



Health & Safety

ISO 45001



Quality

ISO 9001



Environment

ISO 14001

POLICY

Our policy is to meet project requirements with regard to Health & Safety, Environment and Quality as defined in contractual documents, and other requirements. Our Policy is based on the following fundamental values:

- Our organization is a leader in the execution of major construction work due to our clients' trust and our commitment to Health & Safety, Environment and Quality.
- Our president and management team recognize that all workers have the right to work in a safe and healthy workplace and are committed to comply with all client requirements as well as all applicable statutory, legal and other requirements. We will work in cooperation with our employees to achieve this standard while upholding their "right to refuse" unsafe work.
- As part of a continual improvement effort, we implement measures to complete projects according to clients' quality requirements, in a healthy and safe environment, while responsibly preventing and mitigating environmental impacts and pollution.
- We are committed to continual improvement by working with our personnel in the development and implementation of our Health & Safety, Environment and Quality management systems.

Prevent and eliminate injuries and ill health.

Prevent and mitigate the environmental impacts of our operations.

Meet or exceed our client's expectations.

All employees are responsible for enforcing this policy in their workplace and in their actions.

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2023-03-01

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KIEWIT INFRASTRUCTURE GROUP CANADIAN SAFETY MANUAL

Page #	Section	Description of Revision	Revision
82	10	Vehicle parking/key removal requirements.	01-01-21
23	6.2	Added Workplace Violence Policy.	01-01-21
71-72	15.5.4	Clarification on differences between Policy Violations, Unsafe Acts & Conditions.	01-01-21
75	8.3	Included reporting flow charts and links for Incidents reportable to OHS (AB & BC).	01-01-21
80	9.1	Revised the return to work program wording to stay at work.	01-01-21

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INTRODUCTION

At Kiewit, it is our policy to perform work in the safest manner possible with a constant focus on good construction practices. To accomplish this, an organized and effective Safety Program must be implemented at every location where work is performed.

Responsibility for the Safety Program is delegated to line supervision in accordance with the chain of command. The Safety Manager is a staff assistant to line personnel and their presence in no way relieves the line organization of its responsibility.

To achieve and maintain safe operations, there must be written guidelines that will assist employees in conducting their daily work activities in a safe and efficient manner. All personnel associated with the construction operations must view safety as an integrated function of their individual responsibilities and duties.

This Manual outlines the safety responsibilities of management personnel, field employees and safety department personnel. It also includes a number of Safe Work Programs and Procedures, which will be adapted, updated and supplemented as the need arises.

The Kiewit Safety Manual was created to align all Canadian Infrastructure Projects. It is the minimum standard that must be followed on all Canadian Infrastructure Projects. Management at each Project will write, prior to beginning work, a formal site-specific Safety Plan that addresses the specific safety and health issues and regulations for that Project. The Site-Specific Manual must be written to reflect a level of protection equal to or greater than the degree of protection prescribed in the Kiewit Safety Manual. The Project shall incorporate any federal, provincial, municipal or specific contract requirements not addressed in the Kiewit Safety Manual. This plan is to be reviewed annually at minimum.

The written guidelines contained herein are a means to assist employees in achieving and maintaining safe operations. We constantly monitor our performance and maintain a focus on continual improvement.

This plan will cover how each Project will conduct its individual Safety Program.

PURPOSE

The purpose of the Kiewit Safety Manual is to standardize the Project Safety Programs across all Kiewit Projects and to provide the Project Team with the resources and documents needed to execute the Project in accordance with the contract requirements and the Kiewit Safety Policy.

SCOPE

The Safety Manual applies to all work performed on Canadian Infrastructure sponsored Projects. Applicable legislative requirements, additional contract requirements and site-specific Policies are to be followed in conjunction with the Policies outlined in this Safety Manual.

CANADIAN INFRASTRUCTURE SAFETY STANDARDS

The management of the Kiewit Safety Program has four steps:

1. Planning
2. Implementation and Operational Execution
3. Verification
4. Corrective and Preventive Actions

Kiewit safety standards support all four steps of the Kiewit Safety Program listed above. These standards have been developed by teams in cooperation with craft to ensure the safest and most efficient procedures are followed. They take into account; legislative requirements, best practices, and lessons learned.

The following applies to Kiewit safety standards:

- Must be reviewed to ensure all site-specific risk has been identified and mitigated.
- All workers involved in SWP related tasks are trained and understand their responsibilities and expectations.
- Ensure compliance in the field through Kiewit verification process.

Kiewit safety standards are made up of the following procedures, best practices, and proactive Safety Programs:

1. [FUNDAMENTAL PROCEDURES \(Sections 1-19\)](#)

These procedures are the fundamental processes for all Kiewit Projects and operations. Project specific Safety Plans are developed by using these fundamental procedures and incorporating all applicable SWPs, Best Practices and Proactive Safety Programs to address the planning and mitigation requirements for Project and operational risks.

Project safety performance and effectiveness must be monitored to ensure Program compliance and continuous improvement.

2. [SAFE WORK PRACTICES AND PROCEDURES \(Sections 20-53\)](#)

Safe Work Practices (SWPs) are sometimes referred to using other terms, such as or Code of Practice (COP) or Standard Operating Procedures (SOPs). Safe Work Practices are generally written methods outlining how to perform a task with minimum risk to people, equipment, materials, environment, and processes. Some Kiewit Safe Work Practices act as both safe work practice and safe work procedure.

3. **BEST PRACTICES (Found on the SharePoint)**

Best Practices are sometimes referred to using other terms, such as Standard Work Procedure (SWP) or Safe Job Procedure (SJP). A Best Practice is a step by step description of a process when deviation may cause a loss. Some Kiewit Best Practices are built into these SWPs. All other Kiewit Best Practices can be found on SharePoint.

4. [PROACTIVE SAFETY PROGRAMS \(Sections 54-63\)](#)

These programs are designed to proactively address any potential hazards or risks prior to becoming safety issues on the job.

Programs typically focus on developing or shaping the culture of Project personnel.

REFERENCE INFORMATION

These following safety standards include reference information with various links to support compliance and provide the user with all the supplemental information and documents needed to run an effective Project Safety Program.

Below is a list of relevant company standards, manuals and SharePoint links that are referenced in this manual:

Corporate

- [Corporate Safety Link](#)
- [Marine Vessels Compliance Manual](#)
- [Transportation Compliance Manual](#)
- [Environmental Compliance Manual](#)

Crane Services

- [Crane Services Link and Manual](#)

Equipment

- [Equipment Services Link and Manual](#)

Temporary Structures and Construction Devices (TSCD)

- [TSCD Manual Link](#)

Explosives and Blasting

For operations involving explosives and blasting, blasting plans will be developed in accordance with the Canadian Explosives Compliance Manual.

- [Explosives Compliance Manual](#)

FUNDAMENTAL PROCEDURES (Sections 1-19)**1. HEALTH, SAFETY, ENVIRONMENTAL AND QUALITY POLICY**

Our policy is to meet project requirements with regard to Health & Safety, Environmental and Quality, as defined in the contractual documents, and to comply with company objectives. Our policy is based on the following fundamental values:

- Our organization is a leader in the execution of major construction work due to our client's trust and our commitment to Health & Safety, Environmental and Quality.
- Our President and management team recognize that all workers have the right to work in a safe and healthy workplace and are committed to comply with all client requirements as well as all applicable statutory, legal and other requirements. We will work in cooperation with our employees to achieve this standard while upholding their "right to refuse" unsafe work.
- As part of the continual improvement effort, we implement measures to complete projects per clients' quality requirements, in a healthy and safe environment, while responsibility preventing and mitigating environmental impacts and pollution.
- We are committed to continual improvement by working with our personnel in the development and implementation of our Health & Safety, Environmental and Quality management systems.

Prevent and eliminate injuries and ill health.

Prevent and mitigate the environmental impacts of our operations.

Meet or exceed our clients' expectations.

All workplace parties are accountable and responsible for enforcing this Policy in their workplace
and in their actions.

2. GOALS, OBJECTIVES AND TARGETS

2.1. GOALS

The goals of this program are to:

- 2.1.1. Construct each Project with Zero Injuries and lead the Company in safety performance.
- 2.1.2. Construct each Project with zero incidents where everyone commits to error-free performance. This will result in increased productivity and the prevention of job-related losses.
- 2.1.3. Ensure active participation and personal cooperation of all supervision and employees, and a positive coordination of their efforts carrying out the following:
 1. Proper Planning though the use of Detailed Execution Plans of all work is required to minimize personal injury, property damages and loss of productive efforts.
 2. Establishing and maintaining a leading indicator system for the early detection and correction of unsafe practices and conditions.
 3. Providing adequate protection of adjacent public, private and government properties to ensure everyone's safety.
 4. Investigating safety-related incidents to determine cause and taking necessary corrective actions.
 5. Establishing and implementing safety education programs designed to stimulate and maintain the interest and active participation of all personnel involved with the Project.

Programs should include:

 - Safety meetings and safety communications to encourage Craft Engagement.
 - Use of incident trends and causal analysis to preclude the occurrence of similar accidents.
 - Use of proper work procedures and best practices in conjunction with leading indicators.
 6. Safety instruction to individual employees and group safety training programs should include:
 - Incident investigation.
 - Job hazard analysis (JHA).
 - Fall protection.
 - Confined space entry.
 - Cranes and rigging.
 - Personal protective equipment (PPE).
 - Emergence response planning.
 - Other topics determined to be beneficial to the Project.
 7. Maintain records of accidents, claims and losses, and develop accident and/or loss experience summaries.

2.2. **PERFORMANCE OBJECTIVES**

The performance objectives for the Project are:

1. Strive to work each day injury free.
2. Work towards eliminating all injuries, occupational illnesses and incidents through a process of continuous improvement.
3. Promote environmental, safety and health objectives as a constant value in designing, planning, training and executing work.
4. Spread ownership for environmental, safety and health effectiveness throughout the organization.
5. Enhance employee awareness and involvement in the implementation of the Kiewit Safety Program.

2.3. **TARGETS**

Individual Projects will establish safety targets and track the performance of leading indicators.

2.4. **PROJECT RECOGNITION**

Projects will have a plan for recognizing behaviors that contribute to a Nobody Gets Hurt culture. It should be clear how to earn the recognition and be regularly communicated to drive engagement in the program. The Project recognition plan will set safety goals for individuals, groups, crews, or the project, and celebrate their achievements.

- On-The-Spot recognition - Recognizing workers observed working safely; workers implementing job hazard analysis procedures, practicing good housekeeping, and taking a proactive approach to safety.
- Scored Recognition – Recognizing workers based on measured performance, assessments, field tours, audits, etc.
- Project Recognition BBQs, Mass Meetings, Rodeos, Contests, etc. are encouraged.

3. PERFORMANCE MEASUREMENT, MONITORING AND CONTINUOUS IMPROVEMENT

Inspections, assessments, and audits are required at the frequency specified below. The purpose is to determine whether our operations are meeting Kiewit standards, regulatory and legal requirements. This process will identify opportunities for improvement, non-conformities, and non-compliances. Following this process will ensure the continuous improvement of the Safety Program.

SAFETY PROGRAM STEPS

The management of the Kiewit Safety Program has four steps:

1. Planning
2. Implementation and Operational Execution
3. Verification
4. Corrective and preventive actions

3.1. PLANNING

At the Project level, policy principles are translated into objectives and programs aimed at reducing occupational risks and incidents. To do so, all occupational risks and dangers are shared and inventoried.

Existing legislation and regulations play an important part, given the seriousness of occupational health and safety risks and dangers. Requirements from legislation and regulations will be the minimum for the formulated objectives.

3.2. IMPLEMENTATION AND OPERATIONAL EXECUTION

Many kinds of organizational measures are needed to realize objectives and targets and to make up the Safety Program. These include identifying and assigning tasks and responsibilities; procedures and instruction for operations and activities associated with the major risks and dangers; training of personnel; internal/external communication and managing information and documentation.

3.3. VERIFICATION

The company checks itself by monitoring and measuring the performance of operations and audits the implementation of the Safety Program requirements. The verification processes are listed below:

3.3.1. Inspections

Kiewit will maintain the Inspection program by continually monitoring each worksite with both formal and informal inspections.

All formal inspections will be documented and maintained.

Findings identified through inspections will be assigned corrective action(s) that will be implemented as soon as reasonably possible.

Inspection reports will be communicated to appropriate personnel.

3.3.2. Weekly Inspection/Safety Tour

Weekly field inspections are required to ensure field compliance and to identify opportunities for improvement. All supervision, from Superintendents up, including Project Managers, will rotate within the tours. Tour findings are to be reviewed at the daily coordination meeting.

Personnel from the various construction work areas should be assigned on a rotational basis. A craft worker, superintendent an engineer will comprise the daily safety tour group.

Safety Tour Procedure

The safety tours will be conducted as follows:

- The safety tour group will use the safety tour form or similar electronic application.
- The safety tour group will make contact with trade's workers during the tours and get their help in touring their operations.
- All at-risk items, acts and conditions that have the potential to cause injury, equipment, property or environmental damage, are to be corrected immediately by the safety tour group, in conjunction with the responsible discipline.
- LSA Focus: The tour will primarily focus project LSA categories. Tour findings should be tracked and trended and shared with the job.

3.3.3. Project Safety Audits and Assessments

Internal Safety Audits & Assessments:

- **District Standards Audits** – Projects are audited periodically by offsite personnel to verify compliance with the WCD standards. *Audit tool: District Standards Audit Template*
- **Quarterly Project Safety Assessments (PSA)** – A project administrative and field level assessment to ensure consistency, compliance and provide a proactive plan for upcoming risks. The outcome should identify what's working and what needs attention (top risks/challenges) and provide a forward-looking safety emphasis for the next auditing period (minimum quarterly). *Assessment tool: Corporate Project Safety Assessment (PSA) template*
- **Project Startup 5% Complete Safety Audit** – A mandatory safety audit when projects are 5% complete on field work to assess the implementation of the safety plan and the key components of the program. *Audit tool: Corporate Project Safety Assessment (PSA) template*

External Safety Audits:

- **ISO 45001** - Project Safety Management Systems are audited annually as part of the ISO 45001 audit cycle.

- **Provincial Certificate of Recognition (COR)** - Project Safety Management Systems are audited annually as part of the Provincial COR audit cycle.

3.4. CORRECTIVE AND PREVENTIVE ACTIONS

Projects will track and close out corrective actions resulting from incident investigations, project safety assessments, and audits.

The Safety Management System uses the IMS's corrective and preventive actions procedure. The corrective and preventive actions procedure can be found on [SharePoint](#). Any deviations from it may result in corrective or preventive measures.

3.4.1. NONCONFORMITY PROCEDURE

The Safety Management System uses the IMS's nonconformity procedure. The nonconformity procedure can be found on [SharePoint](#).

3.5. KEY PERFORMANCE INDICATORS

The intention and purpose of Key Performance Indicators is to track and trend precursors to determine the best approach to identify, mitigate and solve issues and concerns.

KEY PERFORMANCE INDICATOR	
<i>Leading Indicators</i>	<i>Lagging Indicators</i>
<ul style="list-style-type: none"> • Weekly Safety Tour 	<ul style="list-style-type: none"> • Near Misses
<ul style="list-style-type: none"> • Quarterly Safety Assessment 	<ul style="list-style-type: none"> • First Aids & Recordables
<ul style="list-style-type: none"> • Informal Tours & Audits 	<ul style="list-style-type: none"> • Equipment/Property Damage
<ul style="list-style-type: none"> • Craft Voice in Safety (CVIS) 	<ul style="list-style-type: none"> • Motor Vehicle Incidents
<ul style="list-style-type: none"> • LSA Assessments 	<ul style="list-style-type: none"> • LSA Events

Leading Indicators:

A leading indicator is a measure preceding or indicating a future event used to drive and measure activities carried out to prevent and control injury.

Examples: Safety tours, LSA assessments, audits, CVIS items, etc.

- Weekly Safety Tours
 - Weekly field inspections are required to ensure field compliance and to identify opportunities for improvement. All supervision, from Superintendents up, including Project Managers, will rotate within the tours. Tour findings are to be reviewed at the daily coordination meeting.
- Quarterly Project Safety Assessments
 - Project administrative and field level assessment to ensure consistency and compliance. The outcome should identify what's working and what needs attention (top risks/challenges) and provide a forward-looking safety emphasis for the next auditing period (minimum quarterly).

- Informal Tours & Audits
 - Throughout the week (not formally scheduled), members of the Safety Team and Project management.
- CVIS- Craft Voice in Safety
 - CVIS meets weekly for issues, challenge, solutions, and actions are documented in meeting minutes to reflect Leading Indicators brought forward from Project Craft. Please see CVIS section for further information.
- LSA Assessments
 - The Life Saving Actions (LSA) program is an initiative to raise awareness of incidents that have the potential to be much worse. LSA is an effort to focus on the potential outcome of an incident or event instead of the actual outcome, when determining the resources allocated to react to and prevent those incidents and events.

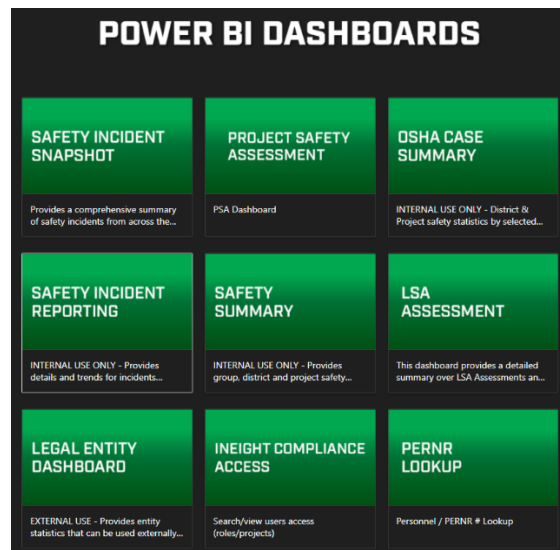
Lagging Indicators:

Lagging indicators measure a company's incidents in the form of past accident statistics.

Examples: *Incidents, near misses, frequencies, worker's compensation, etc.*

Leading & Lagging Indicator Data: [Corporate Safety Dashboards](#)

- **Leading Indicator Dashboards:**
 - LSA Assessment: Top LSA assessment trends, % at-risk, and corrective actions searchable by project and by supervisor.
 - Project Safety Assessments: Safety findings from program audits (quarterly).
- **Lagging Indicator Dashboards:**
 - Safety Summary: Overview of YTD district & project statistics, frequencies, and hours.
 - Safety Incident Reporting: Trend information for incidents by district/project/supervisor.
 - Incident Snapshot: Summary of all company incidents.



4. LEGAL AND OTHER REQUIREMENTS

On an annual basis, an audit team from the District shall perform a compliance and system audit on the safety management system. The goal is to evaluate compliance against laws, regulations, contracts requirements and other requirements.

On a quarterly basis, project teams conduct internal project safety assessments to ensure compliance with legal and other requirements. The assessments are designed to identify and address outstanding compliance items.

All projects are required to have provincial regulations available on-site.

The District Safety Manager monitors changes to laws and regulations through a notification system which alerts them in the event of a new or changed law or regulation.

Applicable Projects are notified in the event of such changes to ensure procedures and operational plans are adjusted accordingly.

4.1. DUE DILIGENCE

All employees, including senior management, managers, supervisors, and workers, will receive training about their respective health and safety responsibilities and will be held individually accountable in fulfilling those responsibilities.

Appropriate action will be taken against any employee who engages in an unsafe act, or who fails to comply with established Safe Work Practices and Procedures.

The underlying philosophy of the Company's Safety Program is that of internal responsibility, wherein health and safety hazards can best be dealt with in the workplace itself through communication and co-operation between all parties in the workplace.

4.1.1. What is meant by Due Diligence?

Due diligence is the level of judgment, care, prudence, determination, and activity that a person would reasonably be expected to do under particular circumstances.

When applied to occupational health and safety, due diligence means that employers shall take all reasonable precautions, under the particular circumstances, to prevent injuries or incidents in the workplace.

To exercise due diligence, an employer must implement a plan to identify possible workplace hazards and carry out the appropriate corrective action to prevent incidents or injuries arising from these hazards.

4.1.2. Why Does Due Diligence Have Special Significance?

Due diligence is important as a legal defense for a person charged under occupational health and safety legislation. If charged, a defendant may be found not guilty if he or she can prove that due diligence was exercised. In other words, the defendant must be able to prove that all precautions, reasonable under the circumstances, were taken to protect the health and safety of workers.

4.1.3. How Does Kiewit Establish a Due Diligence Program?

The conditions for establishing due diligence includes several criteria:

- Kiewit has in place written OH&S policies, practices and procedures. These demonstrate that Kiewit carries out workplace safety audits, identifies hazardous practices and conditions, and makes the necessary changes to correct them, and provides employees with information to enable them to work safely.

- Kiewit provides the appropriate training and education to their employees so that they understand and carry out their work according to the established policies, practices and procedures.
- Kiewit trains their supervisors to ensure they are competent persons, as defined in legislation.
- Kiewit monitors the workplace to ensure that employees are following the Policies, Practices and Procedures. Written documentation of progressive disciplining for breaches of safety rules is considered due diligence.
- Kiewit has many requirements as the employer but workers also have responsibilities. They have a duty to take reasonable care to ensure the safety of themselves and their coworkers - this includes following Safe Work Practices and complying with regulations.
- Kiewit has an incident investigation and reporting system in place. Employees are encouraged to report "near misses" and these are investigated. Kiewit incorporates information from these investigations into revised, improved policies, practices, and procedures.
- Kiewit documents, in writing, all of the above steps. This gives Kiewit a history of how the Company's occupational health and safety program has progressed over time. It also provides up-to-date documentation that can be used as a defense to charges in case an incident occurs despite Kiewit's due diligence efforts.

4.1.4. **Due Diligence Checklist**

Management, supervisors, and staff employees are expected to complete the following checklist.

- ✓ Do you set objectives for safety and health just as you do for quality and production?
- ✓ Do you know and understand your safety and health responsibilities?
- ✓ Do you have definite procedures in place to identify and control hazards?
- ✓ Have you integrated safety into all aspects of your work?
- ✓ Have you committed appropriate resources to safety and health?
- ✓ Have you explained safety and health responsibilities to all employees and made sure that they understand it?
- ✓ Have employees been trained to work safely and use proper protective equipment?
- ✓ Is there a hazard reporting procedure in place that encourages employees to report all unsafe conditions and unsafe practices to their supervisors?
- ✓ Are managers, supervisors, and workers held accountable for safety and health just as they are held accountable for quality?
- ✓ Is safety a factor when acquiring new equipment or changing a process?
- ✓ Are records of our OHS program activities and improvements kept?
- ✓ Are records of the training each employee has received available?
- ✓ Do records show that disciplinary action has occurred when an employee violates safety procedures?
- ✓ Is the OH&S program reviewed at least once a year and improvements made as needed?

5. ROLES AND RESPONSIBILITIES

5.1. WORKERS THREE RIGHTS

5.1.1. Right to know

Workplace hazards can play a part in stress, accidents, injury, disease and even death. Workers have the right to know about workplace hazards. When workers are informed, they can help their employers provide the necessary protection and training to promote a safe workplace. Kiewit uses the following methods to inform workers about the hazards they may face:

- Job Hazard Analysis (Major and Minor JHA)
- Pre-Task Instruction (PTI) meetings
- Work plans
- Risk assessments
- Training
- Craft Voice in Safety (CVIS)

5.1.2. Right to participate

Workers have the right to participate in decisions affecting workplace health and safety and their involvement is vital when it comes to controlling or eliminating dangers in the workplace. Since workers are most commonly exposed to workplace hazards, they are better equipped to find solutions. Our JHA process and POD meetings encourage worker participation within the health and safety program.

5.1.3. Right to refuse unsafe work

Every employee has a right, the responsibility and the authority to refuse to carry out any work or to operate any tool, appliance or equipment when there is reasonable and probable grounds to believe that there exists, or will exist, an imminent danger to the health and safety of the worker or any other worker(s) present at the workplace.

NEVER WALK PAST AN UNSAFE ACT

5.2. WORK REFUSAL PROCEDURE

No worker shall carry out or cause to be carried out any work process, or operate or cause to be operated any tool, appliance or equipment that would create an undue hazard or “imminent danger” to the worker’s health or safety or to the health or safety of any other worker. Undue hazard is a danger that is not normal for that occupation, or a danger under which a person engaged in that occupation would not normally carry out the work.

“Imminent Danger” refers to any danger that isn’t normally faced on the job, or to any dangerous condition that a worker would not normally work under. If workers think their work may put themselves or another worker in imminent danger, they must refuse to do it. Workers must tell their employer they believe there is imminent danger.

- A. Kiewit will:
 - Investigate and take action to eliminate the imminent danger;
 - Ensure that no worker is assigned to use or operate the tool, appliance or equipment, to perform the work for which a worker has made a notification, unless:
 - The worker to be assigned is not exposed to imminent danger;
 - The imminent danger has been eliminated (must be documented).
- B. Workers may be temporarily assigned to alternative work at no loss in pay until the matter is resolved. This shall not be regarded as disciplinary action for the notification of imminent danger and work refusal.
- C. If the worker believes an imminent danger still exists after investigation and action by the Company, the worker may file a complaint with an OH&S officer, who in turn will investigate the matter, giving a copy of the record to the worker and the employer.

5.3. RESPONSIBILITIES

5.3.1. Staff – Personal Safety Plan (PSP)

The PSP is a written commitment for each staff employee regardless of location and position, jobsite, or the district office. The PSP identifies the different actions that each staff employee will do to ensure “Nobody Gets Hurt”. These will be posted at either the employees’ desk, or in their work area. PSPs should be updated at the beginning of each year.

5.3.2. District Safety Manager

The District Safety Manager (DSM) is responsible for the following:

- Ensuring that the Canadian Infrastructure Safety Manual is implemented on all Canadian Infrastructure sponsored Projects.
- Communicating the overall message of our Safety Program, the District’s safety record and safety ranking within the Kiewit organization.
- Developing, implementing, and maintaining comprehensive written Safety, Health, and Environmental Programs containing philosophies, policies and procedures that comply with all corporate, federal, provincial, municipal, and other regulatory agency guidelines.
- Developing, implementing, and overseeing comprehensive training programs for District and Project employees.

- Monitoring Worker's Compensation, insurance, and liability claims.
- Maintaining appropriate records as required by Corporate, federal, provincial, and local regulatory agencies.
- Attending, conducting and/or participating in meetings with Project Managers, Safety Representatives, and other representatives as necessary to assure compliance with safety and health requirements at each project site.
- Conduct project site audits to review records, permits, field conditions, safe work practices and to assess employee knowledge of safety policies and procedure.

5.3.3. **Project Manager**

The Project Manager is responsible for the following:

- Ensuring the annual Canadian Infrastructure Safety Plan is being followed by all staff, craft workers and subcontractors.
- Ensuring that all contractual, legislative and Kiewit policy regarding safety performance and documentation for the Project are met.
- Implementation of the Safety Program on the Project.
- Ensuring Construction Managers, Superintendents, Engineers and Foremen understand and enforce Safe Work Practices and attend required safety training.
- Ensuring a documented safety tour of all construction activities is conducted on a weekly basis. This inspection shall focus on observance and correction of unsafe employee behavior and project site conditions including environmental conditions. A copy of each weekly inspection report, complete with documentation of corrective actions taken, shall be kept in a file on the Project.
- Ensuring weekly foremen safety meetings, weekly foremen toolbox meetings and mass safety meetings are being conducted and attended by all employees and subcontractors.
- Being involved in the review process of all safety related incidents.
- Ensuring Construction Managers, Superintendents, Engineers and Foremen understand and enforce Safe Work Practices and attend safety training as required.
- Ensuring all personal protective equipment is being worn and used properly.
- Conducting or having a delegate conduct 30-day follow up meetings for project new hires.

5.3.4. **Project Safety Manager**

The Project Safety Manager (PSM) is responsible for the following:

- Ensure the annual Canadian Infrastructure Safety Plan is being followed by all staff, craft workers and subcontractors.
- Overseeing the implementation of the Safety Program on the Project.
- Ensuring a documented safety tour of all construction activities is conducted on a weekly basis. This inspection shall focus on observance and correction of unsafe employee behavior and Project site conditions including environmental

conditions. A copy of each weekly inspection report, complete with documentation of corrective actions taken, shall be kept in a file on the Project.

- Providing or coordinating safety orientation training, job-specific training, safety meetings, first-aid facilities and materials, safety reports, incident investigations, case management, safety recognition programs and routine safety inspections.
- Ensuring that all contractual, legislative and Kiewit policy requirements regarding safety performance and documentation for the project are met.
- Implementing weekly foreman safety meetings and weekly Foreman toolbox meetings.
- Leading the incident review process for all safety incidents.
- Ensuring the coordination of and attending weekly CVIS meetings.
- Ensuring the CVIS manual is being followed and working with management to drive the safety culture of the project.
- Working in conjunction with construction managers, superintendents, engineers, and Foremen to ensure implementation of the safety program on all levels.
- Establishing project safety goals with the Project Manager.

5.3.5. **Safety Coordinator**

The Safety Coordinator is responsible for the following:

- Provide necessary training to employees in accordance with OSH regulations.
- Provide feedback to management relative to job site compliance.
- Conduct Safety Inspections.
- Observe personnel and operations for possible safety concerns.
- Assists in accident and injury investigations.
- Communicates with Project Management regarding compliance and safety.
- Monitoring all heavy industrial construction work for compliance with safety requirements
- Conducting training, new hire orientation and Safety Meetings.
- Provide CVIS safety Leading Indicator Program information
- Maintain Fire extinguishers program
- Manage high angle rescue
- Help the staff create and promote a positive safety attitude daily
- Perform any appropriate and applicable duties associated with implementation of an effective Safety Program.
- Gather the facts surrounding all safety events. The Safety Coordinator will keep a log of all the accidents and the status of each injured employee. Upon review and approval by the Project Manager, the Safety Manager will transmit accident information to appropriate parties of concern, including, for example, the District Office and applicable insurance representatives.
- The Safety Coordinator will accompany, along with applicable supervisory staff, any injured employee to appropriate medical treatment facilities, and

subsequently, will routinely follow up with injured employees until released for full duty.

- The Safety Coordinator will keep and maintain a bulletin board with current safety statistics, frequency rates, and safety information. The project goals and actual performance will be conspicuously posted on the project site to communicate goals and advise of performance
- The Safety Coordinator will keep an organized file of completed Toolbox Meetings. Administrative staff may be utilized to maintain current and thorough filing.
- The Safety Coordinator will coordinate with the Construction Manager(s) and Project Engineer to develop a schedule of those responsible for jobsite Safety Tour(s) (see “Safety Tours”).
- The Safety Coordinator will administer the safety portion of the new employee orientations for Site Specifics
- Assist with 30-day new hire follow up interviews

5.3.6. **Project Construction Manager**

The Project Construction Manager (CM) is responsible for the following:

- Ensuring the Canadian Infrastructure Safety Plan is being followed by all staff, craft, and subcontractors.
- Overseeing the implementation of the Safety Program on the Project.
- Ensuring that all safety incidents are investigated by the responsible superintendent.
- Overseeing the safety inspection process, including assigning supervisory staff to conduct inspections.
- Ensuring superintendents, engineers and foremen understand and enforce safe work practices and attend safety training.
- Enforcing requirements relating to the distribution and use of personal protective equipment, attendance at safety meetings and safety planning.
- Involvement in the review and investigative process following all safety related incidents.

5.3.7. **Superintendent**

The Superintendents are responsible for the following:

- Ensuring the annual Canadian Infrastructure Safety Plan is being followed by all staff, craft, and subcontractors.
- Enforcing of safety policies and practices and ensuring applicable training is received by employees under their supervision.
- Training, leading, and controlling work activities so that performance complies with Canadian Infrastructure standards.

- Ensuring that safety is an integral part of the plans for each operation in accordance with the provisions of the Safety Program.
- Providing visible management when implementing and maintaining the Safety program.
- Ensuring compliance with all related Kiewit and owner requirements, as well as municipal, provincial, and federal laws.
- Reviewing, updating, and signing off on major hazard analysis and work plans.
- Reporting and investigating all safety related incidents in a timely manner and ensuing appropriate action is taken.
- Taking immediate action to correct unsafe work practices, acts, and conditions.
- Attending and participating in, on a rotating basis, weekly safety toolbox meetings and pre-job task instruction meetings.
- Engaging and supporting foremen in the preparation of hazard analyses.
- Ensuring that no operation is started without a completed hazard analysis.

5.3.8. **Field Engineer**

The Field Engineers are responsible for the following:

- Assisting Project personnel in the assembly of details, drawings, and inspection procedures.
- Assisting the superintendent in obtaining the necessary approvals before starting construction activities, such as heavy lifts, crane and man-lifts, and steel erection.
- Providing necessary technical specifications requiring approval.
- Assisting the Project Manager in assembling detail drawings requiring a professional engineer's seal.
- Taking action to correct unsatisfactory safety performance.
- Participating in the daily Stretch and Flex Program.
- Encouraging workers to ask questions if they are unsure about the plan and details of a task.

5.3.9. **Foreman**

Foremen are Kiewit's supervisors closest to the craft workers. They are responsible for the performance of the crew under their supervision, and for:

- Set clear expectations and hold workers accountable.
- Training, leading, and controlling work activities so that work in their areas complies with Kiewit policies.
- Lead by example through their daily actions and maintain their work areas with extreme housekeeping and extreme access.
- Mentoring new hires until they become fully trained and productive crew members.

- Ensure their CVIS members are allocated adequate time for CVIS meetings/activities.
- Accountability with craft workers when an at-risk behavior is observed.
- Reporting to the discipline superintendent all health and safety concerns, such as near misses, first aids, environmental concerns, and unsafe conditions.
- Conducting daily pre-task instruction meetings with all crew members and conducting the Stretch and Flex Program at this time and making sure their workers are fit for duty.
- Maintaining orderliness and extreme housekeeping always in work areas.
- Reinforce the importance of the Safety Program when introduced to new crew members.
- Provide feedback to superintendents and safety about prospective quality mentors and CVIS volunteers.
- Ensuring that their workers understand their 3 rights and the requirement to Stop any unsafe work.
- Stopping an operation from being performed when:
 - A. The operation has not been properly planned; or
 - B. Safety is not an integral part of the process.

5.3.10. **Worker**

All staff employees and craft workers will be responsible for complying with established Safe Work Procedures including:

- Reporting to work physically and mentally able to perform their designated duties.
- Following all rules, guidelines, and safe work procedures.
- Complying with all requirements, instructions, and manufacturers' safety recommendations.
- Wearing all personal protective equipment required for individual projects or specific operations. The minimum required safety apparel is:
 - CSA approved hard hat.
 - CSA approved eye protection.
 - Shirts with minimum 6" sleeve and full-length pants (no sweatpants).
 - A high visibility vests.
 - Task specific gloves.
 - CSA-approved work boots (above the ankle).
 - Using the proper tools and equipment for each job.
- Ensuring that they are using tools and equipment correctly If workers are unsure of how to use the equipment or do the operation required, they must ask before doing the work.
- Reporting all unsafe acts or conditions to their foreman or supervisor.
- Taking corrective action, as appropriate, if they observe something that could cause injury to another worker.

- Stopping any work that is considered unsafe and advising a supervisor of any such situation immediately.
- Not performing any work that has not been planned or when safety is not an integral part of the process. Workers must not start any operation without reading, understanding, and signing the detailed execution plan and JHA first.
- Attending all daily Toolbox Safety Meetings and Pre-Task Instruction Meetings and participating in discussion generated at such meetings.
- Participating daily Stretch and Flex Program.
- As part of the green hard hat program, watching over craft workers and staff employees new to the work site, correcting at-risk behavior, and positively reinforcing acceptable behavior.

5.3.11. **Subcontractors**

All subcontractors undertaking work for or through Kiewit are required to comply with all requirements established for the project.

All subcontractors and their employees are required to perform their work in a safe and professional manner. To accomplish the goal of an incident-free work site, Kiewit must ensure that each subcontractor follows the set of safety requirements for work on any project site.

5.3.11.1. **These requirements include:**

- Attending all pre-construction meetings (kick-off meetings).
- Accepting and implementing Kiewit's overall Safety Program.
- Completing Kiewit's orientation programs for each employee and attending any further orientations, as required.
- Developing work plans, job hazard analyses and safe work procedures for their work.
- Providing a full-time safety professional if requested.
- Participating in the project's Craft Voice in Safety committee.
- Inspecting their work area daily, maintaining extreme housekeeping as conditions change.
- Planning each operation with health, safety, the environment, and security as the number one priority; this means having a detailed execution plan and utilizing the JHA.
- Participating in the daily Stretch and Flex Program.
- Attending any safety stand downs / participate in safety rodeos / and attend and participate in any safety related meetings or initiatives that they are requested to attend.

6. POLICIES

6.1. KIEWIT'S HARASSMENT AND DISCRIMINATION POLICY

It is Kiewit's policy to ensure and maintain a work environment that is free of discrimination, harassment, intimidation, and coercion at all sites and in all facilities at which Kiewit employees are assigned to work. Accordingly, Kiewit will not tolerate any form of harassment, unlawful discrimination or intimidation against Kiewit employees by anyone (including managers, supervisors, co-workers, executives, other employees, vendors, clients, customers and third parties) on the basis of race, color, religion, age, national origin or ancestry, sex, pregnancy, citizenship, marital or family status, physical or mental disability, sexual orientation or any other characteristic. All employees are responsible for providing a workplace that is free from unlawful discrimination and harassment and are expected to avoid any behavior or conduct that could reasonably be interpreted as unlawful discrimination or harassment.

For full policy information, follow the link to the [corporate policy manual](#).

6.2. WORKPLACE VIOLENCE POLICY

Workplace violence is the attempted, threatened, or actual conduct of a person who endangers or is likely to endanger the health and safety of staff, Craft or visitors, any threatening statement, harassment, or behavior that gives an individual reasonable cause to believe that their health and safety is at risk.

Violence, threats, and harassment are always prohibited, especially whenever:

- The act, behavior, or communication is abusive and could cause another person physical, emotional, or psychological harm; and
- The act, behavior, or communication damages or threatens damage to an individual's property or disrupts the work, or activities of an individual or group of people.

Employees who engage in actions or threats of violent behavior toward other employees, visitors or the public will be disciplined, up to and including dismissal and/or local authority involvement. A purpose of this policy is to deal with workplace violence proactively, through education, mediation, consultation, before it escalates to the formal level of disciplinary action. Workplace violence incidents reaching the formal level will be dealt with by relevant rules, regulations, and policies.

6.3. DRUG AND ALCOHOL POLICY

Kiewit is committed to protecting the health and safety of its employees, contractors, customers, and the public. The use of drugs and alcohol can adversely affect job performance, the work environment and the safety of our employees, contractors, and others. The purpose of this policy is to address and minimize risks associated with alcohol and drugs in the workplace and to ensure that all employees are fit for duty. The policy outlines our expectations regarding fitness for duty and prohibitions against the use and possession of alcohol and drugs. It represents only one component of Kiewit's overall approach to risk mitigation and safety. Should a client have specific pre-access testing requirements, Kiewit will review and modify our standard Drug & Alcohol practices as required.

6.3.1. Fit for Duty

Personnel are required to report to work fit for duty and free of any adverse effects of illegal drugs, alcohol, or inhalants. They must remain fit for work and unimpaired for the duration of their work shift.

- Personnel must not misuse prescription or over-the-counter drugs that interfere with their ability to operate equipment or vehicles, or their ability to perform work tasks.
- Personnel are required to report to their supervisor any use of medications that might affect their fitness for duty.
- Personnel are required to report unsafe or suspicious work behavior or performance to their supervisor.
- Personnel are required to cooperate with requests made under this Policy.
- Persons who fail to cooperate with request made in accordance with this Policy are subject to termination of their employment.

For full policy information, follow the link below:

https://portal.Kiewit.com/sites/safety/SitePages/Drug%20and%20Alcohol_Canada.aspx

6.4. MANAGEMENT REVIEW POLICY

Kiewit's management review Policy stipulates the fulfillment of an annual review to discuss the performance of our Safety Program. The scope of this review shall include:

- Results of internal/external audits and evaluations of compliance with applicable legal requirements and other requirements to which the organization subscribes.
- The results of participation and consultation.
- Relevant communication(s) from external interested parties including complaints.
- The occupational health and safety performance of the organization.
- The extent to which objectives have been met.
- Safety Lessons Learned.
- Status of incident investigations, corrective actions, and preventive actions.
- Follow-up actions from previous management reviews.
- Investigation of changing circumstances, including developments in legal and other requirements related to occupational health and safety recommendations for improvement.
- This review will be documented, and any resulting actions will be tracked in the business planning process and/or through the corrective action process to ensure continuous improvement.

6.5. INSPECTION POLICY

Regular inspections on work site activities are beneficial for anticipating, recognizing, evaluating, controlling, and eliminating substandard acts, conditions, and hazards.

- Kiewit will maintain the inspection program by continually monitoring each worksite with both formal and informal inspections.
- Inspections will be conducted together with staff and craft employees and reviewed by management.
- All formal inspections will be documented and maintained.
- Findings identified through inspections will be assigned corrective action(s) that will be implemented as soon as reasonably possible.
- Inspection reports will be communicated to appropriate personnel.

6.6. STAY AT WORK AND RE-EMPLOYMENT POLICY

Kiewit is committed to the complete and successful recovery of ill or injured employees. The Kiewit Stay-At-Work Program is to assist employees recovering from occupational injury or illness to return to their usual duties.

Early intervention and a Stay-At-Work program are designed to minimize the impact to an employee of an illness or injury. Kiewit is focused on meeting its obligation to accommodate injured and ill employees.

Every reasonable effort will be made to accommodate the limitations of ill or injured individuals and to promote rehabilitation and recovery. Modified duties will be provided for employees with medical restrictions that preclude them from fulfilling their normal tasks.

All Kiewit projects shall implement a Stay-At-Work program consistent with the Canadian Infrastructure Safety Manual. Participation in this Program is a mandatory condition of employment.

6.7. INVESTIGATION POLICY

Kiewit promotes thorough investigation of all incidents that occur on our worksites.

- All incidents and near misses must be reported to the direct supervisor immediately.
- All incident records, statistics and trends will be tracked through the incident management software.
- All investigations will be followed up with recommendations and the appropriate action must be taken to prevent a similar event from occurring.
- Supervisors, workers, and safety representatives shall be involved in the investigation of all incidents.
- Incidents must be communicated to appropriate personnel.

6.8. PREVENTATIVE MAINTENANCE POLICY

Kiewit is committed to creating a safe working environment, including supplying the correct tools and/or equipment for a job. It is the responsibility of the employee to ensure that these tools and/or equipment are used in a safe manner and not tampered with in any way.

- The tools and equipment will be properly maintained to ensure safe operation.
- Supervisors will ensure qualified personnel carry out all maintenance work.
- All supporting records will be documented and maintained.
- Preventative maintenance procedures will be readily available.
- All tools and equipment found to be defective will be appropriately tagged and removed from service.

6.9. WORKING ALONE POLICY

Kiewit is committed to providing measures to protect the health and safety of, and minimize risk to, any worker working at a workplace who is the only worker of the employer at that workplace, in circumstances where assistance is not readily available to the worker in the event of an injury, ill health or emergency.

This Policy applies to all supervisors and employees who are involved in working alone operations.

Working alone means the performance of any work function by a worker who.

- Is the only worker at that workplace at any time?
- Is not directly supervised by the employer, or another person designated as a supervisor by the employer, at any time;
- In circumstances where assistance is not readily available to the worker in the event of injury, ill health, or emergency.

6.9.1. Requirements

The Project Manager shall ensure that supervisors identify the risks arising from the conditions and circumstances of working alone or in isolation.

Supervisors shall, so far as is reasonably practicable, take steps to eliminate or reduce the identified risks or working alone or in isolation.

If electronic communication is not practical or readily available at the work site, scheduled visits to the worker by another competent worker must be made.

Documentation and tracking must be completed to ensure follow up and management of the worker is being done.

The Project Manager shall ensure that workers are trained and comply with the Safe Work Procedures.

Workers shall advise their supervisor when they plan to work alone or in isolation and shall conduct their work in accordance with the Safe Work Procedures.

The Project Manager shall ensure that supervisors review and revise the procedures not less than every three years or sooner if circumstances at a workplace change in a way that poses a risk to the safety or health of a worker working alone or in isolation.

6.10. **Red Bolt Policy**

Refer to the Corporate Temporary Structures & Construction Devices Manual for specific requirements.

On many of our projects we have concrete vertical formwork for walls, columns, caps and other structures. Commonly, we will pre-strip the forms by removing most of the ties, bolts, and braces.

This allows us to break the bond on the ties/bolts and expedite the final stripping process. In many cases, the vertical forms may be left on the wall for a period either for concrete strength or curing requirements.

It is important to ensure all vertical formwork is stripped in a controlled manner. Each project must develop a specific “Red Bolt Policy” that identifies a safe procedure for stripping forms.

Each form must utilize red bolt tags on pre-determined bolts, braces or engineered systems that can only be removed when a crane is properly rigged to the form. In addition to the tags, an operational specific JHA must be completed and a “designated supervisor” assigned to authorize the removal of the bolts, braces or engineered systems.

The project “Red Bolt Policy” must be approved by the Job Superintendent

6.11. **KIEWIT CORPORATE POLICY MANUAL**

In addition to the policies listed above, all employees must comply with all Corporate Policies listed in the Kiewit Corporate Policy Manual.

7. RULES

7.1. DISCIPLINARY ACTION PLAN

Each Project will have a written disciplinary action plan that shall include types of violations and consequences for non-compliance. The Project's disciplinary action plan will be reviewed during orientation with all employees, subcontractors, and site visitors prior to beginning work at the Project. Consistency is a major component of a successful disciplinary action plan.

Accountability for safety does not always merit disciplinary action. It's important to conduct root cause analysis for all incidents and near misses to ensure proper accountability is implemented.

7.2. ZERO TOLERANCE RULES

To ensure consistent adherence to zero tolerance rules, refer to the accountability matrix as a guideline.

For every project a list of Zero Tolerance Rules will be established and posted.

These are five commonly used rules:

7.2.1. Fall Protection

Kiewit has a 100 percent tie-off policy, meaning a worker must be continually and properly tied to an appropriate anchorage point whenever their feet are more than six feet above the ground, unless the surrounding surface has a guardrail system that complies with regulatory guidelines.

7.2.2. Lock-out/Tag-out (LOTO)

Lockout is the isolation of energy from a system by means of a machine, equipment, or process that physically locks the system into a safe mode. Tag-out is a labeling process that is used when lockout is required. Workers must not fail to lock and/or tag out when required and must not undertake the unauthorized removal of a lock/tag.

7.2.3. Designated Operator

Designated operators are required for all cranes, forklifts, earth-moving equipment, and elevated work platforms. This designation must be specific and determined by a project authorized individual. Individuals found to be operating any equipment determined at a project to require operator designation without such designation will be in violation of the zero-tolerance policy.

7.2.4. Confined Spaces

Any person(s) entering a confined space without prior training and authorization will be considered in violation of the Zero Tolerance Policy.

7.2.5. Drug and Alcohol Use

Any person(s) found to be under the influence of drugs (without a prescription from a licensed health care provider and notification to the Site Safety Manager) and/or alcohol on any of the Projects properties, worksite or while using a Kiewit vehicle, will be considered in violation of the Zero Tolerance Policy.

7.3. RESPONSIBILITY FOR DISCIPLINE ON THE PROJECT

The Project Manager is ultimately responsible for discipline on a Project. He/she retains the right to terminate an employee immediately should the situation warrant it. Examples of this might include an employee's unsafe work habits and unsafe acts, attitudes or other actions that might endanger themselves or other employees.

7.4. "WORKING SAFELY IS A CONDITION OF EMPLOYMENT"

Most of our workforce will never be involved in disciplinary problems. This is consistent with our policy that "Working safely is a condition of employment."

8. PLANNING

8.1. PLANNING BEFORE PROJECT START-UP

8.1.1. Pre-Bid

When preparing the estimate, include a realistic sum of money for safety requirements including:

- Job conditions
- Company safety policies
- Construction safety personnel requirements
- Federal and Provincial Health & Safety Regulations
- Owner and other regulatory agency specifications.

8.1.2. Post-Bid

8.1.2.1. Develop Site Specific Risk Matrix

- See section 9.7 Risk Matrix for further information.

8.1.2.2. Develop Site Specific Safety Plan

Each Project will develop a Site-Specific Safety Plan. This Plan will cover how the Project will conduct safety. The District Safety Manual will be used as a guideline for District Policies. The Site-Specific Safety Plan shall incorporate any provincial, local, or client safety requirements not addressed in the District Manual.

The Site-Specific Safety Plan will be reviewed prior to key events on the Project such as start-up. This should be used as a time to evaluate the Plan and make additions, modifications, or changes.

The Plan, at a minimum must include the following:

- Site-Specific Safety Rules
- Site-Specific Competency, Training and Orientation Plan
- Site-Specific Emergency Response Plan and First Aid Services
- Site-Specific Fall Protection Plan (including procedures for rescue at heights, corporate standards, approved gear ETC)
- Site-Specific Hazard Assessment and Safe Work Plan for all LSA categories (i.e., Confined Space Entry, Overhead Power Lines, Underground Utilities, Critical Lifts, Traffic Control, Excavations, Lock Out, Avalanche, Wildlife Encounter)
- Develop Project LSA Categories to be incorporated into KPIs, Weekly Audits, Inspections and Communications
- Performance Measurement and Monitoring
- Safety Recognition
- Subcontractor Management
- Other applicable conditions specified by the Client/Owner

8.1.3. Meetings Before Project Start-Up:

- Readiness Review Meeting.
- Subcontractor Pre-Mobilization Meeting.
- Provincial OHS Meeting.
- Offsite Medical Clinic Meeting.
- Local Fire Department Meeting.
- Other applicable agencies and resources and businesses as required by the Project.

8.1.3.1. Readiness Review (meeting safety topics):

- Review Owner, Company and regulatory requirements, hazards, and controls measures.
- LSA Categories & mitigation.
- Crane Plan.
- Craft Ownership / CVIS.
- Training & Orientation Plan.
- Emergency Response Planning.
- First Aid.

8.1.3.2. Subcontractor Pre-Mobilization Meeting:

Before subcontractors will be allowed to begin work on the Project, a pre-mobilization safety meeting must take place. This meeting must be attended by the project management team, subcontractor senior management and key supervision.

See section 18 Subcontractor Management, for all subcontractor expectations.

8.1.3.3. Provincial OHS Meeting:

Meet with the provincial OHS enforcement personnel that are responsible for the Project. Discuss the Project scope, the Safety Plan and invite them out for a Project tour once the work has started.

8.1.3.4. Offsite Medical Clinic Meeting:

Meet with the designated offsite clinic. Review OSHA reporting, medical support and treatment, case management process and documentation.

8.1.3.5. Local Fire Department Meeting:

Discuss the Project scope, the Safety Plan, their response capabilities, and potential support. Invite them out for a Project tour once the work has started.

8.2. PROJECT START-UP PROCESS:

1. Safety Start-Up Checklist
2. Safety Supplies and Equipment
3. Project Kickoff Meeting
4. Offsite Notifications
5. CVIS
6. Training and Orientation
7. Project Safety Assessment

8.2.1. Safety Start-Up Checklist

Each Project shall complete the Safety Start-Up Checklist in preparation for start-up. Each item on the checklist must be assigned and addressed.

8.2.2. Safety Supplies and Equipment

Each Project shall ensure safety equipment and supplies are ordered and arrive before the start of the job. Utilize the Safety Supplies and Equipment Checklist.

Specify safety features required on new equipment; check rented equipment before signing agreements to be sure it has all the essential safety features.

Inspect all equipment and tools before putting them to work; correct any deficiencies immediately.

8.2.3. Project Kickoff Meeting

Each Project will hold a Project Kickoff meeting to review Operational Standards/Project Plan with the Project team. Safety topics for the meeting:

- Project Top Risks, LSA Categories & Mitigation
- Project Specific Safety Plan Requirements
- Supervisors and Foreman Expectations

8.2.4. Offsite Notifications

Each Project will notify local OHS, WCB, Police, Fire, Railroad, Utilities, and other applicable resources of the Project start-up.

Depending on the Province, either; Ministry of Labor OHS, or WBC requires a Notice of Project to be completed prior to construction activities.

8.2.5. CVIS

The CVIS committee should be established at the start of the Project. See CVIS section for further information.

8.2.6. Training and Orientation

All workers and visitors must comply with the project's safety, health, environment, and security requirements. Workers may be required to participate in additional Client specific orientation prior to the site-specific orientation. Each project will develop and implement a

training session to orientate all employees on their roles as required by the safety program. This orientation will outline their duties and responsibilities for health and safety in daily work activities.

Visitors to the project will attend a visitor's orientation delivered by a safety department member and must be escorted by a designated employee.

Each Project will have a Training Plan that provides employees with the resources required to perform their work in the safest way possible.

During Project start-up, Projects must establish designated operator requirements for heavy equipment, tools, and other equipment (small tools training), and designated person specific tasks.

See Competency and Training and Designated Operator sections for further information.

8.2.7. **Project Safety Assessment**

Review safety assessment criteria during start-up to ensure compliance with Kiewit, COR, ISO, and legislative requirements.

8.2.8. **Project Trailer/Office Materials**

Offices and trailers will include but are not limited to the following:

- Map & Directions to On-Site Clinic & Preferred Hospitals
- Project ERP
- First Aid Registry
- MSDS Binder
- PPE Posters
- First Aid Attendants
- Job Steward Posters
- Stretch & Flex
- LSA Categories
- Safety Expectations

8.3. **DETAILED EXECUTION PLANNING**

A work plan is our primary strategy to execute Project operations.

All work plans must be approved (signed off) by the Construction Manager or designee, Safety and Quality Managers at a minimum before issuance to field personnel.

8.3.1. **Work Plan Safety Requirements:**

- A. Big picture philosophy for accessing and executing the work safely
- B. Design considerations:
 - Designing safety into the work to eliminate or reduce risk
 - Tie-off points designed in and fabricated at fabrication shop
- C. Job Hazard Analysis
- D. LSA Categories
- E. Detailed Access plan

- Manlifts, scaffolds, swing stages, etc.
 - Address fall protection needs and tie-off anchor points
 - Use drawings and general arrangements to communicate to the crew how they are to access the work. Take the guesswork out of it.
 - Access platforms incorporated into the design
- F. Any operation specific safety considerations or hazards (confined spaces, LOTO needs, etc.).

8.3.2. Reference Information for Execution Planning

- All policies, procedures, and reference information from this Manual.
- Relevant Kiewit Best Practices and Lessons Learned
- Other applicable federal, provincial, municipal, owner or manufacturers requirements not addressed in the Kiewit Safety Manual.

9. HAZARD ASSESSMENT, ELIMINATION AND CONTROL

9.1. INTRODUCTION

Hazard assessment is the basis for the prevention of incidents in the workplace. Kiewit will ensure that a Program is in place to identify, rank and control hazards within our operations.

9.2. DEFINITIONS

9.2.1. Hazard

An object, condition, or behavior with the potential to interrupt or interfere with the orderly progress of an activity.

9.2.2. Hazard assessment

A formal process used to identify hazards that may create losses to people, equipment, materials, property, or the environment.

9.2.3. Risk

Probability that during a period of activity a hazard will result in an incident with definable consequence.

9.2.4. Consequence

The result of an incident occurring.

9.2.5. Probability

The likelihood that the identified hazard will result in an incident within a three-year period.

9.2.6. Risk management

The reduction of consequence and the probability of risk(s) to an acceptable level.

9.3. RESPONSIBILITIES

9.3.1. Project Manager

The Project Manager will be responsible for the implementation of hazard assessment, elimination, and control procedures.

9.3.2. Superintendent

The Superintendent is responsible for ensuring that their operations meet the hazard assessment requirements.

9.3.3. Foreman

The Foreman is responsible for reviewing and updating all hazard assessments that pertain to their work as outlined below.

9.4. HAZARD IDENTIFICATION

The types of workplace hazard that personnel may be exposed are physical, chemical, ergonomic, or physiological. Examples of each of these are as follows:

9.4.1. Physical Hazards

- Excessive levels of noise, vibration, heat or cold.
- Electrical shock and/or burns. Striking or being struck by objects.
- Trips, slips, and falls.
- Work overhead.

9.4.2. Ergonomic Hazards

- Repetitive strain injuries.
- Improper body positioning or movement.

9.4.3. Chemical Hazards

- Excessive airborne concentrations of mists, gases, vapors, fumes, dusts, and fibers.
- Skin contact with corrosive or reactive chemicals.

9.4.4. Physiological Hazards

- Fatigue, boredom on long jobs and stress.
- Personality conflicts between employees and/or management.

9.5. HAZARD MITIGATION CONTROLS:

1. **Eliminate the hazard (1st choice)**
2. **Engineering Controls (2nd choice)**

Engineering control of hazards deals with the elimination or isolation of the hazard from the employee and physically limits the employee's exposure to the hazard. Engineering controls are the preferred method of controlling hazards.

3. **Administrative Controls (3rd choice)**

Administrative controls deal with directing people and can include policy, procedures, and training. Administrative controls reduce or limit the amount of exposure an employee has to a specific hazard.

4. **Personal Protective Equipment (last resort)**

PPE is the final line of defense against hazards in the workplace. It is implemented only after other reasonably practicable means of eliminating a hazard have been ruled out.

9.6. **HAZARD ANALYSIS**

A Job Hazard Analysis (JHA) is a written plan that identifies each step and potential hazard in an operation, states what will be done to eliminate or control these hazards and assigns responsibility for hazard reduction. LSA categories must be identified and addressed as part of the hazard analysis.

There are two types of JHA's:

9.6.1. **Major JHA**

Major JHA'S are required for all major operations. Major JHA's must be present in the field, relevant to the operation, and followed. They must be developed with the foremen and crew input and must be reviewed by all members of the crew: weekly (minimum), at the start of each rotational shift, and at the start of every new operation.

9.6.2. **Quad-Fold Hazard Analysis**

A quad fold hazard analysis is required for all operations. It will list each task-specific activity, identify hazards associated with daily tasks, and be updated throughout the day as changes occur. Supervisors must review their crew's quad folds daily.

9.6.3. **Expectations for Developing and Updating JHA's**

JHA's are to be developed or updated.

- At the beginning of a new shift or task.
- When the work changes (for example, if plans are modified, tools and equipment change, etc.).
- When work site conditions (such as weather, materials, or equipment) change.
- When a change in another person's activity on the work site could pose a risk to you or other workers.

If changes occur, the JHA must be modified and reviewed prior to continuing work. The JHA shall be available at the work area and accessible to employees.

9.6.4. **Developing a Major Hazard Analysis**

There are five basic steps in conducting a hazard analysis:

1. **Selecting the job to be analyzed**

Involve the foreman and crew in the development of the JHA.

2. **Breaking the job down into a sequence of steps**

- Review the scope of work being performed.
- Break tasks into individual steps.
- Determine what resources are involved and identify the hazards for each item:
 - Tools, such as drill, saw, torch.
 - Equipment, such as crane, loader, trucks.
 - Rigging, such as shackles, slings, wire rope clips.
 - Materials, such as solids, liquids, gases.
 - Manpower, such as labourers, operators, electricians.
 - Power sources, such as electricity, diesel fuel, compressed air, pressurized water, fire (torches).

3. **Identifying potential hazards**

- Determine what can go wrong.

Past Experiences:

- Statistics: frequency, severity, insurance rates, etc.
 - Incident Reports.
 - Talk to people that have done this or a similar type of work.
 - Current investigations.
 - Examine similar work at another location.
 - Check Company, government, owner regulations.
 - LSA Categories.
 - Brainstorm: use the knowledge and experience of others.
- Determine what environmental conditions may affect the operations:
 - Weather: wind, rain, snow, extreme temperatures, lightning, etc.
 - Unprotected heights and slippery conditions.
 - Traffic: cars, trains, planes, boats, people, etc.
 - Conflicts with other operators.
 - Accessibility and Housekeeping
 - Air contamination: dust, gas, lack of oxygen, etc.
 - Water: deep, strong current, high waves, flooding, etc.
 - Unstable soil or objects.
 - Crush points.

4. **Develop appropriate controls for each hazard**

Review the assessment with the employees involved in the work.

5. **Follow Up**

Evaluate the operation as it proceeds. Make sure the hazard analysis is followed. Look for unforeseen problems such as who fills in when someone is absent. Determine what changes are necessary to improve the operation.

9.6.5. Public and/or public property hazards and control measures to consider:

- Public Vehicular Traffic Exposure: This includes traffic exposure, signs, barricades, flashers, flagging, detours, traffic lights and load limits.
- Pedestrian/Children: Set up temporary walkways, overhead protection, watchmen, securing equipment, fencing and other methods which protect or deny the public access to the job site.
- Railroad: Notify the railroad of operations that might affect train and rail schedules, secure flagmen, signs, warning signals, special insurance, etc.
- Utilities: Locate and mark underground and overhead utilities: de-energize or relocate lines, provide shoring and blocking, emergency measures, notification of schedules and special insurance, as required.
- Blasting and Pile Driving: Potential damage to homes, businesses, vehicles, and pedestrians. Make sure all explosive planning is planned and approved as per corporate policy standards, Department of Transportation requirements, the Explosives Act and other applicable company and regulatory requirements.
- Potential dangers such as flooding, landslides, undermining, cutting off access, dust, water pollution, and crop damage. When working in and around traffic, develop a traffic control plan and maintain flashing yellow lights on equipment.

9.7. RISK MATRIX

The Project will develop a Project risk matrix.

The Project risk matrix will be developed by reviewing the scope of the work and customizing the Global Risk Assessment document to the Project specific tasks.

The risk matrix is a tool designed to rank the hazards in the workplace. It considers the consequence potential and probability of a given hazard and numerically defines this assessment. Each task has been evaluated based on the potential severity and probability of the consequences to people, equipment, environment, and company image.

Appropriate control methods have been assigned to each task to eliminate or reduce the risk. Tasks that are ranked as very high are critical tasks. The Project Specific Safety Plan will be developed to address the controls identified as being required based on the Project risk matrix.

Hazards ranked using the risk matrix fall into one of four categories and are dealt with accordingly:

9.7.1. Low Hazard (Green)

- Acceptable – Reduce as practical. No further action required.
- This is the preferred risk ranking for all operations.

9.7.2. Moderate (Yellow)

- Undesirable – Take risk reduction measures. Action required.
- This hazard ranking requires additional controls to reduce the risk and requires the Project Manager's and Project Safety Manager's approval.

9.7.3. High (Orange)

- Unacceptable – Must reduce risk. Action required.
- This hazard ranking cannot be undertaken without the approval of the Area Manager and District Safety Manager.

9.7.4. Very High (Red)

- Critical Task
- Unacceptable – Must reduce risk. Action required.
- Safe Job Procedures/Best Practices are required for all critical tasks.
- This hazard ranking cannot be undertaken without the approval of the Area Manager and District Safety Manager.

9.8. CHANGE MANAGEMENT

9.8.1. Overview

On-going organizational change is necessary to significantly improve safety. The challenge of safety is not only individual, but also organizational. Improving safety is a priority for Kiewit. Change management capabilities are not just desirable, they are necessary for achieving and sustaining safety improvements.

9.8.2. General Provisions

Project management must engage in solid diagnostic thinking before finalizing Project changes. They must avoid the reflexive response of viewing the problem as an isolated issue, challenge or event and become open to the need for more fundamental organizational change, if required.

9.8.3. Management of Change – at the site

This standard requires the worksite to ensure all workers are informed and trained on their responsibilities in the change management process. Successful change management requires:

- Proper identification and recognition of when to implement change.
- Effective communication.
- Full and active management support.
- Employee involvement.
- Organizational planning and analysis and widespread perceived need for the change.

9.8.4. Implementing Change

Tools for assessing and implementing change in the field:

- JHA (Major and Minor).
- Behavior Based Safety: Observation/Intervention.
- Risk Reductions.
- Craft Voice in Safety.
- Audits, Inspections, Assessments.

9.8.5. Review

Additional or alternate efforts might be required if a change was implemented but did not achieve the desired outcome.

Larger Project changes should be monitored to ensure the desired outcome is being achieved and to ensure any unintended consequences are identified and addressed.

10. MEETINGS AND COMMUNICATION

10.1. PURPOSE

To ensure timely communication of safety information, various safety-related meetings are required. These meetings will serve as the minimum standard, but Projects may hold additional meetings.

10.2. RESPONSIBILITIES

The Project Manager will be responsible for the implementation of this procedure.

10.3. PROCEDURE

Provide employees with information and hands-on training essential to a proactive Safety Program. Each Project will conduct safety meetings on a regular basis. The following safety meetings are mandatory.

10.3.1. Required safety meetings:

- Project Readiness Review Meeting.
- Subcontractor Pre-Mobilization Meeting.
- Pre-Task Instruction Meeting
- Craft Voice in Safety Meeting.
- Foreman Meeting.
- Mass Safety Meeting.

The required safety meetings conducted on the Project are an opportunity to share safety information with craft, staff, and subcontractor employees. These meetings must be conducted in a structured, well planned, and informative manner. The meetings should cover topics including safety policies, programs, issues, concerns, lessons learned, new equipment, leading indicators, upcoming and on-going operations, site specific information, weather, plan of the day, etc.

Supervisors responsible for these meetings should allow time for employee questions and comments and should create an atmosphere where personnel feel free to communicate.

Each meeting should have documentation of the subjects covered and attendance recorded. These documents must be kept in the safety files.

10.3.2. Project Readiness Review Meeting:

See section 8 Planning, for further information.

10.3.3. Subcontractor Pre-Mobilization Meeting:

See section 18 Subcontractor Management, for further information.

10.3.4. Pre-Task Instruction (PTI) Meeting & Toolbox Talks:

- **PTI Meeting and Stretch & Flex** - The PTI meeting and stretch & flex will be conducted at the beginning of every shift. The Superintendent and Foremen will discuss the crew's operation-specific safety focus for the day. This is the preferred method to communicate relevant project wide information. Topics may include incident review, policy changes, and announcements.

Weekly Toolbox Talks - The project will distribute a weekly (minimum) toolbox talk with a specific safety topic or focus for review during the PTI meeting. It is a very effective method to refresh workers' knowledge, review incidents or lessons learned, and exchange information with the experienced workers. Toolbox talks are also intended to facilitate health and safety discussions on the job site and promote safety culture. Weekly Toolbox talks must be documented and retained for records.

Work Plan/Hazard Analysis Review - Hazard Analysis will be reviewed (at minimum) weekly and at the start of each rotational shift, as well as at the start of every new operation by all members of the crew.

10.3.5. **Foreman Meetings:**

The weekly foremen training will include time to discuss any safety concerns and identify solutions. Attendance is mandatory for all project foremen, including subcontractors. Project management will use this time to elicit feedback from Foremen on ideas, concerns or needs. The expectation is for all departments to participate in the facilitating of the foremen's meetings, Examples include: Survey, Quality, Environment, and Project Controls.

10.3.6. **Craft Voice in Safety Meetings:**

The CVIS committee will meet with project management weekly to discuss safety challenges, craft safety concerns and proactive solutions. The Corporate CVIS Manual provides more details about the CVIS meeting requirements.

10.3.7. **Mass Safety Meetings:**

Mass safety meetings will be conducted to deliver site-wide communication, training, and recognition. Mass safety meetings will be conducted as required (typically monthly, not to exceed quarterly). CVIS and craft will be involved in developing meeting content and presenting the information. Safety recognition will occur at these meetings.

10.3.8. **Safety Stand Down Meetings:**

If a serious or high potential incident occurs, a safety stands down will be held. All work will be stopped to communicate incident details, lessons learned, and other important information. A safety stand-down meeting is not required for all incidents, but it is recommended for serious and high potential events.

10.4. MEETING FREQUENCY

Meetings	Frequency and Timing of Meetings (Minimum)
Project Readiness Review Meeting	Before Project mobilization
Subcontractor Pre-Mobilization Meetings	Before Subcontractors mobilize to work
Play of the Day/Pre-Task Instruction Meetings	Daily before start of each shift
Work Plan / Hazard Analysis Crew Review	Before the start of any operation and weekly
Foreman Meetings	Bi-Weekly
Craft Voice in Safety Meetings	Weekly
Mass Safety Meetings	To be determined during Project start-up
Job Safety Stand Down Meetings	As required

10.5. SIGNAGE AND POSTERS

Project signage and posters should be visibly posted in high traffic areas. At a minimum, each project must post:

- **Site Specific Plans:** Emergency Response and Crisis Management Plans, general and zero tolerance rules, 1-page safety expectations, Recognition Plan.
- **Policies:** Health & safety, drug & alcohol, return to work, workplace violence & harassment.
- **PPE Posters:** Tool PPE Visual Guide, Glove Visual Guide, and Eye Protection Visual Guide.

11. COMPETENCY AND TRAINING

11.1. PURPOSE

All Projects will conduct a comprehensive safety orientation for Kiewit staff, craft, and subcontractors. The safety orientation must be completed prior to allowing any employee to begin work at the Project site.

11.2. RESPONSIBILITIES

Each Project will conduct a safety orientation that, at minimum, will include:

- Kiewit policies
- Owner-specific requirements
- Project specific safety concerns (weather, site conditions, animals/ wildlife, etc.)

The Project Manager is ultimately responsible for ensuring a safety orientation occurs for each employee onsite.

11.3. PROJECT NEW HIRE SAFETY ORIENTATION

Projects must implement a site-specific orientation, training, and competency plan for all site personnel.

11.3.1. Process

All workers and visitors must comply with the project's safety, health, environment, and security requirements. Workers may be required to participate in additional Client specific orientation prior to the site-specific orientation. Each project will develop and implement a training session to orientate all employees on their roles as required by the safety program. This orientation will outline their duties and responsibilities for health and safety in daily work activities.

Visitors to the project will attend a visitor's orientation delivered by a safety department member and must be escorted by a designated employee.

The Project specific orientation should consist of:

- Basic Safety Orientation (specific jobsite hazards);
- LSA Categories;
- Tool and equipment orientations;
- Craft Engagement elements of our safety program;
- All elements of the Project specific safety program;
- A review of all required federal, provincial regulations, Project requirements and required training including supervisor and employee roles and responsibilities;
- Special Project Requirements, Policies and Procedures;
- Stop Work Responsibility;
- Procedure for Reporting and Correcting Unsafe Conditions or At-Risk Behavior;
- Project LSA Categories
- Incident Reporting Requirements;

- Personal Protective Equipment
- Emergency Action Plan.

Employees will be issued the required personal protective equipment (hardhat, safety glasses, gloves, safety vest, etc.) the employee will need to perform their duties.

A best practice is to hand out new-hire pocket books to new personnel on site that summarize project safety expectations.

Documentation, Test & Handouts

All personnel that go through the orientation must complete a test to verify their comprehension of project safety expectations. All orientation records will be documented and stored with project files. Handouts such as a safety pocketbook guides should be provided to support the retention of project safety expectations.

11.3.2. Small Tools Training

This portion of orientation is a continuation of training for all employees who will be using small tools in the field, or for supervising employees who will be using small tools. It should be conducted at the work location on the project. This portion of training will be presented by supervisors or mentors.

See the Designated Operator section for a list of tools and equipment.

