 oz) of cool water or electrolyte drink every 15–20 minutes — about four cups per hour.
- Heavier work or heavier sweating may need more.
- Too much water can cause headache, nausea, vomiting, or confusion.
- Under extreme conditions, physiological checks may be needed:
 - If sweat can evaporate (not trapped in clothing), body weight should not drop more than 1.5% from the start-of-shift weight.
 - Urine should be pale yellow. Use a urine-color chart. Diet, medication, and illness can change the color.

Rest and shade

- Hard muscle work raises core temperature and makes cooling harder. Short rests let blood reach the skin and cool.
- Rests also let heart rate recover.
- Rest in the shade. Moving cool air helps.

Urine Color Chart

Are you hydrated?



Source: NIOSH Occupational Exposure to Heat and Hot Environments (2016). Diet, medication, and illness can change color.

Heat-related illnesses (train cause, prevention, signs, first aid, reporting)

Heat rash

- Cause: skin irritation from heavy sweat.
- Prevent: loose clothes that let sweat dry; clean clothes each day; change out of sweat-soaked clothes; wash and dry skin at breaks and after the shift.
- Signs: itchy, painful clusters of red blisters — often neck, chest, groin, armpits, elbow and knee creases.
- First aid: cool location; cool shower; dry the skin; keep washing and drying. See a clinician if it lasts more than two days or looks infected.
- Report to the supervisor and Safety Manager.

Heat cramps

- Cause: salt and water loss from heavy sweating. Can lead to exhaustion or stroke.
- Prevent: acclimatize; drink water through the day; salt food to taste.
- Signs: cramps, spasms, or pain in working muscles (arms, legs, abdomen, back).
- First aid: cool location; electrolyte drink. Get medical care if cramps last or other heat-illness signs appear.
- Report to the supervisor and Safety Manager.

Heat syncope

- Cause: long standing or standing up fast from sitting or lying down; dehydration can add to it.
- Prevent: acclimatize; drink water; break up long standing; rise slowly.
- Signs: light-headedness, dizziness, fainting.
- First aid: if only slightly dizzy and able to move, two people help them to a cool spot, lie them on their back with feet above the heart, give small amounts of water. If dizziness lasts, get first aid or medical care. If they fainted, secure the area, elevate the feet, get immediate care — do not let them jump up or walk it off.
- Report to the supervisor and Safety Manager.

Heat exhaustion

- Cause: the body cannot cool itself. Heat, humidity, hard work, dehydration, clothes that trap sweat, and/or alcohol can stack. Can become heat stroke.
- Prevent: acclimatize; drink water; short rests in the shade; protect skin from sunburn; do heavier work in cooler hours when you can.
- Signs: core about 100.4–102.2°F (oral about 99.6–101.4°F); weak but rapid pulse; cool, moist, pale or clammy skin; heavy sweating; headache or irritability; fatigue or weakness; dizziness; nausea or vomiting; less urine.
- First aid: call 911. Move to a cool place; loosen extra clothes; small amounts of cool water; spray the skin and fan. Keep cooling until temperature is below 99°F. If it stays above 100°F after 30 minutes, or rises above 102°F, treat as heat stroke.
- Report to the supervisor and Safety Manager.

Heat stroke

- Cause: the body cannot cool itself or regulate temperature. Life-threatening. Call 911.
- Prevent: same as heat exhaustion.
- Signs: core above 104°F (oral above 103.2°F); hot dry skin or heavy sweating; confusion, agitation, or odd behavior; clumsiness; slurred speech; fainting; seizures.
- First aid: call 911 and do not wait. Cool hard — feet above the heart, loosen clothes, ice at groin and armpits, soak and fan, or immerse / douse with cool water. Do not give fluids, especially if they are unconscious. Keep cooling until below 99°F. Start CPR if breathing or circulation stops.
- Report to the supervisor and Safety Manager.

Rhabdomyolysis

- Cause: heat stress plus long hard work can break down muscle. Proteins and electrolytes enter the blood and can shut down the kidneys. Immediate medical care.

- Prevent: same as exhaustion and stroke. Do not over-lift or work a muscle until it fails. Higher risk with diabetes, thyroid disease, muscular dystrophy, some viral infections, alcohol or illegal drugs, and some medicines (antipsychotics, statins).
- Signs: muscle cramps, pain, or loss of range; joint pain or stiffness; swollen muscles; sudden weakness; dark urine (tea or cola). Kidney failure signs: shortness of breath, irregular heartbeat, swelling in legs and feet, seizures, coma.
- First aid: get immediate medical care (IV fluids and treatment for toxic proteins).
- Report to the supervisor and Safety Manager.

When risk is high — physiological monitoring

Oral temperature

- Keep the thermometer out of heat above 95°F.
- Do not take a reading within 15 minutes of hot or cold food or drink, or while the person is mouth-breathing hard.
- Oral temperature should not exceed 99.5°F.
- If it is above 99.1°F, add rest or take other preventive steps.

Recovery heart rate

- At the start of a scheduled rest, worker sits. Take pulse (P1). If it is above 110 bpm, take it again at 2 minutes (P2) and 4 minutes (P3).
- If it does not drop below 110 bpm, heat stress is too high for that person.
- If it started above 110 and the drop between 2-minute readings is less than 10 bpm, that is also too high (or they may be dehydrated).
- People vary. A pre-work resting pulse above 100 bpm should be checked by a qualified medical provider.

Extra dehydration checks

- Body weight: only if clothing lets sweat evaporate. Use a scale good to ±0.25 lb. More than 1.5% weight loss means they are not replacing sweat.
- Urine color: pale yellow is the target. Darker can mean dehydration. Disease, medicine, and food can change color.

Engineering controls

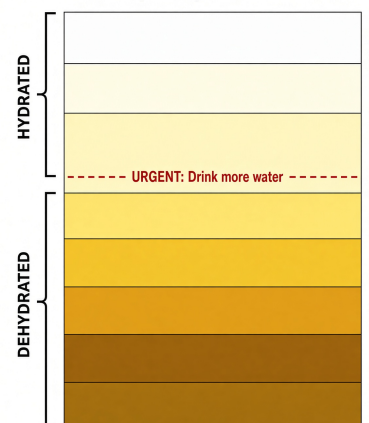
- Use powered tools and equipment to cut heavy lifting.
- Cut radiant heat with line-of-sight reflective barriers or by insulating hot surfaces.
- Air below 95°F: increase air speed across the skin (fans) to help evaporative cooling.
- Air above 95°F: reduce air speed across the skin so hot air does not add heat.
- Humidity below 50%: evaporative coolers or mist fans can drop air temperature about 10–20°F.
- Lower humidity below 50% when you can so sweat can evaporate.

Administrative controls

- Acclimate workers before full heat work.
- Schedule heavy work in the coolest part of the day.
- Shorten heat exposure with more frequent rests. Short frequent breaks beat

Urine Color Chart

Are you hydrated?



Source: NIOSH Occupational Exposure to Heat and Hot Environments (2016). Diet, medication, and illness can change color.

long rare ones.

- Drink about 8 oz every 15–20 minutes.
- Supervisor / foreman owns the water:
 - Clean, sanitary containers, filled at a sanitary location.
 - Disposable cups and a place to throw them away. No sharing cups.
 - Use the spigot. Do not open the cooler top to dip cups.
 - Cool potable water at no cost. Not irrigation, sprinkler, firefighting, or garden-hose water.
 - At least 1 quart per worker per hour for the whole shift.
 - Keep water as close as practical. Drink before you get thirsty.
- Nearby shade or air-conditioned rest.
- Train on signs, symptoms, and prevention.
- Alert the crew on extreme-heat days and review the day's plan.
- Buddy system.
- Avoid caffeine and alcohol before and during hot work.
- Report illness that raises heat risk (diarrhea, fever, infection).
- Medically screen for hot work.

Protective clothing

- Cooling garments (air, cooled fluid, or ice) when used.
- Reflective clothing to cut radiant load.
- Below **95°F** and out of radiant heat: fewer layers when feasible so sweat can evaporate. Do not drop chemical or mechanical PPE without evaluating those hazards.
- Above **95°F**: more coverage can reduce hot air moving across the skin.

Monitoring weather and workplace conditions

The Safety Manager and supervisors monitor daily weather and site conditions to see if workers will be exposed above 70°F (21°C).

Use the National Weather Service (weather.gov). Other public sources: Intellicast or Weather Underground. Use the station closest to the job.

If temperature will exceed 70°F for more than an hour in the shift, run a heat hazard assessment. Collect:

- Air temperature (°F)
- Humidity (%)
- Wind speed (mph)
- Barometric pressure (inches)
- Longitude and latitude
- Cloud cover

Heat hazard assessment

Run this when weather or site conditions will exceed **70°F (21°C)**. Account for temperature, humidity, wind, sun, work rate, and clothing.

Do **not** use heat index alone. Heat index ignores wind, radiant heat, clothing, and metabolic heat.

Use **WBGT-Effective** and NIOSH limits (REL for acclimated workers, RAL for unacclimated). Details and examples: OSHA Technical Manual, Section III, Chapter 4, and the NIOSH heat criteria document. Record the job on the site-specific worksheet (Appendix A in the source packet).

Step 1 — Calculate WBGT from weather data

Argonne National Laboratory built a calculator from Liljegren's outdoor WBGT model. OSHA posted it as:

http://www.osha.gov/dts/osta/otm/otm_iii/wbgtutil.zip

Enter, for the hottest hour of the shift:

- a. Air temperature (°F)
- b. Barometric pressure (inches of mercury)
- c. Relative humidity (%)
- d. Wind speed (mph)
- e. Date
- f. Time
- g. Longitude and latitude (Options)
- h. Solar irradiance (W/m²) from Table 1, plus date, time, and location

Table 1. Estimated Solar Irradiance Based on Cloud Cover

Reported cloud cover	Irradiance (W/m ²)
Sunny	990
Mostly sunny / partly sunny or cloudy / scattered clouds	980
Mostly cloudy	710
Cloudy	250

Source: OSHA as adapted from A. Ben Jemaa et al. (2013) *Energy Procedia* 42:406–415.

Time, date, lat/long, and pressure have to be right — they adjust irradiance before WBGT is calculated. Record the output Wet Bulb Globe Temperature in °F. That is the WBGT for Step 2.

Step 2 — Add clothing adjustment

WBGT-Effective = WBGT + CAF

Table 2. Clothing Adjustment Factors (CAF)

Clothing worn	CAF (°F)
Work clothes (long sleeves and pants). Example: standard cotton shirt/pants.	0
Coveralls with only underwear underneath. Example: cotton or light polyester.	0
Double-layer woven clothing	5.4
SMS polypropylene coveralls (spunbond/meltblown/spunbond)	0.9
Polyolefin coveralls. Example: microporous fabric such as Tyvek.	1.8
Limited-use vapor-barrier coveralls. Encapsulating suits, whole-body chemical suits, firefighter turnout gear.	19.8

WBGT-Effective = WBGT + CAF. Source: OSHA Technical Manual from ACGIH 2017 TLVs and BEIs, converted to °F.

CAF comes from Table 2 (work clothes = 0°F; vapor-barrier / encapsulating / turnout = 19.8°F).

Step 3 — Metabolic heat

Pick the heaviest work category on the job from Table 3 (light / moderate / heavy / very heavy) and the worker's body-weight column.

Table 3. Work Category Based on Metabolic Work Rates

Work category	Example	154 lb	200 lb	250 lb	300 lb
Light	Sitting, standing, light arm/hand work, occasional walking	233 W	303 W	377 W	454 W
Moderate	Normal walking, moderate lifting	349 W	454 W	565 W	681 W*
Heavy	Heavy material handling, fast walking	465 W	605 W*	753 W*	907 W*
Very heavy	Pick and shovel work	580 W	754 W*	940 W*	1131 W*

* Not recommended at this body weight under heat stress. Cut exertion and use physiological monitoring.

Starred values in that table are not recommended at that body weight under heat stress. Cut exertion and use physiological monitoring.

Step 4 — Exposure threshold

REL — acclimated, healthy workers (Tables 4–7 by work/rest schedule)

Table 4. Recommended Exposure Limit (REL) for Continuous Work

Work category	154 lb	200 lb	250 lb	300 lb
Light	85°F	83°F	81°F	79°F
Moderate	81°F	79°F	77°F	75°F*
Heavy	79°F	76°F*	74°F*	73°F*
Very heavy	77°F	74°F*	72°F*	71°F*

Table 5. Recommended Exposure Limit (REL) for 75% Work & 25% Rest Each Hour

Work category	154 lb	200 lb	250 lb	300 lb
Light	87°F	84°F	82°F	81°F
Moderate	84°F	81°F	79°F	78°F*
Heavy	82°F	79°F*	77°F*	76°F*
Very heavy	79°F	77°F*	75°F*	73°F*

Table 6. Recommended Exposure Limit (REL) for 50% Work & 50% Rest Each Hour

Work category	154 lb	200 lb	250 lb	300 lb
Light	89°F	86°F	84°F	83°F
Moderate	86°F	83°F	81°F	80°F*
Heavy	84°F	81°F*	79°F*	78°F*
Very heavy	81°F	79°F*	77°F*	75°F*

Table 7. Recommended Exposure Limit (REL) for 25% Work & 75% Rest Each Hour

Work category	154 lb	200 lb	250 lb	300 lb
Light	90°F	88°F	86°F	84°F
Moderate	88°F	86°F	84°F	82°F*
Heavy	86°F	84°F*	82°F*	80°F*
Very heavy	84°F	82°F*	80°F*	78°F*

RAL — unacclimated workers (Tables 8–11)

Table 8. Recommended Alert Limit (RAL) for Continuous Work

Work category	154 lb	200 lb	250 lb	300 lb
Light	80°F	77°F	74°F	72°F
Moderate	75°F	72°F	70°F	68°F*
Heavy	72°F	69°F*	67°F*	65°F*
Very heavy	70°F	67°F*	64°F*	62°F*

Table 9. Recommended Alert Limit (RAL) for 75% Work & 25% Rest Each Hour

Work category	154 lb	200 lb	250 lb	300 lb
Light	82°F	79°F	77°F	75°F
Moderate	78°F	75°F	73°F	71°F*
Heavy	76°F	73°F*	70°F*	68°F*
Very heavy	73°F	70°F*	68°F*	66°F*

Table 10. Recommended Alert Limit (RAL) for 50% Work & 50% Rest Each Hour

Work category	154 lb	200 lb	250 lb	300 lb
Light	84°F	81°F	79°F	77°F
Moderate	81°F	78°F	76°F	73°F*
Heavy	78°F	76°F*	73°F*	71°F*
Very heavy	77°F	74°F*	72°F*	69°F*

Table 11. Recommended Alert Limit (RAL) for 25% Work & 75% Rest Each Hour

Work category	154 lb	200 lb	250 lb	300 lb
Light	86°F	83°F	80°F	78°F
Moderate	83°F	80°F	78°F	76°F*
Heavy	81°F	78°F*	76°F*	74°F*
Very heavy	80°F	77°F*	75°F*	73°F*

If WBGT-Effective exceeds the REL or RAL, put controls in place.

The source packet also lists these formulas (OCR in the old PDF was broken; this is the intended NIOSH form, with MH = metabolic heat in watts):

- $REL (^{\circ}F) = 1.8 \times [56.7 - 11.5 \times \log_{10}(MH)] + 32$
- $RAL (^{\circ}F) = 1.8 \times [55.5 - 11.5 \times \log_{10}(MH)] + 32$

Step 5. Determine Risk Level

HQ-acclimated = WBGT-Effective ÷ REL

HQ-unacclimated = WBGT-Effective ÷ RAL

- HQ below 1.0 — no extra heat-stress controls expected
- HQ above 1.0 — workers are at risk; use multiple prevention controls

Table 12. Risk Level for Acclimated and Unacclimated Workers

Hazard quotient (HQ)	Risk level
Less than 1.00	Low
1.00 to 1.02	Moderate
1.03 to 1.04	High
1.05 to 1.07	Very high
Greater than 1.07	Severe

Heat-illness prevention strategies

When HQ is above 1.0, use controls. Five steps:

1. Cut the HQ.
2. If risk is high, very high, or severe — add physiological monitoring.
3. Engineering controls.
4. Administrative controls (including acclimatization).
5. Protective clothing and equipment.

Anyone who has not worked in heat in the previous week goes into the acclimatization program.

Step 1 — Cut the HQ

Highly effective:

- Shift work off the hottest hours.
- Shade / shelter so solar irradiance is effectively zero.
- Drop vapor-barrier / encapsulating suits in the hottest part of the day when the chemical hazard allows it.
- Drop double clothing layers when you can.
- Use machines instead of muscle (forklift, hoist, excavator, conveyor, power auger instead of hand shoveling).
- More rest so body heat does not pile up.

Moderately effective:

- Air below 95°F and wind under 1–2 mph: portable fans. Air above 95°F: fans add heat. Do not do that.

Slightly effective:

- Lighter, more breathable cotton or more breathable coveralls.

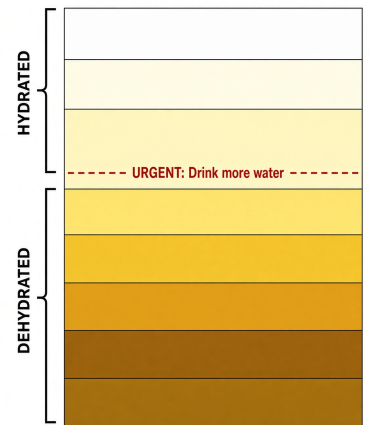
Step 2 — Physiological monitoring (high / very high / severe)

At minimum monitor oral temperature or recovery heart rate. Body weight is extra, for hydration.

- **Oral temperature** — reliable field method. Keep the thermometer below 95°F. Do not read within 15 minutes of food or drink, or while they are mouth-breathing hard. Target: not above 99.5°F. Above 99.1°F, add rest. Use Table 13.
- **Recovery pulse (modified Brouha)** — sit at the start of rest. P1, then P2 and P3 if P1 is above 110 bpm. Use Table 14. Pre-work resting pulse above 100 bpm belongs with a medical provider.
- **Weight and urine** — extra checks only, not a stand-alone heat-stress test. More than 1.5% weight loss (if sweat can evaporate) means they are behind on water. Urine should be pale yellow. Diet, medicine, and illness can change color.

Urine Color Chart

Are you hydrated?



Source: NIOSH Occupational Exposure to Heat and Hot Environments (2016). Diet, medication, and illness can change color.

Step 3 — Engineering controls

Use these when risk is moderate or higher, before you lean on admin or clothing.

- Powered tools and equipment instead of heavy lifting.
- Cut radiant heat: line-of-sight reflective barriers or insulated hot surfaces.
- Air below 95°F: more air across the skin.
- Air above 95°F: less air across the skin.
- Humidity below 50%: mist fans / evaporative coolers can drop air about 10–20°F.
- Get humidity under 50% when you can.

Step 4 — Administrative controls

Use when engineering is not enough. Unacclimated workers (no hot work in the previous week) go on the schedule in the table file.

Other controls (same water rules as training):

- Heavy work in the coolest hours.
- Short, frequent rests beat long rare ones.
- About 8 oz every 15–20 minutes. Supervisor owns the cooler: clean containers, sanitary fill, disposable cups, spigot only, no shared cups. Cool potable water at no cost. Not irrigation, sprinkler, firefighting, or garden-hose water. At least 1 quart per worker per hour. Keep it close. Drink before thirst.
- Shade or AC nearby.
- Train on signs and prevention.
- Daily heat briefing when it is extreme.
- Buddy system.
- No caffeine or alcohol before or during hot work.
- Report illness that raises risk.
- Medical screen for hot work.

