Occupational Health and Safety Program

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Appendices

1 Introduction

This safety and health policy and procedures manual is principally designed to assist construction management personnel in the systematic implementation of safety and health measures throughout all phases of our projects. Its benefit will be directly proportional to the degree it is put into practice. The rules, procedures, and policies contained herein are effective immediately. Whenever a conflict between company policy, client/owner requirements, and governmental regulation exists the most stringent shall apply.

Although federal regulations do not currently require it, the best way to reduce accidents is for employers to adopt written safety policies and procedures and to execute them. The following manual contains information on management commitment, roles and responsibilities, procedures to manage safety and health on company projects. Additionally, included are a hazard communication program and the safety forms and documents that are necessary for this manual's effecting.

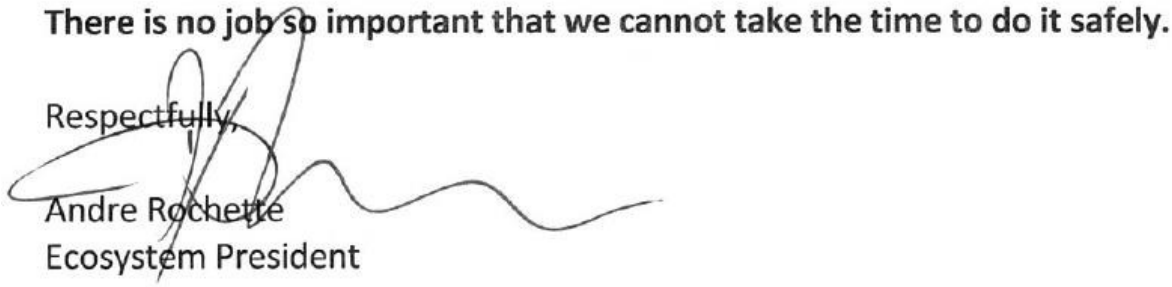
2 Section 1: Management Commitment

Integral to the success of any safety program is full support and commitment from top management and administration. Exemplification of Ecosystem's support and commitment for this program is embodied in the following safety policy statement and company safety goals.

2.1 Safety Policy Statement

Ecosystem is committed to providing a safe and healthful workplace that is free from recognized hazards. The safety and health of our employees, employees working on our projects, and occupants of facilities we work in is a priority. It is the policy of this company that injury and illness prevention will be given primary importance in all phases of operation and administration. To attain this end, this safety and health policy and procedures manual has been developed.

Ecosystem must read this safety and health manual and implement the policies and procedures described herein. Participation of all employees is a condition of employment and is essential to ensure manual effectiveness and achievement of company safety goals.



2.2 Company Safety Goals

On each of our projects and in our offices we shall strive to accomplish the following company safety goals:

1. Zero fatalities or serious injuries
2. Minimization of injuries and lost work day accidents
3. Full protection of building occupants
4. Prevention of damage and destruction to property and equipment
5. Enhanced company image by delivering projects in a safe manner
6. Integration of safety into daily activities

3 Section 2: Roles and Resonsibilities

In order for this policy and procedures manual to be effective, the following roles and responsibilities have been assigned and must be adhered to on all Ecosystem projects.

3.1 Director of Construction

1. Provide funding, facilities, tools, equipment, and information necessary to establish safe and healthy work environments
2. Display interest in safety and health matters at every opportunity
3. Periodically review safety program effectiveness
4. Consider contractor safety records before selection and awarding ofbids
5. Set a personal example

3.2 Project Managers

1. Assist in the selection of safe contractors by procuring the written programs, Experience Modification Rates (EMRs), and OSHA incident rates of bidding outside contractors
2. Thoroughly review the safety and health requirements as mandated by the client/owner and contract specification for each project
3. Facilitate the preparation of Site Specific Health and Safety Plans (HASP's) when required or appropriate
4. Determine project tasks that will require Work plans.
5. Oversee implementation of this policy and procedure manual on each assigned project
6. Set a personal example

3.3 Site Supervisors

1. Be familiar with this policy and procedures manual, client/owner safety and health requirements, and site specific health and safety plan requirements
2. Schedule and conduct project kick-off meetings and periodic safety meetings with hired contractors
3. Ensure hired contractors have designated competent persons and are conducting frequent and regular inspections of work areas under their control
4. Perform daily safety inspections of assigned jobsites
5. Require prompt correction of identified hazards and follow up on the correction of such hazards
6. Address imminent danger conditions immediately
7. Conduct new worker safety orientations
8. Conduct weekly toolbox talks with hired contractor crews or ensure that hired contractors are performing them
9. Report all jobsite accidents to the Ecosystem project manager and to client/owner representatives
10. Investigate accidents
11. Institute the disciplinary action plan for recalcitrant hired contractor workers
12. Maintain all safety related documents on assigned projects
13. Set a personal example

4 Section 3: Managing Safety and Health on Company Projects

The following section provides specific steps to be taken by project managers and site supervisors in the management of safety and health on company projects. Procedures for preplanning, establishing hired contractor responsibility, hazard identification, hazard control, safety training and education, discipline, and document retention are included.

4.1 Guidelines for Selecting Safe Contractors

To manage the risk associated with hiring outside contractors, attention should be paid to selecting those that have a good safety record. The following 3 sources of information should be used to evaluate prior safety performance of prospective outside contractors.

1. Copies of prospective contractor written safety programs should be obtained as part of the bid process. The written programs should be reviewed for:
    a. Statements of management commitment to safety
    b. Defined organizational roles and responsibilities for safety
    c. Procedures for worksite analysis including programs of frequent and regular safety inspections
    d. Procedures for controlling identified safety hazards
    e. Procedures for safety training and education of employees
    f. Inclusion of a hazard communication program
2. The Experience Modification Rates (EMR) for the 3 most recent years should be requested of prospective contractors as part of the bid process. **

    ***The insurance industry uses EMRs as a means of determining equitable premiums to charge companies for worker's compensation insurance. These rating systems consider the average incident losses for a given firm's type of work and amount of payroll to predict the dollar amount of expected losses from injuries and illnesses the employer will pay over a set period of time. As a result, the EMR of a prospective contractor will be a good indicator as to whether they are a safe company or an unsafe company. The higher the EMR the worse their safety performance is. Additionally, an EMR of 1.0 or greater is an indicator of poor safety performance.*

3. OSHA 300A forms and the number of hours worked by all company employees for the 3 most recent years should be requested of prospective contractors as part of the bid process.**

***The Occupational Safety and Health Administration (OSHA) requires employers to annually document their recordable injuries and illnesses on its OSHA 300A form called the Summary of Work-Related Injuries and Illnesses (see Appendix N). Once you have received these forms, you can calculate the prospective contractor's OSHA incident rate for each year by plugging the total number of injuries from the forms and the number of hours worked by all employees into the following formula:*

$$\text{Osha Incident Rate} : \quad \frac{\text{Total \# of recordable cases X 200 000}}{\text{\# of hours worked by all employees}}$$

Once you have calculated the OSHA incident rate for each year you can do a comparison amongst other bidding contractors and also compare the rates to national averages. To compare against national averages, take the Standard Industrial Classification (SIC) or North American Industrial Classification (NAICS) number from the OSHA 300A form and contrast them with rates obtained at the following Department of Labor web address: www.bls.gov/iif/oshsum.htm#10Summary%20Tables

4.2 Site Specific Health and Safety Plans

A Site Specific Health and Safety Plan (HASP) shall be developed for each project. Site specific HASP's shall be used as supplements to this manual and shall contain at a minimum the following components:

1. Scope of work
2. Hired contractor responsibilities
3. Emergency procedures and emergency numbers
4. Directions to nearest medical facility
5. Procedures to comply with client/owner safety and health requirements
6. Procedures for the protection of building occupants
7. Hazard communication program
8. Fire protection program

4.3 Workplans

A Workplan is a procedure used to review job methods, uncover hazards associated with job methods, and identify measures that must be taken to eliminate or control job hazards. The 3 basic steps in performing a work plan include: (1) breaking a job into successive steps, (2) identifying the hazards that result from the performance of each step, (3) developing the measures that will be taken to eliminate or control each job hazard.

The following policy shall be adhered to on all Ecosystem projects with regard to Work plans

1. A Workplan shall be performed for each of the following:
    a. Tasks that present unique hazards
    b. Tasks that provide the potential for severe injury
    c. Tasks that are new to Ecosystem construction management personnel and thus produce unfamiliarity
2. Hired contractors are to perform workplans using the form included as Appendix B and submit it for review before commencement of task. Forms must be completed in full.
3. Hired contractors are to perform a documented review of workplans with applicable workers before commencement of tasks.

4.4 Hired Contractor Designation of Competent Persons

A competent person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and *who has authorization to take prompt corrective measures to eliminate them*. As per OSHA regulation, each employer must designate competent persons to perform regular and frequent inspections of work areas, materials, and equipment. To satisfy this requirement the following must be performed on each Ecosystem project:

1. All hired contractors must designate competent persons using the form included in Appendix C before the start of project work.
2. The qualifications of designated competent persons must accompany the Appendix C form. Acceptable proof of qualifications includes resumes and safety certifications or cards.
3. Designated competent persons must hold a position of authority on the project such as foreman or superintendent.
4. Designated competent persons must perform frequent and regular inspections of work areas under their control
5. Hired contractor competent persons must be present at all times on the projects for which they are designated.
6. The competent person forms must be updated as each project progresses and changes in personnel occur.

4.5 Safety and Health Inspections

The chief purpose of inspection is to detect potential or existing hazards so they can be corrected before an injury or illness occurs. Inspections determine the conditions or worker actions that need to be corrected or improved to bring operations up to acceptable standards. Consequently, the following system of regular and frequent inspection shall be instituted on each Ecosystem project:

1. Ecosystem site supervisors must perform a safety inspection of their jobsite daily. A documented safety inspection must be completed on a monthly basis.
2. The checklist included as Appendix D shall be used as a guide to the inspections and shall subsequently serve as documentation of the inspections.
3. Site supervisors shall take the steps necessary to eliminate or control hazards identified during daily safety inspections and follow up on their correction
4. Imminent danger situations or those acts or conditions that pose the possibility of immediate death or serious physical harm MUST BE ADDRESSED WITHOUT DELAY.

4.6 Safety Training, Education, and Meetings

A key element in any successful health and safety program is training and education. Accordingly, the following system of safety training, education, and meeting procedures must be implemented on each Ecosystem project.

1. Each project worker must receive a safety orientation at time of initial assignment. Safety orientations shall be documented using the form included as Appendix E
2. Safety break minutes talks shall be either conducted by hired contractors to their own workforce or conducted by Ecosystem to hired contractors.
    a. Topics shall be selected based on current operations and equipment used on the jobsite (i.e. ladders, scaffolding)
    b. The topics discussed in these safety break minutes talks must be documented and sign-in sheets shall be used to document attendance (Appendix H).
3. A kick-off meeting shall be held with supervisory personnel from each hired contractor to discuss the safety requirements of each project. The meeting must include discussion of job safety requirements to include at a minimum:
    a. Statement of Ecosystem safety policy
    b. Client/owner safety and health requirements
    c. Tasks that will require Job Hazard Analyses
    d. Designation and role of competent persons
    e. Fall protection
    f. Basic electrical safety
    g. Personal Protective Equipment
    h. Fire protection program requirements
    i. Hazard communication requirements
    j. Emergency procedures, numbers, and medical facility information
    k. Accident reporting procedures

4. Safety break meetings shall be held throughout each project with hired contractor competent persons to discuss safety related matters. (Appendix F)

4.7 Accident Response, Reporting, and Investigation

This section includes the policies and procedures to be followed in the event of an accident. The following must be adhered to on all Ecosystem projects.