11.3.3. Site Tour

A site tour should be conducted with every employee who is new to the site, including subcontractors. This can be conducted by the supervisor (foreman) after the employee is picked up from orientation, or by the craft trainers.

11.4. 30 DAY FOLLOW UP

All Kiewit workers who are new to the project site will have a follow-up meeting with supervision, management, or CVIS to review the following:

- The importance of the safety program, JHA process, CVIS, etc.
- Incident reporting requirements.
- Disciplinary action program and consequences of unsafe actions.
- Importance of zero hurts.
- Question and answer session covering any outstanding questions or concerns.

11.5. Responsibilities

11.5.1. Craft

Project Craft will be involved in delivering the orientation. This is a great time to introduce craft ownership and the CVIS program. Project craft will lead a portion of the orientation in the office or in the field.

11.5.2. Foreman

- Personally escort the new hire to the work assignment.
- Briefly describe the work assignment, emphasizing safety as being of primary importance in performing all work activities.

- Review the Job Hazard Analysis developed for the new hire's work assignment.
- Introduce the new hire to crew members.
- Assign an experienced employee to work with the new hire.
- Physically show the new hire the location of first aid equipment, fire suppression equipment, sanitary facilities, drinking water, telephones for emergency use, radios, tool storage, eating areas, and other relevant items.
- Monitor the new hire's work to ensure skills and physical capabilities are adequate for the work assignment.
- Ensure that the new hire does not work away from immediate supervision.
- Evaluate the worker and complete the Foremen portion of the initial checklist

11.5.3. **Superintendent**

- Ensure small-tools training has taken place.
- Ensure the employee is mentally alert with no physical limitations.
- Evaluate the new hire and complete the Superintendent's portion of the initial checklist.

An employee's indoctrination is not considered to be complete until both the Foreman and Superintendent submit their sections of the checklist.

11.6. TRAINING

Each Project will have a training plan that provides all employees with the resources required to perform their work in the safest way possible.

These programs will include but are not limited to:

- Safe Work Practices and Procedures (SWP's) and potential consequences of deviation from SWP's.
- Front Line Supervisor Training.
- Job Hazard Analysis (JHA)
- Fall Protection
- Confined Space
- Safety Watch
- Cranes & Rigging
- Personal Protection Equipment (PPE)
- Emergency response & Crisis Management
- CVIS & Joint Health and Safety Committee
- Other Site-Specific Topics

Training on record-keeping, accidents, claims, losses and development of accident and loss experience summaries will be provided as appropriate.

11.7. COMPETENT PERSON

Provincial legislation defines competent as it applies to a person as adequately qualified, suitably trained and with sufficient experience to safely perform work without supervision or with only a minimal degree of supervision.

11.7.1. Requirements

A competent person must demonstrate the ability to identify existing and predictable hazards in the surroundings including working conditions that are unsanitary, hazardous, or dangerous to employees. A designated competent person is given the authority to take prompt corrective measures to eliminate these hazards.

The Project will identify areas that require a competent person be designated and use the competent person form to document that designation.

11.8. SUPERVISOR TRAINING

All personnel supervising work will be adequately trained in safety requirements and due diligence practices.

Employees and trades workers will be properly and adequately trained to do their work. To ensure that workers understand and use their training, Kiewit will provide:

- An orientation to the workplace.
- On-the-job training.
- Verification of training and follow-up training.

Superintendents will be responsible for ensuring that all new or transferred employees and trades workers have proper initial and ongoing training. Managers and superintendents will also be provided with ongoing safety training. Records of employees' and trades workers' training will be maintained.

Examples of training and designated/competent person topics:

- Safety policies and procedures
- Safe work practices
- Hazard analysis
- Personal Protective Equipment
- Small tool training
- Construction safety training system (CSTS)
- Environmental training
- Confined space training
- Safety watch
- Rigging and lifting operations training (competent riggers program)
- Scaffold safety training
- Fall protection training
- Trailer Loading and Offloading
- Blasting operations – designing and executing primary blasts
- Spotting
- Ground Disturbance

12. DESIGNATED OPERATOR PROGRAM

12.1. GENERAL PROVISIONS

Projects must establish designated operator process and requirements for all heavy equipment and other high-risk tools and equipment.

The use Forklifts, Civil Equipment, Elevated Work Platforms (EWPs), DOT Vehicles / Trailers and other types of mobile equipment pose special hazards for Kiewit and its employees. To avoid the risk of serious incidents, only designated operators, trainees under direct supervision of designated operators, or qualified maintenance/test personnel can operate this equipment. In addition, each piece of equipment will be assembled, maintained, and operated consistent with guidelines issued by the manufacturer and/or contained in Kiewit Equipment SWP's.

To avoid the risk of serious incidents, only designated operators, trainees under direct supervision of designated operators, or qualified maintenance/test personnel can operate any equipment on a job site or yard location. In addition, each piece of equipment will be assembled, maintained, and operated consistent with guidelines issued by the manufacturer and/or Kiewit equipment requirements.

The Designated Operator Program applies to Heavy Equipment and Other Tools and Equipment as required.

During Project start-up, Projects must establish designated operator process and requirements for heavy equipment, tools, and other equipment (small tools training), and designated person specific tasks.

12.2. OH&S REQUIREMENTS

In keeping with OH&S requirements, all training records and test scores will be retained by the Equipment Operational Safety and Training Department in a central location and available at each job site.

12.3. RESPONSIBILITIES

12.3.1. Supervisors Responsibilities

A supervisor must not knowingly operate, or permit a worker to operate, mobile equipment which is, or could create an undue hazard to the health or safety of any person. A supervisor must also not knowingly operate, or permit a worker to operate, any mobile equipment if the worker is not designated to operate the equipment.

12.3.2. Operator's Responsibilities

The operator must operate the mobile equipment safely, maintain full control of the equipment, and operate the equipment in accordance with the manufacturer's instructions. The operator must report any conditions affecting the safe operation of the equipment, use seatbelts and other safety equipment, and keep the cab/floor free of materials, tools, or other objects that could interfere with the operation of the controls or create a tripping or other hazard to the operator or other occupants of the equipment.

12.4. CRITERIA FOR DESIGNATED OPERATOR SIGN-OFF PERSON

Responsibilities of Supervisors or employees authorized as sign-off person to designate operators:

- Have field experience in a supervisory capacity involving heavy equipment.
- Understand all site procedures for machines and equipment.
- Have received training on the correct completion of all forms related to the designated operator program.
- Must be designated at the beginning of the Project.
- Must understand their limitations and get assistance if they are not qualified for any reason to designate an operator on an unfamiliar piece of equipment.

12.5. COMPETENCY OF OPERATORS

Workers may only operate equipment if:

- They have been authorized in writing to operate the equipment as a designated operator;
- The equipment is appropriate for the task to be completed;
- They are familiar with the manufacturer's operating instructions for the equipment;
- They have received adequate instruction in the limitations, safe use, and pre-use inspection of the equipment;
- They have demonstrated to a qualified supervisor/instructor, competency in operating the equipment and possess the skills required by Kiewit, and the manufacturers' specifications;
- They are familiar with loading/unloading requirements if required along with any hazards specific to the operation of the equipment at the work site;
- They have a valid driver's license with an air brake endorsement when operating equipment with air brakes.

12.6. OPERATOR TRAINING AND DESIGNATION PROGRAM

Upon date of hire, the new employee's information, such as certificates of safety training, apprenticeship records, driver's license and operator certificates will be gathered.

Existing employees will also have the above information collected and recorded. All this information is added to the training matrix and training will be tracked.

Kiewit will provide certified training programs. After the initial training, abilities will be re-accessed and continually evaluated until an operator can be fully designated.

A Superintendent or training coordinator will complete a Record of Certification document which verifies that a worker has been authorized as a Designated Operator for a specific piece of equipment.

12.6.1. Designated Operator for Heavy Equipment:

- Forklifts.
- Overhead cranes.
- Competent rigging.
- Zoom booms.
- Cranes.
- Excavators.
- Dozers.
- Graders.
- Loaders.
- Elevated Work Platforms.

- Rollers.
- Scraper.
- Skid Steer.
- Utility Equipment.
- Haul Trucks.
- Articulating Trucks.
- Vacuum Trucks.
- Roberson.

12.6.2. Designated Operator for Other Tools and Equipment:

(Should be covered during small tools training section of orientation process)

- Chainsaws.
- Cut-Off Saws.
- Ladders.
- Fall Protection.
- Drills.
- Grinders.
- Air Tools.
- Oxy/Acetylene.
- Oxy lance.
- Cable Tugger;
- Chain Hoist;
- Powder Actuated Tools;
- Material Handling Specialties;
- Walk-Behind Equipment;
- Material Lifts;
- Porta Power;
- Roust-a-bout;
- Table Bender;
- Threading Machine;
- Pipe Stands;
- Other Specialized Tools and Equipment.

12.7. EQUIPMENT OPERATORS OTHER THAN CRANES

On our Projects it is important that our operators work safely by following the plan. This process starts with the hiring of competent and experienced craft, it continues with providing the most up to date training on their equipment and its application. By following these steps we will achieve our goal of zero hurts and be incident free.

12.7.1. Hiring

- All operators will be screened prior to hiring for credentials and experience to ensure that they are qualified for the position;
- Minimum requirement will be proof of experience in machine type or training certificate;

12.7.2. Authorization Process

All operators will be required to complete Project specific orientations. In addition, they will be designated on each piece of equipment that they will operate; this process will include the following:

1. Prerequisite Training: Classroom training

The Project Equipment Operational Safety and Training group will facilitate the operator designation starting with delivery of the classroom portion. Upon completion and a passing grade, the operator will move on to field training.

2. Designation: Field training and evaluation

Operator Designators will do field training and a practical evaluation. The designator is a discipline specific operator proficient on the equipment that the

new operator will be using. This person will be selected for having a passion for safety and ability to communicate. They will review the best practices for the equipment as used by the discipline and evaluate operator competence. After successfully completing the practical portion of the authorization process, the new operator, designator and trainer will review the results. They will also at that time review lessons learned and Project rules.

The successful operators will then be added to Training Matrix and given a wallet card that will indicate which equipment they are authorized to operate.

12.8. RECORDS

A master data base (Training Matrix) will be kept with the following information:

1. The operator's surname, given name and employee number.
2. The types of equipment or training.
3. The date on which the employee received training or was authorized by equipment
4. The date that follow up and recertification training is completed.

12.9. AUTHORIZED CRANE OPERATOR PROCESS

This section describes the required criteria for all crane operator authorizations.

12.9.1. Reference Documents

See: Kiewit Corporate Crane Procedures Manual Section 1-A.

12.9.2. Definitions and Acronyms

- AE: Authorized Examiner;
- AO: Authorized Operator;
- DCCM: District Crane Compliance Manager;
- HR: Human Resources.

12.9.3. Responsibilities

12.9.3.1. Authorized Examiner:

- Understands details of the Authorized Operator process;
- Uses good judgment to assess qualifications of operator candidates;
- Keeps updated on procedures and regulations;
- Is familiar with crane's operator's manuals and LMI systems;
- Is consistent in applying assessment of operators; ask the right questions.
- Must not feel pressured in to qualifying or disqualifying an operator;
- Must not be afraid to ask questions; use other resources;
- Needs to communicate to operators that they have the authority and obligation to stop an operation if they feel it is not safe;
- Is the company's representative to decide whether a person is qualified to operate our cranes.

12.9.3.2. Authorized Operators:

- Are responsible for knowing all limitations and company policies for the crane they are operating;
- Are responsible for performing daily visual inspections;

- Are responsible for creating valid lift plans for all lifts;
- Must understand that if all of the information required to make the lift safely is not present, the lift will not be made.

12.9.3.3. District Equipment Department

This District Equipment Department (DED) monitors the program and adjusts as required. It manages the district's compliance with company crane procedures and policies.

The DED:

- Is knowledgeable in the Corporate Crane Procedures Manual;
- Is knowledgeable in applicable industry standards;
- Assists in proper crane incident reporting;
- Is involved with crane operations within the district;
- Selects of Authorized Examiners;
- Helps the jobs with the Crane Operator hiring process.

12.9.3.4. District Crane Compliance Manager (DCCM)

This is the administration of authorized operator and authorized examiner process.

12.9.4. Designated Operator Procedure

12.9.4.1. Hiring Process

HR receives Signed Requisition form:

- Short list of applicants sent to the DCCM;
- DCCM selects candidate ,verifies candidate's experience and notifies hiring Superintendent and HR;
- HR initiates Physical and Drug Test process and notifies hiring Superintendent of pass or fail.

12.9.4.2. Completion of Orientation

The AE begins the Academic Knowledge Verification:

- Pre-test is completed;
- Corporate Crane Procedures Manual Section 1 Test is completed;
- Corporate Crane Procedures Manual Section 4 Test is completed;
- Operator Manual reviews are completed;
- E-learning modules are completed;
- Video modules are completed.

12.9.4.3. Practical Knowledge / Skills Verification

The AE begins the Practical Knowledge / Skills Verification.

- The operator completes a daily visual inspection of the crane being tested;
- The operator completes an accurate On the Spot Lift Plan;
- The operator performs a proper crane setup;
- The operator completes a test lift.

12.9.4.4. The AE Finalizes the Process

- The AE assesses the candidate's competency;
- The AE determines if the criteria has been met;
- The AE and candidate sign off on the modules as completed for the qualification file;
- The AE summarizes the candidate's performance and notes any additional development or deficiencies;
- AE issues a temporary Authorized Operator Card.

12.9.4.5. Operator's Files Stored and Operator Card Issued

- Digital copies of the operator's files are kept on the job; hard copies sent to the DCCM;
- The DCCM creates an Authorized Operator card, and sends it to the hiring Superintendent.

12.9.5. Assessments / Measurement Tools

Three audits will be performed:

1. District Audit.
2. Jobsite Audit.
3. Crane Compliance Audit.

12.9.6. Records Retention

- Projects are to store and keep training records for the duration of the project
- Records are to be retained digitally

13. EMERGENCY PREPAREDNESS:

13.1. PURPOSE

To ensure the safety and well-being of all employees, a Project emergency action plan must be established in the event of an emergency.

13.2. RESPONSIBILITIES

The Project Manager is responsible for the implementation of this procedure.

Due to the unique nature of emergency preparedness, each Project must develop an emergency action plan specific to the Project site using the procedure below as a minimum standard.

13.3. PROCEDURE

In preparation for an emergency that requires outside services, the following contacts shall be clearly posted on the Project site along with the Project address and phone number:

- Clinic and/or nursing station.
- Hospital.
- Ambulance.
- Fire Department.
- Police.
- Emergency/disaster.
- Control room and/or owner entity (if applicable).

13.4. CRISIS MANAGEMENT PLAN

A *CRISIS MANAGEMENT PLAN* sets out the actions an individual needs to take in the event of a crisis situation. It addresses who needs to be contacted, how to deal with the media, and how to ensure the safety of people on site. The *CRISIS MANAGEMENT PLANNING GUIDE* is attached to provide further assistance with a complete and accurate Crisis Management Plan.

13.5. EMERGENCY RESPONSE PLAN

An *EMERGENCY RESPONSE PLAN* is required for all projects and must reflect the site-specific risks and emergency scenarios (confined space, water, etc.)

- All site personnel must be trained and understand their responsibilities under the Emergency Response Plan

13.6. EMERGENCY DRILLS

Emergency drills must be conducted twice per year to test the effectiveness of the Emergency Response and Crisis Management Plans. These tests must be documented and saved for review.

13.7. EMERGENCY RESPONSE TEAM

Pre-mobilization to site – each Project will determine if an emergency response team is required.

13.8. **Emergency Evacuation Plan**

Kiewit will develop a written rescue plan for jobs and/or work that pose a greater than normal safety risk (e.g., work at heights, permit confined space work, excavation and trenching and steel erection).

The emergency evacuation plan will identify emergency procedures, emergency meeting points and assembly/muster areas.

Emergency notification and procedures:

- DO safely and calmly exit to the pre-designated assembly area location provided by your supervisor. If confused or forget where to go, find a supervisor or employee of Kiewit and go with them.
- DO make sure that we know that you are safe. When you get to the assembly area, find your supervisor or designee, and provide them your name.
- DO follow the instructions of site management.
- DO NOT leave your designated meeting/muster point. It is vital that we know where you are and how to contact you. You will be released as quickly as possible.
- DO NOT talk to the media. Direct any media questions to your supervisor or the leader of the assembly area.
- DO NOT speculate about the event.

In the event of a fire, medical emergency, confined space emergency or chemical spill, Kiewit will contact the owner as required.

Kiewit will set up an effective evacuation alarm/light strobe system where applicable, designated meeting/muster locations and a means of quickly and accurately accounting for all employees (including subcontractors).

Kiewit will relay the headcount to the owner in a timely manner, if required.

Projects shall have a process to account for all personnel in the event of an emergency evacuation and Kiewit shall ensure that all personnel are familiar with the emergency procedures.

An alternate designated meeting/muster location is also to be chosen (in case of ammonia spills, fires close to that area, etc.).

Make sure guests and visitors are trained on their responsibilities within the procedure.

Kiewit will coordinate a plan with the owner to establish where media is to gather in the case of a catastrophic event as per the [Crisis Management Plan](#).

13.8.1. Individual/Management Responsibilities:**13.8.1.1. Craft**

- Stop work and assess the situation and area around you.
- Based on where you are located on site, determine which emergency evacuation route to take.
- Proceed to emergency evacuation meeting place using one of the provided routes.
- Once at the meeting place, go to the designated area for your discipline.
- Check in with the Foreman, who will be performing a roll call.
- In the event that the Foreman for your crew is NOT present:
 - Designate someone from your crew to perform a roll call including a completed attendance form.
 - Take completed attendance form to Superintendent.
 - After roll call has been performed and submitted, remain in your designated area, and await further instructions from Superintendent/staff personnel.

13.8.1.2. Foreman

- Stop work and assess the situation and area around you.
- Based on where you are located on site, determine which emergency evacuation route to take.
- Activate emergency response procedures.
- Proceed to emergency evacuation meeting place using one of the provided routes.
- Once at the meeting place, go to the designated area for your discipline.
- Perform roll call using the emergency evacuation attendance form. If you do not have a roll call attendance form, get one from a designated area and perform roll call.
- Take completed attendance form to Superintendent.
- In the event the Superintendent is NOT present, take completed attendance form to General Superintendent.
- After roll call has been performed and submitted, remain in your designated area, and await further instructions from Superintendent/staff personnel.

13.8.1.3. Superintendent

- Stop work and assess the situation and area around you.
- Based on where you are located on site, determine which emergency evacuation route to take.
- Activate emergency response procedures.
- Proceed to emergency evacuation meeting place using one of the provided routes.
- Once at the meeting place, go to the designated area for your discipline.
- Perform a roll call using the emergency evacuation attendance form. If you do not have roll call attendance form, get one from a designated area and perform roll call.
- Take completed attendance form to the General Superintendent and/or Construction Manager.

- After roll call has been submitted, remain in your designated area and await further instructions from Construction Manager or management.

13.8.1.4. Project Management

- Stop work and assess the situation and area around you.
- Based on where you are located on site, determine which emergency evacuation route to take.
- Proceed to emergency evacuation meeting place using one of the provided routes.
- Once at the meeting place, go to the designated area for staff.
- Evaluate the emergency.
- Activate emergency response procedures.
- Collect attendance forms from all discipline General Superintendents.
- Obtain daily personnel record from badge scan system.
- Fill out final attendance record.
- Determine who is missing and/or unaccounted for and relay information to proper authorities.
- Determine who is hurt and needs medical attention and relay information to proper authorities.
- Once situation is under control, give the “all clear” to site personnel.

13.9. FIRST AID AND MEDICAL RESPONSE

Kiewit will ensure the availability of medical personnel, supplies, equipment, transportation and treatment requirements for First Aid and Medical emergencies.

All workers will be trained on their first aid and medical notification, response, and reporting responsibilities during the safety orientation.

Project medical personnel, equipment and support will be planned in accordance with Kiewit, Owner and provincial OHS legislation requirements.

The medical support will be appropriate for the Project-specific work scope. Additional medical personnel, equipment and support may be required based on size and location and provincial requirements of the Project.

13.10. EMERGENCY RESPONSE DRILLS

Emergency drills must be conducted twice per year, or as directed by Project Manager, to test the effectiveness of the Emergency Response and [Crisis Management Plans](#). These drills should account for emergency assembly/muster, rescue, and other relevant ERP procedures.

All drills will be documented and maintained with a section to identify mitigation plans for improvements.

14. PERSONAL PROTECTIVE EQUIPMENT (PPE)

14.1. PURPOSE

Kiewit is committed to providing all staff and craft with the appropriate PPE required for the execution of safe operations. The use of Personal Protective Equipment (PPE) is the final line of defense between employees and hazards.

14.2. RESPONSIBILITIES

The Project Manager will be responsible for implementation of the PPE procedure.

At minimum, all Projects will follow the standardized PPE matrix and all PPE will be used as per manual's recommendations for fittings

14.3. PROCEDURE

14.3.1. Selection of Personal Protective Equipment

Personal Protective Equipment (PPE) should be selected based on the following information:

- Hazard Assessment
- Safety Data Sheets
- Operation Specific Requirements

14.4. Eye and face protection

14.4.1.1. Safety glasses

Fit: Ensure your eye protection fits properly (i.e., close to the face).

Care: Clean safety glasses daily or more often if needed. Store safety glasses in a safe, clean, dry place when not in use. Replace any pitted, scratched, bent, and poorly fitting PPE. (Damages to face/eye protection interferes with vision and will not provide the protection it is designed to deliver.)

Use: Industrial grade safety glasses with side shields will always be worn while on the jobsite. Safety glasses must meet ANSI and CSA standards. Clear safety glasses are required when performing any indoor, night shift or work other dimly light atmospheres. Lenses that enhance the light are acceptable.

14.4.1.2. Goggles

Fit: Ensure your goggles fit properly (i.e., close to the face).

Care: Clean goggles daily or more often if needed. Store goggles in a safe, clean, dry place when not in use. Replace any pitted, scratched, bent, and poorly fitting PPE. (Damages to face/eye protection interferes with vision and will not provide the protection it is designed to deliver).

Use: Goggles are required for power chipping, bush hammering, grinding, over-head work or any other work that has the potential to create falling and/or flying debris. Goggles are also required when handling any materials where the Safety Data Sheet (SDS) requires their use and when windy conditions could blow debris into eyes.

Use of contact lenses while wearing coverall goggles is prohibited when working with corrosive liquids or vapors.

Burning goggles will be used during burning operations.

14.4.1.3. **Face shield**

Fit: Ensure your face shield fits properly (i.e., secured to hardhat and covers eyes and most of the face).

Care: Clean face shield daily or more often if needed. Store face shield in a safe, clean, dry place when not in use. Replace any pitted, scratched, bent, and poorly fitting PPE. (Damages to face/eye protection interferes with vision and will not provide the protection it is designed to deliver).

Use: Full face shields shall be used in conjunction with required eye protection for added face protection.

A full face shield in conjunction with required eye protection are required whenever grinding, cutting (such as chop saw or chain saw), vibrating concrete or operating the concrete hose during placement, exothermic/CAD welding, over-head work and/or other work with the potential to create falling and/or flying debris, leaf blower, nail gun, and when powder actuated tools are being operated. Full face shield is also required when handling any materials where the SDS requires it.

Employees involved in operations dealing with liquid chemicals or other hazardous materials will wear face shields.

Tinted face shields may be used during burning operations in lieu of burning goggles (shade five).

14.4.1.4. **Welding hood**

Fit: Ensure your welding hood fits properly. You don't want it to be too loose or too tight as this could impact your vision as well as safety. If too loose, there is a risk of shifting, possibly exposing parts of your neck or losing clear vision through the lens. If too tight, it may be uncomfortable when working for long periods of time.

Care: Clean your welding hood daily or more often if needed. Store it in a safe, clean, dry place when not in use. Replace any pitted, scratched, bent, and poorly fitting PPE. (Damages to face/eye protection interferes with vision and will not provide the protection it is designed to deliver).

Use: Safety glasses must always be worn under a welding hood. A welding hood must be worn during all welding operations with a shade minimum of ten.

A welding hood and safety glasses may be used in lieu of a face shield and goggles during grinding operations.

14.4.1.5. **Eye first-aid**

All eye discomfort must be reported immediately. Do not try to remove foreign debris yourself. Keep hands away from eyes. Eye wash stations shall be set up in close proximity to the work area.

14.4.2. **Head protection**

Fit: Ensure your head protection fits properly (i.e., snug to the head).

Care: For general hygiene reasons, occasionally clean the inside of your hardhat or more often if needed. Store head protection in a safe, clean, dry place when not in use. Replace any pitted, cracked, bent, and poorly fitting PPE. (Damages to head protection could pose a significant risk to a worker).

Use: All employees, vendors, delivery personnel and other visitors to a Project shall wear hard hats that meet current CSA and/or ANSI standards 100 percent of the time while in the work area and display the employee's name for identification.

14.4.3. **Hearing protection**

Fit: Ensure your hearing protection fits properly (i.e., secured when in/on ear and prevents excessive noise as intended).

Care: Over ear hearing protection should be cleaned after each use for hygiene purposes. General in-ear protection that is company provided is disposable so replace with new after each use.

Use: Hearing protection will be provided to guard against harmful effects of excessive noise on the jobsite.

Hearing protection shall be required during the use of any tool or piece of equipment where required by the manufacturer.

Hearing protection shall be required for hot work operations such as welding, grinding, burning and/or cutting.

14.4.4. **Foot protection**

Fit: Ensure your foot protection fits properly (i.e., appropriate for your foot size).

Care: Boots should be cleaned regularly to ensure proper hygiene and also to ensure the appropriate level of traction. Mud build up can impact traction and pose a hazard. Replace any boots with open holes, damaged protective toe coverings, or other noticeable wear/damage.

Use: CSA approved (green triangle) work boots must be in good condition and provide support above the ankle on all Projects.

All employees involved in concrete operations and that are required to walk in wet concrete shall wear rubber boots with tape sealing the top of the boot.

Additional foot protection (metatarsal protection) shall be worn by all employees involved in operations such as jack hammering, soil compaction using tampers and walk behind mechanical rollers.

14.4.5. **Knee protection**

Fit: Ensure knee protection fits properly (i.e., appropriate size for your leg to maintain flexibility but stays in the desired position as required).

Care: Knee protection should be cleaned occasionally to ensure proper hygiene. Replace any knee protection with open holes, damaged protective coverings, or other noticeable wear/damage.

Use: Knee protection shall be provided and used by all craft that will be continuously working on their knees.

14.4.6. **Hand protection**

Fit: Ensure hand protection fits properly (i.e., appropriate size for your hands to maintain flexibility but stays in the desired position as required).

Care: Hand protection should be cleaned occasionally to ensure proper hygiene. Replace any hand protection with open holes, damaged protective coverings, or other noticeable wear/damage.

Use: Gloves will be worn by all employees involved in work activity. During the rare occasion where the use of gloves creates more of a hazard to the worker or they are unable to complete the task and no other alternative gloves are available, the non-use of gloves must be addressed on the pre-task analysis and approved by the Project Manager.

Other types of gloves will be worn as required by Safety Data Sheets (SDS).

See Hand Protection section for further information.

14.4.7. **Torso protection**

Fit: All clothing, protective and general should be the right fit for the individual to prevent the additional risk posed by baggy and loose clothing.

Care: All clothing, protective and general should be regularly cleaned for hygiene reasons.

Use: High visibility clothing will be worn. Employees will wear jeans or durable work pants and shirts with a minimum of 6" sleeves unless otherwise specified within job task and/or owner requirements. Clothing will be free of excessive holes, tears, rips, etc.

Employees using chainsaws and cutoff saws will wear "Kevlar" chaps. For additional information on PPE requirements for the usage of cutoff saws please see the section on cut off saws.

14.4.8. **Respiratory Protection**

Fit: Respiratory protection must be the correct fit for the face of the worker. Each worker receiving respiratory protection must have a current fit test for confirmation.

Care: Respiratory protection should be cleaned after each use for hygiene reasons. Store respiratory protection in a safe, clean, dry place when not in use. Replace any pitted, scratched, bent, and poorly fitting PPE. (Damages to respiratory protection can interfere with the protection it is designed to deliver).

Use: Whenever an oxygen-deficient atmosphere or harmful dusts, fumes, mists, vapors or gases exist or are produced in the course of employment in quantities giving rise to harmful exposure of employees, these hazards are to be controlled by removing the employees from the exposure to the hazard, by limiting employees' daily exposure to the hazard and/or by application of engineering controls. Whenever these controls are not practical or fail to achieve full compliance, respiratory protective equipment shall be provided.

See Respiratory Protection section for further information.

14.4.9. **Fire-Retardant Clothing (FRC)**






Fit: FRC should be the right fit for the individual to prevent the additional risk posed by baggy and loose clothing.

Care: FRC should be regularly cleaned for hygiene reasons. Professional cleaning is required to maintain the Fire-Retardant rating of the clothing.


Use: If a worker may be exposed to a flash fire or electrical equipment flashover, Kiewit will ensure that the worker wears flame-resistant outerwear and use other protective equipment appropriate to the hazard.

Workers must ensure that the clothing worn beneath flame resistant outerwear and against the skin is made of flame-resistant fabrics or natural fibers that will not melt when exposed to heat.

14.5. EYE PROTECTION VISUAL GUIDE

Level 1	<p>Standard Eye Protection</p> <ul style="list-style-type: none"> • Must be CSA • Clear shade for low light conditions. Dark for sunny conditions • Prescription eye protection must be CSA with side shields or over the top glasses • Must pass the fit test <p>Activities:</p> <ul style="list-style-type: none"> • General Work • Cutting or drilling below your chest • Using a portaband to cut steel below your chest • Finishing concrete • Using skill Saw 	
Level 2	<p>Sealed Eye Protection:</p> <ul style="list-style-type: none"> • Tight fitting Goggles •Hybrid glasses with head strap <p>Activities:</p> <ul style="list-style-type: none"> • Cutting or drilling in winds above 20 KM Per Hour 	
Level 3	<p>Double Eye Protection</p> <ul style="list-style-type: none"> • Includes chain saw use <p>Activities:</p> <ul style="list-style-type: none"> • Using a chainsaw • Cutting or drilling above your chest • Grinding metal • Using a gas powered saw cutting metal • Pouring concrete • Vibrating concrete 	
Level 4	<p>Double Eye Protection:</p> <ul style="list-style-type: none"> • Face shield and sealed eye protection • Welding hood and standard eye protection • Burning operations must have #5 shade • Bionics and standard eye protection <p>Activities:</p> <ul style="list-style-type: none"> • Using a cutting torch • Welding • Liquid under High Pressure 	
Level 5	<p>Full Face Respirator:</p> <p>Activities:</p> <ul style="list-style-type: none"> • Grinding concrete • Using a gas powered saw cutting concrete • Chipping concrete • Liquid Under High Pressure 	


14.6. PPE TOOL PPE VISUAL GUIDE




PERSONAL PROTECTIVE EQUIPMENT

Visual Reference Guide

MANDATORY ON-SITE




HARD HAT
(Green new hire sticker for 30 days)




CLASS 2 SAFETY VEST
(Class 3 may be required for work in traffic)























SAFETY GLASSES
(Close fitting clear or yellow lens. Low light / dark lens for outdoor only)



WORK GLOVES
(Must be Cut Level 4 or Leather)



CONSTRUCTION BOOTS
(Steel toe boots covering ankle)

Activity	PPE Requirements
HOT WORK (CUTTING)	       <p><small>IF ABOVE PPE</small></p>
HOT WORK (WELDING)	     <p><small>IF ABOVE PPE</small></p>
COMPACTOR	   <p><small>IF ABOVE PPE</small></p>
PNEUMATIC	    <p><small>SHOULDER HEIGHT OR HIGHER</small></p>
GRINDERS	   <div style="border: 1px solid black; padding: 2px; font-size: 0.8em; margin: 5px;"> <p>NOTE: Only Grinders with Kick Back / Wheel Stop Approved. See District Grinder Policy.</p> </div>  <p><small>IF ABOVE PPE</small></p>
POWDER ACTUATED	    <div style="border: 1px solid black; padding: 2px; font-size: 0.8em; margin: 5px;"> <p>NOTE: Certification and Special Training Required Prior to use.</p> </div>
UTILITY KNIVES	   <div style="border: 1px solid black; padding: 2px; font-size: 0.8em; margin: 5px;"> <p>NOTE: Utility Knives are not to be used for stripping electrical cable. Use cable stripper instead.</p> </div> 
DRILLS	  <p><small>DRILLING AT SHOULDER LEVEL OR HIGHER</small></p>
SAWS	<div style="display: flex;"> <div style="flex: 1;">     <p><small>IF ABOVE PPE</small></p> </div> <div style="flex: 1; font-size: 0.8em; padding-left: 5px;"> <p>NOTE: STHLS TS 440 out-of machine is the only demo saw approved. It has a kick back brake.</p> </div> </div>
CONCRETE OPERATIONS	 <p><small>NEUTRALIZE</small></p> <div style="font-size: 0.8em; margin-top: 5px;"> <p><small>REQUIRES MEDICAL EVALUATION, FIT TEST AND TRAINING PRIOR TO USE.</small></p> <p><small>FACE SHIELDS MUST BE HIGH IMPACT 201+ RATED. PICTURE IS A MINER BOMBING FACE SHIELD. MUST PURCHASE WITH HARD HAT ADAPTER.</small></p> <p><small>PEL: PERMISSIBLE EXPOSURE LIMIT</small></p> </div>

14.7. HAND PROTECTION VISUAL GUIDE

Kiewit WCD Glove Guide



GENERAL USE LEATHER GLOVE:

- General labor tasks
- Cable pulls
- Building/dismantling formwork and scaffolding
- Surveying
- Warehouse tasks
- Equipment Operation
- Steel pre-fab, bolt-up and tensioning
- Dry concrete finishing
- Hand tool use

CRUSH POINT/IMPACT/CUT 5 GLOVE:

- Knife use
- Power tool use (grinders, drills, saws, etc.)
- Cladding installation, cutting, handling, etc.
- Shake out tasks
- Rigging



4 5 3 3

- └─ Puncture Resistance (0-4)
- └─ Tear Resistance (0-4)
- └─ Blade Cut Resistance (0-5)
- └─ Abrasion Resistance (0-4)



WELDING LEATHER GLOVE:

- Welding
- Rod Connex, handling rods
- Torching
- Plasma Cutting

WET WEATHER LIGHT DUTY GLOVE:

- General labor tasks
- Hand/power tool use
- Steel pre-fab, bolt up and tensioning
- Building/dismantling formwork and scaffolding
- Rigging





WINTER WEATHER LINED LIGHT DUTY GLOVE:

- General labor tasks
- Hand/power tool use
- Steel pre-fab, bolt up and tensioning
- Building/dismantling formwork and scaffolding
- Rigging

CONCRETE GLOVE:

- Concrete pouring
- Wet concrete finishing tasks
- Concrete testing (quality)





ANTI-VIBRATION GLOVE:

- Use of vibrating tools and machinery such as:
 - Hammer drill
 - Compactor
 - Chipper
 - Bush hammer

See Safety Department for any specialty glove requirements outside of the standard gloves listed above.

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15. INCIDENT INVESTIGATION & NOTIFICATION

15.1. PURPOSE

This incident investigation procedure outlines the necessary steps to understand and learn from safety incidents. Additionally, the information gathered is essential to Kiewit's ability to comply with legislative requirements pertaining to occupational illness, injury, and reporting requirements.

15.2. RESPONSIBILITIES

When an incident occurs, the responsible Superintendent must initiate an investigation and notify appropriate individuals as identified within this section. However, the Project Manager is ultimately responsible for the appropriate notifications, investigation, and submittal of necessary documents within the required timeframes.

The Project Manager will notify the Project Sponsor after any incident resulting in injury, near-miss, or equipment damage.

The Project Safety Manager will notify the District Safety Manager as soon as possible after the situation has stabilized.

An email distribution list for incident notifications will be established for each Project.

The Project Equipment Manager will notify the District Equipment Manager of any equipment damage or equipment incidents.

The Superintendent in direct charge of the operation shall gather all required information at the direction of the Project Safety Manager or his designee. The Superintendent is responsible for ensuring the completion of the initial investigation. The final investigation shall be reviewed by the Project Safety Manager and the Project Manager prior to submitting to senior district management.

15.3. REPORTING

All incidents are to be started in InEight within 24 hours of the incident and completed within 48 hours unless permission is given by the District Safety Manager.

All government regulatory visits and violations must be reported within 24 hours of the visit. These visits are to be reported and documented in the InEight system. All applicable inspection forms must be attached in the InEight system along with any supporting documentation and corrective actions.

15.4. PROCEDURE

All incidents must be reported immediately to the Foreman, Superintendent, and safety department, regardless of how minor. Failure to comply with this process can result in disciplinary action up to and including termination.

A process for notification to offsite personnel has been developed and can be found in Section 15.9 Initial Reporting Process/Initial Notification.

All injuries and incidents must be investigated and entered into InEight, unless otherwise noted below.

15.4.1. Reporting timelines

- Within two to two hours, an initial email notification must go out to the District Manager, District Safety Manager, District Safety Administrator, Project Manager and any other relevant personnel.
- Within 24 hours, the first page in InEight must be started.
- Within 48 hours, the InEight entry must be complete and sent to appropriate district personnel with all supporting paperwork attached.

15.4.2. Non-work-related injuries or illnesses

All non-work-related illnesses and injuries must be documented on the Projects and entered into InEight.

15.4.3. Incident Required Documentation:

	Non-Occ/No Treatment	Near Miss	First Aid	Recordable	Property Damage	Auto/Equipment Damage	Crane Incident
InEight Entry Required	X	X	X	X	X	X	X
Initial Incident Notification	X	X	X	X	X	X	X
Reconstruction Photos of Incident		X	X	X	X	X	X
Photographs of Injury			X	X			
Injured Employee's Timecard	X		X	X			
Photocopy of POD/PTI		X	X	X	X	X	X
Photocopy of JHA		X	X	X	X	X	X
Superintendent's Investigation Report	X	X	X	X	X	X	X
Safety Manager Memo	X	X	X	X			
OSHA Recordkeeping Logic Form			X	X			
Crane Incident Alert							X
Incident Alert		X	X	X	X	X	X

15.4.4. Actual/Potential Severity Levels:

All injuries, incidents and near miss incidents are measured based on actual severity and the potential severity.

The severity levels range from 0-5, from zero hurt/potential – multiple fatalities/potential. For detailed information on severity levels review the LSA Event by Severity form.

	Actual / Potential Severity Levels	Actual / Potential Severity Level <i>(How bad could it have been?)</i>
(Red) Diamond Events	Level 5 "Multiple Fatalities" "Potentially Multiple Fatalities"	Multiple Fatalities
	Level 4 "Fatality" "Potential Fatality"	Fatality
Diamond Events	Level 3 "Severe" "Severe Potential"	<p>Injuries or illnesses causing severe physical body damage with probable long-term and/or significant life-altering complications such as:</p> <ul style="list-style-type: none"> Life-altering fractures, lacerations, or penetrations Amputations (All) Significant third degree burns Disfigurement Loss / impairment of body organ function Severe to complete loss of hearing Severe visual impairment to total blindness Confirmed debilitating ergonomic or Serious Illness Events (SIE) cases
	Level 2 "Moderate" "Moderate Potential"	<p>Injuries or illnesses causing significant physical body damage; reasonably expected to heal without significant life-altering complications in a moderate time period (week(s) to months) such as:</p> <ul style="list-style-type: none"> Fractures, Loss of tooth/teeth Lacerations / penetrations Significant second degree burns (blistering) Minor third degree burns Significant Sprains & Strains Major infections post-injury or from illness Dislocations Punctured ear drum or moderate to moderately severe hearing loss Moderate visual impairment Confirmed ergonomic and SIE cases requiring significant treatment, surgery or physical therapy
	Level 1 "Minor" "Minor Potential"	<p>Injuries or illnesses causing minor physical body damage; reasonably expected to heal without any life-altering complications in a short time period (hours to days) such as:</p> <ul style="list-style-type: none"> Minor lacerations / penetrations (that bleed freely) Minor chipping or cracking of a tooth/teeth Minor second degree burns (blistering) Skin rashes / burns from exposure to chemicals / non-aqueous fluids Sprains & Strains Minor Infections post-injury or from illness Bruises Partial and self-resolving dislocations Confirmed slight to mild hearing loss Mild eye (corneal) abrasions Confirmed ergonomic or SIE cases requiring minor treatment
	Level 0 "No Hurt" "No Potential"	No Hurt occurred (no physical body damage) but there are actionable learnings to take to possibly prevent future Hurt.

15.4.5. **First Recordable Protocol**

When a project has a first recordable, the Corporate First Recordable Protocol must be followed. This protocol includes a Project Safety Assessment (PSA) that must take place within 10 days of the first recordable. Should it be necessary to trigger the protocol, one of the district's operational leaders will personally lead. *Assessment tool: Corporate Project Safety Assessment (PSA) template*

15.4.6. **Incidents with Potential Severity Level 4-5**

When a project has an incident with the potential severity of 4-5, the Corporate Potential Severity Level 4-5 Incident Protocol must be followed. This protocol includes a deep dive root cause analysis and specific communication requirements.

15.5. **INCIDENT CLASSIFICATION DEFINITIONS**

15.5.1. **INJURIES**

15.5.1.1. **Lost time**

A work related injury or occupational illness (including fatality), resulting in at least one lost workday beyond the day of the incident, based upon opinion of a physician or licensed health care practitioner as to the capability of the injured person to return to work.

15.5.1.2. **Restricted duty**

An occupational injury or illness resulting in the injured person being unable to perform one or more of the routine functions of their job or from working a full calendar day after the day of injury, regardless if the injured person was scheduled to work the next calendar day.

15.5.1.3. **Recordable**

New work-related injury or illness case that meets Kiewit's recording criteria and results in fatality, days away from work, restricted work duty or medical treatment.

15.5.1.4. **First aid**

A work-related injury where the employee receives any form of treatment (See Incident definition charts for examples) but does not increase to the level of a Recordable status.

15.5.2. **INCIDENTS**

An unplanned event that resulted in or had the potential to result in an injury or damage.

15.5.2.1. **Equipment damage**

Incident involving Kiewit equipment where damage to the equipment has occurred from striking another object, vehicle, or other piece of equipment.

15.5.2.2. Utility strike

Incident involving equipment or hand tool with contact to live or “dead” public utility line.

15.5.2.3. Property damage

Incident involving damage to any Kiewit or third-party property where there was no damage to the equipment or tools involved.

15.5.2.4. Motor vehicle (third party)

Any incident involving a Kiewit vehicle and a member of the public’s vehicle.

15.5.2.5. Crane Incidents

Any incident involving a crane (with the items listed below). InEight entry required if any of the conditions listed below are met.

- Any incident that involves a non-company authorized crane operator.
- Any overload of a crane.
- Any unplanned release of a load.
- Any rigging failure or an event that causes rigging damage beyond normal wear.
- Any damage to a crane that can potentially affect the operating capacity of the crane.
- Utility contact or damage with a crane or rigging.
- Damage caused by a crane striking another piece of equipment or object (either during operation or while moving the crane).
- Crane operation that results in a recordable injury to personnel. This includes Kiewit or third-party personnel.
- Any incident involving a man basket.

15.5.3. NEAR MISS EVENTS

An event that may have resulted in property damage or injury to personnel but did not.

15.5.4. POLICY VIOLATIONS & UNSAFE ACTS/CONDITIONS

Policy violations and unsafe acts or conditions are not, by definition, incidents or near miss events. Zero-tolerance policy violations and/or unsafe acts/conditions fall into this category. These events still need to be reported and addressed/mitigated. **They must be entered into InEight as LSA Observations.**

- Comparing Policy Violations/Unsafe Acts/Unsafe Conditions & Near Miss Events:
 - **Near Miss:** An **event** that may have resulted in property damage, injury, or illness but did not. Example: Worker running on site, trips over a pothole but no injury or damage occurs.
 - **Unsafe Conditions:** A workplace hazard with the potential to cause damage, injury, or illness. Example: the pothole in the example above.

- **Unsafe Act:** A worker performing an action with the potential to cause damage, injury, or illness. Example: the worker running in the example above.
- **Policy Violation:** The violation of a specific policy or rule. Example: A worker digging a trench with an excavator without a permit.

15.5.5. **PARTNER (SUBCONTRACTOR) INJURIES AND INCIDENTS**

All Subcontractor Incidents, Injuries, Near Miss Events, and Zero-tolerance policy violations and/or unsafe acts/conditions must be reported within two hours.

15.5.6. **NON-OCCUPATIONAL AND/OR NO-TREATMENT INJURIES**

All injuries are to be reported within two hours.

15.5.7. AUTOMOBILE INCIDENTS

If one of Kiewit's vehicles is in an incident off-site, an "On the Spot" incident report must be filled out. The Project manager must be notified.

The following information must be provided with an "On-the-Spot" report:

- Name, address and phone numbers of all people involved in the incident. This includes any passengers in the vehicles involved;
- Try to take photos of the incident scene. Be sure to photograph all damage to all vehicles;
- Get the registration and insurance information from all vehicles involved;
- Call the police. We stand a better chance of recovering damages if the police are notified;
- Get a copy of the police report as soon as possible;
- Try to find out where any disabled vehicles were taken;
- If the incident involves injuries, find out where the injured people were taken;
- Try to get witness statements if possible;
- Complete the on the spot incident form.

All materials are to be submitted to the Project manager, Project safety manager and district equipment manager no later than 24 hours from the time of the incident. These incidents are required to be inputted into InEight by the safety department.

15.5.7.1. AUTOMOBILE INCIDENTS – RENTAL VEHICLES

If one of Kiewit's vehicles is in an incident off-site, an "On the Spot" incident report must be filled out. The Project manager must be notified.

1. File a police report. Take pictures if possible.
2. Vehicle insurance card can be found in the glove compartment or via the Avis App. View the insurance card via the Avis App by clicking on the card icon on the rental dashboard. The card displayed is based on the MVA's license plate state.
3. Look inside the cover of the car rental agreement packet. Call phone number given to initiate claim. If you are traveling on company business, please indicate this to the representative and on the claim form. The Claim center will send appropriate forms for claim which should be returned immediately. They will assist in auto replacement if necessary.
4. Always complete an [Avis Accident/Incident Report](#) when the car has been involved in an accident or damaged. Contact Avis Roadside Assist at 800-354-2847.
5. Accident FAQ's <http://www.avis.com/car-rental/content/display.ac?navId=T5M18S00>
6. Make your immediate manager aware of the incident as soon as possible. Complete an [On The Spot Accident Form](#)
7. Make sure the Incident is reported into InEight within 24hrs. Contact your Safety Manager/Representative if you have any questions regarding reporting.
8. If Kiewit employee is at fault, a drug test is mandatory within 24 hours of the incident. Contact your District Safety Manager to assist in locating a Drug Testing Agency.

8.1. ROOT CAUSE ANALYSIS:

8.1.1. Each Project shall conduct root cause analysis for all incidents unless otherwise approved by the District Safety Manager. Root cause analysis options are:

- “5 Why’s” Root Cause analysis is the preferred method of analysis.
- Tap Root Investigations may be required upon request by the District safety manager or the client.

8.2. INCIDENTS REPORTABLE TO PROVINCIAL OHS (ENFORCEMENT – GENERAL REQUIREMENTS)

8.2.1. The injuries and incidents to be reported to OH&S are:

1. An injury or incident that results in death.
2. An injury or incident that results in a worker’s being admitted to a hospital for more than two days.
3. The collapse or upset of a crane, derrick or hoist.

8.2.2. If an injury or incident referred to above occurs at a work site, or **if any other serious injury or any other incident that has the potential of causing serious injury** to a person occurs at a work site, the prime contractor or, if there is no prime contractor, the contractor or employer responsible for that work site shall:

1. Carry out an investigation into the circumstances surrounding the serious injury or incident.
2. Prepare a report outlining the circumstances of the serious injury or incident and the corrective action, if any, undertaken to prevent a recurrence of the serious injury or incident.
3. Ensure that a copy of the report is readily available for inspection by an officer.

8.2.3. The prime contractor, contractor or employer who prepared the report referred to in the above shall retain the report for three years after the serious injury or incident.

Except as otherwise directed by a Director of Inspection, an occupational health and safety officer or a peace officer, a person shall not disturb the scene of an incident reported to OH&S except insofar as is necessary in;

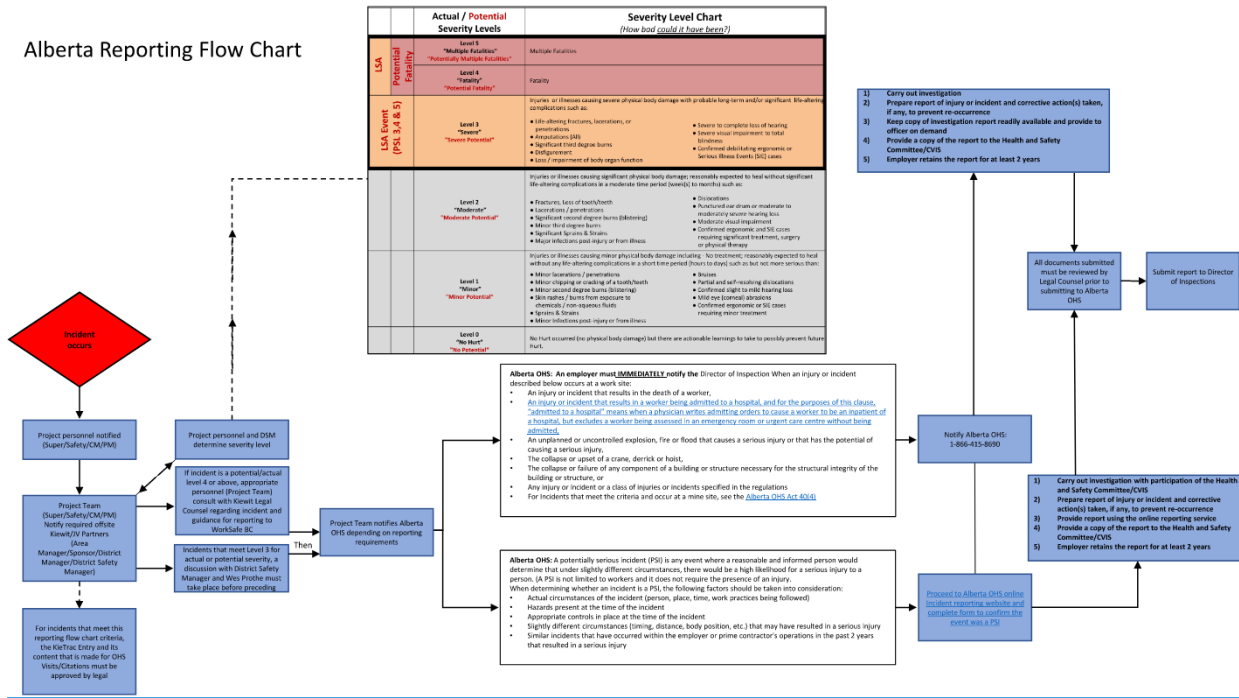
- Attending to persons injured or killed;
- Preventing further injuries;
- Protecting property that is endangered as a result of the incident.

8.3. INCIDENTS REPORTABLE TO PROVINCIAL OHS (ENFORCEMENT – PROVINCIAL SPECIFIC REQUIREMENTS)

Each Province has specific requirements for incident reporting. Specifically, which incidents **must be immediately** (Serious Events) reported and which incidents must be reported **within a specific time frame** (Potential Serious). The following flow charts outline the internal and external reporting process for [Alberta and BC](#).

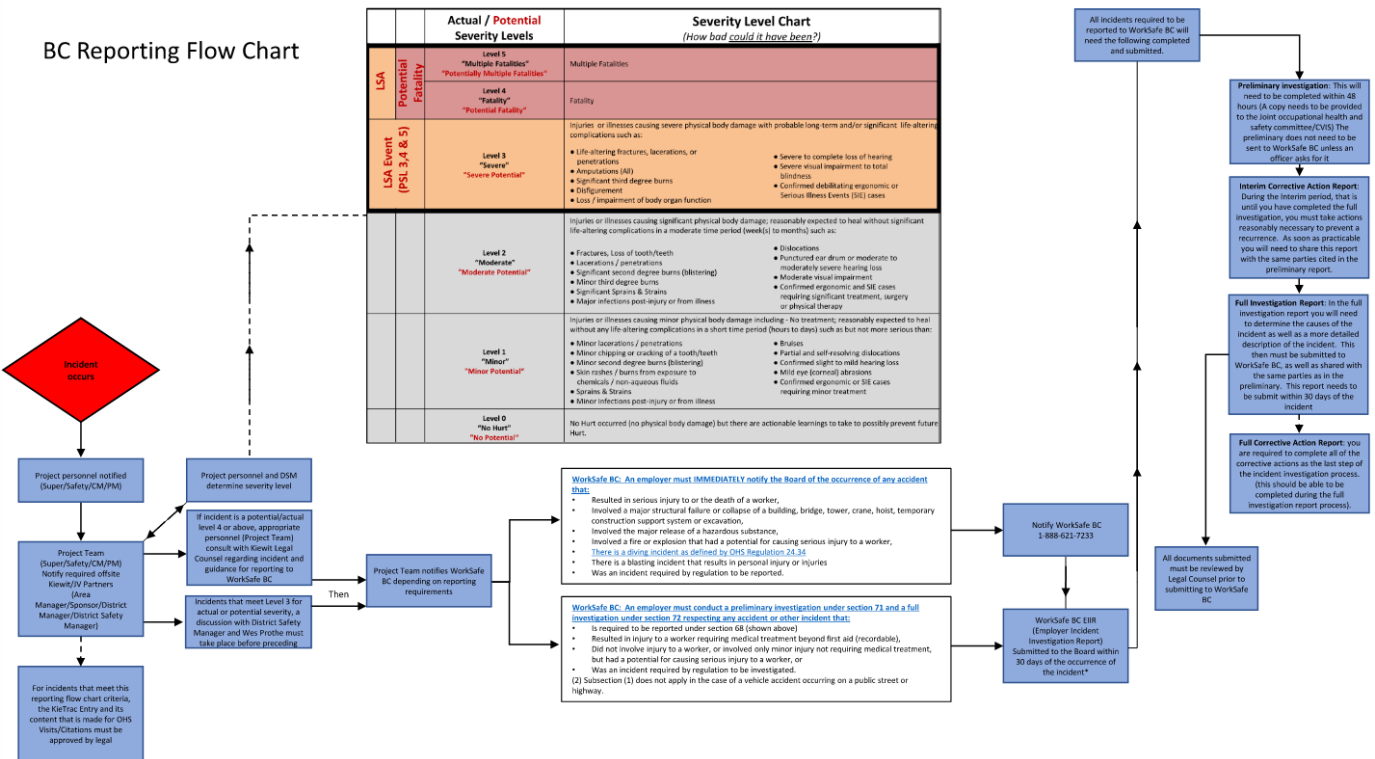
Alberta Reporting Flow Chart

Alberta Reporting Flow Chart



BC Reporting Flow Chart

BC Reporting Flow Chart



8.4. INCIDENTS REPORTABLE TO PROVINCIAL WCB (COMPENSATION/INSURANCE)

All incident details for WCB reports must be kept on file for at least 3 years.

8.4.1. Reportable Incidents:

1. Lost time or the need to temporarily or permanently modify work beyond the date of accident
2. Death or permanent disability (such as amputation, hearing loss, etc.)
3. A disabling or potentially disabling disease or condition caused by occupational exposure or activity (such as poisoning, infection, respiratory disease, dermatitis, etc.)
4. The need for medical treatment beyond first aid (such as assessment by physician, physiotherapy, chiropractic, etc.)
5. Worker incurring medical aid expenses (such as dental treatment, eyeglasses, repair or replacement, prescription medications, etc.)

Incidents resulting in first aid only need not be reported if first aid is limited to a one-time treatment, with follow-up visit if needed for observation purposes only, of minor injuries such as cuts, scrapes, scratches, treatment of minor burns, removing splinters, etc. which do not require ongoing medical treatment beyond the accident date.

8.5. INCIDENT REPORTING PROCESS/INITIAL NOTIFICATION

All incidents must be promptly reported and entered into InEight as per the INFRASTRUCTURE CANADA SAFETY MANUAL, Section 15. The front-line supervision shall notify the Project Manager and Project Safety Manager immediately of an incident, regardless of severity. The PM will notify the District Manager as soon as possible, while the FLS will send out the INITIAL INCIDENT NOTIFICATION FORM within 2 hours.

Projects must use the Initial Notification Report Form for reporting offsite incident notifications.

Below is the initial reporting criterion that needs to be included in the report and distributed via email immediately following any incident on the Project. The e-mail must contain the information noted below, in the subject line and e-mail body.

Email Notification List

The Project will establish the initial notification email list during Project startup. Notification list names should be included on the Project initial notification template.

8.5.1. Personnel to be notified:

Senior Level Project Team (Sponsors, PM, CM), Project Safety Team (PSM and Safety Supervisors), the District Safety Team (Area EHS Manager and DSM), and the owner Safety Representative. At a minimum it must be sent to the Area EH&S Manager and the District EH&S Manager.

8.5.2. Notification Timeline

As soon as possible after the initial incident/treatment up to a maximum of 2 hours.

8.5.3. Notification Form

- The front-line supervision shall notify the project manager and project safety manager immediately of an incident.
- The project manager shall notify the district manager as soon as possible.
- Attach applicable photos in the initial notification email.

INITIAL INCIDENT NOTIFICATION		
Project: _____	Date of Incident: _____	Time of Incident: _____
Type of Incident (Check Box)		
Injury: <input type="checkbox"/>	Near Miss: <input type="checkbox"/>	Utility Strike: <input type="checkbox"/> Equip Damage: <input type="checkbox"/> Property Dmg: <input type="checkbox"/> MVA: <input type="checkbox"/> Metal to Bone: <input type="checkbox"/>
Incident Location: _____		
Names of People Involved:		
Injured/Involved: _____	Occupation/Craft: _____	
Foreman: _____	3rd Party: _____	
Superintendent: _____	3rd Party: _____	
General Super: _____	3rd Party: _____	
Equipment/Property/Vehicle Damaged		
<i>Equipment number/description of property or 3rd party damage:</i>		

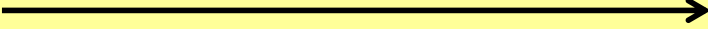
Brief description of what happened:		

Initial/immediate corrective measures:		

Investigation Initiated: <input type="checkbox"/> YES <input type="checkbox"/> NO		
List name & title of investigator		
Name: _____	Title: _____	
Name: _____	Title: _____	
Name: _____	Title: _____	
Name: _____	Title: _____	
Name: _____	Title: _____	
Name: _____	Title: _____	
Name: _____	Title: _____	
Name: _____	Title: _____	
On line supervisor shall notify the project manager and project safety manager immediately of the incident regardless of s		
The project manager or the person in charge in his absence shall notify the district manager as soon as possible		
Email notification for any incident shall be within 2 hours (with this form attached) to:		
shawn.lannen@kiewit.com	ryan.tones@kiewit.com	jeffa.davis@kiewit.com
travis.priddy@kiewit.com	chris.dandurand@kiewit.com	tim.huffman@kiewit.com

All incidents and near misses will be investigated to determine the applicable causes and mitigating actions. The investigation will determine and address the root cause in order to prevent recurrence. Refer to the INCIDENT INVESTIGATION MATERIAL for further assistance involving incident documentation.

8.6. ACCOUNTABILITY MATRIX

Safety Accountability Matrix									
Incident	Low Severity - Resulting in / or Probability of Minor injury (severity Level 0-1) or probability of equipment/property damage.			Moderate Severity - Resulting in / or Probability of injury greater than 1st aid (severity level 1-2) or probability of equipment/property damage			Severe - Resulting in / or Probability of injury greater than first aid (severity level 2-5) or probability of Equipment/property damage (LSA/Life changing events)		
	Culpable Employee	Immediate Supervisor	Supervisor or Subcontractor Manager	Culpable Employee	Immediate Supervisor	Supervisor or Subcontractor Manager	Culpable Employee	Immediate Supervisor	Supervisor or Subcontractor Manager
Violation of General Safety Rule or an unsafe act/behavior	Written Warning	Cover rule with all employees	Provide training to avoid repeat. Assist with investigation & paperwork	Suspension (2 Days)	Cover rule with all employees	Provide training to avoid repeat. Assist with investigation & paperwork	Suspension (3 Days)	Cover rule with all employees	Provide training to avoid repeat. Assist with investigation & paperwork
JHA Not Completed, Covered Prior to Start of Operation, adequate for the task or not followed. This includes failure to properly address change. Failure to report an incident.	Suspension (1 Day)	Cover rule with Culpable Employee	Provide training to avoid repeat. Assist with investigation & paperwork	Suspension (2 Days)	Cover rule with Culpable Employee	Provide training to avoid repeat. Assist with investigation & paperwork	Suspension (3 Days)	Cover rule with Culpable Employee	Provide training to avoid repeat. Assist with investigation & paperwork
Metal on Metal	Suspension (1 Day)	Cover rule with all employees	Provide training to avoid repeat. Assist with investigation & paperwork	Suspension (2 Days)	Cover rule with all employees	Provide training to avoid repeat. Assist with investigation & paperwork	Suspension (3 Days)	Cover rule with all employees	Provide training to avoid repeat. Assist with investigation & paperwork
Zero Tolerance / Project Sin							Removal or Termination Option of Suspension (10 Days) with D.M. approval	Cover rule with all employees	Provide training to avoid repeat. Assist with investigation and paperwork.

Following the incident investigation, the WCD *ACCOUNTABILITY REVIEW PROTOCOL* will be followed. Projects to track accountability actions by person/incident on an accountability log.

The project will follow the accountability matrix for all incidents. Incidents with an actual or potential severity rating of 3-5 require a debrief call/meeting with the District Manager and the District Safety Manager within 24-48 hours of the incident to discuss the incident findings, mitigations, and the accountability. For all incidents, the project team will discuss the incident, lessons learned, and accountability on the weekly district safety call.

9. CLAIMS MANAGEMENT

9.1. STAY AT WORK AND RE-EMPLOYMENT

The goal of the Kiewit stay at work program is to assist employees recovering from occupational injuries or illness to return to their usual duties. When an employee is unable to perform the essential duties and physical demands of their job, they will be offered meaningful and suitable modified work on a temporary basis. The modified duties during the transition should reflect the demands of the worker's normal job. A list of types of work suggested (using physical demands analysis) can be found on the SharePoint site and should be used for reference. The objective is for the employee to return to their usual duties as soon as possible.

9.1.1. Procedure

- Injury is reported on the day that it occurs.
- Employee must notify his or her supervisor if they have sought medical attention for a work-related injury or illness.
- The safety department will determine if the injury is reportable to the Workers Compensation Board (WCB), in accordance with provincial requirements.
- The claims Manager will complete and submit the "employer's report" within the time frame defined by the provincial WCB required timeline.
- When an employee is unable to return to work and perform the essential duties or fulfil the physical demands of their job, he/she will be offered suitable modified work on a temporary basis.
- The treating health care practitioner(s) will be provided with a return to work approval letter (form 2) and a return to work physical assessment form (form 3) to be completed. This will be returned by the employee to be reviewed by the safety department and the Case Manager. In cases where it is warranted, the safety department will coordinate the identification of suitable modified work to complete the modified work offer (form 1). This process will include collaboration with the Supervisor and employee.
- As a best practice, follow-up appointments should be scheduled in two week increments unless stated otherwise by the medical practitioner. The return to work physical assessment form shall then be completed and used to update the existing modified work offer.
- Modified work will accommodate a gradual increase in duties throughout the rehabilitation period, in accordance with limitations/restrictions indicated by the treating health care practitioner.
- All injured or sick employees will receive equal consideration for modified work. Whether or not an employee is placed on modified work will depend upon the availability of meaningful work that meets the limitations and restrictions indicated by their physician.
- The worker will return to full employment following a release from the treating physician.
- A team approach is used to develop an individual program for each employee based on the attending physician's recommendations. Each team member participating in return to work program has a responsibility to ensure its success.
- In coordinating the program, the following roles and responsibilities will apply.

9.2. ROLES AND RESPONSIBILITIES

9.2.1. Injured Worker

The injured worker agrees to:

- Report any illness or injuries on the day they occur.
- Maintain regular appointments with physicians.
- Keep the Occupational Health and Safety department informed of their medical condition as it relates to work readiness by providing information regarding physical restrictions and/or limitations as requested.
- Follow the plan as developed with the team and keep their manager informed of any concerns.
- Attend scheduled appointments and meetings.
- Co-operate in their return-to-work program and mitigate any losses.
- Notify their Supervisor and the Safety department immediately if there is any aspect of their modified work assignment that aggravates their condition, in order that corrective action can be taken.
- All employees who have a modified work agreement are expected to fully cooperate in their safe and timely return to work and have the responsibility to mitigate any losses.

9.2.2. Safety Department

The safety department agrees to:

- Promote effective communication among all involved parties.
- Ensure the suitability of modified duties.
- Liaise with medical practitioner.
- Monitor the success of the program on an ongoing basis.
- Keep the Claims Manager aware of all changes, issues and/or developments.
- Maintain an updated list of all open claims.

9.2.3. Healthcare Professional

The healthcare professional:

- Provides care during occupational illness or injury.
- Completes the Kiewit stay-at-work physical assessment reports.
- Monitors and documents the evolution of the worker's restrictions.
- Collaborates with the WCB case manager, safety department and employee to ensure the success and progress of the stay-at-work plan.

9.2.4. **Claims Manager**

The claim manager agrees to:

- Complete the WCB employer's report of injury or illness by adhering to provincial guidelines on reportability and reporting deadlines.
- Liaise between the worker, site supervisor(s), the safety department and the WCB.
- Maintain contact with the WCB case manager to advise them of updates, changes, issues and developments.
- Ensure the suitability of modified duties provided.
- Monitor the ongoing success of the stay-at-work program by tracking through statistical analysis.
- Maintain WCB correspondence records that include all correspondence with the Workers Compensation board.

9.2.5. **Supervisor**

The supervisor agrees to:

- Meet to discuss suitable modified duties.
- Ensure the modified work assigned is within the employee's limited abilities.
- Monitor and evaluate the performance of the employee while on the program.
- Keep the safety department aware of all changes, issues and developments.

9.2.6. **Management**

Management agrees to:

- Conduct an annual gap analysis of the stay-at-work/reemployment program as well as a statistical review. The results of the analysis will be included in the annual management review.
- Track actions in the business planning process or through the corrective action process to ensure continuous improvement.

9.3. **FACTORS FOR SUCCESS**

Site training sessions will be conducted to ensure that everyone who is assigned with a return-to-work responsibility is aware of the overall program procedures and communication processes to facilitate the successful completion of all cases.

The Kiewit's return-to-work and reemployment information shall be explained during all sites' new hire orientations.

Kiewit will adhere to the reemployment requirements stipulated by applicable provincial WCB regulations.

10. COMPANY VEHICLE USE

10.1. SCOPE

This section is intended to reduce incidents involving vehicle operations and to require planning of trips by all employees operating owned, leased, or borrowed vehicles. For additional clarifications, please reference the District Vehicle Policy.

10.2. POLICY

All Project personnel shall practice sound defensive driving techniques and adhere to the guidelines and requirements outlined in this section.

10.3. VEHICLE OPERATOR REQUIREMENTS

- Operators of on or off-road vehicles shall be qualified by possession of a valid, current driver's license for the type of vehicle being driven.
- Only authorized employees will drive a motor vehicle in the course and scope of work or operate a company owned vehicle.
- No passengers shall be on trucks used to deliver goods.
- Backing in is to be used whenever practicable. Where backing is required, drivers should make every effort to park the vehicle in a manner that allows the first move when leaving the parking space to be forward when exiting the parking space.
- Drivers must have a reversing alarm, use a spotter, or walk around the truck/trailer prior to backing.
- Passenger compartments are to be free from loose objects that might endanger passengers in the event of an incident. Any vehicle with non-segregated storage shall be equipped with a cargo net or equivalent to separate the storage area from the cabin.
- Signs, stickers, or labels are to be fitted in such a manner that they do not obstruct the driver's vision or impede the driver's use of any controls.
- When parking a vehicle, the transmission must be put into park, the ignition turned off and the keys pulled from the ignition prior to exiting. Some exceptions may apply in severe cold/winter temperatures.

10.4. SAFE DRIVING PRACTICES

Employees driving vehicles are required to follow safe driving practices:

- Obey all federal and local driving laws or regulations and requirements of clients.
- Immediately report to the supervisor any citation, warning, traffic violation, collision, vehicle damage or near miss associated with company or client vehicle operation or while driving on company duties.
- Immediately report any restriction or change to their driving privileges to the supervisor.
- Ensure seat belts are always be worn by all occupants whenever the vehicle is in motion. Only seats fitted with three-point inertia-reel type seatbelts shall be used. All vehicles capable of more than 15 kilometers per hour (10 miles per hour) shall have seat belts installed.
- Defensive drivers continually assess conditions and hazards and remain prepared for any challenge that may occur.
- When speaking with a passenger, always keep your eyes on the road.

- Keep both hands on the wheel.
- Use of cell phones, radios or other electronic devices while driving any vehicle is prohibited. The vehicle must be safely parked prior to using a mobile phone or two-way radio.
- Slow down around construction, large vehicles, wildlife, fog, rain, snow, or anything else that adds a hazard to your driving.
- Drive for conditions not just the speed limit.
- Alcohol or illegal drugs are not allowed to be in a company, client, or leased vehicle at any time.
- Drivers shall not operate a motor vehicle while under the influence of alcohol, illegal drugs, prescription, or over-the-counter medications that might impair their driving skills.

10.4.1. **Drivers are to be prepared before leaving:**

- Perform 360 degree walk around and report any new damage to the supervisor.
- Check windshield for cracks that could interfere with visibility.
- Inspect for vehicle damage and immediately report any issues to the supervisor.
- Make sure dirt or snow is removed from lights on all sides of the vehicle.
- Brush or clean off snow or ice on all windows to ensure complete visibility.
- Check fuel level to be certain the destination can be reached.
- Check to ensure the license and registration and insurance papers are in vehicle.
- Check to ensure the license plates and registration tag on vehicle are current.
- Ensure that there is a first-aid kit and inspected fire extinguisher in the company vehicle.
- Ensure the driver is rested and alert.
- Employees are not to perform repairs or maintenance other than routine fluid additions unless otherwise approved and qualified to perform such tasks.

10.5. **VEHICLE REQUIREMENTS**

- All vehicles shall be fit for purpose and shall be maintained in safe working order.
- A Daily Visual Inspection must be completed prior to the use of the company vehicle
- Tire type and pattern to be recommended by the vehicle or tire manufacturer for use on the vehicle in the area of operation.
- Vehicles are to be fitted with a spare wheel or suitable alternative and changing equipment to allow the safe changing of a wheel.
- Loads shall be secure and shall not exceed the manufacturer's specifications and legal limits for the vehicle.
- Roadside emergency kits should be kept in all vehicles used for highway travel. These kits shall include equipment to assist in a roadside emergency such as water, booster cables, first aid supplies, warning triangles, flashlights, etc. If there is potential for snow and ice, carry sandbags and a shovel.