Step 5 — Protective clothing

If engineering and admin are not enough:

- Cooling garments (air, cooled fluid, or ice).
- Reflective clothing for sun or hot surfaces.
- Below 95°F and out of radiant heat: fewer layers when the other hazards allow it.
- Above 95°F: more coverage can cut hot air on the skin.

Medical emergencies

When workers are exposed to heat-stress conditions, adequate supervision, first aid, and medical services must be ready if someone becomes ill. That includes first-aid supplies on hand, and supervisors and workers trained on what to do.

First aid supplies

Keep these on hand:

1. Reliable oral thermometer for checking body temperature.
2. Reliable instrument or timer for checking heart rate.
3. Cool water or electrolyte replacement fluids.
4. Cold packs or ice packs for treatment of heat stroke.
5. Spray bottles with water, or an available water source, for treating heat stroke.

First aid providers

Each work site should have at least one person trained to administer first aid. Two or more is preferred. Obtain the location, physical address, and phone number of the nearest hospital or emergency medical services before work under hot conditions begins. Collect:

1. Names, locations, and phone numbers of all first-aid trained supervisors or key personnel on site.
 2. Phone numbers for on-site or local medical emergency services.
 3. Address, phone number, and directions from the site to the closest emergency medical services (hospital).
 4. Physical address and detailed directions for emergency medical services. If the site is remote, confirm they can find it.
- Some providers need GPS coordinates.

First aid guidelines

See the Training section for first-aid steps for heat-related illnesses. All supervisors and workers need to know how to recognize signs and symptoms of heat stress, when to call for emergency medical assistance, and what to do for the person until help arrives.

Enforcement

Following this plan is a condition of employment. Supervisors and safety/personnel may discipline, up to termination.

Incident investigations

Every heat-related illness gets investigated and reported. Use the Worksite Incident Form in the appendix. If someone is hurt, review this plan and add practices, procedures, or training if needed.

Changes to the plan

The Safety Manager (Mathew Southwick) reviews and approves changes, and reviews the plan at least annually. Train people on new procedures. Keep a current copy on the job.

Silica Program

Program requirements

1. Evaluate the written exposure control plan at least once per year, and sooner if needed (regulatory updates, equipment changes, exposure incidents). Communicate any changes to affected employees.
2. Keep the written exposure control plan available to all employees.

Health hazards

The hazard is breathing the dust. When crystalline silica becomes airborne, the respirable fraction can cause silicosis — a disabling, sometimes fatal lung disease. Fine particles scar the lungs and reduce the ability to take in oxygen. That damage is permanent. Symptoms may not show for years.

Three forms, depending on concentration and duration:

- Chronic silicosis — 10 or more years at relatively low concentrations.
- Accelerated silicosis — 5 to 10 years at high concentrations.
- Acute silicosis — months to less than 2 years at very high concentrations.

Workers may have no symptoms at first. Later: shortness of breath, severe cough, weakness. That can worsen and lead to death. Silica is also linked to kidney and immune-system disease, chronic bronchitis, tuberculosis, COPD, and lung cancer.

Common tasks that can create silica dust:

- Stationary masonry saws
- Handheld power saws
- Walk-behind saws
- Drivable saws
- Rig-mounted core saws or drills
- Handheld and stand-mounted drills
- Dowel drilling rigs
- Vehicle-mounted drilling rigs
- Jackhammers and handheld powered chipping tools
- Handheld grinders
- Walk-behind milling machines and floor grinders
- Drivable milling machines
- Crushing machines
- Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (hoe-ramming, rock ripping, demolition, grading, excavating)

Definitions

- **Action level** — 25 $\mu\text{g}/\text{m}^3$ as an 8-hour TWA. At or above this level, exposure assessment is required.
- **Competent person** — can identify existing and foreseeable respirable crystalline silica hazards and has authority to correct them. Must be able to implement the written control plan.
- **Employee exposure** — airborne respirable crystalline silica as if the employee were not wearing a respirator.
- **HEPA filter** — at least 99.97 percent efficient at 0.3 micrometers. HEPA vacuuming is a housekeeping method, and some Table 1 tasks require it.
- **Objective data** — air-monitoring or composition data that shows exposure for a product, process, or task. Conditions must closely resemble, or be higher-exposure than, current M&M Excavating operations.
- **Permissible exposure limit (PEL)** — 50 $\mu\text{g}/\text{m}^3$ as an 8-hour TWA when using alternative exposure-control methods.
- **PLHCP** — physician or other licensed health care professional whose scope of practice allows them to provide services required by this standard.

General requirements

1. These rules apply to any operation that generates silica dust, except where exposure will stay below the action level (25 µg/m³ as an 8-hour TWA) under any foreseeable conditions. Pouring concrete and mixing small batches can stay below; most dust-making tasks will not.
2. Employees exposed to silica dust must be protected with engineering controls (wet or vacuum), work-practice controls, and respirators when needed so exposure does not exceed the PEL of 50 µg/m³ as an 8-hour TWA. Respirators will be provided when required.

Step 1 — Determine which compliance method

Before work starts, the competent person (typically the superintendent) picks one of the two options below.

Option 1 — Table 1

Use Table 1 if the task is one of the 18 listed equipment/tasks and every engineering control, work practice, and respirator specified in that table can be fully implemented. If Table 1 applies, no extra assessment is required unless conditions change.

Table 1 — Specified exposure control methods

Equipment / task	Engineering and work-practice controls	Respirator ≤ 4 hr	Respirator > 4 hr
(i) Stationary masonry saws	Integrated water delivery that continuously feeds the blade. Operate and maintain per manufacturer to minimize dust.	None	None
(ii) Handheld power saws (any blade diameter) — outdoors	Integrated water delivery that continuously feeds the blade. Operate and maintain per manufacturer to minimize dust.	None	APF 10
(ii) Handheld power saws (any blade diameter) — indoors or enclosed	Same wet saw as above.	APF 10	APF 10
(iii) Handheld power saws for fiber-cement board (blade 8 in. or less) — outdoors only	Commercially available dust collection. Airflow at or above manufacturer rating. Filter 99% or greater efficiency.	None	None
(iv) Walk-behind saws — outdoors	Integrated water delivery that continuously feeds the blade. Operate and maintain per manufacturer to minimize dust.	None	None
(iv) Walk-behind saws — indoors or enclosed	Same wet saw as above.	APF 10	APF 10
(v) Drivable saws — outdoors only	Integrated water delivery that continuously feeds the blade. Operate and maintain per manufacturer to minimize dust.	None	None
(vi) Rig-mounted core saws or drills	Integrated water delivery to the cutting surface. Operate and maintain per manufacturer to minimize dust.	None	None
(vii) Handheld and stand-mounted drills (impact and rotary hammer)	Shroud or cowl with dust collection. Airflow at or above manufacturer rating. Filter 99% or greater with a filter-cleaning mechanism. HEPA vacuum when cleaning holes.	None	None
(viii) Dowel drilling rigs for concrete — outdoors only	Shroud around the bit with dust collection. Filter 99% or greater with a filter-cleaning mechanism. HEPA vacuum when cleaning holes.	APF 10	APF 10
(ix) Vehicle-mounted drilling rigs for rock and concrete	Dust collection with close-capture hood/shroud and low-flow water spray at the collector discharge; OR operate from an enclosed cab and use water on the bit.	None	None
(x) Jackhammers and handheld powered chipping tools — water method, outdoors	Continuous stream or spray of water at the point of impact.	None	APF 10
(x) Jackhammers and handheld powered chipping tools — water method, indoors or enclosed	Same water method as above.	APF 10	APF 10

(x) Jackhammers and handheld powered chipping tools — dust collection, outdoors	Shroud and dust collection. Airflow at or above manufacturer rating. Filter 99% or greater with a filter-cleaning mechanism.	None	APF 10
(x) Jackhammers and handheld powered chipping tools — dust collection, indoors or enclosed	Same dust-collection method as above.	APF 10	APF 10
(xi) Handheld grinders for mortar removal (tuckpointing)	Shroud and dust collection. At least 25 cfm per inch of wheel diameter. Filter 99% or greater plus cyclonic pre-separator or filter-cleaning mechanism.	APF 10	APF 25
(xii) Handheld grinders other than mortar removal — water method, outdoors only	Integrated water delivery that continuously feeds the grinding surface.	None	None
(xii) Handheld grinders other than mortar removal — dust collection, outdoors	Shroud and dust collection. At least 25 cfm per inch of wheel diameter. Filter 99% or greater plus cyclonic pre-separator or filter-cleaning mechanism.	None	None
(xii) Handheld grinders other than mortar removal — dust collection, indoors or enclosed	Same dust-collection method as above.	None	APF 10
(xiii) Walk-behind milling machines and floor grinders	Integrated water delivery to the cutting surface; OR manufacturer-recommended dust collection with airflow at or above rating, 99% filter, and filter-cleaning mechanism. Indoors: HEPA vacuum loose dust between passes.	None	None
(xiv) Small drivable milling machines (less than half-lane)	Supplemental water sprays with surfactant. Operate and maintain to minimize dust.	None	None
(xv) Large drivable milling machines (half-lane and larger)	Asphalt, any depth: exhaust ventilation on the drum enclosure plus supplemental water sprays. Cuts 4 in. or less on any substrate: same, OR supplemental water spray with surfactant.	None	None
(xvi) Crushing machines	Water spray or mist at the crusher and other dust points (hoppers, conveyors, sieves, discharge). Ventilated booth with fresh climate-controlled air, or a remote control station.	None	None
(xvii) Heavy equipment used to abrade or fracture silica materials, or demolition of silica materials	Operate from an enclosed cab. If anyone is outside the cab on the task, apply water and/or dust suppressants as needed.	None	None
(xviii) Heavy equipment for grading and excavating (not demolishing, abrading, or fracturing silica materials)	Apply water and/or dust suppressants as needed; OR if the operator is the only employee on the task, operate from an enclosed cab.	None	None

When working with materials containing crystalline silica. Fully implement the control and the respirator column or use Option 2 (assessment). APF 10 = half-mask / filtering face-piece class. APF 25 = full-face or equivalent.

Source: 29 CFR 1926.1153 Table 1. Indoor/outdoor splits are shown as separate rows so Pages stays readable. If the task is not on this table, or these controls will not be used in full, contact the M&M Excavating Safety Department before work starts (Option 2).

Option 2 — Exposure assessment and alternative controls

If the task is not on Table 1, or specified controls will not be used, the superintendent must contact the M&M Excavating Safety Department before the task starts. The Safety Department will assess the hazard. Results from tasks M&M Excavating does often will be kept and reused when they still apply.

1. **Exposure assessment.** Determine who may be at or above the action level (25 µg/m³ as an 8-hour TWA) using air monitoring or objective data that accurately characterizes the exposure.
2. **Objective data records** must show how the employee is exposed for that material, process, or task, under conditions like or higher than current work. Keep:
 - date of each sample
 - task monitored
 - sampling and analytical methods
 - number, duration, and results of samples
 - laboratory that ran the analysis
 - PPE used (including respirator type)
 - name, Social Security number, and job classification of employees represented by the monitoring
3. **Air monitoring.** Assess each employee who is or may reasonably be at or above the action level, using the performance option or scheduled monitoring. Give results to the employee within 5 business days of analysis.
 - **Scheduled monitoring.** Initial 8-hour TWA from personal breathing-zone samples on each shift, each job classification, each work area. If several people do the same task on the same shift in the same area, sample a representative group — the people expected to have the highest exposure.
 - Below the action level: monitoring for those represented employees may stop.
 - At or above the action level but at or below the PEL: repeat within 6 months.
 - Above the PEL: repeat within 3 months.
 - After non-initial monitoring that is below the action level: repeat within 6 months until two consecutive results, 7 or more days apart, are below the action level. Then monitoring for those represented employees may stop.
4. **Alternative exposure controls** must keep exposure at or below the PEL (50 µg/m³ as an 8-hour TWA):
 - Engineering: wet method or HEPA-filtered vacuum at the point dust is made (water on a stationary masonry saw; dust collector on a handheld grinder).
 - Work practice: do the task so exposure drops (follow manufacturer use and maintenance) or limit time (rotate people).
 - Respirators: typically only when engineering cannot get exposure down.

Respiratory Protection Requirements

1. If the task requires a respirator, a written respiratory protection program must be on site. The competent person (typically the superintendent) implements selection, clean-shaven use, fit testing, and training. See the Respiratory Protection Program.
2. Offer medical exams (including chest X-rays and lung-function tests) to employees required to wear a respirator 30 or more days per year. Keep:
 - Name and Social Security number
 - Copy of the PLHCP/specialist written opinions (Appendix B)
 - Copy of information given to the PLHCP (duties, exposure levels, PPE, prior work-related exam information the employer has)

Step 2 — Restrict access to other workers

Keep other workers out of areas at or above the action level (usually where respirators are required). Use signs, barricades, enclosures, spotters, or do the work only when other contractors and workers are clear.

Step 3 — Housekeeping

1. Wet-sweep or HEPA-vacuum surfaces and clothing unless the competent person determines dry sweeping is the only feasible method.
2. Do not use compressed air to clean clothing or surfaces unless it is tied to a ventilation system that captures the dust cloud.

Step 4 — Written exposure control plan

The competent person completes the Silica Exposure Control Plan (Appendix A) for each task that generates silica dust, whether using Table 1 or alternative methods.

Step 5 — Reassess when conditions change

Reassess exposures, engineering controls, and work practices whenever a change in the operation, equipment, people, or practices may create new or additional exposure at or above the action level.

Training

1. Train employees to recognize silica-dust tasks, the hazards, and how to limit exposure.
2. Each covered employee must be able to show they understand:
 - a. Health hazards of respirable crystalline silica
 - b. Specific tasks that could cause exposure
 - c. Controls in place (engineering, work practices, respirators)
 - d. Who the designated competent person is
 - e. Purpose and description of the medical surveillance program
3. The competent person must be trained to spot existing and foreseeable silica hazards, take prompt corrective action, and inspect sites, materials, and equipment often enough to run the written plan.
4. Evaluate the written plan at least annually, and sooner after rule changes, equipment changes, or exposure incidents. Tell affected employees what changed.

Appendix A — Crystalline silica exposure plan

Competent person completes one plan per job-site / task that generates silica dust. Keep a copy on site.

Jobsite	
Foreman / superintendent	
Date	
Competent person	
Materials on this job that contain crystalline silica	
Employee tasks that create exposure	
Compliance method	
☐ Option 1 — Table 1	List Table 1 row(s) used:
☐ Option 2 — Assessment	Safety Department contacted on:
Engineering controls (wet method, HEPA vacuum, shroud, enclosed cab, water sprays)	
Work-practice controls (manufacturer use, rotation, duration limits)	
Respiratory protection (none / APF 10 / APF 25) and who wears it	
How other workers are kept out of the area (signs, barricades, spotter, timing)	
Housekeeping (wet sweep / HEPA vacuum — no dry sweep or open compressed air unless noted)	
Competent person signature	
Date signed	
Plan reviewed (at least yearly, or after a change)	

Appendix B — Written medical report for the employee

Completed by the PLHCP. This copy goes to the employee. Do not put diagnoses unrelated to silica on the employer copy.

Employee name			
Date of examination			
Employer	M&M Excavating		
Type of examination			
☐ Initial examination			
☐ Periodic examination			
☐ Specialist examination			
☐ Other			
Results of the examination, including any condition that would increase risk from respirable crystalline silica, and any condition that needs further evaluation or treatment			
Recommended limitations on respirator use			
Recommended limitations on exposure to respirable crystalline silica			
Specialist referral recommended?	☐ No ☐ Yes — reason:		
Findings explained to the employee?	☐ Yes		
PLHCP			
Provider name			
Specialty			
Office address			
Office phone			
Signature			
Date			
☐ I attest this examination met 29 CFR 1926.1153(h)			

Concrete Operations

1. Wear the following PPE during concrete work:
 - a. Rubber over-boots when working in wet concrete. The company provides the boots.
 - b. Kneepads when finishing concrete.
 - c. Gloves when installing or removing formwork.
 - d. Hard hats when working around swinging concrete chutes and pump hoses.
 - e. Avoid contact with eyes and skin. If contact occurs, flush with clean water. If irritation continues, check the SDS binder.
 - f. A respirator when sweeping, cutting, or drilling into concrete. Ask your superintendent which respirator to use. See the Silica Program.
2. Wash your hands at the wash station after handling concrete.
3. Confirm all utilities are shut off before drilling or cutting.
4. Watch for moving traffic and heavy equipment during roadway pours. Face oncoming traffic. Watch float poles that extend into live lanes. Use a spotter if needed.
5. Stay clear of overhead power lines. Keep the ends of float poles at least 10 feet from lines up to 50 kV.

Demolition Operations

1. Before demolition, survey the building condition, whether adjacent structures will be affected, and any other condition that could threaten employee safety. Keep a copy of the written report in the field office.
2. Confirm all utilities are shut off.
3. Do manual demolition only under the direction of the qualified person.
4. Do not torch-cut painted steel unless it has been determined not to contain lead.
5. Asbestos must be removed by an associate contractor before demolition. If you suspect or find asbestos, stop work and tell your superintendent.
6. Do not put mechanical equipment on a floor or working surface unless it can support the equipment and its intended load.
7. Use curbs or stop logs so mechanical equipment cannot track over an edge or drop.
8. Only employees needed to run mechanical demolition are allowed in the demo area.
9. Use water to control dust during demolition when it is feasible.

Pile-driving Safety

1. Hose connections to pile-driver hammers, pile extractors, or jet pipes shall be securely attached, with enough cable to stop whipping if the joint breaks.
2. Hanging or swinging leads shall have fixed ladders. Fixed leads shall have rings or attachment points so the aloft worker can hook a lanyard to the leads.
3. Do not use landings or leads for storage of any kind.
4. Pile-driver leads shall have stop blocks so the hammer cannot be raised against the head block.
5. Lower pile hammers to the bottom of the leads while the pile-driver is being moved.
6. Hoist steel piling with a closed shackle or other positive attachment that cannot come off by accident.
7. If piling cannot be pulled without exceeding the equipment load rating, use a pile extractor.
8. Do not pull piling by tipping the crane, dumping the load brake, and catching the load before the crane settles.
9. Always place a blocking device in the leads under the hammer while employees work under the hammer.
10. Guards shall run across the top of the head block so the cable cannot jump the sheaves.
11. Steam or airline controls shall have two shutoff valves. One shall be a quick-acting lever within easy reach of the hammer operator.
12. Keep all employees clear when piling is hoisted into the leads.
13. When driving jacked piles, access pits shall have ladders and bulkheaded curbs so material cannot fall into the pit.