1. Accident Response
    a. The person(s) first on the scene shall quickly survey the scene
    b. Others shall be warned of any immediate danger
    c. The emergency alarm system shall be activated if necessary
    d. Appropriate medical attention shall be provided. Depending on the severity of injury, this includes the summoning of an ambulance, the transportation of the injured to the nearest medical facility, or administering first aid.
    e. The scene shall be secured to prevent further harm, keep unnecessary persons out of the accident area, or eliminate disturbance of the scene.
2. Accident Reporting
    a. All accidents that Ecosystem employees incur shall be immediately reported to the Ecosystem project manager
    b. Hired contractors must immediately report all accidents and near misses to the Ecosystem site supervisor who shall then notify the project manager
    c. Any accidents or incidents resulting in the following shall be reported to the client/owner:
        - Death
        - Days away from work
        - Light duty or job transfer
        - Medical treatment beyond first aid
        - Loss of consciousness
        - Cancer, chronic irreversible disease, fractured/cracked bones, or punctured ear drums
    d. Accidents involving the death or hospitalization of 3 or more employees shall be reported to OSHA within 8 hours. 1-800-321-OSHA
    e. Hired contractors must complete an accident report for each accident they incur and a copy must be obtained for file

3. Accident Investigation

    a. All accidents and near miss incidents shall be investigated by the site supervisor or project manager using the form included in Appendix G.

    b. Investigations shall begin as soon as possible after accident occurrence

    c. Investigations shall include interviews with the injured persons (if possible) and any witnesses.

    d. Investigations shall include photos of the scene, the tools that were used, the location where the event occurred, the wounds of the worker (if possible and with consent of the injured one)

    e. Witness statements shall be obtained by using the form including in Appendix H.

    f. The findings of investigations shall be used to prevent recurrence of the same or perhaps more disastrous sequence of events in the future

4.8 Disciplinary Action Procedures

Whenever project employees violate the Ecosystem safety policy, job safety standards, client/owner safety requirements, or OSHA regulations the following disciplinary action procedure shall be implemented. Disciplinary actions shall be documented using the form in Appendix I.

First Offense:	Verbal warning and proper instruction pertaining to specific safety violation
Second Offense:	A second violation of the same provision will result in a written notice of violation, including a warning that a 3rd violation of the same standard will result in termination
Third Offense:	Termination from the project

*Especially egregious safety violations warrant termination from projects at first offense.

4.9 Document Maintenance and Retention

All safety related documents must be maintained on each project throughout the duration of each project. The list of documents to maintain includes, but is not limited to:

a) Ecosystem Safety and Health Policy and Procedures Manual
b) Site specific health and safety plans (HASP's)
c) Hired contractor written safety programs
d) Material safety data sheets
e) Work plans
f) Emergency procedures, numbers, medical facility information
g) Safety orientation records
h) Safety break meeting minutes and attendance sheets
i) Competent person forms
j) Documented monthly safety checklists
k) Accident report

5 Section 4 " Safe Work Practices and Job Procedures"

5.1 Fall Protection

5.1.1 Guardrails

Guardrails system are the most reliable and convenient means of fall protection and the must be the first consideration.

They must be apply where a worker is at risk of falling:

- More than 3 metres;
- More than 1.2 metres, if the work area is used as a path for a wheelbarrow or similar equipment;
- Into operating machinery;
- Into water or another liquid;
- Into or onto a hazardous substance or object;
- Through an opening on a work surface.

5.1.1.1 Wood guardrails

The wood guardrails must meet those basic requirements:

- Top rail, mid rail, and toeboard secured to vertical supports;
- Top rail between 0.9m (3 feet) and 1.1 m (3 feet7 inches) high;
- Toeboard at least 100 mm (4 inches) high / 89 mm (3 ½ inches) if made of wood, and fixed flush with the surface;
- Posts no more than 2.4 metres (8 feet) apart;
- Installed no farther than 300 mm from the edge.

5.1.2 Personal Fall Protection

If guardrails are not possible and practical, one of the following alternative methods must be apply:

- Travel restraint system;
- Fall restricting system;
- Fall arrest system
- Safety net.

5.1.2.1 Travel restraint system

A travel restraint system is a CSA-approved full body harness (or safety belt) attached by a lifeline (or lanyard), to a fixed support. A competent worker must inspect the installation before each use.

5.1.2.2 Fall restricting system

The fall restricting system limits a worker to fall more than 0.6 metres (2 feet). It can be a belt grab or belly hook that attaches to a safety rail on a fixed ladder. A competent worker must inspect the installation before each use.

5.1.2.3 Fall arrest system

The fall arrest system is also a CSA-approved full body harness, equipped with a shock absorber. It prevent a falling worker from hitting the ground.

5.1.2.4 Safety net

The safety net shall be designed, inspected and tested by a professional engineer. Only a competent worker can install it.

5.2 Hot Work Permits

Any operation (welding, grinding, etc.) that requires the use of heat or that can produce sufficient heat to ignite a liquid, gas or other flammable substance. Furthermore, a hot work permit is required when a worker may be exposed to hazardous conditions.

5.2.1 Responsibilities

5.2.1.1 Worker

- The worker (welder) must obtain a hot work permit before beginning any hot work (as defined above);
- The worker must respect the requirements of the permit and protect other workers from harmful effects to their health and well-being such as welding fumes and flash burns (welder's flash);
- The worker must follow industry best practices and stop work if the requirements of the permit or any safety regulation are not respected;
- The worker must ensure that an appropriate fire extinguisher (i.e., ABC-type) of at least 10 lb is present at all times;
- The worker must advise the permit issuer of any change in the type of work;
- The worker must ensure the site is tidy and safe before returning the permit to the issuer at the end of the shift.

5.2.1.2 Permit Issuer

- The permit is issued by a representative of the principal contractor (usually the person in charge of worksite health and safety) or any other designated individual in his or her absence;
- The permit issuer must become familiar with the work as he or she prepares the permit;
- The permit issuer ensures the work can be carried out safely and adjusts the permit's requirements as needed;
- The permit issuer visits the site while work is underway to ensure the permit's requirements are being respected;
- The permit issuer stops any work that is not in compliance;
- The permit issuer has the covers removed from the detector heads, if necessary, once work is complete.

5.2.1.3 Company Performing the Work

- The company's representative must ensure the worker carries out the tasks in accordance with the provisions in the hot work permit and industry best practices.

5.3 Confined Space Entry

5.3.1 Prerequisites

5.3.1.1 Establishment

- An inventory of all confined spaces must exist, with a sheet for each describing the physical characteristics, any systems connected to the space and the components that need to be isolated and locked out, if necessary.
- The owner must have designated a qualified representative to authorize work in confined spaces.

5.3.1.2 Construction Site

- The principal contractor's prevention program must address work in confined spaces, and the contractor carrying out the work must have presented his/her prevention program containing his/her procedure for work in confined spaces.
- As work progresses, the contractor must inventory the confined spaces present on the worksite and establish protective measures to implement in the event work needs to be carried out in one of the spaces.
- A qualified representative of the owner or principal contractor must be designated to authorize work.

5.3.1.3 Both (Establishment and Construction Site)

- The person in charge of the confined space entry program must ensure that emergency services are available (fire department, paramedics).

5.3.2 Written Request for Authorization to Perform Work

The contractor, worker or any other person who needs to perform work in a confined space must submit a written request for authorization to the designated person in charge of the establishment or principal contractor / owner. The request must include a description of the proposed work and protective and rescue measures. A request for authorization form may be drawn up to assist in structuring requests.

5.3.3 Evaluation of the Request and Authorization of Work (Owner of Confined Space)

The designated person in charge of the establishment or principal contractor must meet with the requester to ensure that the work is necessary and that entry procedures will be followed. The designated person in charge of the establishment or principal contractor then issues a permit for the work and designates an individual to represent the establishment or principal contractor. The permit takes into account the protective measures set out for the confined space in the inventory. One permit is issued per confined space.

5.3.4 Entry

5.3.4.1 Selection of Supervisor and Workers

- The contractor designates a qualified person to act as supervisor and fill out the confined space entry permit. The person must hold a valid workplace first aider card and is responsible for ensuring all provisions of the permit are met.
- The workers selected must be qualified to enter the confined space and perform the work, as per the regulation.

5.3.4.2 Establishing Protective Measures (Supervisor)

- The contractor and designated supervisor must, using the confined space inventory or structural and systems plans, ensure that all necessary measures are taken to isolate the work area from hazards.
- A lockout procedure must be implemented to lock out electrical, hydraulic, pneumatic, etc. systems that could represent a hazard for workers. The release of stored energy, emptying of isolated conduits and start-up test all constitute integral elements of the lockout procedure. The confined space inventory must provide a list of energy-isolating devices to lock out as well as the method to release stored energy.
- The owner of the confined space must designate a person who will be in charge of lockouts.
- A hot work permit must be issued for welding work.
- The confined space assessment must be documented and conserved by the designated supervisor during work.

5.3.4.3 Installation of Lifesaving Devices

- The supervisor ensures that lifesaving devices (lifeline, retractor with retrieval winch, first aid equipment, etc.) are on site and functional.
- The contractor and supervisor ensure that rescue services have been notified and that their procedures have been followed.

5.3.4.4 Data Collection and Permit Issuance (Supervisor)

- Using a gas detector with a built-in sampling pump, the supervisor assesses the air quality of the confined space. The concentrations of the following gases are measured and compared against section 302 of the RROHS:
    - Oxygen: between 19.5% and 23% normal: 20.9%
    - Inflammable gases: less than 10% of the LEI normal: 0%
    - Toxic gases (hydrogen sulfide): less than 10 ppm normal: 0 ppm
    - Asphyxiant gases (carbon monoxide): less than 35 ppm normal: 0 ppm
    - OTHER: Depending on the conditions of the confined space, a multi-gas detector may be necessary to test for other contaminants, such as ammonia, sulfur dioxide, nitrogen oxides or volatile organic compounds. An industrial hygiene company can assess the confined space for possible airborne contaminants.
- The supervisor records the data collected on the permit, along with the date and time.
- The supervisor ensures that the lockout procedures have been followed and that workers have each placed their locks on equipment.
- The supervisor ensures that the start-up test is conducted with the workers who locked out equipment present.
- The supervisor presents the permit to the workers, who sign the document.

5.3.4.5 Radio Test

- The supervisor must conduct a radio test with the workers, if using wired or wireless devices (walkie-talkie).
- The supervisor also performs a test with a designated representative of the contractor, the person in charge of the worksite or security, as they will be notified immediately if there is a problem and are responsible for contacting emergency services.
- A clear audio connection must be maintained between all parties at all times.

5.3.4.6 Entry

- Once authorized to proceed, the workers selected to carry out the work enter the confined space.
- At least two workers must be present in the confined space at the same time.
- Each worker must wear a safety harness to facilitate transport by first aiders in the event of an evacuation.
- At least one worker must wear a continuous gas monitor at all times. The monitor must be turned on BEFORE entering the confined space. There must be one gas monitor per group of workers. If more than one work area is present in the confined space, one functioning gas monitor must be present in each area.
- No gas cylinders are permitted in the confined space. If welding work is performed, the cylinders must be kept outside the space. In the case of arc welding, an extraction fan must be positioned near the weld, and a source of fresh air must be present.