- All vehicles are to be equipped with a multipurpose fire extinguisher with capacity of at least 0.9 kilograms (2 pounds). The fire extinguisher shall be securely mounted on a bracket and located so that it is easily accessible in an emergency without becoming a hazard in case of incident.
- All drivers of light vehicles shall carry a high visibility jacket for use in case of emergency stops.
- All light duty vehicles carry a minimum of one collapsible hazard warning triangle.

10.6. **WHEEL CHOCKS**

- The use of wheel chocks reduces the potential for equipment and/or vehicle runaway incidents, including:
- Each Kiewit motor vehicle identified with the prefix "03" equipment number will be equipped with and utilize a wheel chock or blocking device whenever it is parked or left unattended.
- Vehicles rated at 1-Ton or lower, equipped with automatic transmissions are exempt.
- For vehicles and equipment over 1-Ton, wheel chocks are required anytime the vehicle/equipment is left unattended.
- When used, these chocks need to be of sufficient dimensional characteristics to prevent the wheel from easily rolling over the device in either direction (measured 4" x 4" or larger).
- Subcontractor or outside rented units will also be required to adhere to this policy.
- Other towed equipment, such as generators, tool trailers, light plants, welders and trailers or compressors must also have the wheels chocked before it is unhooked from the tow vehicle.
- Man lifts, scissor lifts and other hydro-statically driven units i.e. skid-steer loaders will not be equipped with wheel chocks.

10.7. **SPOTTING**

- Spotting is required whenever moving equipment in congested areas. Each Project must determine which areas are considered to be congested and communicate the areas that require spotters. Green cones should be used to delineate spotter required areas whenever possible. Anytime an EWP's wheels are moving it will require a spotter.
- The designated spotter must have completed Kiewit's Spotter Training; the spotter must know the viewpoints and best angles for spotting each type of equipment. The spotter is required to walk the perimeter of the equipment or vehicle and its path before and after operation. Stop all movement if contact with between the spotter and the operator is lost.
- The spotter is just as responsible as the operator for the safe completion of the operation which includes zero equipment and property damage, zero dropped objects and ZERO HURTS. The operator and spotter(s) discuss the operation, preform a 360* walk around and update their JHA. The spotter will understand

the equipment's capabilities, the lifting capacity, and that the operator has limited visibility.

- When the operator has unobstructed view, he/she can elect to request that the spotter's function at this time is to prevent contact with any nearby material, equipment or personnel (for example the operator can control the movement of an excavator bucket to pick up material, as long as he/she has complete visibility of what is being lifted).
- Both the spotter and the operator must agree upon the meaning of hand signals and have a clear understanding of the travel plan. If the operator loses sight of the spotter, the operator stops immediately.
- The spotter will assist with the widening/narrowing of the fork width for forked attachments. When performing said task, the forks will be raised to just below waist height, tilted forward, parking brake on, engine off and outrigger down if the machine has one. The spotter will ensure that when making a pick the forks are widened as much as possible to ensure a safe pick.
- The spotter will position themselves as to monitor vehicle and pedestrian traffic as well as the equipment being spotted. Ensure that nothing enters the drop zone or the route of the equipment without prior approval. Barricades, extra spotters or even closing a gate maybe required to safe out an operation.

10.8. **JOURNEY MANAGEMENT PLAN**

The journey management plan is reviewed with applicable employees and should be reviewed with road travelers before they perform any driving on company business. A copy of the plan must be readily available at the workplace and road travelers should carry a copy of the plan.

Driving directions must be obtained before traveling to an unfamiliar destination. Before taking a trip to an unfamiliar location each employee will ensure they have printed driving directions available. Do not plan to read directions from a smartphone while driving. A GPS device may be used but printed directions should be kept as a back-up.

Potential journeys involving driving and/or road transport should be screened and assessed relative to hazards, risks:

- Road travel should be limited whenever practicable and should only be taken when necessary. Try to complete multiple tasks in single trips to reduce the amount of driving for improved safety and efficiency. If the trip is taken to meet with someone, determine if the meeting can be done over the phone instead.
- Consider safer methods of travel (air, train, etc.) where practicable.
- Consider if the business requirement for a potential journey be delayed and possibly combined with a later trip.
- Driving during adverse weather conditions should be avoided whenever practicable. Before leaving on a trip, ensure that weather conditions are safe for driving. Ensure the vehicle being used is adequate for the weather conditions. Make sure emergency supplies are in the vehicle, and the driver has a cell phone in case of emergency. In particularly harsh conditions, consider cancelling or rescheduling the trip.

- Consider if the journey can be combined with other people to share the vehicle and driving duties.
- Driving should be done during daylight hours rather than after dark whenever possible. Reduce speed when driving at night. Be aware of the potential for wildlife on the road, particularly when driving at dusk or dawn.
- Consider a fit-for-purpose vehicle (four-wheel drive vehicle, etc.) when the route and conditions warrant it.
- When driving long distances, sufficient breaks should be taken to prevent fatigue. When driving alone and having trouble staying awake, pull off the road and get out of the vehicle for fresh air, or take a power nap. If driving late at night, consider getting a hotel room and resume the trip the following day. If two licensed drivers are in the vehicle, take turns driving. Get plenty of rest before beginning your journey.

11. SUBCONTRACTOR MANAGEMENT

11.1. PURPOSE

In order to ensure compliance, Kiewit will be directly involved in the management of our subcontractors' safety performance, training and record-keeping practices.

11.2. RESPONSIBILITIES

The Project Manager will be responsible for the implementation of this procedure.

11.3. PRE-QUALIFICATION

Subcontractor prequalification and selection may vary depending on specific Project requirements. Subcontractors should be COR certified for the province of work. At bid time and prior to Subcontractor sign-up Kiewit must be provided with:

- A. Subcontractor's recordable incident frequency rates for the past 5 years. Compare this to the industry average. Subcontractors with incident rate frequency above the industry average. Unacceptably high recordable frequency rates should be investigated further to determine if the Subcontractor is allowed to proceed with the bid.
- B. Subcontractors Workers Compensation Board (WCB) information to including the following:
 - WCB Clearance Certificate and or Letter of Good Standing
 - WCB Rate Statement for the past three (3) years
 - WCB Claims Summary for the past three (3) years
- C. Government Agency / Provincial OHS Compliance Orders for the past 5 years. This applies to official written orders as well as stop work orders. The Order information must include the date of issue, government agency name (i.e. WorkSafeBC) and a detailed description of the Order.
- D. A copy of the Subcontractor's Health and Safety Plan. The Subcontractor's Health and Safety Plan must be reviewed to ensure it addresses the following key elements:
 - Project Safety Policy;
 - Roles and Responsibilities;
 - General Project Safety Rules;
 - Disciplinary Action Policy;
 - Training and Certification;
 - Incident Reporting and Investigating;
 - Emergency Response and First Aid;
 - Confined Space;
 - Fall Protection;
 - Lock Out – Tag Out Procedure;
 - Substance Abuse Policy.

11.4. **SUBCONTRACTOR MANAGEMENT PROCEDURE**

Potential subcontractors will be provided a copy of the Kiewit safety manual. After making any necessary revisions to comply with all Kiewit requirements, subcontractors will also provide a copy of their safety manual as an attachment to the request for proposal prior to bidding the work. Contractors and/or subcontractors shall comply with all applicable legislative, Kiewit safety requirements and owner-specific safety and health laws. The potential subcontractor shall familiarize themselves with all applicable safety requirements and incorporate them into a Project specific Safety Plan. Any additional costs related to safety program compliance shall be included in the subcontractor's final proposal.

Before subcontractors will be allowed to begin work on the Project, a pre-operation safety meeting must take place. This meeting must be attended by the Project management team. Assigned Kiewit subcontractor supervision must be in attendance.

The subcontractor's site safety representative shall monitor the daily safety performance of their employees to ensure program compliance. This includes compliance with Occupational Health and Safety (OH&S) regulations, Kiewit, the owner and the subcontractor's own safety rules. If any deviation from the written program is observed, immediate corrective action must be taken to resolve the issues found in order to restore and maintain compliance.

All subcontractors will be required to:

- In writing, designate a representative responsible for all safety related matters on the Project. The designated safety representative will be employed at the work site and their duties shall include administration and implementation of the safety program.
- Provide a written site Safety Plan prior to beginning any work. The plan must include all procedures covering the operation. The site Safety Plan shall, at minimum, meet all applicable legislative and owner-specific safety and health laws.
- Submit for review a written Job Hazard Analysis (JHA) for each work phase and/or operation.
- All subcontractors will attend the jobsite new hire orientation.
- Support the Craft Voice in Safety (CVIS) program. Major subcontractors are required to have CVIS representation.
- Ensure supervisors, foremen, and employees (as required) must attend all Project safety meetings conducted onsite. Required safety meetings shall include mass safety meetings and weekly foremen meetings.
- Immediately report all occupational injuries or illnesses to the Kiewit Project Safety Manager. This includes first-aid and doctor visits. A verbal report may be given while the subcontractor conducts an incident investigation. Upon completion of a thorough investigation and within a 24-hour period, a written report must be submitted to the Project Safety Manager detailing the root cause(s) of the incident and any corrective actions taken to prevent reoccurrence.
- Immediately report any OH&S (or equivalent) site inspections and provide a copy of all inspection reports and citations to the Project Safety Manager.
- Provide the Project Safety Manager a copy of all Safety Data Sheets (SDS) for hazardous substances being used on the Project. The subcontractor is responsible for

training their employees on the hazard communication program, location of the Project SDS binder(s), proper use, storage, spill and disposal procedures for hazardous materials used on the Project.

- Employ a competent person as designated by OH&S for all work activities that require such a person.
- Co-operate with the Superintendent assigned to the subcontractor in ensuring all forms, safety policies and contracts are being met.
- Complete a subcontractor monthly safety summary and return the completed form to the Project Safety Manager. The subcontractor monthly safety summary should include their first-aid contact and/or procedure as well as their CVIS representative.

11.5. KIEWIT SUPERVISOR/MONITOR RESPONSIBILITIES

1. Attend subcontractor readiness review meetings and make sure all safety aspects are addressed.
2. Train the subcontractor in the Kiewit safety requirements and ensure they are being followed. Require a Hazard Analysis prior to all operations. Review the Hazard Analysis prior to the start of an operation. Monitor and make sure all Hazard Analyses are being reviewed and updated as needed.
3. Attend Toolbox Meetings and procure a copy of the signatures and description of the meeting topics for our records.
4. Perform regular field observations/assessments.
5. Ensure the subcontractor has representation at required Foremen's Meetings.
6. Make sure all near-miss, first aid or recordable injuries are reported immediately.

11.6. SUBCONTRACTOR READINESS REVIEW MEETINGS:

11.6.1. Pre-Mobilization

Before subcontractors will be allowed to begin work on the project, a pre-mobilization safety meeting must take place to discuss their approach to safety, identify any gaps, and to set clear expectations. This meeting must be attended by the project management team, subcontractor senior management and key supervision.

Meeting Topics:

- Subcontractors review how they are going to work safe
- Review safety expectations and identify any gaps in their safety program (PPE, Reporting, HA's, Recognition, Safety Tours, Training & Orientation Plan, etc.)

11.6.2. Post-Mobilization

Major Operation Review:

Prior to starting a major operation, the subcontractor monitor will review the Work plan and JHA and reinforce expectations as work commences. Prior to starting a major operation subcontractor monitor to review the following:

- Work plan/HA
- Access / Housekeeping
- Communication with other parties
- Training needs
- Permitting requirements
- Human machine interface
- Utility locates
- Laydown and storage of materials

11.7. SUBCONTRACTOR INJURIES

Subcontractors will work in cooperation with Kiewit to manage all injury cases and follow the OH&S and safety administration incident classification process.

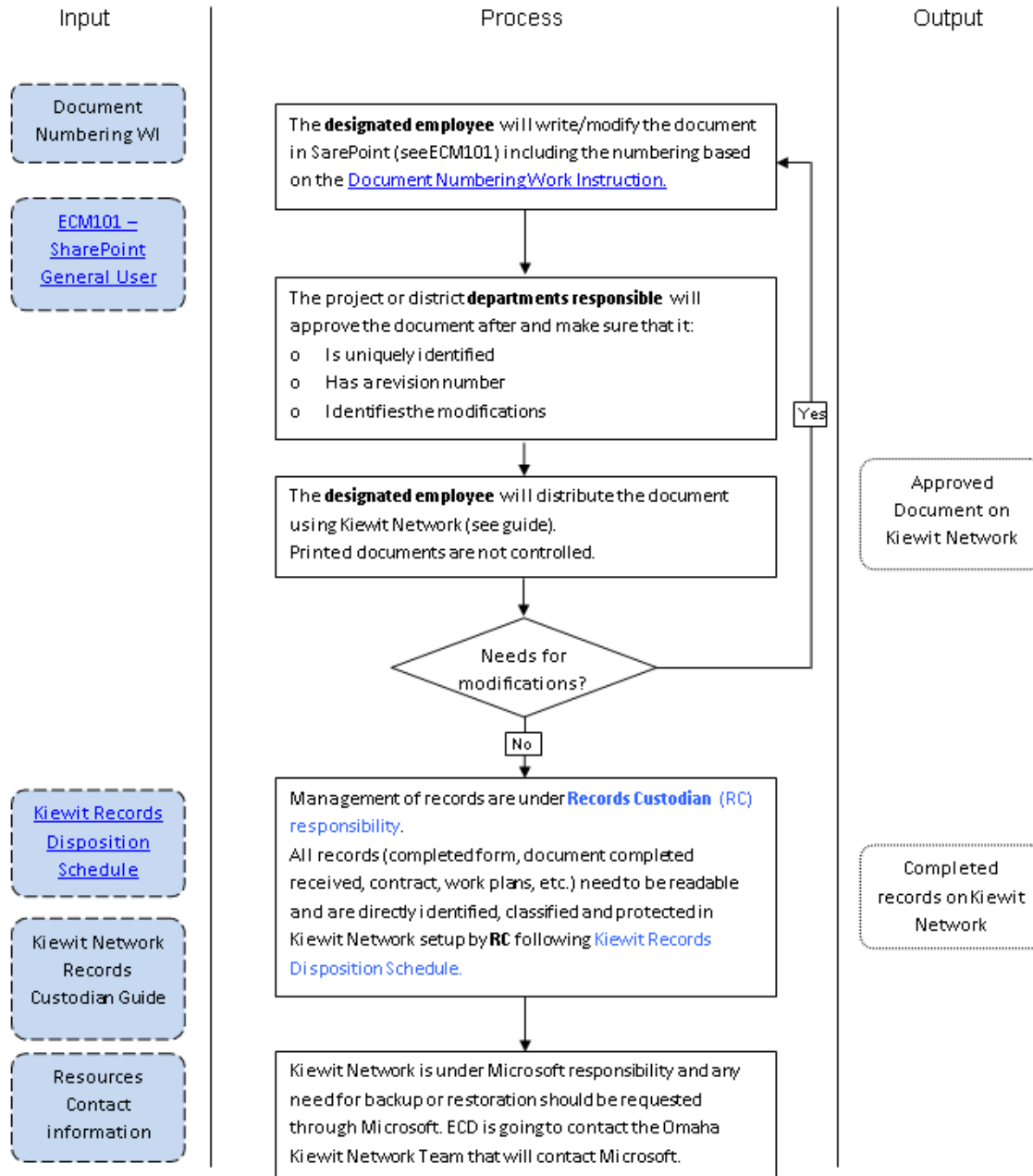
12. DOCUMENTATION AND RECORDS

The Canadian Infrastructure safety management system utilizes the Integrated Management System's (IMS) document and records control procedure.

Link: <https://portal.kiewit.com/sites/CANGov/DistrictGuideline/Forms/English.aspx>

Document and records will be managed through this procedure utilizing SharePoint or similar enterprise content management software.

Document and Records Control Procedure



SAFE WORK PRACTICES AND PROCEDURES (Sections 20-53)

13. ACCESS AND HOUSEKEEPING

All Projects shall make extreme access and housekeeping a key focus for all operations. This SWP outlines the Project access and housekeeping requirements for buildings, roads, waste removal, laydown and other work areas. Each Project shall conduct regular access inspections as part of their daily safety inspection.

14. LADDERS

In some cases, ladders may be required for access. This SWP outlines the safe use, storage, securement, trench access and inspection of ladders on Kiewit Projects.

15. COMPRESSED GAS CYLINDERS

Proper storage, handling and use of compressed gas cylinders is practiced and maintained at Project sites. This SWP outlines the compressed gas types, storage, safety precautions and inspection requirements for compressed gas cylinders and regulators on Kiewit Projects.

16. SCAFFOLDING

Scaffolding plays an important role in providing safe access on Kiewit Projects. This SWP outlines the requirements for scaffold erection/dismantle, safeguarding, drop protection, training and inspections of scaffolding. When scaffolding hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding scaffolds will be implemented.

17. BARRICADES AND TAGS

The use of barricades and tags (control zones) is required to protect and warn employees of known hazards or areas in which an increased risk of injury is present. This SWP outlines the barricading and tagging requirements for various Project risks including cases of moderate, high risk and imminent danger situations. Trailer loading, and offloading expectations are covered in this section as well.

25. COLD WEATHER WORK PROCEDURE

For the safety of our staff and craft working in the field and in an effort to let common sense dictate some of our actions, Kiewit has instituted a cold weather procedure during the winter season. This SWP outlines the cold weather planning requirements including PPE, First Aid measures, warm-up scheduling as well as crane hoisting and rigging limitations.

26. LIGHTNING ACTION PLAN

Projects located in an area where lightning may occur shall have a lightning plan as part of their emergency preparedness plan. This SWP is a guideline to ensure the proper identification, notification, and evacuation of workers on towers, tanks, and in large open areas when they are at risk from lightning.

27. CONFINED SPACE CODE OF PRACTICE

All Projects that have or have the potential of constructing or working in enclosed or confined spaces will follow this Code of Practice. This procedure outlines the various types, hazards, and controls for confined and restricted spaces. Confined space permitting, training, testing, ventilation, and requirements for safety watch, are included in this SWP.

28. WELDING, CUTTING, BRAZING, SOLDERING

Welding and cutting present potential hazards at the work site that could result in personal injury, fires, explosions and equipment or process mishaps, safe welding procedures are ignored. This OSP outlines the requirements for PPE, fire protection, atmospheric hazards and controls required for these activities on Kiewit Projects.

29. FIRE PREVENTION

Fire prevention is every employee's responsibility. Measures must be taken to ensure proper mitigation is in place to prevent fire hazards, control heat sources, develop fire emergency plans and practice emergency drills. This SWP outlines the fire prevention, planning, training, and response required on Kiewit Projects.

30. EXCAVATION SAFETY

All excavations shall follow Kiewit, provincial and territorial guidelines, and regulations. Each Project will have a written program that will address the criteria for all trenching and excavation operations. This SWP outlines the hazards associated with excavations and the planning required ensuring proper trenching practices are followed on Kiewit Projects.

31. GROUND DISTURBANCE AND UTILITY SAFETY

Ground disturbance is classified as any operation that results in the disturbance or displacement of the soil or ground cover, generally associated with excavating and trenching. The purpose of this safe work practice is to help identify the hazards that may be present in this operation and outline the proper procedures and techniques that must be used during any work or task that involves a ground disturbance and underground/overhead utility work.

32. TEMPORARY POWER AND LIGHTING

In order to protect both people and property from the dangers associated with temporary power, when working with temporary power a comprehensive program must be followed that includes the highest level of principles in accordance with all industry standards. This SWP outlines the safe use requirements for temporary wiring and temporary power on Kiewit Projects.

33. WORK ON OR NEAR ELECTRICITY (ARC FLASH)

When work is to be performed within an arc flash boundary or limited approach boundary, proper procedures as outlined by the National Fire Protection Association regulations (NFPA-70E) along with local, provincial, territorial, and federal guidelines shall be strictly followed.

This SWP outlines the requirements for, electrical procedures, PPE, insulated tools and equipment, emergency preparedness, auditing, safe boundaries, and approach distances for work on or near live electricity and overhead power.

34. LOCK OUT / TAG OUT (LOTO)

All Projects shall comply with Kiewit, provincial and territorial regulations for the control of various types of stored energy and its release. This SWP outlines the LOTO responsibilities, isolation and control measures, permitting and verification processes required to protect workers from hazardous energy or electricity.

35. FALL PREVENTION

Fall protection is required where workers are exposed to a potential fall of 1.8 meters (6 feet) or greater. This SWP outlines the fall prevention training, systems, equipment, inspection, maintenance, and rescue requirements to prevent workers from falls. Work at heights requires a hazard assessment that specifically addresses the hazards, controls, equipment, and systems in place to prevent falls.

36. HAND AND POWER TOOLS

All employees who use hand and power tools and who are exposed to the hazards of falling, flying, abrasive and splashing objects, or exposed to harmful dusts, fumes, mists, vapors or gases shall be provided with the appropriate equipment needed, including Personal Protective Equipment (PPE) to protect them from the hazard. This SWP outlines the PPE, guarding, assured grounding, care, maintenance and safe usage of hand and power tools.

37. MACHINE AND TOOL GUARDS

No employee shall operate any machinery/tool without proper protective guards in place or modify/disable any protective guard on machinery/tool without implementing the Kiewit LOTO program. This SWP outlines the specific safeguarding and training requirements for machines and tools.

38. CRANES AND RIGGING

All Kiewit Projects shall follow the corporate crane procedures manual, provincial and territory regulations, and additional Project specific requirements. This SWP outlines the specific crane management plan requirements for Kiewit Projects. Project specific planning is required for authorized operators, assembly/disassembly, power line work, overlapping booms, crane moves, verification and rigging.

39. ELEVATED WORK PLATFORMS

Elevated Work Platforms (EWP) are only intended to position workers and their tools into position to reach high work areas. Only trained and authorized persons (designated operators) are permitted to operate the aerial device. Each This SWP outlines the safe operation, maintenance, designated operator and other requirements for EWPs on Kiewit Projects.

40. ATV / SNOW MOBILE PROCEDURE

In the event that light duty vehicles cannot safely access certain types of terrain, the use of all-terrain vehicles (ATVs) and Snowmobiles may be required. This SWP outlines the requirements for ATV/snowmobile planning, PPE, safe operation, maintenance, and operator designation.

41. TRAFFIC CONTROL AND HCTI

The objective of this section is providing safe passage for vehicular, equipment and pedestrian traffic around construction activities. Kiewit will contain a variety of hazardous conditions such as work areas, workers, tools, equipment, machines, and stockpiles of materials that are potential obstacles and dangers to pedestrians, and vehicles will be correctly cordoned off from the public. This SWP outlines the traffic control planning requirements, access/egress and control measures that must be taken in situations with traffic control hazards.

42. MARINE OPERATIONS

Marine operations require specific planning to address the hazards associated with working around water and water vessels. This SWP outlines the planning, training, PPE, access, signage, communication, and emergency procedures required for marine operations.

43. CONCRETE AND MASONRY

This Procedure sets forth requirements to protect all Kiewit and subcontractor employees from the hazards associated with concrete, masonry, formwork, and tensioning operations performed on Kiewit Projects.

44. TEMPORARY STRUCTURES AND CONSTRUCTION DEVICES (TSCD)

This SWP outlines the framework in which the TSCD design process is to be implemented. The TSCD manual must be followed for all related operations.

45. PIPE TESTING

All Projects that conduct pipe testing shall ensure proper precautions are in place prior and during the test. Only hydrostatic testing may be conducted. If job specifications require pneumatic testing to be performed, permission must be obtained from the Project Sponsor before proceeding. This SWP outlines the responsibilities and procedural requirements that must be followed when planning for pipe testing operations.

46. SANDBLASTING

Protecting all workers performing Sandblasting work, other workers in close proximity of Sandblasting or other work that may be affected by sandblasting operations is our primary concern. This SWP outlines the employee protection methods and general procedures required for sandblasting operations.

47. TRANSPORTATION OF DANGEROUS GOODS

All Dangerous Goods on Kiewit Projects must be properly, shipped, transported, and tracked. All Kiewit, Provincial, federal, and other requirements must be followed in the transportation of dangerous goods.

This SWP outlines the training, shipping, tracking, and handling of dangerous goods.

48. WHMIS – HAZARD COMMUNICATION

All hazardous materials on Kiewit Projects must be properly stored, labelled, handled, transported, and tracked. Safety Data Sheets must accompany hazardous materials and be readily available in the field.

This SWP outlines the training, labelling, PPE, and control measures that are required for the safe use and disposal of hazardous materials.

49. RESPIRATORY PROTECTION

The purpose of the respiratory protection SWP is to ensure Kiewit's compliance with the respiratory protection provisions outlined in Canadian Standards Association (CSA) and provincial Occupational Safety and Health (OHS) requirements. The code of practice outlines the Respirator care, selection and use, medical screening, fit testing, training, and other requirements.

50. OCCUPATIONAL HYGIENE

Occupational Hygiene monitoring on a Project is essential to the detection, assessment, and control of stresses at work that may have health effects in the short or long term. Such stresses may be chemical or physical in nature and specialized techniques are needed to evaluate and control them.

This program outlines how worker exposure hazards will be addressed in the workplace including the interpretation of technical data, conducting research, and assisting in the development of guidelines and procedures that support workplace health and wellness.

51. SILICA CODE OF PRACTICE

Silica dust exposure can be present during chipping, jackhammering, cutting, cleaning, grinding, and drilling concrete, and when mixing grout. Studies show that when these operations are conducted without using dust controls, workers are exposed to airborne silica concentrations at levels far above the occupational exposure limits. This SWP outlines the hazards, responsibilities, control measures, PPE, training and safe work procedures for specific silica related tasks.

52. HYDROGEN SULPHIDE (H₂S)

Hydrogen sulphide is a powerful and deadly gas which smells like rotten eggs at low concentrations and has a sweet smell at high concentrations. This SWP outlines the hazards, responsibilities, control measures, PPE, training, and safe work procedures for specific H₂S related tasks.

53. HEXAVALENT CHROMIUM

It is our policy to protect our employees from exposure to Hexavalent Chromium exposures that may be encountered while welding or torch-cutting on stainless steel or chromium-containing materials. This SWP outlines the hazards, responsibilities, control measures, PPE, training, and safe work procedures for specific Hexavalent Chromium related tasks.

PROACTIVE SAFETY PROGRAMS (Sections 54-62)**54. CRAFT VOICE IN SAFETY (CVIS)**

The CVIS program drives the culture on our projects. The Project Manager (or designate) will meet with the committee once a week. All major disciplines, job areas and major subcontractors must have representation on the CVIS committee. The CVIS GUIDELINES will be used to implement all CVIS programs.

55. RISK REDUCTION TASK FORCE

RRTF empowers the craft to identify potential risks in their operations and challenges them to come up with improvements that eliminate or reduce the risks identified. This allows the craft to effect change in the workplace and eliminate risks before incidents have the potential to occur. This program outlines the training and implementation requirements for the RRTF.

56. DROPPED OBJECT PREVENTION

It is the objective of Kiewit to eliminate dropped objects and drop hazards on every Project through the implementation of a Stop the Drop Program. This program establishes minimum expectations in order to mitigate the risk of damage to property or personnel done by dropped or falling objects. It is the expectation that all tools and materials that could be considered drop hazards are secured with primary and secondary drop prevention systems.

57. BEHAVIOUR BASED SAFETY (BBS)

Kiewit expects that nobody walks past an unsafe act or condition. BBS focuses on the behavior portion and the expectation is that workers intervene when an unsafe act is observed. The BBS program should drive this objective into the culture for everyone on Kiewit Projects. This program outlines the implementation, training, data analysis and intervention expectations for Kiewit Projects.

58. BLOODBORNE PATHOGENS

Kiewit may have certain Projects that have the potential for occupational exposure to blood or other potentially infectious materials. This program is designed to establish the appropriate control measures to eliminate or minimize employee exposure to Bloodborne Pathogens. Projects which have the potential to expose employees to blood or other infectious fluids will implement a Bloodborne Pathogens Program.

59. ERGONOMICS: MUSCULOSKELETAL INJURIES

The purpose of this policy is to provide a safe working environment and minimize musculoskeletal injuries (MSIs) in the workplace by promoting, maintaining, and implementing an effective musculoskeletal program.

60. STRETCH AND FLEX

The stretch and flex program is intended to provide necessary warm-up exercises in order to prevent workplace injuries and improve the quality of life for all Kiewit employees.

61. HAND PROTECTION

This program is designed to outline the hand protection planning requirements for Projects. These plans will be designed to address the planning for education, identification, mitigation, and elimination of potential hand risks.

62. HEARING CONSERVATION

All employees working in a high noise level environment shall be monitored and protected against exposures to excessive noise. This is a guide to exposure limits and control measures required to promote hearing conservation in the workplace. This program helps to outline the hearing conservation strategy to mitigate any noise exposure risks to personnel.

63. Live Saving Actions

Life Saving Actions (LSA) provide a deliberate focus on the potential outcome of an incident or event, instead of the actual outcome when determining the resources allocated to react to and prevent those incidents and events. The project will identify LSA categories and develop safeguards for each category, incorporating them into the planning stages and JHAs.



Kiewit

KIEWIT INFRASTRUCTURE GROUP CANADIAN SWP AND SAFETY PROGRAM MANUAL

Page #	Section	Description of Revision	Revision
312	63	Added the LSA program	01-01-21
142	35	Updated the Fall Protection section to meet the corporate policy requirements.	01-01-21
270	56	Updated the Dropped Object section to meet the corporate policy requirements.	01-01-21

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INTRODUCTION

At Kiewit, it is our policy to perform work in the safest manner possible with a constant focus on good construction practices. To accomplish this, an organized and effective safety program must be implemented at every location where work is performed.

Responsibility for the safety program is delegated to line supervision in accordance with the chain of command. The Safety Manager is a staff assistant to line personnel and their presence in no way relieves the line organization of its responsibility.

To achieve and maintain safe operations, there must be written guidelines that will assist employees in conducting their daily work activities in a safe and efficient manner. All personnel associated with the construction operations must view safety as an integrated function of their individual responsibilities and duties.

This manual outlines the safety responsibilities of management personnel, field employees and safety department personnel. It also includes a number of safe work programs and procedures, which will be adapted, updated and supplemented as the need arises.

The Kiewit safety manual was created to align all Canadian Infrastructure projects. It is the minimum standard that must be followed on all Canadian Infrastructure projects. Management at each project will write, prior to beginning work, a formal site-specific safety plan that addresses the specific safety and health issues and regulations for that project. The site-specific manual must be written to reflect a level of protection equal to or greater than the degree of protection prescribed in the Kiewit safety manual. The project shall incorporate any federal, provincial, municipal or specific contract requirements not addressed in the Kiewit safety manual. This plan is to be reviewed annually at minimum.

The written guidelines contained herein are a means to assist employees in achieving and maintaining safe operations. We constantly monitor our performance and maintain a focus on continual improvement.

This plan will cover how each project will conduct its individual safety program.

PURPOSE

The purpose of the Kiewit safety manual is to standardize the project safety programs across all Kiewit projects and to provide the project team with the resources and documents needed to execute the project in accordance with the contract requirements and the Kiewit safety policy.

SCOPE

The safety manual applies to all work performed on Canadian Infrastructure sponsored projects. Applicable legislative requirements, additional contract requirements and site-specific policies are to be followed in conjunction with the policies outlined in this safety manual.

CANADIAN INFRASTRUCTURE SAFETY STANDARDS

The management of the Kiewit Safety Program has four steps:

1. Planning
2. Implementation and Operational Execution
3. Verification
4. Corrective and Preventive Actions

Kiewit safety standards support all four steps of the Kiewit Safety Program listed above. These standards have been developed by teams in cooperation with craft to ensure the safest and most efficient procedures are followed. They take into account; legislative requirements, best practices, and lessons learned.

The following applies to Kiewit safety standards:

- Must be reviewed to ensure all site specific risk has been identified and mitigated.
- All workers involved in SWP related tasks are trained and understand their responsibilities and expectations.
- Ensure compliance in the field through Kiewit verification process.

Kiewit safety standards are made up of the following procedures, best practices and proactive safety programs:

1. **FUNDAMENTAL PROCEDURES (Sections 1-19)**

These procedures are the fundamental processes for all Kiewit projects and operations. Project specific safety plans are developed by using these fundamental procedures and incorporating all applicable SWPs, Best Practices and Proactive Safety Programs to address the planning and mitigation requirements for project and operational risks.

Project safety performance and effectiveness must be monitored to ensure program compliance and continuous improvement.

2. **[SAFE WORK PRACTICES AND PROCEDURES \(Sections 20-53\)](#)**

Safe Work Practices (SWPs) are sometimes referred to using other terms, such terms as or Code of Practice (COP) or Standard Operating Procedures (SOPs). Safe work practices are generally written methods outlining how to perform a task with minimum risk to people, equipment, materials, environment, and processes. Some Kiewit Safe Work Practices act as both safe work practice and safe work procedure.

A Safe Work Procedure is a step by step description of a process when deviation may cause a loss. Some Kiewit Safe Work Procedures are built into the Safe Work Practices within this manual.

3. **BEST PRACTICES (Found on the SharePoint)**

Best Practices are sometimes referred to using other terms, such as Standard Work Procedure (SWP) or Safe Job Procedure (SJP). A Best Practice is a step by step description of a process when deviation may cause a loss. Some Kiewit Best Practices are built into these SWPs. All other Kiewit Best Practices can be found on SharePoint.

4. **[PROACTIVE SAFETY PROGRAMS \(Sections 54-62\)](#)**

These programs are designed to proactively address any potential hazards or risks prior to becoming safety issues on the job.

Programs typically focus on developing or shaping the culture of project personnel.

REFERENCE INFORMATION

These policies and procedures have been referenced in the development of this manual and various links have been included ensure compliance and to provide the user with all the supplemental information and documents needed to run an effective project safety program.

Below is a master list of relevant company standards, manuals and SharePoint links that are referenced in this manual:

Corporate

- [Corporate Safety Link](#)
- [Corporate Safety Training Library](#)
- [Corporate Safety Centre of Excellence – Best Practices](#)
- [Corporate Safety Manual](#)
- [Corporate Policy Manual](#)
- [Marine Vessels Compliance Manual](#)
- [Transportation Compliance Manual](#)
- [Environmental Compliance Manual](#)

Infrastructure

- [Infrastructure Group Safety Standards](#)

Crane Services

- [Crane Services Link and Manual](#)

Equipment

- [Equipment Services Link and Manual](#)

Temporary Structures and Construction Devices (TSCD)

- [TSCD Manual Link](#)

Explosives and Blasting

For operations involving explosives and blasting, blasting plans will be developed in accordance with the Canadian Explosives Compliance Manual.

- [Explosives Compliance Manual](#)

Kiewit Safe Website

The website provides a way of making all of our safety information available to all of our staff, foremen. The website includes training modules, training videos, toolbox meeting materials, safety forms, craft recognition, the Best Safety Practices and Safety Policy Manual, and much more.

- [Nobody Gets Hurt Website](#) Password: kiewitsafe

SAFE WORK PRACTICES AND PROCEDURES (Sections 20-53)**20. ACCESS AND HOUSEKEEPING****20.1. GENERAL PROVISIONS**

Square to the world is a philosophy regarding all storage of materials and placement of vehicles. Adhering to a clean-as-you-go attitude is crucial to a safe, functioning work task. The extra time needs to be taken to clean unnecessary pallets off the floor and square material parallel and perpendicular as you work.

During the work planning phase, proper work access, travel paths, waste, tool and material storage must be addressed.

20.2. INSIDE BUILDING AND OTHER SHOPS OR FACILITIES

- The floor of every area of the facility will be maintained, so far as practicable, in a dry condition. Where wet processes are used, drainage will be maintained and false floors, platforms, mats, or other dry standing places will be provided. Where practicable or appropriate, waterproof and slip proof footwear is to be worn by employees
- Every floor, workplace, and passageway will be kept free from protruding objects, storage of equipment, pallets of products, and uncovered openings in the floor
- Parts and equipment will be placed in designated and/or marked areas so that walkways are not blocked.
- Ice, grease, debris, and excessive water are to be kept clear from all walking surfaces.
- All extinguishers, eye wash stations, and showers will be kept free from obstruction or blockage by any item which could hamper or prevent someone from obtaining it in an emergency.
- Provide safe access for workers to the job site. Gather up and remove debris to keep the work site orderly.
- A means to remove or manage garbage/construction waste must be provided at each work location (Garbage Cans or Skip boxes)
- Keep the work area and all equipment tidy. Designate areas for waste materials and provide containers.
- Keep stairways, passageways, ladders, scaffold and gangways free of material, supplies and obstructions.
- Secure loose or light material that is stored on roofs or on open floors.
- Keep materials at least 2 m (5 ft) from openings, roof edges, excavations or trenches.
- Remove or bend over nails protruding from lumber.
- Keep hoses, power cords, welding leads, etc. from lying in heavily travelled walkways or areas.
- Ensure structural openings are covered /protected adequately (e.g. sumps, shafts, floor openings, etc.).

- Keep walking / working surfaces clear and clean at all times.
- Clean up spills on floors immediately.

20.3. **STORAGE OF TOOLS AND MATERIALS**

- Store tools quickly after use (especially those that are dangerous and can cause accidents (e.g. axe). After the work day is finished, remove from the work area all items not currently being used, including tools and materials, and store them.
- Keep material storage areas clean and free of unwanted materials and debris.
- Secure loose and light materials which can be blown away by high winds.
- Remove empty bags or other containers of dust producing materials from work area.

20.4. **WASTE**

- Place trash and recyclable containers with lids throughout the job site and mark them for proper use. Remove debris at regular intervals.
- Provide trash chutes for waste removal in above grade floor work areas.
- Use drip pans to collect oils and fluids.

20.5. **SKIP BOXES**

- Lifting devices that have been reviewed and approved for such purposes can only be used.
- The company has a standard drawing and engineered data for skip boxes.
- A placard describing the loading criteria for common materials will be displayed on both sides of the box. The data referenced on that placard represents the maximum capacity for such materials and must not be exceeded, typically 4000 pounds. (Note that these ratings are based on the structural integrity of the box and lifting ears. Excessive damage will be cause for removal from service.

20.6. **FLAMMABLE/EXPLOSIVE MATERIALS**

- Store flammable or explosive materials such as gasoline, oil and cleaning agents apart from other materials.
- Keep flammable and explosive materials in proper containers with contents clearly marked.
- Dispose of greasy, oily rags and other flammable materials in approved containers.
- Store full barrels in an upright position.
- Keep gasoline and oil barrels on a barrel rack.
- Store empty barrels separately.

- Post signs prohibiting smoking, open flames and other ignition sources in areas where flammable and explosive materials are stored or used.
- Store and chain all compressed gas cylinders in an upright position.
- Mark empty cylinders with the letters and store them separately from full or partially full cylinders.
- Ventilate all storage areas properly.
- Ensure that all electric fixtures and switches where flammable materials are stored are explosion-proof.
- Use grounding straps equipped with clamps on containers to prevent static electricity build-up.
- Provide the appropriate fire extinguishers for the materials found on-site. Keep fire extinguisher stations clear and accessible.
- Make sure when transferring flammable and combustible liquids from one conductive container to another that conductive containers are electrically bonded to each other or electrically grounded to prevent the build-up of static electricity.
- Waste material contaminated with solvent, oil, grease, paint, or other flammable substance shall be placed in covered metal containers before disposal and shall be stored in the designated storage area outside of work areas.

20.7. **SMOKING IN THE WORKPLACE**

- Smoking is prohibited in all indoor areas of a workplace. These areas include site office trailers, lunchrooms, washrooms, tool-cribs, warehouses, vehicle maintenance areas, operations buildings and vehicles.
- The Kiewit smoke-free workplace guideline protects employees from workplace exposure to second-hand smoke and helps reduce the number of smokers and the extent of smoking among workers. Smoking will not be permitted indoors or in areas within 10 meters of a building or otherwise enclosed area.
- This guideline is also meant to help smokers quit by providing them with a supportive workplace environment that is conducive to quitting.
- Anyone found in contravention of this policy may be subject to disciplinary action.

20.8. **ROADS**

All are to be kept clean and void of obstacles, in good repair and clearly marked. There should be no roadway debris.

20.9. **SAND AND GRAVEL PILES**

Employees will refrain from climbing on sand or gravel piles as they could be buried.

20.10. VEHICLE PARKING AREAS

All parking areas are to be designated and kept free from loose lumber, trash, large stones or bricks, vehicle parts, excessive vehicle fluid spills. Fluid spills are to be cleaned up using absorbent material and disposed of properly.

Whenever possible, designated parking areas should be no closer than 200ft from the operation.

20.11. SAND AND GRAVEL PILES

Employees will refrain from climbing on sand or gravel piles as they could be buried.

20.12. VEHICLE PARKING AREAS

All parking areas are to be designated and kept free from loose lumber, trash, large stones or bricks, vehicle parts, excessive vehicle fluid spills. Fluid spills are to be cleaned up using absorbent material and disposed of properly.

Whenever possible, designated parking areas should be no closer than 200ft from the operation.

20.13. SITE ACCESS WALKWAYS

Site access walkways should be in good repair, clean, and free of obstacles.

20.14. ADJACENT GROUNDS

Adjacent grounds are to be kept free of holes and/or debris. Proper drainage that does not cross walkways should be provided. Snow and ice are to be removed to eliminate interruptions of safe and orderly passage for equipment and pedestrians.

20.15. CORD MANAGEMENT

Cord management is extremely important for the safety of our employees and maintenance of our equipment.

- Always plan your work to ensure you run your cord the shortest distance to your operation;
- Keep cords organized to prevent any tripping hazards;
- Use rubber cord mats when cords are in the way of an access point;
- With poor weather conditions, keep cords elevated off ground with cord stands or cord trees;
- Make sure to inspect your cords for any damage and tag out the cord if any damage is discovered.

20.16. ILLUMINATION

All walkways and work areas will be free of obstacles and will have adequate lighting during the evening hours.

21. LADDERS

21.1. GENERAL PROVISIONS

- A ladder must be provided for workers where there is a break in access elevation of 18 inches or more with no ramp, runway or embankment.
- When there is only one point of access between levels, it must be kept clear to allow free passage by workers.
- A double-cleated ladder or two or more ladders must be provided when ladders are the only means of access for 25 or more employees or when a ladder serves simultaneous two-way traffic.
- Ladder rungs, cleats and steps must be parallel, level and uniformly spaced.
- Ladders must not be tied or fastened together to create longer sections unless they are specifically designed for such use.
- Ladders shall not be used in a horizontal position as platforms, runways, or scaffolds.
- Aluminum ladders are not allowed for use on any Kiewit projects. This includes all subcontractors.
- All portable ladders use on Kiewit project must be CSA certified.
- As part of the orientation training on each project, workers are provided training on ladder safety.

21.2. FIXED LADDERS

- Must support the number and position of concentrated loads of 250 pounds which are expected to be used on the ladder,
- Must be capable of supporting at least two loads of 250 pounds each, concentrated between any two consecutive ladder attachments.
- Must be capable of supporting anticipated loads caused by ice buildup, winds, rigging and impact loads resulting from the use of ladder safety devices.
- Each step or rung must be capable of supporting a single concentrated load of at least 250 pounds applied in the middle of the step or rung.

21.3. DESIGN AND CONSTRUCTION REQUIREMENTS FOR LADDERS

Type of ladder	Required Distance Between Rungs
Portable ladders (except stools and trestles)	Not less than 10" or more than 14"
Step stools	Not less than 8" or more than 12"
Extension trestle ladders (base section)	Not less than 8" or more than 18"
Extension trestle ladders (ext. section)	Not less than 6" or more than 12"

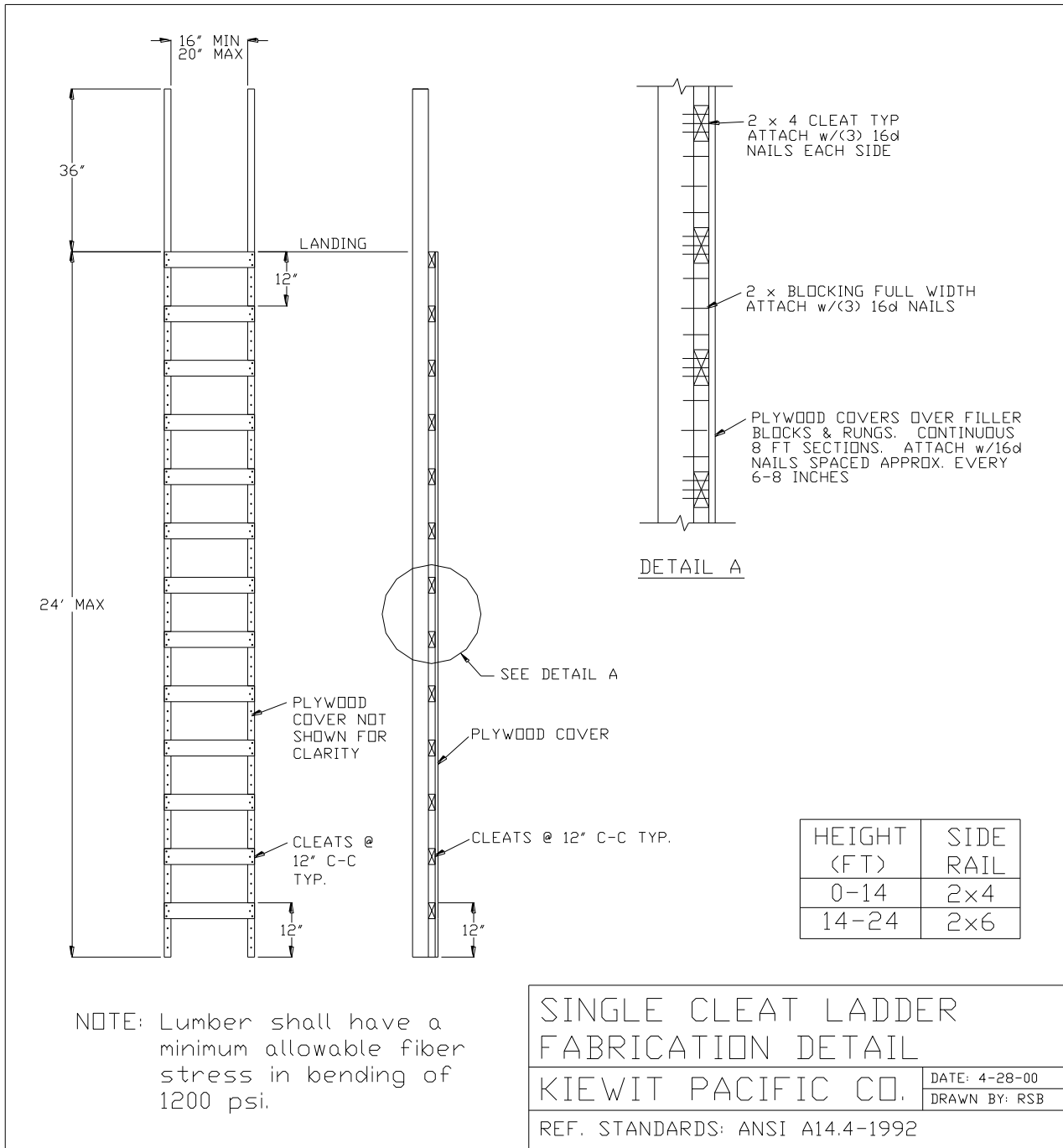
21.4. JOB-MADE LADDER REQUIREMENTS

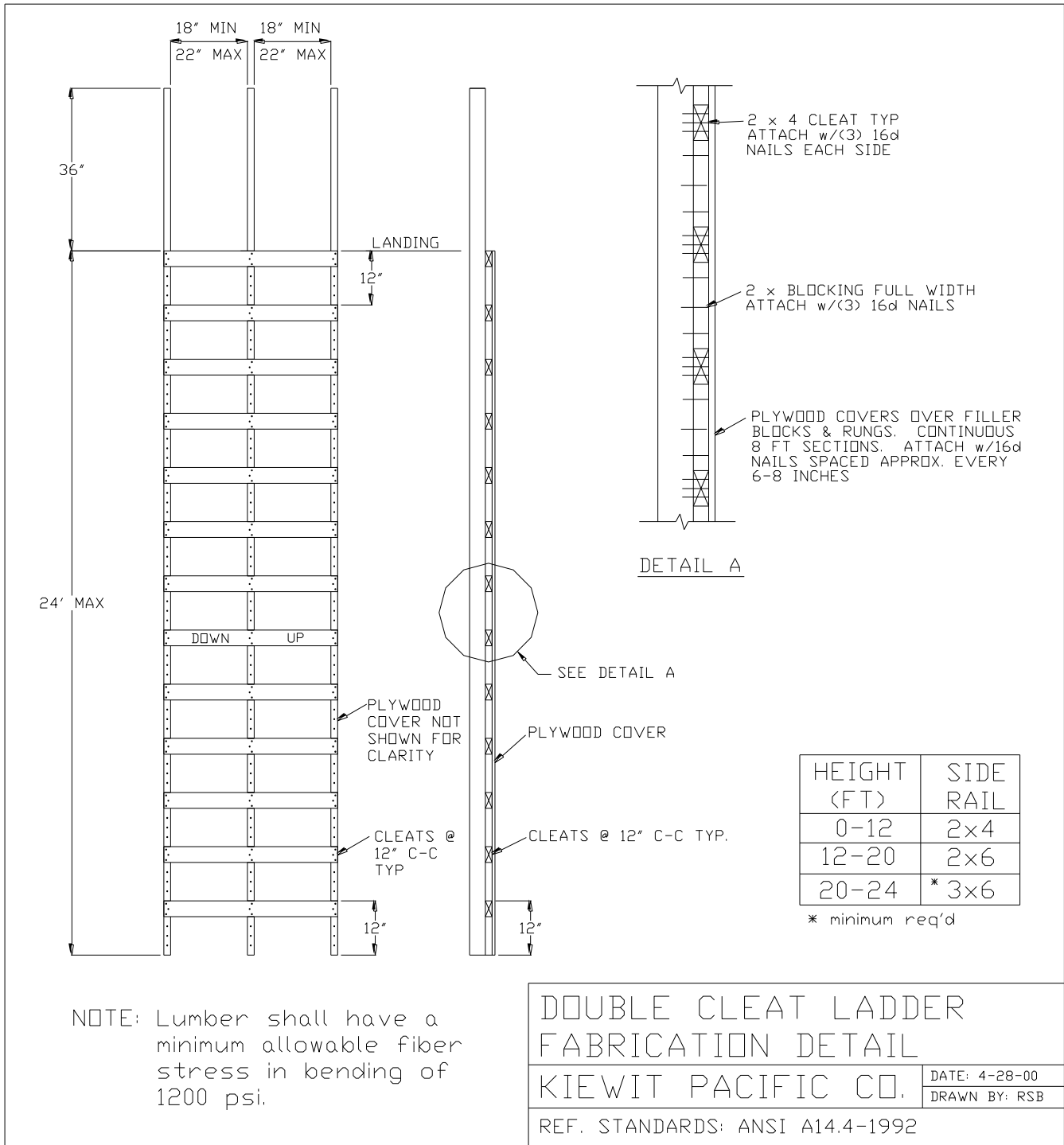
- Single-Cleat Ladder
- For use by 24 or fewer employees; shall not exceed 30 feet in length.
- Width shall be 15 to 20 inches at the top; side rails shall be parallel or flared top to bottom not more than ¼ inch for each two feet of length.
- 2x4 inch lumber shall be used for side rails up to 16 feet long; 2x6 inch lumber shall be used for ladders 16 to 30 feet long.
- Double cleat ladders shall not exceed 24 feet in length.

Length of Cleat (inches)	Width (inches)
Up to and including 20"	3 1/2
Over 10" and up to and including 30"	3 3/4

Wood materials acceptable for ¾ inch thick cleats:

- | | |
|-----------------|-----------------------|
| • Oregon ash | • Locust |
| • Pumpkin ash | • Hard maple |
| • White ash | • Red maple |
| • Beach | • Red oak |
| • Birch | • White oak |
| • Rock elm | • Pecan |
| • Soft elm | • Persimmon |
| • Hackberry | • Southern yellow pin |
| • Hickory | • Tamarac |
| • Western larch | |





21.5. LADDER SAFETY PRACTICES

- When portable ladders are used to access an upper landing, side rails must extend at least three (3) feet above the upper landing so an employee can walk through the ladder by gripping the side rails while stepping onto the landing. *It is forbidden to perform work from the top three rungs of an extension ladder.* When an extension is not possible, the ladder must be secured at the top to a rigid support that will not deflect and a grasping device. Non-self-supporting ladders must be angled so that the horizontal distance from the top support to the toe of the ladder is ladder at a 4:1 ratio.
- Ladders must be maintained free of oil, grease, and other slipping hazards.
- Ladders must not be loaded beyond the maximum intended load or beyond the manufacturer's rated capacity.
- Ladders must be used only for the purpose for which they were designed.
- Ladders must not be used on slippery, unstable and uneven surfaces unless secured or slip-resistant feet are used to prevent accidental displacement. Slip-resistant feet must not be used as a substitute for care in placing, lashing or holding a ladder.
- Ladders placed in passageways, doorways or driveways, must be barricaded to keep the activities or traffic away from the ladder.
- The area around the top and bottom of ladders must be kept clear of debris and obstructions.
- The top of a non-self-supporting ladder must be placed with the two rails supported equally unless it is equipped with a single support attachment.
- Ladders must not be moved, shifted or extended while occupied.
- Cross-bracing on the rear section of stepladders must not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- Single-rail ladders must not be used.
- Ladders shall be tied, blocked or otherwise secured to prevent displacement.
- Step ladders are not intended or designed for access.
- Top two steps on step ladders are not for use.
- Step ladders cannot be used for leaning or used without all four legs extended and in use.
- Step ladders maximum length measured along its side rail shall not be more than six (6) meters.
- Stairs, not ladders, must be used for any access five (5) feet or under.

21.6. FIXED LADDER REQUIREMENTS FOR LADDERS 24' AND LONGER

- Side guard rails or vertical life line.
- Self-retracting lifelines with rest platforms every 150 feet or less.
- Cage or well and multiple ladder sections, each section not exceeding 50 feet.
- Anyone working off ladders must be tied off.
- Three-point contact must be maintained when ascending and descending a ladder.

21.7. LADDER INSPECTION AND REPAIR

- Ladders must be inspected periodically (and before use) for visible defects and after any situation that may have affected their safe use.
- Portable and fixed ladders with structural defects must be withdrawn from service immediately. A ladder may be removed from service by cutting up, destroying and blocking it with a piece of plywood or other attachment that spans several rungs.
- Ladder repairs for job-built ladders must restore the ladder to condition meeting its original design criteria before the ladder is returned to service.

21.8. STAIRWAYS

- All parts of stairways must be free of hazardous objects (such as protruding nails).
- Slippery conditions on stairways must be eliminated.
- OH&S requires that stairways with four risers or more, or rising more than 30 inches (whichever is less), must be equipped with at least one handrail and one stair rail along each unprotected side or edge. Design and construction specification will be as follows:
 - Stair rails must be at least 36 inches high; handrails shall be between 36 and 42 inches. When the top edge of a stair rail also serves as a handrail, its height cannot be more than 37 inches nor less than 36 inches. For all such height provisions, you must measure from the support surface of the stair rail to the surface of the tread in line with the face of the riser at the forward edge of the tread.
- In order to protect employees from falling off stairs to lower levels, stair rails must include mid-rails, screens, mesh, intermediate vertical members or equivalent intermediate structural members between the top rail and the stair steps.

Note: Mid-rails must be located halfway between the top edge of the stair rail and the stair steps. Screens or mesh must extend from the top rail to the stair step and along the entire opening between top rails supports. Intermediate vertical members and other equivalent structural members must not be more than 19 inches apart.

Handrails and the top stair rail must withstand a force of at least 250 pounds applied within two (2) inches of the top edge in any downward or outward direction.

Additional measures for safeguarding employees:

- Surfacing handrails and stair rails to prevent injury from punctures or lacerations and from snagging clothes.
- Hand holds for grasping to avoid falling.
- Construction that does not create a projection hazard.
- Guardrail protection of stair sides and landing.
- Pull nails used for holding rails temporarily.
- In wooden construction, the posts must be at least 2x4 inch nominal material spaced not to exceed eight (8); top rails must be smooth with rounded corners and not less than 2x4 inch nominal material. Single mid-rails may not be less than 2x4 inch nominal material and must be installed on the contact side of the guardrail.
- Where toe boards are required, they shall be constructed of wood, concrete, metal or other suitable material. The top of the toe board shall not be less than 3 ½ inches above the platform, walkway or other working level and the bottom clearance shall not exceed ¼ inch.
- All guardrails, connections and anchorage, shall be designed for a live load of 250 pounds per linear foot applied either horizontally or vertically downward at the top rail.
- Double head/duplex nails are not permitted on handrails and/or guardrails or stairs.

21.9. WHEELBARROW RUNWAYS

- Ramps or runways erected for the use of employees shall be not less than 20 inches in width and shall be secured and secured at each end to prevent ramp from sliding. Platform planks shall be firmly cleated together.

21.10. FOOT TRAFFIC

- Ramps or runways erected for the use of employees shall not be less than 20 inches in width and shall be secured and supported so as to avoid deflection and springing action.
- Securely fastened cleats or other means shall be used on inclined runways sloped two (2) feet in 10 feet or more to improve the footing. Where cleats are used, they shall be eight (8) inches or more in length and not more than 16 inches apart.
- When planks are used for raised walkways, runways or sidewalks, they shall be secured against displacement. Planks shall be uniform in thickness and all exposed ends shall be provided with beveled cleats to prevent tripping.
- All foot traffic areas must be free of debris and rubble to prevent harm to workers. This includes but is not limited to; concrete debris, rebar, and lumber or cut off material.
- Pathways through work areas should be clearly defined and used in the work plans and job hazard analysis to reduce the risk of injury.

21.11. ACCESS AND EGRESS FROM TRENCHES AND EXCAVATIONS

- A stairway, ladder, ramp, or other safe means of egress shall be located in trench excavations that are four (4) feet or more in depth so as to require no more than 25 feet of lateral travel for employees. Ramps will be built at a 4:1 ratio.

22. COMPRESSED GAS CYLINDERS

22.1. PROCEDURE

The purpose of this procedure is to establish guidelines which ensure that proper storage, handling, and use of compressed gas cylinders are practiced and maintained at project sites.

This Procedure will encompass all compressed gas cylinders to include, oxygen, liquid oxygen, nitrogen, argon, helium, carbon dioxide, liquid carbon dioxide, hydrogen, acetylene, ethylene oxide, liquefied petroleum gas, (L.P. gas) ammonia, and specialty gases.

22.2. GENERAL PROVISIONS

This Procedure applies to the storage, the handling and the use of compressed gas cylinders.

22.3. COMPLIANCE

- Compressed gas cylinders must be properly stored in conformity with the required guidelines in this procedure.
- Employees who use compressed gas cylinders must be properly trained and understand and follow safe work practices required by the guidelines in this procedure.
- Employees using compressed gas cylinders must be provided the proper personal protective equipment (PPE) when needed.
- All compressed gas cylinders are properly labeled and have current Safety Data Sheet (SDS) for each cylinder.

22.4. DEFINITION OF COMPRESSED GAS CYLINDER

A compressed gas cylinder is any cylinder specifically designed to contain gases under pressure of greater than one atmosphere, and having the capability of dispensing the gas by the means of a control valve mechanism to ensure the safe and proper use of the gas at a point of operation.

22.5. TYPES OF GASES COMPRESSED INTO CYLINDERS

- A. **Oxygen** is a colorless, odourless, and tasteless gas. Oxygen will not burn, but it supports and can greatly accelerate combustion.
- B. **Liquid: Oxygen, Carbon Dioxide, Hydrogen** Gases in liquid form are extremely cold and accidental contact with eyes or skin may cause severe frostbite.
- C. **Nitrogen, Argon, Helium and Carbon Dioxide:** These gases are inert, colorless, odourless and tasteless gases. These four gases can cause asphyxiation and death in confined, poorly ventilated areas.
- D. **Hydrogen** is a colorless, odourless and tasteless gas. Hydrogen is a flammable gas. A mixture of hydrogen with oxygen or air in a confined area will explode if ignited by spark, flame or other source of ignition. Hydrogen flames are virtually invisible.

- E. **Acetylene** is a colorless gas with a distinctive garlic-like odour. It is also a flammable gas. A mixture of acetylene with oxygen or air in a confined area will explode when brought in contact with a flame or other source of ignition.
- F. **Ethylene Oxide** is a colorless, flammable irritating liquid and gas. It liquefies at 7 p.s.i.g. at 70 degrees F. and its liquid form can be found in a cylinder or drum. Ethylene oxide is flammable. Ethylene oxide vapour will explode when exposed to common igniters. Ethylene oxide is toxic. The liquid will cause severe eye and skin injury and the gas will cause eye irritation. Ethylene oxide vapours should not be inhaled. Over exposure by inhalation may result in temporary paralysis and pulmonary irritation.
- G. **Specialty Gases** are special purpose liquids and gases. Gases are multi-component mixtures in any compatible combination. They include atmospheric and chemical gases and volatile liquids. Some specialty gases have flammable, toxic, corrosive, oxidizing, and other hazardous properties which can cause serious or fatal injury and property damage if proper safety precautions are not followed. Some toxic specialty gases can result in fatal injuries even/ (if) in very low concentrations. Other specialty gases can cause serious eye or skin injury upon bodily contact. Some specialty gases are flammable and can result in fire or explosions.
- H. **Ammonia** is a colorless, pungent gas, NE3 composed of nitrogen and hydrogen. The effects of overexposure: Eyes – can cause severe irritation, redness, tearing, and blurred vision; Skin – vapours can cause irritation of nasal and respiratory passages. Swallowing – results in severe damage to mucous membranes.

22.6. SAFETY PRECAUTIONS

- A. Oxygen, nitrogen, argon, helium, carbon dioxide, hydrogen, acetylene, ethylene oxide and specialty gases, have properties that can cause serious accidents, injuries, and even death if proper precautions and safety practices are not followed. Therefore, be certain to use the applicable safety precautions described in this procedure during handling and use of these gases. Gas equipment manufacturers-operating instructions are to be followed exactly.
1. Read the label on all cylinders before use to identify the cylinder contents. If the label is not legible or is missing, do not assume that the cylinder contains a particular gas, but return the cylinder to the gas supplier. Observe all safety precautions set forth on the cylinder label.
 2. Secure all cylinders to suitable cylinder carts, benches, walls, posts or racks so that they cannot be knocked or pulled over accidentally.
 3. Cylinders containing liquid oxygen, nitrogen, argon, helium, or hydrogen must be kept in an upright position and secured in that position to prevent them from being knocked over. Cylinders must not be tipped over or dropped and must be moved with a cylinder hand truck.
- B. The proper personal protective equipment (PPE), particularly for liquid oxygen, liquid carbon dioxide and liquid hydrogen, shall be worn by employees who handle and use compressed gas cylinders. Persons preparing cylinders for use shall wear gloves constructed of impervious materials, rubber aprons, safety glasses with side shields and, if deemed necessary, a complete face shield.

- C. Frostbite – Liquid gases such as oxygen, hydrogen and carbon dioxide, may cause severe frostbite to the skin or eyes. Do not touch frosted pipes or valves. If accidental exposure to liquid gases occurs, the exposed person shall immediately consult a physician or occupational nurse. If a physician/nurse is not immediately available, warm the areas affected by frostbite with water that is near body temperature and then seek medical attention.

22.7. STORAGE OF COMPRESSED GAS CYLINDERS

- Cylinders stored inside and outside of buildings shall be stored in well-protected, well-ventilated location, at least twenty (20) feet from highly combustible materials such as oil or fuel.
 - Cylinders shall be stored only in assigned areas and secured to prevent tipping.
 - Assigned storage spaces shall be located where cylinders will not be knocked over or damage by passing or falling objects or subject to tampering by unauthorized persons.
 - Empty cylinders shall have their valves closed.
 - Acetylene cylinders shall be stored valve end up.
 - Valve protection caps (where the cylinder is designed to accept a cap) shall always be in place, hand tight, except when cylinders are in use or connected for use.
 - Fuel gas cylinder storage (LP gas) inside a building, except for those cylinders in actual use or attached ready for use, shall be limited to a total gas capacity of 2,000 cubic feet or 300 pounds of liquefied petroleum gas.
 - Cylinders shall be kept away from radiators and other sources of heat.
 - Full cylinders of oxygen and fuel gas should be used in rotation as received from the supplier.
- A. Compressed gas cylinders must be double chained to a stable structure. The first chain should be placed about 1/3 of cylinder height from the top.
- B. Do not use table/bench clamps to secure the cylinders. Strap the cylinders with a maximum of 3 cylinders clustered together. Secure cylinders of equal sizes together to avoid chain problems.
- C. Do not store cylinders on transportation carts.
- D. Compressed gas cylinders should be stored in an upright position; unless, the cylinder is designed for use in horizontal position. In any case, gas cylinders must be properly stored and secured.



22.7.1. Oxygen Cylinders

Oxygen cylinders are stored separately from fuel gas cylinders or combustible materials (especially oil or grease) by minimum distance of 20' or by a noncombustible barrier at least 5' high with a fire resistance rating of at least 1/2 hour. The barrier must be at least 18' above the tallest cylinder.



22.8. REGULATORS

- Gas cylinder regulators must be removed from the cylinders when not in use and must be replaced with a safety cap;
- Never force the cap or regulator. The cap should only be hand tight;
- Never use a cylinder without a regulator. Always use the correct pressure regulator;
- After attaching the regulator and before the cylinder is opened, check if the regulator is completely attached. Do not release the compressed gas thru the regulator abruptly;
- Never force the cap or regulator. The cap should only be hand tight;
- Remove flush back arrester before returning the cylinder to storage area;
- Cylinders should not be exposed to excessive dampness or to corrosive chemical or fumes;
- Gases are not to be transferred from one cylinder to another. Never try to refill compressed gas cylinder by yourself;

22.8.1. Before using a cylinder:

- Slowly crack the valve to clear dust or dirt;
- Make sure that the opening is not pointed towards anyone;
- Additional precautions must be taken when fixture or flammable gas cylinders are used. Do not stand in front of the regulator gauge glass when opening the valve.



22.8.2. Guidelines

- Never strike an electric arc on the cylinder;
- Never use leaking, corroded, or damaged cylinders. Remove all leaking cylinders from service and contact the supplier for return of cylinders;
- Avoid dropping and striking the cylinders together. Use the cradle for hoisting, never a lifting magnet or a sling;
- Avoid dragging, sliding, or rolling the cylinders;
- Do not lift the cylinder by the cap

22.9. CYLINDER MARKINGS AND INSPECTION

- A. Compressed gas cylinders shall be legibly marked for the purpose of identifying the gas content with either the chemical or the trade name of the gas. These markings shall be by means of stencilling, stamping or labelling and shall not be readily removable. Whenever practical, the markings shall be located on the shoulder of the cylinder.
- B. Compressed gas cylinders will be inspected twice per calendar year in accordance with the following guidelines. Any cylinders failing to meet these guidelines will be removed from service.
 - 1. **Dents** – Dents are deformations caused by the cylinder coming in contact with a blunt object in such a way that the thickness of metal is not normally impaired. Only cylinders that have major dents that do impair the metal wall will be removed from service.
 - 2. **Cuts, gouges and digs** – These are deformations caused by contact with a sharp object in such a way as to cut into or upset the metal of the cylinder, decreasing the wall of thickness at that point. Cylinder that have cuts, gouges and digs that decrease the thickness of the metal wall will be removed from service.
 - 3. **Corrosion and pitting** – Cylinders that have corrosion and pitting in the cylinder involving the loss of wall thickness caused by a corrosive media will be removed from service.
 - 4. **Bulges** – Cylinders which have definite bulges will be removed from service.
 - 5. **Neck** – The cylinder neck will be examined for serious cracks, folds and flows. Neck cracks are determined by testing with a soap solution. Cylinders found to have a serious neck crack will be removed from service.
 - 6. **Foot-Ring and Head-Ring** – Cylinders will be removed from service when the head-ring and/or foot-ring becomes so distorted that they no longer 1) maintain the cylinder in a normal upright position or 2) when the head-ring becomes so distorted it no longer adequately protects the valve and the neck area of the cylinder.
- C. Cylinders valves, couplings, regulators, hoses and other apparatuses shall be kept free from oily or greasy substances.

23. SCAFFOLDING

23.1. PURPOSE

This procedure establishes the requirements for Scaffolding pursuant to OH&S regulations and to CSA Standard CAN/CSA-S269.2-M87 (R1998).

23.2. SCOPE

All types of scaffolding will be used throughout construction activities. Suitable scaffolding will be erected, used and dismantled during construction. Scaffold use will require identification of hazards and also supervision and training by a competent person.

23.3. RESPONSIBILITIES

1. Project Manager

The Project Manager is responsible for implementing the scaffolding procedure.

2. Competent Person

A competent person will oversee the scaffold selection, erection, use, movement, alteration, dismantling, maintenance, and inspection. The competent person will be knowledgeable about proper selection, care, and use of the fall protection equipment. Additionally, the competent person will assess hazards.

3. Employees

Employees will comply with all applicable guidelines contained in this safety policy and procedure. Employees will report damaged scaffolds, accessories, and missing or lost components.

23.4. SAFETY SCAFFOLD ERECTION AND USE

Safe scaffold erection and use is important in minimizing and controlling the hazards associated with their use. Scaffold work practices and rules should be based on:

- Sound design
- Selecting the right scaffold for the job
- Assigning personnel
- Fall protection
- Guidelines for proper erection
- Guidelines for use
- Guidelines for alteration and dismantling
- Inspections
- Maintenance and storage

23.5. TRAINING

All users of scaffold shall undergo training in the subject matter.

Company designated “competent person(s)” will receive training regarding the selection of scaffolds, recognition of site conditions, recognition of scaffold hazards, protection of exposed personnel and public, repair and replacement options, and requirements of standards.

23.6. TAGGING

All scaffolds will be inspected weekly to ensure safety and integrity of structure. A tagging system will be used to relay scaffold information to the users. No worker is to access the scaffold without reviewing the scaffold inspection tag to know its deficiencies. Workers must not use a scaffold that has an expired inspection tag or no tag at all.

The scaffold will be tagged as follows for general use:

<i>Tag</i>	<i>Instructions for Use</i>
NO TAG / OUTDATED TAG	Do Not Use
RED	Do Not Use
YELLOW	Hazards Exist – Tag will identify hazards
GREEN	Good – Safe to use

- Best Practice: Use a sign to indicate when fall protection is required
- Scaffold tags must be signed off at least every shift by a competent person.

23.7. SAFETY REQUIREMENTS FOR SCAFFOLDS

Only engineered scaffold parts and systems shall be used.

Only individuals designated as competent shall erect, modify, dismantle, or move scaffolding.

A competent person will inspect scaffolds and tagging for completeness prior to allowing workers to use them.

Scaffolds shall be anchored and braced to prevent swaying, tipping, or collapsing.

All scaffolds will be equipped with a guardrail, mid-rail, toe board, and be completely planked from side to side. This requirement is to be met regardless of the height of the scaffold above the ground or adjacent working surface. Gaps between boards or planking on a scaffold will not exceed 1” except where necessary to fit around uprights, brackets, piping, etc. Scaffold edges more than 14” from a solid surface must have a guardrail, mid-rail, and toe board.