Aerial Work Platforms

1. Use one of these fall-protection systems when operating an extendable or articulating boom-supported aerial lift:
 - a. Fall arrest. Wear a harness and clip the lanyard to the designated anchor on the machine. The lift must be designed to take the vertical and side load of an arrested fall.
 - b. Fall restraint. Wear a harness with a short (2-foot) lanyard that will not stretch or “break” away. Clip it so the operator cannot reach a fall distance. Use restraint on lifts that are not designed for an arrested fall (typically smaller lifts).
2. Only employees who have been trained and issued a permit may operate an aerial work platform.
3. At the start of each shift, before use, the operator shall:
 - a. Operate all platform and ground controls to confirm they work.
 - b. Inspect the work area for ditches, drop-offs, holes, floor and overhead obstructions, debris, power lines, and clearance.
 - c. Correct unsafe items before using the lift.
 - d. Visually inspect the lift for defects that would affect safe operation (cracked welds, bent or broken members, damaged controls and cables, loose wires, tires, fluid levels, slippery platform).
4. A permit is valid only for work for the employer who issued it.
5. Every occupant shall wear a harness with the lanyard attached to the proper points on the platform.
6. Never tie off to an adjacent structure from an aerial platform.
7. **Operating aerial lifts** — general
 - a. Do not exceed the manufacturer’s rated load.
 - b. Raise the platform only on a firm, level surface, or within the slope limits.
 - c. Use outriggers or stabilizers if the manufacturer provides them. Set the brakes. Put outriggers and stabilizers on pads or solid ground.
 - d. Keep the platform floor clean. Only employees, their tools, and necessary materials belong on the platform.
 - e. Keep your feet on the platform. Do not use rails, ladders, planks, or anything else to gain height.
 - f. Keep gates closed and chains secured when the platform is up.
8. Operating aerial lifts on or next to roadways
 - a. Traffic control shall comply with Part 6 of the MMUTCD.
 - b. Keep enough clearance from live lanes so no part of the lift (articulating or extensible boom), tools, or material can enter a live lane.
9. Never stand on rails or planks to gain working height.
10. Keep at least 10 feet from energized electrical lines.

Scaffolding

1. Erect scaffolding only under the direction of a qualified employee.
2. A competent person shall inspect scaffolds each day. Damaged or weakened parts (bent braces, split planks, broken platforms, unstable ground support) shall be removed from service or repaired before use.
3. If you see damaged parts, missing guardrails, or other scaffold safety problems, tell your superintendent immediately.
4. Every employee shall be trained to recognize the hazards of the scaffold they are using.
5. See MIOSHA Construction Safety Standard — Part 12 Scaffolds and Scaffold Platforms, the manufacturer’s recommendations, and any engineering design for additional requirements.
6. Keep scaffolding free of extra tools, materials, and debris.
7. Scaffolds 6 feet or higher shall have a guardrail system on any open side.
8. Remove from service wood or laminated planks in poor condition, and any bent scaffold members.
9. Keep 6 feet from energized lines.
10. Wear a fall-arrest device when working on a scaffold at or above 10 feet.

Miscellaneous Rules

1. Do not use tools or equipment you have not been trained and authorized to use. This includes power-actuated tools.
2. Store and transport gasoline only in approved cans. Shut engines off when refueling. No smoking near flammable liquids.
3. Report all injuries — yours or a coworker's — to your superintendent immediately.
4. Do not distract fellow workers.

Definitions

1. **Competent person.** Can identify an existing or potential hazard in the surroundings or working conditions that is dangerous to an employee, and has authority to correct it promptly.
2. **Qualified person.** Has a recognized degree or professional standing, or extensive knowledge, training, and experience, and has shown they can solve problems on the subject matter and the work.
3. **Authorized person.** Approved or assigned by the employer to perform a specific duty or to be at a specific location on the job-site.
4. For this program, unless stated otherwise, a qualified individual is also deemed competent and authorized.

Employee Information and Training

All employees must have the safety training needed to be on the job-site. If someone needs training in a language other than English, written or oral translation will be provided to the best of our ability.

1. The Safety Manager coordinates and keeps records of training for M&M Excavating.
2. Before starting work, or as soon as possible after, each new employee attends a safety briefing covering:
 - a. Chemicals and their hazards in the workplace.
 - b. How to lessen or prevent exposure.
 - c. What the company has done to lessen or prevent exposure.
 - d. What to do if they are exposed.
 - e. How to read and interpret labels and SDS.
 - f. Where SDS are kept and who can provide copies.
3. Employees will also be told:
 - a. The employer may not discharge or discriminate against an employee for exercising rights to information about hazardous chemicals.
 - b. Attendance is taken at training. The Safety Manager keeps the records.
 - c. Before a new hazardous chemical is brought into the workplace, employees get the same information they got in the briefing.

Signals, Signs and Barricades

1. Some traffic layouts use the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). MDOT has placement plans for those devices. Ask your qualified person about proper placement.
2. When controlling traffic, use a handheld stop/slow paddle on a 6-foot staff.
3. Barricades may be used to direct vehicle traffic when work is in a public right-of-way. Ask your superintendent.
4. When working in or next to vehicle traffic, face the flow of traffic or use a spotter.
5. Barricade hazardous areas. Caution tape may not be enough to keep people out. Guardrails or perimeter cable plus danger signs may be needed. Barricades should be lighted or reflective at night.
6. Do not enter a barricaded area. Get instruction from your superintendent first.
7. Post danger signs where an immediate hazard may not be obvious (for example: DANGER – Overhead Power-lines).

Heavy Equipment Rules

1. Every employee — not just the operator — must know the safety side of heavy equipment.
2. Stay alert around heavy equipment. The operator cannot always see people near the machine. Stay out from under suspended loads and away from moving equipment and counterweights.
3. Only designated people may operate or service heavy equipment.
4. Do frequent and periodic inspections as required.
5. Keep a 5 BC fire extinguisher in the excavator cab or within 100 feet.
6. Do not ride on any part of heavy equipment unless a seat and seat belt are provided. Operators shall wear the seat belt if one is provided.
7. Hooks on buckets and booms shall have self-closing latches.
8. Everyone is responsible for backup alarms on equipment with an obstructed rear view. If an alarm does not work, use a flagger to move the machine.
9. Keep a 10-foot minimum clearance from energized lines. Use a spotter in tight spots.

Guarding work areas

1. Never use rebar for guardrail construction.
2. Space guardrail posts not more than 8 feet apart.
3. Top-rail height shall be 42 inches, plus or minus 3 inches.
4. The mid-rail shall sit halfway between the floor and the top rail.
5. Guard open-sided floors and work platforms 6 feet high or higher, unless a safety belt or harness is used.

Fall Protection

1. Cover manholes that present a fall hazard and mark them as a hole.
2. Do not walk or work on a surface (platform, roof, floor) that may be deteriorated, rotted, or not fully installed. Tell your superintendent if you see a defective walking or working surface.
3. The superintendent (or other designated employee) shall inspect walking and working surfaces to confirm they have the strength and structural integrity to support employees.

Guardrail specifications

1. Install guardrails along edges of walking or working surfaces that are 6 feet or more above a lower level. If there is no guardrail, use another fall-protection system.
2. A guardrail is a top rail and a mid-rail. Add a toe-board when people are working below.
3. Typical construction is 2x4 lumber or 3/8-inch wire-rope cable. Never use rebar.
4. Set top rails or cables 39 to 45 inches above the floor or lower working level.
5. Top rails shall take at least 200 pounds applied outward or downward.
6. If wire-rope cable is used, the top cable shall stay tight and not sag below 39 inches when pushed down or out. Flag it every 6 feet with high-visibility material.
7. Set mid-rails or cables halfway between the floor (or lower working level) and the top rail. They shall take 150 pounds applied outward or downward.
8. Space support posts not more than 8 feet apart for 2x4 guardrails. End top rails and mid-rails flush with the posts. No sharp edges or protruding nails. Wire-rope support points may be farther apart.
9. Guardrails around open shafts and bore pits deeper than 6 feet shall be 42 inches high, plus or minus 3 inches. Mid-rail halfway between floor and top rail.
10. Fall-protection threshold is 6 feet. Options are guarding, a personal fall-arrest system, or safety nets. Ask your qualified person.

Personal fall-arrest system specifications

1. Wear a personal fall-arrest system (PFAS) when exposed to a fall of 6 feet or more.
2. The harness attachment point shall be in the center of the wearer's back, near shoulder level.
3. Never use a body harness as a material-handling device.
4. Do not reuse fall-protection gear that has taken an impact load until a qualified employee inspects it and clears it. Tag it out of service until then.
5. A PFAS is three parts: harness, lanyard or lifeline, and anchor point.
6. Visually inspect the harness, lanyard, lifeline, and anchor before each use for wear, damage, and deterioration. Remove defective gear from service. Do not use it.
7. The harness shall fit — not so loose it slips, not so tight it blocks movement. D-ring on the upper back near the shoulders.
8. Use only properly rated lanyards, vertical lifelines, and connectors made for fall protection. Do not tie, shorten, or knot lanyards.
9. Only self-locking snap hooks. Do not clip a snap hook to an object or structure unless the hook is designed for that connection. Ask your superintendent if you are unsure.
10. Horizontal lifelines shall be designed, installed, and used under the superintendent or another designated qualified person. These systems are typically engineered for a safety factor of at least two.
11. Do not attach a lanyard or lifeline to a guardrail. Anchors shall support at least 5,000 pounds per employee. Most guardrails are not designed as anchors. Ask your superintendent.
12. Plan and provide prompt rescue for anyone wearing a PFAS unless the system is designed to rescue them. Employees, ladders, aerial lifts, and equipment may be used for rescue.

Restraint system specifications

1. Design and install restraint so the employee cannot reach a fall hazard (edge, floor opening).
2. Use only fixed lifelines, lanyards, and anchors. Do not use deceleration devices or parts that break away, elongate, or lengthen when loaded.
3. Restraint components shall meet the same criteria as PFAS (harnesses, snap hooks, lifelines, lanyards). Do not use miscellaneous rope or knots.
4. Anchor a restraint system to a fixed point strong enough for at least two times the potential load.

Fall protection plan for precast box-culvert construction

M&M Excavating is dedicated to protecting employees from on-the-job injuries. Everyone is responsible for working safely. This plan adds standards for fall protection on box-culvert work and requires training in those provisions before construction starts.

Use this plan where conventional fall protection is not used. Activities that may need non-conventional means:

- | | |
|---|-------------------------------|
| 1. Rigging (hooking and unhooking precast sections) | 4. Unprotected sides or edges |
| 2. Connecting (point of erection) | 5. Grouting |
| 3. Leading-edge work | 6. Final wrapping |

The plan is so employees can recognize fall hazards on this job and follow procedures that prevent falls to a lower level. Train every employee in these procedures. Follow them unless doing so would create a greater hazard. If that is the case, tell the superintendent and settle it before going on.

No one person can run safety alone. It takes everyone on the project. Each employee needs to know their value to the company; the cost of accidents (money, body, and family); the point of this policy; the rules that apply; and their own role. Planning, training, and cooperation come first. If an unsafe act continues, enforcement follows.

The superintendent implements this plan, watches the work, enforces it, and corrects unsafe acts or conditions immediately. Employees follow the plan and the superintendent's instructions, and they report unsafe conditions or acts.

Any change to this plan must be approved by:

Qualified person: _____

Fall-protection systems on this project

Where conventional fall protection is infeasible or creates a greater hazard at the leading edge and during initial connecting, use a safety-monitoring system and expose only the minimum number of employees for the time needed.

The Safety Monitor role may rotate among two or more trained employees under the superintendent. One designated Safety Monitor watches a maximum of three designated erectors in the Controlled Access Zone. The Safety Monitor wears an orange hard hat.

Safety Monitors for this project:

Designated erectors may enter the Controlled Access Zone and work without conventional fall protection. They wear a blue hard hat.

Designated erectors for this project:

1. Only people with the right experience, skill, and training are authorized as designated erectors. Training for that role shall cover:
 - Recognition of fall hazards in the work area (leading edge, initial connections, grouting, wrapping, hooking and unhooking crane rigging)
 - Avoiding those hazards with established work practices
 - Recognizing unsafe practices or conditions that could lead to a fall, including wind
 - Function, use, and operation of safety-monitoring systems, control zones, and other protection
 - Correct procedures to erect, maintain, and inspect the system
 - Knowledge of the box-culvert sequence or erection plan
2. Before work starts, the superintendent holds a conference with designated erectors, Safety Monitors, the crane crew, and supervisors of other contractors on the job. Cover erection sequence and the safety practices that will be used.
3. Tell everyone that the Controlled Access Zone is off limits except to designated erectors trained to work there.

Safety Monitoring System

A safety-monitoring system is a competent person who watches for fall hazards and warns employees. The Safety Monitor shall:

1. Call out if someone approaches an open edge in an unsafe way.
2. Call out if a dangerous situation is developing that the person placing product cannot see.
3. Make designated erectors aware they are in a dangerous area.
4. Be competent at recognizing fall hazards.
5. Warn employees who appear unaware of a fall hazard or who are acting unsafely.
6. Be on the same walking/working surface as the people being watched, and within sight of them.
7. Be close enough to talk to them.
8. Not take on other work that gets in the way of monitoring. If the monitor gets overloaded, stop erection and hand monitoring to another designated monitor.

Do not use the safety-monitoring system when wind makes footing unstable, or when ice or slip makes the walking surface unsafe.

Controlled Access Zone (CAZ)

A CAZ is a marked area where leading-edge work and other operations may proceed without guardrails, safety nets, or PFAS for the employees inside it.

On this work the CAZ is the entire top deck of the box culvert during erection, grouting, and wrapping.

- Mark it with a sign at the base of the ladder access that restricts the area to designated erectors installing precast sections.

A CAZ is a marked area where leading-edge work and other operations may proceed without guardrails, safety nets, or PFAS for the employees inside it.

On this work the CAZ is the entire top deck of the box culvert during erection, grouting, and wrapping.

How this plan is used on the job

Typical roadway box culverts are up to 12 feet high × 20 feet wide × up to 200 feet long.

This project:

Overall finished length: _____

Number of precast sections: _____

Each section — height: _____ width: _____ length: _____

Rigging

Sections arrive on a trailer, come off into a staging area, then go to assembly. Designated erectors use a portable ladder to get on top of each section to hook and unhook. They cannot reach the lift points from the ladder. After hook or unhook they climb down while the section is hoisted. Another employee foots the ladder and watches from the ground. The fall exposure is short (usually a few minutes) — shorter than the time to install and strip temporary anchors.

Precast sections, connections, grouting

The work deck gets longer with each section. The leading edge moves. Fall protection on the deck during erecting, welding connections, and grouting is the safety-monitoring system. Only designated erectors work on the deck.

Whenever possible, approach the incoming member at the leading edge only after it is below waist height so the member itself blocks a fall. When the member is within 2–3 inches of final position, designated erectors move to each end under the Safety Monitor. Crane hooks come off under the monitor's direction.

While waiting for the next member, stay under the monitor and stay at least 6 feet from the edge. To go from one end of a just-placed member to the other, first step back 6 feet from the leading edge, then walk the other way while keeping that 6 feet.

Connecting (welding) and grouting happen in the erection sequence at first connection, under the monitor. Face unprotected edges and keep 6 feet when you can.

Wrapping

After all sections are in, designated erectors wrap the top and sides with membrane from the work deck, working backward sheet by sheet under the monitor. Membrane is about 4 feet wide.

Why conventional fall protection is not used for this sequence

Personal fall-arrest systems. On this sequence, PFAS does not cut the hazard and creates others during first placement:

- The exposure is short. Installing a system first exposes the installers longer to the same edge.
- Hooking, unhooking, and guiding multi-ton sections needs free movement. Lifelines and lanyards restrict that.
- Two or more workers move around each other. Tangled lines pull attention off the load. Retractables do not fix a tangle and can fail to retract.
- Crossing another person's line can unbalance both. One fall can take the second person.
- Grout in a retractable housing can wear or jam the unit.
- A tied-off erector can be trapped in the path of a moving member.
- Retractables lock around 3.5–4.5 ft/sec. Slack toward the device can jerk the worker and damage the drum.

Sudden movement can come from:

- Crane — operator error, soft ground, mechanical or structural failure, rigging failure, signal/radio failure
- Weather — wind or gusts, snow/rain, fog, cold
- Structure/product — lifting-eye failure, bearing slip, shift, bracing or product failure
- People — bad tag-line use, hang-up, wrong signal, misjudged height or speed

Cast-in anchors need the design engineer's approval and later patching, which puts someone back on an open edge. Overhead temp supports take space needed to land the section, can be struck by the load, and take more hours (and more edge time) than placing the section. There is usually no structure above the piece being set.

Retractables want a fixed point above the D-ring. Floor-level cables or inserts increase free fall, arrest force, and swing. Horizontal cables multiply force at the supports (a 2-degree sag can multiply about 15 times). A line dragged over a concrete edge while loaded can break; typical 3/16-inch retractable cable is about 3,000–3,700 lb.

The competent person decides when a designated erector cannot use PFAS on this project.

Safety nets. Deck is typically 16 feet or less above grade — not enough clearance under a net for the drop-test impact. The net would have to move after every section. Install/test/strip time is longer than placing a section, so net installers would be exposed longer than the people the net is meant to protect. Perimeter attachments leave holes to patch. A net at the leading edge can snag the incoming member.

Guardrails. The perimeter changes with every section. After the box is complete the whole thing is wrapped with 4-foot membrane. A rail at the moving leading edge blocks swinging the next section in low enough to control it, and erectors would have to work through the rail. Drilling for posts exposes people longer than the rail would protect. A rail also creates pinch points with the suspended load.

Other measures considered

If an erector sees a spot that would be safer with one of these, tell the superintendent.

- Scaffolds — leading edge moves too often; erectors of the scaffold would be exposed longer; the frame can block the load; power lines, terrain, or the site may not allow it.
- Vehicle-mounted platforms — site/terrain; can block the load.
- Crane-suspended platforms — a second crane in the same air can interfere with the member crane; power lines and site work may not allow a second crane.

Weather

Suspend work if warranted for:

- Wind (strong wind or sudden gusts)
- Snow or rain (visibility)
- Fog (visibility)
- Cold (slowed reactions or mechanical problems)

Enforcement

Following this plan is a condition of employment. The superintendent or Safety Manager may discipline, up to termination.

Accident investigations

Investigate and report every injury, no matter how small, as soon as possible so the cause and a fix can be found. If someone falls or another serious incident happens, review this plan and add practices, procedures, or training if needed.

Changes to the plan

Approved by: **Qualified person:** _____

A qualified person reviews the plan as the job moves and adds practices, procedures, or training if needed. Train people on new procedures. Keep a current copy on the job.

(Adapted from a MIOSHA Part 45 / MITA template. Fill the length, count, and dimension blanks for each job.)

Safety Net Specifications

1. Use only safety nets and hardware rated and designed as a fall-protection system.
2. Install nets as close as possible under the walking/working surface. Never more than 30 feet below.
3. Nets shall extend outward from the outermost projection of the walking/working surface:

Vertical distance from working level to the net	Minimum horizontal extension past the working surface
Up to 5 feet	8 feet
More than 5 feet, up to 10 feet	10 feet
More than 10 feet	13 feet

4. Leave enough clearance under the net so a drop test does not hit the surface or structure below.
5. Drop-test with a 400-pound bag of sand from the highest working point:
 - a. After first install, before anyone uses the net
 - b. Whenever the net is moved
 - c. After a major repair
 - d. Every six months if it stays in one place
6. If a drop test cannot be done, a competent person shall certify in writing that the net and components meet strength and clearance. Keep that record on the job. Include location, date, and signature.
7. Remove materials, scrap, equipment, and tools that fall into the net as soon as possible — at least before the next shift.
8. Inspect nets and components at least once a week for wear, damage, and deterioration. Take defective nets and parts out of service.

Floor Openings and Holes

1. Cover floor openings and holes (2 inches or greater) that are 6 feet or more above a lower level. Larger holes may be guarded with a rail instead.
2. Covers shall support at least twice the maximum load expected from vehicles, employees, equipment, and materials at one time.
3. Secure covers so wind, equipment, or people cannot move them.
4. Mark covers with high-visibility paint or the words COVER or HOLE.
5. If a cover comes off to do work, put it back immediately. Never leave the hole open.