5.3.4.7 Breaks and Meals

Workers leave the confined space to take breaks and meals. After breaks and meals, the supervisor must remeasure air quality parameters (

5.3.4.8 Completion of Work

- Once the work has been completed, all equipment must be removed from the confined space.
- The supervisor ensures that all workers have exited the confined space.
- The supervisor notifies the designated representative of the contractor, the person in charge of the worksite or security that work has been completed.
- The supervisor ensures emergency services have been notified that the work was completed.

5.3.5 Stoppage of Entry Procedures and Work

5.3.5.1 Detection of an Airborne Contaminant or Low Oxygen Concentration

- Prior to Entry
    - If the supervisor detects an airborne contaminant or low oxygen concentration in the confined space:
        - no workers are permitted to enter and
        - the confined space must be ventilated for 30 minutes, then reentry procedures repeated..

- If the situation persists, the supervisor must order all work to cease, and the situation must be completely reassessed, beginning with a review of the confined space inventory. The source of the contamination must be identified, and a method must be developed to eliminate the hazard at the source.

- During Work
  - If the gas detector alarm goes off, all workers in the confined space must evacuate.
  - The cause of the alarm must be identified and eliminated before workers can be authorized to reenter the confined space.
  - Once the cause has been identified and eliminated, repeat reentry procedures.

5.3.5.2 External Emergency

- If an emergency occurs outside the confined space that could endanger the safety of the workers inside, the supervisor must issue a stop-work order and evacuate the workers.
- Workers must comply immediately and exit the confined space.
- The supervisor must obtain authorization from the site supervisor before work can proceed. Reentry procedures must be repeated, starting from step.

5.3.5.3 Internal Emergency (Within the Confined Space)

- Immobilized Worker

  A worker may be immobilized by a fracture for example, without there being a danger to his life or his coworkers'.

  A first aider must stabilize the worker, and the location if necessary, and ensure it is safe to await evacuation by the rescue team. Paramedics will then transport the worker to hospital.

- Casualty

  A casualty refers to a person who is seriously injured, such as wounded, intoxicated, crushed, buried, etc.

  1. If a casualty occurs, evaluate if it is safe to enter the confined space**. If it isn't, wait for specialized emergency services.**
  2. If it is safe to enter, secure the confined space. Supply lighting and ventilation while first aiders stabilize the worker, then wait for specialized emergency services to arrive.
  3. ONLY ENTER THE CONFINED SPACE TO ASSIST THE INJURED WORKER IF IT IS SAFE TO DO SO. OTHERWISE, WAIT FOR SPECIALIZED EMERGENCY SERVICES TO ARRIVE.

5.3.6 Archival Storage

- Air quality readings that do not comply with the standards must be recorded in a register and kept for five years.

  Data-logging gas detectors are more accurate and make it easier to record data. They also record the date, time and ambient temperature. The data can then be transferred onto a computer and saved onto storage media (CD, DVD, Blue Ray, etc.) for long-term archiving

5.4 Housekeeping and Material Storage

- Good housekeeping must be practiced at all times. Tripping hazards and slippery conditions must be eliminated. Aisles and access ways must be kept clear of any obstruction, and be well-lit and properly ventilated.
- Scraps must be removed to disposal bin or designated disposal area.
- Nails or sharp objects protruding from lumber or boards must be removed.
- Daily job site cleanup is required and individual cleanup duties must be assigned to all workers.
- All materials must be segregated as to size, kind and length and placed in neat, safe and orderly piles. This will ensure clear passageways in storerooms, warehouses and on job/project sites creating a safe workplace for all employees.
- Materials must be properly stored, stacked or piled away from power lines and to prevent tipping/spilling.
- Bagged or sacked material should be stacked or piled no more than ten high and should be cross piled on skids so that in all cases, no one can be injured because the material falls, rolls, overturns or breaks.
- Barrels may be stacked upright with platforms/planks between layers and should not be stacked any higher than the mechanical equipment can safely reach.
- Skids of brick blocks or other such material should be stockpiled in such a manner as to prevent tipping or collapsing.
- Employees are not allowed to climb up, on or about around any such stacked equipment, machinery, supplies, parts, products, etc.
- Stockpiles should be blocked and interlocked ensuring that they are not too high or obstruct any fire access, extinguishing or fire safety equipment (e.g. fire doors).
- Proper tools, such as cutters or snips, must be used to break metal bands and extreme caution should be taken when removing such objects.
- Protruding nails in boards, planks, etc., must have the nails removed or bent over, and the boards placed in an orderly fashion. When handling such material, the workers should wear heavy gloves and safety footwear as prescribed.
- Signs must be posted to warn workers of hazardous areas.

5.5 Lifting and Hoisting

5.5.1 Evaluating the Load

Determine the weight of the object or load prior to a lift to ensure the lifting equipment operates within its capabilities.

5.5.2 Balance Loads

Estimate the center of gravity or point of balance. The lifting device should be positioned immediately above the determined center of gravity.

5.5.3 Landing the Load

Prepare a place to land the load. Lower the load gently and make sure it is stable before slackening the sling or chain.

- Select only appropriate slings for the task and NEVER exceed the working load limits.
- Make sure the hoist or crane is directly over the load.
- Use slings of proper reach. Never shorten a line by twisting or knotting.
- With chain slings, never use bolts or nuts.
- Never permit anyone to ride the lifting hook or the load.
- Make sure all personnel stand clear from the load being lifted.
- Never work under a suspended load, unless the load is properly supported.
- Never leave a load suspended when the hoist or crane is unattended.
- Inspect all slings thoroughly at specified intervals and maintain them in good condition.
- Inspect each chain or sling for cuts, nicks, bent links, bent hooks, etc., before each use. If in doubt, don't use it.
- Ensure that safety latches on hooks are in good working condition.
- Ensure that the signaller is properly identified and understands techniques of proper signaling.
- Make sure a tagline is used to control the load.

5.6 Designated Substances

5.6.1 Asbestos

5.6.1.1 What is Asbestos?

Asbestos is a naturally occurring material once used widely in the construction industry. Its strength, ability to withstand high temperatures, and resistance to many chemicals made it useful in hundreds of applications. However when asbestos is inhaled, it can be harmful and lead to the following diseases:

- asbestosis
- lung cancer
- mesothelioma (cancer of the lining of the chest and/or abdomen).

5.6.1.2 Where can it be found?

- Sprayed-On Fireproofing
- Pipe and Boiler Insulation
- Loose Fill Insulation
- Asbestos Cement Products
- Acoustical Plaster
- Acoustical Tiles
- Vinyl Asbestos

- Gaskets
- Roofing Felts
- Asphalt/Asbestos Limpet Spray
- Drywall Joint-Filling Compound
- Coatings and Mastics

5.6.1.3 Prior to Commencing Work

- Supervisors:
  - **a)** Prior to commencing work in any area, request a copy of the owner's Asbestos Report.
  - **b)** If there is asbestos in the work area and it needs to be removed to perform the work, request that the owner to remove it.
  - **c)** Do not commence work until you have received a notice from the owner in writing that the asbestos has been removed and it is safe to commence or return to work.
  - **d)** If there is asbestos in the work area and its presence does not impact the work, advise workers of location and what not to disturb.
- Workers:
  - a) In all projects, bear in mind the possible presence of asbestos.
  - b) If you are working in an area known to contain asbestos, contact your supervisor to determine whether or not asbestos is present in the work area or adjacent areas in which you may be working.
  - c) If there is any doubt about pipe or duct insulation, textured ceilings, vinyl asbestos floor tile, flooring sheet goods, wall cladding or underground piping, especially in older facilities, do not commence work and notify your supervisor.

To remove Asbestos a worker requires knowledge of the type of asbestos, knowledge of the proper choice and use of PPE and Respirators, understanding of containment procedures and knowledge of proper handling, storage and waste removal procedures.

DO NOT REMOVE OR DISTURB ASBESTOS CONTAINING MATERIAL. IF YOU ARE INSTRUCTED TO DO SO, STOP WORK AND CONTACT YOUR SUPERVISOR

5.6.2 CRYSTALLINE SILICA

Protection of respiratory passages: The impurities in the air of a work environment shall be eliminated at their emission point so that their concentration is reduced to a level lower than the permissible values.

When crystalline silica dust is liable to be generated, the employer must control the dust to prevent it from being dispersed throughout the area, either by using tools with wet dust suppression systems or by capturing dust particles in high efficiency filters. The employer must also provide workers with respirators that are equipped with filters capable of removing a minimum of 99.97% of all airborne particulate matter 0.3 µm in diameter or larger (HEPA).

Workers must employ the good hygiene practices below when working around crystalline silica dust:

- Vacuum clothing with a HEPA vacuum, or remove coveralls.
- Wash hands and face before eating, drinking or smoking.
- No eating or drinking in the work area.

For any work involving a wet dust suppression system, the dust remaining on the floor after the water has evaporated must be vacuumed up with a HEPA vacuum.

5.6.2.1 Types of work

- Heavy Work
  - Demolition
  - Concrete breaking
  - Cutting concrete bricks or blocks (with a gasoline saw for example)
  - Preparing concrete using a tremie, mixer, etc.
- Light Work
  - Drilling anchor holes in concrete
- Sanding of Drywall (Compound)
  - If the data sheet indicates the drywall compound contains silica

5.6.2.2 Protective measures - In a Well-Ventilated Area (Outdoors)

- Heavy Work
  - Limit dust dispersal at the source with wet suppression methods or a dust control system equipped with a HEPA filter.
  - Wear a half-mask respirator equipped with P100 filters.
  - If necessary, wear coveralls.
  - Isolate the work area to protect other workers and the public.
- Light Work
  - Wear a half-mask respirator equipped with P100 filters.

5.6.2.3 Protective measures - In an Enclosed Area (Indoors)

- Heavy Work
  - Limit dust dispersal at the source with wet suppression methods or a dust control system equipped with a HEPA filter.

        - Wear a half-mask respirator equipped with P100 filters.
        - If necessary, wear coveralls.
        - Isolate the work area, and use at least one air extractor with a HEPA filter to ventilate the work area without contaminating the air in the surrounding areas.
    - Light Work
        - Isolate the work area.
        - Wear a respirator.
        - Use a tool with a dust control system.

5.7 Trenching and Excavating

Soil conditions and stability can vary greatly from one area to another. Factors that can affect soil stability include, but are not limited to: previously disturbed soil, drying of walls and sub-surface weeping.

5.7.1 Hard Compact

Hard compact is defined as:

- Hard to hand excavate,
- An excavating bucket can leave well defined teeth marks in the soil,
- The soil has been verified as hard compact by a Professional Engineer,
- A soil testing kit indicates that it is hard compact.

5.7.2 Soils Other than Hard Compact

- Require a 45 degree or greater cutback from the vertical side wall in all soil conditions above 1.2 meters in height.
- Require the use of shoring, or
- Require the use of an engineered trench box.

5.7.3 Frozen Soils

Frozen soils cannot be considered hard compact due to the risk of wall failure below the frost line.

5.7.4 Set-Backs

Trenches in or near roadways and construction sites are subject to wall movement from vibration. Vehicles and equipment must be kept back from the trench a distance equal to the depth of the trench.

5.7.5 Spoil Piles

- They must be set back a minimum of 1.0 m from the trench/excavation edge.
- If placed too close to the trench or excavation edge, they can exert excess downward pressure causing wall failure.
- Excavated loose material should be scaled back away from the edge of the trench.