Guardrails must be 42" above the walking/working surface and capable of withstanding an outward/downward force of 200lbs. Mid-rails must be installed midway between the top edge of the guardrail (at least 21") and the walking/working surface and capable of withstanding an outward/downward force of 150lbs. The toe board must be 4" above the walking/working surface and capable of withstanding an outward/downward force of 50lbs.

Scaffolds will have adequate access provided. This may be accomplished by use of ladders, ramps, stair towers, etc. Ladders will be secured at both the top and bottom and extend three (3) feet above the landing. Swing gates or a similar method of entry onto the scaffold without climbing over the railing will be provided on each scaffold. On ladders greater than 20 feet, ladder climbing devices (or retractable lanyards) will be provided. Fall Protection apparatuses will be reinforced to withstand the weight of the fall.

Planking will be secured with cleats or 9-wire to avoid slippage during use. All planking must be scaffold grade or equivalent, as recognized by approved grading rules for the wood used. The maximum permissible span for 2" x 9" or wider planks is shown in the following:

- a. The maximum permissible span for 1-1/4 X 9 inches or wider plank of full thickness shall be 4 feet with medium duty loading of 50 p.s.i.
- b. All planking or platforms must be overlapped (minimum 12 inches) or secured from movement. Any hole in a platform larger than 6" will be covered with suitable material and secured to prevent accidental removal.
- c. Scaffold plank must extend over their end supports not less than 6 inches or more than 18 inches. Metal components (planking) must be securely fastened in place over the supporting members by their hooks built in to the unit.

The height of rolling scaffolds may not exceed 4 times the minimum base dimension unless the scaffold is secured or appropriate outriggers are provided. Workers are not allowed on rolling scaffolds during movement. All wheels must be locked before workers are allowed to work on a rolling scaffold.

All scaffolds will be built to meet standards that will enable workers to work without using a harness/lanyard system (green tagged). In those cases where penetrations or missing railing are required to accomplish the work the scaffold will be returned to a "green" tag status as quickly as possible.

If scaffolding members must be used as an anchorage point it may only be done when the Project has documentation from the scaffold manufacturer or an engineer designed set of drawings indicating the scaffold meets all fall protection anchorage point requirements. Anchorage points outside the scaffold must be provided in cases where documentation is not present.

Workers that may need to exit the scaffold to accomplish work in an unprotected area will wear a complete fall protection system.

Ladders, step-stools, boxes, etc. will not be used to extend the reach of workers on a scaffold unless the specific requirements have been met. These requirements include the following:

1. When the ladder is placed against a structure which is not a part of the scaffold, the scaffold shall be secured against the sideways thrust exerted by the ladder;
2. The platform units shall be secured to the scaffold to prevent their movement;
3. The ladder legs shall be on the same platform or other means shall be provided to stabilize the ladder against unequal platform deflection, and
4. The ladder legs shall be secured to prevent them from slipping or being pushed off the platform.

Areas at the base of scaffolds where ladder access is required will be kept clear of potential tripping hazards such as cords, leads, building material, and scrap.

All cords and leads used on scaffolds will be inspected to ensure faulty wiring does not energize the scaffold. Cords and leads will not be secured by metal materials such as 9 wire, tie-wire, welding rod, etc.

23.8. MINIMUM REQUIREMENTS FOR SCAFFOLDS NEAR OVERHEAD POWER LINES

Scaffolds must be separated from overhead power lines using the following minimum requirements:

22.8.1. Insulated Lines

Voltage	Minimum Distance	Alternatives
Less than 300 volts	3 feet (0.9m)	None
300 volts to 50 kV	10 feet (3.1m)	None
More than 50 kV	10 feet (3.1m) plus 0.4 inches (1.0cm) for each 1 kV over 50 kV	2 times the length of the line insulator, but never less than 10 feet (3.1m)

22.8.2. Uninsulated Lines

Voltage	Minimum Distance	Alternatives
Less than 50 kV	10 feet (3.1m)	None
More than 50 kV	10 feet (3.1m) plus 0.4 inches (1.0cm) for each 1kV over 50kV	2 times the length of the line insulator, but never less than 10 feet (3.1m)

23.9. DROP PROTECTION

Scaffolds installed above high-activity areas will have drop protection installed between the toe board and mid-rail.

Workers will not work on scaffolds under swinging loads unless those loads are being delivered to the workers on the scaffold.

Areas below scaffold where operations have the potential to drop objects will be barricaded to prevent entry into the potential drop area.

23.10. SWING STAGE SCAFFOLD

Kiewit is dedicated to the prevention of bodily injuries in all aspects of work performed by its employees. This written Swing Stage Safety Policy supplements our standard safety policy and fall protection programs by providing specific uniform policies and procedures concerning the erection and use of swing stage scaffolds by all employees.

This program ensures that each employee who erects or uses swing stage scaffolds are properly trained in the erection and operation of this equipment. This program also ensures that each employee who uses swing stage scaffolds understands the proper use of personal fall arrest systems (PFAS) and other safe guards in place to protect employees. The Use of swing stage scaffolds by untrained employees is prohibited.

23.10.1. Set-up

- Must be erected under the supervision of a competent person.
- Must be properly installed and commissioned in accordance to manufacturer specifications.

23.10.2. Inspection

- Must be inspected at a minimum of weekly, by a competent person.
- Must be re-inspected any time conditions change that may affect the structural integrity of the scaffold.

23.10.3. Training

- All training must be conducted by a qualified person.
- Employees must be trained in the proper care and use of the swing scaffold.
- Employees must be trained in the hazards associated with the use of swing scaffold.

23.10.4. Operation

- Designated operators must be competent in the safe operating procedures of the equipment.

23.11. REFERENCE INFORMATION

[Scaffold Tags](#)

[Example "Fall Protection Required" Sign](#)

24. BARRICADES AND TAGS

24.1. PURPOSE

All projects shall protect and warn employees of known hazards or areas in which an increased risk of injury is present through the use of Danger and Caution Barricades.

24.2. SCOPE

This procedure applies to all Kiewit Infrastructure Canada sponsored projects.

24.3. RESPONSIBILITIES

24.3.1. Project Manager

The project manager will be responsible for implementation of this procedure.

24.3.2. Superintendent

The Superintendent's responsibilities include:

- Identify type of protection needed.
- Coordinate with crews to ensure that necessary barricades, signage, and/or tags are installed properly.

24.4. PROCEDURE

All project employees shall receive ongoing training on the proper use of Danger and Caution barricades and tags on the project on an as needed basis.

Barricades must enclose the affected area to keep unauthorized personnel out of the area.

Signs/Tags must be visible on all sides of the barricade.

Barricades must be continually maintained.

All "Caution" and "Barricade" tags will have all required information such as:

- Name of who put it up
- Contact information of person responsible for tag
- Why (What is the hazard to look out for?)
- Date it was put up

24.5. WHEN TO USE RED DANGER TAPE

Use red danger tape to prevent unauthorized entry into an area that poses imminent danger or overhead hazards, such as lifting or, hoisting materials. Working overhead always requires red tape because of dropped object potential. The red tape must cover the drop zone below and a potential ricochet area. Workers must obtain permission from the person identified on the tag to enter a red-barricaded (danger) area.

Red danger tape is not used for:

- Head bangers;
- Stored Materials;
- Minor hazards.

24.6. WHEN TO USE YELLOW CAUTION TAPE

Use yellow tape to prevent unnecessary traffic into areas that pose minor hazard to personnel:

- Stored materials;
- Head bangers;
- Slip or trip hazards;
- Minor hazards.

Yellow Tape is not used for

- Overhead work;
- Open holes;
- Dropped Object potential;
- Fully restricting access in any way.

Yellow barricades (caution) may be crossed without permission. Employees must know the hazards before entering.

24.7. GENERAL PROVISIONS

Control zones are required to be removed at the end of shift unless there is an immediate hazard within the area. At the start of shift the control zone must be inspected to ensure access cannot be gained from any direction and ensure legibility on all tags.

Upon completion of the work and when all hazards are eliminated the red danger tape must be completely removed and disposed of in an appropriate location.

Permission must be obtained from the Supervisor of the operation to take down any control zones.

Unauthorized entry into a red taped control zone area or unauthorized removal of the red tape or barrier will be subject to accountability.

Work above an active haul road should not use be marked with red danger tape. Signage must to be posted on either side of the overhead work on the haul road. In addition, a spotter must be utilized to stop.

24.8. TRAILER LOADING AND OFFLOADING

A JHA must be in place for everyone involved in loading and offloading operations.

All personnel involved in trailer loading/offloading operations must be trained on the loading/offloading expectation;

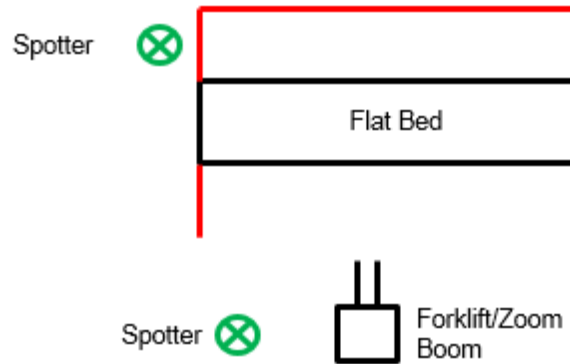
- Trailer Loading/Offloading - [Video](#)
- Trailer Loading/Offloading - Designated Person Checklist
 - Trailer Inspection
 - Accessing the deck (utilize ladders)
 - Truck Drivers
 - Exclusion Zones
 - JHA's
 - Cranes

24.8.1. Barricading Trailers Exclusion Zones / Red Tape Rule

Red tape being used for unloading/loading operations is to be treated the same as red tape anywhere else. All sides must be tagged and permission must be obtained before entry.

Unloading from Both Sides

- When unloading tractor trailer or flatbed from one or both sides, use two spotters;
- Opposite side to be fully enclosed with barricade tape;
- Working side to be barricaded to prevent access between flat bed and equipment.
Spotters to be utilized on both sides.

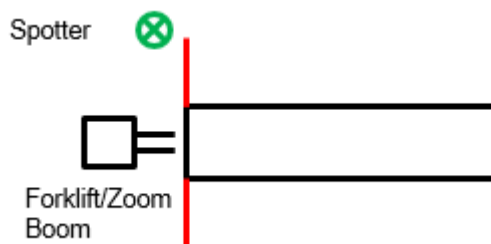


Note: Spotter should stand to the left side (driver's side) of the equipment.

Barricade tape should be at least 10 ft. out from flat bed or twice the height of the material being unloaded, whichever is greater.

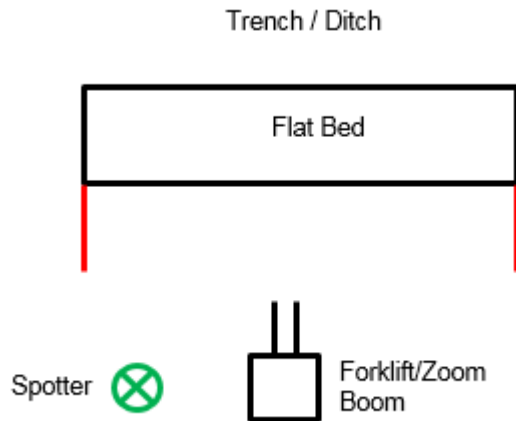
Unloading from an Enclosed Trailer or Van

For enclosed trailer or van loads, the barricade is to be extended 10' on both back corners to prevent traffic near the offloading operation.



Unloading from One Side

- When unloading a tractor trailer or flatbed from one side on site, use one spotter when the opposite side is not accessible, i.e. if there is a ditch or trench;
- The working side is to be barricaded to prevent access between flat bed and equipment.



Note: The spotter should stand to the left side (driver's side) of the equipment.

Barricade tape should be at least 10' out from flat bed, or twice the height of the material being unloaded, whichever is greater.

25. COLD WEATHER WORK PROCEDURE

25.1. INTRODUCTION

For the safety of our staff and craft working in the field, Kiewit has instituted a cold weather Procedure during the winter season. Any time conditions are consistent with the below parameters, non-essential fully exposed work will cease.

25.2. PROCESS

Supervisors shall exercise due diligence for personal safety when assigning work in extreme cold, and shall ensure that all employees are familiar with first aid procedures for frostbite and hypothermia.

1. Employees shall adopt buddy systems for personal safety in extreme cold.
2. Project Management will evaluate working conditions on a regular basis throughout the day if the ambient temperature or wind chill temperature reaches minus 30°C.
3. All crane operations will be reduced or ceased when temperatures are reached as specified under Cold Weather Hoisting Procedure/Crane Procedure.
4. In regards to all crane procedures in cold weather, see Kiewit Crane procedures.
5. Refer to Table 1 for dangers of exposed flesh during cold weather and Table 2 for recommended warm-up during extreme cold conditions.
6. All Company vehicles equipped with a block heater shall be plugged in wherever possible when the temperature reaches minus 20°C.
7. All equipment shall have a warm-up period to allow hydraulics and major components to warm-up before work commences. This will be determined by the maintenance superintendent on that day depending on the temperatures.
8. Please refer to manufacturing manuals for all man-lifts when the ambient temperature drops below -30°C. Ensure all man-lifts are plugged in when not in use during cold weather.

25.3. GENERAL PROVISIONS

- Outline the requirements for appropriate supervisory and employee due diligence.
- Set the limitations regarding work in extreme cold.
- Cold weather terms

25.3.1. Buddy System

- A system of organizing employees into pairs or work groups
- The supervisor is responsible for establishing buddy system in cold weather conditions.
- Workers in assigned groups must watch out for one another and be alert for signs of hypothermia.

25.3.2. Guidelines

The following suggestions will promote personal safety in extreme cold:

- Footwear

Remember that, in addition to any occupational-related selection criteria, winter footwear must protect against the cold and wet and must also provide traction to help prevent slips and falls. Know your outdoor work environment and decide whether you need over-the shoe or over-the-sock footwear for warmth and traction.

- Clothing

Cold weather clothing should maintain layers of warm air around the body. Clothing should be worn in a number of layers so that one or more items of clothing can be discarded when doing heavy work. The outer layer should be wind-proof. Gloves should also be worn in layers. Mitts are the warmest. Protection of the head is essential.

- Keeping Dry

Wet clothing will conduct heat away from the body. Wear clothing in layers that will permit you to remove outer coverings to avoid overheating and excessive perspiration.

- Avoiding the Wind

Avoid exposure of the face to the wind. Wear a balaclava or work on the lee side of buildings or trees.

- Stay Safe

Limit the length of time you spend in extreme conditions as per the attached chart. Use buddy systems.

- Avoid Fatigue

It is recommended to take rest periodically in a sheltered, heated area.

- Avoid Tobacco

Avoid tobacco in any form, because nicotine decreases blood flow and increases the possibility of cold injury.

25.3.3. Batteries

- A battery with 50% charge will freeze at -27°C.
- A battery with 100% charge will freeze at -29°C.
- At -17°C a fully charged battery retains 40% of its cranking power.
- At -29°C a fully charged battery retains 18% of its cranking power.

25.3.4. First Aid for Frostbite

1. Seek medical attention.
2. If possible, move the victim to a warm area.
3. Gently loosen or remove constricting clothing or jewellery that may restrict circulation.
4. Loosely cover the affected area with a sterile dressing. Place some gauze between fingers and toes to absorb moisture and prevent them from sticking together.
5. Quickly transport the victim to an emergency care facility.
6. DO NOT attempt to warm the affected area on site (but do try to stop the area from becoming any colder) - without the proper facilities, tissue that has been warmed may refreeze and cause more damage.
7. DO NOT rub area or apply dry heat.
8. DO NOT allow the victim to drink alcohol or smoke.

25.3.5. First Aid for Hypothermia

Hypothermia is a medical emergency. At the first sign, find medical help immediately. The survival of the victim depends on their co-workers' ability to recognize the symptoms of hypothermia. The victim is generally not able to notice his or her own condition.

First aid for hypothermia includes the following steps:

1. Seek medical help immediately. Hypothermia is a medical emergency.
2. Ensure that wet clothing is removed.
3. Place the victim between blankets (or towels, newspaper, etc.) so the body temperature can rise gradually. Body-to-body contact can help warm the victim's temperature slowly. Be sure to cover the person's head.
4. Give warm, sweet (caffeine-free, non-alcoholic) drinks unless the victim is rapidly losing consciousness, is unconscious, or is convulsing.
5. Quickly transport the victim to an emergency medical facility.
6. Do not attempt to warm the victim on a site (e.g., do not use hot water bottles or electric blankets).

Perform CPR (cardiopulmonary resuscitation) if the victim stops breathing. Continue to provide CPR until medical aid is available. The body slows when it is very cold and in some cases, hypothermia victims that have appeared "dead" have been successfully resuscitated.

Table 1: Exposed flesh dangers in cold weather
Cooling Power of Wind on Exposed Flesh – Wind Chill

Actual Temperature Reading (C)

Estimated wind	10	4	-1	-7	-12	-18	-23	-29	-34	-40	-46	-51
Equivalent Wind Chill Temperature												
Calm	10	4	-1	-7	-12	-18	-23	-29	-34	-40	-46	-51
8	9	3	-3	-9	-14	-21	-26	-32	-38	-44	-49	-56
18	4	2	-9	-16	-23	-31	-36	-43	-50	-56	-64	-71
24	2	-6	-13	-21	-28	-38	-43	-50	-58	-65	-73	-80
32	0	-8	-16	-23	-32	-39	-47	-55	-63	-71	-79	-85
40	1	-9	-18	-26	-34	-42	-51	-59	-67	-76	-83	-92
48	-2	-11	-19	-28	-36	-44	-53	-62	-70	-78	-87	-96
56	-3	-12	-20	-29	-37	-46	-55	-63	-72	-81	-89	-98
64	-3	-12	-21	-29	-38	-47	-56	-65	-73	-82	-91	-100

Table 2: Warm-Up Schedule for working in extreme cold

THRESHOLD LIMIT VALUES WORK/WARM-UP SCHEDULE FOR FOUR-HOUR SHIFT*											
Air Temperature Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx)	°F (approx)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	(Norm breaks) 1		(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4
-29° to -31°	-20° to -24°	(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4	30 min.	5
-32° to -34°	-25° to -29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5	↓ Non-emergency work should cease ↓	
-35° to -37°	-30° to -34°	55 min.	3	40 min.	4	30 min.	5	↓ Non-emergency work should cease ↓			
-38° to -39°	-35° to -39°	40 min.	4	30 min.	5	↓ Non-emergency work should cease ↓		↓ Non-emergency work should cease ↓			
-40° to -42°	-40° to -44°	30 min.	5	↓ Non-emergency work should cease ↓		↓ Non-emergency work should cease ↓		↓ Non-emergency work should cease ↓			
-43° to below	-45° & below	↓ Non-emergency work should cease ↓		↓ Non-emergency work should cease ↓		↓ Non-emergency work should cease ↓		↓ Non-emergency work should cease ↓		↓ Non-emergency work should cease ↓	

25.3.6. Work Stoppage

- Work Stoppage based on workers level of exposure, for example:
- Work Stoppage @ >-34 C Actual Temperature Reading
- Therefore >8 kph wind @ -26 = Work Stoppage
- Work Stoppage based on workers level of exposure, i.e. scaffolders on a build, work stops (fully exposed to elements). Workers conducting tasks inside of buildings, work continues (not exposed).
- Work Stoppage criteria should be consistent with PPE manufacturer usage limitations.

25.4. COLD WEATHER HOISTING

25.4.1. Manitowoc Crawler Cranes

- -15C and Warmer - no restrictions on hoisting operations
- -15C to -30C - crane is reduced by a 25% reduction in crane charts capacity and crawling is prohibited.

A Manitowoc Crawler Crane can pick and carry a load without the 25% cold weather de-rating, as long as the following conditions exist:

- the grade in any direction does not exceed 1%
- the ground conditions are suitable and mats are used if required
- the crane must have an approved CWT and boom combination
- the crane must be travelling as slowly as possible as to ensure no dynamic loading (impact or shock) is imparted onto the crane's boom structure and car body
- sponsor has to sign off on lift plan prior to lifting
- construction manager must be on hand for all lifts
- -31C to -40C - crane can operate with a 40% deduction in crane chart capacity.
- No lifting operations are to be done below -40°C unless it is an emergency.

25.4.2. Grove Rough Terrain Cranes

- -40C and Warmer - no restrictions on hoisting operations
- -40C and Lower - crane will be reduced by 3.67% per degree if it is below -40C. The following chart depicts this deduction.

Temp in C	% Decrease
-40	0
-41	3.67
-42	7.34
-43	11.01
-44	14.68
-45	18.35
-46	22.02
-47	25.69
-48	29.36
-49	33.03
-50	36.7
-51	40.37
-52	44.04
-53	47.71
-54	51.38
-55	55.05
-56	58.72
-57	62.39
-58	66.06
-59	69.73

25.4.3. **Crawler Crane Earthworks Policy for Cold Weather**

The Kiewit Policy states that crane mats are to be used under the crane when the ground conditions are unknown or unsuitable.

The site plan for crane picks and travel locations are as follows:

- To lift off of frozen ground without crane mats we must conform to the recommendations from Earthworks Engineering regarding various depths of frost and ground bearing pressures.
- Crane mats will be used for traveling and lifting when the ground bearing pressures are in excess of the limit provided by Earthworks Engineering.
- When new material must be placed on the parent frozen ground, we will use 3" crush to bring us to within 1-2" of our desired elevation. It will be compacted in 1' lifts and it will be left to freeze and set according to the following guidelines:
 - **@ -20°C it will freeze in 6 hours**
 - **@-10 °C it will freeze in 12 hours**
- The final lift before being completed will be of 20- crushed rock and compacted as necessary.
- If the ground is unstable it will be flooded and allowed to freeze to solidify the soil.
- This procedure will ensure the safe operation of equipment on site and provide the most cost efficient method of completing a heavy lift program.

25.5. **RIGGING**

25.5.1. **Chain Slings**

- Alloy steel chains slings are not allowed for any work except certain maintenance operations i.e. transporting equipment to/from site.
- Sling manufacturer should be consulted for temperatures below -40°C.

25.5.2. **Wire Rope**

- Wire rope slings can be used in temperatures as low as -39°C.
- The sling manufacturer should be consulted for temperatures below -40°C.

25.5.3. **Polyester Round-Slings**

- Not to be used in contact with any object or temperature below -40°C.

25.5.4. **Polyester and Nylon Webbing Slings**

- Are not to be used in contact with any object or temperature below -40°C.

26. LIGHTNING

26.1. PURPOSE

The purpose of this procedure is to establish guidelines to ensure the notification and evacuation of workers on towers, tanks and in large open areas to a safe location when they are at risk from a lightning threat.

26.2. WHEN TO ACT

At the first sign of an impending storm (darkening skies, increasing wind), the person responsible for workers at heights or in large open areas must follow the 30/30 Guideline to determine when to execute the lightning action plan/protocol. If they see storm clouds developing, lightning, or hear thunder, there is immediate danger of a strike and the protocol must be implemented immediately.

26.3. 30/30 Guideline

When there is 30 seconds or less (6 miles) from "flash to bang" or the sight of a lightning flash to the resulting sound of thunder, then you are too close to the storm and need to implement the Lightning Action Plan/Protocol immediately. Thunder takes 5 seconds to travel one (1) mile after the flash. The average length of a lightning bolt is 8 miles and the maximum distance you can hear thunder is as short as two (2) miles and seldom exceeds twelve (12) miles. Therefore, even if you do not hear the thunder but see the light from the flash, you may be in immediate danger.

If Thunder is heard...	If Lightning is observed...
5 seconds after flash	1 mile away
10 seconds after flash	2 miles away
15 seconds after flash	3 miles away
20 seconds after flash	4 miles away
25 seconds after flash	5 miles away
30 seconds after flash	6 miles away

26.3.1. FIELD ACTIONS

Have workers at heights and in large open areas move to the safe locations as directed by your supervisor. Although no place is absolutely safe from a lightning threat, some places are safer than others.

- Large enclosed structures tend to be much safer than smaller or open structures. The risk for lightning injury depends on whether the structure incorporates lightning protection, construction materials used and the size of the structure.
- In general, fully enclosed metal vehicles such as cars, trucks, buses, vans, etc. with the windows rolled up provide good shelter from lightning. Avoid contact with metal or conducting surfaces outside or inside the vehicle.

AVOID being in or near high places and open fields, isolated structures, communications towers, flagpoles, light poles, metal fences, and water.

- Approximately 30 minutes after the last recorded 30/30 is detected, the lightning storm is considered clear and workers are safe to return to work.

NOTE: Projects will have a Lightning monitoring, system set up to manage the risk in conjunction with the flash bang method of monitoring.

<https://skyscanusa.com/product/storm-pro-2-lightning-detector/>

27. CONFINED SPACE PROGRAM/CODE OF PRACTICE

27.1. PURPOSE

Kiewit has identified potential hazards to workers who may be required to enter and perform work inside confined spaces at their project sites and is committed to proactively preventing confined space incidents and maintaining the health and safety of workers.

Through the implementation of this Confined Space Program/Code of Practice, Kiewit will ensure compliance with applicable regulations. This program will be followed by all managers, supervisors, and workers involved in confined space work. Entry into a confined space without adherence to the requirements outlined herein will be considered a Zero Tolerance violation.

The purpose of this program is to ensure the health and safety of all workers performing confined space-related work. By implementing this Program, Kiewit will ensure that:

- Work requiring confined space entry is identified and the potential hazards/risks assessed
- Control measures required to mitigate all identified hazards are defined according to the Hierarchy of Controls
- Procedures are developed to ensure that the controls are implemented properly and as required by the regulations
- Workers received proper education/training in all applicable confined space regulations and Kiewit's policies.

This program applies to all Kiewit workers as well as Subcontractors who may be required to perform confined space work on Kiewit project sites in the Western Canada District. As the regulations regarding confined space vary between provinces and territories, the differences have been outlined below. The appropriate regulation must be used for the geographic location of the project.

27.2. REGULATIONS

The following regulations will be referenced as needed to ensure compliance:

British Columbia:

- WorkSafeBC Occupational Health and Safety Regulations – Part 9
- <https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-09-confined-spaces>

Alberta:

- Occupational Health and Safety Code – Part 5
- <http://www.qp.alberta.ca/documents/OHS/OHSCode.pdf>

Saskatchewan:

- Occupational Health and Safety Regulations – Part 18
- <http://www.qp.gov.sk.ca/documents/english/regulations/regulations/o1-1r1.pdf>

Manitoba:

- Workplace Safety and Health Regulation – Part 15
- https://www.gov.mb.ca/labour/safety/pdf/1_2016_wsh_ar_oc.pdf

Northwest Territories:

- Occupational Health and Safety Regulations – Part 18
- <http://www.wscn.nt.ca/sites/default/files/documents/NEW%20OHS%20REGS.pdf>

Yukon:

- Occupational Health and Safety Regulations – Part 2
- <https://yukonregs.ca/RegsPublic/Home/Details/573>

Ontario

- https://www.labour.gov.on.ca/english/hs/pubs/confined/cs_4.php

Newfoundland

- <https://assembly.nl.ca/Legislation/sr/Regulations/rc120005.htm>

27.3. RESPONSIBILITIES**27.3.1. Project Management**

The project manager will be responsible for overall implementation of the program and for assigning responsibilities to involved personnel.

27.3.2. Superintendent

- Review of construction phase(s) at project pre-meetings to identify confined and restricted/enclosed space requirements and plan for all potential expenditures;
- Identify activities/operations which require confined or restricted/enclosed space entry;
- Ensure all workers involved in the operation are trained, understand the requirements, and are aware of the hazards;
- Ensure all confined space work is overseen by a trained/competent supervisor (e.g. themselves, Foreman, Field Engineer);
- Ensure confined space hazards/risks are assessed by a competent person and a Hazard Assessment Form is completed;
- Ensure all required control measures are implemented and all safety equipment available;
- Ensure that confined space Entry Procedures are prepared by a competent person and reviewed by involved workers;
- Ensure that rescue procedures have been developed by a competent person and the Rescue Team is aware of the confined space work;

- Hold a toolbox meeting prior to the confined space work to review the requirements of the Entry Permit with everyone involved;
- Sign off on the entry permit to signify work commencement and closure;

27.3.3. Safety Department

- Review the confined space Hazard Assessment, Entry Procedure and Rescue Procedures;
- Coordinate and/or conduct worker training on confined space;
- Conduct periodic field audits to verify compliance with this Program and the Procedures;
- Keep records of confined space Entry Permits (minimum 1 year);
-
- Ensuring that all fields within the permit are filled in and completed.
- Ensuring that all control measures for the entry are in place as required.
- Ensuring that workers understand the limitations of the permit.
- Ensuring that a rescue plan is developed and rescue capabilities are in place before entry is allowed.
- Maintaining copies of the permit and any testing or inspections as required.

27.3.4. Confined Space Supervisor

- Understanding and communicating the scope of work;
- Supervising the confined space entry and entrants;
- Ensuring the work tasks are carried out as per the Entry Procedures;
- Ensure the air testing is being conducted properly and recorded on the Entry Permit at required intervals;
- Assigning Standby/Safety Watch/Hole Watch/Attendant duties to a competent/trained worker;
- Ensuring that all equipment provided is used appropriately;
- Ensuring that all control measures are utilized and followed;
- Ensuring Entry Permit is returned to the Safety Department for filing after work or shift completion.

27.3.5. Safety Watch/Standby/Air Tester (Attendant, Monitor)

- Attend toolbox safety meeting for the confined space;
- Not perform safety watch/air tester duties without having confined space training;
- Maintain control of the confined space work zone;
- Ensure there is no work in the immediate area that will adversely affect the confined space;
- Not allow untrained/unauthorized workers to enter the confined space;
- Maintain the entry/exit log on the Entry Permit to record the names of the entrants and their times of entry/exit;
- Retrieve and calibrate a confined space gas monitor from the Safety Department;
- Conduct air tests of the confined space at required intervals and record results on Entry Permit;

- Instruct workers to evacuate the confined space if the gas monitor alarms and notify Supervisor;
- Ensure the ventilation equipment operates continuously during the confined space work;
- Be stationed at or near the confined space during the work inside;
- Maintain communication with workers inside the confined space at minimum 20-minute intervals;
- Never leaving the entrants unattended. If the safety watch/air tester must leave, they must be relieved by a trained competent alternate;
- Summon emergency assistance if required.

27.3.6. Entrant

- Attend toolbox safety meeting for the confined space;
- Not enter a confined space without being trained/competent;
- Follow all direction from Superintendent, Confined Space Supervisor, Safety Watch/Standby Person/Air Tester
- Review/sign and follow the confined space Entry Procedures;
- Communicate with Safety Watch/Standby Person at minimum 20-minute intervals;
- Immediate exit the confined space if the gas monitor alarms or if instructed to do so.

27.3.7. Rescue Team

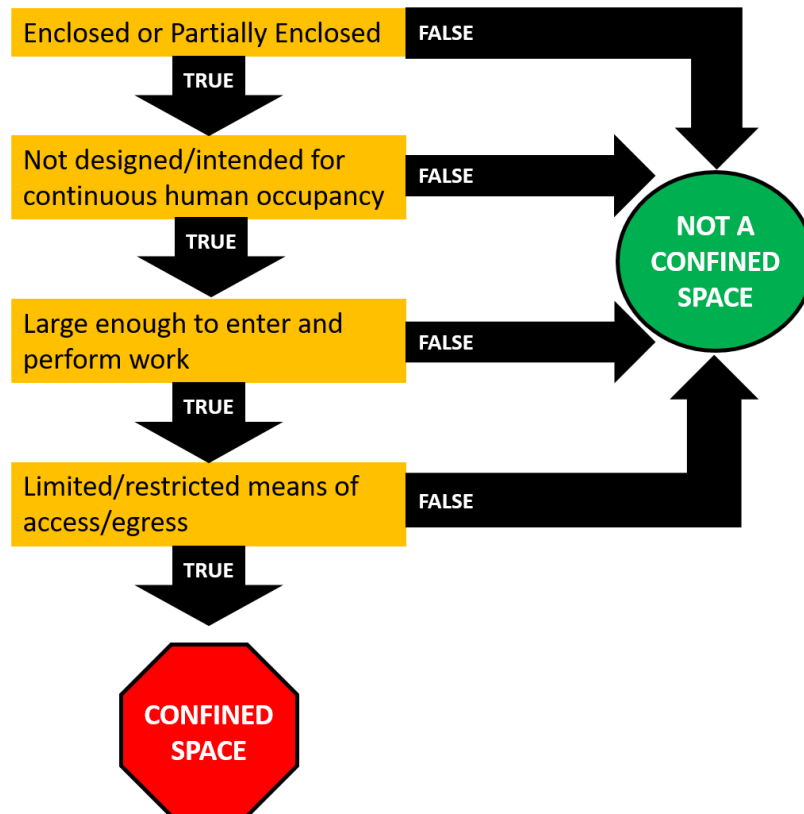
- Understand the confined space work and develop space-specific Rescue Procedures;
- Do not perform any rescue duties without being trained;
- Implement required controls to eliminate/minimize risk, prior to/during rescue;
- Be readily available to perform rescue services, if summoned;
- Maintain rescue equipment in good working condition and inspect prior to use;
- Never enter a confined space to perform rescue if the air quality inside the space is unknown or high risk;
- Never enter a confined space to perform rescue unless there is one additional rescuer stationed outside the space;
- Conduct and document rescue practice drills at least once per year.

27.4. DEFINITIONS

BRITISH COLUMBIA:

Confined spaces will be identified using the following criteria. If a space meets all four of these criteria it will be considered a confined space.

- Is enclosed or partially enclosed;
- Is not designed or intended for continuous human occupancy;
- Has limited or restricted means for entry or exit that may complicate the provision of first aid, evacuation, rescue or other emergency response service; and
- Is large enough and so configured that a worker could enter to perform assigned work.



Select types of confined spaces (Column A) can be “downgraded” to “**enclosed**” if they meet all the exclusion criteria below (Column B).

Column A – Enclosed Space Types	Column B – Exclusion Criteria
<ul style="list-style-type: none"> • Swimming Pools • Crawl spaces under school portables or other non-industrial buildings • Excavations • Attic Spaces • Open, unconnected wet wells or dry wells for storm or sewer hookups at new construction sites • Elevator shafts • HVAC plenums • Agricultural feed mixer wagons and trucks that are permanently open on top, and empty 	<ol style="list-style-type: none"> 1. The design, construction, location, and intended use of these spaces will ensure these spaces are characterized by clean respirable air at all times. 2. The space must have an interior volume of not less than 64 cubic feet per occupant. 3. The space must have openings to the atmosphere that are known to provide natural ventilation. 4. There must be no potential for a high or moderate hazard atmosphere to exist or develop immediately prior to any worker entering the space or during any work within the space. 5. There must not be a need to mechanically ventilate, clean, purge, or inert the space prior to entry for any reason. 6. There must be no potential for a hazardous substance to migrate through any media (e.g. air, soil, conveyance, piping, or structure) to infiltrate the space. 7. The space must be free of residual material (e.g. waste, sludge, debris) that if disturbed could generate air contaminants that could immediately and acutely affect a worker's health. 8. There must not be any risk of entrapment or engulfment to workers entering the space. 9. The space must not contain, have introduced or be adjacent to tools, equipment or involve processes that could generate air contaminants that could immediately and acutely affect a worker's health.

Although enclosed spaces are not considered “confined spaces” the following safety requirements still apply:

- Hazard Assessment;
- Rescue Plan;
- Workers and Supervisors trained in the hazards of the enclosed space.
- Designated worker in constant communication with the worker(s) inside the space.
- Safe means of entry/exit

ALBERTA:

Spaces will be identified as either “**restricted**” or “**confined**” per the following criteria.

Restricted Space:

- Enclosed or partially enclosed space;
- Not designed or intended for continuous human occupancy;
- Has restricted, limited or impeded means of entry or exit because of its construction.

Confined Space:

A restricted space which may become hazardous to a worker entering it because of:

- a. An atmosphere that is or may be injurious by reason of oxygen deficiency or enrichment, flammability, explosivity or toxicity;
- b. A condition or changing set of circumstances within the space that presents a potential for injury or illness; or
- c. The potential or inherent characteristics of an activity which can produce adverse or harmful consequences within the space.

Examples of changing conditions or activities that can introduce additional hazards:

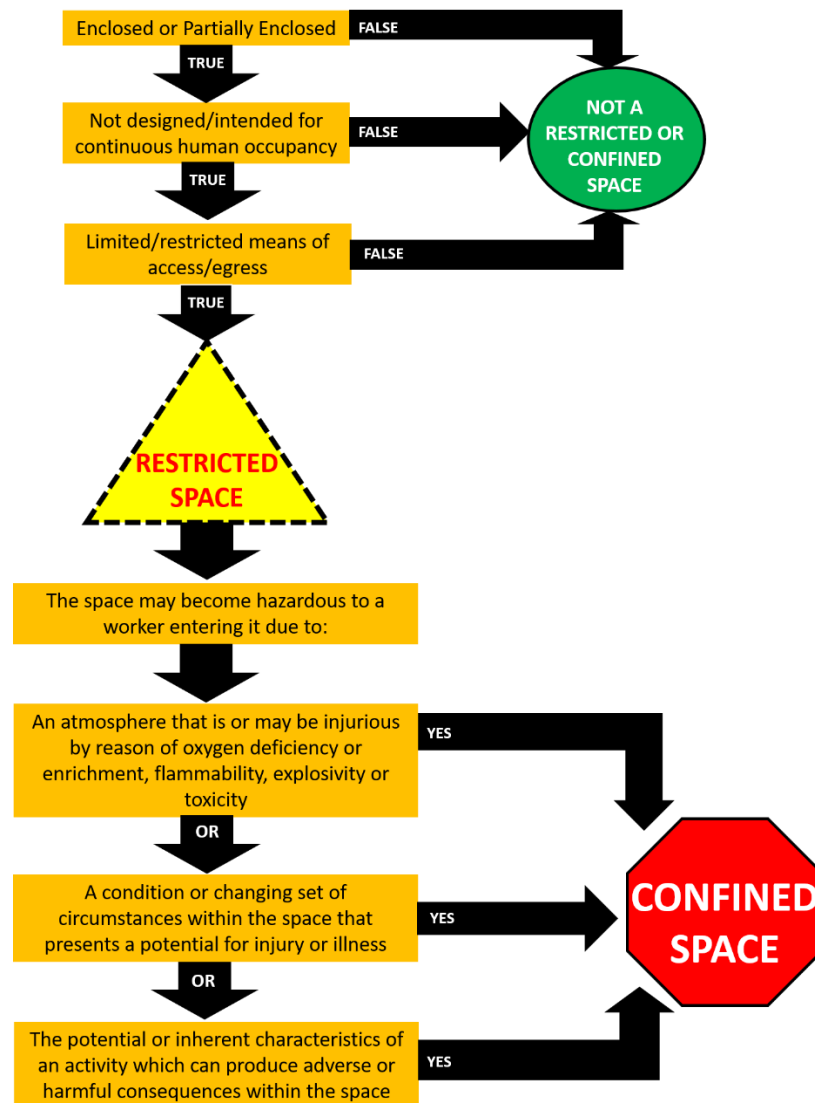
- Physical hazards i.e. electrical, thermal, radiological, noise, engulfment, etc.
- Liquids, gases, or solids being introduced to the space during occupancy.
- Welding activities may generate toxic gases or vapors; and
- The use of gasoline or diesel engines can lead to the build-up of poisonous carbon monoxide gas. There is also a risk of fire resulting from leaks; and Introduction of hot work.

Safety Requirements of a Restricted Space:

- Hazard Assessment
- Permit
- Rescue Plan
- Workers and Supervisors trained in the hazards of the restricted space.
- Designated worker in constant communication with the worker(s) inside the space.
- Safe means of entry/exit
- Atmospheric Testing (initial & continuous monitoring).
- Ventilation when appropriate.

Examples of Restricted Spaces include:

- Building attics,
- Below-ground vaults used for electrical or communication cables,
- Building crawl space,
- Trench with a temporary protective structure, and
- A deep excavation requiring ladder or lift access.



SASKATCHEWAN

Spaces will be identified as either “**confined**” or “**hazardous confined**” per the following definitions:

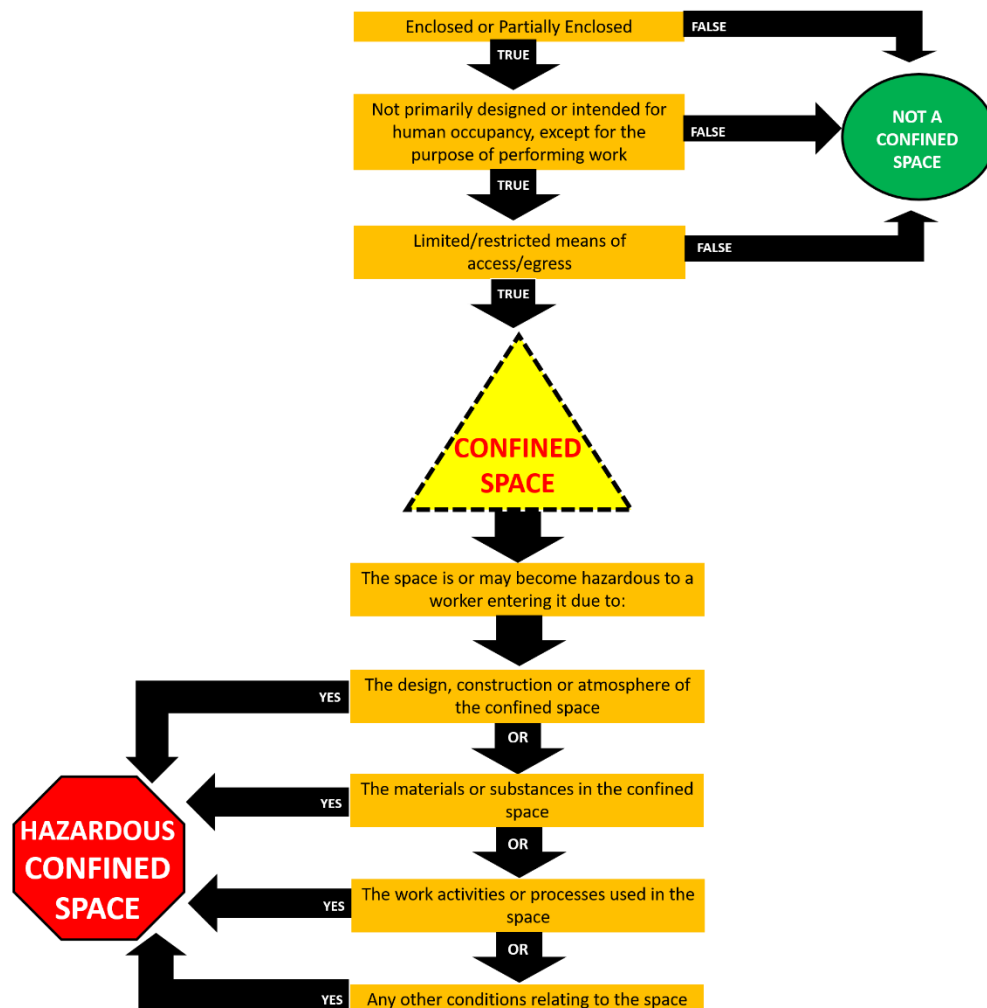
Confined Space: an enclosed or partially enclosed space that:

- a. Is not primarily designed or intended for human occupancy, except for the purpose of performing work;
- b. Has restricted means of entrance and exit.

Hazardous Confined Space: a confined space that is or may become hazardous to a worker entering the confined space due to:

- a. The design, construction or atmosphere of the confined space;
- b. The materials or substances in the confined space;
- c. The work activities or processes used in the confined space;
- d. Any other conditions relating to the confined space.

Wherever possible, Kiewit will use alternative means to perform work that doesn’t require a worker to enter into a hazardous confined space.

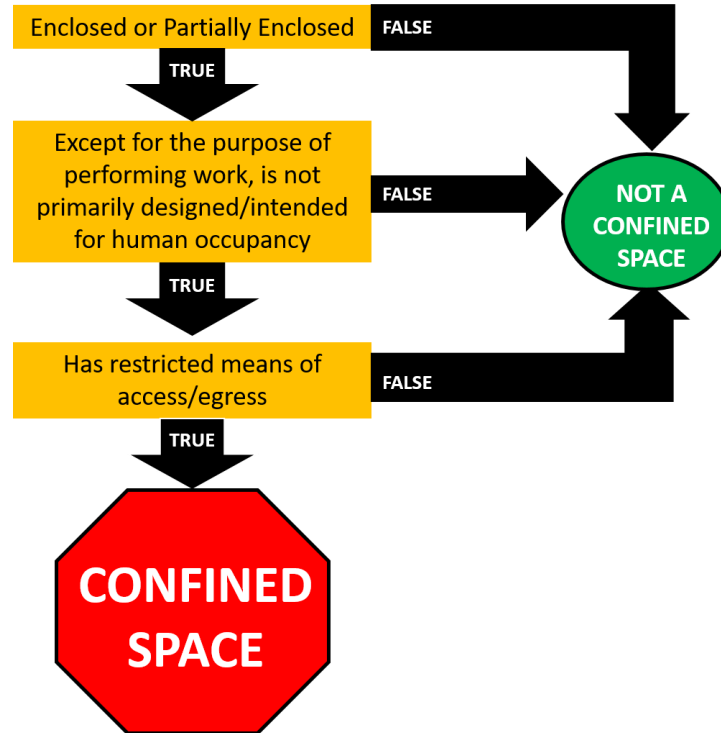


MANITOBA

Confined space will be identified using the following definition:

An enclosed or partially enclosed space that:

- a. Except for the purpose of performing work, is not primarily designed or intended for human occupancy; and
- b. Has restricted means of access or egress.


NORTHWEST TERRITORIES

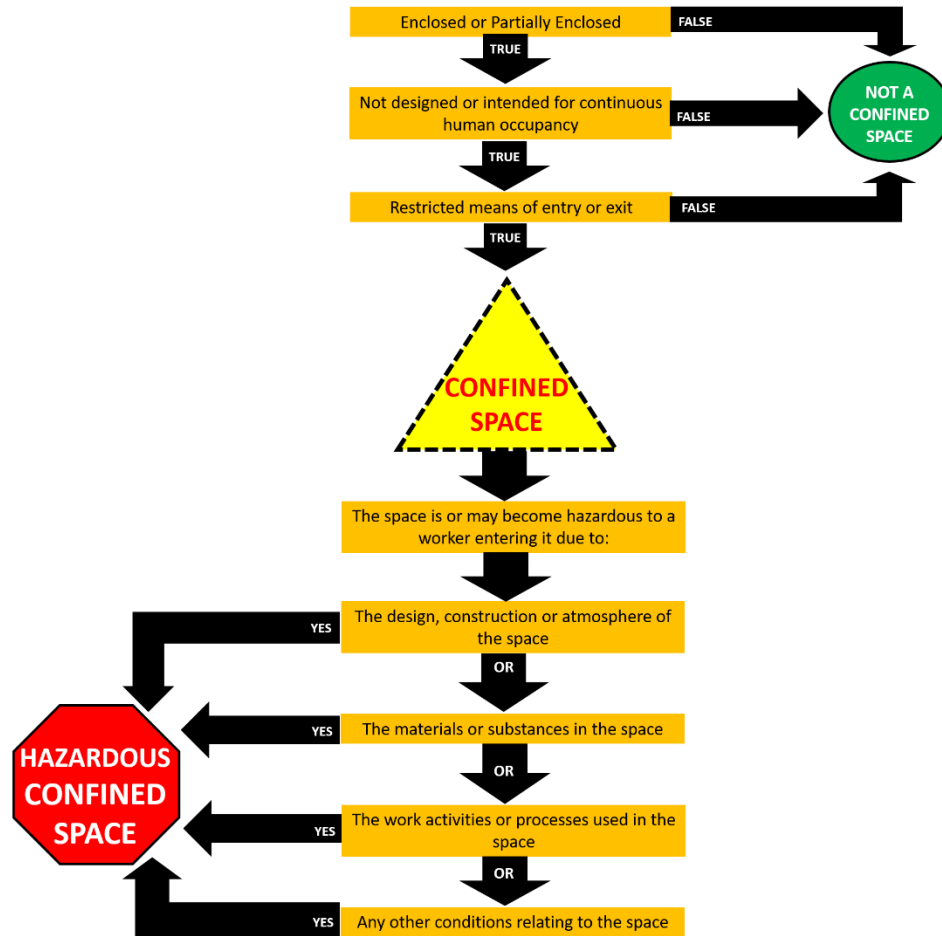
Spaces will be identified as either “**confined**” or “**hazardous confined**” per the following definitions:

Confined Space: an enclosed or partially enclosed space that:

- c. Is not designed or intended for continuous human occupancy;
- d. With a restricted means of entry or exit.

Hazardous Confined Space: a confined space endangers or could endanger a worker entering into or already in the confined space, due to:

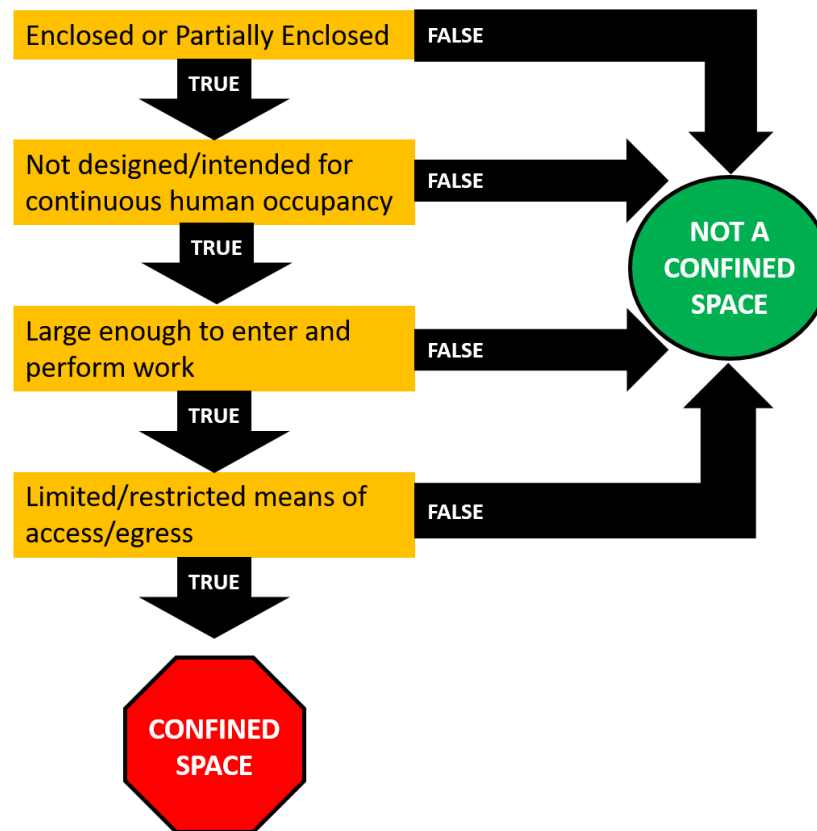
- e. The design, construction or atmosphere of the space;
- f. The materials or substances in the space;
- g. The work activities or processes used in the space;
- h. Any other conditions relating to the space.



YUKON

Confined spaces will be identified using the following criteria. If a space meets all four of these criteria it will be considered a confined space.

- a. Is enclosed or partially enclosed;
- b. Is not designed or intended for human occupancy;
- c. Has limited or restricted means for entry or exit that may complicate the provision of first aid, evacuation, rescue or other emergency response service; and
- d. Is large enough and so configured that a worker could enter to perform assigned work.



27.5. HAZARD ASSESSMENT

For each confined space or hazardous confined space that requires entry, a Hazard Assessment will be completed by a qualified person at the work planning stage and will be documented on a Hazard Assessment Form.

The hazard assessment will consider:

- Pre-existing conditions/hazards due to the design, configuration, location and use of the space; and
- Hazardous conditions that may arise due to the specific work activities to be performed and the materials, tools, substances that will be used.

A Qualified Person will be defined as someone who is competent in confined space via training/education and/or experience.

The following types of hazards will be assessed:

- Atmospheric/chemical hazards
 - Oxygen deficiency/enrichment, flammable gas/vapours, hydrogen sulfide, methane, carbon monoxide, nitrogen dioxide, metal fume, silica, asbestos, lead, etc.
- Biological Hazards
 - Mould/bacteria, sharps, sanitary waste, etc.
- Physical Hazards
 - Noise, slips/trips, lighting, ergonomics, hot/cold surfaces, heat/cold stress, pinch/crush points, falls, HCTI, entrapment, entanglement, suspended loads, etc.
- Energy/Equipment Hazards
 - Kinetic, potential, electrical, pneumatic, hydraulic, mechanical, etc.
- Flows/Content Hazards
 - Flooding, material conveyances, adjacent piping, engulfment/drowning, etc.
- Others
 - Communication, weather conditions, etc.

Based on the hazards identified within the hazard assessment, an overall risk classification of the confined space will be determined, per the following:

BRITISH COLUMBIA, SASKATCHEWAN, MANTIOBA, NORTHWEST TERRITORIES, YUKON

LOW RISK: An atmosphere shown by pre-entry testing to contain “Clean Respirable Air” immediately prior to entry and which is not likely to change during the work activity.

MODERATE RISK: An atmosphere that is not clean respirable air, but is not likely to impair the ability of the worker to escape unaided from the space, in the event of a failure of the ventilation system or respirator.

HIGH RISK: An atmosphere that may expose a worker to risk of death, incapacitation, injury, acute illness or otherwise impair the ability of the worker to escape unaided from the space, in the event of a failure of the ventilation system or respirator.

NOTE: The definitions for low, moderate and high risk confined spaces only take into consideration the air quality within the space and do not consider other types of hazards (e.g. physical, energy, flow/content, etc.). Therefore, it is possible to have a low risk confined space due to its clean air quality, but to still have other high-risk hazards such as a 20-foot fall, or high voltage electrical hazard.

Entry into **high risk** confined spaces is not covered by this Program and requires the approval of the district Safety Manager and Project Director as higher-level controls (e.g. supplied air respirators) and training are required.

ALBERTA

LEVEL 3, LOWER HAZARD: The only hazard present is the difficulty in accessing and egressing the space.

LEVEL 2, MEDIUM HAZARD: Only non-atmospheric hazards are present.

LEVEL 1, HIGHER HAZARD: Atmospheric hazards are present. These can include gases or vapours that are toxic, flammable, or explosive. It can also include atmospheres with insufficient oxygen.

27.6. **ENTRY PROCEDURE**

In addition to a Hazard Assessment Document, each confined space entry will require the development, by a Qualified Person, of an Entry Procedure. The entry procedure will detail all required control methods – via the Hierarchy of Controls – to eliminate or minimize the identified hazards and will outline the steps required to carry out the work safely.

Entry Procedures will consider all requirements regarding the following:

- Control equipment;
- Air testing;
- Ventilation;
- Lockout/Isolation;
- Cleaning, purging, venting, or inerting;
- Safety Watch/Standby Person duties; and
- Personal Protective Equipment.

27.7. **TRAINING**

All employees involved in confined, restricted or enclosed space work will be instructed in confined space requirements by a Qualified Person. The primary objectives of the training include:

- Educating/informing involved workers of the identified and potential hazards/risks associated with confined/restricted/enclosed spaces;
- Education regarding confined space regulatory requirements;
- Instruction in the required control measures and how to properly select, inspect, use and care for them;
- Training/instruction on confined space paperwork including Hazard Assessments, Entry Procedures, Entry Permits and Rescue Procedures.

Records of worker training will be maintained by the Safety Department.

27.8. AIR TESTING

Prior to entry into any confined space, the air within the space will be tested by a trained, competent worker with a properly calibrated confined space gas monitor. Air testing will occur at the following intervals:

1. **Initial/Pre-Ventilation Testing:** Upon opening of the space, prior to ventilating.
2. **Pre-Entry Testing:** After ventilating the space and within 20 minutes of first entry.
3. **Ongoing Testing:** Continuous testing will occur for the duration of the work inside the confined space.

Air testing results will be recorded on the Entry Permit at each interval and every 20 minutes for the duration of the work.

The confined space gas monitors will measure the following gases:

- Oxygen (O₂)
- Flammable gas/vapour (LEL)
- Carbon Monoxide (CO)
- Hydrogen Sulfide (H₂S)

Alarm level settings of the monitors will be verified prior to each use. Alarm levels will be set at the following:

GAS/VAPOUR	ALARM #1	ALARM #2
Oxygen Deficiency	20.5%	19.5%
Flammable Gas/Vapour (LEL)	5%	10%
Carbon Monoxide	12 ppm	25 ppm
Hydrogen Sulfide	1 ppm	5 ppm

Oxygen:

- Normal air contains 20.9% oxygen by volume.
- An atmosphere that contains 19.5% oxygen by volume or less is considered “oxygen deficient”.
- Entry into a confined space which contains less than 19.5% oxygen by volume will be considered high risk and requires high level of controls, including the use of a Self-Contained Breathing Apparatus (SCBA) or a Supplied Air Respirator (SAR).
- Increased oxygen levels present a hazard as well. An “oxygen-enriched” atmosphere contains more than 23.0% oxygen and results in a highly flammable environment. The slightest spark could result in the violent burning of clothes and/or any other combustibles.

Kiewit will ensure that normal oxygen levels (20.9%) are present inside of confined spaces prior to allowing any worker to enter.

Explosive Gases

Explosive atmospheres could develop inside a confined space by migration of a flammable gas/vapour into the space, via leaking welding leads, etc. When flammable gases/vapours are present at sufficient concentrations, a spark could cause the atmosphere to ignite and explode.

The lowest concentration at which a gas can ignite is called its Lower Explosive Limit (LEL). At concentrations lower than the LEL, the gas in the air will not burn.

Kiewit will ensure that the LEL concentration inside a confined space is less than 10% before allowing workers to enter and is 0% whenever possible/practical. If testing reveals levels greater than 10% of the LEL the space will be ventilated until the LEL concentration is below 10%.

Toxic Gases

Kiewit will ensure that no worker is exposed to toxic gases in concentrations exceeding their exposure limits and will implement control measures to minimize exposures as low as reasonable achievable.

Carbon monoxide and hydrogen sulfide will be measured at a minimum. Where other toxic gases may be present (as identified on the hazard assessment), additional monitoring may be performed.

Carbon Monoxide gas is a byproduct of the combustion process, and is present in the exhaust of petroleum driven motors, generators, etc. Hydrogen sulfide gas is a natural byproduct of decomposing sewage. It has a “rotten egg” smell and is heavier than air, so it tends to collect at the bottom of spaces.

Kiewit will ensure that the sense of smell is never relied upon as a means of detecting toxic gases as some toxic substances are odorless, others are toxic before the nose can detect them, and still others (like H₂S), can “paralyze” the sense of smell before reaching deadly proportions.

Calibration

Kiewit will ensure that confined space gas monitors are maintained in good working order and calibrated at the required intervals.

Fresh Air Zero: A fresh air zero calibration will be performed prior to each use of the monitor, and prior to the bump test, per the manufacturer’s specifications. Fresh Air calibrations will be performed in a clean air environment, away from any potential air contaminants that could influence the calibration.

Bump Test: Following the fresh air zero calibration a bump test will be performed, prior to taking the monitor into the field. The bump test will confirm the proper functionality of the monitor by comparing gas monitor readings to known concentrations of test gas.

Span Calibration: A span calibration will be performed at least once every 30 days. Prior to the span calibration a fresh air zero and bump test will be performed. The span calibration will test the monitors accuracy and precision.

Factory (Annual) Calibration: Gas monitors will be factory calibrated by an approved service facility as required by the manufacturer (at minimum annually).

Kiewit will ensure that the proper calibration gas (as specified by the manufacturer) is used for calibration. Expired gas will not be permitted to be used to calibrate confined space monitors.

Gas Monitor Alarms

If a gas monitor alarms while a worker is inside a confined space, the worker will immediately exit the space. An investigation into the cause of the alarm will be performed by a combination of Safety Watch/Standby Person, Foreman, Superintendent and Safety Department as required. Work inside the confined space will not continue until the cause of the alarm has been identified and corrected and subsequent air tests reveal clean air inside the confined space.

27.9. **SAFETY WATCH/STANDBY PERSON REQUIREMENTS**

Kiewit will ensure that a trained, competent Safety Watch/Standby Person is assigned for each confined, restricted or enclosed space entry. The Safety Watch/Standby Person will communicate (via verbal means, hand signals, radios, cell phones) with the workers inside the confined space and will be able to summon rescue assistance if required.

The Safety Watch/Standby Person will communicate with confined space workers at minimum 20-minute intervals to ensure their safety and well-being.

BRITISH COLUMBIA

The requirements of the Safety Watch/Standby Person will depend on the hazard rating of the confined space.

Low Hazard

- Safety Watch/Standby Person will
 - Be another assigned worker (not a worker entering the confined space).
 - Have means to communicate with the worker inside the space
 - Check up on the worker at least every 20 minutes, and
 - Have means to summon rescue personnel if required.

Moderate Hazard

- Safety Watch/Standby Person will
 - Be another assigned worker (not a worker entering the confined space).
 - Have means to communicate with the worker inside the space
 - Be stations **at or near** the confined space entry point

- Visually (whenever possible) check up on the worker at least every 20 minutes, and
- Have means to summon rescue personnel if required.

High Hazard

- Safety Watch/Standby Person will
 - Be another assigned worker (not a worker entering the confined space).
 - Have means to communicate with the worker inside the space
 - Be 100% stationed at the space entry point and continuously perform Safety Watch/Standby Person duties
 - Visually or otherwise **continually** monitor the worker's well-being
 - Have means to immediately initiate the rescue plan and effect rescue/extraction of the worker, and
 - Prevent the entanglement of lifelines and other equipment.

The Standby Person will not be permitted to enter the confined space or to leave his/her duties as Standby Person unless replaced by a trained, competent alternate Standby Person.

ALBERTA

A competent Tending Worker will be assigned for every confined or restricted space entry and will be equipped with means for summoning rescue assistance if needed.

The Tending Worker will be trained in the evacuation/rescue procedures and will be stationed at or near the space entrance if:

- The oxygen content of the atmosphere inside the confined space is less than 19.5% by volume;
- The oxygen content of the atmosphere inside the confined space is greater than 23.0% by volume;
- The concentration of a contaminant inside the confined space is greater than 50% of its occupational exposure limit; or
- Another hazard is identified that cannot be eliminated or effectively controlled.

The Tending Worker will be responsible for:

- Keeping track of the number of workers inside the confined space at all times;
- Maintaining constant communication with the workers inside the space; and
- Having suitable means for summoning rescue assistance.

The Tending Worker will not be permitted to leave the confined space work area until all workers have left the confined space or another Tending Worker is in place.

SASKATCHEWAN

A trained, competent confined space Attendant will be assigned for every hazardous confined space entry. The Attendant will:

- Communicate with the workers inside the hazardous confined space to ensure their well-being;
- Be adequately trained in the rescue procedures;
- Remain stationed at the entrance to the confined space unless replaced by another adequately trained worker; and
- Be equipped with a suitable alarm to summon assistance.

MANITOBA

A competent Standby Person will be assigned for every confined space entry and will remain present at the entrance to the space at all times while workers are inside the space, if a risk assessment identifies that the space is or may become hazardous to a worker entering it for any reason, including:

- The design or construction of the confined space;
- The materials or substances in the confined space, including the materials or substances in its atmosphere, or
- The work activities performed or the processes used in the confined space.

The Standby Worker will be qualified with first aid level 1, 2 or 3 and will be trained in confined space work and emergency and rescue procedures. The Standby Person will be in direct communication with the worker(s) inside the confined space and will have suitable means to summon assistance if necessary.

NORTHWEST TERRITORIES

A Safety Watch/Standby Worker will be assigned for each worker entry into a hazardous confined space. The Safety Watch/Standby Person will:

- Maintain communication with the worker(s) inside the space;
- Be trained in the rescue procedures;
- Remain stationed at the entrance to the confined space unless replaced by another adequately trained worker; and
- Be equipped with a suitable alarm to summon assistance.

YUKON

A competent, trained Standby Person will be assigned for every entry into a confined space. The requirements of the Standby Person will depend on the hazard rating of the confined space.

Low and Moderate Hazard:

- Be stationed at or near the space entrance;
- Check on the well-being of workers inside the space at least every 20 minutes;
- Have a means to immediately summon rescue personnel, and
- Be available to be summoned by the worker or others at any time.

High Hazard, Engulfment or Entrapment Hazard:

- Be stationed at the entrance to the space and continuously attend to the standby duties;
- Visually observe or otherwise continuously monitor the well-being of the worker(s) inside the space;
- Be equipped and capable of immediately effecting rescue using lifting equipment if required,
- Be available to be summoned by the workers or others at any time, and
- Prevent the entanglement of lifelines and other equipment.

27.10. ENTRY PERMIT

A confined space Entry Permit will be filled out prior to each confined space entry. Information that will be on the Permit includes the following:

- Hazard classification of the confined space;
- Location of the confined space;
- Work activities to be completed, to which the Entry Permit applies;
- Calibration record for the gas monitor;
- Air testing results log;
- Log for workers entering/exiting the space;
- Precautions/controls required to eliminate or minimize all hazards that may be present or develop during the work activities;
- The time the Entry Permit expires.

The confined space supervisor will conduct a pre-job meeting to review the contents of the Entry Permit with all involved workers.

Entry Permits will be re-authorized/re-signed by the confined space supervisor when:

- a. There is a change in work crew;
- b. After each shift change; and
- c. After a change of the confined space supervisor.

Permits will only be altered/written on by the confined space supervisor and Standby Person/Air Tester. Permits will expire once the confined space work is completed or at the end of the work shift (whichever comes sooner).

Completed Entry Permits will be returned to the Safety Department and filed for one year.

27.11. LOCKOUT/ ISOLATION

Kiewit will ensure that any equipment or machinery associated with a confined space requiring entry is properly locked out by a qualified person, prior to worker entry, via Kiewit's Lock Out/Tag Out Program.

Where adjacent piping/lines are connected to a confined space requiring entry/work that could allow hazardous materials to flow into the space, Kiewit will ensure that the pipes/lines are properly isolated via acceptable methods (e.g. blanking, blinding, disconnection).

27.12. VENTILATION

BRITISH COLUMBIA

Kiewit will ensure that all confined spaces are ventilated prior to entry regardless of their hazard classification.

The only scenario in which ventilation will not be required is when a confined space has a low hazard atmosphere **and**:

- The atmosphere is continuously monitored and shown to contain clean respirable air,
- The space has an internal volume greater than 64 cubic feet per occupant,
- The space is occupied for less than 15 minutes, and
- The work inside the space generates no contaminants other than exhaled air.

Mechanical ventilation will be the primary method used for ventilation. When mechanical ventilation is not practical (e.g. due to extremely large space volume), natural ventilation will be relied upon. Where natural ventilation is relied upon, the rate of airflow through the space will be monitored to ensure it is sufficient to maintain concentrations of airborne contaminants below their exposure limits.

Natural ventilation will never be relied upon to ventilate a confined space when there is a high hazard atmosphere, or if natural ventilation could draw air other than clean respirable air into the space.

ALBERTA

Confined Spaces will be ventilated with either stationary or portable confined space fans prior to entry and at all times during occupation of the space.

If the confined space has initial air testing readings that show evidence of atmospheric contaminants, the space will be purged with normal, respirable air for a minimum of five (5) minutes or five (5) complete air exchanges, whichever takes longer. When this purge process is complete, the ventilation equipment shall be turned off for a time equal to 100 times the amount of time it would take occupants to exit the space from the farthest point to the entrance of the space, and then the air inside the space shall be tested again. If the space becomes contaminated again during this time preventing safe occupant escape in case of ventilation equipment failure, respiratory protection must be used in this space.

Kiewit will never allow the use of pure oxygen to ventilate a space. Doing so will result in an oxygen-enriched atmosphere, in which flammable materials (like clothing and hair) could easily catch fire and burn violently.

When flammable contaminants are to be purged, explosion-proof ventilation equipment designed for use in hazardous locations will be used and precautions taken to eliminate all sources of ignition.

The confined space supervisor, or a person designated by the supervisor, will check periodically to ensure that contaminated air from the space is exhausted to a location where it does not present a hazard to employees or equipment. Any hazardous concentrations will be diluted by the use of additional blowers or additional ducting as necessary.

SASKATCHEWAN

Where a concentration of a toxic, flammable or explosive substance is present or an oxygen enrichment or deficiency exists in a hazardous confined space, Kiewit will ensure that the hazardous confined space is:

- Purged and ventilated before a worker is allowed to enter the space so that;
- Any hazard associated with a toxic, flammable or explosive substance is reduced to the extent that is possible or eliminated; and
- An oxygen content of not less than 19.5% and not more than 23% is ensured.
- Continuously ventilated at all times during which the worker occupies the hazardous confined space to maintain a safe atmosphere.

MANITOBA

In the following circumstances, Kiewit will ensure that a confined space that requires entry is purged and ventilated:

- a. Where there is or may be a concentration of a flammable or explosive substance at more than 10% of its lower explosive limit (LEL) so that the LEL concentration is reduced below 10% and to 0% whenever possible.
- b. Where there is or may be an oxygen deficient or enriched atmosphere, to ensure that oxygen levels are between 19.5% and 23.0%.
- c. Where there is or may be a chemical or biological substance that creates a risk to the safety or health of the worker, to eliminate or reduce the risk associated with the substance.

NORTHWEST TERRITORIES

Where a concentration of a toxic, flammable or explosive substance is present or an oxygen enrichment or deficiency exists in a hazardous confined space, Kiewit will ensure that the hazardous confined space is:

- a. Purged and ventilated before a worker is allowed to enter the space so that;
 - a. Any hazard associated with a toxic, flammable or explosive substance is reduced to the extent that is possible or eliminated; and
 - b. An oxygen content of not less than 19.5% and not more than 23% is ensured.
- b. Continuously ventilated at all times during which the worker occupies the hazardous confined space to maintain a safe atmosphere.

YUKON

Kiewit will ensure that all confined spaces are ventilated prior to entry regardless of their hazard classification.

The only scenario in which ventilation will not be required is when a confined space has a low hazard atmosphere **and**:

- The atmosphere is continuously monitored and shown to contain clean respirable air,
- The space has an internal volume greater than 64 cubic feet per occupant,
- The space is occupied for less than 15 minutes, and
- The work inside the space generates no contaminants other than exhaled air.

Mechanical ventilation will be the primary method used for ventilation. When mechanical ventilation is not practical (e.g. due to extremely large space volume), natural ventilation will be relied upon. Where natural ventilation is relied upon, the rate of airflow through the space will be monitored to ensure it is sufficient to maintain concentrations of airborne contaminants below their exposure limits.

Natural ventilation will never be relied upon to ventilate a confined space when there is a high hazard atmosphere, or if natural ventilation could draw air other than clean respirable air into the space.

27.13. **RESCUE/EQUIPMENT**

Kiewit will ensure that a properly trained/qualified confined space rescue team is available, within close proximity of all confined space work and able to effect rescue if needed. At minimum, 2 rescue personnel will attend to a confined space to perform rescue. Kiewit will ensure that, in situations where an entry rescue is required, that there is always one additional trained rescuer present outside the space.