Falling Object Protection

1. Wear a hard hat when walking or working under areas where people are working or falling objects are possible.
2. If needed, install toe-boards, screens or panels, guardrails, or canopies so debris, material, and tools cannot fall from overhead edges.

Work-zone Safety

Wear the high-visibility apparel below when working on a roadway or next to vehicle traffic.

Class 1

High-visibility shirt or vest. Daylight with good visibility.

Class 2

High-visibility vest or jacket with 360-degree reflective material and contrasting colors. Daylight with good visibility. Class 2 is the minimum MDOT requirement inside the highway right-of-way.

Class 3

More background material and 360-degree retroreflective material. Vest or jacket and hard hat. Night work, and low-visibility daylight.

Always face oncoming traffic or use a spotter when working on a roadway or next to vehicle traffic.

Traffic Control Devices

1. Place, remove, and maintain devices as required by Part 6 of the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). MDOT may also issue a project-specific plan. Ask your superintendent or the designated qualified person which plan and devices apply.
2. Place all devices under the direction of the qualified employee. While flagging or directing traffic, wear a reflectorized fluorescent-orange warning vest and a hard hat. Be courteous.
3. Control traffic with a 6-foot staff and a two-sided paddle: STOP on one side, SLOW on the other.
4. Install and maintain devices per MMUTCD Part 6.
5. When working in or next to vehicle traffic, face the flow of traffic or use a spotter.
6. Replace damaged devices and downed signs as soon as possible.
7. Cover construction traffic control when work is not in progress, if possible.
8. Take traffic-regulation questions to the qualified person.
9. Light traffic-regulator stations to at least 10 foot-candles at night.

Rules of Conduct for Traffic Regulators

1. Pay attention to your surroundings. Do not mingle with the crew, the traveling public, or other people.
2. Watch traffic. Never turn your back on approaching vehicles.
3. Spot dangerous traffic early enough to warn workers and other regulators.
4. Plan an escape path. Move fast if an errant vehicle comes at the station.
5. Do not leave the station until a replacement is there and ready.
6. Do not sit in a parked vehicle while directing traffic, and do not have someone else sitting in that vehicle.
7. Do not use a cell phone to direct traffic unless your superintendent tells you to.

Utility Locating — Best Practices

Before excavating

Call **MISS DIG** at **800-482-7171** at least 72 hours before construction, and not more than 14 calendar days before. Keep the ticket number. Be specific about the limits of the proposed excavation.

Positive response

Participating utility owners notify MISS DIG through an automated response. Use that to confirm every utility in the proposed area has been located — or that the owner has no facilities there. Check **missdig.org** or **800-763-3888**.

No marks

If work started within the 14-day window on or after the ticket start time, and there is reason to worry about an unmarked facility because:

There is visible evidence of a facility,
A notified owner did not give a positive response, or
Positive response said it was marked, but the marks are gone,

call MISS DIG. The owner shall respond within 3 hours, unless you and the owner agree on a later time.

Additional assistance

If a marked facility cannot be pinpointed, request help through **MISS DIG (800-482-7171)**. During normal hours (7 a.m. to 5 p.m. on a business day) the owner has 3 hours to respond, or meet at a mutually agreed time.

Excavating

Start within 14 days of the dig-start date on the ticket. If you miss that window, get a new ticket before you dig.

Safe zone

48 inches or farther from either side of the owner's mark. No hand-dig or verification required. Stay alert for unmarked facilities.

Caution zone

Within 48 inches of either side of the mark. Soft-excavate or hand-dig to find the facility before powered work. Work that runs parallel to a facility needs hand-dug test holes as often as reasonably needed to stay on the line. Powered excavation may start after the facility location is established.

Zone	What it means
Safe zone	48 inches or more from either side of the utility mark. Powered excavation is allowed. Stay alert for unmarked facilities.
Caution zone	Within 48 inches of either side of the mark. Soft-excavate or hand-dig to find the facility before powered work. Parallel work needs hand-dug test holes as often as needed to stay on the line.

Marks

Paint, stakes, and/or flags mark underground facilities. Colors:

Color	Facility
Yellow	Natural gas, oil, steam, petroleum, or other gases
Orange	Phone and cable
Red	Electric
Blue	Water
Green	Storm drains
Brown	Sewer

Paint, stakes, and flags may be used together.

Excavations

Protecting Underground Utilities.

1. Do not start excavating until MISS DIG has been called and P.A. 174 locating rules are met.
2. Adequately support utilities (gas lines, piping, structures) that work has exposed or disturbed.
3. If a utility is struck or damaged, tell the superintendent immediately. Evacuate the excavation if the damage could cause explosion, asphyxiation, or electrocution. Report damage to the facility owner.

Inspections

1. Do not enter an excavation or trench unless the superintendent says to. The superintendent or another designated qualified person shall inspect each excavation before anyone enters, and keep inspecting for instability (cracks, slides, cave-ins, water, flaking) after rain or other changes.
2. If a hazardous condition is found, stop work and get out until protection is added (more shoring, cut the slope back). Tell your superintendent if you have a safety concern.

General Excavation Requirements

1. Install cave-in protection (sloping, shoring, sheeting, trench boxes) before entering an excavation more than 5 feet deep.
2. Keep spoil, rocks, debris, and material at least 2 feet back from the edge.
3. Wear a hard hat. Stay inside the protective system.
4. Never climb on shoring, shields, or sloped walls. Do not ride buckets, lifts, hooks, chains, cables, slings, or other equipment parts.
5. Do not work where water is accumulating unless precautions are in place (special shoring or a box, pumps, or harness and lifeline).
6. Do not work where there is an atmospheric hazard unless air has been tested and proper protection (respirators, ventilation) is provided.

Access and egress

1. Use a ladder or ramp to get in or out of an excavation deeper than 4 feet.
 2. Place the ladder or ramp within 25 feet laterally of where people are working.
 3. Ladders shall be stable and extend 3 feet above the top of the excavation.
 4. Earth ramps shall be stable and no steeper than 45 degrees. Place the ramp no more than 30 feet from the bottom.
- Manholes, pipe, and similar structures are confined spaces. A qualified person shall evaluate and test for oxygen, combustibles, and toxics before anyone uses them to travel through for access. See the Confined Space Program.

Fall Protection for Excavations

1. Do not leave open manholes unprotected. Cover them or use a guardrail or barricade. A temporary cover shall be labeled, strong enough, and secured or made of material that will not kick out.
2. Stationary or long-term excavations 6 feet or deeper (bore pits, wells, shafts) shall have guardrails, fences, barricades, or covers.

Energized Lines

1. Excavators and backhoes shall keep the minimum clearance in Table A from overhead energized lines.
2. Use a spotter if the operator cannot hold that distance by eye. The spotter stays in visual contact with the operator and does spotting only.

Table A — Minimum Clearance Distances

Voltage (kV)	Minimum clearance (feet)
Up to 50	10
Over 50 to 200	15
Over 200 to 350	20
Over 350 to 500	25
Over 500 to 750	35
Over 750 to 1,000	45
Over 1,000	Check with the utility owner or a registered professional engineer

Table B — Minimum Clearance Distances While Traveling with no Load

Voltage (kV)	Minimum clearance while traveling (feet)
Up to 0.75	4
Over 0.75 to 50	6
Over 50 to 345	10
Over 345 to 750	16
Over 750 to 1,000	20
Over 1,000	Check with the utility owner or a registered PE

1. Bench only when the soil can hold a 5-foot vertical side (for example, stiff clay).
2. Vertical rise no more than 5 feet. Step back at least to the angle of repose in Chart A.
3. Height of the lower bench shall not be more than the lesser of 5 feet or the trench width at the bottom.

Sloping requirements

Trenches and excavations more than 5 feet deep shall be cut back, sloped, or benched to the angle of repose for that soil and those site conditions, unless they are supported by sheeting or a shoring system. Use Chart A for the maximum angle.

Chart A — Maximum angle of repose (more than 5 feet deep)

Soil	Angle	Slope	Min. strength
Solid rock	90°	vertical	—
Fractured rock	75°	1/4 : 1	—
Stiff clay	63°	1/2 : 1	2.5 TSF
Firm clay	56°	2/3 : 1	1.5 TSF
Granular soil — dry	45°	1 : 1	1.0 TSF
Granular soil — wet	34°	1½ : 1	1.0 TSF
Saturated granular	26°	2 : 1	—
Running soil	18°	3 : 1	—

Flatten the sides more than Chart A if water, silt, loose boulders, erosion, frost, or slide planes are present. Use the lowest penetrometer reading (TSF) to pick the row.

See Figure 2 in Appendix — Figures for Chart A (maximum angle of repose).

Determining soil type with a penetrometer

1. Take several samples to judge soil type and strength, and to pick the angle of repose. The penetrometer reads strength in tons per square foot (TSF).
2. Take more readings if conditions change as the hole gets deeper. Protect the person taking the readings.
3. Use the lowest reading to pick the Chart A row. Example: four readings between 1.5 and 2.5 TSF → use 1.5 TSF → 56° (firm clay).

Calculating the angle of repose

Divide height by slope width. That number is the tangent. In the example: 7 ft ÷ 4 ft = 1.75.
Use Chart C to turn the tangent into degrees. 1.75 = 60°.

See Figure 3 in Appendix — Figures for Chart B (how to measure height and slope width). Use the Chart C table on this page to convert the tangent to degrees.

Chart C — Tangent to degrees

Tan	Deg	Tan	Deg	Tan	Deg
0.000	0	0.577	30	1.73	60
0.017	1	0.601	31	1.80	61
0.035	2	0.625	32	1.88	62
0.052	3	0.649	33	1.96	63
0.070	4	0.675	34	2.05	64
0.087	5	0.700	35	2.14	65
0.105	6	0.727	36	2.25	66
0.123	7	0.754	37	2.36	67
0.141	8	0.781	38	2.48	68
0.158	9	0.810	39	2.61	69
0.176	10	0.839	40	2.75	70
0.194	11	0.869	41	2.90	71
0.213	12	0.900	42	3.08	72
0.231	13	0.933	43	3.27	73
0.249	14	0.966	44	3.49	74
0.268	15	1.000	45	3.73	75
0.287	16	1.036	46	4.01	76
0.306	17	1.072	47	4.33	77
0.325	18	1.111	48	4.70	78
0.344	19	1.150	49	5.14	79
0.364	20	1.192	50	5.67	80
0.384	21	1.235	51	6.31	81
0.404	22	1.280	52	7.12	82
0.424	23	1.327	53	8.14	83
0.445	24	1.376	54	9.51	84
0.466	25	1.428	55	11.43	85
0.488	26	1.483	56	14.30	86
0.510	27	1.540	57	19.08	87
0.532	28	1.600	58	28.64	88
0.554	29	1.664	59	57.29	89

Compare that degree to Chart A for the soil you measured. If the cut is steeper than Chart A allows, it is not cut back far enough.

Benching requirements

1. Bench only when the soil can hold a 5-foot vertical side (for example, stiff clay).
2. Vertical rise no more than 5 feet. Step back at least to the Chart A angle of repose.
3. Height of the lower bench shall not be more than the lesser of 5 feet or the trench width at the bottom.

Trench boxes, shoring, shields, and sheeting

1. Boxes, shoring, or sheeting may be used alone or with sloping or benching. The qualified person picks the system. Keep the manufacturer's trench-box design on the job.
2. Use a ladder or ramp to get into the box.
3. Stay inside the protective system (box, shoring, slope, or sheeting).
4. Everyone out before the box is installed, moved, or removed.
5. The toe of the box shall not be more than 2 feet above the trench floor unless there is protection below the box.
6. Keep the sides of the excavation at least 18 inches below the top of the box. Slope any soil above the box.

Trench boxes, shoring, shields, sheeting

Rule	Detail
Who picks the system	Qualified person. Manufacturer design on site.
Access	Ladder or ramp into the box.
Stay inside	Box, shoring, slope, or sheeting.
Move / remove	Everyone out of the box first.
Toe of the box	Not more than 2 feet above the trench floor unless protection is below the box.
Soil above the box	At least 18 inches of box wall above the soil line. Slope soil above the box.

See Figure 4 in Appendix — Figures for the trench-box cut (18 inches of box above the soil, 2 feet max from the toe of the box to the floor).

Shoring design sketches and open-cut examples are a guide only. They are not MIOSHA standards. See Figures 5–... in Appendix — Figures. The manufacturer's design for the box in use shall still be on the job.

Trenching Rules

1. Spoil at least 2 feet back from the lip.
2. Everyone in the trench stays inside the protective system (shield, shoring, or slope).
3. Never climb on shoring, shields, or sloped walls. Do not ride lifts, hooks, chains, cables, slings, or other parts.
4. Ladders extend at least 3 feet above the top. Everyone in the trench shall be within 25 feet of a ladder or ramp.
 - a. More detail: MITA Trench Safety Handbook.
 - b. Trenches over 5 feet deep shall be cut to the angle of repose, sheeted, or shored.

Tunnel Rules

1. Always use the in-and-out board.
2. Wear the PPE for the assignment.
3. Never stand under a load being lowered into the shaft.
4. Before tunneling, have rescue equipment in place and the tunnel rescue team assembled.
5. Inspect haulage equipment regularly.
6. Always have a top-man when people are in the tunnel.
7. Tunnels longer than 225 feet shall have communication at:
 - a. The working face
 - b. The top of the shaft
 - c. The bottom of the shaft
 - d. The hoisting station, if provided
 - e. Each 1,000 feet of tunnel
 - f. The office, if provided
8. Test the tunnel atmosphere as often as needed to keep oxygen at least 19.5% and not more than 22%. Record the results.

Auger Operations

1. Stay a safe distance from rotating augers.
2. Remove extra dirt only after the augers have come to a complete stop.
3. Do not work on auger equipment unless controls are locked out or the keys are pulled so it cannot start.
4. Cover open holes until the dewatering system is in.

Pipe Boring and Jacking Operations

1. Build the pit to the design unless the qualified person on site directs otherwise.
2. Barricade the pit with one or more of the following:
 - a. Snow fence at least 6 feet back from the edge
 - b. Railing at least 42 inches high with a mid-rail
 - c. Steel plates driven so they give 42 inches of fall protection
3. The area in front of the excavator stays unbarricaded during work hours so the machine can reach and the operator can see. No one between the excavator and the open side of the pit. Barricade that side after hours.
4. Entry into any casing requires:
 - a. Test and record air before entry. Monitor continuously while occupied.
 - b. Never enter a small-diameter casing without anklets and a lifeline.
 - c. A rolling cart is recommended in small-diameter casings.
 - d. Never enter a casing without an attendant.
 - e. Have ventilation available and use it if needed.
 - f. Five-minute air packs on site before anyone enters a casing.
5. Get in and out on an approved ladder, free of defects, secured against displacement, extending 36 inches above the landing.

Respiratory Protection

Mandatory information when respirators are used but not required by the standard.

Respirators protect against designated hazards when they are selected and worn correctly. Voluntary use is allowed even below the exposure limit. A dirty or misused respirator can become its own hazard.

If the company provides a respirator for voluntary use, or you bring your own:

1. Read the manufacturer's instructions on use, maintenance, cleaning, care, and limits.
2. Use only a respirator NIOSH-certified for the contaminant. The NIOSH mark is on the package.
3. Do not wear a respirator in an atmosphere it is not designed for. A dust filter will not protect you from gases, vapors, or fume particles.
4. Keep track of your respirator so you do not use someone else's.

Dust masks will be available for voluntary use in dusty work.

Confined Space Program

Confined Space Rules

1. Do not enter a confined space unless you are trained and authorized by the company's qualified person. If you are unsure what counts as a confined space, ask your superintendent.
2. Test the atmosphere before anyone enters or goes underground. Record the results. If the air is dangerous, ventilate until it is acceptable. Report any positive toxic or explosive reading, and any high or low oxygen, to the superintendent. No one enters until readings are acceptable. Full rules are in this section.

Definition

A confined space has all three:

- Large enough and configured so an employee can bodily enter
- Limited or restricted entry and exit
- Not designed for continuous occupancy

Examples: storage tanks, manholes, sewers, water mains, storm drains, underground vaults, concrete pier columns, precast manhole units, drilled shafts, pipelines, gatewells, ducts, catch basins, and open-top pits, tubs, vaults, and vessels.

Classifications

- **Non-permit space** — no existing or potential physical or atmospheric hazards. A space with only physical hazards can be reclassified as non-permit after those hazards are isolated or eliminated. You cannot reclassify when an atmospheric hazard exists or could exist (sewers, manholes, similar places).
- **Alternate-entry space** — a permit space with no physical hazards (or they are isolated/eliminated); the atmospheric hazard can be controlled with continuous mechanical forced-air ventilation; and people can get out safely if ventilation stops. Procedures are lighter than a full permit.
- **Full permit space** — existing or potential physical and/or atmospheric hazards. Full permit procedures required.

MIOSHA references

Construction Safety Standard Part 35 — Confined Space in Construction. Welding: CS Part 7 and General Industry Part 12. Part 35 does not cover diving, excavations, or underground construction (tunnels, shafts, cofferdams, caissons). Those are CS Part 9, Part 14, OH Part 504, and Part 665.

Employee responsibilities

Do not enter until trained and authorized by the supervisor or superintendent. If you are not sure a space is confined, ask.

Employee training

1. Every employee shall be trained on where permit spaces are, what the dangers are, and that they may not enter without authorization.
2. People on alternate-entry or full-permit work shall be trained to do their duties, know the hazards and the controls, and know not to attempt entry rescue unless authorized.
3. Keep names, trainer, duties trained, and dates at the office. Records available to employees on request.

First step — initial work-site evaluation

1. Before work starts, the competent person (typically the superintendent) shall identify any space workers might enter that meets the confined-space definition.
2. No one enters until the superintendent picks the class and procedure:
 - a. Non-permit
 - b. Alternate entry
 - c. Full permit
3. Use the Classifying Confined Spaces flowchart (Appendix A).

See Figure 6 in Appendix — Figures for the classifying flowchart. Use Appendix A in the confined-space forms if you need the Yes/No table instead.

Appendix A — Classifying confined spaces

Competent person (typically the superintendent) walks this path before anyone enters. Do the first evaluation from outside if you can. If you must enter to evaluate, use full permit procedures.

Step 1 — Is it a confined space?	
Large enough to bodily enter?	☐ Yes ☐ No
Limited or restricted entry and exit?	☐ Yes ☐ No
Not designed for continuous occupancy?	☐ Yes ☐ No
All three are Yes	It is a confined space. Go to Step 2.
Any answer is No	Not a confined space under this program. Stop here.

Step 2 — What hazards are in the space?	
Existing or potential atmospheric hazard?	☐ Yes ☐ No
Existing or potential physical hazard?	☐ Yes ☐ No
No physical and no atmospheric hazard	Non-permit space. Employees may enter. Danger signs not required.
Physical hazards only — and they are eliminated or isolated	Reclassify as non-permit. Write the rationale on PEC Section 1.
Physical hazards remain	Full permit space.
Atmospheric hazard exists or could exist (sewer, manhole, similar)	Cannot reclassify as non-permit. Go to Step 3.

Step 3 — Can alternate entry be used?

All physical hazards eliminated or isolated?	☐ Yes ☐ No
Atmosphere can be kept safe with continuous mechanical forced-air ventilation?	☐ Yes ☐ No
Entrants can exit safely if ventilation stops?	☐ Yes ☐ No
All three are Yes	Alternate-entry space. Complete PEC Sections 1 and 2. Post the danger sign.
Any answer is No	Full permit space. Complete PEC Section 1 and the Full Permit (Appendix D).