5.8 Tagging and Lockout

+ Review drawings of the system to be de-energized and de-activated to determine the switches, power sources, controls, interlocks, or other such devices necessary to isolate the system. Confirm with the client/owner where required.
+ All apparatus capable of being electrically energized or dynamically activated must be de-energized or de-activated by locking out, physically disconnecting or otherwise rendering the apparatus inoperable.
+ Test the system with a CSA-certified potential test indicator to ensure that all components are de-energized and de-activated, including interlocking or dependent systems which could feed into the system being isolated, either mechanically or electrically. Potential test indicators should not be used beyond the voltage limits for which they are rated.
+ Observe the following safeguards for locking out and tagging:
    - After the circuit has been de-energized, locked out by the person in charge, workers must be protected by personally placing their own safety lock on the disconnect switch. The worker must retain the key for this lock while lock is in place.
    - Where several workers or trades are working on the circuit, provision for additional locks must be made through the use of a lockout bar. This arrangement can accommodate any number of locks by placing another lockout bar in the last hole of the previous bar.
    - Each worker must attach to their lock a durable tag filled out with the following information:
    - Reason why the equipment was disconnected;
    - Name of person responsible for the disconnection and his/her employer; and
    - Date on which the equipment was disconnected.
    - The de-energized electrical system must be discharged by short circuit and phase to ground. A temporary ground cable must be attached to the system and remain in place until work is completed.
+ A record must be kept of the devices opened, locked out or otherwise rendered inoperable so that all of these devices can be reactivated once work is complete.
+ Place signs on the system indicating that it is not to be energized or operated and that guards, locks, temporary ground cables, chains, tags, and other safeguards are not to be tampered with or removed until work is complete.

- Workers testing electrical equipment must:
    - Remove all watches, rings, neck chains or other current-conducting jewelry;
    - Wear electric shock resistant footwear; and
    - Wear safety glasses with side shields.
    - Wear rubber insulated gloves underneath protective leather gloves.

In-plant procedures specified by the owner or client take precedence over the procedures outlined here, providing there is no contravention of existing codes or statutes.

5.9 Ladders

- All portable ladders must be equipped with non-slip bases.
- Ladders must be set up on a firm level surface. If the base is to rest on soft, uncompacted or rough soil, a mud sill shall be used.
- Straight ladders will be tied off or otherwise secured to prevent movement. If this is not possible, one worker will hold the base of the ladder while it is being used.
- When a task must be done while standing on an extension ladder, the length of the ladder must be such that the worker stands on a rung no higher than the fourth from the top.
- When climbing up or down, workers must always face the ladder.
- Unless suitable barricades have been erected, or other adequate protection provided, ladders must not be set up in passageways, doorways, driveways or other locations where they can be struck or bumped by persons or vehicles.
- Ladders must not be erected on boxes, carts, tables, scaffold platforms, elevating work platforms or on vehicles.
- Straight ladders must be set up at an angle such that the horizontal distance between the top support and the base is not less than one-quarter or greater than one third of the vertical distance between these points.
- Metal ladders or ladders with wire reinforcing must not be used in the proximity of energized electrical conductors.
- Wooden ladders must be unpainted or finished with a clear non-conductive wood preservative.
- All ladders erected between levels must be securely fastened, extend 90 centimetres (3 feet) above the top landing and afford clear access at top and bottom.
- Ladders with weakened, broken, bent or missing steps, broken or bent side rails, broken, damaged or missing non-slip bases, or otherwise defective must not be used and must be tagged and removed from the worksite.
- Ladders must not be used horizontally as substitutes for scaffold planks, runways or any other service for which they have not been designed.
- Workers on a ladder must not straddle the space between the ladder and another object.
- Three points of contact must always be maintained when climbing up or down a ladder (two feet and one hand or one foot and two hands).

5.9.1 Portable Ladders

Before using any ladder, make sure that it is in good condition and is right for the job to be done.

- When setting up a ladder, secure the base and "walk" the ladder into place.
- The ladder should be set at the proper angle of one foot out at the base for every four feet of height.
- Before using a ladder, make sure it is secured in place.
- When in position, the ladder should protrude one meter above the intended landing point.
- Workers shall not work from the top two rungs of a ladder.
- Don't overreach while on a ladder. It is easier and safer to climb down and move the ladder over a few feet to a new position.
- Always face the ladder when using it. Grip it firmly and use the three-point contact method when moving up or down.
- The minimum overlap on an extension ladder should be one meter unless the manufacturer specifies the overlap.
- Keep both metal and wood ladders, away from electrical sources.

5.9.2 Step Ladder

As with all ladders, make sure that the step ladder is in good condition, and is right for the job to be done. Step ladders are to be used only on clean and even surfaces.

- No work is to be done from the top two rungs of a step ladder, counting the top platform as a rung.
- The step ladder is only to be used in the fully opened position with the spreader bars locked.
- Tops of step ladders are not to be used as support for scaffolds.
- Don't overreach while on the ladder. Climb down and move the ladder over to a new position.

5.10 Scaffolding

+ The erection and dismantling of scaffolds must be carried out under the supervision of a competent worker who is knowledgeable and experienced in such operations.
+ Workers erecting and dismantling a scaffold more that 2.4 metres (8 feet) high must be tied off with a full body harness and lanyard equipped with a shock absorber.
+ Scaffolds must be erected with all braces, pins, screw jacks, base plates, and other fittings installed, as required by the manufacturer.
+ Scaffolds must be adequately braced horizontally and vertically.
+ Scaffolds must be equipped with guardrails consisting of a top rail, mid-rail and toeboard.
+ Scaffold platforms must be at least 46 centimetres (18 inches) wide and if they are over 2.4 metres (8 feet) high they must be planked across their full width.
+ Scaffolds must be tied in to a building at vertical intervals not exceeding three times the least lateral dimension, including the dimension of any outrigger stabilizing devices.
+ Where scaffolds cannot be tied in to a building, guy lines adequately secured should be used to provide stability.

- Scaffold frames must be properly pinned together where scaffolds are two frames or more in height or where they are used as rolling scaffold towers.
- Scaffolds must be erected, used and maintained in a reasonably plumb condition.
- Scaffold planks must be securely fastened to prevent them from sliding.
- Scaffold planks must be installed so that they overhang by at least 15 centimetres (6 inches) but no more that 30 centimetres (12 inches).
- Scaffold planks must be:
    - of good quality,
    - free of defects, such as loose knots, splits or rot,
    - rough sawn, measuring 48mm X 248mm (1 7/8 " X 9-3/4") in cross section, and
    - No. 1 spruce or better.
- Scaffolds must be equipped with a proper ladder for access. Vertical ladders must be equipped with 15 centimetre (6 inch) stand-off brackets and a ladder climbing fall protection device or safety cage when they are more than 3 metres (10 feet) high.
- Frame scaffolds over 15 metres (50 feet) high and tube-and-clamp scaffolds over 10 metres (30 feet) high must be designed by a professional engineer and constructed in accordance with the design.
- Remove ice, snow, oil, grease and other slippery material from the platform, and apply sand to the surface.
- Wheels or casters on rolling scaffolds must be equipped with braking devices and securely pinned to the scaffold frame.

5.10.1 Wood Scaffolds

The construction of wood scaffolds is closely regulated by legislation. Materials and material dimensions are specified in detail in the Regulations for Construction Projects.

Construction of scaffolds can vary greatly as to use, shape, location and the type of job to be done. Consequently, they sometimes are built in a haphazard manner. To avoid this, the following safe work practices are a minimum requirement.

- The construction, alteration, design and removal of wood scaffolds are to be done by competent workers.
- The material used to construct these scaffolds should be sound, close grained and finished on all four sides.
- The scaffold must be capable of supporting four (4) times the load that might be imposed on it.
- All component parts should be tight together and properly fixed to each other.
- Proper guardrail must be set in place (top rail, intermediate rail, toe board).
- The scaffold work platforms shall extend for the full width of the scaffolding.
- When used as a scaffold work platform, planks shall be secured from movement by the use of cleats or by being wired in place.
- Safe access and egress is to be provided to all work platforms by the use of ladders.
- Scaffold work platforms shall not span more than 2.1 metres.

5.11 Fire Prevention/Extinguishers

5.11.1 Fire Prevention Requires Special Attention.

- Keep all entrances and exits clear of obstructions such as vehicles, equipment and general clutter at all times.
- Correct poor housekeeping practices.
- Use appropriate shielding of flammable surfaces when performing hot work.
- Remember that grinders are capable of throwing red hot particles approximately 30 feet.
- Keep your work area free of unnecessary combustible materials.
- Use proper degreasing agents. Never use gasoline or other "flammable liquids" for degreasing or cleaning.
- All fire doors are to be kept closed when the shop is vacant.

5.11.2 Fire Fighting Equipment

- All workers should know the location of the fire fighting equipment in their area.
- Fire extinguishers are to be checked monthly.
- Never return an empty extinguisher to its fire station. Clearly mark it "MT" with chalk and exchange it for a charged unit.
- All fire extinguishers will be inspected on an annual basis by a certified company.
- All workers must receive training before using fire extinguishing equipment.

5.11.3 Fire Extinguishers

Good housekeeping is essential in the prevention of fires. Fires can start anywhere and at any time. This is why it is important to know the type of fire extinguisher to use and how to use it.

Always keep fire extinguishers visible with easy access. Fire extinguishers have to be properly maintained. Where temperature is a factor, ensure that care is taken in selecting the right extinguisher.

Workers must receive training before using fire extinguishing equipment.

5.11.3.1 Types of Fires

a) Class A: Wood, paper, rags, rubbish and other ordinary combustible materials.
   - Recommended Extinguishers: Water from a hose, pump type water can, pressurized extinguisher, or soda acid.
   - Fighting the Fire: Soak the fire completely – even the smoking embers.

b) Class B: Flammable liquids, oil and grease.
   - Recommended Extinguishers: ABC units, dry chemical, foam and carbon dioxide.
   - Fighting the Fire: Start at the base of the fire and use a swinging motion from side to side, always keeping the fire in front of you.

c) Class C: Electrical equipment.

- Recommended extinguishers: Carbon dioxide and dry chemical (ABC units).
- Fighting the Fire: Use short bursts on the fire. When the electrical current is shut off on a Class C fire, it can become a Class A fire if materials around the electrical fire are ignited.

5.11.4 Cleaning Solvents Flammables

Cleaning solvents are used in day-to-day construction work to clean tools and equipment. Special care must be taken to protect the worker from hazards which may be created from the use of these liquids. Wherever possible, solvents should be nonflammable and nontoxic.

The foreman must be aware of all solvents/flammables that are used on the job, and be sure that all workers who use these materials have been instructed in their proper use and any hazard they pose. The following practices will apply when solvents/flammables are used:

- Use nonflammable solvents for general cleaning.
- When flammable liquids are used, make sure that no hot work is permitted in the area.
- Store flammables and solvents in special storage areas.
- Check toxic hazards of all solvents before use (MSDS).
- Provide adequate ventilation where all solvents and flammables are being used.
- Use goggles or face shields to protect the face and eyes from splashes or sprays.
- Use rubber gloves to protect the hands.
- Wear protective clothing to prevent contamination of worker's clothes.
- When breathing hazards exist, use the appropriate respiratory protection.
- Never leave solvents in open tubs or vats. Return them to storage drums or tanks.
- Ensure that proper containers are used for transportation, storage and the field use of solvents/flammables.
- Where solvents are controlled products, ensure that all employees using or in the vicinity of use or storage are trained in the Workplace Hazardous Materials Information System (WHMIS).
- Ensure all WHMIS requirements are being met.