Kiewit will ensure that detailed/specific confined space Rescue Procedures are developed for each confined space requiring entry, during the planning stage of the work. These procedures will be developed by a qualified person (e.g. rescue team member, safety professional).

Any worker entering into a confined space will be required to wear a fall protection harness to aid in rescue should it be needed.

Each project that has confined spaces will develop and train its own confined space rescue team. The team shall practice a rescue at minimum quarterly.

In the event that a confined space entrant detects any unsafe condition (gas monitor alarm sounds; entrant feels sick, light headed, etc.) the entrant will inform the attendant that he is evacuating the space. The cause of the unsafe condition must be identified and evaluated before any subsequent entry.

If the entrant is unable to evacuate the Confined Space under his/her own power, non-entry rescue procedures will be used, if possible. This means using the safety harness/lifeline to pull the entrant to safety.

If the entrant is disabled due to falling or impact, entrant shall not be moved unless a situation immediately dangerous to his/her life exists. Steps will be taken to stabilize the injured worker's condition. Fire department rescue personnel and an ambulance will be called to provide rescue and medical services.

If non-entry rescue is not possible, designated rescue personnel will conduct an rescue via entry into the space.

A Safety Watch/Standby Person will remain stationed outside of the Confined Space for the duration of the rescue process.

27.14. **HOT WORK**

Hot work is defined as any welding, cutting, grinding, or any other activity involving open flames, sparks, or other ignition sources which may cause smoke or fire.

Hot work space must meet all of the following criteria:

- The oxygen content of the atmosphere does not exceed 22.0 percent by volume.
- The concentration of flammable vapours in the atmosphere is less than 10 percent of the lower explosive limit.
- The residues or materials in the space are not capable of producing a higher concentration than permitted in point (1) or (2) of the above.

All adjacent spaces have been cleaned, or inerted, or treated sufficiently to prevent the spread of fire.

27.14.1. **Hot Work Permit**

Hot Work Permit is required for any hot work performed in a confined space, restricted or enclosed space, or location with a potentially hazardous atmosphere (ie. explosive environment).

27.15. **REFERENCE INFORMATION**

[Confined Space Pre-Entry Checklist](#)

[Confined Space Entry Permit](#)

[Confined Space Worker Log](#)

[Confined Space Advisor](#)

28. WELDING, CUTTING, BRAZING, SOLDERING

28.1. **POLICY**

Welding and cutting present potential hazards at the work site that could result in personal injury, death, fires, explosions and equipment or process mishaps, safe welding procedures are ignored.

Kiewit will comply with CSA requirements. Welding or allied process equipment will be erected, installed, assembled, started, operated, used, handled, stored, stopped, inspected, serviced, tested, cleaned, adjusted, carried, maintained, repaired and dismantled in accordance with the manufacturer's specifications.

The following precautionary measures must be taken to ensure the safety of all personnel, equipment and work sites:

28.2. GENERAL PROVISIONS

The following are general precautionary measures that Kiewit staff employees and craft workers should be aware of:

- Do not permit unauthorized persons to use welding or cutting equipment.
- Under certain circumstances (i.e., confined space), a hot work permit will be required.
- Flammable or combustible materials should not be in the direct vicinity of any welding. If they are and cannot be removed, they will be covered with a flame resistant blanket to protect them from hot sparks and slag.
- Before welding or cutting, warn those in close proximity who are not protected to wear proper clothing or eye protection.
- Use rod buckets to remove electrode stubs and steel scrap when work has been finished. Pick up tools on the ground or around the welding equipment as you perform your work.
- Keep a fire extinguisher within 7.6 m (25 feet) of the source of ignition at all times. Ensure that the fire extinguisher is in operable condition.
- Mark all hot metal after welding operations are completed. Soapstone or paint stick will be used for this purpose.
- The welding and cutting equipment will be inspected to ensure that the equipment meets the CSA Standard W117.2-M87 (i.e., check valves on hoses).
- Examine cables and hoses before use. Check for damage. Welding cables and cutting hoses will be protected from damage and potential hazards. Do not use tape or repair a leaky hose.
- An operator of an electric welding machine must remove the electrode before leaving the machine unattended.
- Welding services provided from vehicles will comply with CSA Standards.
- Test regulator and flexible connecting hose immediately after connecting to a gas cylinder to ensure there is no leak.
- Welding operation is not to resume until the leak is repaired.
- Hot taps will be accordance with local and federal codes and a specific safety plan approved by both the client representative and construction management.
- Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions will be taken so that no readily combustible materials below will be exposed to sparks which might drop. A properly trained fire watch person will be located below during the operation and in special cases required additionally for 1 hour after termination of the work being performed. The same precautions will be observed with regard to cracks or holes in walls, open doorways and open or broken windows.
- When installed outdoors, arc-producing electrical equipment will not be installed within 1m of the discharge of combustible gas relief device or vent.

28.3. PERSONAL PROTECTIVE EQUIPMENT

Welders and those working nearby need protection against arc radiation. Being closest, the welder needs the most protection. They should be equipped with a welding helmet equipped with the proper shade lens and safety glasses to protect the eyes and face from harmful light and particles of hot metal. Welders should never weld with cracked or defective shields, because penetrating rays from the arc may cause serious burns. Contact lenses should not be worn when welding or working around welders. Tinted safety glasses with side shields are recommended, except when working at night. Those working around welders should also wear tinted safety glasses with side shields.

Welders should wear work clothes without openings or gaps to prevent arc rays from contacting the skin. Flameproof aprons or jackets made of leather, fire resistant material, or other suitable

material should be worn for protection against spatter of molten metal, radiated heat and sparks. Capes or shoulder covers made of leather or other suitable materials should be worn during overhead welding or cutting operations. Synthetic clothing should never be worn. Clothing should always be kept dry, including gloves. To prevent sparks or slag from becoming lodged in clothing and causing burns, sleeves and collars should be kept buttoned, pockets should be eliminated from the front of overalls and aprons, and pants and overalls should not be turned up on the outside.

Leather welding gloves should be worn to protect the hands and arms from rays of the arc, molten metal spatter, sparks and hot metal. Leather gloves should be of sufficient thickness so that they will not shrivel from the heat, burn through, or wear out quickly. Do not allow oil or grease to come in contact with the gloves, as this will reduce their flame resistance and cause them to be readily ignited or charred.

When welding in any area, the operation should be adequately screened to protect nearby workers or passers-by from the glare of welding. The screens should be arranged so that no serious restriction of ventilation exists. For this reason, the arc should never be viewed with the naked eye within a distance of 15.2 m (50 feet). The danger of the light depends on the welding process, the metals in the arc, the arc atmosphere, the length of the arc, and the welding current. The intensity of the light from the arc increases with increasing current and arc voltage. Arc radiation, like all light radiation, decreases as the distance from it increases.

28.3.1. **Respirators**

Good safe practices recommend using engineering controls, such as local exhaust and/or general ventilation, to reduce the exposure level to zinc oxide fumes. However, there are times when such practices and controls are not feasible, or are in the process of being installed, or are down during periods of failure. Then respirators are needed. Respirators are often used for operations in confined spaces, such as tanks or closed vessels, and in emergency situations. Always use respirators that are approved by the Mine Safety and Health Administration (MSHA) or by the National Institute for Occupational Safety and Health (NIOSH)

28.4. **COMBUSTABLE MATERIAL**

Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions shall be taken so that no readily combustible materials below will be exposed to sparks that might drop. A properly trained fire watch person shall be stationed below during the operation and, in special cases, be required to stay in that location for one additional hour after termination of the work being performed. The same precautions shall be observed with regard to cracks or holes in walls, open doorways and open or broken windows.

28.5. **FIRE PROTECTION**

Fire prevention and protection is the responsibility of welders, cutters and supervisors. During the welding and cutting operations, sparks and molten spatter sometimes fly considerable distances. For this reason, welding and cutting should not be done near flammable or combustible materials unless every precaution is taken to prevent ignition. Ideally, the materials will be removed from the vicinity of the welding. If that is not an option, they will be covered with fire resistant blankets.

Fire extinguishing equipment will be immediately available.

28.6. FIRE WATCH

Fire watchers shall be required whenever welding, soldering, grinding, or cutting is performed in locations where a minor fire might develop, or any of the following conditions exist:

- Appreciable combustible material, in building construction or contents, is closer than 35 feet (10.7 m) to the point of operation.
- Appreciable combustibles are more than 35 feet (10.7 m) away but are easily ignited by sparks.
- Wall or floor openings within a 35 foot (10.7 m) radius expose combustible material in adjacent areas, including concealed spaces in walls or floors.
- Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.
- The fire watch will be conducted for a 1 to 4 hour period.

Fire watch personal shall have fire extinguishing equipment readily available and be trained in its use. They shall be familiar with facilities for sounding an alarm in the event of a fire. They shall watch for fires in all exposed areas, try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound an alarm. A fire watch shall be maintained (in some cases) for at least one (1) hour after completion of welding, cutting, burning or soldering operations to detect and extinguish possible smouldering fires. If required, the fire watch person shall remain in the location where the work has been performed. An additional extended fire watch may be continued for an additional 3 hours

Before cutting, burning, welding or soldering is permitted, the area shall be inspected by an individual responsible for authorizing the "Hot Work Permit".

28.7. VENTILATION

Certain welding operations can create hazardous atmospheres for the welder or other employees working in the vicinity. Protective measures, such as ventilation or respiratory protection, will be used to prevent exposure to a hazardous atmosphere.

To assist with proper ventilation, welding screens will be arranged so that no serious restriction of ventilation exists. It is desirable to have the screens mounted so that they are about 0.6 m (2.0 feet) above the floor, unless the work is performed at such a low level that the screen must be

extended closer to the floor to protect workers from the glare of welding. If mechanical ventilation is required, it will be designed so as not to interfere with the shielding of the welding process.

Respiratory protection will be utilized when welding exotic metals that expose welders and their helpers to levels in excess of the chemical exposure limits referenced in the OH&S regulations of the province that a job is in.

28.8. **CUTTING**

Many of the same hazards exist when using a torch to cut materials as when welding. Many of the same precautions will be implemented for cutting operations. The additional factor is the use of a flammable gas and pure oxygen to facilitate the cut. Each of these has special precautions that must be adhered to for safe operations.

28.9. **HEATING CYLINDERS AND TORCHES**

Kiewit staff employees and craft workers should recognize the following precautions when handling cylinders and torches:

- Flashback arrestors will be in place at both the cylinder and torch ends.
- Cylinder tanks must be in an upright position and properly secured with chain or wire rope. Nylon ratchet straps can be used as an additional safety device.
- Cylinder valves must only be opened with approved keys or hand-wheels. Do not use excessive force to open or close the cylinder valve.
- When connecting hoses on oxygen cylinders, pipe dope must not be used.
- Leave the valve wrench on the fuel gas cylinder whenever the valve is open. This permits emergency shut-off of the gas.
- Avoid stringing out an excessive amount of hose. It can become kinked, causing reduced flow, and it can become a tripping hazard.
- Welding and cutting equipment must be turned off when not in use. Valves must be shut off before putting down a torch. Torches should not be hung from the gauges, because this can cause damage.
- Torches must only be lit with a striker. Torches relit from hot work can cause a violent ignition if the gases do not light instantly. When lighting up, ensure that the torch is not pointed at any person, cylinder or combustible material.
- Never use oil or grease on the oxygen regulator or torch fittings. A spontaneous ignition and violent fire may occur when oil or grease comes into contact with oxygen.

28.9.1. **Metal Fume Fever**

Metal Fume Fever is the name for an illness that is caused primarily by exposure to zinc oxide fume (ZnO) in the workplace. The main cause of this exposure is usually breathing the fumes from welding, cutting, or brazing on galvanized metal. Metal Fume Fever is an acute allergic condition experienced by many welders during their occupational lifetimes. Studies indicate that the most common cause of metal fume fever is overexposure to zinc fumes from welding, burning, or brazing galvanized steel. Since galvanized steel is more and more common in industry, the chances of welders having to work with it are occurring more frequently. Other elements, such as copper and magnesium, may cause similar effects.

28.9.2. **Effects of Overexposure**

Zinc Oxide Fumes can cause a flu-like illness called Metal Fume Fever. Symptoms of Metal Fume Fever include headache, fever, chills, muscle aches, thirst, nausea, vomiting, chest soreness, fatigue, gastrointestinal pain, weakness, and tiredness. The symptoms usually start several hours after exposure; the attack may last 6 to 24 hours.

Complete recovery generally occurs without intervention within 24 to 48 hours. Metal Fume Fever is more likely to occur after a period away from the job (after time off or vacations). High levels of exposure may cause a metallic or sweet taste in the mouth, dry and irritated throat, thirst, and coughing at the time of the exposure. Several hours after exposure, a low grade fever (seldom higher than 102° F or 39° C) can occur, followed by sweating and chills before temperature returns to normal in 1 to 4 hours. If you have these symptoms, contact the Safety Department and have a medical examination/evaluation. There is no information in the literature regarding the effects of long-term exposure to zinc oxide fumes.

28.9.3. **Permissible Exposure Limit (Pel)**

NIOSH recommends that the permissible exposure limit be 5 mg/m³ averaged over a work shift of up to 10 hours per day, 40 hours per week, with a Short-Term Exposure Limit (STEL) of 10 mg/m³ averaged over a 15-minute period. Consult the NIOSH standard, *Criteria Document for Zinc Oxide*.

28.9.4. **How to Avoid the Hazard**

- Keep your head out of the fumes.
- Do not breathe fumes.
- Use enough ventilation, exhaust at the arc, or both, to keep fumes and gases from your breathing zone and the general area.
- If adequacy of the ventilation or exhaust is uncertain, have your exposure measured and compared to the Threshold Limit
- Consult Values (TLV) in the Safety Data Sheet (SDS) for the galvanized material.
- Never take chances with welding fumes. If none of this is adequate or practical, wear an approved respirator, air-supplied or otherwise, that adequately removes the fumes from your breathing zone.

29. FIRE PREVENTION

Fire prevention is every employee's responsibility. Unsafe practices will not be tolerated. The following safe practices are to be considered and followed at all times.

- Flammables, including paper, cardboard, books, rags, clothing, flammable liquids (solvents, thinners, cleaners) or rubbish must not be placed or stored near heaters or their vents, any electrical appliance, or other potential sources of ignition.

- Sources of actual or potential heat, such as portable space heaters and welding or cutting apparatus, will not be placed near flammable materials.
- Care must be taken not to block potential escape routes, particularly with flammable materials.
- All portable gasoline or kerosene storage cans must conform to provincial and federal law and any other applicable regulations.
- Each individual is personally responsible for ensuring that extension cords and multiple plugs are in good condition.
- Care must be taken at any construction/repair site or shop/lab area to avoid an accumulation of debris (wood shavings, saw dust, metal shavings, or fibreglass).
- Flammable substances stored or used at a work area will not be a sufficient quantity to produce an explosive atmosphere is inadvertently released.
- Flammable substances will not be stored within 30 meters of an underground shaft or in the immediate vicinity of the air intake of ventilation supply system, an internal combustion engine, or fire box of a fired heater or furnace.
- If work requires that the contents of metallic or conductive containers be transferred from one to the other, foreman must ensure that static electricity is controlled while the contents are being transferred.
- Internal combustion engine in a hazardous location has a combustion air intake and exhaust discharge that are equipped with a flame arresting device, or located outside the hazardous location. Whenever possible, internal combustion engines should be located outside the hazardous location.
- Flare pits, flare stacks or flares are beyond 25 meters of a hazardous location.

29.1. RESPONSIBILITIES

- All employees are responsible for respecting this policy and for familiarizing themselves with the locations of fire alarms and evacuation routes in the areas they occupy.
- Supervisors are responsible for ensuring compliance with this policy and for referring matters requiring corrective measures to the appropriate parties.

29.2. FIRE PROTECTION REGULATIONS

- Persons are required to respect the workplace no-smoking policy.
- Acts of tampering or vandalism of fire protection devices (fire alarms, emergency exits, exit doors, exit lights, sprinklers, detectors, etc.) is a Federal Offence in Canada.
- Safe evacuation routes are to be maintained at all times. In particular, corridors, stairways, and fire escapes are not to be used for storage.

- Quantities of combustible material (paper, cardboard, etc.) and flammable materials (solvents) should be kept to a minimum, and stored in appropriate locations.
- Never overload electrical circuits and avoid the use of long or multiple extension cords.
- Defective electrical equipment must be taken out of service and appropriately tagged for repair.
- Suspected leaks of natural gas and propane must be reported immediately.
- Electrical installations will be made so that the probability of spread of fire through fire stopped partitions, floors, hollow spaces, firewalls or fire partitions, vertical shafts, or ventilation or air conditioning duct is reduced to a minimum. Where a fire separation is pierced by a raceway or cable, any openings around the raceway or cable shall be properly closed or sealed in compliance with the National Building Code of Canada.
- Hot work may only begin upon the issue of a Hot Work Permit. Hot work is defined as any welding, cutting, grinding, or any other activity involving open flames, sparks, or other ignition sources which may cause smoke or fire.

29.3. FIRE PROCEDURE

1. Shout "FIRE" repeatedly to give the alert.
2. Raise an alarm.
3. Call or radio emergency response services, if available.
4. Evacuate the premises in a swift, orderly fashion using stairways, ladders, EWP's and/or fire escapes.
5. Inform emergency response services of the location, magnitude, and nature (e.g., electrical) of the fire, the open evacuation routes, persons requiring assistance, and other pertinent details.
6. If safe to do so, wait for the arrival of emergency response vehicles in order to direct the firemen to the fire.
7. Upon hearing the fire alarm (voice, horn or bell), it is the responsibility of each supervisor to ensure that the personnel under their respective jurisdictions be evacuated to a muster point quickly, calmly, and completely.
8. Fire-fighting should always be a secondary consideration to building evacuation. It should be attempted only if the fire in question can be extinguished with ready-to-hand and appropriate equipment and especially, only if there is no danger of the evacuation route being cut off.

29.4. INTERIOR FIRES

Upon discovery of any interior fire, the following procedures shall be followed:

1. Activate the building fire alarm if one exists in the building.
2. If the building is not equipped with a fire alarm system, start a verbal alert to warn all personnel of the danger and to order them to leave the building immediately. Leave the area immediately; if possible without compromising safety, close all windows and doors in the vicinity of the fire.

3. From a telephone or radio in a safe location, call Emergency Response Services with the following information:
 - Your name
 - The specific area where the fire is burning
 - The nature of the fire and any specific information which may be valuable to the fire department such as any toxic chemicals that may be encountered or any incapacitated or trapped personnel that you are aware of.

Even if properly trained in the use of fire extinguishers, before you consider fighting an interior fire:

- Make sure everyone has left the immediate area or is leaving.
- Make sure emergency responders have been notified.
- Make sure you are familiar with the operation of the portable fire extinguisher in the area.
- Decide your primary and secondary means of egress if the firefighting is unsuccessful.
- Never attempt to fight an interior fire if any of the following conditions exist:
 - if the fire is spreading beyond the immediate area where it started, or is already a large fire
 - if the fire could block your escape
 - if you are unsure of the proper operation of the fire extinguisher
 - If any of the above conditions exist, it is reckless to attempt to fight the fire with a portable extinguisher. Instead, leave the area immediately; if possible without compromising safety, close all windows and doors in the immediate area of the fire.

In the event you are trapped in a building and cannot escape:

- Call or radio emergency response the fact that you are trapped.
- If you get caught in smoke, get down on your hands and knees and stay low. Smoke and hot fumes rise, so the cleanest air is near the floor.
- If the fire is on the other side of the door to the room you are in, try to seal the doorway so that smoke and fumes cannot enter your room.
- If water is available in the room, use a wet rag or a piece of your clothing as a filter to breathe through.

29.5. EXTERIOR FIRES

Upon discovery of any exterior fire, the following procedures shall be followed:

1. If the fire poses a threat to any immediately adjacent structure, inform someone inside the building so that personnel can evacuate the area.
2. Dial or radio emergency response services with the following information:

- Your name
- Location of the fire, if different from the location you are calling from. Use buildings or other readily identifiable landmarks for reference.
- Nature of the fire, (automobile, brush, etc.), any toxic chemicals or trapped personnel that you are aware of.

Before you attempt to fight an exterior fire:

- Unless the area involved is a small patch of grass or brush and you have a water supply line available, it is best to leave the task to the emergency response services.
- Automobile fires can be extremely hazardous due to the type of materials used for construction and the proximity of the fuel tank. Most automobiles contain synthetic materials which may produce cyanide and a host of other highly toxic gases when burned. Stay upwind at all times.
- A minor fire in the engine compartment of a vehicle can be fought with a portable fire extinguisher if the hood can be opened a few inches and the contents of an appropriate portable fire extinguisher are directed through the opening. Do not raise the hood all the way open. If in doubt, activate the inside hood release mechanism and leave the vehicle. Keep others clear of the area.

29.6. **AVOIDANCE OF EXPLOSIVE ATMOSPHERES**

A worker must not enter or work at a work area if more than 20 percent of the lower explosive limit of a flammable or explosive substance is present in the atmosphere. Atmospheric testing should be assessed before a worker is exposed.

29.7. **SUSPECTED FIRES**

Anyone discovering smoke, a strong smell of something burning, or a smell of an unusual nature, should immediately:

1. Report it to a supervisor.
2. Report it to the safety department.
3. Report it to the site-wide services provider.

29.8. FIRE EXTINGUISHERS

Classes and Uses:

1. Class A – Use for paper, trash, rubbish products
2. Class B – Used for oils, solvents, gas, grease
3. Class C – Used for electrical
4. Class D – Used for metal

All portable fire extinguishers currently being used on site are to be 20 lb dry chemical type (triple purpose) and can be used on Class A through Class C fires.

Extinguishers will be conspicuously located where they will be readily accessible and immediately available in the event of fire. They will be located along normal routes of travel and, where practical, should be located near exits. Extinguishers must not be obstructed from view by furnishings, storage containers, furnaces, etc. In large rooms or storage areas where visual obstructions cannot be completely avoided, appropriate signs will be provided to indicate their location.

29.9. INSPECTION OF FIRE EXTINGUISHERS

Portable extinguishers will be maintained in a fully charged and operable condition. Safety personnel will perform the monthly visual inspection of portable fire extinguishers required. The inspection is to ensure that the portable fire extinguishers are in their designated places, have not been tampered with or actuated, and is free from obvious physical damage, corrosion, or other impairments to full service. Any extinguisher showing defects will be removed from service and replaced with a fully serviceable unit. Safety personnel will maintain appropriate records of inspections, by tagging the extinguishers and keeping a log of the serial numbers.

29.10. CLOTHING OR SKIN CONTAMINATION WITH FLAMMIBLE/COMBUSTABLE LIQUID

If clothing or skin comes into contact with flammable or combustible liquid, the worker must:

- Avoid any activity where a spark or open flame may be created or exists.
- Remove the clothing and ensure the clothing is decontaminated before it is used again. If the worker's skin came into contact with the liquid, worker must wash the skin thoroughly immediately.

TYPES OF FIRES		TYPES OF EXTINGUISHERS	
LETTER SYMBOL		PICTURE SYMBOL	
	For wood, paper, cloth, trash and other ordinary materials.		CLASS A 
	For gasoline, grease, oil paint and other flammable liquids.		CLASS AB 
	For live electrical equipment.		CLASS BC 
	For combustible metals.	No Current Symbol	CLASS ABC 

30. EXCAVATION SAFETY

30.1. POLICY

The purpose of this policy is to prevent personal injury and illness to Kiewit employees and subcontractors, while performing excavation duties. The objectives of this policy are to establish a written program outlining general guidelines governing excavations and trenches.

30.2. GENERAL PROVISIONS

Please ensure that you are following the provincial/territorial guidelines for excavation work.

30.3. Responsibilities

30.3.1. Supervisors have the responsibility to:

- Identify and assess the hazards of each excavation area.
- Ensure that all employees receive the appropriate training and equipment they need to protect themselves and others.
- Enforce compliance with this policy.

30.3.2. Employees have the responsibility to:

- Understand their assigned tasks relating to excavation safety.
- Apply the proper training and equipment to work safely in excavations and trenches.
- Assist with the assessment and the identification of excavation hazards.
- Comply with the directives of this policy.

30.4. DEFINITIONS

Excavation

An excavation is any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal. Excavations produce unsupported soil conditions.

Trench

A trench is a narrow excavation made below the surface of the ground in which the depth is greater than the width. The width does not exceed 15 feet.

Sloping System

A sloping system means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins

Benching System

A benching system means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels.

Aluminum Hydraulic Shoring

Aluminum Hydraulic Shoring means a pre-engineered shoring system comprised of aluminum hydraulic cylinders (cross braces) used in conjunction with vertical rails (uprights) or horizontal rails (wales). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

Cave-in

A cave-in is the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent person

A competent person is someone 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.

Distress

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. It is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and raveling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

Faces or sides

Faces or sides mean the vertical or inclined earth surfaces formed as a result of excavation work.

Hazardous atmosphere

A hazardous atmosphere is an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

Protective system

A protective system is a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Professional engineer

A professional engineer is a person who is registered as a professional engineer in the province where the work is to be performed.

30.5. HAZARDS

The most common hazards that should be recognized and associated with work in excavations are categorized as follows:

- Cave-ins – Cave-ins are the most common excavation hazard. They occur when a mass of soil or rock material separates from the side of an excavation or when soil is lost from under a trench shield or support system. The mass of soil or rock material then moves suddenly into the excavation either by falling or sliding. Cave-ins can entrap, bury, or otherwise injure and immobilize a worker. Protective support systems such as sloping, benching, shielding, and shoring should be used to protect workers from cave-ins.
- Falls – Use warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs to alert operators of the edge of an excavation. Do not allow employees to work on faces of sloped or benched excavations at levels above other employees unless the employees at lower levels are adequately protected.
- Equipment accidents – Keep all equipment that might fall into an excavation at least 2 m from the edge of the excavation. Also, keep excavated soil at least 2 m from the edge of the excavation.
- Water accumulation – Employees are not to work in excavation areas where water has accumulated unless water removal equipment is being used. Diversion ditches, dikes, or other means should be used to prevent surface water from entering an excavation and to provide drainage.
- Hazardous atmospheres – Any excavation deeper than four feet or where an oxygen deficiency or a hazardous atmosphere exists or could exist needs to be checked by a competent person. If hazardous conditions exist, respirators must be worn or ventilation must be provided and the atmosphere needs to be monitored.
- Access and egress – If an excavation is deeper than four feet, adequate means of exit, such as ladders, steps, ramps or other safe means of egress must be provided and be within 25 feet of the worker. These must extend three feet (one meter) above the ground.

30.6. PRE-PLANNING

- An excavation competent person shall be on site at each excavation
- Before beginning any excavation, identify and evaluate specific job hazards. These can include traffic, nearness of structures and their conditions, soil, surface and ground water, the water table, overhead and underground utilities, and weather.
- Call the local utilities hotline 48 hours before digging for the exact location of all utilities, including electric, gas, telephone, sewer, water, and cable television lines.
- Pick the correct type of personal protective equipment for the job. If you are to be working near vehicular traffic, wear a warning vest or other suitable garments marked with or made of reflectorized or high-visibility material. Also wear hard hats, goggles, adequate CSA footwear, and respirators as necessary.

30.7. SOIL CLASSIFICATION

Every soil and rock deposit needs to be classified by a competent person as stable rock, type-A, type-B, or type-C before excavation can begin. In a layered system, the system is classified according to its weakest layer. Any time the properties, factors, or conditions affecting the soil type change in any way, the area needs to be re-evaluated and reclassified to reflect the changed circumstances.

1. Stable rock is natural solid mineral matter.
2. Type-A soil is cohesive soil with an unconfined, compressive strength of 1.5 tons per square foot or greater. Examples of Type-A soils are: clay, silty clay, sandy clay, clay loam, caliche, and hardpan and, in some cases, silty loam and sandy clay loam. No soil is Type-A if:
 - a. The soil is fissured.
 - b. The soil is subject to vibration from heavy traffic, pile driving, or similar effects.
 - c. The soil has been previously disturbed.
 - d. The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical or greater.
 - e. The material is subject to other factors that would require it to be classified as a less stable material.
3. Type-B soil is:
 - a. Cohesive soil with an unconfined compressive strength greater than 0.5 tons per square foot, but less than 1.5 tons per square foot.
 - b. Granular cohesion less soil including: angular gravel, silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
 - c. Previously disturbed soil except that which would otherwise be classed as Type C soil.
 - d. Soil that meets the unconfined compressible strength or cementation requirements for Type A, but is fissured or subject to vibration.
 - e. Dry rock that is not stable.
 - f. Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical, but only if the material would otherwise be classified as Type B.
4. Type-C soil is:
 - a. Cohesive soil with an unconfined compressive strength of 0.5 tons per square foot or less.
 - b. Granular soil including gravel sand and loamy sand.
 - c. Submerged soil or soil from which water is freely seeping.
 - d. Submerged rock that is not stable.
 - e. Material in a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical or steeper.
 - f.

30.8. TESTING OF SOIL

Classification tests of soil shall be performed by a competent person using at least one visual test and one manual test.

30.8.1. Visual tests

Visual tests provide qualitative information on the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from the excavated material.

To perform a visual test

1. Observe samples of soil and estimate the range of particle sizes and their relative amounts. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.
2. Observe soil as it is excavated. Soil that remains in clumps is cohesive and soil that breaks up easily is granular.
3. Observe the side of the opened excavation and the adjacent surface. Crack-like openings, tension cracks, and chunks of soil that spall off a vertical side could indicate fissured material. Small spalls are evidence of moving ground and are potentially hazardous.
4. Observe the surrounding area and the excavation area itself for existing utility and other underground structures, and to identify previously disturbed soil.
5. Observe the sides of the excavation for layered systems.
6. Observe the excavation area for evidence of surface water, water seeping from the sides of the excavation, or the level of the water table.
7. Observe the excavation area for sources of vibration that may affect the stability of the excavation face.

30.8.2. Manual tests

Manual tests provide quantitative as well as qualitative properties of soil. They provide more information in order to classify the soil properly. Some examples of manual tests include:

1. Plasticity
2. Dry strength
3. Thumb penetration
4. Other strength tests: pocket penetrometer, hand-operated shear vane
5. Drying test

30.9. PROTECTIVE SUPPORT SYSTEMS

- The excavation competent person shall determine the type of protection required.
- The Trench Protective system for trenches 20 or more feet in depth must be designed and approved by a Registered Professional Engineer.
- The designs should include the sizes, types and configuration of materials to be used and the engineer's identity. A copy of the design should be kept at the jobsite.
- *Any adjacent structures that might be affected by excavation activities must be adequately supported before work begins. Support system must be design and review as per Kiewit temporary structure procedure.*

Protective support systems are required to protect Kiewit employees from cave-ins while working in any excavation unless:

1. The excavation is made entirely in stable rock, or
2. The excavation is less than 5 feet deep and a competent person has examined the ground and found no indication of a potential cave-in; when soil conditions are unstable, excavations less than 5 feet deep must also be protected from cave-ins.

Protective systems shall have the capacity to resist, without failure, to all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

30.9.1. Sloping and Benching Systems

1. A sloping system means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins.
2. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads. Use charts and tables to determine the angle of incline.
3. The maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V). This varies according to the soil type which can be classified by a competent person. See Table for the maximum allowable slopes.
4. The actual slope shall never be steeper than the maximum allowable slope. When there are signs of distress, the slope shall be cut back to an actual slope which is at least $\frac{1}{2}$ horizontal to one vertical (1/2H: 1V) less steep than the maximum allowable slope.
5. A benching system means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels.
6. The length of the vertical sides of a benching system and the maximum allowable slope required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads. Use charts and tables to determine the length of the sides and the maximum allowable slope.
7. It is always better to over-compensate and make the angle flatter.

30.9.2. Shielding Systems

- A shield system means a pre-constructed structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields used in trenches are usually referred to as trench boxes or trench shields.
- Shields can be permanent structures or can be designed to be portable and moved along as work progresses.
- Shielding must extend above the ground level or the trench walls above the top of the box must be sloped.

30.9.3. Shoring Systems

A shoring system means a structure such as a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins. Shoring systems shall be installed from the top down and removed from the bottom up unless they are installed and removed from outside the trench.

30.9.4. Backfilling

Use machines to fill the excavated area as soon as you are done working in that area. Backfill materials shall not be pushed or dumped into an excavation while an employee is still in it. At the completion of a backfill operation, excess fill and other debris should be completely cleaned up, especially on paved roads.

30.10. EXCAVATION NEAR UTILITIES

When excavating near utility lines, always follow all excavation safety rules, as well as these special situation rules.

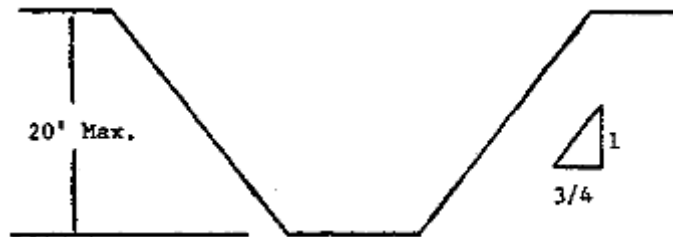
- If you are digging within eighteen inches of a utility line, ask the utility company to expose and protect the line.
- A Safety Data Sheet (SDS) should be obtained for all chemicals that may be contained in pipelines and vessels. The warnings on the SDS should be followed.
- Mechanical digging is not allowed near the utility lines.
- Power tools and mechanical equipment such as concrete breakers, drills, and backhoes should be effectively grounded with a 2/0 ground lead.
- Be careful not to drop large rocks, roots, or clumps of soil directly on to the exposed utility line while backfilling.
- When utilities are exposed in a trench and are unsupported, supports shall be installed as needed to prevent damage or creating a hazardous situation.

30.11. MAXIMUM ALLOWABLE SLOPES FOR EXCAVATIONS

Soil Or Rock Type	Maximum Allowable Slopes (H:V)(1) For Excavations Less Than 20 Feet Deep(3)
Stable Rock	Vertical (90°)
Type A (2)	3/4:1 (53°)
Type B	1:1 (45°)
Type C	1 ½:1 (34°)

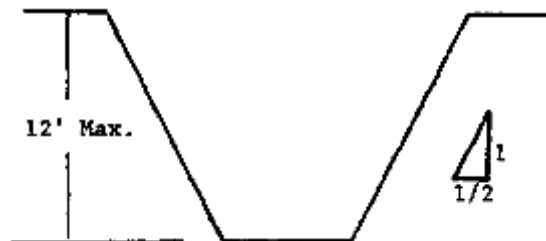
30.11.1. Excavations made in Type-A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of $\frac{3}{4}:1$.



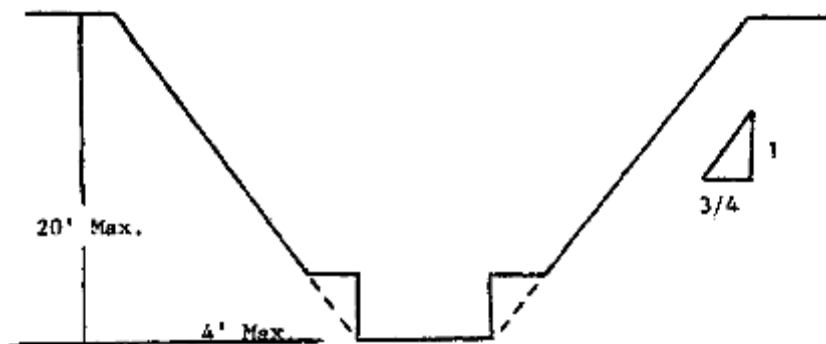
SIMPLE SLOPE – GENERAL

Exception: simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of $\frac{1}{2}:1$.

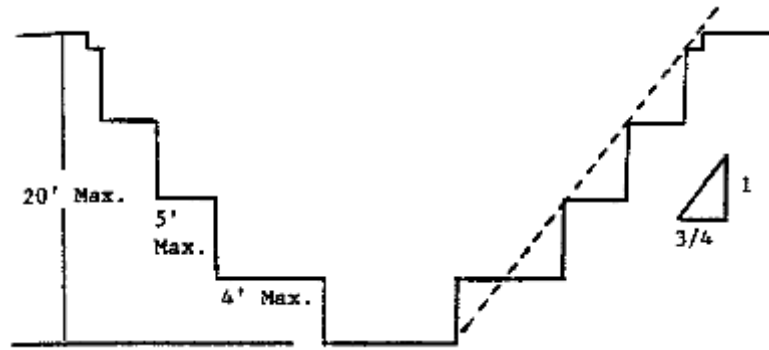


SIMPLE SLOPE -- SHORT TERM

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of $\frac{3}{4}$ to 1 and maximum bench dimensions as follows:



SIMPLE BENCH



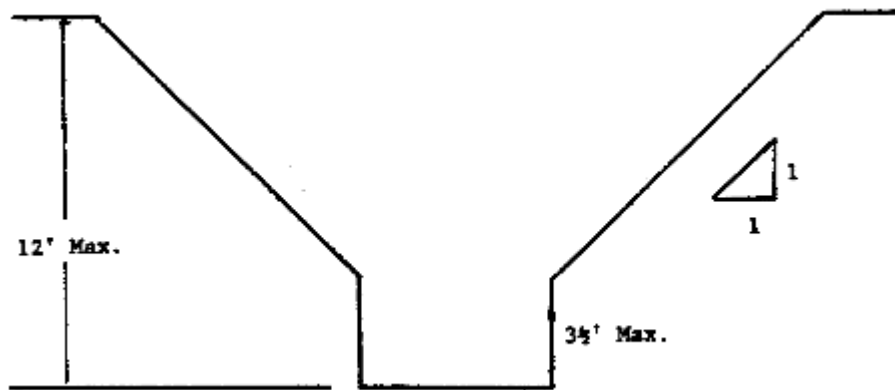
MULTIPLE BENCHES

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3½ feet.



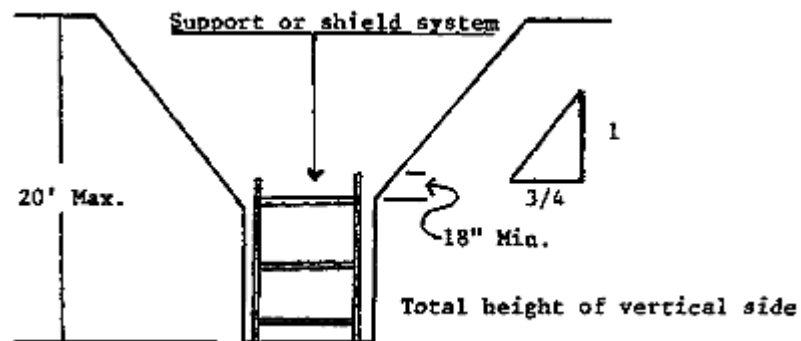
UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 8 FEET IN DEPTH

All excavations more than 8 feet but not more than 12 feet in depth with unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3½ feet.



UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 12 FEET IN DEPTH)

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of $\frac{3}{4}$:1. The support or shield system must extend at least 18 inches above the top of the vertical side.

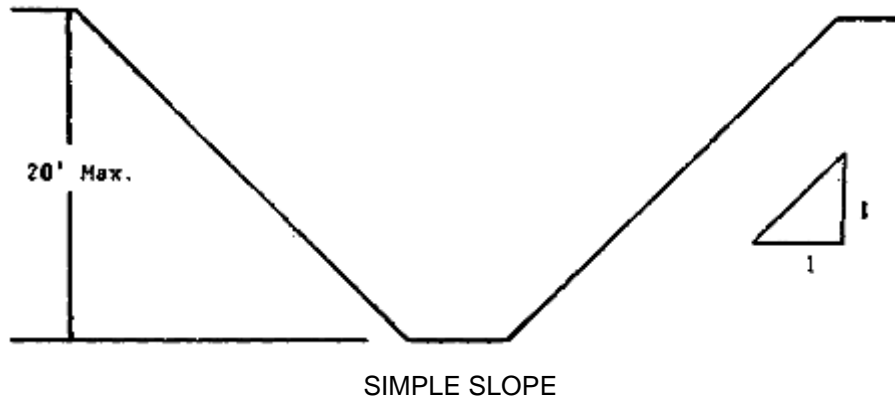


SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

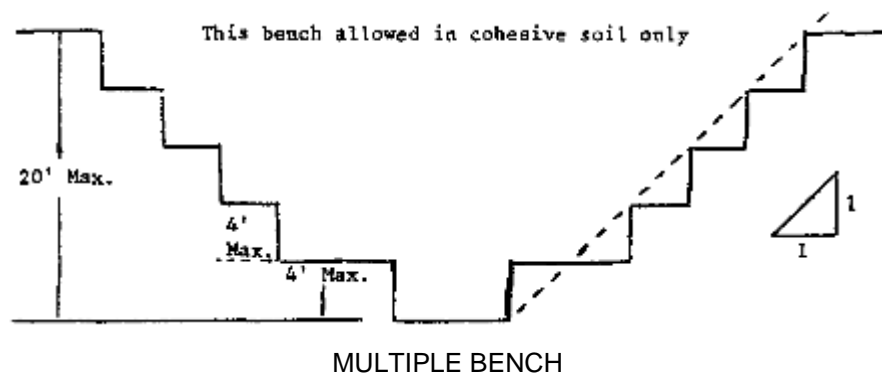
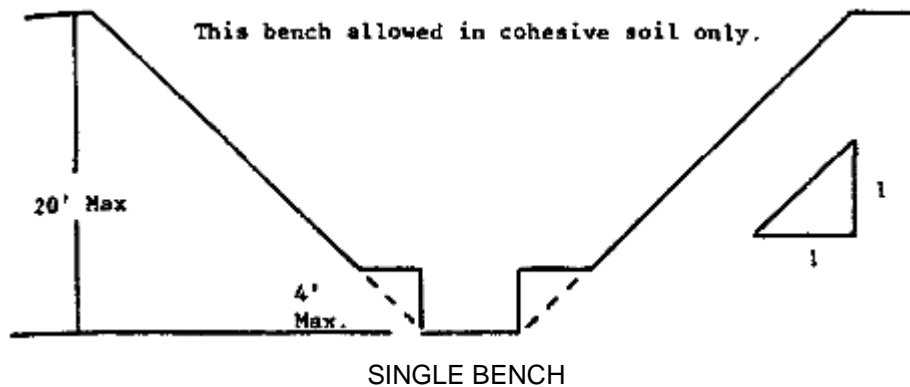
4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under § 1926.652(b).

30.11.2. Excavations Made in Type-B Soil

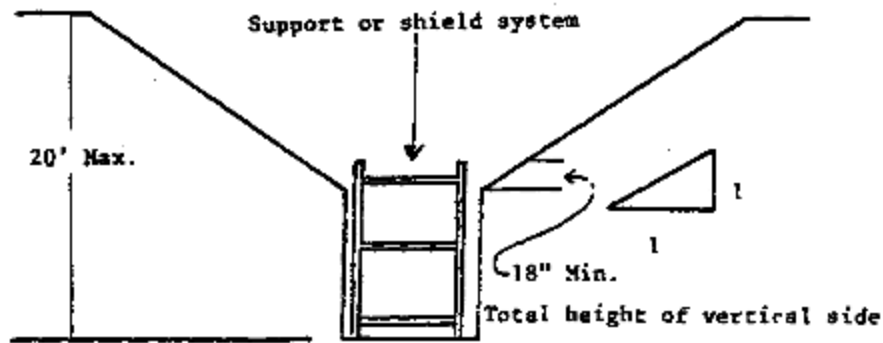
1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:



3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

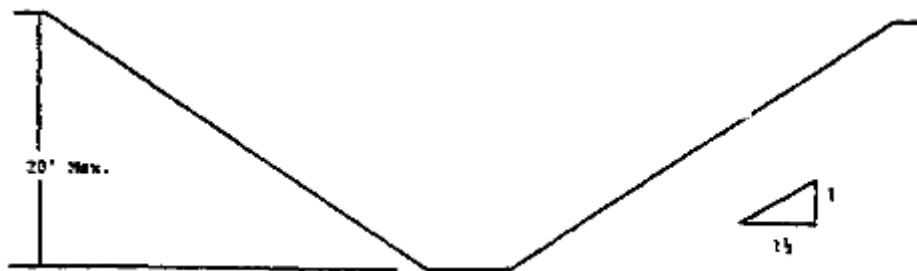


VERTICALLY SIDED LOWER PORTION

4. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

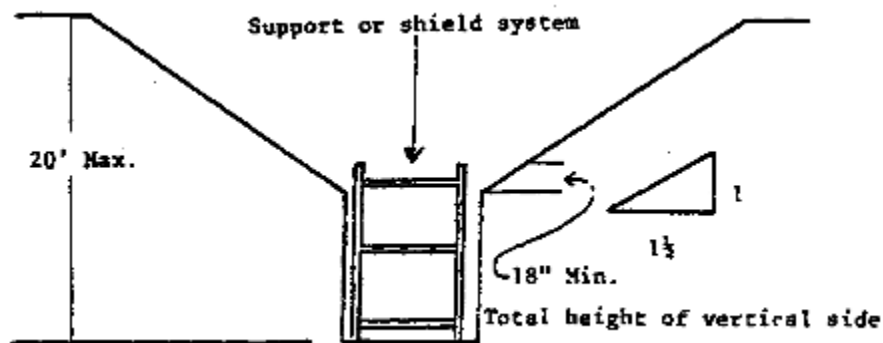
30.11.3. Excavations made in Type-C soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of $1\frac{1}{2}:1$.



SIMPLE SLOPE

All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of $1\frac{1}{2}:1$.

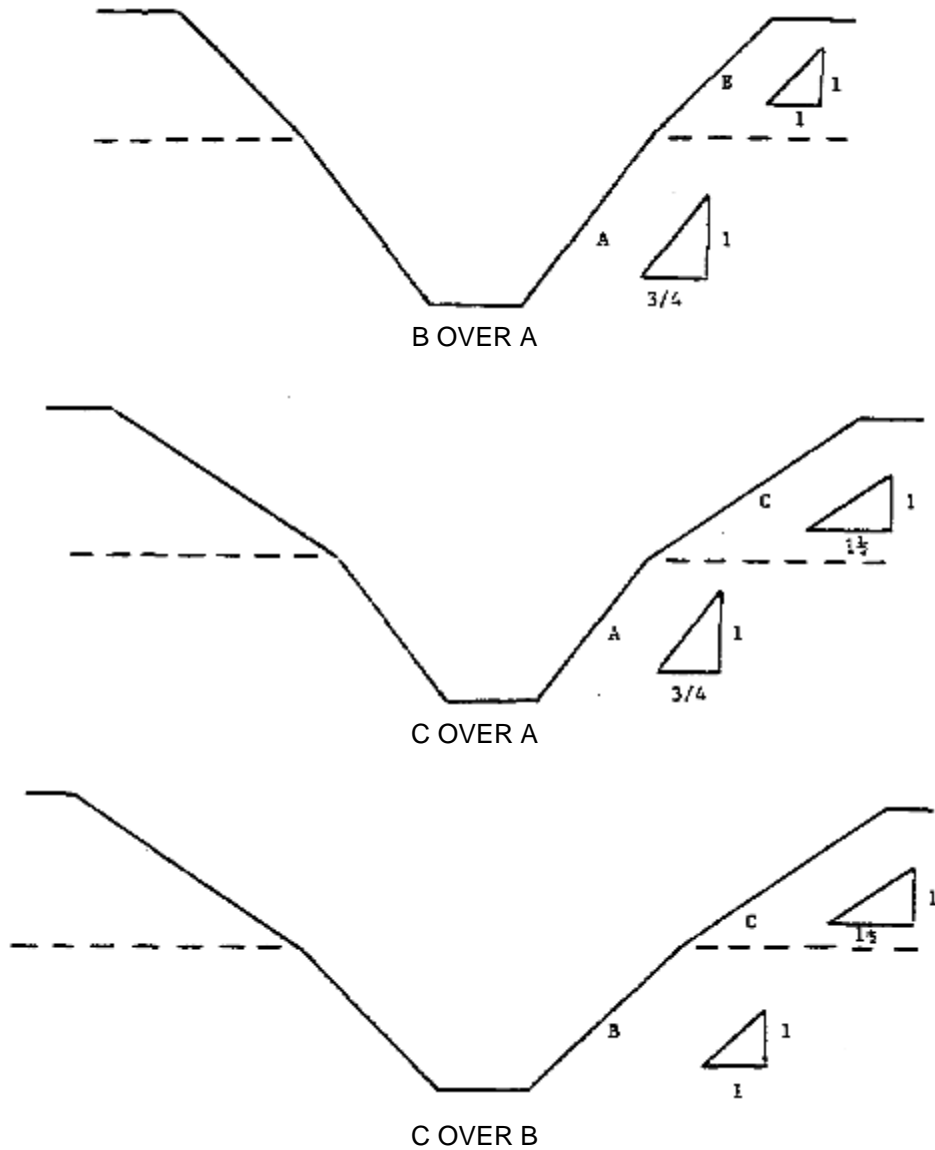


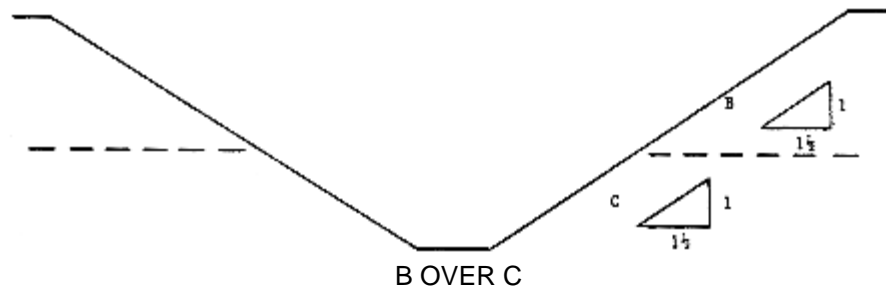
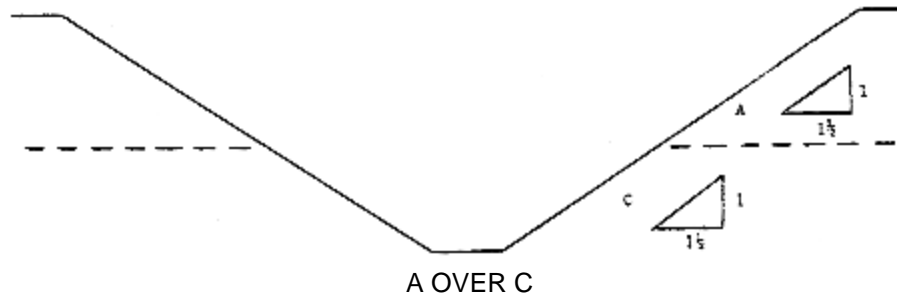
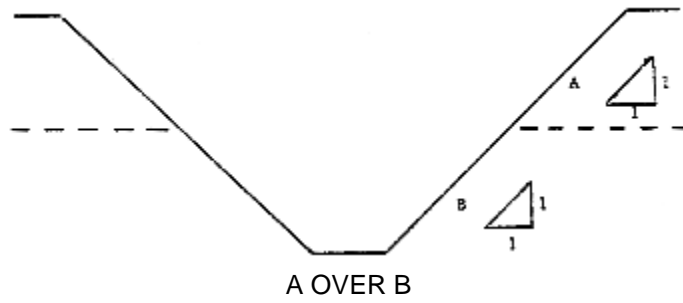
VERTICAL SIDED LOWER PORTION

2. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

30.11.4. Excavations made in layered soils

1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.





31. GROUND DISTURBANCE AND UTILITY SAFETY

Ground disturbance is classified as any operation that results in the disturbance or displacement of the soil or ground cover, and it is usually associated with excavating and trenching.

31.1. Purpose

The purpose of this safe work practice is to help identify the hazards that may be present in this operation and outline the proper procedures and techniques that must be used during any work or task that involves a ground disturbance.

- Kiewit staff employees and trades workers must be aware of the potential hazards that are present while conducting a ground disturbance activity and follow the appropriate procedures to mitigate these hazards.
- A Ground Disturbance Permit is required before any ground disturbing activities take place. The General Superintendent, Superintendent, Engineer, Foreman and Operator are required to sign off on the permit prior to the start of work.
- If the ground disturbance, to include potholing involves other companies buried utilities, or if crossing another companies/persons property, then proper notification must be given. The property/utility owner must be given enough notice of your intent to reply and take the appropriate actions and arrangements for a crossing agreement if required. They must be given a schedule and scope of work that describes the ground disturbance if required. This permit must remain on site at all times.

Any “hits or contacts” with the utility must be reported, documented and proper notification given to all parties involved.

31.2. DEFINITIONS

“Buried Facility” is anything on the surface or/and below ground used in the collection, storage, transmission or distribution of: water, storm water, sewage, electronic, telephonic or telegraphic communications, cable TV, electrical energy, oil, natural gas, steam, petroleum products, chemicals and other substances and include, but is not limited to: pipes, conduits, ducts, cables, wires, valves, manholes, catch basins and attachments to these items.

“Ground Disturbance” is considered to be any work, operation, or activities that results in a disturbance of the earth or that result in a reduction or increase of the initial installation cover or load over a buried facility. The term Ground Disturbance has been adopted to replace “excavate” because there are many activities that apply. Such operations may involve the use of explosives, or mechanical or non-mechanical equipment. These activities may include, but not limited to, auguring, blasting, boring, compressing, digging, ditching, dredging, drilling, driving-in, grading, loading, ploughing-in, pulling-up, ripping, scrapping, settling, trenching, tunnelling and vibrating.

“Competent Person” is someone with significant experience in trenching and excavation and designated as Competent by the Segment Manager or designee.

31.3. HAZARDS

Excavation and trenching are hazardous construction operations. Kiewit staff and craft workers involved in excavating and trenching are exposed to many different potential hazards, including:

1. cave ins, sliding or rolling material
2. buried utilities
3. falls
4. equipment accidents
5. access and egress

Incidents involving potential hazards are a direct result of not following the proper procedures for a ground disturbance. Excavation of any underground utility must be carefully managed and planned to avoid these hazards. Kiewit staff and craft workers must abide by regulations and methodologies from Provincial and other applicable Regulations, for the following:

1. classification of soil type and stabilization
2. locating and exposing buried facilities
3. methods of protection
4. safe entry and exit

31.4. PROCEDURES

Each project shall develop their own ground disturbance policy or adapts the clients' grounds disturbance program (i.e. Most established industrial sites have a program/policy in place). The procedures to mitigate potential hazards and meet the requirements of the projects local, Provincial, occupational health and safety act and federal regulation. The program should follow these key six chronological steps, and include:

2. plan the work
3. search the area - visually check for unmarked utilities
4. notification and GDP
5. locating and marking (survey provides ground scans, as-builts and marks the area with the supervisor from the crew).
6. exposure/excavation
7. inspection by ground disturbance crew supervisor (Foreman or Superintendent).

Additionally procedures should take into consideration the location of the project such as congest urban renewal, rural, remote or industrial site.

A minimum clearance of 1.0 m must be maintained between an underground facility and the cutting edge or point of any power operated excavating or earth moving equipment. If a Ground Disturbance is required within 1.0 of any marking, the excavation will be performed utilizing hand tools or vacuum excavation techniques only. Local utility company requirements might be more stringent.

Utility owners will not guarantee the depth of a utility so it is required to employ the same excavation technique vertically as horizontally, unless a utility owner informs us that we can use a different technique. However we cannot deviate from our company policy just because the owner allows us to.

31.5. **CROSSING EXISTING UTILITIES**

Any operations, equipment or materials that will cross or be stored on an underground utility requires that the utility be assessed so that the operation, equipment or materials will not damage the utility. If determined high risk, the operation GDP shall include the engineered study of the utility and measures to prevent damage to the utility.

31.6. **SUPPORT OF UTILITIES**

Utilities that require temporary support shall have an engineered support system (Refer to the TSCD). The engineered support system shall be included with the GDP. A copy shall be maintained by the project.

31.7. **PLAN THE WORK**

Before any ground disturbance begins, all proper documentation must be obtained. If the work is to cross a facility owners right of way Kiewit is to initiate a crossing agreement as required by the facility owner.

31.8. **VISUALLY CHECK FOR UNMARKED UTILITIES**

The area where the ground disturbance takes place must be thoroughly examined to ensure that all utilities are located before excavation occurs.

31.9. **NOTIFICATION**

Utility companies maybe be required to be notified prior to any ground disturbance within 30 meter of their right-of-way such as pipeline regulated by the National Energy Board. Utilizing the provincial call/click before you dig will help initiate this process.

All companies must be contacted before the start of any excavation. This can be done by contacting all local utilities, including gas, water, electrical, telephone and sewage companies. Kiewit requires that anyone engaging in any activity which displaces earth, rock, or other material on or below the ground, to notify 1st Call or the client representative at least two working days, but not more than seven days, prior to excavation. This includes all contractors, subcontractors, and sub-tiered subcontractors. Each separate company must notify the service of their excavation plans and have their own dig permit.

Note: Provincial regulations require excavators to pre-mark the area of the proposed excavation with white paint, stakes, or flags prior to notification.

Utility Companies will require the following information:

- North/east/south/west coordinates of ground disturbance (i.e. street names and/or block numbers). The more accurate the description of the area, the better;
- Types of work being performed;
- What area is to be marked (i.e. entire roadway or empty field); the area needs to be marked, or set apart, for the system locators.

If notifying by telephone, ask the operator for an electronic copy of the request. The operator will then send a copy of the completed request with a locator number to track when the request was received.

Once have been contacted, they are required by law to provide notification within two working days by either physically locating the utilities within the excavation area, or by notifying by telephone or email that the area of excavation is clear of their facilities. When not clear, utility owners will mark utility routes with stakes, flags, paint, or other suitable materials in varying combinations depending upon the type of surface to be marked. These marks will be in sufficient quantity to clearly identify the routes of the utility. The markings should also include the symbols of the underground utility owner. When it is expected that the surface covering the underground utility will be destroyed, supplemental offset markings may be added at the discretion of the utility owner.

The traffic signal wires for intersections may not be covered by any listed service. It is the superintendent's responsibility to contact the proper authority to locate the traffic signal wires.

In addition, newly constructed work is not covered (i.e. drainage, electrical subcontractor new installations, etc.). Plans will need to be referred for locations of this work. The engineer, foreman, or superintendent responsible for this work will be contacted to verify what has been constructed and appropriate as-builts requested.

This process includes obtaining all required permits to work, crossing agreements, and safe work agreements.

31.10. **LOCATING AND MARKING**

The ground disturbance site must be clearly marked with all underground utilities identified. Utility plans are used here to give an outline of what could potentially be buried in the excavation area. Once the utility plan has been reviewed, the lines must be located, marked and potholed if required by this policy, before proceeding with ground disturbance. A competent person or qualified contractor will be responsible for locating the underground utilities. Once identified, all utilities will be marked with 1" white PVC pipe and ribbon with the corresponding color, depth and offset if required as per Table 2 – Utility Color Code.

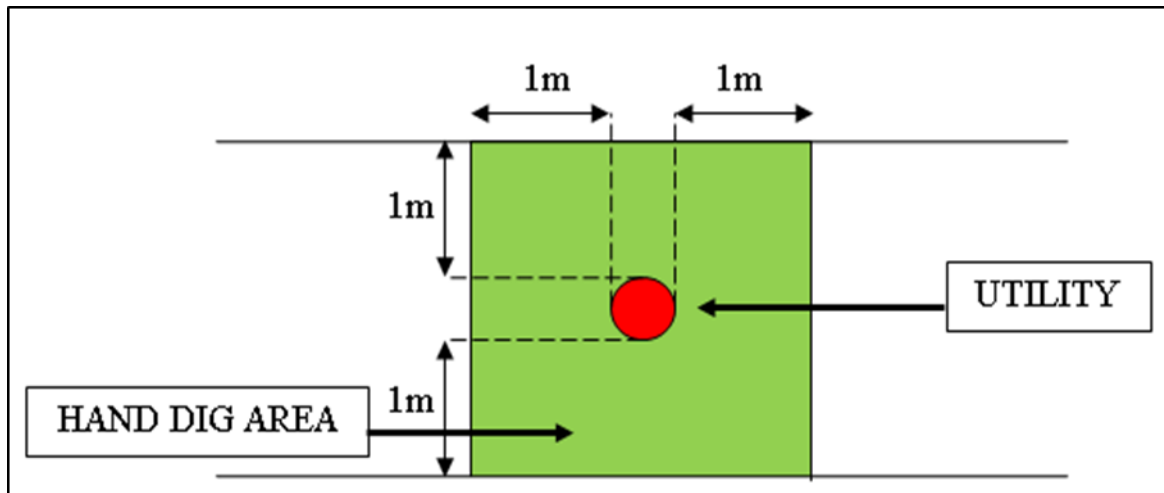
The colours used for ground disturbance markers are shown in Table 2

Table2: Colours Used for Ground Disturbance Markers

Colour	Meaning of Colour
White	Proposed excavation
Pink	Temporary survey markings
Red	Electric power lines, cable conduit, light cables
Yellow	Gas, oil, petroleum lines
Orange	Telephone, cable, communication cables
Blue	Potable water lines
Green	Sanitary sewer lines, storm sewer lines
Purple	Irrigation lines

31.11. EXPOSURE AND EXCAVATION

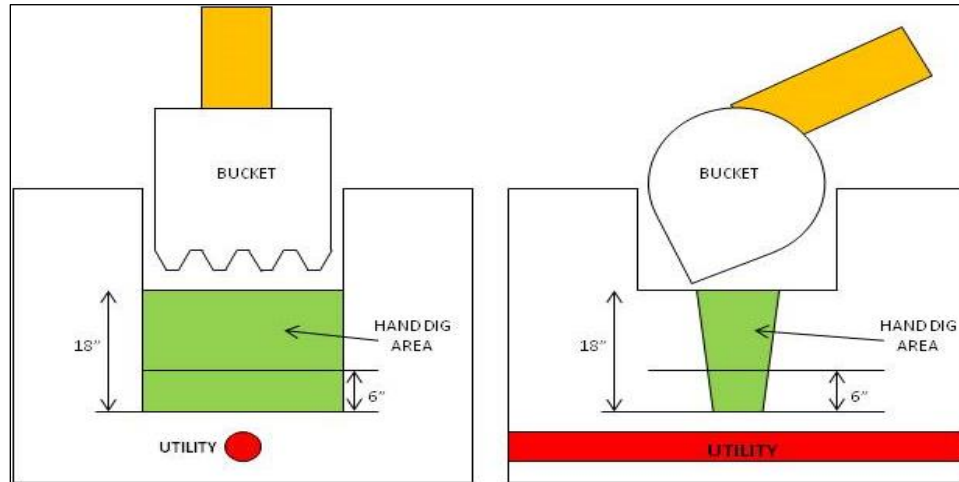
After the locating and marking process has been completed, then the physical work of actually exposing the utility begins. The work superintendent must ensure that all of the appropriate permits are in place so they can begin their work. A review of the ground disturbance permit must be done with staff and craft workers prior to going to work. A hand exposure zone is the area surrounding the utility at a distance of 1 meter or greater if required by the facility owner. No mechanical equipment, aside from vac trucks will be used unless a variance from the Manager or designee has been issued. This is to ensure that there is no damage done to the utility. Once the utility has been exposed within the hand exposure zone, mechanical excavation can start outside the zone.



This procedure can only be performed with the project managers (or designee's) approval.

31.11.1. Non Mechanical Potholing Procedure

Whenever possible hand digging with caution or the use of a hydro vac will be used for potholing utilities. This is to reduce the risk on contacting a utility.



31.11.2. Mechanical potholing Procedure

The soil must be excavated in 18" (450mm) lifts (approximately) by hand to verify that no utilities are present. Equipment can only be used to excavate the material to within 6" (150mm) of the bottom of a hand-excavated lift, or twice the tooth length of the bucket, whichever is GREATER (If utilities are located, then the utilities must be exposed by hand, no equipment. The proper tools that can be used for handwork are shovels and pry bars (or other tools of this nature). At no time should a pickaxe or other similar tools be used. High Voltage underground electrical utilities shall only be located by use of a vacuum system to eliminate the possibility of damaging the utility. Once located, shovels may be used to expose the remainder of the utility. In addition to marking with PVC the holes are to be backfilled at all times to eliminate open holes on the grade.

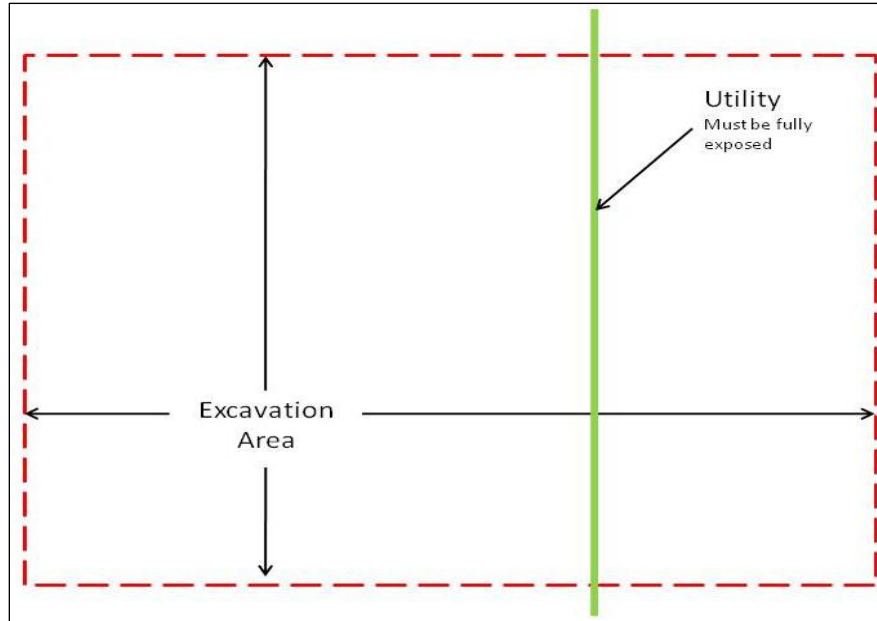
If your work will require powered digging equipment within 1m of any utility the Manager or his designee will review the risks and sign off any needed exceptions.

You will pothole to find the utility. If the utility was not found in the first pothole, do not assume that this utility is not there. The utility must be found prior to the start of the excavation operations.

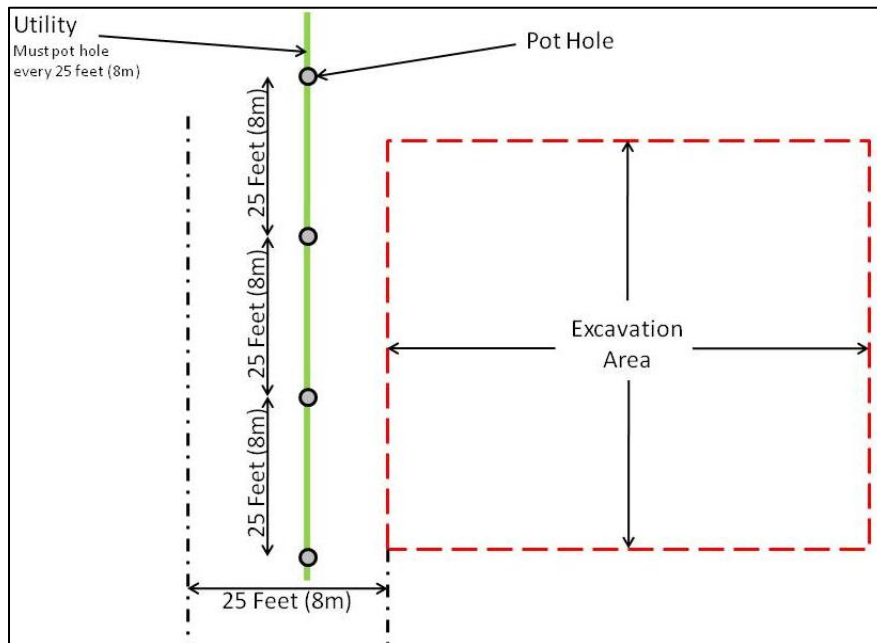
IF YOU DON'T KNOW, YOU DON'T GO!

31.11.3. Underground Utility Pothole Spacing and Frequency

High Risk utilities such as gas, oil, major fiber optic feeds and electrical services will be exposed through the entire length of the excavation. Suggested pot holing frequencies as follows, depending on the area more or less exposing of the utility maybe required.



Pothole buried facilities every 8 meters if your excavation is within 8 meters



31.12. EMERGENCY

All parties in the vicinity should be familiar with the emergency response plan. Important numbers needed for assistance in any event must be listed on the permit.

31.13. GROUND DISTURBANCE OPERATION

When conducting ground disturbing operations, follow these procedures;

1. Conduct site walk a within the area of proposed Ground Disturbance and visually check for unmarked utilities;
2. Locate and identify buried facilities in the area;
3. Ensure that executed copies of any written approvals such as crossing agreements, ground disturbance permits or ground disturbance checklist are on site at all times during the ground disturbance;
4. Ensure all the conditions outlined in the crossing agreements, Ground Disturbance permits or checklists and regulations are met at all times during the Ground Disturbance;
5. Ensure that copies of the project utility drawing and the utility locates sheets are on site at all times during the Ground Disturbance;
6. Maintaining the Buried Facility locate and/or pothole marks for the duration of the work in the area;
7. Request additional Utility locates and Project utility drawing when the extent of the Ground Disturbance increases; beyond its initial size and shape or duration;
8. Maintain a minimum of 1m from any buried facilities with mechanical means unless otherwise approved with a variance by the project Manager or designee.
9. Contacting the owner of the Buried Facility if damage is found or caused;
10. All requirements of the Utility Owner and applicable regulation must be followed;
11. Restoring the Ground Disturbance site to the specifications of the project owner, the crossing agreement and/or the regulations.

Utility Owners Requirements Take Precedent if more stringent than company policy.

31.14. ONE-CALL\CLICK BEFORE YOU DIG CENTRE

Anyone placing a locate request with a one-call\Click Before You Dig center will be given a ticket number for future reference and advised of those members that will be notified on behalf of the person requesting the locate.

Registration with one-call centers by owner of Buried Facilities is voluntary. Not all owners of buried facilities are registered with one-call\Click Before You Dig centers. You are required to identify and contact directly the owners of buried facilities that are not registered with the local one-call center. One-call centers can be used to advise members of damage to their Buried Facilities, although it remains the responsibility of the person who damaged the facility to notify the owner of the facility.

Canadian Province's Click before you dig Link- Follow the below link to you province your work is being performed in

<http://www.clickbeforeyoudig.com/>



31.15. PROJECT MAINTAINED UTILITY DRAWINGS

It is a best practice for each project to develop and maintain a current set of "EXISTING UTILITY DRAWINGS". The drawing set shall cover the entire footprint of the work on the project. Each page shall show the locations of all utilities as provided by agency owners. Any changes discovered by potholing or exposing shall be updated by a designated person on the project. Include any ground imagery available in the Utility drawings

31.16. GROUND DISTURBANCE PERMIT (GDP)

Before any ground disturbance begins, a request is submitted to the survey department. The request consists of the responsible field engineer completing the first page of the GDP, which includes scope, dates required, and attaching any drawings highlighting ground disturbance areas.

The as-built records and ground scans will be held by the survey lead for all previous work. The survey department will cross check any new work against previous work to prepare the GDP.