Classification for this space: ☐ Non-permit ☐ Alternate entry ☐ Full permit

Jobsite / space name	
Competent person	
Date	

4. Evaluate each space for existing or potential physical and atmospheric hazards. Do that from outside if you can. If you must enter to evaluate, use full permit procedures.
5. Test the atmosphere before changing natural ventilation. Use calibrated direct-reading instruments, in this order: oxygen, flammable gases and vapors, then potential toxics. Look for:
 - a. Oxygen below 19.5% or above 23.5%
 - b. Any flammable gas, vapor, or mist above 10% of LEL
 - c. Combustible dust at or above its LEL
 - d. Any substance that can kill, incapacitate, block self-rescue, injure, or cause acute illness
6. Complete Section 1 of the Pre-Entry Checklist (Appendix B) for each space people may enter. Keep it on the job. The Pre-Entry Certification (PEC) records the evaluation, the air tests, the class, and the entry procedure.

Appendix B — Pre-entry certification (PEC)

Complete Section 1 for every confined space people may enter. Keep this on the job. Entrants (or their representative) may see it.

Section 1 — Initial evaluation (all spaces)

Jobsite	
Space name / location	
Date / time of evaluation	
Competent person	
Controlling contractor / GC	
Purpose of entry	

Physical hazards found (or none)

--

Atmospheric hazards found or possible (or none)

--

How hazards will be isolated or controlled

First-round air test (before changing natural ventilation)

Calibrated direct-reading instruments. Test in this order: oxygen, flammables, then toxics.

O2 %	LEL %	CO ppm	H2S ppm	Other	Time	Tester

Acceptable entry conditions	O2 19.5–23.5% LEL under 10% toxics below limits
Classification	☐ Non-permit ☐ Alternate entry ☐ Full permit
Rationale (why this class)	
Appendix A path used?	☐ Yes
Competent person signature	

Section 2 — Alternate entry only

Danger sign posted at the space?	☐ Yes
Local emergency services available?	☐ Yes
GC notified of the work and entry method?	☐ Yes ☐ N/A
Alternate-entry training given?	☐ Yes

Atmospheric hazards in this space

☐ Oxygen deficiency	☐ Welding / cutting
☐ Carbon monoxide (CO)	☐ Hydrogen sulfide (H2S)
☐ Flammable / explosive gases or vapors	Specify:
☐ Other	Specify:

How the atmosphere will be controlled

☐ Mechanical ventilation at 100% outside air	
☐ Open extra manholes for circulation	
☐ Portable blowers	
☐ Continuous air monitoring during and after entry	
☐ Re-test after ventilating	
☐ No burning, cutting, or welding in the space	
☐ Intrinsically safe lighting	
☐ Other	Specify:

If ventilation stops — how people know and get out

☐ Space ventilated to non-detect, then fan off and air watched. If limits are hit, go full permit.	
☐ Air monitor has an audible alarm	
☐ Entrants wear personal monitors with an audible alarm	
☐ Ventilator has an audible alarm	
☐ Top-man watches the fan and tells people to leave	
☐ Other	Specify:

How people exit on their own

☐ Fixed ladder in the space, safe to use	
☐ Portable ladder stays in the manhole while people are in	
☐ Work platform installed for egress	
☐ Other	Specify:

Extra physical-hazard steps

☐ Periodic inspections ☐ Early-warning system ☐ Other:

Section 3 — Hazard found after the first evaluation

Fill this only if a hazard shows up after Section 1.

Were employees evacuated when the hazard was found?	☐ Yes
---	------------------------------

Describe the event, the hazard, and what was done to eliminate or isolate it so it does not happen again

--

Space safe for re-entry?	☐ Yes — employees may re-enter. ☐ No — now a full permit space.
Foreman / superintendent signature	
Date	

Section 4 — After work in the space is done

GC told that work is complete?	☐ Yes
GC told of any hazards found during entry?	☐ Yes ☐ N/A
Competent person signature	
Date	

1. If there is no existing or potential physical or atmospheric hazard, it is non-permit. Employees may enter. Danger signs are not required.
2. If the only hazards are physical and they have been eliminated or isolated, reclassify as non-permit and write the rationale in Section 1 of the PEC. Do not reclassify when an atmospheric hazard exists or could exist. Use Alternate Entry instead.
3. Periodic air tests may still be needed, especially if welding, cutting, or toxic materials could add a hazard. Record periodic tests (Appendix C) unless you are monitoring continuously.
4. Exit immediately if a hazard appears. Reclassify as full permit until testing shows it is safe. Document the event, hazards, and fixes in Section 3 of the PEC. Superintendent signs before re-entry. Tell the GC about hazards created during entry.

Use for periodic, subsequent, or re-tests. Continuous monitoring does not have to be logged line by line. Test order: oxygen, flammables, toxics. Keep this sheet on the job with the PEC.

Jobsite / space	
Instrument make / model	
Calibration date	
Tester	

[illegible]

Acceptable unless the PEC lists tighter limits: oxygen 19.5–23.5%; LEL under 10%; CO and H2S below the limits on the instrument / SDS. Any out-of-limit reading: get out and tell the superintendent.

Alternate-entry space

1. Use alternate entry instead of a full permit only if all three are true:
 - a. Physical hazards are eliminated or isolated
 - b. The only hazard is an actual or potential atmosphere that continuous forced-air ventilation can keep safe
 - c. Entrants can exit safely if ventilation stops
2. Before entry, the superintendent tells the controlling contractor the space exists, where it is, the hazards, and that alternate entry will be used. Coordinate with the controlling contractor and any other employer whose people will be in the space or whose work could create a hazard.
3. Post **DANGER — PERMIT-REQUIRED CONFINED SPACE** — DO NOT ENTER at each alternate-entry location.
4. Complete PEC Sections 1 and 2 before entry. Make the PEC available to each entrant (or their representative) and keep it on the job.
5. Make the cover safe to remove before you pull it. Guard the opening immediately with a rail, temporary cover, or barrier so no one falls in and nothing falls on people inside.
6. Use continuous mechanical forced-air ventilation. Exhaust-only or natural ventilation does not count. Aim it at where each person is working. Keep it running until everyone is out. Air shall come from a clean source and shall not add a hazard.
7. After ventilating, re-test before entry. Then monitor continuously, unless periodic monitoring is enough to keep the air safe. Record periodic or re-tests (Appendix C) unless monitoring is continuous.
8. Monitors shall have an audible early-warning alarm that gives time to get out.
9. If the ventilator has an alarm, leave when it sounds. If it does not, a top-man stays at the opening, watches the fan, and can tell people inside to get out if it stops.
10. Provide a safe way in and out. Any hoisting system shall be designed or manufactured for personnel, or approved for personnel hoisting by a registered professional engineer.
11. Confirm local emergency units are available. Attendants, rescue gear, and rescue teams are not required for alternate entry unless the space is reclassified as full permit.
12. If a hazard shows up while people are inside, everyone leaves. Reclassify as full permit until testing shows it is safe. Document in PEC Section 3. Superintendent signs before re-entry.
13. Tell the GC when work is done and of any hazards created. Record that in PEC Section 4.

Appendix D — Full permit space entry permit

Complete before anyone enters a full permit space. Keep on the job during entry. Superintendent cancels when work is done or a new hazard appears. Keep cancelled permits at least one year.

Space and duration	
Permit number	
Jobsite	
Name / location of the space	
Purpose of entry	
Date of entry	
Authorized duration (start – end)	
Controlling contractor / GC	

People authorized under this permit

Update names if the attendant or entry supervisor changes during the shift.

Role	Name	Time in	Time out

Roles: authorized entrant / attendant / entry supervisor (foreman) / superintendent.

Known hazards	
☐ Oxygen deficiency or excess	☐ Engulfment / drowning
☐ Flammable / explosive atmosphere	☐ Electrical
☐ Carbon monoxide	☐ Moving machinery / lockout needed
☐ Hydrogen sulfide	☐ Heat
☐ Other toxics	☐ Fall hazard
☐ Welding / cutting / hot work	☐ Other:

Describe hazards and how they will be isolated or controlled

Acceptable entry conditions

Oxygen	19.5% – 23.5% unless a tighter limit is written here:
LEL	Under 10% unless a tighter limit is written here:
CO / H2S / other	
How an increase in atmospheric hazard will be detected	☐ Continuous monitor ☐ Personal monitor ☐ Periodic test (interval:)

Atmospheric tests

Test before changing natural ventilation, then as required during entry. Order: oxygen, flammables, toxics. Tester initials each row.

Date	Time	O2 %	LEL %	CO ppm	H2S ppm	Other	Initials

Rescue and emergency

Rescue service name	
Phone / how to summon	
Confirmed available for this entry?	☐ Yes Time confirmed:
On-site rescue team?	☐ Yes ☐ Off-site service
Non-entry rescue equipment on site	☐ Retrieval line ☐ Harness ☐ Other:

Communication, PPE, and other permits

Communication with attendant	☐ Voice ☐ Radio ☐ Other:
PPE required	
Alarm systems	
Special equipment / procedures	
Hot-work or other permits issued?	☐ No ☐ Yes — attach copy. Permit #:
Other information needed for safe entry / exit / rescue	

Authorization

Superintendent authorizing entry (print)	
Signature	
Date / time authorized	
Danger sign posted?	☐ Yes
PEC Section 1 complete?	☐ Yes

Cancel or suspend

☐ Cancelled — work complete	Date / time:
☐ Cancelled — new hazard or prohibited condition	Describe on the line below.
☐ Suspended — temporary condition, not expected to return	Reinstated only if conditions again match this permit.
Hazards noted at cancel / suspend	
Superintendent signature	
GC told work is done and of any hazards created?	☐ Yes ☐ N/A

A cancelled permit cannot be reused. File it for at least one year and use it when the full-permit procedure is reviewed.

Full Permit Space Entry

- Complete Section 1 of the PEC during the first site evaluation and before entry. Use full permit procedures when hazards cannot be eliminated, isolated, or controlled with ventilation, or when people cannot get out safely if ventilation stops.
- Post **DANGER — PERMIT-REQUIRED CONFINED SPACE — DO NOT ENTER** at each full-permit location.
- Before entry, the superintendent tells the controlling contractor the space exists, where it is, the hazards (including hazards that work may create), and that full permit procedures will be used. Coordinate with the controlling contractor if another employer's people will be in the space at the same time, or if other work in the space could create a hazard.
- Write and use entry procedures that cover at least:
 - Acceptable entry conditions
 - Chance for entrants (or their representative) to watch monitoring or testing
 - Isolating the space and the physical hazards in it
 - Purging, inerting, flushing, or ventilating as needed to control the atmosphere
 - If ventilation stops, monitoring that will catch a rise in time for people to get out
 - Barriers for pedestrians, vehicles, or other outside hazards
 - Checks that conditions stay acceptable the whole time people are in
- Provide, maintain, and require use of:
 - Testing and monitoring equipment
 - Ventilating equipment
 - Communication equipment
 - PPE when engineering and work-practice controls are not enough
 - Approved lighting
 - Barriers and shields
 - Ladders or other safe access and egress
 - Rescue and emergency equipment, unless the rescue service brings it
 - Anything else needed for safe entry, exit, and rescue
- During entry:
 - Test the atmosphere before changing natural ventilation. If the space cannot be isolated (large space or a continuous system such as a sewer): test as far as you can before entry; monitor continuously where people are working; and use an early-warning system for non-isolated engulfment that gives time to get out.
 - Monitor the atmosphere continuously unless periodic monitoring is enough to keep it safe.
 - Test order: oxygen, then combustibles, then toxics.
 - Let entrants or their representative watch the tests.
 - Reevaluate if they ask, and give them the results.
- Entrants, attendants, and the foreman have the duties below.
- At least one attendant stays outside while people are in, talks to every entrant, and tracks their condition. If someone cannot get out without help, the attendant starts rescue. If one attendant covers more than one space, extra emergency steps must be in place.

9. Set rescue and emergency procedures, including how to call help and how to keep unauthorized people from trying a rescue.
10. Review the procedures and fix gaps after an injury or near miss, unauthorized entry, a new hazard or a condition the permit does not allow, or an employee complaint. Review cancelled permits at least once a year.
11. Complete a Full Permit Space Entry Permit (Appendix D) for each full-permit space before entry.
12. The superintendent cancels the permit when work is done or when a new hazard or condition appears. A cancelled permit cannot be reused. Note the new hazard on it and use that when the program is revised. Keep cancelled permits at least one year.
13. The superintendent may suspend instead of cancel if a temporary condition appears that, once fixed, is not expected to return. Reinstate only if the entry supervisor confirms conditions again match the permit.
14. Tell the GC when work in the space is done and of any hazards that showed up or were created.

Authorized entrants

1. Know the hazards, how exposure happens (breathing or skin), and the symptoms.
2. Wear required PPE correctly.
3. Stay in contact with the attendant so the attendant can track them and call an evacuate.
4. Get out as soon as:
 - the attendant or superintendent orders it
 - they see warning signs or symptoms
 - a prohibited condition exists
 - an automatic alarm sounds
5. Tell the attendant about a prohibited condition or symptoms.

Attendants

1. Stay outside unless another authorized attendant relieves them.
2. Do non-entry rescue when the rescue procedure says to.
3. Know existing and potential hazards, exposure types, signs, symptoms, and effects.
4. Stay in contact with people inside and keep an accurate count.
5. Watch conditions inside and outside. Order an evacuate when:
 - a prohibited condition exists
 - someone shows effects of exposure
 - something outside could endanger people inside
 - the attendant cannot do the job safely
6. Call rescue and other services in an emergency or if someone is hurt or ill.
7. Keep unauthorized people away. If they have entered, get them out.
8. Tell the people inside and the superintendent if an unauthorized person enters.
9. Do no other work that gets in the way of attending.

Foremen (entry supervisors)

1. Know the hazards, how exposure happens, signs, symptoms, and consequences.
2. Confirm permits, tests, procedures, and equipment are right before allowing entry.
3. End entry and cancel or suspend the permit when work is done or a condition not allowed on the permit appears.
4. Confirm rescue is available and the way to call them works.
5. Remove unauthorized entrants.
6. Keep the entry consistent with the permit and keep acceptable conditions.

Rescue

Non-entry rescue

Preferred. Use retrieval gear unless the line would raise the risk or would not help (snag, tangle with air lines or cords). The attendant must be ready to pull.

Each entrant wears a chest or full-body harness. Retrieval line at the center-back D-ring, or another point that lets them be pulled out. Other end of the line to a mechanical device or a fixed point outside. A mechanical device is required for vertical spaces more than 5 feet deep. Wristlets or anklets only if a harness is infeasible or creates a greater hazard.

If non-entry is the plan, the superintendent also confirms before entry that emergency help (typically the local fire department) is available if the pull fails.

Entry rescue

Used when non-entry will not work. On-site team is M&M Excavating people or another contractor. Off-site is fire or another service. The service must be able to get the person out in time for medical care. The superintendent calls them before entry and describes the space and the hazards. IDLH work on an airline or SCBA may need a standby team.

During an entry rescue, an attendant stays outside. If the original attendant will go in, a new attendant is in place first.

Training for rescue teams and off-site services

Rescue team members get authorized-entrant training plus their rescue duties. They get PPE and rescue gear, including respirators, and instruction on use. All rescuers get first aid and CPR. At least one member is certified in first aid and CPR. Tell rescuers the hazards before they enter. Practice at least yearly. Give off-site services access to practice if they ask.

Off-site services shall tell the superintendent if they become unavailable. Postpone the work or use another service. Before using an off-site service, the superintendent confirms they have the skill and gear for that space and that they can respond while someone is inside.

Hazard Communication Program

Right to Know

This program is established for M&M Excavating and is available for any employee to review.

Hazard determination

The Safety Manager relies on safety data sheets from suppliers to meet hazard-determination requirements.

Labeling

1. The Safety Manager makes sure incoming containers are labeled.
2. Check every label for:
 - identity
 - hazard
 - name and address of the responsible party
3. Each superintendent makes sure portable containers used on their work are labeled with identity and hazard warning.

Safety data sheets (SDS)

1. The Safety Manager keeps the master SDS file at: **17 Old State Road, Gaylord, MI 49735**
2. SDS for every hazardous chemical employees may be exposed to are available to employees on request.
3. Each superintendent gets the required MIOSHA Right-to-Know posters. New or revised SDS are posted within five days of receipt.

Employee information and training

1. The Safety Manager coordinates training and keeps the records for M&M Excavating.
2. Before starting work, or as soon as possible after, each new employee attends a safety briefing covering:
 - chemicals and their hazards in the workplace
 - how to lessen or prevent exposure
 - what the company has done to lessen or prevent exposure
 - what to do if they are exposed
 - how to read labels and SDS
 - where SDS are kept and who can provide copies
3. Employees are also told:
 - the employer may not discharge or discriminate against an employee for exercising rights to information about hazardous chemicals
 - attendance is taken; the Safety Manager keeps the records
 - before a new hazardous chemical is brought in, employees get the same information they got in the briefing

Hazardous non-routine tasks

Employees may sometimes work in higher-hazard areas (for example, confined spaces). Before that work starts, they get information on:

1. The specific chemical hazards
2. Protection they can use to cut the risk
3. What the company has done to cut the hazard (ventilation, respirators, a second employee, emergency procedures)

No employee starts work in a confined space, or on any other non-routine task, without a safety briefing first.

Informing contractors

1. The Safety Manager gives subcontractors whose people may contact M&M Excavating chemicals:
 - the hazardous chemicals they may contact
 - how to lessen the risk
 - where to get SDS
 - that the SDS book is at 17 Old State Road, Gaylord, MI 49735
2. The Safety Manager also gets chemical information from contractors when those contractors will expose M&M Excavating employees to chemicals they bring on site.

List of hazardous chemicals

The list of chemicals used by M&M Excavating is the SDS file.

Mobile Device Policy

M&M Excavating works in a connected world. Employees still have to stay on safety, production, quality, and performance. Keep personal calls and messages to a minimum.

Do not use a phone for social media, or post to social media, during working hours. That includes current or live job-site photos and video of tasks.

Applicability

1. This policy covers personal and company phones, and listening devices, on a job-site — handheld or hands-free (Bluetooth, earbuds, headphones).
2. “Cell phone use” means calls, texts, messages, email, social media, photos, video, or anything similar.

Cell phones

1. Only foremen, superintendents, or other designated qualified people may use a cell phone on a job-site or during working hours. Management must approve any exception.
2. Personal phones may be used on break or lunch in a safe place away from active work (job-site trailer or a parked vehicle).
3. Personal ringers stay off, mute, or vibrate during work hours.

Listening devices

Radios, portable players, iPods, and similar listening devices are not allowed on job-sites.

Safe practices for cell phones

1. Use a phone only in a way that does not put you or anyone else in a recognizable hazard.
2. Do not use a phone, radio, or other device when it could keep you from hearing alarms or an approaching hazard. Move to a safe spot before you answer.
3. Turn the phone off, or set it to silent or vibrate, before you start a vehicle.
4. Pull over to a safe place to make or take a call on the road.
5. Set your voicemail to say you cannot answer or return messages while driving.

Lead Abatement

General

NIOSH and OSHA recommend cutting exposure to lead dust and fumes with engineering controls, work practices, and PPE, including respirators.

Workers can be exposed on bridges and other steel structures (water and fuel tanks). Jobs that may see lead: abrasive blasting, inspection, ironwork, painting, labor.