5.12 Air Tools

Air powered tools in construction range from stapling guns to jack hammers. If not treated with respect, these tools can become a detriment rather than a benefit.

- Compressed air must not be used to blow debris or to clear dirt from any worker's clothes.
- Ensure that the air pressure has been turned off and the line pressure relieved before disconnecting the hose or changing tools.
- All hose connectors must be of the quick disconnect pressure release type with a "safety chain/cable".
- Wear personal protective equipment such as eye protection and face shields. Restrict access to the area or ensure other workers in the area are aware of hazards.

- Hoses must be checked on a regular basis for cuts, bulges, or other damage. Ensure that defective hoses are repaired or replaced.
- A proper pressure regulator and relief device must be in the system to ensure that correct pressures are maintained.
- The proper air supply hoses must be used for the tool/equipment being used.
- The equipment must be properly maintained according to the manufacturer's requirements.

5.13 Powder Actuated Devices

There are a number of tools that utilize an explosive charge in use throughout the construction industry. The manufacturers of these devices provide detailed instructions regarding their use and maintenance. These instructions, along with specific legislation shall be closely adhered to at all times.

The following apply to all explosive/powder actuated tools.

+ Only properly trained and qualified personnel are to use this type of tool.
+ The tool must be approved for "Explosive Actuated Fastening Tools".
+ The tool should be loaded just prior to use with the correct charge for the job anticipated. Tools should never be loaded and left alone or moved to an alternate work site after being loaded.
+ The tool should never be pointed at anyone, whether loaded or unloaded. Hands should be kept clear of the muzzle at all times.
+ Explosive/powder actuated tools should always be stored in their proper lock boxes.
+ Explosive/powder actuated tools must never be used in an explosive atmosphere.
+ When used, the tool must be held firmly and at right angles to the surface being driven into.
+ Eye protection must be worn by the operator.
+ Where there is a danger of spalling, full face protection must be worn.
+ Appropriate hearing protection is to be worn.
+ To prevent free-flying studs, ensure that the material being driven into will not allow the stud to pass through it (glass block, hollow tile etc.).
+ Manufacturer's recommendations should be consulted and followed whenever there is a doubt about the material being driven into, maintenance procedures, or determining the charge to be used.
+ Always be aware of other workers. Where a hazard to other workers is created by this operation, properly sign and barricade the area.

5.14 Elevated Work Platforms

+ A worker who operates an elevating work platform shall, before using it for the first time, be given oral and written instruction on the operation of the elevating device. An elevating work platform shall only be operated by a worker who has been instructed in:
+ operating the machine;
+ the daily inspections and maintenance required by the manufacturer;
+ the types of working surface on which the machine is designed to be used;
+ the maximum rated working load;

- special conditions or limitations of the machine;
- the significance of alarms; and
- the location of emergency controls
- An elevating work platform which is not working properly or which has sustained damage to critical components must not be used until repaired by a qualified mechanic.
- In the raised position, an elevating work platform shall only be used on surfaces specified by the manufacturer.
- An elevating work platform must not be driven in a raised position close to holes, depressions, trenches or similar hazards.
- An elevating work platform must not bear more than its rated working load and, where possible, the loads shall be distributed over the platform.
- When elevating work platforms are used to lift materials, care must be taken to ensure that the materials are firmly secured to the platform.
- Do not place makeshift platforms, such as boxes, or proper access equipment, such as ladders and scaffolds, on an elevating work platform to gain access to areas above.
- Overhanging loads must not be lifted on an elevating work platform.
- An elevating work platform or any other part of an EWP device must not be moved closer than 3 metres (10 feet) to overhead power lines, unless the device is equipped for live electrical line work and the workers on the platform are qualified for such work.
- An elevating work platform must not be used for pulling, pushing or dragging materials.
- The platform of an elevating work platform must not be extended by using cantilevered planks or similar platform materials. Only manufacturers' platform extension devices shall be used.
- Planks or similar platform materials must not be used to bridge a gap between an elevating work platform and other work areas.
- Workers must always maintain 3-point contact (one hand and two feet or two hands and one foot) when getting on or off the platform of an elevating work platform.
- For all types of off-slab devices, the terrain on which the device is placed or over which it will travel must be firm enough to support the device and its rated working load.
- An elevating work platform must not be used under high wind conditions. This is especially important for smaller scissor lifts and boom-type devices.
- When the elevating work platform is not being used, turn off the power system to prevent exhaust fumes from accumulating in an enclosed work area.
- Elevating work platforms used on ramps or on sloping or uneven surfaces must be designed for such use and properly secured against horizontal and vertical movement.

5.15 Heat/Cold Stress

5.15.1 Heat Stress

Heat stress takes place when your body's cooling system is overwhelmed. It can happen when heat combines with other factors such as:

- hard physical work
- fatigue (not enough sleep)

- dehydration (loss of fluids)
- certain medical conditions.

Heat stress can lead to illness or even death.

5.15.1.1 Employers' legal requirements

Employers have a duty to take every precaution reasonable in the circumstances to protect the worker. This includes developing policies and procedures for hot environments.

5.15.1.2 Heat stress symptoms

- Heat rash: itchy red skin.
- Heat cramps: painful muscle cramps.
- Heat exhaustion: high body temperature; weakness or feeling faint; headache, confusion or irrational behaviour; nausea or vomiting.
- Heat stroke: no sweating (hot, dry skin), high body temperature, confusion, or convulsions. Get immediate medical help.

5.15.1.3 Follow these procedures when working in hot, humid conditions

- Increase the frequency and length of rest breaks.
- Provide cool drinking water near workers and remind them to drink a cup every 1/2 hour.
- Caution workers about working in direct sunlight.
- Train workers to recognize the signs and symptoms of heat stress. Start a "buddy system" because it's unlikely people will notice their own symptoms.
- Tell workers to wear light summer clothing to allow air to move freely and sweat to evaporate. They should always wear shirts to protect themselves from direct sunlight.

5.15.2 Cold Stress

When you're cold, blood vessels in your skin, arms, and legs constrict, decreasing the blood flow to your extremities. This helps your critical organs stay warm, but your extremities are at risk for frostbite. Frostbite means that your flesh freezes. Blood vessels are damaged and the reduced blood flow can lead to gangrene.

The first sign of frostbite is skin that looks waxy and feels numb. Once tissues become hard, it's a severe medical emergency. Wind chill accelerates heat loss—sometimes to a dramatic extent. For example, when the air temperature is –30°C,

- with no wind, there is little danger of skin freezing
- with 16 km/h wind (a flag will be fully extended), your skin can freeze in about a
- minute
- with 32 km/h wind (capable of blowing snow), your skin can freeze in 30 seconds.

When your core temperature drops, you're at risk for hypothermia. Early signs of hypothermia are shivering, blue lips and fingers, and poor coordination. Soon your breathing and heart rate slow down, and you become disoriented and confused. Hypothermia requires medical help.

5.15.2.1 What you can do to prevent cold stress

- Wear several layers of clothing rather than one thick layer.

- Wear gloves if the temperature is below 16°C for sedentary work, below 4°C for light
- work, and below –7°C for moderate work.
- Take warm, high-calorie drinks and food.
- If your clothing gets wet at 2°C or less, change into dry clothes immediately to
- prevent hypothermia.
- If you feel hot, open your jacket but keep your hat and gloves on.
- Give workers warm-up and rest breaks in a heated shelter.

The table below provides guidelines on maximum cold exposure.

5.16 Working Alone

In construction there are situations where personnel sometimes work alone. Examples include :

+ staying late to complete a job that must be done before the next day's work
+ making a splice or connection in a space that has only enough room for one worker
+ installing a ceramic tile floor in a washroom
+ servicing a roof-mounted air-handling unit
+ cleaning up scrap and debris when work is done for the day.

It may involve work done by the only employee of a contractor on a jobsite or work done by a worker who is not directly supervised. Working alone may also involve working beyond the visual or audible range of any other individual for more than a few minutes at a time or working where the worker cannot be readily heard or seen in the event of an accident.

The greatest risk in working alone is that no one is available to help a worker who may be injured, trapped, or unconscious. Even if co-workers realize that someone is missing, it may be difficult to locate an incapacitated worker. In addition, studies have shown that personnel working alone are more likely to take risks by cutting corners or not following established procedures.

5.16.1 Planning

- Inspect the jobsite for real and potential hazards and taking whatever steps are required to safeguard workers.
- If any personal protective equipment or clothing is required in addition to hard hat and safety boots, it should be provided, along with instruction in its proper use.
- All safety and work-related procedures should be reviewed with workers to ensure that each procedure is clearly understood. The procedures should also be spelled out in the company's health and safety policy.

5.16.2 Communication

- Communication is crucial in accounting for personnel working alone. A system must be established where, at regular intervals, someone checks on the worker or the worker reports to a designated person.
- Where hazard exposure is high, intervals should be kept short.
- Means of communicating between worker and outside contact must be predetermined and understood by both parties.

- If a site telephone is involved, it must be clearly identified, conveniently located, and working properly. The number of the individual to be contacted must be clearly posted near or on the phone.
- Cellular phones or two-way radios can also provide effective communication. Test the units on-site to ensure that reception is reliable.
- One option is having a person working alone phone an answering service at regular intervals. If the worker fails to report at one of the designated times, the answering service phones the employer, who goes to the project, or sends someone there, to check on the worker.

5.16.3 Responsibilities

The supervisor shall ensure that any worker working alone is aware of real and potential hazards in the area. The worker should be trained in hazard recognition and in the procedures and equipment required to do the job safely. The supervisor must also ensure that :

- a method of checking in with the worker has been established
- check-in intervals are clearly understood
- the designated contact person is aware of the work schedule
- any communication equipment used is in good working order
- no obstructions or interference may block phone or radio communications.

5.17 Dust Hazards

5.17.1 What Are The Hazards?

There are two kinds of hazardous dust common in construction. These include:

- fibrous dust from insulation materials (such as asbestos, mineral wool, and glass fibre) and
- non-fibrous silica dust from sandblasting, concrete cutting, or rock drilling

5.17.2 Where Does Construction Dust Come From?

Dusts are particles which are usually many times larger than fume particles. Dusts are generated by crushing, grinding, sanding, or cutting and by work such as demolition.

5.17.3 Preventative Measures

5.17.3.1 Ventilation:

- Natural dilution ventilation — Welding outside in a light breeze or inside with doors and windows open provides large volumes of fresh air which should disperse airborne contaminants sufficiently in most cases. However, it is important for the welder to stay to one side of the plume.
- Mechanical dilution ventilation – Fans such as roof exhaust fans and wall fans force outside air into and out of the building. General mechanical ventilation in most cases will deflect the plume out of the welder's breathing zone.
- Local exhaust ventilation – Consists of an exhaust fan, air cleaner, and ducted system dedicated to removing airborne contaminants at the source and exhausting them outdoors. Local exhaust ventilation is preferred over dilution ventilation because it is better able to prevent airborne contaminants from entering the welder's breathing zone.

5.17.3.2 Respiratory Protection:

If you are in doubt about choosing the correct Respiratory protection or if you are not sure to the source of the dust stop work and advise your supervisor.

5.17.4 Respirator Selection

In order to select the proper respirator for a particular job, it is necessary to know and understand:

- the characteristics of the contaminant(s),
- the anticipated exposure conditions,
- the performance limitations of the equipment,
- any legislation that applies.