Once the GDP has been returned, the field engineer will walk the area and complete the ground disturbance pre-work checklist.

The GDP must be reviewed and approved by the following positions in this order:

- Survey Manager (prior to returning to requesting department);
- Discipline Field Engineer (after field walk and pre-work checklist completion);
- Electrical Superintendent;
- Discipline Superintendent;
- Construction manager.

Note: Some projects may have outside agencies acting for survey, and potentially one construction manager may fill all of the other roles if the project is small)

A list of approved individuals for each position shall be generated on each project. Once all approvals have been completed, an electronic copy will be sent to the survey department for archiving and tracking purposes.

The as-built plot plan drawings supplied by the survey department shall follow the underground utility colour scheme shown in Table 14-1 and shall include:

- Utilities found on ground scans;
- As-built drawings supplied by owner or 3rd parties;
- As-built data from project;
- Future underground utilities (greyed out and labeled (FUTURE));
- Overlay of final grade design or reference to a known coordinate;
- Above ground utilities such as pipelines and trailing cables;
- Overhead power lines with heights to lines.

Once a GDP has been received, the requesting department will submit a survey request highlighting all underground facilities which require field layout. Existing utilities will be located, marked, and visually verified prior to starting any operation. The foreman of each operation is responsible for ensuring that the Kiewit GDP, as-builts, and all necessary drawings are available at the operation. The operator is ultimately responsible and will be held accountable to ensure the operation does not proceed without a valid Kiewit GDP.

It is ultimately the Construction Manager's responsibility to ensure that the roles and responsibilities listed below are followed.

A supervisor of the ground disturbance activity must meet a person from the survey department at the ground disturbance location to review the identified utilities before the ground disturbance begins.

A risk assessment for all ground disturbances shall be performed by the General Superintendent and Construction Manager.

Factors to be considered in this assessment include, but are not limited to,

- Proximity to overhead power lines, buildings;
- Existing buried facilities;
- Proximity to traffic and environmental conditions.

For high risk work, the maximum validity period for a GDP is two weeks. For low risk operations, the maximum validity period is one month. For high risk work, the permit is not allowed to extend past two weeks.

GDPs must be re-issued to incorporate any change in original scope, or after permit has expired. GDPs which cover backfill only can be extended by the General Superintendent. The survey department must receive notification of all such extensions.

A Kiewit GDP does not negate other permit or agreement requirements.

31.17. OH&S REGULATIONS

The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation. Utility companies or owners shall be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground installations within 24 hours (unless a longer period is required by provincial, federal or local law), or cannot establish exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installation are used.

31.18. OPERATOR AWARENESS

Training will be performed with all operators, foreman, superintendents, and engineers.

This training is also required for personnel involved in the completion of the Kiewit GDP.

Operator Key Questions prior to digging.

1. Do you have a current dig permit?
2. All Utilities located, potholed and positively located?
3. If a utility is in the work-zone, is it visible?
4. Are all utilities marked?

31.19. REPORTING REQUIREMENTS

If a utility hit does occur, several reporting steps are required:

1. First, and foremost, clear and secure the area if there is potential for further exposure to hazardous environments.
2. Contact the appropriate utility owner to inform them of the damage so they can inspect and repair, if necessary.
3. Notify the Utility Engineer, Superintendent, and the Project Manager.
4. The Utility Engineer will complete the Kiewit Utility Damage Report and transmit it to the Project Manager, Job Sponsor and Senior Safety Manager by end of shift. The report will be filed within the document control system.

31.20. COMPANY MARKERS

1. Check all sides of the work area, the right-of-way, and the surrounding ditches and roads for pipeline or utility markers. Upon discovery of a company marker, ensure the company named has been provided proper notification of the Ground Disturbance.
2. NEVER rely solely on company markers for location purposes. It is possible that markers may have been knocked down or removed at some point in the past and repositioned inaccurately.

31.21. VISIBLE INDICATORS

Upon performing the site visit, it is critical to look for any visible indicators that previous construction has taken place.

Look for any indications:

1. Is the vegetation: greener, taller, shorter, or browner than the vegetation surrounding it?
2. Are there any depressions in the land, land scarring, visible improvements, above ground facilities, or buildings within the search/controlled area?

31.22. OVERHEAD POWER LINES

Whenever machinery is being used near overhead electrical equipment, all workers in the vicinity will be instructed to remain clear and out of contact with the frame of the equipment, hoisting lines or the hoisted load, except to attach or detach the load. The height, width and maximum reach of the equipment will be known by the operator of the machine. A safe approach distance of 7 meters must be maintained until the voltage of the power line is known.

Materials will not be placed under or beside an overhead power line if doing so reduces the safe clearance to less than the safe limit of approach distance.

When working near overhead lines, signs will be posted adjacent to the power lines and in the area of work giving notice of the following:

- limits of approach
- signal person required
- height of power lines

A signal person will direct the moving equipment and be identified by a gauntlet and high visibility vest. The signal person will not be assigned any other duties during the time when the equipment is near the limits of approach. The signal person will only use accepted signals and at no time allows a limit of approach encroachment.

Approach boundaries outlined by the National Fire Protection Association are listed in Table 4-1.

Prohibited distances in Alberta are shown in Table 4-2.

Table 4-1: Table of Approach Boundaries to Live Parts for Shock Prevention

Limited Approach Boundary				
Nominal System Voltage Range, Phase to Phase	Exposed Movable Conductor	Exposed Fixed-Circuit Part	Restricted Approach Boundary (Allowing for Accidental Movement)	Prohibited Approach Boundary
0 to 50 volts	Not specified	Not specified	Not specified	Not specified
51 to 300 volts	10 ft. 0 in.	3 ft. 6 in.	Avoid contact	Avoid contact
301 to 750 volts	10 ft. 0 in.	3 ft. 6 in.	1 ft. 0 in.	0 ft. 1 in.
751 to 15,000 volts	10 ft. 0 in.	5 ft. 0 in.	2 ft. 2 in.	0 ft. 7 in.

Source: From a portion of Table 2-1.3.4, Approach Boundaries to Live Parts for Shock Protection (NFPA 70E Standard for Electrical Safety Requirements for Employee Workplaces) This reprinted material is not the complete and official position of the National Fire Protection Association on the referenced subject, which is represented only by the standard in its entirety.

Table 4-2: Prohibited Distances in Alberta

Voltage	Distance in Meters
0 to 40 kV	3.0
69 kV, 72 kV	3.5
138 kV, 144 kV	4.0
230 kV, 240 kV	5.0
500 kV	7.0
500 kV +	7.0

31.23. OPERATOR NOTIFICATION

Notification will be given to an operator of an energized overhead power line before work is done or equipment is operated in the vicinity of the power line at distances less than the safe limit of approach distances. The operator's assistance is required in protecting the safety of all workers involved.

32. TEMPORARY POWER AND LIGHTING

32.1. PURPOSE

In order to protect both people and property from the dangers associated with Temporary Power a comprehensive program must be followed that includes the highest level of principles when working with temporary power in accordance with all industry standards.

32.2. RESPONSIBILITIES

The Project Manager will be responsible for the implementation of this procedure.

32.3. GENERAL REQUIREMENTS

- All electrical wiring and equipment will conform to Section 76 of CSA Standard C22.1, "Canadian Electrical Code", and to the requirements of the local provincial electrical authority.
- Each project's electrical system must be inspected and maintained on a regular basis.
- Electrical equipment shall not be opened, adjusted, repaired or otherwise handled until it is de-energized and locked out according to the lock-out policy.
- De-energized equipment shall be tested before anyone works on it.
- All metal panels, boxes, covers, conduits, etc. that are part of our electrical system shall be grounded.
- All splices and repairs shall be made inside an approved box or approved splice kit. Tape alone is not acceptable.
- Metal ladders shall not be used for electrical work.
- All electrical equipment that is exposed to flammable gases or vapours, combustible dust, or ignitable fibres must meet hazardous location requirements in order to prevent explosions.
- All circuit breakers must be labelled to show what they control. All circuit breakers panels must be labelled to show the voltage they contain.
- Panel covers must be kept in place whenever the panel is energized.
- All panels shall be equipped with a lockable door so that power can be turned off and locked out for repairs. Adequate space is needed to open the door at least 90 degrees.
- Panels shall be locked so as to prevent unauthorized access.
- Circuit breakers that protect hand tool receptacles shall have a maximum rating of 20 amps. Waterproof connectors shall be used as necessary.
- All holes in panel boxes and gaps where circuit breakers are missing shall be securely plugged with a fireproof material.

- Circuit breakers shall be matched as closely as possible to the electrical needs they supply.
- All temporary electrical services from the warehouse shall be inspected prior to energizing.
- All cables and wires for electrical distribution will be suspended overhead with adequate clearance for traffic. Such cables and wires will be suitably protected against damage.
- Adequate lighting will be provided throughout the building under construction or alteration in all work areas and means of egress. Electrical lamps for temporary lighting will be protected by wire guards against breakage.
- When work is carried out at night, emergency lighting will be provided in locations designated by the Administrative Official to provide access to a safe location from working areas. Such installations will conform to the requirements of FC Standard No. 501, "Emergency Lighting Systems".

32.4. **MAINTENANCE OF EQUIPMENT**

Wiring components and utilization equipment in hazardous locations shall be maintained in a dust-tight, dust-ignition-proof or explosion-proof condition as appropriate. There shall be no loose or missing screws, gaskets, threaded connections, seals or other impairments to a tight condition.

32.5. **ENVIRONMENTAL DETERIORATION AND DETERIORATING AGENTS**

Unless identified for use in the operating environment, no conductors or equipment shall be located:

- In damp or wet locations.
- Where exposed to gases, fumes, vapors, liquids or other agents having a deteriorating effect on the conductors or equipment.
- Where exposed to excessive temperatures.

Control equipment, utilization equipment and bus ways approved for use in dry locations only shall be protected against damage from the weather during building construction.

Protection against corrosion - metal raceways, cable armor, boxes, cable sheathing, cabinets, elbows, couplings, fittings, supports and support hardware shall be of materials appropriate for the environment in which they are to be installed.

32.6. **BATTERIES AND BATTERY CHARGING**

- Batteries of the unsealed type shall be located in enclosures with outside vents or in well ventilated rooms and shall be arranged so as to prevent the escape of fumes, gases or electrolyte spray into other areas.
- Ventilation shall be provided to ensure diffusion of the gases from the battery and to prevent the accumulation of any explosive mixture.
- Racks and trays shall be substantial and shall be treated to make them resistant to the electrolyte
- Floors shall be of acid resistant construction unless protected from acid accumulations.
- Face shields, aprons and rubber gloves shall be provided for workers handling acids or batteries.

- Facilities for quick drenching of the eyes and body shall be provided within 25 feet of battery handling areas.
- Facilities shall be provided for flushing and neutralizing spilled electrolyte and for fire protection.
- Battery charging installations shall be located in areas designated for that purpose.
- Charging apparatus shall be protected from damage by trucks.
- When batteries are being charged, the vent caps shall be kept in place to avoid electrolyte spray. Vent caps shall be maintained in functioning condition.

32.7. TEMPORARY WIRING

- Temporary wiring shall be removed immediately upon completion of construction or the purpose for which the wiring was installed.
- All lamps for general illumination shall be protected from incidental contact or breakage. Metal-case sockets shall be grounded. Damaged cages/lamps shall be corrected upon notice.
- Temporary lights shall not be suspended by their electric cords unless cords and lights are designed for this mean of suspension.
- Portable electric lighting used in wet and/or other conductive locations, for example drums, tanks, and vessels shall be operated at 12 volts or less. However, 120 volt lights may be used if protected by a GFCI.
- Flexible cords and cables shall be protected from damage. Sharp corners and projections shall be avoided. Flexible cords and cables may pass through doorways or other crush points, if protection is provided to avoid damage.
- Extension cord sets used with portable electric tool and appliances shall be of three-wire type and shall be designed for hard or extra-hard usage. Flexible cords used with temporary and portable lights shall be designed for hard or extra-hard usage.
- Examples of flexible cords suitable for project temporary wiring is hard service cord (types S, ST, SO, STO) and (types SJ, SJO, SJT, SJTO).
- All spider boxes shall have GFCI protection built into the box.

32.8. SITE-SPECIFIC REQUIREMENTS

Each project shall develop additional site-specific requirements for Temporary Power, including the following:

- Locations of all temporary services, spider boxes, circuit breaker panels, etc.
- Labeling and barricading requirements
- Lockout/tag out procedures
- Emergency contact numbers
- Inspections

The final design of the Temporary Electrical Plan must be approved by the Project Manager, Site Utility Locate Engineer (for underground temporary power), and Electrical.

33. WORK ON OR NEAR ELECTRICITY (ARC FLASH)

33.1. PURPOSE

It is Kiewit company policy not to work on energized electrical equipment within a limited approach or arc flash boundary unless it falls into the following categories.

- When de-energizing the equipment introduces additional hazards or increased risk.
- When it is not feasible to de-energize the equipment due to equipment design or operational limitations including some start-up, troubleshooting and performance testing.
- When the supply voltage is less than 50 volts and it is determined that there will be no increased exposure to electrical burns or to explosion due to electrical arcs.

33.2. SCOPE

All work on and around energized equipment shall be approved by the Construction Manager during the construction phase and the Start-up Manager during the start-up phase of the project.

Any deviations from this policy must be approved by a representative of startup and a safety representative; both from the District Office and notification to the District Safety Manager.

33.3. RESPONSIBILITIES

The Project Manager will be responsible for implementation of the program.

The Construction Manager and Start-up Manager or their designees will review and approve or reject energized work permits within their respective areas of responsibilities and jurisdictions.

- Scheduling activities so that work can be performed when systems are de-energized.
- Review of construction and start-up activities at project pre-activity meetings to identify the requirements for working on and around energized systems.
- Ensure personnel receive training appropriate to their assigned electrical tasks and maintain documentation of such training (including first aid, AED and CPR). Annual certification is required for CPR & AED.
- Develop and maintain a list of all Qualified Persons under their supervision.
- Ensure that personnel are provided with, use, and have been trained on the appropriate Personal Protective Equipment (PPE).
- Complete or cause the completion of calculations required by this program when needed.
- Complete energized work permits for site management approval.
- Ensure electrical equipment is field marked with a label as per section 130.5.C NFPA-70E.
- Maintain strict Lock-Out/Tag-Out (LOTO) procedures and adherence in accordance with District Safety Policy.
- Create a detailed, written plan (Job Hazard Analysis), to include:
 - Hazards associated with working on energized systems
 - Level of PPE requirement for the energized work

- Any appropriate drawings
- Tools needed to work on energized equipment
- Approach distances
- Means of keeping others out of the area

33.4. **PROCEDURE**

A flash analysis will be done in order to protect personnel from the possibility of being injured by an arc flash. The analysis will determine the flash protection boundary and the personal protective equipment that people within the flash protection boundary will use.

All testing or work performed on electrical equipment must be performed by a qualified person or a worker under the direct supervision of the qualified person.

Where the electrical equipment has a voltage in excess of 120 V between any two conductors or between one conductor and ground:

- The qualified person, and any individuals assisting, must use all required insulated protection equipment and tools necessary to protect themselves from injury during the performance of the work.
- All employees working with, or near, the live electrical equipment must be instructed and trained in the use of the insulated protective equipment and tools.

Where electrical equipment is not live, but is capable of becoming live:

- No employee is to work on the equipment unless it is completely isolated by a locking device.
- A safety ground is properly connected to that equipment.
- The equipment is locked out as required by the Kiewit LOTO procedures.

When working on an electrical system always consider exposed electrical parts to be 'live' until you have personally ensured that they have been properly disconnected and locked/tagged out and it has been verified that the equipment is off and all components which could store a charge have been discharged.

33.5. **ELECTRICAL PROCEDURES**

The following work practices are part of all live electrical work procedures:

- When normally enclosed live parts are exposed for maintenance or repair, they must be guarded to protect people from making accidental contact. Barricades can be used. If barricades are not sufficient, then an 'Electrical Safety Monitor' must be used.
- Never approach or take any conductive object without an approved insulating handle, closer than 1 meter to any exposed energized parts. Approved electrical gloves, sleeves and tools must be used if approaching closer than 1 meter.

- Examples of items to avoid: jewelry, body jewelry, watch bands, bracelets, rings, key chains, necklaces, hair bands, conductive buttons, metal zippers or zipper parts, coins.
- Always use non-conducting ladders intended for electrical work when working around electricity. Ensure the ladder is clear of oils, grease or spilled liquids which could conduct electricity.
- Do not work on circuits in wet locations or on outside outlets which don't have GFCIs (ground fault circuit interrupters) to prevent the worker's body from becoming the path to ground for 'leaking' current.
- Ensure that all electrical boxes remain accessible at all times and never place equipment in front of them. Flammable and combustible materials should not be stored in electrical equipment rooms at any time.
- Passageways and working space around electrical equipment are not to be used for storage and will be kept clear of obstruction and arranged to give authorized persons ready access to all parts requiring attention.
- Ensure a minimum working space of 1 meter with secure footing is provided and maintained about electrical equipment (switchboards, panel boards, motor control centres) that are enclosed in metal. That working space is not required behind such equipment where there are no renewable parts such as fuses or switches on the back and where all connections are accessible from other locations other than the back.
- Never modify electrical devices beyond the intent of their design.
- Provide adequate ventilation to prevent the development around electrical equipment of ambient air temperatures in excess of those normally permissible.
- When installed outdoors, arc producing electrical equipment will not be installed within 1 m of the discharge of a combustible gas relief device or vent.
- All electrical work installed will follow the Canadian Electrical Code requirements.
- Electrical equipment will be installed and guarded so that adequate provision is made for the safety of persons and property and for the protection of the electrical equipment from mechanical damage.
- Bare live parts will be guarded against accidental contact.
- Electrical equipment approved for use in hazardous location must also be approved for the specific gas, vapour, mist or dust that will be present. No electrical equipment will be used in a hazardous location unless the equipment is essential to the process being carried out.
- Service equipment, panel boards, switchboards, and similar electrical equipment should be located in rooms/sections of the building in which hazardous conditions do not exist.
- Temporary lighting must be used to provide sufficient illumination for safe working conditions.

33.6. **PERSONAL PROTECTIVE EQUIPMENT**

All workers who work in or around energized equipment and have the potential to come into contact with live exposed parts must be provided with and use personal protective equipment (PPE).

33.7. PPE GUIDELINES

- PPE must be used whenever there is a chance of coming into contact with exposed electrical parts. This includes simple operations such as resetting a switch inside a piece of equipment or a panel box that contains exposed live wires, connectors or contacts.
- The PPE used must be appropriate for the work being performed. Ensure that electrical rated glove, insulated tools, and other test equipment or protective devices are rated in excess of the voltage levels they will be used around. Electrically rated tools must be clearly labeled with the level of voltage for which they are approved. Never exceed the tool's electrical rating.
- Always inspect electrical tools and PPE before each use to make sure they are in good condition and work properly. If a tool has been damaged, or the PPE has tears or holes, replace the item(s) before conducting the assigned work. In order to protect electrical insulated gloves from puncture, they can be worn under thicker, heavier electrically rated leather gloves.
- Wear non-conductive head protection if working in a location that presents a possible electrical hazard to the head (bumping into exposed lines or parts.) Head Protection: Class 'E' (Electrical) is tested using 20,000 volts and Class 'G' (General) is tested using 2,200 volts.
- Wear eye and face PPE, such as an approved electrical face shield and safety glasses, (on higher voltages a chin cup is required) whenever there is a possibility of electrical arcs or explosion. Non-conductive safety glasses with side shields should always be worn underneath a face shield. A face shield alone does not provide enough protection.
- All test instruments and equipment (volt, amp, and ohm meters) and associated leads, cables, power cords, probes, and connectors must be visually inspected for external defects and damage before the equipment is used. If any defect or damage is noted remove the item from service.
- All electrical workers are required to wear electrically rated steel-toed boots, identified with the CSA Green Patch and omega symbol, at all times.
- Use approved electrical tools and fuse handling equipment that is insulated in excess of the circuit voltage indicated on the box. Never use a non-insulated tool to remove a fuse.
- You may need to use insulating materials, such as non-conductive matting and insulated blankets. They are intended to provide a barrier between your body and the energized parts.

Clothing Systems

Table 4-3: Simplified, Two-Category, Flame-Resistant Clothing System

Applicable Tasks	Clothing Requirement
<p>All hazard/risk category 1 and 2 tasks listed in table 2 On systems operating at less than 1000 volts, these tasks include work on all equipment except:</p> <ul style="list-style-type: none"> • Insertion/removal of low-voltage motor starter "buckets" • Insertion/removal of power circuit breakers with the switchgear doors open • Removal of bolted covers from switchgear. • On systems operating at 1000 volts or more, tasks also include the operation, insertion, or removal of switching devices with equipment enclosure doors closed. 	<p>Everyday work clothing</p> <p>Flame-resistant long-sleeve shirt (minimum ATPV of 5) worn over an untreated cotton T-shirt with FR pants (minimum ATPV of 8)</p> <p>Or</p> <p>FR coveralls (minimum ATPV of 5) worn over an untreated cotton T-shirt (or an untreated natural-fiber long-sleeve shirt) with untreated natural-fiber pants.</p>
<p>All hazard/risk category 3 and 4 tasks listed in table 2</p> <p>On systems operating at 1000 volts or more, these tasks include work on energized parts of all equipment.</p> <p>On systems of less than 1000 volts, tasks include insertion or removal of low-voltage motor-start motor control center "buckets," insertion or removal of power circuit breakers with the switchgear enclosure doors open, and removal of bolted covers from switchgear.</p>	<p>Electric "switching" clothing</p> <p>Double-layer FR flash jacket and FR bib overalls worn over either FR coveralls (minimum ATPV of 5) or FR long-sleeve shirt and FR pants (minimum ATPV of 5) worn over untreated natural-fiber long-sleeve shirt and pants worn over an untreated cotton T-shirt</p> <p>Or</p> <p>Insulated FR coveralls (minimum ATPV of 25, independent of other layers) worn over untreated natural-fiber long-sleeve shirt with untreated cotton blue jeans ("regular weight," minimum 12 oz./sq. yd. fabric weight), worn over an untreated cotton T-shirt.</p>

FR – flame resistant

ATPV – arc thermal performance exposure value of the clothing in calories/cm².

Source: Based on Table F-1 in appendix F of NFPA 70E, Electrical Safety Requirements for Employee Workplaces.

33.8. RUBBER INSULATING EQUIPMENT

- Rubber insulating equipment includes protective devices such as gloves, sleeves, blankets and matting.
- Insulating equipment and tools must be inspected for damage prior to each use and immediately following any incident that could have caused damage.
- An air test must be performed on rubber gloves before each use.
- Insulating equipment found to have defects that might affect its insulating properties must be removed from service.
- Where the insulating capability of protective equipment is subject to damage during use, the insulating material shall be protected by an outer covering of leather or other appropriate material.
- Rubber insulating equipment must be tested according to the schedule contained in this document. Testing must be recorded and test results must be readily available.
- Rubber insulating equipment must be stored in an area protected from light, temperature extremes, excessive humidity, ozone, and other substances and conditions that may cause damage. No repairs to rubber insulating equipment will be allowed.

33.9. INSULATED TOOLS AND MATERIALS

- Only insulated tools and equipment shall be used within the Limited Approach Boundary of exposed energized parts. Prior to use, each insulated tool and equipment shall be inspected for any damage to the insulated coatings and immediately removed from service if damage is noted.
- Insulated tools shall be rated for the voltages on which they are used and carry a CSA or ANSI rating.
- No “homemade tools” will be permitted.
- Fuse or fuse holder handling equipment, insulated for the circuit voltage, shall be used to remove or install a fuse.
- Ropes and hand lines used near exposed energized parts shall be nonconductive.

33.10. ALERTING TECHNIQUES

- Barricades shall be used in conjunction with safety signs to limit access to work areas containing live parts. Conductive barricades shall not be used where they might cause an electrical hazard.
- Barricades shall be placed no closer than the Limited Approach Boundary.
- Safety signs and tags must be used to warn employees of electrical hazards.

Table 4-4: Flame-Resistant Protective Clothing and Equipment

Flame-Resistant Protective Clothing and Equipment	Protective Systems for Hazard/Risk Category (4 = Most)			
	1	2	3	4
Hazard/risk category number				
Flash suit jacket (2-layer)				X
Flash suit pants (2-layer)				X
Head protection	X	X		
Hardhat	X	X		
Flame-resistant hardhat liner		2* tasks	X	X
Eye protection (safety glasses + side shields or safety goggles)		2*tasks	X	X
Face protection (double-layer switching hood)	As needed	X	X	
Hearing protection (ear canal inserts)	As needed	X	X	X
Leather gloves or voltage-rated gloves with leather protectors			X	X
Leather work shoes			X	X

33.11. EMERGENCY PROCEDURE

- Employees that are exposed to shock hazards and those responsible for taking action in case of emergency shall be trained in methods to release victims from contact of energized parts.
- Employees shall be regularly instructed in methods of first aid and emergency procedures, such as approved methods of resuscitation, if their duties warrant such training.
- Employees shall receive First Aid, CPR and automatic external defibrillator (AED) training annually.
- Employees shall receive additional training (or retraining - not to exceed 3 years) under any of the following conditions:
- If the supervision or annual inspections indicate that the employee is not complying with safety-related work practices.
- If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices that are different from those that the employee would normally use.
- If he or she must employ safety-related work practices that are not normally used during his or her regular job duties.

33.12. ELECTRICAL SAFETY AUDITING

- The audit shall be documented.
- The electrical safety program shall be audited to verify the principles and procedures of the electrical safety program are in compliance with the standard. The frequency of the audit shall not exceed 3 years.
- Field work shall be audited to verify the requirements contained in the district safety manual and NFPA-70E is being followed.

33.13. WORKING ON OR NEAR LIVE PARTS

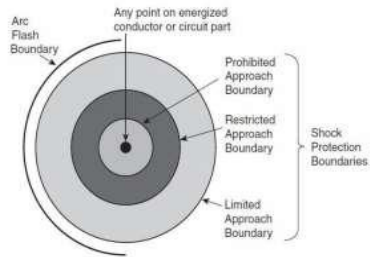
- 70E 130.2 (3)(B)(1) If live parts are not placed in an electrically safe condition, the work to be performed shall be considered energized electrical work and shall be performed by written permit only.
- A copy of the “Energized Electrical Work Permit” can be found in References, of this document. The intent of this permit is to ensure that all appropriate safety precautions are taken prior to starting energized electrical work.
- 70E 130.2(3) Exemptions to Work Permit- Work performed within limited approach boundary or arc flash boundary of energized electrical equipment by qualified persons related to tasks such as testing, troubleshooting and voltage/current measurements shall be permitted to be performed without an energized electrical work permit, if appropriate safe work practices, Hazard analysis and PPE are used.
- If the purpose of crossing the limited approach boundary is only for visual inspection and the restricted approach boundary will not be crossed, then an energized electrical work permit shall not be required.
- The permit is to be originated by the individual requesting that the energized work be performed. (This will normally be the electrical superintendent). The requestor is responsible for completing section I of the permit.
- The qualified persons who will be engaged in the task are responsible for completing section II of the permit.
- All Energized Work Permits shall be approved by the Project Manager before any work is performed.
- The permit must be posted in the area where the energized work is taking place for the duration of the task.
- Completed permits are to be returned to the Safety Department for filing.

33.14. ARC FLASH BOUNDARY

- 70 E 130.5(B) Personal Protective Equipment shall be provided to and used by all employees working within the “Arc Flash Boundary”.
- 70 E 130.5(A) The arc flash boundary for systems 50 volts and greater shall be the distance at which the incident energy equals 5 J/cm² (1.2 cal/cm²).
- 70 E 130.5(C) Labels will be printed and installed on the equipment on the job site indicating the correct flash protection boundary. Labels shall have the following: (1) At least one of the following: a. Available incident energy and the corresponding working distance b. Minimum arc rating of clothing c. Required level of PPE d. Highest Hazard/Risk Category (HRC) for the equipment (2) Nominal system voltage (3) Arc Flash boundary.
- Barricades shall be set accordingly prior to work.
- The specific protective equipment to be worn within the Arc Flash Boundary can be determined by either of the following two methods:
 - Ensure that an Arc Flash Hazard analysis has been performed. Appropriate protective clothing can then be selected based on the calculated exposure level.
 5. If the parameters are greater than those listed in NFPA 70E table 130.7(C)(15)(a) or (b), the incident energy level and arc flash boundary need to be calculated.
 6. For arc resistant switch gear with all covers in place and doors closed, category 0 PPE may be used.
- Determine the available short circuit current and the maximum clearing time in the event of a fault. If the parameters are less than or equal to these listed in NFPA 70E Table 130.7 (C) (15) (a) or (b) “*Hazard/Risk Category Classifications*”, then this table may be used to determine the hazard level of the task to be performed. Once the hazard level of the task has been determined, the required PPE can then be ascertained from NFPA 70E Table 130.7 (C) (16), “*Protective Clothing and PPE Matrix*”.

33.15. APPROACH BOUNDARIES TO LIVE PARTS OR CIRCUIT PARTS

- Observing a safe approach distance from exposed energized parts is an effective means of maintaining electrical safety. As the distance between an individual and live parts increases, the potential for an electrical injury decreases.
- Safe approach distances will be determined for all tasks in which approaching personnel are exposed to live parts. Barricades will be erected to prohibit inadvertent or unauthorized entry.
- Safe approach distances to fixed live parts can be determined by referring to, “Approach Boundaries to Live Parts for Shock Protection”. This can be used to identify the Limited, Restricted, and Prohibited Approach Boundaries associated with various system voltages.
- Unqualified persons may only cross the Limited Approach Boundary when they are under the direct supervision of a qualified person named in the permit. Under no circumstance shall an unqualified person be allowed to cross the Restricted Approach Boundary.
- Qualified persons may not cross or take any conductive object closer than the Restricted Approach Boundary unless one of the following conditions applies:
 - A. The qualified person is insulated or guarded from the live parts and no un-insulated part of the qualified person’s body crosses the Prohibited Approach Boundary.
 - B. The live parts are insulated from the qualified person and from any other conductive object at a different potential.
- Crossing the Prohibited Approach Boundary is considered the same as making contact with the energized parts. Qualified persons may only cross this boundary when all of the following precautions have been taken:
 - A. The qualified person has specific training to work on energized parts.
 - B. The qualified person has obtained an approved Energized Electrical Work Permit.
 - C. The qualified person uses PPE appropriate for working on energized parts which are rated for the voltage and energy level involved.



33.16. REFERENCE INFORMATION

[Energized Electrical Work Permit](#)

[Approach Boundaries to Live Parts from Shock Protection](#)

[Hazard / Risk Category Classifications](#)

[Protective Clothing and PPE Matrix](#)

[Inspection Schedule for Rubber Insulating Equipment](#)

34. LOCK OUT / TAG OUT (LOTO)

This section establishes the minimum procedural requirements for safely isolating potentially hazardous energy sources for electrical and piping related construction, pre commissioning, commissioning, and live plant maintenance work.

Utilizing a client based permitting system is acceptable as long as the client based permit system meets the below safety precautions and the above LOTO requirements already discussed.

34.1 PURPOSE

The purpose of this procedure is to describe the methods used to properly tag and permit a system or component, both before and after turnover of the system from construction to pre-commissioning. It also describes other tagging methods used by the pre-commissioning group.

Safety tags and permits are to be used to allow craft, technicians and operators to safely perform specified tasks. They are also used to protect equipment from damage that could result from improper operation.

In the event that Kiewit is responsible for pre-commissioning, the tag procedure will remain in force until owner acceptance of turnover.

34.2 SCOPE

Safety tagging and permit procedures requires strict adherence to fulfill the intended purpose. No procedure can be effective if it is not clearly understood by all involved. Penalties for violation of the procedure must be severe enough to prevent individuals from disregarding safety tagging and permit procedures.

Copies of the procedure will be distributed to all contractors and other groups. It is the responsibility of each contractor and his or her employees to comply with this procedure.

All craft workers and contractors who work on electrical circuits, piping or other equipment which could inadvertently become energized or operational must comply with this procedure. Failure to do so can result in bodily injury and equipment damage.

This is a Zero Tolerance requirement.

All safety tagging and permit questions or issues are directed to the lock-out / tag out issuing authority / authorized person.

34.3 LOTO DEFINITIONS

34.3.1 Authorized Person

The authorized person is the physical person authorized to lock out or tag out the equipment that will be serviced.

34.3.2 Complex Group Control Lock Out

This is a lockout where only the LOTO authority has the system, machine or equipment locked out.

34.3.3 Group Control Lockout

This lockout procedure is commonly known as the key-box procedure.

This procedure reduces the number of locks required on an energy isolating device, and saves time. If a number of workers are working on a system, machinery or equipment, particularly if a large number of energy-isolating devices must be locked out a group lockout procedure can be used.

A lock-out authority must lock out the energy isolating device(s) of that system, machine or equipment, and the key(s) go into a lock box. All workers who then work on that system, machine or equipment must apply a personal lock to the key securing system and be on a LOTO permit before working on that system.

34.3.4 Energy-Isolating Device

This is a device in a machine, equipment or system that renders said machine, equipment or system inoperable or isolates it from its energy source. For instance manually operated circuit breakers for electrical equipment, manually operated switches for electrical circuits or machinery, a process flow blind installed in a piping system's flanged joints, a valve in a hydraulic or pneumatic system, blocks with visible indication of the physical position of the device; slide gates; slip blinds; lockable line valves, etc.

Note: Push button electrical switches and check valves are not considered energy-isolating devices.

34.3.5 Energized

This is defined as any equipment that is connected to an energy source or that contains residual energy that may be released.

34.3.6 Lockable energy-Isolating Device

This refers to any energy-isolating device where a lock-out device (personal lock, etc.) can be placed to hold the device in its off or safe position, preventing the machinery, equipment or system to be unexpectedly energized.

34.3.7 **Energy Source**

This refers to any source of energy (electrical, mechanical, chemical, thermal, acoustical, ionizing, radiation, or other energy) that, when active and uncontrolled, represents a potential source hazard to the personnel or property.

34.3.8 **Lockout**

This is defined as the established/approved procedure which ensures that the energy-isolating device and the equipment being controlled cannot be operated until the locking device is removed.

34.3.9 **Lockout Device**

This is a device that utilizes positive means (such as a lock, either a key or combination type), to hold a lockable energy-isolating device in a safe position and to prevent the energizing of the machine or of the equipment.

34.3.10 **Positive Lockout**

Positive lockouts shall be done through physical application of a lock or other energy-isolating device. "Positive" means that once secured into position, the lock cannot fall off or allow the energy isolating device to move from its off or safe position. Positive lockouts include, but are not limited to, the energy isolating devices previously described.

Workers servicing, maintaining or cleaning cord-connected electrical equipment can lock out the equipment by applying a lock to the electrical plug or, more practically, render the equipment inoperative by unplugging or disconnecting it from the energy source, provided that the plug or the connector is under the exclusive control of the employee performing the work.

34.3.11 **Tag Out**

This refers to the placement of a warning tag on a locked energy-isolating device in accordance with an established/approved procedure. It indicates that the energy isolating device and the equipment being controlled cannot be operated until the lock and warning tag is removed.

34.4 RESPONSIBILITIES

34.4.1 Issuing Authority / Authorized Person

The issuing authority / authorized person is a qualified and competent person with the knowledge and experience to organize the work execution from the safety point of view.

The issuing /authorized person has knowledge of any potential or actual danger to health or safety in the workplace. The issuing authority / authorized person signs all LOTO permits to issue them. The issuing authority / authorized person has the authority to initiate prompt corrective measures to control and eliminate the hazard. The issuing authority / authorized person has the responsibility to immediately verify by test or any other means the effectiveness of the energy source isolation, and then must sign off and release the temporary power isolation.

34.4.2 Responsible Foreman

The responsible foreman will validate that all policies and actions addressed in this procedure are implemented in the field. The responsible foreman will direct, oversee and control those under his or her supervision. The responsible foreman reviews the detailed execution plan, Quad Fold JHA and the Lock Out / Tag Out permit with the workers involved in the lock out / tag out.

The responsible foreman, or a person designated by him / her, will be present at all times at the working place.

34.4.3 Lock Out Procedure

- The issuing authority / authorized person will properly isolate the energy source, applying his/her own lock and tag on the equipment or lockable energy-isolating device;
- The issuing authority / authorized person will physically put the key related to the lock out inside a safety box equipped with a multi-lock device;
- Each worker involved in performing the lock out will apply his or her own lock and tag, retain one of the lock key.

34.4.4 Area Authority

This person has the authority to remove employee locks only in the case that the employee has forgotten to remove his/her lock at the completion of the work shift, has left the worksite, and any attempt to contact him/her has failed (form will be filled out to authorize this).

The Area Authority is responsible for ensuring the issuing authority / authorized person is competent to issue the Lock out/Tag out Permit.

34.5 **MANAGING THE CONTROL OF HAZARDOUS ENERGY ISOLATION**

If machinery, equipment, or powered mobile equipment is to be serviced, repaired, tested, adjusted or inspected, no worker shall perform such work on the machinery, equipment or powered mobile equipment until it has come to a complete stop and:

1. All hazardous energy at the location at which the work is to be carried out is isolated by activation of an energy-isolating device, and the energy-isolating device is secured in accordance with section, [Securing Isolation](#) described below, or;
2. The machinery, equipment or powered mobile equipment is otherwise rendered inoperative in a manner that prevents its accidental activation and provides equal or greater protection than the protection afforded as listed above.

Procedures and controls that ensure the machinery, equipment or powered mobile equipment is serviced, repaired, tested, adjusted or inspected safely is required if:

1. The manufacturer's specifications require the machinery, equipment or powered mobile equipment to remain operative while it is being serviced, repaired, tested, adjusted, or inspected, e.g. when working on live systems in a live plant for pre-commissioning, commissioning or maintenance work, or
2. There are no manufacturer's specifications, and it is not reasonably practicable to stop or render the machinery, equipment or powered mobile equipment inoperative.

If piping, a pipeline or a process system containing a harmful substance under pressure is to be serviced, repaired, tested, adjusted or inspected, a job must ensure that no worker performs work on the system until flow in the piping, pipeline or process system has been stopped or regulated to a safe level, and the location at which the work is to be carried out is isolated and secured in accordance with the above requirements.

34.5.1 **Verifying Isolation**

A worker must not perform work on machinery, equipment or powered mobile equipment to be serviced, repaired, tested, adjusted or inspected until:

1. The actions required by section, [Managing the Control of Hazardous Energy Isolation](#) above are completed.
2. The machinery, equipment, or powered mobile equipment is tested to verify that it is inoperative.
3. The worker is satisfied that it is inoperative.

34.5.2 Securing Isolation

34.5.2.1 Securing by Individual Workers

Once all energy isolating devices have been activated to control hazardous energy in accordance with the above LOTO requirements, a job must ensure that a worker involved in work at each location requiring control of hazardous energy secures each energy-isolating device with a personal lock.

Workers must verify hazardous energy sources have been effectively isolated.

If more than one worker is working at each location requiring hazardous energy to be controlled:

1. Each worker must attach a personal lock to each energy-isolating device.
2. The first worker applying a lock must verify that the hazardous energy source has been effectively isolated.

If a worker who has placed a personal lock is reassigned before the work is completed, or the work is extended from one shift to another, the LOTO authority must ensure that:

1. Another worker, authorized by the employer to do so, attaches a personal lock to the energy-isolating device prior to removal of the reassigned or departing worker's lock.
 2. There is an effective and orderly transfer of control of the reassigned or departing worker's lock.
- Each personal lock used must have a unique mark or identification tag on it to identify it as belonging to the worker to whom it is assigned.
 - The name of the worker to whom a personal lock or identification tag is assigned is readily available during the time a hazardous energy source is isolated.
 - Upon completing the work requiring isolation of hazardous energy, the machinery, equipment or powered mobile equipment must be returned to a safe condition before the isolation is removed.

34.5.2.2 Securing by a Group

Securing by a group is required when a large number of workers are working on machinery, equipment or powered mobile equipment, or a number of energy isolating devices must be secured. A group procedure is permitted providing that the five criteria below are met:

1. All energy-isolating devices are secured.
2. Any keys for the devices into a lock box are secured.

3. A checklist that identifies the machinery or equipment covered by the hazardous energy control procedure is completed, signed and posted.
4. It is verified and documented that all sources of hazardous energy are effectively isolated.
 - a. Each worker working at each location requiring control of hazardous energy must apply a personal lock to the key securing system referred to above before working on the machinery, equipment or powered mobile equipment.
 - b. If a worker who has placed a personal lock is reassigned before the work is completed, or the work is extended from one shift to another, the lock must be transferred out of control of the original worker and reassigned to a new worker (or a new worker applies their personal lock and the original worker removes their lock). This must be done without the system becoming energized and creating a hazard for other workers in the area.
 - c. Upon completing the work requiring isolation of hazardous energy, a worker who has placed a personal lock must remove his or her personal lock from the key securing system.
5. Upon completing the work requiring isolation of hazardous energy, the machinery, equipment or powered mobile equipment must be returned to a safe condition before the isolation is removed.

34.5.2.3 **Securing by Complex Group Control**

Complex group control processes can be used if it is not reasonably practicable to secure energy isolating devices due to the conditions below:

1. The physical size and extent of the machinery, equipment, piping, pipeline, or process system;
2. The relative inaccessibility of the energy-isolating devices;
3. The number of workers involved in the work requiring hazardous energy control;
4. The number of energy-isolating devices involved;
5. The extended length of time of the required isolation; or
6. The interdependence and interrelationship of the components in the system or between different systems;
- 7.

Prior to initiating a complex group control process, a hazard assessment must be documented to identify the type and location of hazardous energy sources.

If using a complex group control process, the requirements listed below must be met:

1. Procedures are implemented to ensure continuous safe performance of the work requiring isolation of hazardous energy.
2. A work permit or master tag procedure is implemented so that:
 - a. Each involved worker personally signs on the job before commencing the work, and then signs off on the job upon completing the work; or
 - b. A crew leader signs on and off the job for a crew or team of workers.
3. The LOTO authority or designate:
 - a. Has activated all required energy-isolating devices to control hazardous energy;
 - b. Has secured the energy-isolating devices; and
 - c. Another worker designated by the LOTO authority has verified that all sources of hazardous energy are effectively isolated.

If a complex group control process is being used, and provided that the isolation point is reasonably accessible and isolation is required for the work being undertaken by the worker, each involved worker may place personal locks on the energy isolating devices and verify effective isolation.

Upon completing the work requiring isolation of hazardous energy, the machinery, equipment or powered mobile equipment must be returned to a safe condition before the isolation is removed.

34.5.3 Removing Personal Locks / Securing Devices

A person must not remove a personal lock or other securing device unless:

1. The person is the worker who installed it,
2. The person is the area authority identified on a lock removal request, or
 - a. In an emergency or if the worker who installed a lock or other securing device is not available, a worker designated by the employer may remove the lock or other securing device. A Lock removal request form will be used.
 - b. The worker removing the lock must verify that no other worker will be in danger due to the removal of the lock or securing device.

Securing devices and locks must not be removed until

1. The lock removal form is completed when removing someone else's lock.
2. Each involved worker is accounted for.
3. Any personal locks placed by workers are removed.

34.6 LOCK OUT/TAG OUT PROCEDURES

34.6.1 Responsibilities

The turnover manager is responsible for implementing this procedure, unless otherwise assigned by a Project Manager.

The construction manager is responsible for compliance with the requirements of this procedure.

Only competent workers (qualified, suitably trained to this document) will take part in a lock-out/tag-out operations.

34.6.2 Process

The lock-out and tag-out (LOTO) and work permit requirements are designed for the protection of all employees and equipment from unintentional energization. The procedure is written as follows:

1. Identifying systems or areas where a work permit is required
2. Obtaining a work permit
3. Filling out a work permit
4. Obtaining tags and or locks
5. Lock-out and tag-out of equipment
6. Craft LOTO procedures
7. Closing the LOTO record

34.6.3 Identifying Systems or Areas where a Work Permit is required (Boundary Tags)

During the turnover from construction to commissioning / pre-commissioning, boundary tags will be placed on all equipment within the boundary of the system. Note: This applies to Kiewit directed pre-commissioning or commissioning activities.

Scoped Piping and Isometric Drawings (P&IDs) and electrical one-lines are also another resource for identifying the correct system that needs to be assigned to the LOTO permit.

In the case where Kiewit is doing construction and another group is doing the pre-commissioning / commissioning, the client's identification system will be utilized to show ownership boundaries (e.g. Comm. tags).

Boundary tags and labels are used to indicate jurisdictional transfer of a component or system from one Kiewit construction to Kiewit pre-commissioning or Kiewit commissioning. The placement of boundary tags and labels is to signify pre-commissioning ownership, and that a permit is required to work within that system.

When Kiewit pre-commissioning / commissioning accepts a system turnover package, the entire system shall be tagged.

Boundary tags are placed on:

- The beginning and end of scoped system in P&IDs;
- All valves;
- Breaker panels and breaker control switches;

- Control panels and switches;
- Instrumentation;
- Any other location necessary to indicate boundaries under pre-commissioning control;
- At intervals of no greater than every 10 meters for electrical wire runs or piping runs without any of the above configurations.

No construction personnel will be permitted to operate or otherwise work on the equipment unless a LOTO safe work permit is obtained from the LOTO office.

Boundary tags or labels indicate jurisdictional transfer only. These do not indicate safety protection for personnel or protect equipment from unintentional damage.

Danger tags are to be used for personnel or equipment protection. Boundary tags are not a replacement and must not be used as such.

34.6.4 **Obtaining a Work Permit**

Blank work permits can be obtained through the LOTO group (where the designated permit location resides), and must be completed and submitted 24 hours in advance. Each discipline must obtain its own permit. In the event that the job is following a client's permitting system, all workers will be trained in the clients system.

34.6.4.1 **Filling out a Work Permit**

The safe work permit is the most critical document in determining the correct LOTO requirements for the work being identified. It is the responsibility of the discipline superintendent to verify the LOTO, and to identify all possible energized sources by marking up P&IDs or electrical schematics before the work is assigned to workers.

Part I. Work Request (This section is to be completed by person requesting the permit).

This part of the work permit includes:

- Type of work (cold or hot);
- Serialized permit number;
- Pre-commissioning system: system # and service description;
- Responsible supervisor – directing the work;
- Discipline of work;
- Duration – estimated duration that the permit will be opened for, up to seven days. Duration of the permit can be less and is determined by the LOTO authority.

Part II. Permit Requirements

This section is to be completed by Lock-Out and Tagging issuing authority / authorized person.

This part of the work permit includes:

- Lock-out / tag-out: Any energized or potential energization will require LOTO;
- Gas analysis: The presence of any hydrocarbons for confined spaces and to be evaluated in a case by case for hot work permit areas;
- Hot work permit if needed;
- Special precautions required.

Part III. Permit Issue

The permit issue includes the following:

- Permit Issuer who is the issuing authority / authorized person
- Permit Receiver
- Area Authority

Part IV. Permit Return

Permit return is completed by the permit receiver.

34.6.4.2 Completed Work Permits

A work permit inbox will be provided in the permitting office. Permits will be retained until mechanical completion of entire plant.

34.6.4.3 Confined Space Permit

Confined Space Permits are to be used and attached to the LOTO permit whenever the “Confined Space Work Required” field on the work permit is checked.

34.6.4.4 Obtaining Tags and or Locks

After the LOTO office receives the safe work permit with Part I completed, 24 hours in advance, the LOTO group will review the safe work permit request for completeness and provide individual numbered tags and locks (locks will be of the single keyed style and key cannot be removed unless locked) as well as a LOTO record. The safe work permits will be issued after the LOTO is executed, before work execution.

34.6.4.5 LOTO Required

The LOTO team will assign a LOTO Record. This LOTO record and tags will identify:

- Tag number;
- Lock number;
- Lock location;
- Lock position;
- Date hung by.

34.6.4.6 Issue Permit

The issuing authority / authorized person and a designated person assigned by the lock-out and tagging authority must hang the tags and locks with appropriate equipment, and return all keys to the lock-out office. The keys will then be placed in a lock box and locked by the lock-out and tagging authority. A copy of the permit and LOTO record will be left assigned to the lockbox.

34.7 CRAFT LOTO PROCEDURES

After the LOTO has been created and is active, the workers on that permit are responsible to review the permit as well as the LOTO of the identifying tags and locks that apply to their specific task. This includes visually checking the locks and tags for identification and comparison to the LOTO. At this point, they may be handed a numbered lock and key for where they must hang on a lockbox.

34.7.1 Lock Box Log

A lock box is a lockable box that secures the keys of all workers who are working on a system. The lock box log contains the information recorded by workers pertaining to locks, including:

- System or component tagged and/or locked out
- Lock number;
- Name;
- Date;
- Signature;
- Release time;
- Release signature.
- Lock Box number

After completing the lock box log, the worker now has all LOTO and documentation in place to work on the system.

A LOTO does not exclude any craft from other safety requirements, such as Quad Fold JHA or verifying de-energized systems.

34.7.2 Closing the LOTO Record

Construction

At the end of every shift, all construction personal must remove the locks from the lock box and sign off from the Lock Box Log. If the work continues over multiple shifts, each person will be required to sign on and off the log. This promotes safety and ensures that no locks have been inadvertently left on in error.

34.7.3 LOTO Clearance

1. Only when all craft locks are removed from the lock box and all signatures are accounted for on the Lock Box Log may the permit holder ask for clearance on that LOTO.
2. The issuing authority / authorized person releases keys from LOCK BOX.
3. The issuing authority / authorized person collects all locks and tags from the field.
4. The issuing authority / authorized person closes the LOTO Record (signature / date):
 - a. A record of all closed LOTOs and attached work permits will be placed in a closed LOTO folder on file.
 - b. This will be done by the issuing authority / authorized person and can be turned over to the owner at mechanical completion if requested.

34.7.4 LOTO Clearance If Individual Is Not Present

If an employee fails to remove a lock, that employee will be required to return to remove it in person. If the individual cannot be contacted or cannot return to remove the lock and tag, the following steps will be initiated:

1. The equipment or system protected by the individual's lock and tag must be thoroughly inspected to ensure that all personnel are clear and that it is safe to bring back it into operation.
2. Written permission to remove a lock and tag must first be obtained from the project or construction manager, pre commissioning manager (when applicable), and area authority.
3. Following the removal of the lock and tag, the Lock-Out / Tag Out Device Removal form will be completed and kept in the lock-out office.

34.7.5 Tags

An Example of danger, and commissioning tags, also different colored tapes are shown in [Figure 18.17-1: Example Tags](#).

These tags will be used when Kiewit is directing the construction and pre-commissioning / commissioning work, or when the clients pre-commissioning / commissioning work does not meet the Kiewit LOTO requirements.

Figure 18.17-1: Example Tags


34.7.5.1 Danger Tags

A danger tag is placed for the protection of personnel or equipment. Equipment must not be operated under any circumstance if it is tagged with a red danger tag.

Locks must be used with danger tags when a LOTO safe work permit is issued for circuit breakers or switchgear.

Each danger tag will list:

- Tag number;
- Equipment name and identification;
- Reason for placement of tag;
- Date tag is placed;
- Signature of person placing the tag.

34.7.5.2 Caution Tags

Yellow caution tags provide specific instructions for the operation of system components. Green tags are generally used during pre-commissioning where equipment is being operated in a manner to accommodate a specific activity. They are also commonly used to identify a specific range of operation in a pre-commissioning activity.

Caution tags are not used where plant safety is affected or where personal injury might result.

A log for caution tags lists the following:

- Tag number;
- System or component description;
- Date the tag was installed;
- Name of the individual who installed the tag;
- A description of special precautions to be used during operation of the component or system;
- Signature of the individual removing the tag;
- Date the tag was removed.

Each caution tag will list:

- The tag number;
- The signature of person installing the tag;
- The date the tag is installed;
- A description of special precautions to be used during operation of the component or system.

34.7.6 **General Procedures**

1. Tags are to be securely attached so that removal requires a definite positive effort. This prevents casual loss or removal.
2. The LOTO log will be compared against the number of tags removed to ensure complete removal of tags.
3. Plastic tag protectors should be used for tags exposed to harsh environments or when they are expected to be in use for long periods of time. Moisture, wind and normal construction activity can easily damage tags.
4. All tags, logs and tag indexes will be reviewed every two weeks. Active tags are checked to verify that protection is still in place.

34.7.6.1 **Notes and Precautions**

- Tags placed to indicate system and equipment turnover to pre-commissioning must not be removed. Danger and Caution tags may be placed over these tags;
- The person performing the work will check the equipment personally to ensure that equipment is properly tagged, de-energized, locked out and safe for work;
- The Kiewit LOTO tags are the only type allowed on the job site until the Client or another pre-commissioning / commissioning group's acceptance. This maintains standardized and effective safety enforcement. Personal and other non-standard tags are not recognized or allowed;
- All entries on the tag must be completely filled out;
- Defacing tags or unauthorized removal of tags or other disregard for LOTO procedures is a violation of the safety rules and grounds for dismissal;
- Work activities must be strictly confined within LOTO boundaries. Failure to do so jeopardizes personnel and equipment safety;

- Persons performing work under a LOTO safe work permit must report to the lock-out office upon completion. This allows the timely turnover of equipment for return to normal operation;
- No one is permitted to work under a tag/lock or LOTO issued to another group.
- Tags must be readily visible and conspicuously displayed. This helps ensure worker and equipment safety;
- Manual valves must be tagged at the hand-wheel or handle. The tag will indicate the position of the valve. “Locked Closed” and “Locked Open” are the usual ways valve position is described on a danger tag;
- Motor-operated valves must be tagged at the hand wheel, at the motor starter, and at the breaker. In critical situations, it might be necessary to use extra locks and chains for secure boundary isolation. Breakers will be locked open when danger tags are in place;
- 120 volt AC and 125 volt DC circuits are isolated by opening supply breakers or knife-switches, which are then locked and tagged. Control fuses are removed to afford additional safety protection;
- A lock box will be used any time multiple locks are required for tagging and locking a single breaker in an electrical panel;
- DC or AC power leads are lifted (by a competent person) at the terminal blocks when circuits are not readily de-energized. The power leads are then labelled, disconnected and taped;
- Control power fuses will also be removed and tagged if specifically requested by craft personnel when tagging out switchgear;
- To prevent inadvertent re-engagement, the LOTO authority will ensure that open breakers tagged with Danger signs are completely locked as per requirements;
- When performing work on equipment to be tested, individual workers must ensure the equipment is suitably locked out by testing before starting the task.

34.8 PIPING SPECIFIC LOTO

34.8.1 Piping and Pigging

To isolate piping or a pipeline containing harmful substances under pressure, the following may be used:

1. A system of blanking or blinding.
2. A double block and bleed isolation system providing:
 - a. Two blocking seals on either side of the isolation point; and
 - b. An operable bleed-off between the two seals.

Piping that is blanked or blinded must be clearly marked to indicate that a blank or blind is installed.

For valves or similar blocking seals with a bleed off valve between them that are used to isolate piping, the bleed off valve must be secured in the OPEN position and the valves or similar blocking seals in the flow lines are functional and secured in the CLOSED position.

For a double block and bleed system; the two blocks must be locked closed and the bleed must be locked open.

The device used to secure the valves or seals described in the above paragraph must:

1. Have a positive mechanical means of keeping the valves or seals in the required position.
2. Be strong enough and designed to withstand inadvertent opening without the use of excessive force, unusual measures or destructive techniques.

If it is not reasonably practicable to provide blanking, blinding or double block and bleed isolation, an alternative means of isolation that provides adequate protection to workers, certified as appropriate and safe by a professional engineer, can be implemented.

34.8.2 Pigging and testing of pipelines

A person who is not directly involved in a pigging and testing operation must not be in the immediate area of piping exposed during the operation. Distance must be determined by the pressure of the test.

A pig catcher on a pipeline must be isolated from the pipeline and depressurized before the pig is removed. There must not be any workers at the end of the pipe or in the immediate vicinity of the pig catcher if the pipe or pig catcher is under pressure during the operation

34.9 ELECTRICAL LOTO

34.9.1 Special Considerations for working on Live Systems

The paragraph below describes how work on an energized system is permitted without a physical LOTO in place. This can only be carried out by an electrician trained in the technique of working on live electrical circuits (i.e. hot work).

A LOTO permit still needs to be issued before any work on live systems occurs. This will ensure that no unintentional activation of systems will occur which could put the worker conducting hot work at risk.

Work on energized circuits is allowed only under the situations described below, and providing that the nature of the work (due to comprehensive training and a job hazard analysis) provides equal or greater protection compared to a LOTO being in place:

1. Work on Extra Low Voltage Power Circuit that operates at no more than 30 volts, and that is supplied from a transformer or other device restricted in its rated output to 1000VA (as defined by Canadian Electrical code).
2. Hot work is permitted when working on circuits that have a potential less than 130 volts to ground only if positive lockout cannot be applied and, in the judgment of the electrician, the work can be performed safely and the Area Authorities approval is obtained. In such cases, a dedicated Quad Fold JHA must be prepared and approved. The Quad Fold JHA shall not be in conflict with the latest edition of the Canadian Electrical Code requirements.
3. Hot work on circuits having a potential greater than 130 volts to ground will be by exception. In emergency situations, approval by the Area Authority is required.
4. Voltage and/or current measurements are permitted on live electrical circuits regardless of voltage when performed by a qualified electrician familiar with the circuit and measuring equipment. In this situation, the person making the measurement must have a qualified safety back-up person on circuits that have a potential greater than 300 volts to ground, or on high power rated circuits.
5. Livening up notices for temporary power to fixed equipment shall be posted on equipment and communicated to all personnel.

34.10 TEMPORARY POWER

34.10.1 Hook up temp power / Sequence of Lock Out

1. Assess all potential hazards. Conduct a detailed Quad Fold JHA. Ensure that arc flash precautions and PPE requirements have been assessed. Each person working on the equipment must have a lock and tag in place before he/she begins to perform any work.
2. Notify all affected employees that servicing, maintenance or construction is required on the equipment or device, and that it must be shut down and locked out to perform the work.
3. The worker shall identify along with the Foreman the magnitude of the energy that the equipment utilizes, shall understand the hazards of that energy and the methods necessary to safely control it.
4. Proceed to shut down the equipment or device by the normal stopping procedure, i.e. depress the stop button, open switch, only after it is confirmed that power is not being utilized from the source being shutting down. For hook up of temporary power (portable generators) a permit is not required.
5. De-activate the energy source. Shutting down a generator will also suffice, providing that it cannot be started by another employee.
6. Lock out and tag out the energy source or devices with an assigned personal safety lock.
7. Stored or residual energy such as capacitors must be dissipated through proper grounding.
8. Test to ensure the equipment or device is disconnected from the energy source by operating a push button or other operating controls to ensure the equipment will not operate.
9. Proceed to hook up temporary power.

34.10.2 Restoring Equipment to Service

1. Check that both the equipment or device, and that the immediate area, are ready for return to normal operating condition. If grounding cables have been installed, ensure that the safety grounds are removed.
2. Check and ensure that all employees have been safely positioned or removed from the area. All locks have been removed and confirmed.
3. Turn on the energy source only after work is verified as complete.
4. Notify all affected parties after energization and that the work is complete and ready for use.

34.11 MAINTENANCE LOTO

34.11.1 When to Use It

Maintenance LOTO is used before the commencement of ANY maintenance work on equipment or machinery.

34.11.2 Usage Examples

Repair of any equipment should begin with the disconnect switch and/or valve placed in the OFF position. The technician should then place a DO NOT START sign that is locked to the master switch. Only the technician working on the piece of equipment should have the key to the lock.

34.11.3 Hazards

- Inadvertent start-ups;
- Accidental equipment movement;
- Stored energy

34.11.4 General Notes

- The Machine must remain locked out until the repair is complete;
- A “Do Not Start” tag must be signed, dated and the reason stated on the tag;
- In addition to locking and tagging out a piece of equipment, place a “Warning—Do Not Operate” magnet over the door of the equipment (if applicable);
- The machine must remain locked out until the repair is complete;
- Each authorized technician is given a personal lock with on key. Under no circumstance can someone lock out for another technician;
- If more than one technician is working on a piece of equipment, a multiple locking device must be used if the primary device is unable to accommodate more than one lock;
- Check and verify to ensure the equipment is completely immobilized after it is locked out.

34.11.5 Lock Out Tag Out Specifics

1. Notify ALL affected employees that a lockout procedure is going to be implemented, the equipment or process to be affected and the reasons for lockout.
2. Shut down the equipment or process.
3. Locate the master disconnect switch to the piece of equipment (i.e. electrical disconnect switches, valves, quick disconnects, etc.).
4. Attach a lockout padlock(s) to the disconnect switch and/or other energy isolating devices.
5. The lockout tags must include the authorized employee’s name, date and the reason for lockout. Include all involved employees working on the piece of equipment.
6. Stored energy in springs, elevated machine members, rotating flywheels, hydraulic systems and air, gas, oil or water pressure must be dissipated or restrained by methods such as blocking, bleeding down, repositioning, etc.
7. Attempt to restart the equipment 3 times to verify that it is fully de-energized.
8. Return shutoff, E-Stops, etc. to their off or neutral position after testing that the equipment is locked out.
9. Upon completion of service and Maintenance activities, authorized employee should ensure that all lockout devices have been removed.

10. Testing of the service or maintenance activities requires removal of lockout protection. If upon testing it becomes clear that further repair is necessary, the equipment or process must be placed back under lockout protection.

34.11.6 Lock Out / Tag Out - Pneumatic & Hydraulic

1. Turn off the air or hydraulic supply to that piece of equipment and LOTO the valve out.
2. The employee should attempt to start the equipment to ensure the power source is locked out.
3. Ensure that the equipment will not operate with residual, accumulated pneumatic or hydraulic pressure.

34.11.7 Lock Out / Tag Out: Mobile or Vehicular Equipment

1. Place the key in the OFF position, and remove the key.
2. Place the key on the lockout device; the lockout device will be placed in a location that will positively lock out the equipment.
3. Remove the battery cable at the battery end and pull any fuses out.
4. If the equipment must be started for testing, all authorized employee locks must be removed after everyone is advised of the procedure. One person will be designated to operate the equipment.
5. No employee will remove another person's lock or tag. At the end of each shift, each person will remove their locks and tags.
6. After completion of work, the supervisor must be notified that the equipment is released.
7. Should any employee fail to remove a lock, that employee will be required to return to remove it in person. If the employee cannot be found, the Equipment Superintendent will be notified. He or she will ensure the equipment is safe and give the go-ahead to remove the lock.

34.12 ELECTRICAL EQUIPMENT LESS THAN 1000 V LOTO

1. All electrical equipment involving the use of disconnect switches as a source of power for their operation will be turned off, locked out in the "Off" position and tagged with a "Do Not Start" tag.
2. After the equipment has been locked and tagged out, the authorized employee will attempt to start the equipment to ensure that the proper switch has been locked out and the equipment will not start.
3. 1000 V gloves must be worn when using a meter to confirm zero energy.
4. If the equipment is greater than 1000 V, consult an electrician for additional assistance.

34.12.1 General requirements

34.12.1.1 Lock Control

All locks used for lockout/tag out shall have one key only. The control procedure on the keys and lock is as follows:

Each employee will retain his/her lock key and will be in their possession at all times.

34.12.1.2 Continuity of Lockout

If it is necessary to extend a lockout beyond the end of a shift, all individuals who will be leaving the job shall remove their personal locks and tags. Individuals who will be resuming the work shall then immediately apply their personal locks and tags. Locks shall be applied in the fashion of first on, last off.

In those cases, where the work is not continued immediately after the end of the shift, the Area Authority or designate will maintain his or her lockout (tags and locks) while the working crew will remove their locks.

Five General Steps to Lockout

1. Identify the machinery or equipment that needs to be locked out.
2. Shut off the machinery or equipment. Make sure that all moving parts have come to a complete stop. Also ensure that the act of shutting off equipment does not cause a hazard to other workers.
3. Identify and de-activate the main energy-isolating device for each energy source.
4. Apply a lock to the energy-isolating device for each energy source, and ensure that all parts and attachments are secured against inadvertent movement.
5. Test the lockout to make sure it's effective and to verify that each energy source has been effectively locked out. First ensure that all workers are in the clear and that no hazard will be created if the lockout is not effective.

34.13 REFERENCE INFORMATION

[Danger Tag](#)

[Caution Tag](#)

[Jurisdictional Tag](#)

[Lock Out Tag Out Log](#)

[LOTO Record Form](#)

[Temporary Lift Form](#)

[LOTO Trained Personnel Log](#)

[Emergency LOTO Removal Form](#)

[Work Authorization Request Form](#)

[Caution Tag Log](#)

[LOTO Training Log](#)

[Satellite Lock Box Log](#)

[Example Electrical Temporary Power One-Line](#)

35. FALL PREVENTION

35.1. POLICY

It is the policy of the Kiewit Infrastructure to perform work in the safest manner possible, or if working in a manlift or man basket, which is 6 feet or more above a lower level, or less if other hazards exist, must be protected from falling. In conjunction with fall prevention, breaking the plane is considered to be when any worker's shoulder extends past any permanent, temporary or scaffold handrail to conduct work. 100% tie off is required when breaking the plane while working above 6 ft.

35.2. SCOPE

This safe work practice describes a systematic approach that must be used to protect people and prevent them from falling. The implementation of a proactive Fall Protection System will maximize employee safety and minimize the hazards associated with falls on the job. This program also applies to Partners, visitors, and other individuals on site who are exposed to a fall hazard. A policy of 100% fall protection shall apply at all times.

Each assigned job task will be assessed for potential fall hazards. Proper fall prevention equipment will be used for jobs requiring fall protection when elimination of the hazards is not possible. A Fall Protection Plan specific hazard assessment must be developed for all operations where a potential fall hazard exists.

35.3. MOST COMMON FALL HAZARDS

Special attention will be given to providing fall prevention and fall control protection in the design, engineering, planning and execution stages of this type of work. Supervisors will give special consideration to fall protection for the following tasks and situations, which present inherent fall hazards:

- Working from crane booms and tower cranes;
- Working from elevated work platforms and boom supported elevated devices and telescopic forklift truck work platforms;
- Working on top of machinery and equipment, such as vessels, stacks and man baskets;
- Other work that involves fall hazards, such as off-chutes' from main piping in duct work;
- Working on roofs with deteriorating or unsupported sections and framing;
- Working over chemical tanks or open pits;
- Working from fixed or portable ladders, or from climbing systems;
- Performing work on water towers, product tanks, silos, pip- racks, presses, floor pits;
- Working from scaffolds;
- Steel erection;
- Working near floor openings, open-sided floors and stages;
- Conducting aerial and scissor lifts;
- Loading and unloading material and equipment.

35.4. RESPONSIBILITIES

Field Supervisors

Field supervision will be responsible for the training of their employees on site. They will be responsible for the oversight of daily inspections, overall compliance with the written program, enforcement of program requirements and ensuring employees are working in a safe manner when exposed to any and all fall hazards. They are responsible for the development of Fall Protection Permit for each specific working at heights operation. Verify that the craft is properly trained, and understands the Fall Protection Permit, also known as Fall Protection Work Plan, and confirm that the permit is being followed in the field.

Workers

Workers will be responsible to actively participate in all toolbox meetings, report any fall hazards to management, work in a safe manner and adhere to the fall prevention and protection requirements of this program. Workers are also responsible for all specified daily inspections on all personal (company provided) fall arrest equipment before use. In addition, workers are responsible for ensuring that they have a Fall Protection Permit in place for the work they are performing, to review, sign and understand the permit prior to starting their work at heights.

35.5. FALL PROTECTION PLANNING

Fall protection planning begins with the identification of all potential fall hazards in the workplace. Anytime a worker is at a height greater than six feet (1.8 meters), or less if another hazard exists such as impalement, a fall hazard exists.

The following guidelines will be used when planning work at elevated heights:

- Utilize the Hierarchy of Controls when developing work plans:
 - a) Eliminate fall Hazards (work at grade level)
 - b) Prevent fall hazards (engineer out the hazard)
 - c) Administrative Controls (restraint system)
 - d) Lastly, utilize personal fall arrest systems.

Competent individuals will design fall prevention permit/plans. Superintendents and field engineers, where appropriate, will be provided with any required specialized training to recognize fall hazards, to understand and address fall prevention techniques, and to become familiar with fall arrest equipment and procedures.

Is critical that superintendents and field engineers consider fall protection design for the safety of operations where employees must work at elevated heights.

Safety during access and egress from elevated work sites will also be considered. The following guidelines will be used when planning work at elevated heights:

1. Involve the safety department early in the project planning/job planning so that they can recommend appropriate fall-protection measures and equipment.
2. Involve qualified engineers when load rating of anchorage points must be determined or is in doubt. Required training will be provided as necessary.

3. Involve engineering when anchorage points must be installed.
4. The safety department will use the expertise of fall protection equipment manufacturers to determine type and rating of equipment required.
5. Supervision will be specific in dealing with fall hazards when developing work plans. Subcontractors will be required to provide a written fall protection program which describes the subcontractors' fall protection policies and procedures when they will be working at elevated heights. Emergency/Rescue planning must be in place for workers at heights.

35.6. **FALL PROTECTION AUTHORIZED USER TRAINING**

Prior to any worker using a fall protection system they must be properly trained, using the standard company Fall Protection Authorized User Training conducted by an Authorized Trainer.

The company Fall Protection Authorized User Training cannot be changed or modified by instructors or from projects, and it must include the following:

1. Identification of fall hazards and exposures
2. Fall protection planning and the hierarchy of controls
3. Identification and proper use of fall protection equipment
4. Maintenance and cleaning of personal protective devices
5. Inspection procedures for personal protective devices
6. Methods for rescue and self-rescue in the event of a fall as well as emergency notification procedures,
7. Hands-on experience performing tasks.

For additional equipment not covered in the Fall Protection Authorized User Training, the worker will be given copies of the manufacturer's instructions and will be trained on how the system is to be used. Such as the procedures for operating, maintaining, erecting, disassembling and inspecting.

Site Specific Training

Site specific requirements can be added and covered following the standard Fall Protection Authorized User Training.

Workers will be trained to recognize the hazards of falling from elevations, and to avoid falls from grade level to lower levels through holes or openings in walkways or on working surfaces. Training programs will include prevention, control and fall arrest systems. It must be ensured that appropriate fall arrest systems are installed, and that employees know how to use them before beginning any work that requires fall protection.

Training will be conducted prior to job assignment. Kiewit will provide training to ensure that employees understand function, and proper use of fall protection and employees acquire that the knowledge and skills required for the safe application, and usage. This standard practice instruction will be provided to and read by all employees receiving training.

The training will include, as a minimum, the following:

1. OHS Regulatory Information
2. Fall hazards associated with the work to be completed
3. Procedures for using fall prevention and protection systems.
4. Equipment strengths and limitations.
5. Prevention, control and fall arrest systems.
6. Pre-use Inspection and storage procedures for the equipment.
7. Types of fall protection equipment appropriate for use.
8. Equipment maintenance and inspection requirements.
9. Equipment donning and doffing procedures.
10. Procedures for removal of protection devices from service for repair or replacement.

35.7. CERTIFICATION

Kiewit will ensure that employees' training has been accomplished and is being kept up to date. The certification will contain each employee's name and dates of training. Competent personnel will accomplish training and will compile all training records regarding Fall Protection.