Health effects

Lead enters the body by breathing or swallowing. It is a cumulative poison. It builds up in blood, bone, and organs. Over time it can damage blood, the nervous system, kidneys, bones, heart, and the reproductive system, and it can raise blood pressure.

Symptoms of lead poisoning can include:

- Headache
- Poor appetite
- Dizziness
- Irritability or anxiety
- Constipation
- Pallor
- Excessive tiredness
- Numbness
- Metallic taste
- Muscle and joint pain or soreness
- Sleeplessness
- Hyperactivity
- Weakness
- Reproductive problems
- Nausea
- Fine tremors
- Insomnia
- “Lead line” on the gums
- “Wrist drop” (weakness of the extensor muscles)

Employee safety practices

Personal hygiene

1. Workers exposed to lead wash hands and face before eating, drinking, or smoking. Do not eat, drink, or use tobacco in the work area.
2. Take contaminated work clothes off before eating.
3. Change into work clothes at the site.
4. Store street clothes away from work clothes in a clean area. Change back to street clothes after washing or showering before leaving, so lead dust does not go into cars and homes.
5. Park personal vehicles where they will not pick up lead.

PPE

1. Wear protective clothing so lead does not build up on skin and hair. Change into work clothes just before entering the work area. Change out before leaving the site.
2. Employees get a half-mask respirator for airborne lead. Sandblasters get a supplied-air blast hood. Respirators use **HEPA** filters or equal.

Engineering controls

1. Post warning signs at the edge of lead-contaminated work areas.
2. Annual blood-lead tests for employees at risk of exposure:
 - Under 40 µg/dL — stay on the job; keep monitoring
 - 40 µg/dL or above — medical exam / consultation
 - 50 µg/dL or above — medical removal from lead work
3. Air monitoring on the site to:
 - check paint composition
 - measure worker exposure to airborne lead and other agents (silica, solvents)
 - pick engineering controls and PPE
4. When abrasive blasting, scaling, chipping, grinding, or otherwise removing lead-based coatings, use available practices that cut airborne lead (negative air, wet methods, daily cleanup of lead debris and abrasive).
5. Train and notify workers on:
 - health effects of lead
 - early signs of lead intoxication
 - obeying boundary signs
 - personal hygiene
 - use and care of PPE

Safe work practices

1. Use the exhaust ventilation where it is provided.
2. Use the correct, clean respirator.
3. Keep the site clean. Vacuum with a HEPA filter or wet-clean lead dust. Never use compressed air to clean.
4. Eat, drink, and smoke outside the work area. Keep lunch boxes and cups out of the work area. Use a separate lunchroom.
5. Wash hands and face before eating, drinking, smoking, or applying cosmetics.
6. Wear protective clothing. Store street clothes separate from work clothes. Never wear contaminated clothes home.

Training

Anyone who may be exposed shall be told the hazards of lead and trained in the precautions. Training includes work practices and PPE: eye and face protection, head protection, coveralls, and respirators.

HAZWOPER Program

Hazmat information

These M&M Excavating employees are trained and certified in HAZMAT procedures:

Name / certification: _____

Name / certification: _____

Name / certification: _____

Hazardous materials for the job will be stored at:

PPE specifications

Task	Level	Body	Head	Respirator
General work when no chemical exposure is expected	D	Work clothes; steel-toe, steel-shank leather boots; work gloves	Hard hat, safety glasses, ear protection	None required
Tasks with potential chemical exposure	Modified D	Uncoated Tyvek coveralls; steel-toe chemical-resistant or leather boots with outer rubber covers; inner surgical nitrile + outer chemical-resistant nitrile gloves	Hard hat, splash shield, safety glasses, ear protection	None required
Not authorized on M&M Excavating work unless the Safety Manager approves	C	Same coverall / boot / glove package as Modified D	Hard hat, splash shield, ear protection, spectacle inserts	APR full-face (MSA Ultraine or equal) with GME-H cartridges or equal
Not authorized on M&M Excavating work unless the Safety Manager approves	B	Same coverall / boot / glove package as Modified D	Hard hat, splash shield, ear protection, spectacle inserts	Positive-pressure SCBA (MSA Ultralite or equal)

Upgrade the level of protection when

Trigger
The person doing the task asks for it
The task will increase contact or possible contact with hazardous materials
Gas or vapor is present or likely
Known or suspected skin hazards
Instrument action levels are exceeded

Downgrade the level of protection when

Trigger
New information shows the situation is less hazardous than first thought
Site conditions drop the hazard
The task will reduce contact with hazardous materials

Decontamination — personnel

Step
Boot wash / rinse
Glove wash / rinse
Outer-glove removal
Body-suit removal
Inner-glove removal
Respirator removal
Hand wash / rinse
Face wash / rinse
Shower ASAP
Bag and dispose of PPE on site. Water disposal: none anticipated.

Sample equipment: wash/rinse or solvent-rinse. Heavy equipment: power wash or steam clean. No eating, drinking, or smoking in contaminated, exclusion, or decon zones. No contact lenses in those zones. The SSC sets the eating area.

Upgrading or downgrading level of protection

MIOSHA Publication 85-115, EPA Standard Operating Safety Guides, and the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities are available with the superintendent at:

17 Old State Road, Gaylord, MI 49735

Emergency equipment and supplies

Item	Location
First-aid kit	Field vehicle
Eye wash	Field vehicle
Potable water	Field vehicle
Portable phone	Field vehicle
Additional (specify)	

Incident response

Fire, explosion, or chemical release:

1. Shut down site operations and evacuate the work area.
2. Account for people at the designated area.
3. Notify the right response personnel.
4. Decide if the whole site must evacuate, and evacuate if it does.

Evacuation signals

Signal	Meaning
Grasp throat with hand	Emergency — help me
Thumbs up	OK, understood
Grasp buddy's wrist	Leave the area now
Continuous horn	Emergency — leave the site now

Emergency phone numbers

Service	Number
Police	911
Fire	911
Ambulance	911
Water / gas / electric locate	MISS DIG 1-800-482-7171

If you use a cell phone outside its normal calling area, 911 may not reach the local dispatcher. Keep backup local numbers if the job relies on a cell phone for 911.

Emergency Response Program

As part of its safety program, it is the policy of M&M Excavating to make certain that all employees have been instructed as to proper procedures in case of an injury or accident.

1. M&M Excavating designates the 911 system as its first response in the event of a medical emergency and/or rescue operation.
2. A list of emergency phone numbers will be posted at the job-site when practical. If no suitable or convenient location exists, the list will be kept by the project superintendent.
3. All injuries and/or accidents shall be reported to the job superintendent immediately.
4. All accidents and/or injuries shall be reported to the Safety Manager as soon as is practical.
5. M&M Excavating will provide a person at each job site who is trained in CPR and First Aid procedures as required by any applicable Safety and Health Standards.
6. Never move an injured person unless absolutely necessary. Further injury may result. Keep the injured comfortable and use available first-aid equipment until an ambulance arrives.

Medical Emergencies — job-site procedures

Every M&M Excavating job-site shall have at least one person trained in CPR and basic first aid. Name them at the start of the job.

- Get that person immediately if someone is hurt.
- Minor injuries: treat on site or transport in a company vehicle.
- Serious injuries: call local emergency services. Give first aid until they arrive. One employee meets them at the entrance and takes them to the injured person.
- If no trained person is there, call emergency services and give basic care as well as you can.

Stop Work Authority

Every employee may stop work immediately, without retaliation, if they believe:

- There is a threat to the health or safety of workers or the public
- There is a risk to safe operation of a facility, or of significant damage
- There is a chance of a hazardous-substance release above regulatory limits

Reporting unsafe conditions

Report unsafe work or conditions right away to the supervisor or the designated person on that job. That person acts immediately to fix it.

Right to a safe workplace

M&M Excavating does not tolerate discrimination against anyone who reports a work-related fatality, injury, or illness, files a safety complaint, asks for injury and illness records, or uses any right under occupational safety and health law.

Employees may stop or refuse unsafe work without retaliation from management or coworkers. Safety concerns get addressed before work restarts.

Stop-work resolution

If a stop-work issue is not resolved through normal channels, call the Safety Manager or the union representative.

Appendix — Figures

Figure 1. Overhead power-line storage examples

OVERHEAD POWER LINE STORAGE CLEARANCE

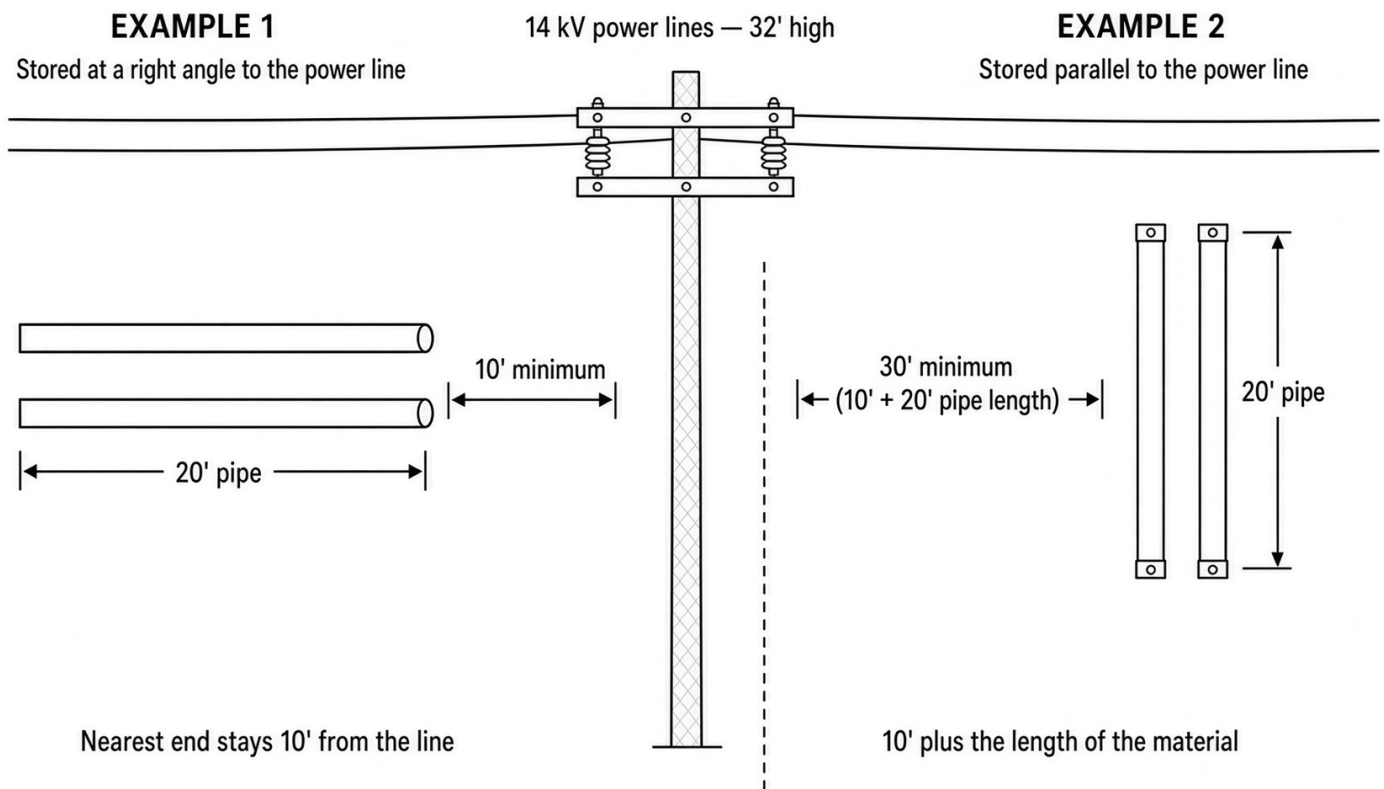


Figure 2. Chart A — maximum angle of repose

Chart A — Maximum angle of repose (excavation more than 5 feet deep)

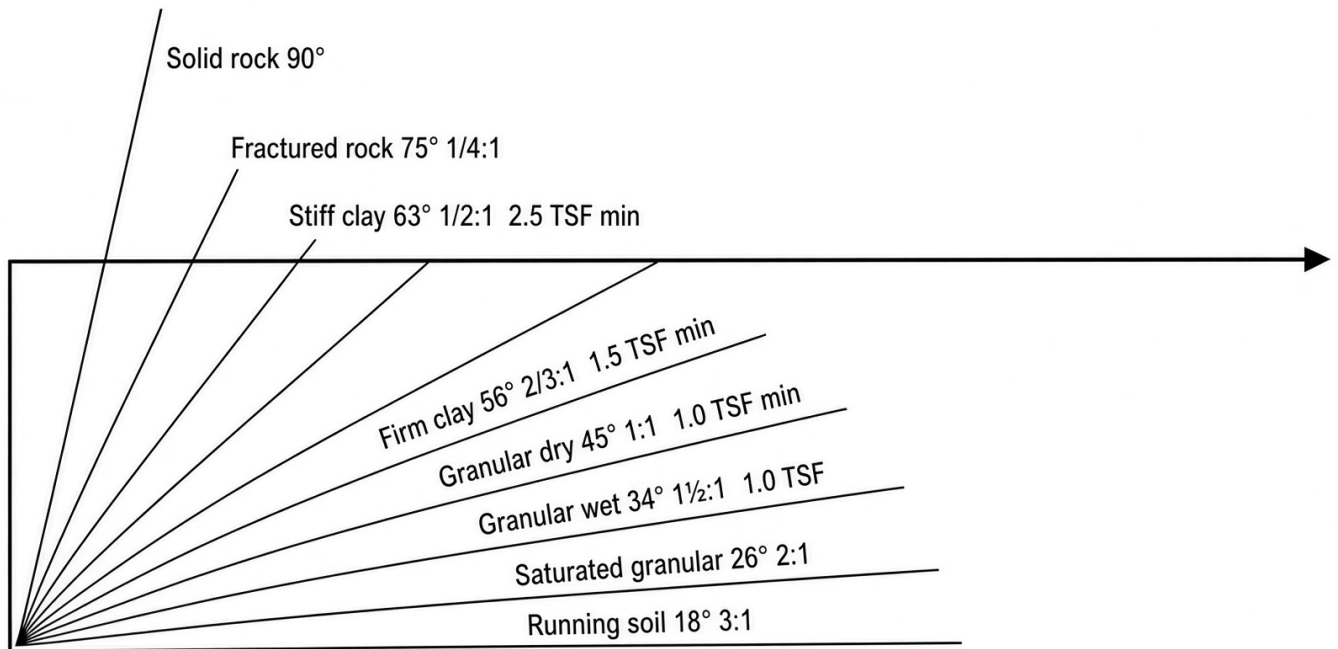
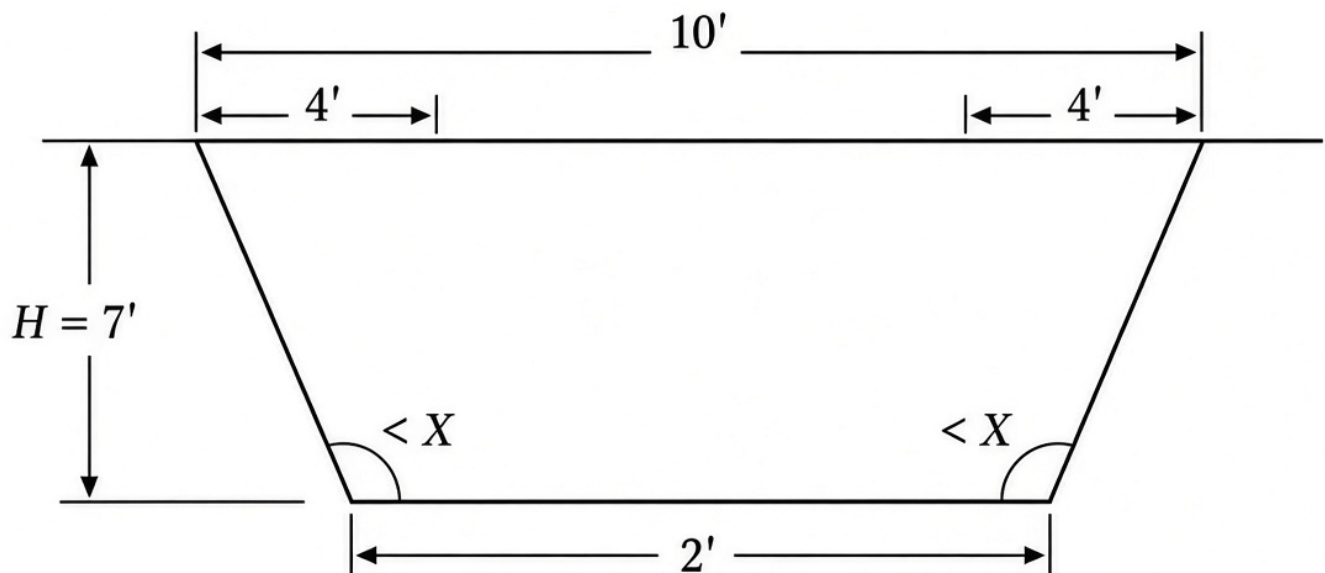
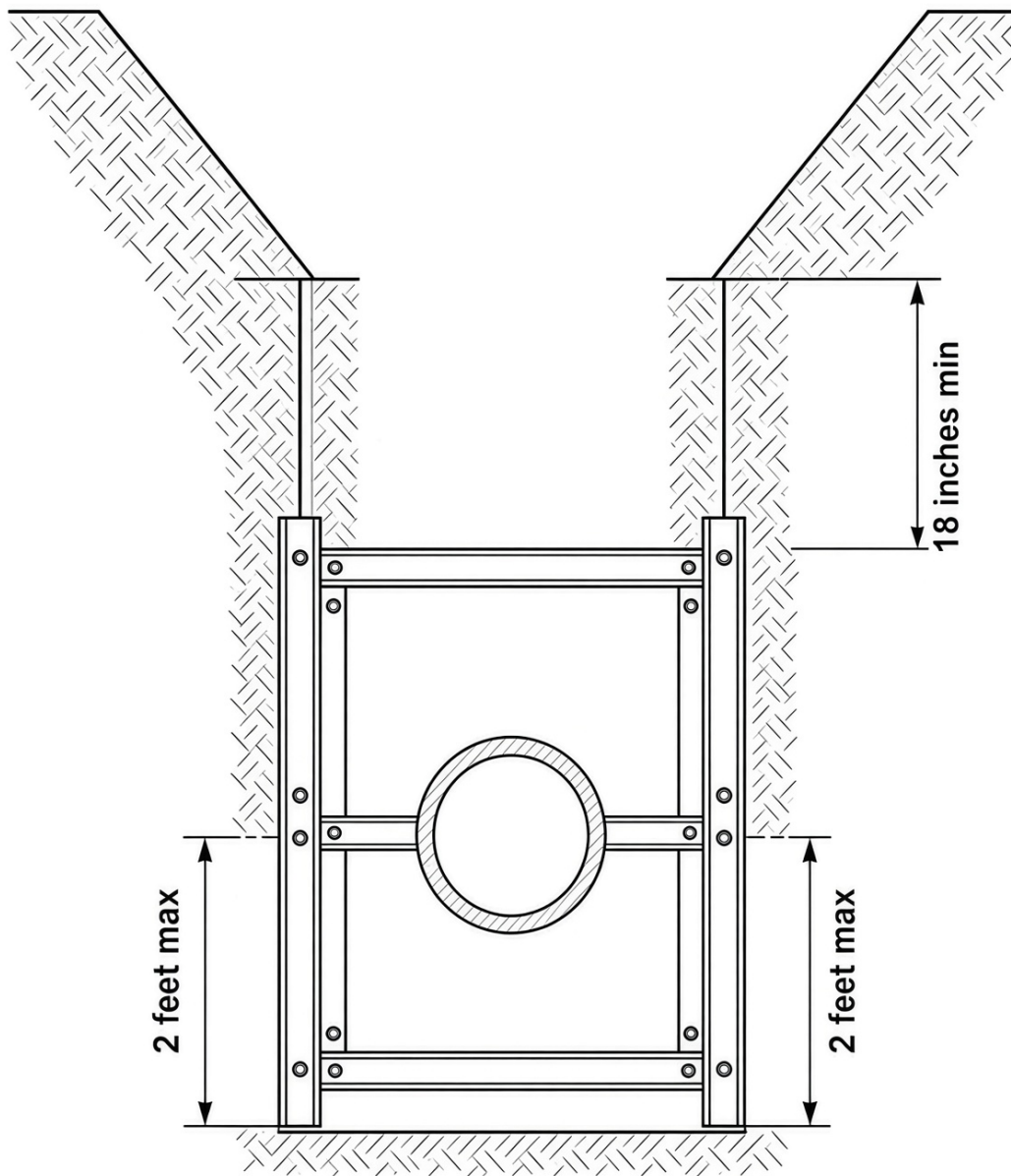