Refer to the Material Safety Data Sheet (MSDS) or Sheets if more than one product is being used. The MSDS will identify any respiratory protection required and should specify the type of respirator to be worn.

An assessment should be made to ensure that workers who are called upon to use respirators are medically fit to do so.

It is also important to realize that facial hair and deep facial scars can interfere with the seal between the respirator and face. Respirators should only be selected by someone who understands all of these factors.

If there is any doubt about the correct type of protection for a specific material and operation, consult the manufacturer of the product, a supplier or manufacturer of respirators.

5.17.5 Fit Testing

Before each use, you must perform a Positive and Negative pressure test. This applies to respirators only. If the required protection is a filtering half facepiece (dust mask) then follow manufacturer's instructions.

5.17.5.1 Negative Pressure Test

The wearer puts on the respirator and adjusts it so that it feels relatively comfortable. Then the air inlets are blocked off with the hands or a plastic cover, and the wearer inhales gently. If the respirator is properly fitted, it should collapse slightly and not permit any air into the facepiece. If leakage is detected, the mask should be readjusted and the test repeated until the fit is satisfactory.

5.17.5.2 Positive Pressure Test

The wearer puts on the respirator and adjusts it so that it feels relatively comfortable. Then the exhaust port of the respirator is covered and the wearer tries to exhale gently. The facepiece should puff away from the wearer, but no leakage should occur.

5.17.5.3 General Instructions:

- Filters should be changed as follows:
  - Dust/mist/fume filters should be changed when there is noticeable resistance to normal breathing.
  - Chemical cartridge respirators should be changed when the gas or vapour can be tasted or smelled.
  - Any filter should be changed at the interval specified by the manufacturer or when damaged in any way.
- Inhalation and exhalation valves should be checked before the respirator is used.
- Damaged facepiece, straps, filters, valves, or other parts should be replaced with "original equipment" parts.

- Facepieces should be washed with mild soapy water as often as necessary to keep them clean and wearable.
- Respirators should be assigned to the exclusive use of individual workers.
- Where a respirator must be assigned to more than one worker, it should be disinfected after each use. (Check with the manufacturer regarding acceptable sanitizers/disinfectants.)
- Check all supply hoses, valves, and regulators on supplied-air respirators as specified by the manufacturer.
- Compressors and filtration systems used with supplied-air respirators must be maintained in accordance with the manufacturers' recommendations.
- Consult the manufacturer for information on respirator cartridge change-out.
- and its amendments. Special safety boots may however be required in certain areas of the facilities or for certain specific work.

5.18 Overhead Power Lines

The employer must agree on safety measures with the electrical operations company. These measures must be applied before the work begins and continue until completion.

The subcontractor must meet the following requirements for all work in the vicinity of high-voltage power lines:

+ Equip all deployable construction equipment, such as backhoes, power shovels, cranes, platforms, and dump trucks, with a device that:
+ Warns the driver (audible and visible signal).
+ Prevents movement once the minimum approach distances are reached.
+ Completely stops the boom or bucket, for example, from moving in the event of failure.

Note: A representative appointed by the principal contractor will be present to ensure minimum approach distances are respected.

Voltage	Minimum approach distance
Less than 150,000	3 metres
150,000 to 250,000	4.5 metres
More than 250,000	6 metres

5.19 Buried Utilities

There is more to safe excavation than simply calling before you dig. That's only the first step in safeguarding underground utilities from damage and construction workers from harm.

Before you dig call your local authorities (such as DigSafely.New York Call 8-1-1) . The operator will tell you which utilities will be contacted in your work area. Allow time for the utilities to schedule and perform the locates.

You can also look for posted signs identifying buried utilities. Look for evidence of unmarked utilities. Maintenance holes, catch basins, pedestals, junction boxes, water and gas meters, valve chambers, conduit

affixed to wood poles, test posts, sunken ground -- these may indicate the presence of underground structures.

Don't start excavating until locates are completed. To start without locates is negligent and almost impossible to defend if something goes wrong.

Locates are available for genuine emergencies. But failing to plan ahead or failing to allow time for utilities to do their job isn't a valid reason for an emergency locate.

Many utilities have out-sourced their locating service to contractors who mark buried services in the work area with paint, stakes, or flags and then leave.

Utilities are identified by an international colour code. Some excavators rely on this code alone; others require direct contact with the utility to confirm locates. The stake-out report given to an excavator should be legible, clearly understood, and signed by both parties. The report may include special instructions such as "Erect a snow fence at this point" or "Hand dig to expose utility." Excavators should comply fully with these instructions.

5.19.1 Excavate With Caution

The surest, safest way to confirm the location of any buried structure is to expose it by hand excavation. This means excavation by shovel alone, not picks or spud bars. New technology now allows for vacuum excavation as well.

Most utilities prohibit mechanical excavation within one metre on either side of painted marks. Some utilities are less specific. Confirm the location of all utilities before bringing in heavy equipment.

Stake-out marks are eventually destroyed by excavation. To protect against possible damage claims, it is recommended that the excavators photograph or videotape the staked-out site before digging.

If the stake-out report requires a utility inspector on site during excavation, make sure the inspector is there before you start digging. Ensure that all of the inspector's instructions are carried out during excavation.

5.19.2 A Word Of Caution

There's always the possibility that utilities have been staked out inaccurately or not at all. Utility locators are sometimes confused by contradictory signals in urban settings where tramp iron, abandoned services, changes in elevation, parallel fences, and overhead wires may interfere with detection equipment. Information on utility depth is especially unreliable.

Keep an eye out for evidence of previous excavation. Virgin ground is usually harder than disturbed ground. Soft ground may indicate a utility trench, backfill material, and buried services

5.20 Hygiene Requirements

5.20.1 Drinking Water

- A reasonable supply of potable drinking water shall be kept readily accessible at a project for the use of workers.
- Drinking water shall be supplied from a piping system or from a clean, covered container with a drain faucet
- Workers shall be given a sanitary means of drinking the drinking water, without having to share a drinking cup.

5.20.2 Toilet Facilities

- Toilet facilities shall be provided in sufficient quantities. The facilities shall be in place before the start of the project. The facilities shall be reasonably accessible to all workers on the project.
- The facilities shall be serviced, cleaned and sanitized as frequently as necessary to maintain them in a clean and sanitary condition. Records of servicing must be available at the project.
- For work of shorter duration, facilities that are not under the constructor's control may be used only if you have received permission from the facilities' owner for workers to use the facilities.
- The facility shall be kept in good repair at all times.
- Each single-toilet facility shall be provided with its own clean-up facility.

5.20.3 Clean-Up Facilities

- If it is not reasonably possible to have a wash basin with running water at a clean-up facility, hand cleanser that can be used without water shall be provided instead.
- Workers who handle or use corrosive, poisonous or other substances likely to endanger their health shall be provided with washing facilities with clean water, soap and individual towels.

5.21 Electrical Safety: 0 energy policy

Ecosystem applies the rule that « no repairs or alterations must be carried out on any live equipment except where complete disconnection of the equipment is not feasible.

The only tasks that are allowed on live equipment without a permit are troubleshooting of control circuits, testing and diagnostics

If it is not feasible to disconnect the equipment, a live work permit must be completed, signed and justified by the person who ask the work to be done while the equipment is energized.

5.21.1 Training

- Ecosystem employees who are required to troubleshoot on control circuits, test and produce diagnostics must have previously followed a training based on the NFPA 70E Workplace Electrical Safety standard.

5.21.2 Electrical PPE

- See section 5.1.2.10 and 5.1.2.11 for protection against electrical shocks and arc flash events.

5.21.3 Extension Cords

Extension cords can cause serious accidents if the following practices are not followed.

- All electrical extension cords must be designed for external use.
- All extension cords will be inspected before use.
- Extension cords are to be protected against damage.
- All extension cords are to be placed in such away that they will not be a tripping or falling hazard.
- All extension cords used in hazardous areas or in damp locations are to be protected by approved ground fault protection.
- All frayed, cut or spliced extension cords are to be tagged and removed from service.

5.22 Cell Phone Policy

5.22.1 Directive:

Ecosystem strictly prohibits employees from physically manipulating a cell phone (holding the device in their hands) while driving a vehicle.

5.22.2 Hands-free systems:

Employees can use their cell phones while driving as long as they use an earpiece or a hands-free system (Bluetooth). However, employees are strongly encouraged to keep conversations brief.

5.22.3 Avoid using your hands-free system in the following situations:

- When traveling in urban areas (presence of pedestrians, cyclists and heavy traffic).
- When the weather is difficult: heavy rain, snowfall, icy pavement and intense fog.
- When traveling on more complex roads: steep turns, inclines and blind spots.
- When the conversation becomes technical or emotional and requires a lot of attention. In this case, park in a public parking lot to continue your conversation.

5.22.4 When you call a colleague:

If you have any reason to think that your colleague may be driving, ask your colleague 3 key questions:

1. **Are you on the road?** To confirm your doubts (background noises, echo).
2. **Are you using Bluetooth?** If the person answers no, hang up immediately.
3. **Is this a good time to talk?** Because you cannot see the conditions in which your colleague is driving.

5.22.5 Distraction:

Using a hands-free system is tolerated by the authorities. However, this system will never eliminate cognitive distraction due to the fact that we are not 100% focused on the road. Use your hands-free system intelligently, in ideal conditions, i.e. straight road at constant speed with regular flow of traffic.

5.22.6 Other modes of transport:

Do not use your cell phone while traveling by bike.

The use of earphones while riding a bicycle is an illegal practice.

When walking down the street, always look in the direction you are walking. Stop walking and put yourself in a safe place before sending a text or an e-mail.

5.23 Substance Abuse

Ecosystem recognizes the inherent dangers to other workers who have to work with a worker who is impaired through substance abuse, as well as the personal problems associated with the substance abuser.

Any worker suspected of being impaired will not be allowed to continue working. The site supervisor will discuss the situation with the worker and the site foreman if a sub-contractors' worker is involved. If the employee is deemed unfit for work, the employee will be taken home.

Ecosystem will not tolerate the following behavior by any worker :

- Use or consumption of any form of alcohol or any prohibited substance on a construction project at any time.
- Sale, purchase, transfer, offering, use or possession of alcohol on company property or at a site where Ecosystem is engaged.
- A worker will not arrive or be at work while under the influence of alcohol or prohibited substances.

6 Personal Protective Equipment

6.1 Personal

6.1.1 5.1.1 Mandatory Personal Protective Equipment (Ppe)

This equipment must be worn in all areas where site work is carried out as well as in storage areas.

6.1.1.1 Safety helmet

This equipment is mandatory when on the site.

6.1.1.2 Safety boots

This equipment is mandatory when on the site.Special safety boots may however be required in certain areas of the facilities or for certain specific work.

6.1.2 Other Individual and Special Equipment

Signs indicating that certain personal protective equipment is mandatory must be posted in the vicinity of the work areas or at the doors used to access the site.

6.1.2.1 Safety glasses

All workers must wear protective equipment that complies with the industry standard for eye and face protectors.

6.1.2.2 Gloves

This equipment must be used when required by the task carried out. Gloves must be suitable for the work carried out.

6.1.2.3 Kevlar gloves

This equipment must be used for welding and assembly work, on steam pipes and in any other situation where there is a risk of injury to hands.

6.1.2.4 High-visibility (reflective) vest

This equipment must comply with applicable standards. Reflective vests and/or clothing must be worn by:

- All individuals present on the site during excavation work
- All individuals in the vicinity of heavy vehicles and mobile equipment

6.1.2.5 Harness and lanyard

This equipment is used only if other means cannot be used to provide equivalent safety to workers if there is a fall hazard.