35.8. RETRAINING

Retraining will be provided for all authorized and affected employees whenever and before:

- A change in their job assignments takes effect and every 2 years
- A change in the type of fall protection equipment used; or
- When a known hazard is added to the work environment which affects the fall protection program.
- Additional training or complete retraining is required based on performance of an employee.

35.9. FALL PROTECTION SYSTEMS

When fall hazards cannot be eliminated through any other means, fall arrest systems will be used to control falls. Proper training on the use of fall arrest equipment is essential and will be provided prior to use.

Fall protection equipment is broken down into three categories:

1. Body wear (harness),
2. Connecting device (lanyard),
3. Anchorage connectors and points.

All three categories of fall protection equipment must be in place and of sufficient design to complete the system.

Selection of Equipment

Fall Protection Equipment Guide is the standard for fall arrest gear. Only equipment from this guide will be purchased and used on Kiewit projects, any deviation from this guide requires Executive Vice President. If specified gear is not available then the District Safety Manger may approve alternate gear.

Appropriate fall protection devices will be provided for potential fall hazards. Selection of the equipment will be based on the fall protection evaluation. All fall protection equipment that is selected will meet the requirements of the Corporate Fall Protection Memo, will be 3M DBI Sala or Protecta brands and will be rated for sharp edge, leading edge and foot level tie off. A sharp edge is defined as an edge with a radius that measures less than 0.25 mm.

Fall protection devices will be:

1. Singularly identified.
2. The only devices used for controlling falls.
3. Capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.
4. Capable of withstanding the ultimate load of 3600 lb or the load maximum of the province you are working in.
5. Standardized within Kiewit, whenever possible. All CSA requirements must be met.
6. Anchor points will not deteriorate when located in corrosive environments, such as areas where acid and alkali chemicals are handled and stored.
7. Fall protections devices will not be used for other purposes.

Full Body Harness (Body wear)

A full body harness system consists of a full-body harness, lanyard, energy shock absorber, and self-locking snap hook. Before using a full-body harness system, the supervisor and/or the user must address such issues as those listed below:

1. Has the user been trained to recognize fall hazards and to use fall arrest systems properly?
2. Are all components of the system compatible according to the manufacturer's instructions?
3. Have appropriate anchorage points and attachment techniques been reviewed?
4. Has free fall distance been considered so that a worker will not strike a lower surface or object before the fall is arrested?
5. Have swing fall hazards been eliminated?
6. Have safe methods to retrieve fallen workers been planned?
7. Has the full-body harness and all of its components been inspected both before each use and on a regular semi-annual basis?
8. Is any of the equipment, including lanyards, connectors, and lifelines, subject to such problems as welding damage, chemical corrosion, or sandblasting operations?

Lanyards (Connecting devices)

- Personal lanyards will be "shock absorbing", SRL and will be rated for sharp edge, leading edge and foot level tie off. The Nano-Lok Edge Personal SRL is currently the ONLY approved personal SRL that can be used on Kiewit projects.
- Type 2 SRLs must be 3M DBI Sala or Protecta brands, be rated for sharp edge, leading edge and foot level tie off and be equipped with a shock absorber. The following Type 2 SRLs are approved for use on Kiewit projects:
 - Ultra-Lok Leading Edge SRL
 - Rebel SRL Leading Edge
 - Smart Lock Leading Edge SRL
- Snap hooks will be double locking. The only hooks currently approved for use on Kiewit projects are:
 - Locking nose steel rebar hook with 2.5" gate opening
 - Steel rebar hook with 2.5" gate opening
 - Comfort grip hook with 2.25" gate opening (Allows transverse loading)
 - Steel snaphook
- When any SRL (personal or Type 2) is used in an area where there is a potential for the equipment to contact a sharp edge (radius less than 0.25 mm) a softener must be used.

NOTE: An easy way to determine whether an edge is too sharp (less than 0.25 mm) and will require a softener is to place a square device over the edge:

- If there isn't a perfect seal and daylight shines through, the edge measures greater than 0.25 mm and does not require a softener.
- If it is a perfect fit and no daylight is visible, it is too sharp and a softener must be used.
- Steel Belly Chains with Ironworker Hooks shall only be used on rebar or other items that will allow the hook throat safety latch to close completely. These devices are for positioning work only, and are not to be used for fall protection.
- When lanyards or carabineers are used on horizontal lifelines, the gates must be rated to withstand a 3600 lbs load
- Use of any fall protection gear that does not comply with the corporate fall protection memo must receive approval from an executive vice president. The following fall protection items are prohibited on Kiewit sites:
 - Synthetic lanyards
 - D-ring extenders
 - Aluminum hooks
 - Scaffold chokers

Retractable Lifelines

A retractable lifeline is a fall arrest device used in conjunction with other components of a fall arrest system. One person should use retractable lifelines at a time. A properly inspected and maintained retractable lifeline, when correctly installed and used as part of the fall arrest system, automatically stops a person's descent in a short distance after the onset of a fall.

Retractable lifelines may be considered when working in areas such as on roofs and scaffolds, or in tanks, towers, vessels, and manholes. Also, retractable lifelines should be considered when climbing such equipment as vertical fixed ladders. Before using a retractable lifeline, the supervisor and/or the user must address the following questions:

1. Has the user been trained to use a retractable lifeline correctly?
2. Is the retractable lifeline being used in conjunction with a complete fall arrest system?
3. Is the equipment under a regular maintenance program?
4. Is the equipment inspection up to date?

Standard Harnesses

Harnesses for general-purpose work should be Class III, constructed with a sliding back D-ring and must be 3M DBI Sala or Protecta brand. Standard harnesses are suitable for continuous fall protection while climbing, riding, or working on elevated personnel platforms. They are suitable for positioning, fall arrest, and the rescue and evacuation of people who are working at elevated heights.

Ladder Climbing Safety Devices (LCSD)

Rope systems- A polypropylene rope may be used for vertical fall protection. The rope must be well tied to a substantial anchorage point. The LCSD must be “hands free” operation in both directions, and be connected to the “D” ring of a full body harness with an approved connection. The appropriate CSA code and manufacturers recommendations must be researched to determine the allowable length lanyard to be utilized. Lanyards longer than 1.22 M (4Ft) will not be used without Construction Manager written approval.

Anchorage Connectors and Points

An anchorage connector or point for a single worker must be capable of supporting 5,000 lbs. End anchors for a horizontal lifeline for more than one worker must have an ultimate load capacity of at least 16,000 lbs. This can be accomplished in a number of ways and must be engineered to ensure the point has that capability. The anchor can be provided by either outside manufactured devices or engineered jobsite design. Fall Protection systems are to be built/installed as per the design. (i.e.: Horizontal Lifelines, Handrail, temporary anchorage systems etc.).

The following equipment may be used as an anchorage adapter to provide a point of connection for an SRL:

- **Basketing Cable**
 - Can be used overhead and at feet
 - Have two rings and one snaphook or carabiner
 - The cable loops around the anchor (e.g. steel beam) and the snaphook or carabiner connects to one of the two rings
 - The SRL (Personal or Type 2) connector (hook), attaches to the second ring.
- **Choking Cable**
 - Can be used overhead and at feet
 - Has one small D-Ring and one larger O-Ring
 - The cable loops around the anchor (e.g. steel beam) and the small D-Ring passes through the larger O-Ring.
 - The cable is pulled tight around the structure
 - The SRL (Personal or Type 2) connector (hook), attaches to the small D-Ring
 - NOTE: When choking at feet, the choker tail cannot exceed 1 foot in length (to minimize free-fall distance).
- **Anchor Extender**
 - Can only be used in a straight orientation
 - Cannot be looped around a structure
 - Purpose is to provide a closer point of attachment to an anchor
 - Can be used in a horizontal or vertical orientation
 - The SRL (Personal or Type 2) connector (hook) connects to the D-Ring of the anchor extender

Horizontal Lifelines

Horizontal lifelines such as Sayline and EZ-Line must be used in accordance with the manufacturer's specifications. Additional considerations to the clearance requirements such as deflection of the line, must be taken into account.

Elevated Work Platform Anchor Point

When working on a boom-supported elevating work platform, boom-supported aerial device, or telescopic forklift truck work platform, a personal fall arrest system is connected to an anchor point specified by the manufacturer of the platform, aerial device or telescopic forklift truck or certified by a professional engineer. Ensure the lanyard, if reasonably practicable, is short enough to prevent the worker from being ejected but is long enough to allow the worker to perform their work. Retractable life lines are preferred as long as their use does not contradict the manufacturer's instructions of the elevated work platform.

Clearance

Clearance is the distance required to prevent a worker – in the event of a fall – from contacting an obstruction below. Clearance requirements must be calculated for each scenario in which fall protection equipment is used and must be specific to the equipment being used.

Clearance requirements will vary depending on:

- Type of fall protection equipment being used
- Location of anchor (above or below D-Ring)
- Location of worker in relation to anchor (horizontal distance from anchor, crouching versus standing)

When available, manufacturer's charts/graphs will be used to determine required fall clearance in lieu of performing calculations. Graphs and charts are available for the following equipment and scenarios:

- Personal Nano-Lok Edge SRLs – above and below D-Ring anchor
- Type 2 SRL – below D-Ring anchor

Calculations will be performed to determine the required fall clearance for Type 2 SRLs when the anchor is located above the D-Ring as there are no graphs/charts from the manufacturer that provide this information.

The calculation that will be performed is as follows:

Step 1: Determine the height of the anchor from the worker's feet. This value represents "A"

Step 2: Determine the distance that the worker will need to travel horizontally away from the anchor point. This value represents "B"

Step 3: Use the calculation: $\sqrt{A^2+B^2} = C$ and find the value of C

Step 4: Find the difference between C and A by the equation: $C - A = D$ (D represents the additional clearance that is required due to swing fall)

Step 5: To calculation the required clearance add the following values to D:

- Maximum Arrest Distance (MAD) = 3.5 feet
- Harness Stretch Factor = 1 foot
- Safety Factor = 1.5 feet
- Crouching factor (CF) (if kneeling or crouching required) = 3 feet

Clearance = D + 3.5 ft + 1 ft + 1.5 ft + CF

NOTE 1: Fall clearance is calculated from foot height to the nearest floor or ground

NOTE 2: Each piece of equipemnt has a maximum horizontal travel distance that is allowed. Refer to the manufacturer’s manual to determine the maximum B value for the equipment being used.

INSPECTION AND MAINTENANCE

To ensure that fall protection systems are ready and able to perform their required tasks, a program of inspection and maintenance will be implemented and maintained. The guidelines provided in this section will, as a minimum, comprise the basic requirements of the inspection and maintenance program:

Equipment manufacturer’s instructions will be incorporated into the inspection and preventive maintenance procedures. **Pre-use Inspection**

All fall protection equipment (harnesses, lanyards, SRL, etc.) will be inspected prior to each use by the Authorized User in accordance with the manufacturer’s instructions. Inspections of personal fall protection gear (e.g. personal harness and SRL) will be documented daily. ~~on the Quad-Fold JHA.~~

Inspections of other types of fall protection equipment (e.g. Type 2 SRLs, Horizontal Lifelines, Anchorage Adapters, etc.) will be logged prior to each use by the Authorized User.

Annual Inspection

Harnesses and lanyards require a biannual inspection by competent person. Inspections will be documented utilizing the Fall Protection Inspection Checklist located in the Compliance app in InEight. The first inspection shall be completed between January 1 – 31. The second, inspection shall be completed between July 1 – 31. Color coding shall be used to visually indicate a passed inspection, rigging shall be marked by color tape or colored zip ties. Color coding is as follows:

- January – White
- July – Green

Best Practice: Manufacturers and suppliers offer annual inspection training for harnesses.

Defective fall protection equipment must be immediately taken out of service.

Inspection Guidelines

The guidelines below, indicating inspection and maintenance of fall protection equipment components, are to be followed:

1. User will inspect his or her equipment before each use and check the inspection date.
 2. Any fall protection equipment subjected to a fall or impact load will be removed from service immediately and inspected by a qualified person (sent back to the manufacturer).
 3. The user will check all equipment for mold, damage, wear, mildew, or distortion.
 4. Hardware should be free of cracks, sharp edges, or burrs.
 5. The user will ensure that no straps are cut, broken, torn or scraped.
 6. Special situations such as radiation, electrical conductivity and chemical effects will be considered.
 7. Equipment that is damaged or in need of maintenance will be tagged as unusable, and will not be stored in the same area as serviceable equipment.
 8. Anchors and mountings will be inspected before each use by the user and supervisor for signs of damage, and this will be recorded on the inspection sheet.
- CSA Z259.2.2-14-Self-Retracting Devices
Type 2 and Type 3 self-retracting lanyards must be inspected by the manufacturer; 2 years after the date of manufacture and annually afterwards.

RESCUE PROCEDURES

Kiewit will develop rescue procedures before the start of the work at height to ensure a worker that has fallen can be reached within 5 minutes of the fall to, at a minimum; relieve the pressure exerted by the body on the harness. If the work is being done at a location from which a fall of 7.5 m (25 ft) or more may occur, the rescue plan must be in writing. This may be accomplished by using man lifts, scissor lifts, high angle rescue box, ladders, or self-rescue devices.

Once the initial pressure has been removed, the worker must be rescued within 15 minutes of the fall.

SCAFFOLD PLANK POLICY

In applications where approved scaffolding planks are required, ONLY Microllam LVL stamped lumber scaffolding plank will be purchased for our jobsites.

If any scaffold planks are found on the jobsite that are not Microllam LVL stamped lumber they are to be removed immediately.

Microllam LVL scaffold plank is made from many layers of thin veneer, so there is no cross-grain or concentrated areas of knots to contend with. When properly cared for and inspected, Microllam planks can be reused for several years.

Proper Handling

Scaffold planks can be damaged when thrown from a scaffold. Ensure that scaffold planks are lowered in a safe manner. Scaffold planks that have been thrown from scaffolding or had heavy objects dropped on them should be removed from service and evaluated before reuse.

Overloading

Heavy materials should never be stored on scaffold planks unless permitted by the scaffold designer. The maximum allowable deflection for scaffold planks is about 1 5/8" for an 8' span and 2" for a 10' span; If a scaffold plank deflects more than this, or makes cracking noises, it is being overloaded. Scaffold planks that have been overloaded should be immediately removed from service, then visually inspected and field tested before reuse.

Misuse

Scaffold planks should never be used for loading ramps, walkways through mud, or anything other than scaffold planking. Improper use might cause damage that makes the scaffold planks unsafe.

35.10. OVERHEAD WORK AND PROTECTION AGAINST FALLING OBJECTS

When jobsite personnel are exposed to falling objects the following precautions must be taken to protect workers below from falling items.

4. Guardrail systems shall be installed with adequate toe boards to prevent materials from falling.
5. Barricade the areas below to keep employees from entering the area that objects may fall.
6. Additional Guidelines
7. Use of spotters to keep employees and others from being struck by falling objects.
8. Use screens or netting along handrail to keep smaller items from falling.
9. Workers only need to take the tools needed to perform the work, remove non-essential tools before working at elevated heights.
10. See dropped object prevention section for further information.

36. HAND AND POWER TOOLS

36.1 PURPOSE

Various types of tools and equipment including electrical power tools are an essential requirement on a construction site. When tools and equipment are misused or handled carelessly, serious or fatal incidents may result. The tools and equipment procedure has been established to provide a safe work environment for employees using different types of tools.

36.2 SCOPE

This procedure applies to all Kiewit-sponsored projects.

36.3 RESPONSIBILITIES

The Project Manager is responsible for implementing the tools and equipment program.

36.4 PROCEDURE

36.4.1 General Provisions

- Flexible cords may be used in place of any permanent wiring method for temporary work if equipped with an attached plug and energized from an approved receptacle. Flexible cords may not be spliced.
- Grounding: Each 15- and 20-ampere receptacle must have a grounding contact connected to an equipment-grounding conductor.
- Ground fault circuit interrupters (CGCI's) are required on all receptacles not connected to the site's permanent wiring, and must have a rating of 15/20 amperes, 120 volts, AC, single phase. An alternate to CGCI's is substituting an Assured Ground Conductor Maintenance Program.
- Power-operated tools will be grounded or be double-insulated type. They should be kept out of wet locations.
- Electrical cords on power tools must not be spliced.
- The following tools must be equipped with a constant contact on-off switch: drills, tappers, fastener drivers, grinders, disc and belt sanders, reciprocating saws, sabre saws; circular saws; chain saws (electrical, hydraulic, pneumatic); and tools similar to these.
- All handheld tools shall be equipped with a second handle. Those tools that cannot be retrofitted with a second handle must be tagged and removed from service and a replacement is to be obtained from the approved tool list. Tools covered under this provision include but are not limited to: drills, tappers, fastener drivers, grinders, disc and belt sanders, reciprocating saws, saber saws; circular saws; chain saws (electrical, hydraulic, pneumatic); and tools similar to these. If a tool does not have second handle capability and must be used, the Project Manager must approve it prior to use.
- If a second handle must be removed to perform a task, the superintendent over the operation must give approval to remove the handle and the provision shall be noted

on the Job Hazard Analysis/Pre-Task Analysis and signed off by the superintendent. The approval for removing the handle will only be made after the superintendent has investigated using a different tool or process to perform the task. The approval to remove the handle is only valid for that one specific task.

- Powder-actuated tools must meet current American National Standards Institute (ANSI) standards. Operators of powder-actuated tools must be trained in the proper operation of the tool being used.
- Powder-actuated tools shall not be loaded until just prior to the intended firing time. All operators of powder-actuated tools must wear face shields. The area must be marked with a sign indicating the tool is in use.
- Pneumatic power tools will have whip-checks (air hose safety cables) at all connections of the hose to include the tool connection. Hoses will not be used for hoisting or lowering tools.

36.4.2 **Small Tools and Equipment**

- All hand tools and equipment require daily inspection; protection guards; recommended use, repair, alteration or modification according to the manufacturer's specification; company hazard analyses; and utilization of a lockout/tag-out program when taken out of service.
- All tools must be maintained in good, safe condition; that handles on hand tools to be free of defects (splitting or splintering); that tool heads be secured to avoid slipping down or flying off; and that broken or defective tools must be repaired immediately or removed from the job. Guards must be in place and serviceable, personal protective equipment (PPE) is worn where warranted, and switches on all handheld power tools have positive on/off control.
- All hand tools and equipment must be used in accordance with manufacturer recommendations. Refer to the relevant operation manual/instruction book before using, repairing, altering or modifying any tool or piece of equipment. Always select the right tool for the job. Tools such as grinders and drills must be used with a second handle. Two hands must be used on grinders and drills at all times.

36.4.3 **Guarding**

Power-operated tools are designed to accommodate guards, and shall be equipped accordingly when in use to protect employees from exposed moving parts. These include belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, and chains or other reciprocating, rotating, or moving parts of equipment. Portable power tools are difficult to guard completely and because of their mobility the potential for unintentional contact with the operator's body is increased. Extra precautions must be taken when using this type of equipment.

Employees who are exposed to hazards of falling, flying, abrasive, and splashing objects or are exposed to harmful dusts, fumes, mists, vapors, or gases while using hand and power tools shall be provided with the appropriate personal protective equipment necessary to protect them from these hazards. All personal protective equipment shall meet the OHS standards and be maintained properly.

36.4.4 Hazard Analysis

A Job Hazard Analysis must be completed for all operations to review the proper use of hand tools and equipment and identify potential hazards during work operations.

36.4.5 Banding

Flat and round steel strapping helps palletize and reinforce wood or containers during handling and shipping. Both are applied under tension. Flat banding ends are overlapped and joined by a crimped metal seal; round strapping ends are twisted together to form a joint.

Hazards associated with steel strapping include shifting or moving loads, loose ends whipping, improper use of banding as handholds, tripping over banding and cuts from sharp edges.

Prior to cutting a strap, ensure other employees and/or machinery are clear of the work area so they won't be struck by flying straps or shifting loads.

Two-hand operated strap cutters are recommended because they are designed to cut the strap and absorb the energy released when the strap is cut. If duckbilled shears must be used, workers should place a gloved hand on the strap and make the cut so the un-grasped end is too short to reach them. Then if the strap springs, it will fly away from the cutter's face and body, which should be positioned out of direct line of the strap.

Straps should be cut square and not at an angle. Straps cut on an angle have sharper ends and increase potential cut hazards.

36.4.6 Electrical Tools and Equipment

36.4.6.1 Assured Grounding Program

Do not use any electrical cord unless it has been tested for assured grounding or is used in conjunction with a Ground Fault Circuit Interrupter (GFCI).

All electrically powered tools, equipment and cords must be periodically tested to assure proper grounding. Double-insulated tools must have the manufacturer's label attached and this must be legible. Three-prong connections must be used and all standard connections will have the third prong ground pin in place.

All generator sets must be grounded to the frame of the generator. In some cases, ground grids or grounding rods may be required. Seek electrical assistance when setting up temporary power.

Use only Underwriters' Laboratories (ULC) or Canadian Standards Association (CSA) approved electrical extension cords and plugs. All extension cords must be properly grounded.

Damaged or inoperative cords must be turned in immediately for repair or replacement. Route electrical cords overhead to avoid damage to cords and tripping hazards or employ wire walkways to ensure there is no tripping hazard or damage to the cords.

36.4.6.2 Power Tools: Drills, Saws and Reciprocating Saws

- Half-inch corded drills must have clutch safety features. The clutch/electric break safety feature stops the drill during binding when drilling, thereby eliminating bind-up situations and preventing drills from spinning out of control.
- All handheld power tools must be equipped with a momentary contact or constant pressure on/off control switch that will shut off power when the pressure is released.
- All electrically powered tools shall either be of the approved, double-insulated type or grounded in accordance with UL standards. Use three wire plugs or approved double-insulated type wire. Disconnect the tool from the power source before making any adjustments, repairs or changing a bit or accessory.
- Tools must not be hoisted or lowered using their electric cord.
- In order to prevent drills from binding, drill clutches should be set to the least amount of torque necessary to complete each task.
- Safety glasses or goggles must be provided and worn while drilling.
- Do not use a power tool with broken or defective insulation on the cord, broken or defective plugs, or loose or broken switches.
- Before starting an operation, remove the chuck or adjusting key. Whenever possible, secure the work with clamps or put it in a vise.
- Make sure you have solid footing before you start your work.
- Once an operation begins, make sure that the piece you are working on is self-supporting and is not supported by any part of your body. In the case of sawing, all cutting must be done on a suitable cutting surface that will not inhibit blade movement. A wooden surface is preferable. Plunge cuts must be made with both hands on the saw and without "walking" into the cut.
- When working in wet areas, make sure your tool is designed for work in this environment. Wear rubber insulated boots and gloves when necessary.
- Never tip a drill and bit sideways to enlarge a hole. Use a larger bit or reamer.
- Second handles must be equipped on drills, with two hands being used on the drill.

36.4.6.3 Temporary Electrical Installations

- Daily visual inspections must be made of all electrical tools, cords and circuit breakers prior to use. Be certain all switches and circuit breakers are properly labeled with their voltage.
- All circuits must have proper circuit breakers and must be properly grounded with grounding wires that are adequate for the job. Do not overload the circuits.
- Use the proper sized wire for the amperage you are carrying and protect electrical cords from vehicular traffic. Do not hang temporary wire or cord over nails, rebar or other metal objects.

36.4.6.4 Grinders

- Daily visual inspections must be made of grinders, cords and GFCI breakers prior to use. Check all grinding disks and stones for cracks, chips or other flaws before, during and after use. Replace damaged disks immediately.
- Grinders must be stored without disks attached. Disks not attached to grinders must be stored per manufacturer's requirements and/or specifications.
- OHS requires that all grinders be maintained in good, safe condition and that broken or defective grinders be repaired immediately or tagged and removed from the job.
- All handheld powered grinders must be equipped with a momentary contact or constant pressure on/off control switch that will shut off power when the pressure is released. Trigger locks must be made inoperable.
- Electric cords shall not be used for hoisting or lowering the tool and must be protected from vehicular traffic.
- Be sure the correct diameter disk is being used for the size of the grinder being used. Also check to see that the tool is operated at the recommended rotations per minute (RPMs) and that the RPM rating for the disc is not less than the RPM used for the grinder. (A photo tachometer is used for this procedure.)
- When working in wet areas, use electrical connections designed for wet areas to minimize shock hazards. To protect them from hazards, employees using grinders must wear personal protective equipment including hard hats, hearing protection, safety glasses or goggles, face shields and gloves. If necessary, respirators will also be provided and used.
- When power-operated tools are designed to accommodate guards, they must be equipped with these guards when in use. Assure guards meet the manufacturer recommendations and are used according to those specifications.
- Second handles must be equipped and used on all grinders.

36.4.6.5 Bench Grinders

The angular exposure of the grinding wheel periphery and sides for safety guards used on machines known as bench and floor stands should not exceed 90 degrees (or one-fourth of the periphery). This exposure shall begin at a point not more than 65 degrees above the horizontal plane of the wheel spindle. Work rests must be positioned a maximum of $\frac{1}{8}$ inch from the grinding wheel.

36.4.7 Handheld Tools and Equipment

36.4.7.1 Axes, Machetes and Hatchets

Employees using axes, hatchets and machetes are exposed to hazards of flying objects and cuts from sharp edges. Employees shall stay clear of swing areas; personal protective equipment (hard hats, eye protection, sturdy gloves and long-sleeved shirts) shall be worn by employees using these tools.

Cutting tools will be stored with protective sheaths to prevent blade damage and minimize potential cuts to employees. Keep the tool sharp for the most effective use.

36.4.7.2 Chisels, Punches and Files

- Broken or defective chisels, punches or files shall not be used.
- Chisels and punches must not be used to loosen or tighten screws, open cans, or as pry bars.

36.4.7.3 Screwdrivers

- Screwdrivers are intended for one purpose only: to loosen and tighten screws. Select the proper sized screwdriver for the screw so that the thickness of the blade makes a good fit in the slot. This prevents the risk of damaging the screw and reduces the force required to keep the tool in the screw head.
- Keep the screwdriver square with the screw head to prevent slipping. Do not use pliers on a screwdriver. Use a square shank screwdriver that is designed for the purpose.
- Use the proper blade for the screw. Do not use a small-tipped flathead in a Phillips head screw. Select the right length of screwdriver so that your hands are free from obstructions.
- Always use a vice or clamps or work on a firm, flat surface. This will prevent puncture injuries if the screwdriver slips. Never hammer a screwdriver handle, or use a screwdriver as a pry bar, punch or lever.
- Use only appropriately approved screwdrivers for electrical work.

36.4.7.4 Wrenches

- Wrenches are tools that grip. They can be fixed or adjustable and include sockets, pliers and channel locks.
- Wrenches should be placed so that the pull on the nut comes from the solid jaw and the push from the adjustable jaw. Fully seat the jaws on the nut or bolt to minimize slipping. Fixed jaw wrenches are preferable to adjustable jaw wrenches because they have a better fit. Box or socket wrenches are even more desirable because they are less likely to slip and cause injuries.
- It is important to use the correct sized wrench for the nut or bolt to avoid damaging the tool and/or the nut. Do not use shims. Maintain a good stance when applying pressure to a wrench to prevent falls and always pull rather than push.

- Never use a piece of pipe or "cheater" on the handle of a wrench to increase leverage. Wrenches were not designed for this increased pressure and may break or slip off and cause injuries. Do not use wrenches as hammers or pry bars.
- Keep wrenches clean and in good repair. Free frozen nuts or bolts by applying penetrating oil and use a striking face box wrench. Keep slugger wrench impact areas dressed.

36.4.7.5 Care and Maintenance

- Make the best use of these tools through proper care.
- Immediately repair chisels, punches or files that are badly worn or have bent or broken tips. Grind or file the blades square and sharp. Be careful not to remove the temper from the blade during grinding, or it will become soft. A sharp, square-edged blade will not slip as easily as a worn, dull, rounded one.
- Keep the tool free of dirt and grease to prevent slipping in your hand.
- Tools with mushroomed heads, chipped points, over-tempered blades or shortened shanks must be removed from service.
- Never carry chisels, punches or files in your pockets.
- Select the proper sized chisel, punch or file for the job. Always wear gloves when using a chisel, punch or file. ALWAYS wear safety glasses with side protection when using a chisel or punch.

36.4.7.6 Knives

36.4.7.6.1 General Provisions

General use of knives on our projects is not permitted. However, in certain cases a specialized knife or cutting tool may be used for a task if no other tool is feasible for the application. The following rules shall be followed regarding the use of knives or cutting tools on Kiewit work sites:

Prior to the start of any operation where a cutting tool is to be used, at a minimum, the Superintendent must approve the tool to be used. The policy shall be included in the project safety plan.

Cutting tools shall have guards in place to prevent accidental cuts. Specialized safety cutting tools are available for most tasks. Self-retracting knives are permitted for specific tasks when other cutting tool use is not practical.

Before any cutting tool can be used for any operation the Job Hazard Analysis (JHA) must identify the hazards and mitigation required for the use of the tool. The JHA shall be reviewed and signed by the segment manager or a designee prior to work commencing.

Always cut away from yourself while using a knife or any cutting tool.

All cutting tools shall be high quality, durable, intended for heavy duty use and properly stored or carried.






Kevlar or similar cut-resistant gloves are required when using knives. A cut resistance of Level 4 or greater is mandatory for knife usage.

Any change to the project knife policy requires the job sponsor's and District Safety Manager's approval.

Personal knives or cutting multi-tools is not allowed at our Kiewit work locations.

36.4.7.6.2 Additional Information

- Utility blades must have a single-sided blade and be able to retract when not in use.
- Only knives with sharp blades shall be used.
- Knives must be project issued.
- No personal knives are to be used on the job.
- Never cut towards yourself; always keep your hands and body away from the path of the cut.

PROHIBITED FOR USE ON THE PMH1 PROJECT				
SNAP-OFF BLADED KNIVES	UNGAUDED LOCKED UTILITY KNIVES	BLADES WITH MULTI-TOOLS	POCKET KNIVES	HAWKBILL / HOOK KNIFE
				

ALTERNATE TOOLS TO BE USED	
TASK	TOOL DESCRIPTION AND PPE REQUIRED
CUTTING WIRE STRIPPING WIRE	WIRE CUTTER / STRIPPER <u>PPE</u> REGULAR WORK GLOVES AS PER COMPANY POLICY 
CUTTING INSULATION FROM MEDIUM AND LARGE DIAMETER ELECTRICAL WIRES / CABLES	ELECTRICAL OR POWERED CABLE CUTTERS / STRIPPERS <u>PPE</u> CUT RESISTANT GLOVES 
CUTTING SHEET METAL CUTTING BANDING	SNIPS OR SHEARS <u>PPE</u> CUT RESISTANT GLOVES 

APPROVED CUTTING TOOLS	
TASK	TOOL DESCRIPTION AND PPE REQUIRED
CUTTING / TRIMMING: - CARDBOARD - RUBBER LINING MATERIAL - GEOTEXTILE LINERS - ROPE	"AUTO RETRACTING" OR "AUTO GUARDED" BLADE THAT RETRACTS OR IS GUARDED AUTOMATICALLY WHEN IT LOSES CONTACT WITH MATERIAL BEING CUT. PPE - KEVLAR CUT RESISTANT GLOVES - CHAPS ARE REQUIRED IF WORK POSITION REQUIRES YOU TO CUT TOWARDS YOUR BODY.
CUTTING: BUBBLE WRAP FOAM TWINE/STRING THIN SHEET MATERIALS CARDBOARD OR FILM	CONCEALED UTILITY CUTTER PPE -REGULAR WORK GLOVES AS PER COMPANY POLICY



36.4.8 Pneumatic Tools and Equipment

36.4.8.1 Air Powered Hand Tools

- Air powered hand tools include grinders, sanders, buffers, drills, screwdrivers, wrenches, air motor drives, chippers, scalers, riveting hammers, jack hammers, rock drills, tampers, air pressure guns, paint sprayers. Tools should be designed and constructed to withstand normal operating conditions. Gripping areas should provide the operator with full control over the tool.
- Air powered tools must have throttles that can interrupt the airflow. Three types of throttles are: constant pressure, positive on/off, and constant pressure with instant release lock.
- Safe operation of air powered tools means selecting the right tool for the job. Manufacturers' specifications should be followed and tools should be tagged or marked for specific use.

36.4.8.2 Air Pressure Hazards

- Tools are designed to operate with supplied air at a force of 90 psi. Tools designed to operate at other pressures must be conspicuously marked with their rated air pressure. Critical rating markings must be legible on the tool. Product and manufacturer identification should also be clearly marked.
- Air hoses, which carry the power to the tool, create a number of hazards. Hoses laid across walkways or curled underfoot can be tripping hazards. Check that the air hose is in good condition by looking for weak points such as bends, kinks or swelled areas. Hoses that are not in good condition must be removed from the site. Duct tape is not to be used for repairs.
- Pneumatic hoses with an inside diameter exceeding ½ inch shall have an approved safety device attached to the air source and at each connection.

- If a hose under pressure breaks or comes apart at the coupling, it can whip around and strike the operator or anyone standing nearby. Whip checks are designed to prevent this and will be used at all hose connections. Whip checks should be positioned on the hose rather than next to the fitting. If the hose should break without a whip check, the fitting may stay connected while the hose will whip around.
- Air powered tools create hazards for the operator either from the compressed air or particles flying from equipment such as chipping guns, rock drills, rotary drills or sanders. Approved goggles/safety glasses and face shields are required when working with air powered tools. Steel-toed boots or other positive metatarsal (toe/foot) protection must also be worn when working with heavy air powered equipment.
- Air powered tools and compressed air create certain health hazards where fine particles of dust or chemicals are blown into the air. This air contamination should be eliminated with wetting agents, exhaust ventilation or, as a last resort, having the operator wear National Institute for Occupational Safety and Health/MSHA approved respiratory protective devices.
- Loose clothing that could get caught in the moving parts of equipment should not be worn while working with rotary tools
- All air hose clamps must be crimped into place. Do not use worm gear clamps to attach couplings and fittings to air hoses.
- Air pressure against the skin can penetrate causing internal hemorrhaging and intense pain. Air that enters body openings can burst internal organs and lead to death.
- When air powered tools create hazards to others, warning signs or placards shall be posted detailing the type of hazard(s) and directions for protection.
- Rotary grinders and saws must have 180-degree guards over their wheels or blades at all times when in operation.
- If a wheel explodes, the guard should be replaced because it will have been exposed to very high loads and may have developed internal flaws or other physical damage.
- Guards must be affixed firmly to the tool. Saw guards must automatically retract to the closed position when not in use. Never purchase or modify tools that have provisions to lock the guard in the open position.

36.4.8.3 Installation and Maintenance

- Refer to manufacturer safety instructions regarding use and maintenance of air powered tools before beginning any operation. Be sure the hose is blown clean before use, by pointing the end toward the ground and holding it firmly while blowing the air through. Once an operation is completed, air pressure must be relieved before disconnecting the tool from the air hose.
- Tools and hoses must be installed by trained and competent personnel.

36.4.8.4 Abrasive Tools

- Abrasive tools such as grinders, sanders, polishers, buffers, wire brush tools and rotary files create specific hazards from other air powered tools. Because of these inherent hazards, the rated speed (revolutions per minute or RPM) and maximum rated air pressure (pounds per square inch or PSI) must be marked clearly in a durable manner on each abrasive tool.
- Grinders require wheel guards and must be permanently marked “Warning. Use Recommended Guard and Use Wheels with Adequate Speed Ratings.”
- Grinding wheels should be kept away from oil and water. These factors can affect their balance. They should be stored where they are protected from contact with other tools.
- Wheels should be mounted only by properly trained employees and sound tested to make certain that peripheral speeds will not be exceeded, and that proper sized flanges are used. Abrasive-type safety washers should be installed between flanges and the wheel.
- Sanders require frequent cleaning because of the accumulation of dust and need to be dismantled during this process. Cleaning should be done with brushes rather than air. Proper respiratory protection must be used for this.

36.4.8.5 Blow Pipes

Blow pipes are commonly used to clean out concrete forms or a deck before a pour. High air pressures used during this procedure necessitate the following safety measures:

Personal Protective Equipment:

- Safety glasses or safety goggles
- Full face shield
- Hearing protection
- Respiratory protection (as necessary)

Safety Practices:

- Keep unnecessary people well away from the operation
- Never use to clean clothing or point the hose nozzle at others
- Secure all hose connections and use whip checks.
- Install shut-off valve at the hose to pipe connection.

36.4.8.6 Compressed Air Safety

- Pneumatic hoses exceeding a ½-inch diameter shall have an approved safety device attached to the air source and at each connection.
- Use safety clips or retainers on percussion air tools to prevent attachments from being expelled.
- Never exceed the manufacturer's recommended operating pressure.
- Do not use compressed air for cleaning purposes unless it's reduced to a force of less than 30 psi, and then only with proper protective equipment.
- Compressed air from portable compressors or plants will not be used as a source of breathable air unless it is equipped with the proper air filter to remove oil, dust and fine debris.
- Air receiver tanks must be in good condition, have current inspections tags attached indicating the last inspection date and have current inspection record files along with a history of receiver maintenance.

36.4.9 Sandblasting Equipment

Abrasive blasting involves the use of handheld or automatic equipment through pneumatic pressure, hydraulic pressure or centrifugal force, and directs a blast of abrasive material (wet or dry) against a surface in order to clean it, remove burrs and excess surface material, or develop a surface finish. All sandblasting equipment must be maintained in good, safe condition.

36.4.9.1 Hoods and Respirators

Make a daily visual inspection before using sandblasting equipment. Check the sandblast hood for damage, holes, and cleanliness prior to use. Clean the lens with a non-fogging glass cleaner. Some operations create a large amount of dust, chemicals and abrasive grit that becomes airborne and require the use of supplied air respirators. These respirators should be checked for cracks, dust filters, retaining rings, hoses, connections and air supply prior to use. Repair broken/damaged equipment according to the manufacturer's instructions. If it cannot be repaired, remove it from service and replace it with equivalent or better equipment. For silica or slag blasting, supplied-air hoods designed for abrasive blasting are the only acceptable respiratory protection.

In addition to respiratory hazards faced by the blaster, there are hazards to people from downwind exposure, and to those doing cleanup and pot tending, that will require protection.

36.4.9.2 Portable Blast Cleaning Machines

Portable blast cleaning machine components include a source of compressed air in the 90-100 pounds per square inch range, a container or pressure vessel to contain the abrasive, a metering device to control the air for abrasive ration and flow, a flexible hose to deliver the abrasive and a handheld nozzle to aim the abrasive onto the blasting surface.

Hose lines that are subjected to abrasive materials should be examined on a regular basis using a suitable nondestructive testing technique. The testing schedule should be determined by the frequency of use and type of abrasive. All metal pipes, lines, valves, pressure vessels and other parts should be inspected prior to use. Check all hose to tool and hose to air source connections for proper seating to minimize potential whipping hazards.

36.4.10 **Gas Type Tools and Equipment**

36.4.10.1 **Gasoline Powered Tools**

Gasoline is dangerous. It is to be used as a fuel only. Never use gasoline as a solvent or fire starter. Gasoline doesn't burn, its vapours do. The tiniest spark can ignite gasoline vapours.

Gasoline vapours are heavier than air and although you may not see them, be aware of their downward travel path. Refuel tools in areas away from pilot lights, non-spark-proof electrical equipment or other ignition sources. Gasoline's flash point is 40°F. The lit end of a cigarette is about 212°F and can easily ignite gasoline vapours. Always have a fire extinguisher nearby in case of an emergency.

Store gasoline in a proper container that has been properly labeled. Always transfer gasoline from one approved container to another away from ignition sources. Keep the metal containers in contact with each other while transferring gasoline, or bond the two containers together with wire.

36.4.10.2 **Underwriter's Laboratory Approved Safety Cans**

These cans are equipped with positive self-closing lids and have flash arresting screens in the neck of the gasoline can. No other type of gasoline storage can is acceptable.

36.4.10.3 **Glass Containers**

Never store gasoline in glass containers. Glass is easily broken and can cause sparks when breaking.

36.4.10.4 **Plastic Containers**

Never use plastic gas cans. The friction of gasoline flowing over plastic can create static electricity and/or sparks.

Gasoline powered tools shall be free of defects, such as a leaking fuel tank, to avoid the possibility of explosion or fire. Broken or defective tools must be repaired immediately or removed from the job. Be familiar with the manufacturer's instructions and follow their recommendations for use. Disconnect the spark plug from the tool before making any adjustments or repairs.

To protect them from hazards, employees using gasoline powered tools must wear personal protective equipment including hard hats, hearing protection, safety glasses or goggles, face shields and gloves.

36.4.11 Torches

Torches are a common tool at the job site, but can be very hazardous if not used properly. Torches shall be visually inspected before each use to make sure they are in good condition and that there are no leaks in any connections. Any repairs that need to be made will be done in accordance with the manufacturer's recommendations.

Torches will be only be lit with a striker. Do not use matches or lighters. During work operations using torches, burning goggles must be worn, NOT regular safety glasses or goggles. Workers must also wear gloves and leathers while using torches. Combination flash/check valves must be installed at the end of the torch with acetylene pressure of not more than 15 psi. In addition, for quick closing, acetylene (fuel gas) valves must not be opened more than one and one-half turns of the spindle. Oxygen valves must be opened completely.

All bottles must be capped, secured in proper storage areas and stored in an upright position when not in use. They must not be placed in confined spaces. Storage areas (whether full or empty) must be segregated and separated by 20 feet or a five-foot high barrier rated for one-half hour fire protection. Fire extinguishers must be readily available and a fire watch implemented.

When bottles are not in use (OHA standard designates period of one-half hour or more), valves will be kept closed.

36.4.12 Chainsaws and Cut-Off Saws

36.4.12.1 Chainsaws

- Always read and become familiar with the manufacturer's instructions before using a chain saw or cut-off saw. Operators shall be trained in the safe operation and maintenance of chainsaws, proper tree felling procedures and use of personal protective equipment. Prior to use, chainsaws must be inspected for defects including broken or worn chains. Any chainsaw that is broken or defective must be taken out of service and repaired immediately or removed from the job.
- When purchasing chainsaws, always buy those with anti-kickback chains. Old-style chainsaws can snag on wood, causing violent kickback. Anti-kickback chains reduce this hazard dramatically. Regular chains should be disposed of and replaced with anti-kickback chains.
- Anti-kickback chains are low energy chains designed to skim the surface of the work in the event the upper part of the chain comes in contact with the work. Older chains have a flat link between each of the raised cutters while newer chains have either a triple thick raker in front of each cutter or an extra raised section between the cutters.
- Employees using chainsaws are exposed to flying debris, dust, and noise. Kevlar type chaps, hard hats, safety glasses and face shields (mesh face shields are acceptable) and gloves are required when working with chainsaws. No loose or ragged clothing is allowed. Additionally, hearing protection must be worn as noise levels can reach 120 dBA. or more.

- All chainsaws must be equipped with a momentary contact or constant pressure on/off control switch that will shut off power when the pressure is released.
- Electrically powered chainsaws shall either be of the approved double-insulated type or grounded in accordance with Kiewit electrical standards, with three wire plugs or approved double-insulated wire. Never use the cord to hoist or lower the tool. Disconnect the power source from the chainsaw before making any adjustments or repairs.
- Gasoline powered chainsaws must comply with the applicable safety requirements noted in the Gas Type Tools and Equipment section of this manual.

36.4.12.2 Chainsaw Safety

- Chainsaws shall be kept sharp, well lubricated and properly tensioned at all times. The chain needs sharpening when it must be pushed through to cut or when it throws sawdust rather than wood chips.
- All saws must have spark-arresting mufflers.
- Chainsaws shall be inspected before each day's use and during each refueling.
- Saws that are not in safe operating condition must not be used.
- Before refueling, saws must cool to the point that spilled gas will not ignite. Keep the air cleaner clean and use the correct fuel and oil mixture.
- Only spark-arresting safety fuel cans that are labeled with their contents are allowed on the job site.
- Fully charged 10-pound ABC or larger fire extinguishers shall be kept at all refueling areas.
- Saws must be kept clean of excess oil to prevent slipping or fire hazards. Any oil spills that occur must be cleaned up immediately.
- Chainsaws must be carried or moved with the engine in the off position.
- When starting a chainsaw, place it on the ground, hold the handle with one hand and pull the starter with the other hand. Never start a saw in the air or on your leg.
- Running saws must be gripped with both hands.
- Maintain a clear work area free of tripping hazards and obtain firm footing before commencing any work. Keep your weight balanced on both feet and do not overreach.

36.4.12.3 **Cut-Off Saws**

- Cut-off saws pose a greater threat of injury than chainsaws and therefore have stricter rules during use. A full face shield and safety glasses are required during operation of cut-off saws. Safety glasses and goggles provide only minimal protection. Chaps are mandatory for leg protection from loose objects as well as from the saw. Other required protective equipment includes hard hats, gloves, hearing protection and leather work boots.
- When starting the cut-off saw, place it on firm ground in an open area where you have good footing and balance. When the engine starts, the speed is sufficient enough for the clutches to engage the V-belt pulley and turn the wheel. To prevent sudden injury, the cutting wheel must be clear of you and other objects.
- Cutting saws will be carried or moved with the engine in the off position. Grip the front handle and place the muffler (which may be hot) at the side away from your body.
- During operation, hold the saw with both hands and adjust the disc guard so its rear section is close to the work piece. Be sure to adjust the guard to protect yourself from particles of material being cut, sparks and pieces of damaged wheel. Keep the rotating blade away from your body. Do not step backwards while the cutting wheel is rotating. Wait until the flywheel effect has stopped. Do not cut above waist height and never work from a ladder or overreach.

36.4.13 **Powder Actuated Tools**

- Powder-actuated tools use gunpowder as the working mechanism. Whenever employees use powder-actuated tools, warning signs must be posted to read: "Warning. Powder Actuated Tools in Use."
- These tools must be handled as you would a firearm. Never point the tool at anyone, not even in fun. Never place your hand over the muzzle of a loaded tool. Never rest the tool against your body when loading or making adjustments. Never leave a loaded tool unattended. Load all tools just before use. Never fire the tool in a flammable or combustible atmosphere.
- Be familiar with the manufacturer's instruction for testing and follow their recommendations for use. Do not substitute any parts: use only the fasteners and boosters manufactured for your brand of tool. Make sure no one is working behind the area where powder actuated tools are in use.
- Before use, visually inspect the tool to be sure the safety mechanism is working properly. The tool should not fire unless there is contact with the work. Tools shall be free of defects, such as a broken safety, to avoid the possibility of unintentional firing and flying object injuries. Broken or defective tools must be repaired immediately or removed from the job.

- Remove all powder charges from the tool before making any adjustments or repairs. Never try to release a loaded tool that has jammed in the firing position. Take the tool out of service and call the manufacturer's representatives for further instructions. If a misfire occurs, hold the tool against the work for an additional 30 seconds.
- Do not remove the tool from the work surface when opening to remove the defective load.
- Always check the manufacturer's recommendations for handling misfires.
- Employees using powder actuated tools and employees exposed to flying debris and/or harmful dusts must be provided with the particular personal protective equipment required including hard hats, safety glasses and face shields. Hearing protection must be worn as impact noise levels can reach 120 dBA or more.
- Live loads/cartridges must be stored in an approved, locked storage cabinet to meet applicable OHS regulations. Do not throw explosive charges into trash containers or leave them lying around.
- All powder actuated tool operators must have training in the use and storage of loads and cartridges. The operator must also have a valid training card on his or her person at all times.

36.4.14 Walk Behind Equipment

- Walk-behind equipment is common on construction sites and in many cases reduces the hazards that employees are exposed to. The following basic safety rules should be followed when using this type of equipment:
- Only designated, trained operators shall use walk-behind pieces of equipment.
- Operators will read and follow the owner's manual and safety warnings.
- Appropriate personal protective equipment will be worn at all times while operating walk-behind pieces of equipment.
- The operator must have control of the machine at all times. If work is on an uneven surface, the operator will be positioned on the uphill side for added protection, away from the machine.
- Always maintain secure footing while operating the machine.
- Never operate a defective piece of equipment and never remove any safety devices.

37. MACHINE AND TOOL GUARDS

37.1. POLICY

No employee shall operate and/or cause to be operated any machinery without proper protective guards in place or modify/disable any protective guard on machinery without implementing the Kiewit Lock-out/Tag-out Program. Such guards shall be provided to protect the operator and other employees from hazards such as exposed belts, pulleys, sheaves, drive shafts, drive couplings, chains, rotating parts, flying chips and sparks.

When working around equipment with moving parts, the potential hazard of worker contact should be eliminated. Jewellery, such as rings, bracelets, necklaces, and watches must not be worn. Hair must be short or confined to prevent it from getting caught. Clothing must fit closely to the body that cannot be snagged.

Guards shall be affixed to the machine where possible and secured elsewhere if, for any reason, attachment to the machine does not prevent access to the hazard from all accessible directions including front, top, bottom and back side. Examples of guarding methods include barrier guards, two-hand tripping devices or electronic safety devices.

When a guard has to be removed from a machine or tool (for repair or adjustment, for example) its removal must follow a documented procedure to ensure personnel protection. Guards shall be replaced before the machine is put back in service.

Special hand-feeding tools for placing and removing material shall be such as to permit easy handling of material without the operator placing a hand in the danger zone. Such tools shall not be in lieu of other guarding required by this policy, but shall only be used to supplement protection provided.

37.2. GENERAL PROVISIONS

37.2.1. Areas Requiring Safeguarding

Dangerous moving parts in three basic areas require safeguarding:

37.2.1.1. Point of Operation

The area on a machine where work (such as cutting, shaping, boring, forming of stock) is actually performed on the material being processed.

37.2.1.2. Power Transmission Apparatus

All components of the mechanical system which transmit energy to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, cranks, and gears.

37.2.1.3. Other Moving Parts

All parts of the machine which move while the machine is working, including but not limited to, reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

37.2.1.4. **Exposure of Blades**

When the periphery of the blades of a fan is less than seven feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than one-half inch.

37.2.2. **Anchoring Fixed Machinery**

All machines designed for a fixed location shall be securely anchored to prevent the machine from walking or moving.

37.2.3. **Hazardous Mechanical Motions and Actions**

Rotating motion can be dangerous because it can grip clothing, and, through mere skin contact, can force an arm or hand into a dangerous position. Collars, couplings, cams, clutches, flywheels, shaft ends, spindles, meshing gears, and horizontal or vertical shafting are some examples of common rotating mechanisms which may be hazardous. The danger increases when projections such as set screws, bolts, nicks, abrasions, and projecting keys on rotating parts are exposed.

Dangerous moving parts in three basic areas require safeguarding.

37.2.3.1. **Point of Operation**

That point where work is performed on the material, such as cutting, shaping, boring, or forming of stock.

37.2.3.2. **Power Transmission Apparatus**

All components of the mechanical system that transmit energy to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, cranks, and gears.

37.2.3.3. **Other Moving Parts**

All parts of the machine which moves while the machine is working. These can include reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

Crush point hazards are caused by the in-turning sides of rotating parts. There are three main causes of crush points:

- Parts can rotate in opposite directions while their axes are parallel to each other. These parts may be in contact (producing a crush point) or in close proximity to each other. In the latter cases, the stock fed between the rolls produces the crush points.
- Points between rotating and tangentially moving parts. Some examples would be the point of contact between a power transmission belt and its pulley, a chain and a sprocket, or a rack and pinion.
- Points between rotating and fixed parts creating a shearing or crushing action. Examples are spoked hand wheels, flywheels or screw conveyors.

37.2.4. Requirements for safeguards

Safeguards shall meet these minimum general requirements:

Prevent contact: the safeguard shall prevent hands, arms, and any other part of a worker's body from making contact with dangerous moving parts. An effective safeguarding system eliminates the possibility of the operator or another worker placing parts of their bodies near hazardous moving parts.

Secure: workers should not be able to easily remove or tamper with the safeguard. Guards and safety devices shall be made of durable material that will withstand the conditions of normal use. Guards shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible.

Protect from falling objects: the safeguard shall ensure that no objects can fall into moving parts. See Dropped Object Prevention section for further information.

Avoid creating new hazards: a safeguard defeats its own purpose if it creates a hazard of its own such as a shear point, a jagged edge, or an unfinished surface that could cause a laceration. The edges of guards, for instance, should be rolled or bolted in such a way that they eliminate sharp edges.

Avoid creating new interference: any safeguard which impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded. Proper safeguarding can actually enhance efficiency since it can relieve the worker's apprehensions about injury.

Allow safe lubrication: if possible, one should be able to lubricate the machine without removing the safeguards. Locating oil reservoirs outside the guard, with a line leading to the lubrication point, will reduce the need for the operator or maintenance worker to enter the hazardous area.

37.2.5. Non-mechanical hazards

When machines produce noise which can startle and disrupt concentration, and can interfere with communications, it hinders the worker's safe job performance. When the use of cutting fluids, coolants, and other potentially harmful substances are used to lubricate machinery, refer to the Hazard Communication Program.

37.2.6. Training

Supervisors shall facilitate operator training involving instruction or hands-on training in the following manner:

- Describing and identifying of the hazards associated with particular machines.
- Describing and identifying safeguards on the particular machines and addressing how they provide protection, the hazards for which they are intended and how they use them.
- Describing and identifying what to do (e.g., contact the supervisor) if a safeguard is damaged, missing, or unable to provide adequate protection.

This training shall be provided to all new operators, maintenance or setup personnel, when any new or altered safeguards are put in service and when workers are assigned to a new machine or operation.

38. CRANES AND RIGGING

The project will fully comply with the most current version of the Corporate Crane Procedures Manual CCP.

As per section 1-S of the CCP, for all projects with cranes, a site specific crane management plan is required prior to crane operations starting on the project.

Copies of the SSCP will be sent to the Sponsor, District Crane Compliance Manager, Equipment Operations Manager and Regional Equipment Manager for their review and comment prior to any crane operations commencing onsite.

The project teams will review and update these plans periodically (not to exceed 12 months); updates are to be sent to the Project Sponsor, District Crane Compliance Manager, Equipment Operations Manager and Regional Equipment Manager for review and comment.

38.1. **SITE SPECIFIC CRANE PLAN**

At a minimum the Site Specific Crane Plans will address the following items:

38.2. **AUTHORIZED OPERATORS** (Reference Policies: CCP 1-A and 4-D)

- Specify the approximate number and authorization(s) of crane operators required for the project
- Identify the Authorized Examiners for the project

38.3. **ASSEMBLY / DISASSEMBLY** (Reference Policies: CCP 1-B, 3-A and 4-B)

- Specify cranes planned to be used
- Identify primary and alternate Assembly / Disassembly Director for each crane planned for the project

38.4. **LIFT PLANNING (Reference Policies: CCP 1-E and 4-A)**

- Specify the Critical Lift Plan form to be used
- Identify the names of Project/District personnel to sign-off on critical lifts per the Crane Planning / Approval Matrix
- Identify lifts on the project deemed critical due to additional risk to personnel, public or the project schedule
- Clarify any additional Client or jurisdictional requirements regarding lift plans (i.e. your owner may require a Critical Lift Plan for all lifts above 75% of the crane's capacity)
- Crane operations and lift planning should be reviewed at the daily coordination meeting

38.5. **WORKING AROUND POWER LINES (Reference Policies: CCP 1-F and 4-F)**

- Identify the locations of power lines and all potential crane work on the project
- If possible, have power lines relocated or de-energized and visually grounded to eliminate the hazard
- Identify any additional jurisdictional requirements regarding work around power lines (i.e. 30M33 in B.C.)

- Determine the method of training personnel per section 4-F
- 38.6. **CRANE SETUP (Reference Policies: CCP 1-Y, 3-A and 4-B)**
- Identify and evaluate all potential working surfaces for cranes on the project. Track these on the Project Risk Matrix and manage them per the TSCD and CCP Manuals
 - Create a site layout map identifying all potential working surfaces. Highlight regions showing the cranes and max loads allowed in each region
 - Develop a boom lay-down plan to be used for inclement weather and monthly inspections
 - Develop and post the project lightning response plan
 - Post operating and boom-down wind restrictions for all cranes onsite
- 38.7. **OVERLAPPING BOOMS (Reference Policies: CCP 1-T)**
- Develop an anti-collision plan for the project
 - This plan should also address other equipment such as pump trucks and aerial work platforms.
- 38.8. **ON-SITE CRANE MOVES (Reference Policy: CCP 4-H)**
- Define 'Major' crane moves for the Project which will require a Crane Move Permit
 - Identify approval process including documentation and personnel for sign-off
- 38.9. **CLIENT / JURISDICTIONAL REQUIREMENTS**
- Review contracts, specifications and jurisdictional legislation to determine any additional requirements beyond the minimum standards from the Corporate Crane Procedures Manual.
- 38.10. **ONSITE VERIFICATION**
- For each plan and procedure above, the project team will develop a plan and schedule to regularly verify the use and effectiveness of the plan or procedure.
- 38.11. **RIGGING (Reference Policies: CCP 1-G and 4-Q, TSCD Table 3.2)**
- Develop a plan for the purchase, initial inspection and storage of rigging onsite
 - Specify the personnel involved in the at-purchase, periodic and before-use inspection of the rigging on the project
 - Specify the training required for Qualified Riggers and Signal Persons (per Section 2-A)
 - Determine a method for identifying Qualified Riggers and Signal Persons
 - Specify the required training for spotters and all other personnel involved in crane operations
 - Develop an approval process for the use of synthetic rigging on the project
 - Identify all below-the-hook lifting devices to be used on the project and track these on the Project Risk Matrix

38.11.1. Rigging Inspection**38.11.2. Pre-use**

Rigging and rigging components shall be inspected prior to each use by the user and be inspected throughout the day.

38.11.3. Annual

Wire rope and nylon slings shall have a documented inspection performed once a year.

Best Practice: During the annual inspection, projects may use coloured tape or tags for visual confirmation the sling has been inspected.

Annual Colour Recommendations:

- 2016 – Brown
- 2017 – Light Grey
- 2018 – White
- 2019 – Orange
- 2020 – Blue-Grey

Defective rigging will be removed from service immediately and either tagged out of service or have the eyes cut so they cannot be used.

38.11.4. Nylon Rigging Policy

Nylon and endless slings may only be used to hoist the following items:

- Any coated surface that would be damaged by steel slings
- Pipe;
- Scaffolding;
- Crane booms;
- Electrical Cables;
- Machined surfaces that could be damaged by steel;
- Insulating line when welding on a load attached to the crane.

Nylon / Polyester web slings and synthetic endless round slings are very susceptible to cuts, burns and damage resulting from rigging around sharp corners or edges. For these reasons Nylon / Polyester and synthetic endless round slings may only be used where other types of rigging cannot be used or will cause damage to the load or crane.

Rigging must be painted red if it is used to pull equipment and will never be used for lifting.

38.11.5. Synthetic Slings

- Synthetic rigging is not for general or day-to-day use.
- Synthetic slings will not be used to handle objects with sharp corners, as they will cut the slings.
- Synthetic slings are also subject to deterioration from weather and sunlight. This deterioration leads to reduced capacities, although visually they still appear to be in usable condition. To mitigate this, slings will be stored in a dry environment out of direct sunlight and away from any chemicals.

38.11.5.1. **If a pick requires the use of synthetic slings, the following protocol is required:**

- An operation-specific hazard analysis must be approved and signed by the construction manager.
- Shall be legibly marked to show the rated capacities for each type of hitch. If the tag is absent or unreadable, the sling is to be removed from service and destroyed.
- Must not be used where fumes, vapours, sprays, mists, liquids, acids, or phenols are present.
- Shall be stored where they are not subjected to heat above 65.5° C (150° F).

38.11.5.2. **Synthetic slings must be removed from service and destroyed if any of the following conditions are present:**

- acid or caustic burns
- melting or charring of any part of the sling surface
- broken or worn stitches
- distortion of fittings
- snags, punctures, tears or cuts
- visible exposed wear indicator thread in any location
- missing tag

38.11.6. Chain Rigging

Chain rigging is not permitted for general rigging purposes. Certain maintenance and equipment assembly operations might require the use of chains to accommodate differential leg lengths. In such cases, the rigging will be certified and rated chain conforming to all applicable standards and codes and inspected before use.

**** The use of chain rigging shall require specific approval of the Regional Equipment Manager**

38.11.7. Rigging Storage

Rigging is to be stored in an area where it is protected from the elements. Rigging is not to be stored on the ground. A rigging connex will be set up where rigging will be stored and returned when not in use.

38.12. OTHER ITEMS

Address additional items listed in CCP Section 3-Q as applicable.

Note: The reference policies provided are the primary source of policies regarding the specific areas. Additional policies may apply. Contact the District Safety Manager or District Crane Compliance Manager for further clarification.

39. ELEVATED WORK PLATFORMS

Elevated Work Platforms are designed only to take workers and their tools safely to high reach areas.

39.1. RESPONSIBILITIES

Project Manager is responsible for:

- Assuring a designated operator program for Personnel Lift is implemented
- Implementing a Personnel Lift training program
- Assuring an inspection program is implemented
- Applying appropriate disciplinary action

39.2. PROCEDURE

The use of personnel lifts (boom lifts, scissor lifts) poses special hazards. Trained, competent and careful operators are essential.

39.2.1. Designated Operator Requirements

Only trained, authorized employees shall operate personnel lifts. Designated Operator Requirements include classroom instruction, written exam, and hands-on training.

39.2.2. Designated Operator

- Only trained and authorized persons are permitted to operate an elevated device.
- Operators must attend a certified EWP training and be designated after the course to operate EWP's.
- A qualified individual will be appointed to conduct designated operator training of prospective operators.
- The operator must demonstrate that he fully understands all the mechanical functions and limitations of the aerial device.
- Trained operators will then be awarded the trained operator decal. This decal should be displayed on the operator's hardhat.

39.2.3. Requirements

All designated persons will have read and understood the device manufacturer's Operator's Handbook.

All personnel lifts must be maintained according to the manufacturer's recommendations. If there is a problem with a machine, it should be reported and if determined serious, the machine should not be operated until corrected.

Full body harnesses are mandatory when operating or working from an elevated lift. Full body harnesses must be maintained in good condition.

An inspection of the equipment including operation of controls shall be completed and documented on a company form prior to use. Equipment shall not be used if equipment is found to be unsafe. All personnel lifts must be maintained according to the manufacturer's recommendations. If there is a problem with a machine, it should be reported and if determined serious, the machine should not be operated until corrected.

39.2.4. Operators Visual Inspection Checklist:

The following are minimum requirements for visual inspection prior to use. Any equipment found to be defective and will affect the safe operation will be removed from service immediately until proper repairs.

39.2.5. Safe Operation

The following guidelines must be followed for safe operation:

- Before use, inspect the equipment for cracked welds and hydraulic leaks.
- Operators must be familiar with the model of Elevated Work Platform being used.
- Know where the operations and maintenance manuals are stored.
- Be familiar with and comply with the operations and safety manual.
- Understand the control functions, decals and warnings.
- be aware of and understand all of the safety devices for the model of aerial platform being used
- know the specific hazards associated with exiting an Elevated Work Platform while elevated and use all means/precautions provided to avoid them
- The aerial device is only as stable as the ground beneath it. Always spot the machine on level, stable soil. Check the work area drop-offs, holes, debris, and overhead obstructions such as high voltage lines.
- Do not attempt any operation that will cause the work basket to contact any object and induce an upward or downward force on the basket.
- Always work within the rated capacity of the machine. Do not attempt use aerial platform as a crane.
- Proper operation requires both feet on the basket floor — never attempt to extend reach by adding ladders, planks, or by climbing on guard rails.
- Personnel in aerial devices must be tied off with a full body harness to proper attach bar on the platform, never to an adjacent object or structure.
- Do not lower the basket onto the ground or place against any other object, and attempt to free a stuck machine by telescoping the boom.

This standard applies to all self-propelled elevating work platforms and man baskets. A work platform is a personnel-carrying component of a device used to elevate employees so they may perform their assigned tasks. This standard is to outline general practices and serve as a guide for employees. Employees must refer to the manufacturer operating and maintenance manuals for specific requirements.

Each lift must have an operating/maintenance manual with the equipment at all times.

Each lift must have the last six months maintenance records on site. Each lift must have a proper inspection log.

39.2.6. Operations

- Operators of Elevated Work Platforms must be trained, qualified and capable of safely operating the equipment.
- Any personnel in the Elevated Work Platform must have fall arrest training
- All Elevated Work Platforms must be inspected by the operator before being used. Inspections are to be recorded in the Operators Daily Log book. Any malfunction or

defect that could cause a safety problem must be corrected before the Elevated Work Platform is used. Equipment that is deemed unsafe is not to be in service until all safety related components are operational according to manufactures specifications.

- Self-propelled work-platform load ratings must never be exceeded. The platform should never substitute for a crane. The hoisting of materials other than small tools is not permitted.
- Employees will maintain firm footing on the platform and must wear approved fall protection equipment at all times. The use of ladders and planks is prohibited.
- Each platform will have anchorage points for fall protection equipment for each employee.
- All stepping, standing, and working surfaces must be skid resistant.
- Altering, modifying and disabling safety devices are prohibited. The manufacturer, in writing, must approve any modifications to the lift.
- Elevated lift platforms are prohibited from operating within seven meters of energized power lines. Signs must be installed in all elevated lift platforms to inform the operator of this requirement.
- All job sites must be evaluated for hazards before beginning work. Hazards such as uneven surfaces, ditches, power lines, and overhead obstructions must be considered.
- Barricades must be erected around the work area to protect others below from falling objects. In addition to barricades, toolboxes and tie-offs must be in place to prevent tools and equipment from falling.
- The lift will have operational primary and secondary controls where the secondary controls are easily accessed at ground level and can override the platform controls.
- The lift will have an emergency stop easily accessed by the operator.

39.2.7. **Load Ratings**

- Either single or multiple ratings can be used. These must be clearly marked at the operator stations for all loading configurations.
- Where load ratings are dependent on a boom angle, a means to measure this angle from the work platform must be provided.

39.2.8. **Maintenance**

- Each lift must be maintained according to the specifications outlined in the manufacturer's equipment manuals and according to Kiewit's Maintenance Program.
- Employees will be provided training on preventive maintenance and inspection requirements from a qualified Kiewit or manufacturer trainer. A record of the training will be recorded.
- Monthly preventive maintenance inspections must be performed.
- All lifts must be re-certified annually. Non-destructive tests of all load bearing components must be conducted by a qualified person and the results of the testing recorded must be on site. Those lifts requiring electrical insulating properties must undergo a dielectric test. The annual certification tag must be attached to the equipment for the duration of the certification period.

39.2.9. Travel Operations

- Check the area in which you intend to travel. It should be clear of people, equipment and power lines before you begin. If so equipped, the boom should be fully retracted and in line with the direction of travel.
- Travel cautiously. Never take chances. Travel on firm, level ground. Avoid soft or sloping ground. Maintain a safe distance from drop-offs, un-compacted earth fills, ditches and holes. The edge could cave in from under you.
- When moving use a spotter. Maintain a safe distance from overhead or side obstructions. Make a special note of where power lines are located.
- Consider the weather conditions. Discuss the danger of working in bad weather with your foreman. Unsafe operation and horseplay are prohibited.

39.2.10. Operation Tips

- Ensure the area surrounding the elevated lift is clear of people and equipment before raising, lowering or moving the basket. Don't deliberately swing boom lift baskets over people. Check your tail swing clearance. Alert people in the area and use signs on the ground to warn them you are working above.
- Do not sit or climb on the frame of the basket. Never use planks or ladders to access a higher level. Always stand with your feet firmly on the floor of the basket.
- Know the capacity rating of the aerial device. Do not exceed the load limit. The maximum rated capacity is located on a decal on the machine. Caution: When stripping form work hardware, the basket can be easily overloaded. Capacities are people, tools and supplies. The aerial device is not a crane. Do not attempt to use it as such.
- All items must be positioned within the basket boundaries where they won't get in the way of a smooth operation. Avoid sudden starts or stops. If you find yourself starting to tip, retract the boom immediately. If you collide with other equipment or structures, stop and inspect the aerial device. Report any damage.
- Locate, know and test the emergency controls. At the end of your task, retract the platform and lower to the ground. Put the controls in neutral, shut the engine off and turn off the key or switch at the ground control panel.
- Do not attempt any operation that will cause the work basket to contact an object and include an upward or downward force on the basket. Do not position basket on a building ledge, roof or any other object and boom down to increase stability of the basket. Do not allow the platform to strike the ground or surface while traveling, as this can induce severe loading into the platform leveling system. Do not lower the basket onto the ground or place against any other object. Do not attempt to free a stuck machine by telescoping the boom.
- If any of the improper methods of operation occur, the packing may be damaged and may fail completely at a later date. At the time of failure, the basket may tip without warning.
- Never use another machine to push an aerial device for any reason. If stuck, attach a tow line to two lugs and pull the unit out.

39.2.11. **Electrical Hazards**

A minimum distance of 7 meters must be maintained between the boom and energized power lines. For provincial and local regulations, check with your Supervisor.

Use a signal person traveling or working near electricity. Position the signal person where you will see them at all times. If necessary to work near energized power lines for a long period of time, have them relocated or de-energized for the period of time you'll be working near them.

You and your crew members should know what procedures to follow in case the aerial device does make contact with an energized source:

- Warn everyone to stay away from the machine. The entire aerial device could be electrically energized.
- Attempt to break contact by using the basket controls to reposition the machine. If you cannot break contact, the power company should be notified immediately to cut power.
- Following any electrical contact, the aerial device should not be used until a mechanic has thoroughly inspected the entire machine for damage.

39.2.12. **Cold Weather Operations**

Find out the procedures for cold weather starting on your job. Exercise extreme care when using cold weather starting aids. If you're not familiar with them, ask the maintenance department or your Supervisor.

Never smoke when using starting fluid. Review the SDS.

Clean off all ice and snow from the machine. An overload condition could result from an accumulation of heavy snow left on the boom or platform. Allow ample time for hydraulic oil to warm up. Exercise the aerial device slowly at first. Observe ground conditions for slippery or icy travel. Be careful not to slip in icy conditions.

39.2.13. Exiting at Elevated Heights

Procedure for Exiting an Elevated Work Platform at Elevated Heights

1. Verify the wind speed. Exiting an Elevated Work Platform will not be permitted in winds 24 km/hour (15 mph) or greater.
2. Two persons in an Elevated Work Platform are required in order to exit an Elevated Work Platform at elevated heights.
3. The Elevated Work Platform must be located / operated on a firm and level ground surface capable of supporting the full weight of the Elevated Work Platform, personnel and equipment.
4. Verify that the structure to be exited to is stable, secure and capable of supporting the weight of the person exiting the Elevated Work Platform, materials and the equipment.
5. A detailed execution plan is to be written for the work is being performed and must cover the elements of this policy. The detailed execution plan must be reviewed at least once per week and signed by the persons performing or expected to perform the work.
6. A Minor Fold JHA must be completed before starting work and must be signed by the Superintendent, as well as those performing the work.
7. Proper and approved fall protection, full body harness and lanyards, must be worn at all times. The lanyards used must be designed to allow for 100% tie-off when exiting or entering the Elevated Work Platform.
8. Exit or enter the Elevated Work Platform only from the sliding mid-rail entry or the gate provided. Do not climb on guardrail.
9. Before exiting or entering an Elevated Work Platform, the platform entry step must never be more than 305 mm (12 inches) away from the structure being exited to or from.
10. 100% tie-off is required at all times. The tie-off point(s) on the structure being exited to must be of an approved type, able to support 5000 lbs. of vertical force.
11. A lanyard is to be attached to the structure anchor point before detaching the primary lanyard from the Elevated Work Platform anchor.
12. The lanyard attached to the Elevated Work Platform anchor must be detached before exiting the Elevated Work Platform. Do not exit the man-lift while the lanyard is still attached to the Elevated Work Platform anchor point. Do not re-attach the lanyard to the Elevated Work Platform anchor point until re-entering the Elevated Work Platform.
13. To achieve 100% tie-off while re-entering the Elevated Work Platform, attach one lanyard to the Elevated Work Platform anchor point before disconnecting the lanyard from the structure being exited from.
14. Do not operate the man-lift while it is being entered or exited from.