Figure 3. Chart B — calculating the angle of repose**Chart B — Calculating the angle of repose**

$$\text{TANGENT} = H / W = 7 / 4 = 1.75 = 60^\circ$$

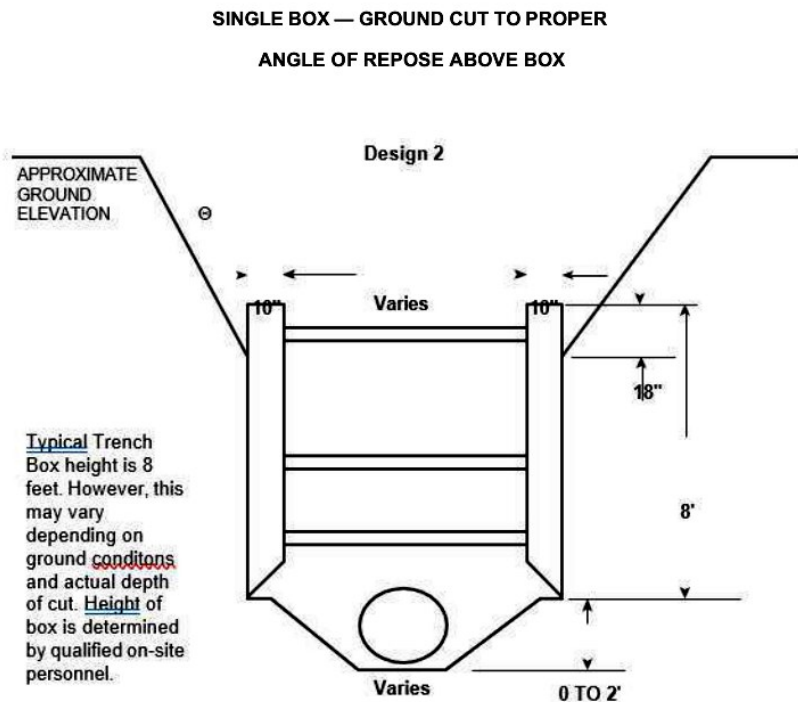
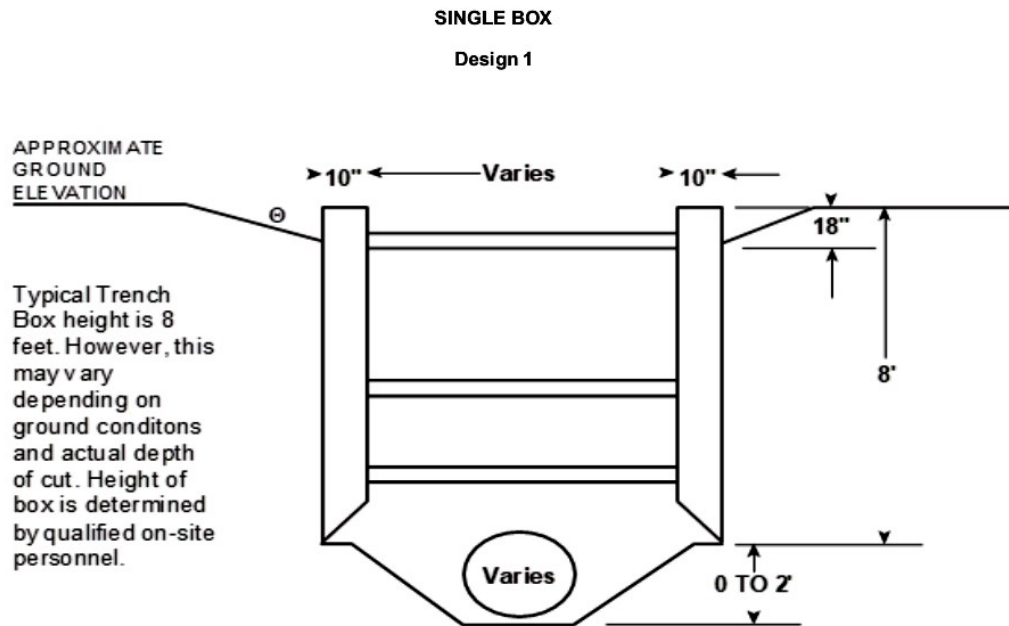
Figure 4. Trench box — 18 inches / 2 feet

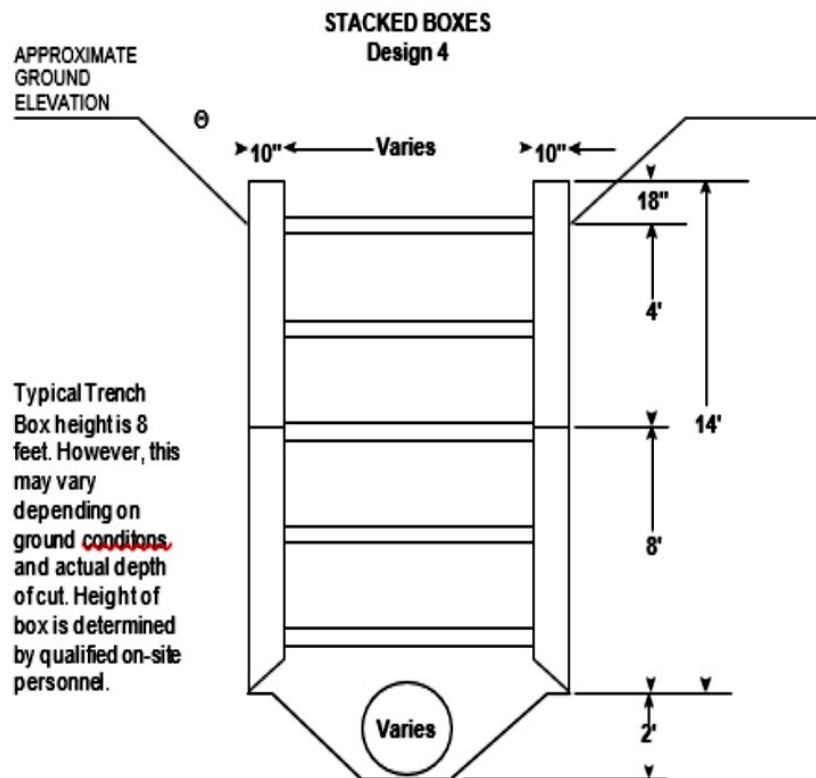
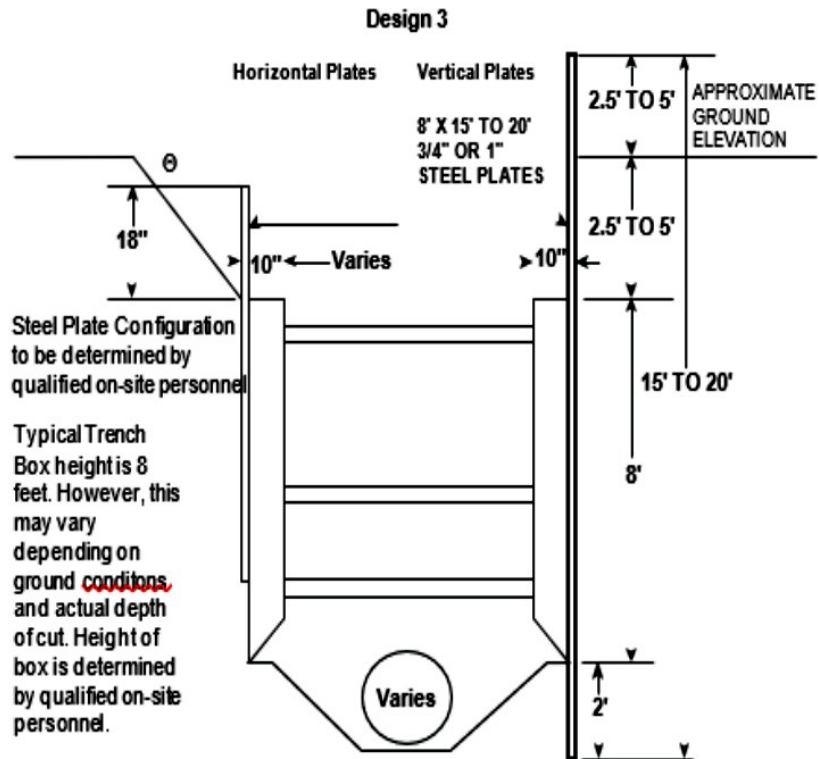
Trench box — minimum soil cover

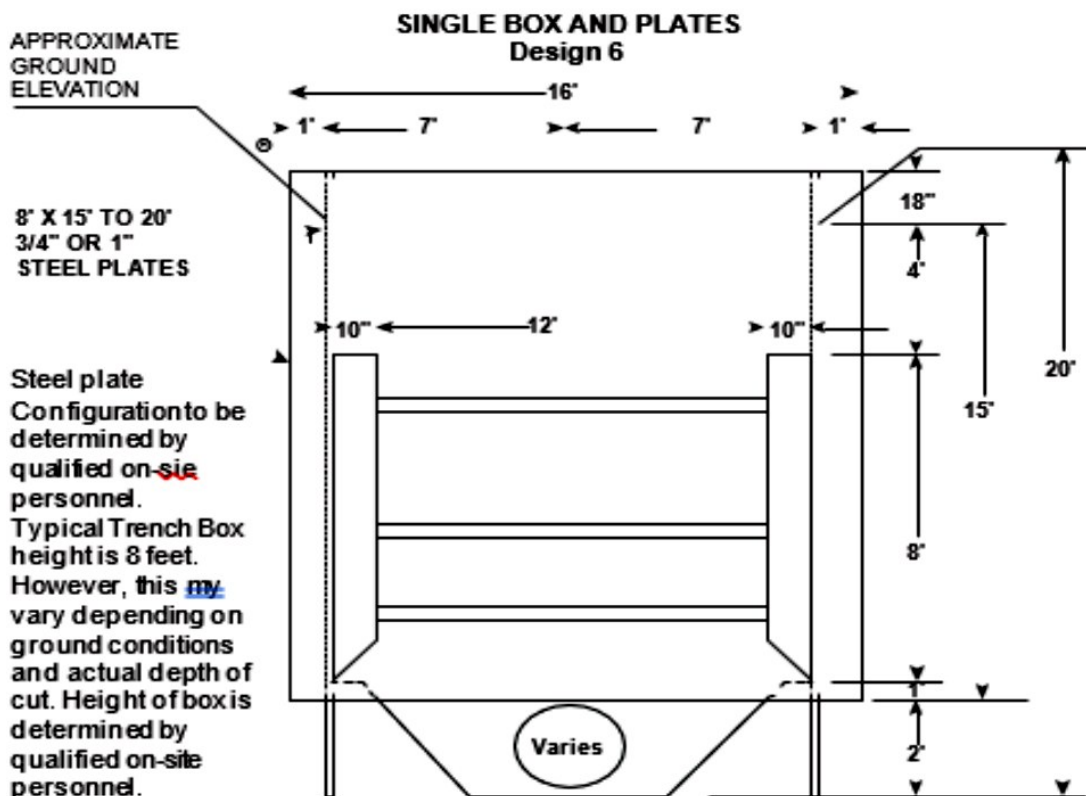
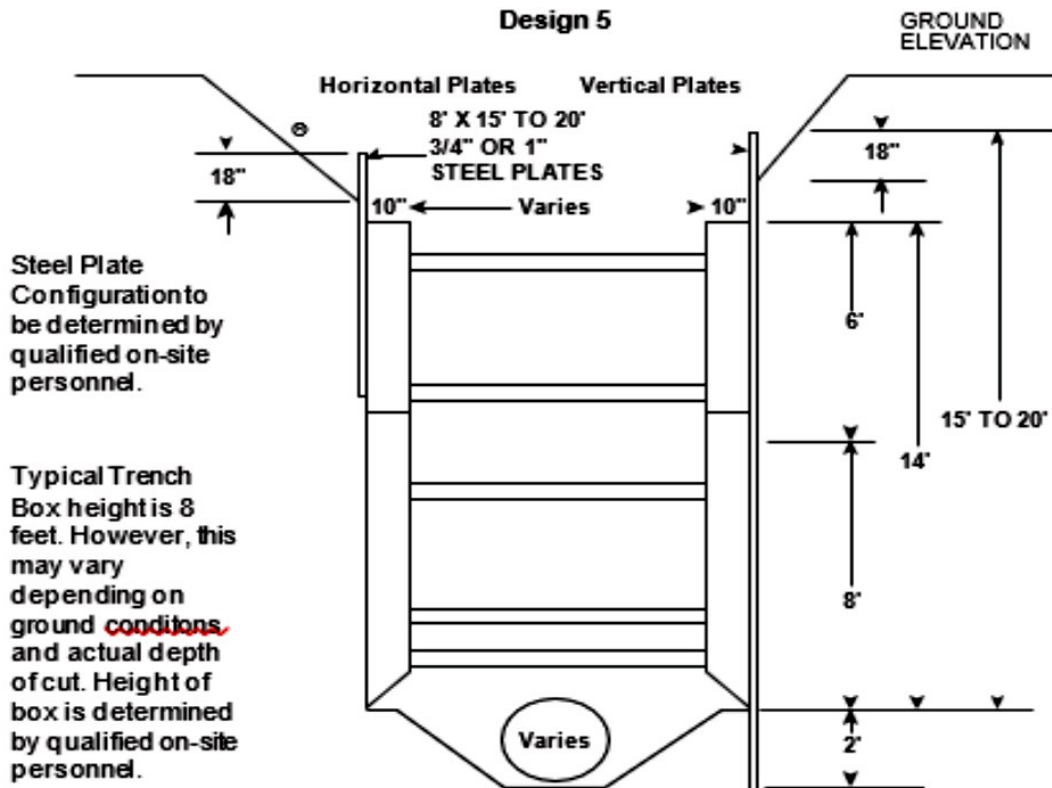


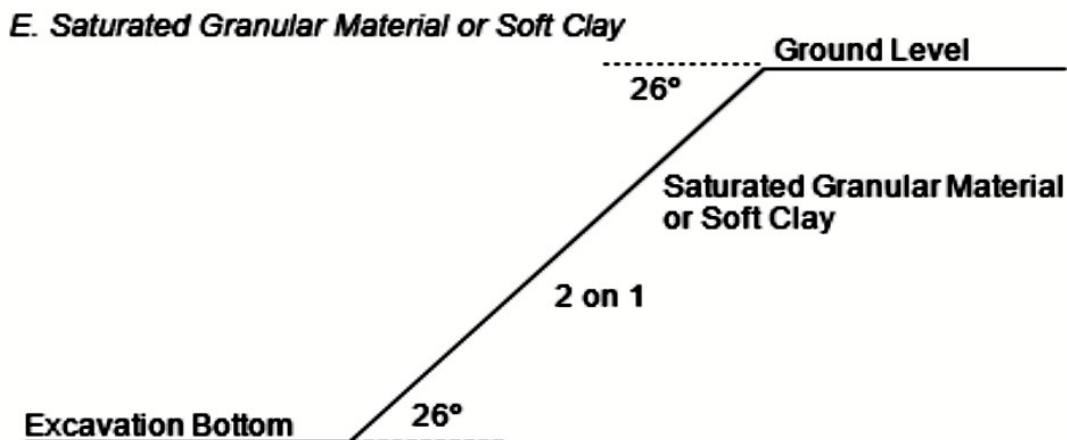
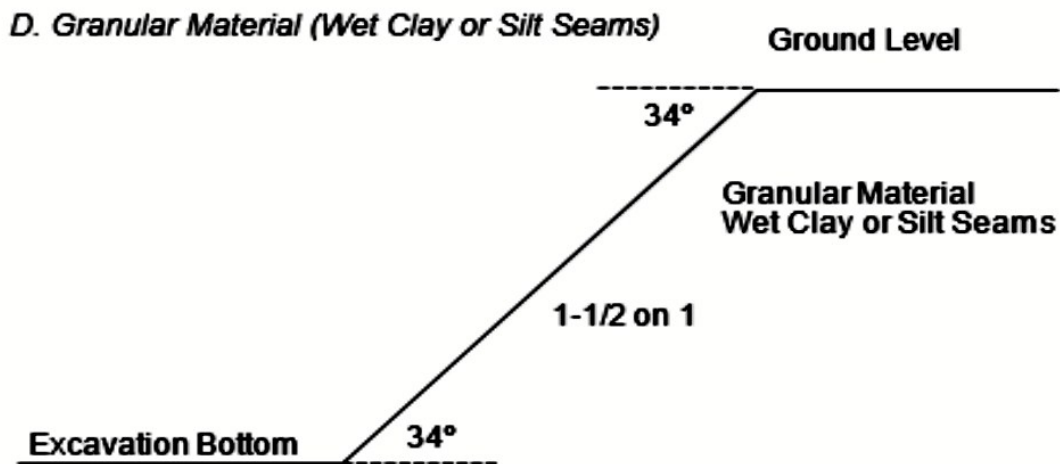
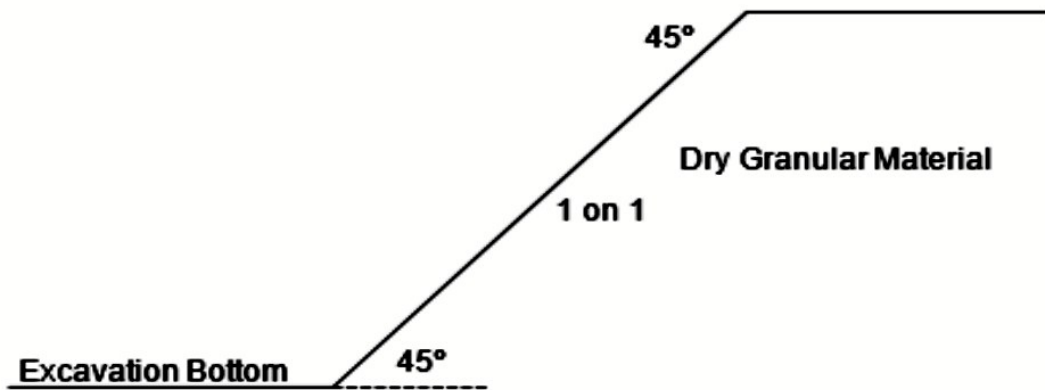
Figures 5 — 14. Shoring designs

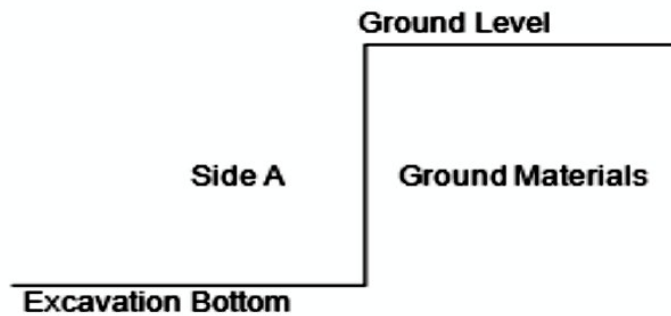
These shoring designs are intended to serve as a guide. They are not part of the MIOSHA Standards and are to be used only for reference purposes.