The use of a self-retracting lanyard is preferable if the fall hazard is under 4 metres, or when worker mobility is hindered by a regular lanyard.

The worker must complete a visual inspection of the fall protection equipment prior to each use.

6.1.2.6 Hearing protection

This personal protective equipment is used if noise levels cannot be reduced. Other protective means exist, such as limiting worker exposure, moving the noise source further away, isolating the source, or changing working methods.

Signs may be used to indicate that wearing ear protectors is mandatory in certain areas.

6.1.2.7 Protection of respiratory passages and tightness (fit) test

A mask must be worn when workers are exposed to harmful airborne particles (fine dust (PM3), silica or asbestos particles, paint mist, drywall sanding dust, etc.) or harmful vapours or gases.

P100 particulate filter cartridge masks (full face or half mask) are mandatory for work liable to generate silica or asbestos dust.

Chemical cartridge masks are required for workers exposed to harmful vapours or gases. A prior assessment must be carried out to determine the correct type of cartridge for the situation if it is not possible to prevent the emission of harmful substances at source.

6.1.2.8 Eye protection

Safety glasses and/or visors are required whenever workers' eyes or face are exposed to a projected particle risk.

6.1.2.9 Fireproof clothing

NOMEX or PROBAN type fireproof overalls or leg protectors must be worn:

- When using a gasoline-powered disc saw or chainsaw
- When working in live electrical substations.

Welders must wear the fireproof clothing typically used in their work according to best practices.

6.1.2.10 Mandatory personal protective equipment when there is a risk of arc flash (depending on the incident energy released during an arc flash) [1] [2]

- Safety Helmet protection Class E with face shield ;
- Ear plugs ;
- Safety glasses ;
- Leather gloves (thermal protection) ;
- ATPV Rated clothing (cal/cm2)[3] ;
- CSA approved safety leather boots ;
- Isolated safety tools ;

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1 Equipment below 240 V is not considered unless it involves at least one 125 Kva or larger low impedance transformer in it's immediate power supply.
2 It is mandatory to evaluate the risk to select the appropriate category of PPE (1,2,3,4).
3 This value is measured in calories per square centimeter and represents the maximum performance capability for arc-flash protection of a particular garment or fabric.

- Use of multimeters with probes protected by HRC fuses ;
- Underwear made of natural fibers (synthetic materials prohibited).

6.1.2.11 Mandatory Personal protective equipment when there is a risk of electrical shock on Ecosystem sites[4]

- Safety Helmet protection Class E (20 000 Volts Dielectric strength) ;
- Isolated rubber gloves depending on voltage : 00, 1, 2, 3, 4 ;
- Leather protective glove over the rubber glove (protects the integrity of the isolated glove) ;
- Safety glasses with non-conductive material (plastic) ;
- Safety electric shock protective boot wear (Omega orange label).

6.1.2.12 Specialized personal protective equipment clothing for chainsaws

When using a chainsaw, the appropriate specialized protective pants, boots, and gloves must be worn, as well as a visor.

6.1.2.13 Knee pads

This equipment is required for work carried out in a kneeling or crouched position on hard surfaces, particularly for periods of longer than one hour.

6.2 Collective

6.2.1 Signage

Signage includes all notices posted to inform people about site conditions and general directives in force.

6.2.2 Marking Off the Site and Work Zones (Safety Perimeter)

A chain link or wooden fence, or barrier tape, must be used to control entry to and exit from the site, or inside establishments, rooms must be locked at all times with controlled access.

All work zones that contain hazards must be marked off.

- Red tape must be used in situations where access to a zone is prohibited without the specific authorization of the principal contractor, for no longer than one shift at a time. Tape must be removed after use.
- Yellow tape must be used in situations where third parties may have access to a zone and must take specific care with respect to a hazard in the vicinity, for no longer than one shift at a time. Tape must be removed after use.
- Fences must be used in situations where access to a zone is prohibited without the specific authorization of the principal contractor, for longer than one shift at a time.

6.2.3 Site Traffic Plan

The facility or site traffic plan should be updated as work progresses. All changes should be flagged to the subcontractor and site committee and posted on the site or in the trailers.

Whenever possible, pedestrians and vehicles should circulate in different areas.

4 Watches, rings and metallic jewellery must be removed before performing task.

6.2.4 Guardrail and Walkway

A compliant guardrail must be installed in all areas where there are fall hazards. The guardrail must comply with all requirements of the *Occupational Health and Safety Act* and Regulations for Construction Projects. When a guardrail cannot be installed, anchor points (as prescribed) must be installed to enable workers to use a safety harness.

6.2.5 Safety Guard

Safety guards must be erected for equipment and areas requiring protection from vehicles and other traffic. For example:

- Installing concrete blocks around a propane tank
- Installing a fence around a transformer
- Using concrete blocks to separate the work area from the trailers
- Etc.

6.3 Additional Protective Measures (Procedure and Directives)

6.3.1 Work Plan

An occupational health and safety work plan must be established jointly with the principal contractor's representative and subcontractors to provide for interaction with other contractors and subcontractors, the client's personnel and customers, and the public.

This occupational health and safety work plan may be integrated into the planned work schedule.

An occupational health and safety work plan will be required for work involving clear and specific risks and requiring particular preparation and planning (electrical connection with service shutdown, asbestos removal, etc.).

6.3.2 Lifting Plan

A lifting plan is required when a crane in needed to handle materials or heavy equipment. The lifting plan must take into account the zone footprint, vehicle and pedestrian traffic, access to affected buildings, the presence of one or more flaggers, the size of the load and the path between the pick-up and drop-off points, etc.

The lifting plan must be submitted to the principal contractor's representative at least 72 hours prior to starting work or according to a timetable drawn up by the client and the principal contractor.

6.3.3 Openings in Floors and Concrete Slabs On Site

So as not to expose workers to fall risks, the contractor must adequately cover each opening with plywood or install a full guardrail

7 Tool and Equipment Maintenance

Ecosystem's Site supervisors and Construction Managers must verify that all subcontractor's tools, equipment and vehicles are well maintained in order to reduce the risk of accidents or injuries.

- Only properly trained workers are to use tools, equipment and vehicles.
- Inspect all tools, equipment and vehicles before using.
- For vehicles, inspection will consist of doing a circle check.
- If applicable, maintenance schedules for all tools, equipment and vehicles are to be respected.
- Each jobsite supervisor is to conduct an inspection of all tools, equipment and vehicles on the site.
- If at any time a worker judges that a tool, equipment or vehicle is unsafe for use, they are to properly tag the item and inform the supervisor immediately.
- Tools, equipment or vehicles that are tagged unsafe shall be either repaired or replaced. Head office shall be informed.

REMINDER: Always use Hand and Power Tools Safely

1. Select the right tool for the job.
2. Keep tools in good condition.
3. Use tools the correct way.
4. Keep tools in a safe place.

8 Emergency Preparedness

8.1 Emergency Plan Guidelines

8.1.1 Policy Statement

Ecosystem is committed to having an emergency plan in place for each workplace to assist workers and the public to respond to any emergency situation.

8.1.2 Emergency Plan

All workplaces require:

a) A method for reporting the emergency;

b) A list of workers responsible in emergency situations and how to contact them;

c) A plan for incident investigation and correction of the hazard;

d) A list of phone numbers for emergency and support services (should be posted by telephones)

Workplaces may also require:

a) A method for sounding the alarm;

b) A description of potential emergencies;

c) A map of the workplace that shows evacuation routes and head count location, as well as the location of emergency equipment, first aid station and fire extinguishers

d) An evacuation, head count and rescue plan.

8.1.3 Planning the Emergency Program

If the project is located within a plant which has an existing emergency and evacuation plan, the supervisor must learn it and establish only those procedures necessary to complement the plant system and ensure a complete Emergency Plan for the project site.

8.1.4 Guidelines for Preparing and Emergency Plan

All projects require an emergency plan. The magnitude and complexity of the plan depends on the size of the project/workplace. Required elements are:

a) A method for reporting the emergency. Generally, telephone is the most effective; however, an alternative should exist if the emergency disables the site phones.

b) A list of workers responsible in emergency situations and how to contact them. This should be plainly posted.

c) A plan for incident investigation and correction of hazard.

d) A list of phone numbers for emergency and support services. This should be posted by the telephone.

e) A method for sounding an alarm, such as an air horn or warning bell.

f) A description of potential emergencies. This is extremely important from an educational standpoint. Emergency preparedness is essentially based on anticipating all possible situations.

g) A map of the work place that shows evacuation routes, head count location, as well as location of emergency equipment, first aid station, fire extinguishers. This should be designed at the start of the job and posted where visible.

h) The manager's routine for shut down of the job. This should be established to ensure that if a shutdown occurs, no potential hazard may be left. For example, ensuring that the power has been shut down before attempting an electrical contact rescue.

i) A system for communication, both internal and external. Two way radios, telephones or alarms should be available.

j) An evacuation, head count and rescue plan. Rescues should only be attempted by trained persons and only if they do not risk injury to themselves. Each supervisor should have a roll call system in place to ensure that all workers have been evacuated from the hazard area.

8.2 Procedure in the Event of a Fire

8.2.1 Objectives

8.2.1.1 Ensure lives are saved

- By developing a procedure to follow in case of a fire;
- By ensuring fire protection equipment is on site and in good working order (fire extinguishers, sprinklers, exterior Siamese connections, etc.);
- By establishing an assembly point, based on the layout of the construction site, where evacuees can safely assemble and a head count can be performed.

8.2.1.2 Facilitate evacuation

- By training the person in charge of evacuation and site emergency measures (site supervisor, the replacement and any person nominated to carry out the role) who will ensure that an evacuation plan is developed and followed;
- By ensuring the entrances to the site are kept free of obstacles at all times and unlocked when workers are present;
- During an evacuation, by taking the necessary measures to ensure that no one is left on site and that evacuees gather at the assembly point;
- Upon arrival of the fire department, by informing the firefighter in charge where the fire is located, that the occupants have been evacuated (head count) and if there are any hazardous materials or gas cylinders on site.

8.2.1.3 Limit the spread of fires

- By placing a sufficient number of fire extinguishers on each floor and at every location at risk (welding station, temporary storage of flammable substances, etc.);
- By installing an alarm on every 3 floors (at the exit) with signage indicating the site emergency contact number (of the person in charge of emergency measures) (the signage can be a sticker on the alarm);
- By posting a sign showing the location of first response equipment (fire extinguisher, blanket).

8.2.1.4 Promote awareness of fire prevention

- By posting signage and holding presentations for new workers and foremen;
- By collaborating with authorities during investigations.

8.3 Procedures to Follow in Case of a Fire

8.3.1 If you see smoke or fire:

- Notify the designated person in charge (site emergency contact number);
- Call 911, provide the information requested and wait for the operator to ask you to hang up before doing so;

8.3.2 Evacuation of all occupants

- Turn off all equipment and machinery.
- Use the stairs, not the elevators (if present).
- Do not attempt to return to a room.
- Continue to evacuate even if the alarm stops.
- Proceed to the assembly point.
- Notify your foreman or person in charge of the evacuation that you are present.
- Only the firefighter in charge can authorize occupants to return to the site. The Ecosystem site supervisor will advise the foremen of each employer of the conditions upon which reentry is permitted.

8.3.3 Head count

At the assembly point, the foremen of each employer will perform a head count of their workers and notify the Ecosystem site supervisor or person in charge of the evacuation of the number. The results of the head count will be reported to the firefighter in charge.