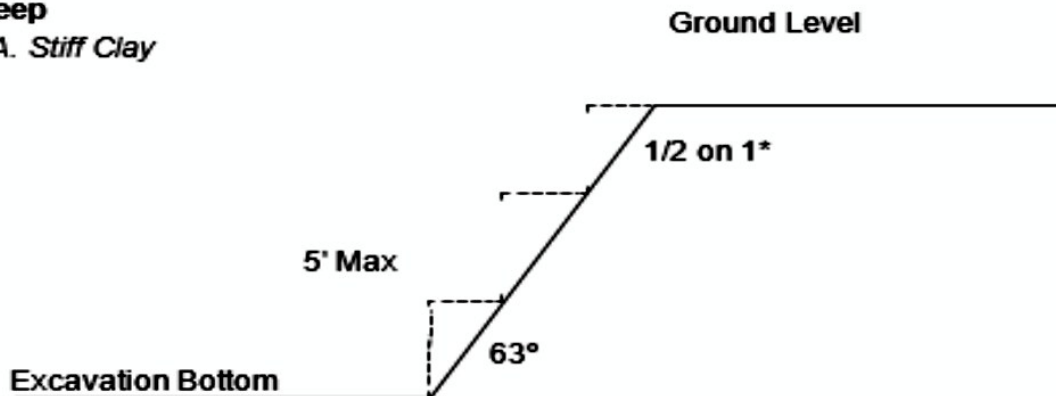


EXAMPLE 1 0 – 5' Deep

Side A: If the ground shows indication of hazardous movement, Side A Shall be cut to the proper angle of repose or a supporting system shall be provided.

EXAMPLE 2 More than 5' Deep

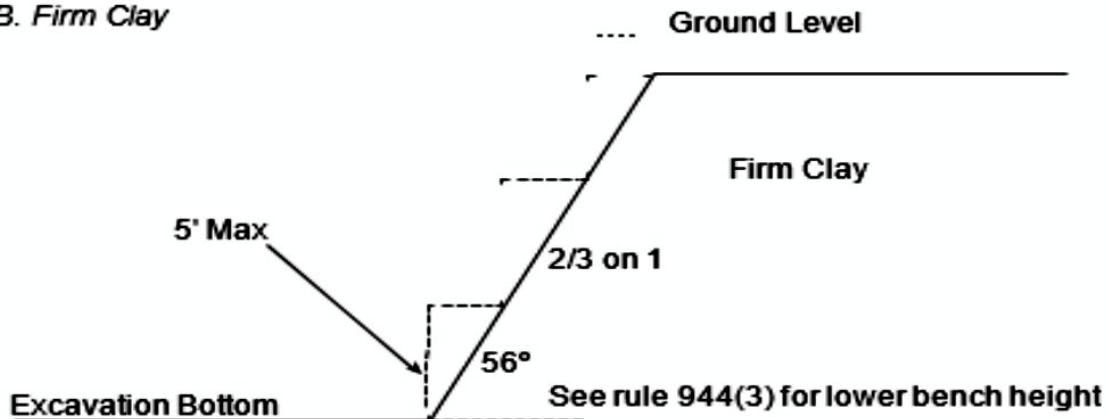
A. Stiff Clay



***1/2 HORIZONTAL: 1 VERTICAL**

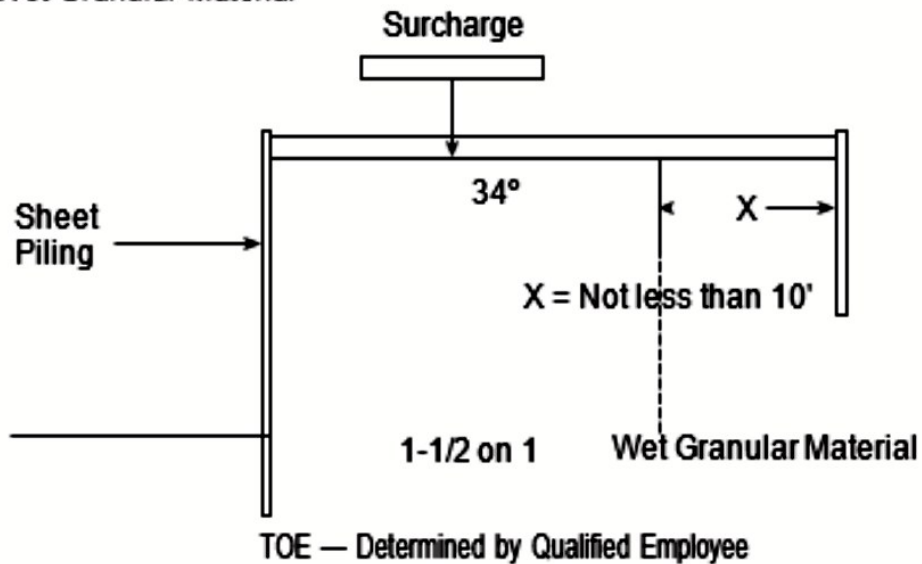
Penetrometer reading 2.5 TSF or greater required

B. Firm Clay

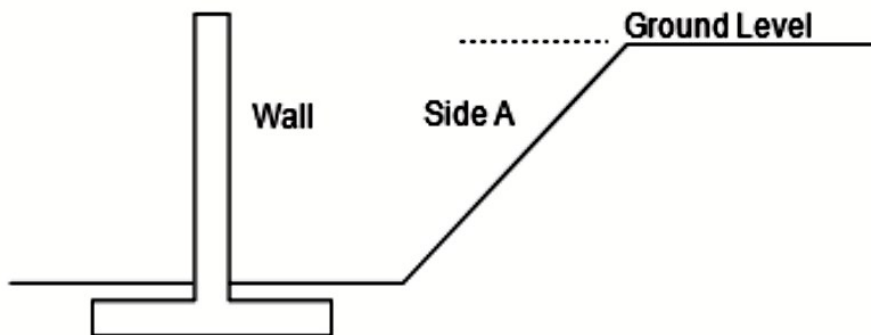


Penetrometer reading 1.5 TSF or greater required

Wet Granular Material

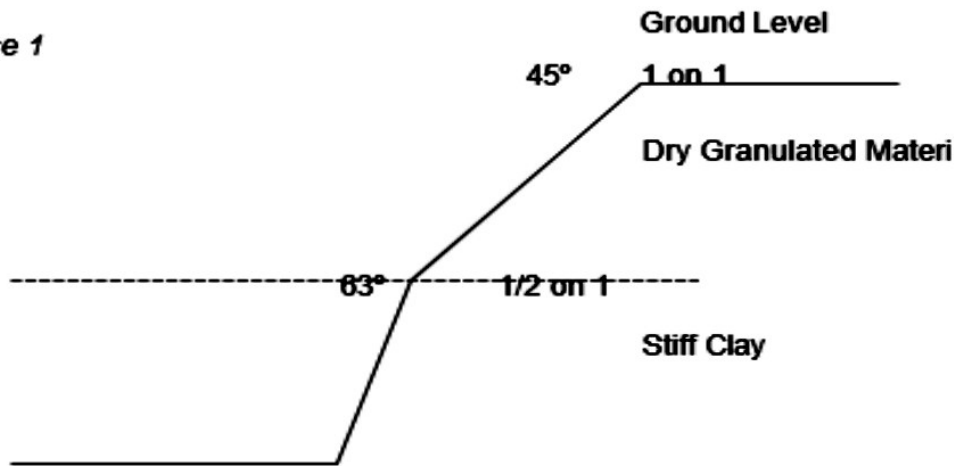
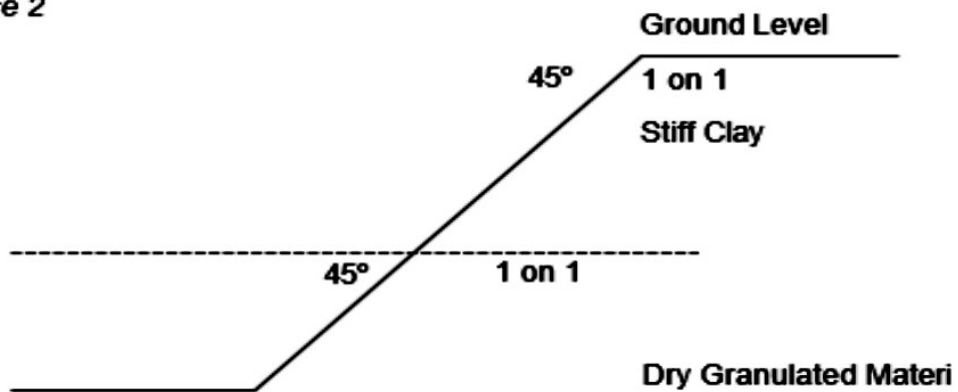


EXAMPLE 4 Wall in Place

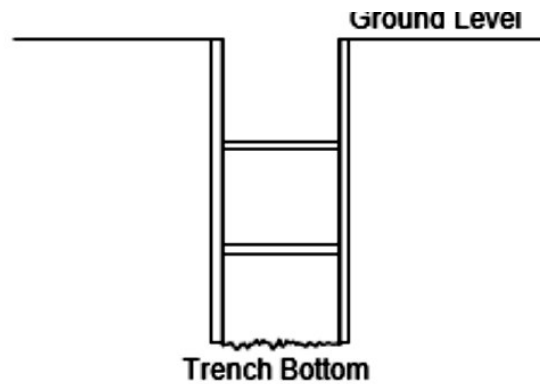


Side A: Side A should be cut to the angle of repose or a supporting system provided.

If support system is designed for Side A, no braces or members should bear against the wall unless the wall is designed to withstand bracing loads.

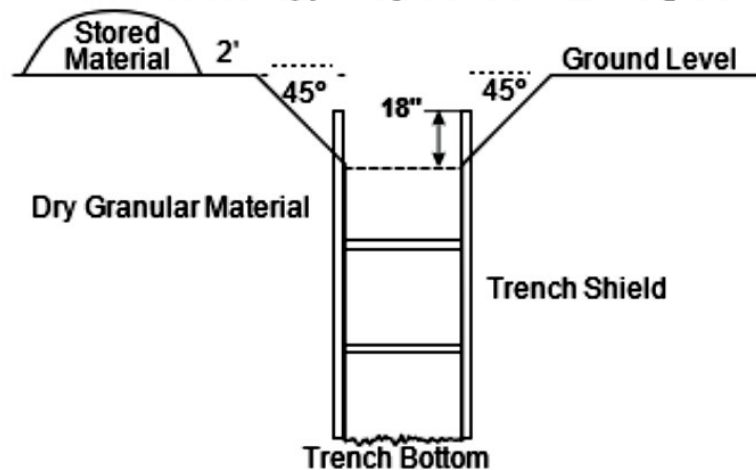
Soils**Case 1****Case 2****EXAMPLE 6 0 – 5' Deep Trenches**

Side A & B: If examination of the ground indicates hazardous ground, movement may be expected. Sides A & B shall be sloped to the proper angle of repose.



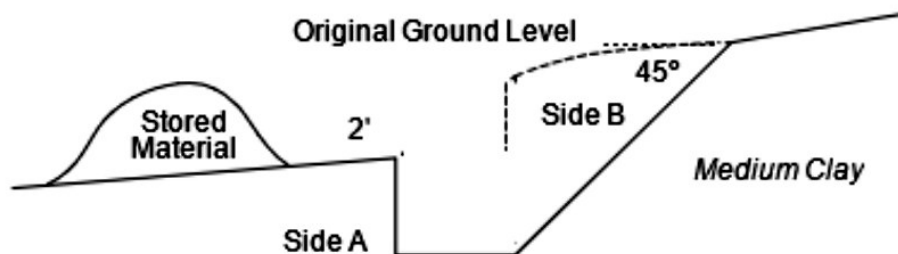
A trench support system shall be designed by a qualified employee knowledgeable in the field. The arrangement of stringers, struts, and braces should be as designed by the plans.

EXAMPLE 8 0–5' Trench Support System Not Extending to Ground Level



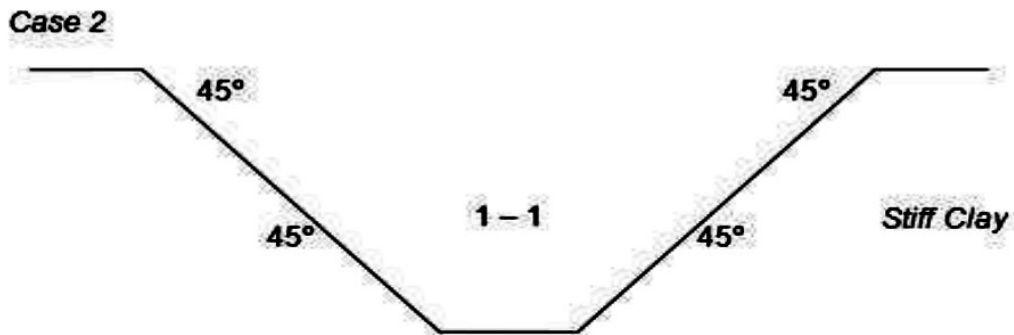
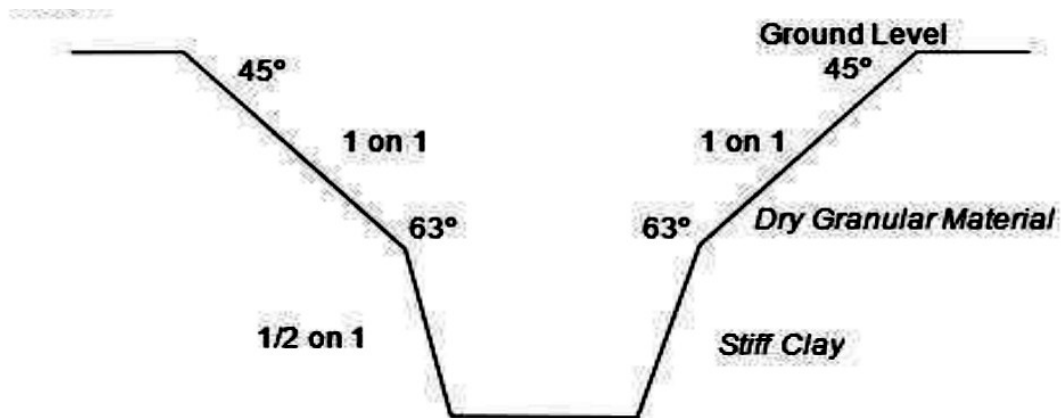
EXAMPLE 9 0–5' Trench Cut in Sloping Ground

Medium Clay



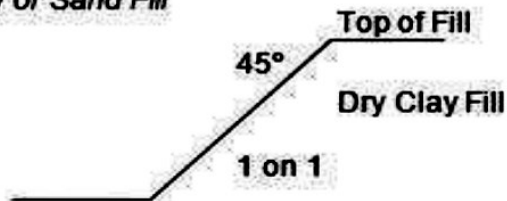
If Side A is 5' or less and Side B is more than 5':

- (1) Side A should be sloped as provided for in Example 6.
- (2) Side B should be cut to the correct angle of repose.
- (3) All excavated material should be stored on the low side of the trench, if possible.



EXAMPLE 11 Fill Areas

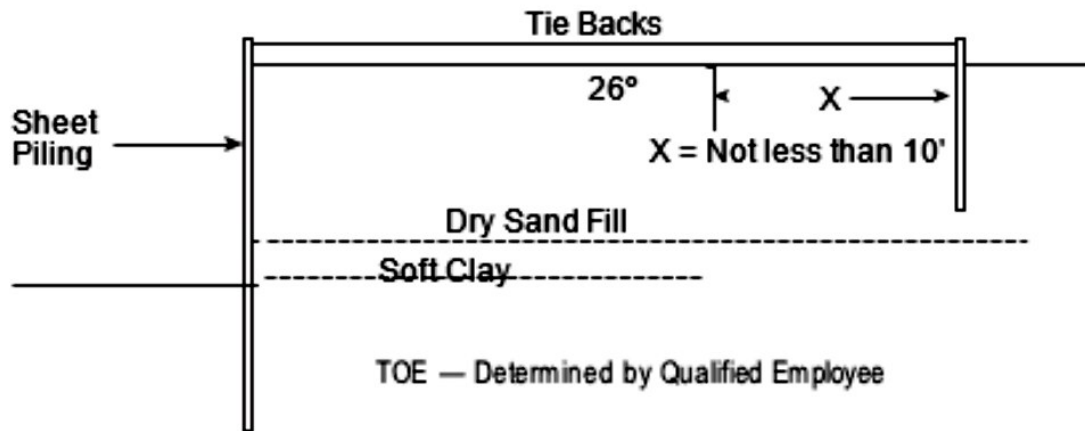
Case 1 *Dry Clay or Sand Fill*



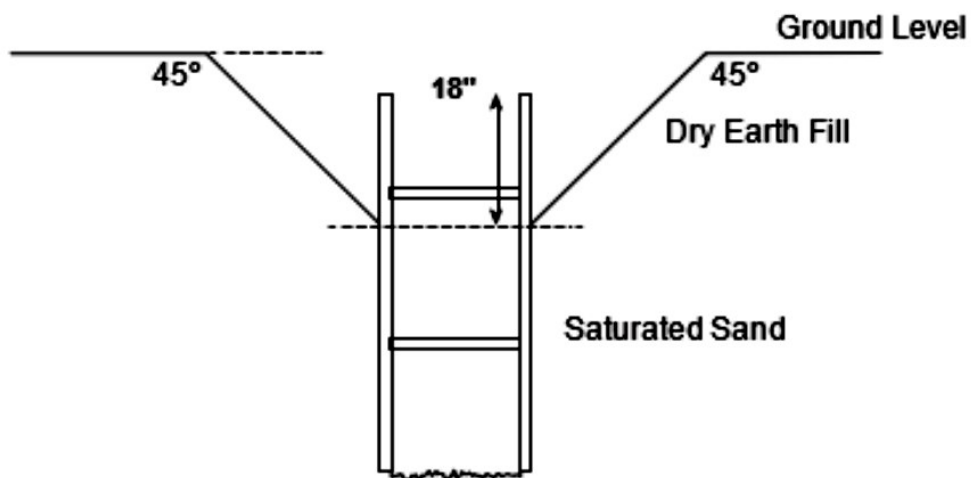
Case 2 *Wet Soil, Rubble, Trash, Organic Material Fill*



soil encountered at depth under fill area.



EXAMPLE 13 Trench — Saturated sand, soft clay or organic soil encountered at depth under fill area.



If the bottom of the trench extends into saturated sand, soft clay, or organic soil under a fill, a trench supporting system should be used to provide protection below the fill