8.3.4 Incident report

- The site supervisor must submit an incident report to the site project manager, following an investigation.
- All foremen and workers present during the incident must participate in the investigation.

8.4 Procedures for Rescue of a Worker Suspended in a Safety Harness

The rescue of a worker who has fallen and is being suspended in his/her safety harness needs to be undertaken as quickly as possible for several reasons:

a) The worker may have suffered injuries during the fall and may need medical attention.

b) Workers suspended in their safety harness for long periods may suffer from blood pooling in the lower body and this can result in "suspension trauma."

c) The suspended worker may panic if they are not rescued quickly.

d) The event that led to the fall may create additional risks that need to be addressed.

8.4.1 General Rescue Procedures:

8.4.1.1 If Elevating Work Platform is available on site:

- Bring it to the site and use it to reach the suspended worker.
- Ensure that rescue workers are protected against falling.
- Ensure that the EWP has the load capacity for both the rescuer(s) and the victim.

- If the victim is not conscious, 2 rescuers will be probably be needed to safely handle the weight of the victim.
- Position the EWP platform below the worker and disconnect his lanyard when it is safe to do so.
- Treat the victim for Suspension Trauma and any other injuries.
- Arrange for transport to nearest hospital.

8.4.1.2 If no Elevating Work Platform is available:

- Where possible, use ladder(s) to reach the victim.
- Rig separate lifelines for rescuers to use while carrying out the rescue from the ladder(s).
- If worker is not conscious or cannot reliably help with his/her own rescue, at least 2 rescuers may be needed.
- If worker is suspended from a lifeline, where possible, move the suspended victim to an area that can be safely reached by the ladder(s).
- If victim is suspended directly from his/her lanyard or from a lifeline, securely attach a separate lowering line to the victim's harness.
- Other rescuers should lower the victim while he/she is being guided by the rescuer on the ladder.
- Once the victim has been brought to a safe location, administer First Aid and treat the person for Suspension Trauma and any other injuries.
- Arrange for transport to nearest hospital.

8.4.1.3 If the injured person is suspended near the work area and can be safely reached from the floor below or the area they fell from:

- Ensure that rescuers are protected against falling.
- If possible, securely attach a second line to the workers' harnesses to assist in pulling them to a safe area. (Note: at least 2 strong workers will be needed to pull someone up.)
- Ensure that any slack in the retrieving lines is taken up to avoid slippage.
- Once the victim has been brought to a safe location, administer First Aid and treat the person for Suspension Trauma and any other injuries and arrange for transport to the nearest hospital.

8.4.1.4 If a person has fallen and is suspended in an inaccessible area (e.g. a tower, against a building or structure that has no openings):

- Specialized rescue techniques are needed for this type of situation. It may involve a rescuer rappelling or being lowered down to the victim, it may involve using the lifeline to retrieve the fallen worker, or the use of high-reach emergency equipment.
- Due to the inherent risk to the rescuers and/or the victim, this type of rescue should not be undertaken by people without specialized training and experience.

8.5 Workplace Hazardous Material Information System – Whmis

8.5.1 Responsibility for Msds Is As Follows:

8.5.1.1 Management:

a) Review in conjunction with the supervisor all [company] supplied material with the review of obtaining all MSDSs that are required

b) Obtain from the owner any MSDSs which are required for owner supplied material

c) Obtain from subcontractors any MSDSs which are required for material supplied by subcontractors

d) Cooperate with the owner/general contractor in setting up a general MSDS file for the project

e) Ensure foreman has set up and has updated MSDS filing system on site

f) Request from purchasing any labels that may be required

8.5.1.2 Supervisor (foremen, superintendent, project manager as applicable)

a) Ensure that there is an MSDS for controlled products used on the site and in the site file which is accessible to all workers

b) Review all [company] supplied material and obtain all MSDS required

c) Make available "upon request" MSDS to all [company] employees

d) Ensure that proper personal protective equipment is available on site

8.6 Hazardous Materials

8.6.1 Transporting Flammable Liquids

- Gasoline and other highly flammable liquids must not be carried in the passenger compartment of a vehicle.
- Gasoline and other highly flammable liquids must be transported and stored in approved containers.
- Ensure that the containers are not damaged and that caps or fittings are properly secured after filling.
- Flammable liquids must be transported in an upright position, braced or otherwise secured to prevent overturning.
- When transporting gasoline or other flammable liquids in a van, place the containers in the rear of the van with adequate ventilation. Remove the containers from the van immediately upon arrival at the destination.
- Provide a 5BC fire extinguisher in the driver's compartment when gasoline or other flammable liquids are transported in a van.
- Do not use gasoline as a cleaner.
- Gasoline engines should be shut off and allowed to cool before refuelling.

8.6.2 PROPANE

- Unless designed for horizontal use, propane cylinders must be kept in an upright position.
- Propane cylinders must be stored in a well-ventilated area away from heat sources, outdoors and above grade.

- Only approved hoses and fittings must be used to connect a cylinder to tools and equipment.
- When not in use, propane cylinders and hose-connected devices must not be left in trenches or other low-lying areas. Propane is heavier than air and can settle in dangerous concentrations at the bottom of trenches, manholes, vaults, basements, sumps and other below-grade areas.
- Never look for leaks in a propane cylinder or hose with a flame. Use soapy water.

8.6.3 Oxygen & Acetylene

- Leather gauntlet gloves and goggles with No. 4 or 5 lens shade must be worn by workers using an oxyacetylene cutting torch. No.4 or 5 lenses do not remove arc-welding rays.
- Oxygen and acetylene cylinders must be secured in an upright position at all times during storage, use and transportation.
- Cylinders should be stored in a well-ventilated area, outside with overhead protection from the weather.
- Protective caps must be in place when the cylinders are not in use or when they are being moved.
- Type BC fire extinguishers must be available whenever oxyacetylene cutting is being done.
- Cylinders must not be placed where they may become part of an electric circuit or be inadvertently struck by a welding rod.
- Cylinders must be hoisted in properly rigged racks or baskets to keep them secure and upright.
- Workers using oxyacetylene must not carry butane lighters.
- Oxygen or acetylene torches must not be used to blow dust from work surfaces, clothing or skin.
- Do not move cylinders without first closing the valves.
- Do not use regulators, hoses or torches unless they are working properly.
- Use only a spark lighter to ignite torches. Never use matches or a cigarette lighter.
- A leaking gas cylinder must be shut off and removed to an outdoor location away from ignition sources and marked to be readily identifiable. The supplier should be notified about the defective cylinder.
- Keep acetylene cylinders away from heat source. The surrounding temperature must be kept below 54 C (130 F).
- Empty cylinders must be stored separately from full cylinders. Store acetylene cylinders separately from oxygen cylinders.
- Cylinders must not be placed where materials or equipment can strike, fall on or knock them over.
- Supply hoses must be protected from traffic.

8.7 Welding Fumes (Vapours and Gases)

8.7.1 What Are the Hazards?

The most common hazards are air borne contaminants generated by welding.

These include:

- Fumes – Beryllium, Cadmium, Chromium, Lead, Nickel and Zinc
- Vapour/Gases – Hydrogen fluoride, Nitrogen oxide, Ozone, Phosgene, Phosphine, and Asphyxiants

8.7.2 How Does Welding Create These Hazards?

8.7.2.1 Fumes:

- Some of the metal melted at high temperatures during welding vaporizes. The metal vapour then oxidizes to form a metal oxide. When this vapour cools, suspended solid particles called fume particles are produced. Welding fumes consist primarily of suspended metal particles invisible to the naked eye.
- Fume particles may reach deep into the lungs and cause damage to lung tissue or enter the bloodstream and travel to other parts of the body.

8.7.2.2 Vapour/Gases:

- A gas is a low-density chemical compound that normally fills the space in which it is released. It has no physical shape or form. Vapour is a gas produced by evaporation.
- Several hazardous vapours and gases may be produced by welding. Ultraviolet radiation, surface coatings, shielding gases, and rod coatings are primary sources of vapours and gases.
- Overexposure may produce one or more of the following respiratory effects:
  - inflammation of the lungs
  - pulmonary edema (fluid accumulation in the lungs)
  - emphysema (loss of elasticity in lung tissue)
  - chronic bronchitis
  - asphyxiation.

8.7.3 Preventative Measures

8.7.3.1 Ventilation:

- Natural dilution ventilation — Welding outside in a light breeze or inside with doors and windows open provides large volumes of fresh air which should disperse airborne contaminants sufficiently in most cases. However, it is important for the welder to stay to one side of the plume.
- Mechanical dilution ventilation – Fans such as roof exhaust fans and wall fans force outside air into and out of the building. General mechanical ventilation in most cases will deflect the plume out of the welder's breathing zone.
- Local exhaust ventilation – Consists of an exhaust fan, air cleaner, and ducted system dedicated to removing airborne contaminants at the source and exhausting them outdoors. Local exhaust ventilation is preferred over dilution ventilation because it is better able to prevent airborne contaminants from entering the welder's breathing zone.

8.7.3.2 Respiratory Protection:

- Respiratory protection will not be required for most welding operations if proper ventilation is provided. However, when ventilation or other measures are not adequate, or when the welding process creates toxic fumes (as with stainless steel and beryllium), respiratory protection must be worn.

8.8 DUST

8.8.1 What Are the Hazards?

There are two kinds of hazardous dust common in construction. These include:

- fibrous dust from insulation materials (such as asbestos, mineral wool, and glass fibre) and
- non-fibrous silica dust from sandblasting, concrete cutting, or rock drilling

8.8.2 Where Does Construction Dust Come From?

Dusts are particles which are usually many times larger than fume particles. Dusts are generated by crushing, grinding, sanding, or cutting and by work such as demolition.

8.8.3 Preventative Measures

8.8.3.1 Ventilation:

- Natural dilution ventilation — Welding outside in a light breeze or inside with doors and windows open provides large volumes of fresh air which should disperse airborne contaminants sufficiently in most cases. However, it is important for the welder to stay to one side of the plume.
- Mechanical dilution ventilation – Fans such as roof exhaust fans and wall fans force outside air into and out of the building. General mechanical ventilation in most cases will deflect the plume out of the welder's breathing zone.
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8.8.3.2 Respiratory Protection:

- If you are in doubt about choosing the correct Respiratory protection or if you are not sure to the source of the dust stop work and advise your supervisor.

9 First Aid

9.1 Equipment

A first aid station must be provided and maintained by the site manager. The first aid kits have to be accessible every time, by everybody.

9.2 Facilities

On construction projects, the constructor is responsible to provide a first aid station (usually in the site office).

9.3 Trained Personnel

Employers must ensure that first aid is provided by trained and knowledgeable workers. The first aid providers have to be kept up to date.

9.4 First Aid Procedure

9.4.1 Emergency Procedures

- TAKE COMMAND: Assign the following duties to specific personnel;
- PROVIDE PROTECTION: Protect the accident scene from continuing or further hazards (traffic, machinery, fire, live wires,…);
- GIVE FIRST AID: Give first aid to the injured as soon as possible;
- CALL AN AMBULANCE: If required, call an ambulance and any other emergency services;
- GUIDE THE AMBULANCE: Meet and direct the ambulance to the accident scene;
- GET NAME OF HOSPITAL
- ADVISE MANAGEMENT: Inform supervisor or manager.
- ISOLATE THE ACCIDENT SCENE: Barricade, rope off or post a guard at the scene to make sure that nothing is moved or changed until authorities have completed their investigation.

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