40. ATV / SNOW MOBILE PROCEDURE

40.1. INTRODUCTION

In the event that light duty vehicles cannot safely access certain types of terrain, the use of all-terrain vehicles (ATV's) or snowmobiles may be required. This program is designed to ensure the safe use of ATV's and snowmobiles.

The Kiewit ATV/snowmobile procedure covers the proper training, general safety concerns, hazard analysis, and the proper care for ATV and snowmobile. It will be adhered to on all Canadian Kiewit Infrastructure projects where employees will be utilizing ATV's and snowmobiles.

1. To be eligible to operate an ATV or snowmobile, an employee must successfully complete a certified safety course.
2. Only people "designated" to operate A.T.V.s/snowmobiles will operate them.
3. Operators must wear all appropriate P.P.E. (helmet, boots, pants, shirt, and safety glasses).
4. Operators must complete a hazard analysis before starting a task.
5. Power pole guy wires shall be flagged prior to any other site work.

40.2. GENERAL PROVISIONS

To insure safety, a rider should take several precautions before attempting to ride an ATV/snowmobile. First, read the owner's manual and become familiar with the ATV/snowmobile. Second, make a pre-ride inspection of the machine. Third, wear proper clothing and safety gear. Know basic safety rules and riding skills. Practice riding in an open area free of obstructions.

40.3. Pre-Ride Inspection

A pre-ride inspection ensures that everything on the machine is adjusted and working properly to prevent a breakdown or even an accident. In a pre-ride inspection, check tires and wheels, controls, lights and switches, oil and fuel, chain or drive shaft, and chassis. A general pre-ride checklist is provided in this publication, but riders should refer to the owner's manual for a more detailed checklist for their machine. ATV/snowmobile should always be equipped with a complete tool kit supplied by the manufacturer.

40.4. Helmets and Eye Protection

Safety gear is a must for the ATV/snowmobile rider; the most important piece of safety equipment is the helmet. A rider should always wear a helmet that meets or exceeds safety standards. Only a helmet which is approved and marked by the Department of Transportation (DOT), the American National Standards Institute, or the Snell Memorial Foundation shall be worn. A helmet should fit snugly and always be securely fastened. Riders are to wear safety goggles to protect eyes with an appropriate face shield. Sunglasses are not safety goggles and do not provide adequate eye protection.

Note: Never ride an ATV/Snowmobile on public roads.

40.5. CARE OF ATV/SNOWMOBILE

- Safety with an ATV/snowmobile begins with the proper maintenance of the unit.
- The persons designated to run an ATV/snowmobile are responsible to make sure the ATV/snowmobile is in proper working condition. This includes the daily checks as well as the periodic maintenance required in the owners' manual.
- Site maintenance is responsible for the maintenance of the ATV/snowmobile.

41. TRAFFIC CONTROL AND HCTI

41.1. SCOPE

The objective of this section is providing safe passage for vehicular, equipment and pedestrian traffic around the construction site.

41.2. HUMAN CONSTRUCTION TRAFFIC SAFETY MANAGEMENT (HCTI) PRINCIPLES

During the development of work plans/hazard analyses and throughout the execution of the work, the Project team shall adopt the following guiding principles, protocols and priorities for controlling HCTI. These protocols shall be adopted by all operations in the following order:

1. **Eliminate:** where possible and practical, completely remove workers and other non-essential equipment from the area in which the primary piece of equipment is operating.
2. **Separate:** where workers and equipment must travel/work in the same general area, install a physical barrier to separate the movement of equipment and pedestrian traffic to prevent from coming in contact with one another.
3. **Administrative Controls:** where workers and vehicles/equipment must work together, implement controls to mitigate the hazards. The objective of such administrative controls shall be to:
 - A. Restricting and/or controlling the operation and movement of equipment
 - B. Implement other necessary controls to increase the visibility, awareness, and effective communication between equipment operators and workers

41.3. HUMAN CONSTRUCTION TRAFFIC INTERFACE MANAGEMENT (hcti) CONTROLS

- Elimination
 - Establish restricted work zones, where possible, around working equipment
 - Barricade or rope off the area around a crane
- Separation
 - Concrete jersey style barrier wall
 - Fencing
 - Dedicated and designated travel ways (roadways and pedestrian walkways/access). See Appendix "A".
- Administrative Controls
 - Designated and trained operators
 - Designated ground-people, spotters and flaggers
 - Equipment back-up alarms and flashing beacons
 - High visibility PPE for workers (vests, gloves, and pants)
 - Warning signs
 - Communication tools (hand signals, whistles, air horns and/or radios)
 - Hazard assessments (JHA)

41.4. GENERAL PRECAUTIONS

Kiewit will contain a variety of hazardous conditions such as work areas, workers, tools, equipment, machines, and stockpiles of materials that are potential obstacles and dangers to pedestrians, and vehicles will be correctly cordoned off from the public.

Road, bridges and sidewalk construction activities will be monitored for public safety access by:

1. Removing entire sidewalks from public circulation;
2. Providing a continuous, accessible path of travel around or through construction that is accessible by all types of pedestrian and cyclist traffic including disabled persons in wheelchairs and are delineated with fencing so pedestrians can't enter the job site;
3. Providing adequate warning and rerouting signs so that pedestrians and public can avoid the affected area;
4. Parking equipment and machines away from the public, roadway and pedestrians;
5. Not blocking the pedestrian zone with materials, traffic devices or equipment;
6. Provided a safe and accessible alternative route around the construction site to adjacent businesses and destinations;
7. Proper barriers will be installed around the site;
8. Signage notifying pedestrians and the public of construction work will be located throughout the construction site;
9. A variety of measures will be taken to reduce potential safety and access problems at or near the Project construction site;
10. A continuous route for all pedestrians;
11. A continuous route for vehicles and other forms of public transportation will be maintained at all times;
12. The alternate routes will be established to enable pedestrians, vehicles and public to bypass the construction site;
13. All areas of the Project will have controls in place to provide for the safety of the traveling public and marine traffic. i.e. screening, hoarding with toe-boards to be provided on all bridge work and overpasses;
14. Controls will also be in placing concrete using pump trucks. Lane closures will be used when required to protect the traveling public;
15. Information boards will be provided in advance, to warn pedestrians, vehicles and the public of the alternate circulation routes available;
16. Pedestrians, vehicles and the public will be aware of the construction site location and the impact on the circulation route at each intersection or cross street location prior to the construction site, so pedestrians and the public can alter their route before they arrive near the site;
17. Pedestrians and the public will be given a reasonable amount of time before the construction takes place so that pedestrians who use the route on a regular basis, will have sufficient time to plan and learn alternate routes to their destination; and
18. The alternate circulation route location and any instructions will be clearly delineated.

41.5. **EQUIPMENT ACCESS AND EGRESS**

When access or egress for Heavy Construction Vehicles (larger than an F-350 pickup) or Construction Vehicles is required near traffic, Traffic Control Layout Plans or Detour Designs will be required. These plans shall be developed in accordance with the Project Traffic Management Plan and should be submitted for review by the necessary parties within the production departments to ensure the plan fits the access and egress needs of their work plan. The following general guidelines will be followed for access and egress of equipment;

For Heavy Construction Vehicles (larger than and F-350 pickup):

1. Ingress and egress of equipment will only occur during Non-Restricted Periods within traffic control closures unless an appropriate acceleration lane and deceleration lane is provided that conforms to the standards of the Project Traffic Management Plan.
2. Designated access and egress locations will be signed appropriately with “DO NOT ENTER” and “CONSTRUCTION VEHICLES ONLY” signage.
3. Acceleration lane and deceleration lane designs shall be engineered Traffic Control Layout Plans or Detour Designs that have been reviewed and signed off by a professional engineer.
4. Access and egress operations on Cross Streets during the Restricted and Non-Restricted Periods shall be coordinated with Traffic Control Personnel (TCP) so long as there is additional traffic control in place to protect the TCP(s) in accordance with provincial Traffic Control regulations.
5. For construction vehicles (F-350 pickup and smaller): Ingress and egress during the Restricted and Non Restricted Periods will occur in accordance with the working around traffic reference documents.

41.6. PROTECTION OF EMPLOYEES

When Kiewit employees are required to work over, under or near traffic, they will develop a JHA and plan their work in accordance with the requirements of the approved Project Traffic Management Plan (TMP). The TMP includes specific operation requirements for the items identified as 4.1 to 4.8 below. Upon review of the TMP, Kiewit employees will be able to determine which of the following applies to their production operation.

Each of these requirements will need to be reviewed prior to work commencement:

- Engineered Traffic Control Layout Plans (TCLPs) and Detour Designs;
- Access and Egress Plans;
- Incident Management Plan;
- Traffic Control Devices;
- Concrete Roadside Barrier;
- Buffer vehicles or Shadow Vehicles;
- Proper signage; and
- TCP's as required.

It is possible that not all of the items identified above will be required for every production or traffic operation.

JHA(s) will be reviewed and signed off by all Supervisors and Employees involved in the operation. The JHA(s) will assist in assuring safety for Kiewit employees.

41.7. REFERENCE INFORMATION

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42. MARINE OPERATIONS

42.1. OVERVIEW

All work activities near or above a water hazard will be considered high risk. Some working near or over water work at Westridge shall include:

- Foreshore expansion
- Berth Installation
- Equipment Operation
- Transportation of Workers and Equipment
- Dredging

Any work near or on a water hazard requires a task specific hazard assessment, such as a JHA, prior to the task commencing. Eliminating the need to work near the water hazard must always be considered first.

When the work must remain near or above the water, a hazard assessment must be developed prior to commencing work. When developing the hazard assessment consider items such as the:

- Depth of water. Water greater than 4 ft. (1.2 m) increases the risk of drowning, engulfment or the inability to self-rescue.
- Distance between work location and the water's edge. Work within 12 ft. (3.7 m) of the water's edge increases the risk of accidentally entering the water. This distance may need to be increased if the ground leading to the water's edge is sloped.
- Ability to access worker from water's edge.
- Hazards associated with muddy ground conditions that could cause entrapment or impair the ability of the worker to perform a self-rescue from the water.
- Temperature of the water. Cold water, less than 15°C (59°F), increases the likelihood of hypothermia.
- Potential for hidden hazards under the water's surface.
- Rate of water movement. Water moving 1.5 mph (0.66 m/s) is considered swift moving.
- The need for a fall protection system due to:
 - Ground stability at the water's edge.
 - Work 20' above surface of water. (PFD no longer sufficient and fall pro required)
- Equipment placement and use near the water's edge.
- Environmental impact (consult site specific Environmental Protection Plan).

Hazard assessments for all work near or above any water hazard must include a documented rescue plan and appropriate rescue equipment required for the specific work location and task. The plan must include considerations for an external rescue team or specialized equipment if required.

42.2. PERSONAL PROTECTIVE EQUIPMENT

All personnel who will be working near or over water at risk of drowning shall wear a personal flotation device (PFD) or life jacket with sufficient buoyancy to keep the worker's head above water. If a personal fall protection system, guardrail or safety net is in place to prevent a worker from falling into the water, then no PFD is needed, unless the worker is breaking the plane. Specialized PPE is dependent on the job to be conducted and the work location. This may include but is not limited to:

- An appropriately fitted Transport Canada approved Personal Flotation Device (PFD) that provides enough buoyancy to keep the wearer's head above water, face up, without effort by the wearer.
- A full body harness that simultaneously permits the use of a PFD. (Suggested model: SALA Exofit XP flotation harness.)
- A flotation suit. (Suggested model: Mustang MS-185 Classic Flotation Suit.)

All buoyancy equipment shall be labelled and meet the requirements of CGSB Standard CAN/CGSB-65.7-M88, Lifejackets, Inherently Buoyant Type with a minimum buoyancy of 93 N (21 lbs.), CGSB Standard CAN/CGSB-65.11-M88, Personal Flotation Devices with a minimum buoyancy of 69 N (15.5 lbs.), CGSB Standard 65-GP-14M, Lifejackets, Inherently Buoyant, Standard Type with a minimum buoyancy of 125 N (28 lbs.), or British Safety Standard BS EN 396-1994, Lifejackets and Personal Buoyancy Aids - Lifejacket 150 N, automatically inflatable units with a minimum buoyancy of 150 N (34 lbs.).

Personal flotation devices and lifejackets must have at least 200 sq. cm (32 sq. in) of white or silver retroreflective material fitted on surfaces that are normally above the water surface.

If automatically inflatable lifejackets are used, KLTP shall record all inspections made and maintenance performed on them.

42.3. **WORKING NEAR OR OVER WATER**

The following shall be adhered to while working near or over water:

- Guardrails or hard barricading must be used to limit access to the water if a fall hazard also exists.
- When the work is within 12 ft. (3.7 m) of the water hazard, delineation must be placed 6 ft. (1.8 m) from the edge of the water (Not including barges or Derricks).
- When guarding is not possible, a travel restraint system must be used to eliminate the worker's ability to reach the water's edge (Not including barges or Derricks).
- All water hazards must be clearly identified with highly visible signage. Warning signs must be placed 25 ft. (7.6 m) away from the water hazard to ensure workers are warned prior to exposure.
- Any workers required to work near a water hazard must meet all required competency measures for the specific job task they will be conducting and use of any specialized PPE required.
- Access to the water hazard must be maintained with good housekeeping practices to mitigate any slip, trip or fall hazards that could cause a worker to fall into the water.
- Work areas near water hazards must have sufficient lighting, daylight or artificial, to conduct tasks safely.
- When the shore does not gradually slope at a 1:1 ratio, a ladder must be in place to allow workers to exit the water. The ladder must be clearly visible, be secured to enable safe use and, extend at least 3 ft. (1 m) above and 3 ft. (1 m) below the water's surface.
- All electrically powered tools and equipment used within 16 ft. (4.9 m) of the water hazard must be equipped with a Ground Fault Circuit Interrupter (refer to SA-SWP-11 Electrical and Assured Grounds Safety).
- When electrical equipment can become submerged, waterproof equipment must be used. When waterproof equipment isn't available, use of electrical equipment must be avoided.
- When the water hazard cannot be completely mitigated by controls, a ring buoy will be placed and must be:
 - Adequate size to rescue workers exposed to the water hazard.
 - Connected to a minimum of 90 ft. (27.4 m) of self-buoyant rope.
 - Placed at a distance of no more than 165 ft. (50.3 m) from the work location

- Clearly visible.
- Work conducted over a water hazard must not be performed alone. A watch person must be situated so the work can be observed at all times without being at risk of falling in the water. Radio communication is not a suitable replacement for a watch person.

Working Near or Over Water Hazards with Equipment

The following shall be adhered to while working near or over water with equipment:

- When building a ramp for equipment to access a level work surface at the water's edge, a ramp must be built at a 1:1 ratio.
- When a ramp cannot be built and the water's edge is not at a 1:1 ratio to shore, equipment must stay a minimum of 3 ft. (1 m) from the leading edge.
- Ensure the equipment is set up on level ground and not sloping towards the water.
- Environmental requirements stated in the site specific Environmental Protection Plan must be met prior to any equipment entering any water.
- When the cab of the equipment working near water has the potential to become fully or partially submerged, the cab must be equipped with a roof escape hatch or tool for breaking glass to enable escape.
- Once the equipment is in place the worker's seatbelt may be undone to avoid being trapped if the equipment becomes submerged. If having the seat belt off is not practical in controlling risk, a seat belt cutter must be provided in the cab of the equipment.
- An appropriately fitting Transport Canada Approved PFD must be provided in the cab of any piece of equipment that has the potential to fall into a water hazard and the cab become submerged.

Entering Water (Excluding Diving Operations)

The following requirements shall be adhered to if entering water (not including diving operations):

- Swift moving water must never be entered.
- When the water is more than waist deep or other hazards exist, such as unstable ground conditions below the water, the water must not be entered and other means to do the work must be established.
- Workers entering water shall be equipped with an appropriately fitting Transport Canada Approved PFD and waterproof boots or waders high enough to ensure water doesn't contact the skin in addition to their general PPE.
- If skin gets wet, wet clothing and boots must be removed as soon as possible in an environment that is suitable.
- When a worker must enter the water, at least one worker must remain on shore to initiate rescue. Workers must never enter the water when working alone.

No diving operations have been identified for this scope of work. In the event that a need arises for diving operations a specific risk assessment with mitigations must be completed as well as meeting the requirements set forth by WorkSafe BC before any diving operation is permitted by the Segment Construction Manager.

Emergency

All workers must follow the emergency working near water rescue procedures as per the Emergency Response Plan. For the Westridge Terminal, a fast rescue team shall be readily available with boats should an emergency offshore be required. Rescue must only be attempted if it can be done safely and will not pose danger to the rescuer. Only competent and trained rescue

personnel shall attempt to rescue workers from the water. All rescue equipment must be inspected prior to work commencing and must be maintained in good working order.

42.4. **CRUSH POINTS**

One major hazard when working in marine operations is pinch points. Every vessel that moors against a dock, pier, barge or another vessel creates a risk for an employee to have a part of their body trapped in a pinch point. Kiewit will ensure that points are listed in all marine operation work plans.

Bumpers are to be placed at all access points to reduce risk of metal on metal contact pinch points and this reduces the risk of injury. This also reduces the risk for equipment damage from accidental strikes.

All barges, flexi floats and similar vessels must be equipped with proper access and handrails. Handrails on crane barges may only be three sided. The open side is the pile handling work zone and a handrail creates a greater risk of injury. These open handrail areas must be clearly marked with yellow paint lines. They do not remove the requirement for PFDs.

42.5. **TRAINING AND EDUCATION**

All workers on-board marine operations will require special training and will be the first response team for person (or man) overboard rescue. This POR or MOR or MOR POR will require the following specialty training:

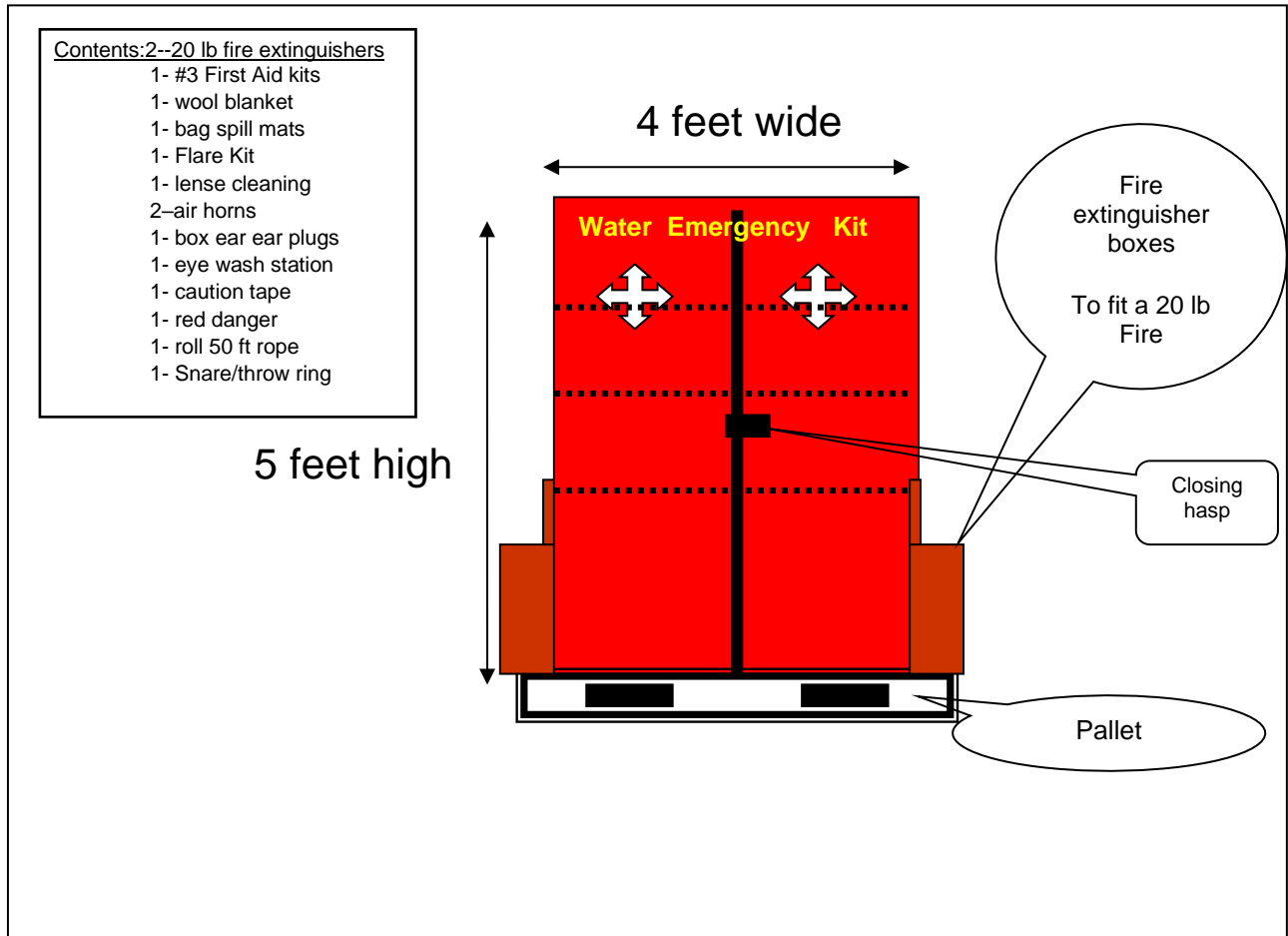
1. Small Craft License
2. Small Craft Training;
3. Marine Orientation;
4. Water Rescue and Casualty Management;
5. Annual training is to be conducted for emergency response;

42.6. **RESCUE EQUIPMENT**

Rescue equipment will be required onshore and on barge systems. Each system must be independent. Each onshore and barge system can share the onsite rescue boat, but all other safety rescue items must be kept separate.

42.7. SHORE AND BARGE REQUIREMENTS

A safety rescue cabinet is required on both starboard and port. All platforms or barges must have one safety rescue cabinet. See cabinet below for details and contents:



42.8. SAFETY SKIFF

A designated safety skiff is required on all projects where employees are working on or above water. Provincial regulation requires a designated safety skiff/rescue boat that must be capable of being launched by a single person and able to reach the individual(s) needing rescuing within 3 to 4 minutes. The safety skiff/rescue boat shall be equipped with the following items:

1. Paddle with T-top;
2. Life ring with 15 m (50 ft) of rope;
3. Fire extinguisher;
4. Boat hook or pike pole;
5. Anchor with line;
6. Working outboard with fuel.
7. Picking attachment on the skiff;

8. Hand rail (Bailey Rail);
9. Skiff capacity stenciled (or welded) on the side of the skiff; and
10. Waterproof emergency box containing:
 - a. First-aid kit (small);
 - b. Hypothermia blanket;
 - c. Flares;
 - d. Air horn.

All skiffs will be equipped to be a designated safety skiff. The designated safety skiff may be used to transport people from shore to the crane and back again but it is not to be used as the primary work skiff. If work is to be performed out of a skiff then a 2nd skiff is required. It is the responsibility of the skiff operators to keep the outboard on the safety skiff in good running condition.

42.9. **FALL PROTECTION**

Fall protection is not required when employees are wearing an approved PFD and have an unobstructed fall to the water of 3 m (10 ft) or less. If an obstructed fall exists or the fall height exceeds 1.8 m (6 ft) then an approved fall protection plan must be written and in place prior to the commencement of work.

42.10. **MAN OVERBOARD**

At a minimum, 0.8-meter (30-inch) ring buoys with at least 30 meters (90 feet) of over-600 lbs.-capacity line shall be provided every 60 meters (200 feet) along the water's edge and readily available for emergency rescue operations.

If someone goes overboard, the following emergency procedure will be followed:

Throw a life ring (with the other end of the line attached on board) to the person overboard. If a permanently mounted life ring is not readily available, throw any floatable object such as a loose life ring or float. This will aid in the visibility of the person.

DO NOT jump in after the person. The best way to save a person overboard is to be available to call for help.

Immediately alert the derrick operator or superintendent and initiate emergency contact procedures as detailed below. If possible, throw a ring buoy with a strobe light to the person or as close to the person as possible. This will help locate them.

One crew member must maintain visual contact with the person overboard at all times.

Launch the safety skiff and recover the individual. When approaching a person in the water, approach from downstream (this is commonly referred to as a Lazy J-Hook maneuver) so that the current brings the swimmer to the boat. Do not underestimate the effort required to haul someone into a boat. Particularly in winter months, be prepared to treat the victim for hypothermia, and keep emergency blankets on board the derrick for this purpose. There must be at least two wool blankets on each derrick at all times.

Do not attempt an open water swim.

42.11. **EMERGENCY CONTACT PROCEDURES**

The derrick barge must be equipped with a VHF radio. Unless the person overboard is recovered immediately, call 911 to have an emergency response team sent to the jobsite.

Be prepared to detail the exact location and heading of the person overboard and brief the local police or RCMP on the local conditions of deployment of the barges, weather, etc. Follow the directions of the authorities. Notify the Project Manager and the Project Safety Manager of the emergency.

42.12. **ACCESS**

Proper access must be maintained from the derrick to the dock, between barges and from boats to barges. Ramps or gangways between derricks, barges and permanent structures must be equipped with handrails and a non-skid surface. Gangways should be a minimum of 0.8 meters (28 inches) wide. Other than vertical boarding ladders permanently mounted to the side of a barge, ladder access should be avoided. If ladders are the only option, they must be secured at the top and a pitch of one quarter the length of the ladder must be maintained. Never use a ladder in the horizontal position. Inspect all access before each use and repair as required. Planning for all operations must include an access plan.

Access to the barges should be limited to authorized personnel. Visitor tours may be authorized by the job superintendent, but the parties must be escorted by a superintendent or designated crew member. All visitors not employed by the company must sign in before touring a jobsite.

43.5. Lighting, Lights and Shapes

All derricks have boom lights. Light towers will be used as necessary to provide additional lighting of the barge deck and the work area as needed. Provide adequate lighting at all access locations.

All derricks and barges must be equipped with proper navigation lights and corresponding day shapes. Barges will have lights on all four corners and any additional navigation lights required by the Canadian Coast Guard. Anchor buoys must be lighted with steady white lights at night. All lights shall be checked for proper operation every day.

42.13. **COMMUNICATIONS**

All derrick barges are equipped with a VHF radio that can be used in an emergency situation.

42.14. **OIL SPILL**

All derricks will be equipped with an oil spill cleanup kit. The kit will include diapers and an oil boom ready for rapid deployment. Other operations on or near the water that have the potential for an oil spill will also keep oil spill cleanup kits available.

A supply of kitty litter will be kept on each derrick for cleaning up small spills on deck. Clean up small spills on deck immediately to avoid slipping hazards. Repair oil leaks promptly to avoid spills.

If an oil spill occurs and ANY amount of oil has entered the water, notify the job superintendent immediately so that proper notification may be made to the Coast Guard. We are required to notify the authorities immediately if any spill occurs where product enters a body of water. Oil spills are to be cleaned up immediately and aggressively with all of the resources available to us.

If feasible, use biodegradable hydraulic oil on equipment that is to be used over or near the water.

Any spill, including a bio-oil spill, must be reported to the appropriate authority (or authorities) for the applicable province. The correct authorities are listed here.

It is project management's responsibility at the start of the job to locate a spill response company (such as Global Diving and Environmental, NSRC, etc.) who is to be contacted in the event of an oil spill. The firm's name and phone number must be posted on all derrick barges and in the job trailer. The selected spill response company may be different from job to job depending on the geographic region of the project.

42.15. **NOTICE TO MARINERS**

As per the Canadian Coast Guard and Fraser River Port Authority regulations, proper notice to mariners, must be issued prior to moving on site and updated with changes to your mooring plan. Project management is responsible for issuing the notice to mariners.

42.16. **PUBLIC SAFETY**

Keep proper navigation lights in place on buoys, barges and bridge structures and maintain proper notice to mariners. Be aware of private vessels transiting the area. Be prepared to call vessels via VHF radio and give them five blasts on the air horn if they are entering the work zone. Posting signs is a good way to warn the public of submerged anchor wires or other hazards and give warnings to give clearance of 150 meters (500 feet).

42.17. **WAKE WATCH GUIDELINE**

When a shore crane is used to hoist work onto floating equipment, or when a floating derrick is hoisting onto a land based structure or hoisting onto another barge, there is a potential for passing boat traffic to have a safety impact. Movement due to the wake can catch workers off guard with serious potential. If the operation has obvious potential for injury or equipment damage, an employee should be designated as a spotter to watch for any wake-producing marine traffic. NO WAKE signage should be used if conditions dictate it at the work site

42.18. **DESIGNATED SKIFF OPERATOR**

A designated skiff operator policy will apply to all skiffs. The job superintendent is responsible for the assignment and training of all designated skiff operators. Each project will be required to establish a method of identifying designated skiff operators such as placards, wallet cards or hard hat stickers.

The designated skiff operator is responsible for performing visual inspections of the skiff each day prior to use. This person is responsible to ensure the skiff is clean, work wise and to notify their supervisor of any mechanical needs that require attention.

The designated skiff operator is to ensure that the maximum capacity for workers in the skiff is not exceeded.

Designated operator training will follow the project-designated operator training guidelines

42.19. **SMALL BOAT DESIGNATED OPERATOR POLICY**

Safe operations of small boats, work boats and skiffs are the responsibility of the General Superintendent. Part of this responsibility is restricting the operation of this equipment to designated operators.

Only Designated Operators, trainees under direct supervision of a designated operator or qualified maintenance personnel are allowed to operate a boat or skiff.

The names of all designated operators will be maintained in the project office on the segment.

Prior to being designated as an operator an individual must demonstrate the following competencies to the qualified trainer:

1. Performance of a pre-operation inspection
2. Knowledge of the basic rules for passengers
3. Man overboard procedure
4. Starting the motor and setting the trim
5. Have an Understanding of tides and current
6. Knowledge of the basic right of way rules
7. Use of the marine radio and Nextel
8. Understanding how a small boat can get in trouble and its avoidance
9. Tying the boat up and anchoring
10. Fuel the boat and spill control
11. Locking up the boat
12. Pleasure craft operator card

42.20. **BEST PRACTICES**

To prevent falling overboard, passengers and the designated operator should always sit down when riding in a skiff.

The safest, most stable position is to angle the vessel's bow into the current, chop, waves or rollers. This is often referred to as quartering.

When setting anchor in tidal influenced or moving currents, you must allow for anchor rope three to four times longer than the depth of water you are anchoring in. For example, if you are anchoring in 3 meters (10 feet) deep water, you would need 10 to 15 meters (30 to 40 feet) of scope in your anchor line. Failure to have this could result in the vessel being dragged under water.

43. CONCRETE AND MASONRY

43.1. PROCEDURE

This Procedure sets forth requirements to protect all Kiewit and subcontractor employees from the hazards associated with concrete and masonry construction operations performed on all projects.

43.2. DEFINITIONS

Bull float means a tool used to spread out and smooth concrete.

Formwork means the total system of support for freshly placed or partially cured concrete, including the mold or sheeting (form) that is in contact with the concrete as well as all supporting members including shores, re-shores hardware, braces, and related hardware.

Limited access zone means an area alongside a masonry wall, which is under construction, and which is clearly outlined to limit access by employees.

Precast concrete means concrete members (such as walls, panels, slabs, columns, and beams) which have been formed, cast, and cured before final placement in a structure.

Re-shoring means the construction operation in which shoring equipment (also called re-shores or re-shoring equipment) is placed, as the original forms and shores are removed, in order to support partially cured concrete and construction loads.

Shore means a supporting member that resists a compressive force imposed by a load.

43.3. GENERAL REQUIREMENTS

43.3.1. Construction Loads

No construction load shall be placed on a concrete structure or portion of a concrete structure unless the employer determines, based on information received from a person who is qualified in structural design, that the structure or portion of the structure is capable of supporting the load.

43.3.2. Reinforcing Steel

All protruding reinforcing steel, onto and into which employees could fall, shall be guarded with rebar or “mushroom” caps to eliminate the hazard of impalement.

43.3.3. Post-Tensioning Operations

No employee (except those essential to the post-tensioning operations) shall be permitted to be behind the jack during tensioning operations.

Signs and barriers shall be erected to limit employee access to the post-tensioning area during tensioning operations.

43.3.4. **Riding Concrete Buckets**

No employee shall be permitted to ride concrete buckets.

43.3.5. **Working Under Loads**

No employee shall be permitted to work under concrete buckets while buckets are being elevated or lowered into position.

To the extent that is practical, elevated concrete buckets shall be routed so that no employee, or the fewest number of employees, is exposed to the hazards associated with falling concrete buckets.

43.3.6. **Personal Protective Equipment**

No employee shall be permitted to apply a cement, sand, and water mixture through a pneumatic hose unless the employee is wearing protective head and face equipment.

43.4. **REQUIREMENTS FOR EQUIPMENT AND TOOLS**

A concrete mixer with loading skips that are one cubic yard or larger shall be equipped with a mechanical device to clear the skip of materials and guardrails installed on each side of the skip.

43.4.1. **Power Concrete Trowels**

Powered and rotating type concrete troweling machines that are manually guided shall be equipped with a control switch that will automatically shut off the power whenever the hands of the operator are removed from the equipment handles.

43.4.2. **Concrete Buggies**

Concrete buggy handles shall not extend beyond the wheels on either side of the buggy.

43.4.3. **Concrete Pumping Systems**

Concrete pumping systems using discharge pipes shall be provided with pipe supports designed for 100 percent overload.

Compressed air hoses used on concrete pumping system shall be provided with positive fail-safe joint connectors (whip checks) to prevent separation of sections when pressurized.

43.4.4. **Concrete Buckets**

Concrete buckets equipped with hydraulic or pneumatic gates shall have positive safety latches or similar safety devices installed to prevent premature or accidental dumping.

Concrete buckets shall be designed to prevent concrete from hanging up on top and the sides.

43.4.5. **Tremies**

Sections of tremies and similar concrete conveyances shall be secured with wire rope (or equivalent materials) in addition to the regular couplings or connections.

43.4.6. **Bull Floats**

Bull float handles used where they might contact energized electrical conductors, shall be constructed of nonconductive material or insulated with a nonconductive sheath which electrical and mechanical characteristics provide the equivalent protection of a handle constructed of nonconductive material.

43.4.7. **Masonry Saws**

Masonry saw shall be guarded with a semicircular enclosure over the blade. A method for retaining blade fragments shall be incorporated in the design of the semicircular enclosure.

43.5. **REQUIREMENTS FOR CAST-IN-PLACE CONCRETE**

43.5.1. **General Requirements for Formwork:**

Formwork shall be designed, fabricated, erected, supported, braced and maintained so that it will be capable of supporting without failure all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork. Formwork which is designed, fabricated, erected, supported, braced and maintained in conformance with the Appendix to this section will be deemed to meet the requirements of this paragraph.

Drawings or plans, including all revisions, for the jack layout, formwork (including shoring equipment), working decks, and scaffolds, shall be available at the jobsite.

43.5.2. **Shoring and Reshoring**

- All shoring equipment (including equipment used in reshoring operations) shall be inspected prior to erection to determine that the equipment meets the requirements specified in the formwork drawings.
- Shoring equipment found to be damaged such that its strength is reduced to less than that required by regulation shall not be used for shoring.
- Erected shoring equipment shall be inspected immediately prior to, during, and immediately after concrete placement.
- Shoring equipment that is found to be damaged or weakened after erection, such that its strength is reduced to less than that required by regulation, shall be immediately reinforced.
- The sills for shoring shall be sound, rigid, and capable of carrying the maximum intended load.
- All base plates, shore heads, extension devices, and adjustment screws shall be in firm contact, and secured when necessary, with the foundation and the form.
- Eccentric loads on shore heads and similar members shall be prohibited unless these members have been designed for such loading.

43.5.3. Reinforcing Steel

Reinforcing steel for walls, piers, columns, and similar vertical structures shall be adequately supported to prevent overturning and to prevent collapse.

Supervisors shall take measures to prevent unrolled wire mesh from recoiling. Such measures may include, but are not limited to, securing each end of the roll or turning over the roll.

43.5.4. Removal of Formwork

Forms and shores (except those used for slabs on grade and slip forms) shall not be removed until the employer determines that the concrete has gained sufficient strength to support its own weight and that of any superimposed loads. Such determination shall be based on compliance with one of the following:

- The plans and specifications stipulate conditions for removal of forms and shores, and such conditions have been met
- The concrete has been properly tested with an appropriate ASTM International standard test method designed to indicate the concrete's compressive strength, and the test results indicate that the concrete has gained sufficient strength to support its weight and that of superimposed loads.

Re-shoring shall not be removed until the concrete being supported has attained adequate strength to support its own weight and that of all loads in place upon it.

43.6. REQUIREMENTS FOR MASONRY CONSTRUCTION

A limited access zone shall be established whenever a masonry wall is being constructed. The limited access zone shall be:

- Established prior to the start of construction of the wall
- Equal to the height of the wall to reconstruct plus four feet, and shall run the entire length of the wall
- Established on the side of the scaffold wall that will be dismantled
- Restricted to all but employees actively engaged in constructing the wall; no other employees shall be permitted to enter the zone

In addition, when the height of the wall is less than eight feet, the limited access zone will remain in place until the wall is adequately supported to prevent overturning and to prevent collapse. All masonry walls over eight feet in height shall also be adequately braced to prevent overturning and to prevent collapse unless the wall is adequately supported so that it will not overturn or collapse. The bracing shall remain in place until the permanent supporting elements of the structure are in place.

43.6.1. Worker Safety

The following precautions are to be adhered to when working with concrete:

- Try not to over-exert yourself when mixing or moving concrete, especially when using a wheelbarrow, shovel, or trough. Concrete is extremely heavy and caution must be taken to avoid back, shoulder, or other muscle strains. Keeping you physically fit and performing pre-work stretch and flex exercises can aid in injury prevention.

- Always wear goggles and safety glasses when mixing or pouring concrete. The lime and cement dust can be very irritating to the eyes. If it enters your eyes, rinse for 15 minutes. If eyes are still irritated, seek medical attention.
- Always wear impermeable gloves, rubber boots, knee pads and a long sleeve shirt, when working with concrete. The cement can cause irritation when it comes into contact with skin. Lime burns are common in the industry but can be lessened by barrier creams or gloves to protect hands and forearms from industrial dermatitis.
- Read and heed the manufacturers' recommendations on concrete additives, acids for etching, form release oils, or other chemicals used in conjunction with concrete.

43.7. **REQUIREMENTS FOR PRE-STRESSED CONCRETE**

43.7.1. **Pre-Tensioning Operations**

1. Clean, inspect and lubricate strand chucks between each use.
2. Do not use any worn or distorted chucks.
3. Check alignment of strand vices. Do not stretch tendon unless vises are in line with pull and are seated properly.
4. Do not begin tensioning if a strand has been nicked or otherwise damaged.
5. Do not begin tensioning any strand with a broken wire.
6. Keep all torches and welding equipment away from the strands.
7. Protect tendons during handling and moving by attaching handling devices to flanges of reels or coils.
8. Set or position all anchorages (strand vises and anchor plates) perpendicular to the tendons.

43.7.2. **Tensioning Operations**

1. Prior to tensioning a bed, give a visible and audible signal.
2. Do not begin tensioning operations until all personnel leave the area adjacent to the bed.
3. Position or secure jacks by a means to prevent the jack from flying longitudinally or laterally in event of tendon failure.
4. Do not stand at either end of the bed, directly in line with the tendon being tensioned.
5. Do not stand over tendons being tensioned to make elongation measurements. Measurements should be made by jigs or templates from the side or from behind

44. TEMPORARY STRUCTURES AND CONSTRUCTION DEVICES (TSCD)

44.1. POLICY

The purpose of this SWP is to provide guidance in the administration of the Company policy covering Temporary Structures and Construction Devices (TSCD), Corporate Policy, Section 4-24 (rev 12-2008) which states:

It is the Company's policy to properly and systematically address the design and construction of temporary structures and other construction devices used in our operations. When the design is not provided by the owner, the liability assumed by the Company requires even greater attention to minimize the risk of failure. The design and construction of temporary structures and other construction devices requires thoughtful risk analysis and risk mitigation measures that begin with appropriate selection of designers, an independent review of the resultant design, and proper inspection during construction.

Projects are to follow the [Design and Construction of Temporary Structures and Construction Devices Manual](#).

Corporate Policy, Section 4-24 applies to;

- Systems and devices that are not specified by contract documents; but are required for the execution of our work and are designed, engineered and constructed by the Company, its subsidiaries or subcontractors.
- The analysis and review of potential impacts to permanent work resulting from temporary construction activities.
- The effect on permanent work when a temporary work item is not fully removed.

The TSCD manual has been developed to serve as a foundation for the District Manager along with Project Management to assess, mitigate, and manage temporary work risk. If there are any project specific temporary work items not discussed in the Manual, a thoughtful risk analysis and mitigation plan shall be established through the collaboration of the District Manager, Project Management, and Kiewit Infrastructure Engineers (KIE).

The underlying philosophy which guides our construction process is to build quality work, on time, safely, and in an efficient manner. To accomplish all four goals within the context of competitive pressures and fulfilling contractual obligations requires inventive but disciplined thinking. Throughout the design and construction process our personnel must be guided by the following process:

- CONCEPTUALIZE
- DESIGN
- DESIGN REVIEW
- INSPECT and VERIFY

This process forms the basis for how temporary work risk is managed.

44.2. BASIC REQUIREMENTS

44.2.1. Risk Management Plan (RMP)

All projects and Company-managed fixed facilities (District shops/yards) are to develop a plan to manage the risk associated with Temporary Structures and Construction Devices. The plan will establish the strategy that the project team will utilize in executing their temporary works. Specifically this plan will:

- Identify the TSCD Manager(s)
- Identify the TSCD Coordinator
- Identify any other individuals who will assist in developing, maintaining, monitoring, editing, or documenting the plan or matrix
- Establish the protocol and approval steps the team will use to revise, change or add to the plan
- Establish a list of individuals or firms that are appropriate to function as the Designer, Design Reviewer and Inspectors for given temporary work items
- Establish the documents control and record management program for temporary works

The preparation of the RMP should be initiated during the proposal or bid phase to help establish the overall temporary engineering strategy while developing an appropriate budget. Once the project is won, a more fully developed plan and matrix shall be established using the preliminary plan as a starting point. The District Manager shall indicate his or her approval of the RMP by signing the RMP.

44.2.2. Matrix

To assist with monitoring the implementation of the project's RMP, the project is to generate, maintain, and keep easily accessible a matrix itemizing the following for each temporary work item:

- Task Description
- Risk Level
- Designer
- Design Reviewer
- Inspector(s)
- Indication that the District Manager or District Manager's Designee has approved the mitigation scheme for the particular task
- Dates associated when the Design, Design Review, and Inspection(s) are complete.

The matrix shall reflect the current construction means and methods including any changes, and serves as a tool for monitoring compliance with the RMP. The matrix can be in a form (physical wall chart or electronic) that the project team deems most efficient. There are no specific format requirements for this matrix as it is the responsibility of the project to produce and use the most economical and efficient system to comply with the above requirements which allows for updates, revisions and tracking approvals. It is an established best practice to have this matrix, especially for the current High Risk items, posted as a wall chart in the project office for the project staff to see; however, this is not required by this Manual.

As the project progresses, the TSCD Coordinator will complete the boxes in the matrix to indicate when each step has been executed. Any revisions or changes will be implemented according to the process established in the project's RMP. This will ensure the matrix is current so it can be used as a tracking and planning tool for the project.

44.3. **TEMPORARY WORKS RISK MANAGEMENT TABLES**

This section provides a listing of common temporary work items. The TSCD manual lists their attributes and proven risk mitigation techniques. The items identified are not intended to be a comprehensive listing of all items that may be encountered, nor entirely prescriptive, but represent effective risk management practices developed over a broad range of operations and many years of experience.

All work should be planned and checked in accordance with all requirements and with other Corporate or District policies and procedures when applicable.

44.3.1. **List of Tables**

- Access (For Personnel and/or Equipment)
- Below the Hook (BTH) Lifting Devices and Rigging
- Cofferdams
- Crane Barges
- Critical Crane Lifts
- Cut Slopes (Trench or Excavation)
- Dewatering
- Equipment - Custom Design and Fabrication
- Fabric Structures
- Fall Protection Systems and Lifelines
- Falsework
- Formwork
- Hoisting and Jacking Systems
- Maintenance of Traffic (MOT)
- Mechanically Stabilized Earth (MSE) Walls, Reinforced Soil Slopes (RSS), Soil Nail Walls
- Owner-provided Designs of Temporary Works
- Permanent Structures - Temporary Condition during Demolition/Dismantling
- Permanent Structures - Temporary Condition during Construction/Erection
- Rebar Cage Structures - Hoisting
- Rebar Cage Structures - Temporary Support (Guying/Bracing)
- Support of Excavation
- Temporary Bridges, Trestles, Work Platforms, Gangways

45. PIPE TESTING

45.1. PURPOSE

All projects that conduct pipe testing shall ensure proper precautions are in place prior and during the test. Only hydrostatic testing may be conducted. If job specifications require pneumatic testing to be performed, permission must be obtained from the Project Sponsor before proceeding. If the Project Sponsor is not available, the District Manager and District Safety Manager will be contacted prior to beginning work. Approval for pneumatic tests will be given only after the work plan and JHA have been reviewed.

45.2. RESPONSIBILITIES

45.2.1. Project Manager

The project manager will be responsible for implementation of the program.

45.2.2. Superintendent

Superintendent's responsibilities include:

- Review of construction phase(s) at project pre-meetings to identify the requirements for pipe testing
- Identifying the type of test required (pneumatic or hydrostatic)
- Obtaining documented approval for any pneumatic test prior to the start of the test
- Creating a detailed, written plan (Job Hazard Analysis), to include:
 - Hazards associated with the pipe test
 - Engineering controls needed to control or eliminate the hazards
 - Test pressures and time duration for the test
 - Outline steps for pressurizing the pipe in increments
 - Means of keeping unauthorized people out of the testing area
 - Procedures for leaks or failures
 - Pre-Hydro test checklist (If applicable) and Pipe Testing Hazard Assessment Checklist
- Ensuring all gauges have been properly calibrated
- Communicating with the project team to advise of scheduled test times and locations
- Ensuring environmental controls are in place
- Ensuring that all discharges are compliant with regulatory requirements

45.3. PROCEDURE

45.3.1. Generally, only hydrostatic testing may be conducted. If job specifications require pneumatic testing to be performed, permission must be obtained from the Project Sponsor before proceeding. If the Project Sponsor is not available, the District Manager and District Safety Manager must be contacted prior to beginning work. Approval for pneumatic tests will be given only after the work plan and Job Hazard Analysis have been reviewed.

- 45.3.2. One individual shall be responsible for supervising the test.
- 45.3.3. On longer lines, radio communications should be established between the ends.
- 45.3.4. Testing equipment (pumps, manifolds, gauges, valves, etc.) must be inspected prior to use to ensure they meet the required pressure ratings and all connections are tight.
- 45.3.5. Before belowground testing and prior to pressure being applied, the pipeline must be centre loaded with fill material on all push-on and high-pressure fixed connection lines. This will prevent the pipeline from flexing and walking out of the trench. Similarly, restraints must be applied to aboveground lines if testing must be performed before the line is secured to all of its permanent mounts. The hanger system must be checked to ensure it is designed to hold the pipe when full of water. Additionally, safety devices such as thrust blocks or kickers should be used whenever possible to contain any temporary plugs in the event of a blowout.
- 45.3.6. No unauthorized persons will be allowed to enter the test area while the line is under pressure. Pneumatic tests shall be prepared in accordance with American Society of Mechanical Engineers standard PCC-2 and the stored energy and safe distance calculations contained therein.
- 45.3.7. Flagging, barricades and/or other means must be used in addition to continuous surveillance of the line to keep people away from the area. Excavations near the line under test should be avoided. High-pressure tests shall be performed after working hours whenever practical. Highly visible “UNDER TEST” signs or tags must be used at both ends of, and/or at strategic locations along, the pipe under test.
- 45.3.8. If the line will be subject to thermal expansion during the testing, a calibrated pressure relief valve shall be installed at one of the end caps.
- 45.3.9. The line shall be filled with water in a manner that will ensure no air remains in the pipe. Vents must be installed in the high point of the pipeline being tested.
- 45.3.10. Once the line is completely filled and sealed off, a reciprocating pump is to be used to apply the test pressure to the pipe.
- 45.3.11. Serious incidents may result due to faulty pressure gauges. Either two gauges must be installed in series or a pressure relief valve must be installed at the lowest test point.
- 45.3.12. On pipelines traveling over severe elevation changes, the weight of the water in the line must be taken into account when reading the pressure gauge and relief valve set point.
- 45.3.13. Applying pressure must be performed by a qualified person in accordance with industry standards.
- 45.3.14. All engineering must be specific to the test being performed. During this process it is essential to ensure the pressure stabilizes at each increment before proceeding.
- 45.3.15. Under no circumstances should any attempt be made to tighten down or repair any line while the line is under pressure. The line must be bled completely before any repair work may begin. A positive method to determine if the line is empty must be implemented. This may be accomplished by installing a vent at the top and a drain at the bottom. A qualified supervisor must certify that there is no pressure or vacuum before proceeding.
- 45.3.16. The test pressure is to be maintained for an owner-specified duration. The line will be slowly bled as soon as the test is completed. Water used for hydrostatic testing will be discharged per Kiewit’s environmental procedures.

46. SANDBLASTING

46.1. PURPOSE

It is Kiewit's policy to perform all Sandblasting and related work in the safest possible manner in compliance with all legislative requirements and according to our company procedures. Protecting all workers performing Sandblasting work, in direct support of Sandblasting or work that may be affected by the operation is our primary concern.

46.2. RESPONSIBILITIES

The Project Manager is responsible for implementing the sandblasting procedure for the job site.

46.3. PROCEDURE

All workers supervising, performing Sandblasting or work in direct support of sand blasting will have the appropriate training. Once the employee has undergone training they will be given oral/written instructions (JHA) and be supervised while performing practical applications.

46.3.1. Employee Protection

Supervisors are responsible to facilitate and/or provide proper instruction to their workers on protection requirements and training, equipment selection, hazard analysis, and inspect worksite. When sandblasting in an area other than a confined space, the worker at the nozzle end must wear one of the following:

- Positive pressure air hood with air supplied by compressed breathing air bottles.
- Positive pressure air hood with air supplied by oil-less air compressor that meets CSA standard Z180.1 compressed breathing air and systems.
- Positive pressure air hood with air supplied by general purpose air compressor, with carbon monoxide monitor and air filter in-line.

46.4. GENERAL PROCEDURES

- The sandblasting worker and supervisor must ensure no other activity is taking place adjacent to or on the item you are sandblasting.
- Red Tape, barricade and post signs (DANGER) to restrict access to area due to Sand Blasting Operations in Progress.
- During operations a safety watch is to monitor conditions, traffic, and standby at the air source.
- All employees involved in the sandblasting work must have a proper method of communication.
- A proper sized air supply should be used. This should have regulated pressure and functional shut off readily accessible to the Safety watch person.
- A proper size and length of air hose should be used and there should be a whip check on every hose connection.
- In extremely hot conditions, a ventilation air hose may need to be attached to the blaster's hood. Workers in the dust cloud downwind must be protected from silica particles in the air. This is best accomplished by use of a half mask respirator with the appropriate filter cartridge.

- All sandblast hoses shall be equipped with a Dead Man Switch at the nozzle end.
- All other personnel who are exposed to the sandblast dust must wear the appropriate respirator, safety glasses, and hard hat.
- If during sandblasting operations wind direction or speed changes or results in the unexpected exposure of unprotected workers the operation will be suspended until proper precautions can be taken to limit exposure.

46.5. **USE OF COMPRESSED GAS**

- Do not spray clothing or body with air
- Do not aim sand blasting equipment in direction of other workers
- Any airline must be bled down when left unattended and all equipment related to their operation must be shut down.
- All safety devices must be operational
- All compressors must have a fast shut down switch (Emergency Stop) and a clear access route
- Any or all air tests must have a regulator valve and high pressure release
- Ensure tool is attached before energizing hose.
- Protective Caps must be installed when not in use
- Cylinder valves must be closed when not in use
- Use regulators, pressure gauges and hoses only with gasses and pressure ratings for which they are designed and rated
- Compressed Gas Cylinders shall not be taken into Confined Spaces.

46.6. **REFERENCE INFORMATION**

[Sandblasting Safety Training Attendance Sheet](#)

47. TRANSPORTATION OF DANGEROUS GOODS

47.1. OVERVIEW

This procedure applies to products that are defined as dangerous goods under the Transportation of Dangerous Goods (TDG) Regulations. Included are products as well as waste chemical, radioactive and biological products and organisms. As a general rule, all large volume controlled products fall under some category of the TDG legislation and therefore, this procedure applies and must be followed.

The regulations apply when dangerous goods are:

1. Received and/or shipped.
2. Transported more than 3 km on public roads, by air or by rail.
3. Shipped within Canada or internationally.

The project manager is responsible for ensuring that employees on their project who have been designated to handle dangerous goods comply with the TDG regulations as outlined in this document, and have received the appropriate training.

When the materials management group receives or ships dangerous goods, including hazardous waste, the materials management group must identify a persons or persons who will be responsible for the handling of the goods.

A certificate is valid for three years, after which the individual must undergo re-certification. An untrained individual may handle dangerous goods provided the goods are handled in the presence and under the direct supervision of an individual who holds a training certificate.

Two different courses may be required or combined into one session:

1. Receiving and Shipping Dangerous Goods by Ground under TDG regulation.
2. Shipping and Transport of Hazardous Waste under TDG and provincial regulations.

The safety department will retain all training records, and each individual trained will be provided with a TDG Certified card that must be carried when shipping or receiving dangerous goods.

Dangerous goods must be shipped and received only by TDG or IATA trained employees, or an employee working in the presence and under the direct supervision of an individual who holds a training certificate.

47.2. GENERAL PROVISIONS

According to the TDG Clear Language Regulation, some dangerous goods cannot be shipped above certain specified quantities, unless an Emergency Response Assistance Plan (ERAP) has been developed. Consult the TDG handbook to see if the shipment falls under the amount specified in column 7 of schedule 1 - ERAP quantities below 75 (L or Kg). If an ERAP is required for the shipment, consult the safety department.

The shipper is responsible for the proper classification of dangerous goods, and for obtaining the proper packaging materials. Therefore, the person signing the documentation must ensure that the package has been packaged properly if it has been prepared by someone else.

Consult the TDG handbook for a list of TDG shipping classes. An SDS may provide the necessary information to properly classify the dangerous goods into one of the classes.

If after consulting the regulations, there is still uncertainty as to the class or the type of package required, contact the manufacturer, consult the original shipping documentation, or contact the safety department.

47.2.1. Transporting

The means of transport determines the type of packaging that is required. Packages shipped only by ground must meet the packaging instructions as stated in the TDG Clear Language Regulation. If package will at any point be transported by air, it must meet the packaging requirements set out in the International Air Transport Association Regulation.

The outer package of dangerous goods must contain the following:

- The shipping name listed in upper case letters;
- Hazard class label(s);
- Identification number (UN number);
- Packing group;
- Orientation label (for liquids only);
- Standardized UN certification mark (automatically appears on UN certified packaging).

The shipper is responsible for filling out the proper shipping documentation that can only be signed by a trained employee, or an untrained employee working in the presence and under the direct supervision of an individual who holds a training certificate. Three documents apply for the shipment of dangerous goods depending on the mode of transport and the type of goods being shipped:

- Straight Bill of Lading Form- for shipments by ground under TDG
- Shippers Declaration of Dangerous Goods Form- for shipments by air under IATA
- Waste Manifest- for shipments of hazardous waste Under TDG & Provincial Regulations

Example of Dangerous Goods Safety Marks: Small Means of Containment



- | | | |
|--------------------------------|-----------------------|---|
| ① Orientation label (optional) | ② Primary class label | ③ Standardized UN certification (according to standard) |
| ④ Shipping name | ⑤ UN number | ⑥ Subsidiary class label |

47.2.2. **TDG Handbook**

Information on TDG classifications and symbols, and on requirements for handling, shipping and quantities, is available on site in the TDG handbook.

47.2.3. **Hazardous Waste**

The Kiewit Policy Statement on Environmental Management outlines the company's commitment to the protection of the environment through the implementation of an effective Environmental Management Program. An important aspect of this program is the proper handling, storage, and disposal of all hazardous waste generated on sites.

The Transportation of Dangerous Goods (TDG) Act and Regulations set out guidelines for the safe handling and transportation of dangerous goods. It is therefore necessary that all waste chemicals are adequately packaged and labelled, in order to comply with all applicable regulations, and to insure appropriate and safe disposal of hazardous chemicals.

47.2.4. **Before Disposal**

Before disposing of any unused or unopened chemicals, personnel must determine if they can be used by another person or discipline.

No hazardous chemical is to be flushed down the drain. Personnel must reference the SDS, or contact Environmental Health and Safety (EH&S) if unsure of the chemical's properties.

Before disposing empty containers of chemicals in the regular garbage, ensure no hazardous residue is present in the container. Ensure empty containers meet SDS guidelines. Empty containers must then be defaced of all hazardous symbols and warnings prior to disposal in regular garbage.

47.2.5. **Identification**

Complete and accurate identification of all chemical waste is the most important factor in providing safe and environmentally sound hazardous waste management.

Furthermore, it is illegal under the TDG regulation to transport unknown materials. It is, therefore, essential that the chemical name, contaminants and concentrations be identified.

Analysis and identification might be required when the identity of a material cannot be determined with certainty.

47.2.6. **Oil and Liquid Waste**

This waste will be picked up in appropriate containers that are clean and properly sealed. Containers should not be larger than 20 L, unless special arrangements are made with an outside contractor.

47.2.7. **Batteries**

All waste batteries must be placed in a box along with a completed hazardous waste disposal form and dropped off at a centralized pickup location. Caps leaking with acid will not be picked up.

47.2.8. **Paint**

Latex paint can be disposed in the regular garbage, provided the cans have been allowed to dry and no liquid paint residue is present.

47.2.9. **Aerosol Cans and Compressed Gas Cylinders**

Do not throw aerosol cans or cylinders out with regular garbage. Place all cans and cylinders in an appropriate area, outside or in a controlled means of containment for pick up.

48. WHMIS – HAZARD COMMUNICATION

48.1. PURPOSE

The WHMIS is a Federal & Provincial requirement which addresses the employee's "Right to Know" about hazards of materials used in the workplace and the means to find out that information.

WHMIS applies to all controlled products and to all personnel on the worksite. It does this through a three (3) part system.

1. Warning Labels on containers of hazardous materials.
2. Safety Data Sheets (SDS) providing further detailed information on each controlled material.
3. Employee Training on how to use the information contained on labels and SDS.

48.2. RESPONSIBILITIES

48.2.1. Project Manager

The Project Manager will ensure that all hazardous materials stored or used by site personnel are identified and labeled and, where applicable, supplied with Safety Data Sheets (SDS) that meet regulated requirements.

All information regarding hazardous materials will be made readily available to workers exposed to such materials by providing an SDS file for all work locations where WHMIS-controlled materials are used, handled or stored.

Management will ensure all employees exposed to hazardous materials have been trained in recognition and safe handling, use and storage procedures. The information and training regarding hazardous materials will be reviewed on a regular basis.

48.2.2. Supervisors

Supervisors are responsible for ensuring that workers who use or handle WHMIS- controlled or other hazardous products have been adequately trained to recognize standard hazard symbols, understand risk phrases and first aid measures, and implement appropriate protective measures as required by law.

In addition, Supervisory staff is responsible for ensuring that sufficient labeling, SDS and protective equipment are available at work locations to meet regulated requirements.

48.2.3. Project Safety Manager

The Project Safety Manager or their designee is responsible for developing a written hazard communication program for the project that includes:

- A list of the hazardous substances known to be present on the job site
- The method(s) by which employees will be informed of the hazards of non-routine tasks.
- A complete and readily available file of Safety Data Sheets (SDSs).
- A defined process that ensures all SDS's are received and communicated to affected employees, subcontractors, and vendors.
- Training
 - Workers will be informed about the locations of program and chemical inventory, the locations of chemicals in the workplace, methods used to observe and detect chemicals, employee protection that includes specific work practices/procedures and personal protective equipment and the details of non-routine tasks requiring hazardous chemical controls.
 - Individual training will be performed initially.
 - Retraining will be performed annually

48.2.4. Designated Salaried Employee

A designated salaried employee will be responsible for coordinating the hazard communication program and will keep up to date.

- An inventory of hazardous chemicals to be updated monthly and/or when additional hazardous chemicals arrive on the project site. A site log of inventoried hazardous chemicals will be kept in the project files.
- A file of Safety Data Sheets complete with an index for ease of use.
- A procedure whereby all Purchase Orders for hazardous chemicals will specifically request an SDS for the project and that vendors are informed payment will not be made until the proper SDS data is on file for their product.
- A procedure whereby each employee is to be oriented in the following:
 - The location of the hazardous chemicals log
 - The location of the SDS documents on file and how to request and obtain them.
 - Safety and first-aid measures for all applicable hazardous chemicals.
 - A procedure whereby all hazardous chemicals are kept in their original containers with legible labels or if transferred to other containers, suitable and complete labeling is affixed to the new container
 - A procedure whereby any empty containers, chemicals that will no longer be used, or containers with illegible labels will be properly disposed of and that no chemicals will be transferred or disposed of without the proper certification and corresponding SDS.

48.2.5. **Workers**

Workers are responsible for following procedures and instructions provided for safe use, handling, storage and transport of hazardous products. Lastly, workers are responsible for reporting containers that are unlabeled, illegibly labeled or incorrectly labeled.

48.2.6. **First Aid Attendants**

First Aid Attendants will ensure they are aware of the emergency first aid procedures (refer to SDS) required for workers who may have been overexposed to WHMIS at their worksites.

48.3. **HAZARDOUS MATERIALS AND CONTROL MEASURES**

48.3.1. **Inventory**

The jobsite will maintain a list of all hazardous materials used at the jobsite. The list will be updated as necessary and will be available to all jobsite employees. A best practice is to set up a project account with SDS online and include all project SDS on the project account. This allows access to project SDS for all personnel with internet connection.

<https://msdsmanagement.msdonline.com/8f4d7298-eb8d-44e4-b8ed-7ee3435163e9/ebinder/?nas=True>

48.3.2. **Purchasing**

At the time of ordering any new materials, the supplier must be requested to identify which products, if any, are covered by hazardous materials legislation.

Where multiple products that are used for the same purpose are available, the least hazardous material will be obtained if practicable.

All WHMIS-controlled hazardous materials ordered may only be accepted if accompanied with applicable labeling and SDS.

48.3.3. **Labeling**

Proper labels will be required of all materials received and used at the project. If labels are not provided, the supplier must be contacted and asked to supply the specific labels. All containers of chemical products, including laboratory bottles, solvent cans and dispensers must be labeled.

Only those chemicals classified for “immediate use” (which means that the hazardous chemical is under control of and used only by the person who transfers it from the labeled container and only within the work shift in which it is transferred) are exempt from the labeling procedures described above.

Information contained on labels must not conflict with federal, state or local laws and/or regulations in labeling requirements.

The labels should provide the following information:

- Identity of the chemical products or substances in the container
- Hazard warnings
- Name and address of the manufacturer or other responsible party
- Applicable Pictograms that meet [GHS requirements](#).

Labels must not be removed and must be replaced if illegible.

In areas where similar chemical products are in storage, signs or placards may be posted to identify the material and list the required labeling information in lieu of individual container labels. If any materials are to be transferred from a storage tank or container through a pipeline, labels with the required information will be affixed to the line at the discharge point (valve).

In those cases where a chemical product other than that specified on the container label is placed in the container, the container must be immediately re-labeled to accurately reflect the hazards of the chemical product that has been substituted.

48.3.4. **Safety Data Sheets (SDS)**

The person responsible for receiving new materials must ensure that SDS are received for all controlled products supplied to the workplace. In addition, the receiver must contact the supplier for an updated sheet if the preparation date on an SDS indicates it is more than three years old.

Copies of SDSs must be made accessible to employees, close to their work areas and available during the work shift.

Note: If a Safety Data Sheet does not exist for a product, it will not be used until a proper sheet is obtained for the manufacturer or supplier.

48.4. **SAFE WORK PROCEDURES AND CONTROLS**

Supervisory personnel are responsible for monitoring storage, handling and use of controlled products on their work sites as part of their daily and weekly inspections. Monitoring will take into account the physical and health hazards of the product, quantities, work processes, location of use, etc.

On the basis of WHMIS and other workplace information, management, in cooperation with suppliers and supervisory personnel, will develop work procedures that ensure worker health and safety.

Hazard control measures may include:

- engineering controls such as ventilation, process modification or isolation of the hazard source,
- administrative controls such as work procedures, storage arrangements, maintenance and shift scheduling, personal protective equipment such as respirators, gloves and protective clothing.

48.5. EDUCATION AND TRAINING

The Project Manager will ensure a designated WHMIS trainer (qualified) for the site is appointed and receives training.

Employees should be able to answer the following questions:

1. What are the hazards of the controlled product?
2. How are you protected from those hazards?
3. What do you do in the event of an emergency?
4. Where do you get further information?

48.5.1. Generic WHMIS Education

Employees should have Generic WHMIS Education prior to accessing the workplace. Employees without training should contact their supervisor.

48.5.2. Workplace Specific WHMIS Training:

Supervisory personnel shall ensure that employees have received Workplace Specific Training and that the work is undertaken without undue risk.

Employees that use hazardous materials or work in proximity to them are required to have received previous instruction in:

- Hazards of the materials they will be exposed to,
- Procedures for safe use, handling and storage of the product as contained on labels and SDSs,
- Recognition of symptoms of overexposure,
- Overexposure emergency response,
- Responsibilities for reporting injuries, and reporting containers that are unlabelled illegibly labeled or incorrectly labeled.

48.6. DISPOSAL OF HAZARDOUS SUBSTANCES

Hazardous substances must be disposed of using the method described by the Safety Data Sheet (SDS) for that substance or as required by the provincial authority having jurisdiction. (I.e. Ministry of the Environment, the municipality, etc.)

48.7. WHMIS PROGRAM EFFECTIVENESS

As with any safety and health program, effective implementation and utilization of the program are keys to that programs success. In order to ensure the effectiveness of the Workplace Hazardous Materials Information System (WHMIS) program, the following “four questions” should be used a measuring tool;

1. What is the name of the product you are using? Any worker using a controlled product must be aware of the product they are using.
2. What are the hazards associated with the product you are using? Effective safety and health, for the individual worker, can only be assured if that worker is aware of the hazards of the product(s) in use.
3. What are the emergency procedures for this product? Any worker using a controlled product must be knowledgeable in the effective emergency measures for the product including fire, spill, contact, etc.
4. Where can you find out more information regarding the product? Are workers aware that Safety Data Sheets (SDS) are available and are they aware of the location of the SDS information.

48.8. REFERENCE INFORMATION

[Safety Data Sheet Log Book](#)

[GHS Training Example](#)

[Chemical Inventory Log Example](#)

[GHS Secondary Label Example](#)

49. RESPIRATORY PROTECTION

49.1. PURPOSE

The purpose of the respiratory protection program is to ensure Kiewit's compliance with the respiratory protection provisions outlined in Canadian Standards Association (CSA) and provincial Occupational Safety and Health (OHS) requirements.

49.2. RESPONSIBILITIES

The Project Manager is required to implement the respiratory protection program.

Superintendents and Foremen

1. Must ensure that a hazard assessment and any emergency response procedures have been identified prior to work beginning, and accompanies the work plan onsite.
2. Workers wearing respiratory protection equipment have been trained in proper selection, care, use, and maintenance of the equipment and are competent in doing so.

Workers

1. Follow all health and safety standards, rules and regulations.
2. Report all hazardous conditions to the Supervisor immediately.
3. Wear or use prescribed protective equipment.
4. Complete a Quad Fold JHA before work begins.

49.3. CODE OF PRACTICE

Whenever an oxygen-deficient atmosphere or harmful dusts, fumes, mists, vapours or gases exist or are produced in the course of employment in quantities giving rise to harmful exposure of employees, these hazards are to be controlled by removing the employees from the exposure to the hazard, by limiting employees' daily exposure to the hazard and/or by application of engineering controls. Whenever these controls are not practical or fail to achieve full compliance, respiratory protective equipment shall be provided.

Each project will designate an individual to oversee the respiratory protection program for that job site. This individual will be suitably trained to identify hazards that require respirator use, select the proper respirator for the exposures present, and ensure that medical screening, fit testing and training are conducted in the required manner.

49.3.1. Selection, Maintenance and Use

This program is designed to provide instruction to any employees, contractors or visitors in the selection, maintenance and use of respiratory protective equipment whenever exposed to airborne hazards at Kiewit Industries. It includes the following elements:

- Hazard Identification, assessment and control
- Types of respiratory protective equipment
- Selection of respiratory protection equipment
- Use, care and maintenance of respiratory protection
- Fit Testing and Training Requirements
- Responsibilities
- Medical Surveillance

49.3.2. Approved Respiratory Equipment

Only respiratory equipment approved for the intended purpose shall be used and such equipment shall be approved by CSA or the U.S. National Institute for Occupational Safety and Health (NIOSH).

A wide variety of equipment can be used to protect workers from respiratory hazards. Generally, the equipment can be divided into two distinct classes: air-purifying respirators and supplied-air respirators.

Air-Purifying Respirator

An air-purifying respirator has an air-purifying filter, cartridge or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Supplied-Air Respirator (SAR) or Airline Respirator

A supplied-air or airline respirator is an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

Self-Contained Breathing Apparatus (SCBA)

A self-contained breathing apparatus is an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user. The quality requirements for breathing gas in closed-circuit SCBA are addressed in CSA Standard CAN/CSA-Z94.4. For diving operations, refer to CSA Standard CAN/CSA-Z275.2.

Combination Airline/SCBA

Combination airline/SCBA units are available for work in confined spaces and other high-risk assignments where reserve protection is required. The wearer's mobility is normally restricted by the tailing hose and the length of line available.

Filtering Face Piece (Dust Mask)

A filtering face piece is a negative pressure particulate respirator. In one type the filter is an integral part of the face piece and in another the entire face piece is composed of the filtering medium.

49.3.3. Respirator Equipment Selection

The correct respirator, certified by NIOSH, will be identified for each job. The respirator type will be specified in the Job Hazard Analysis by a qualified individual supervising the program. The individual issuing the respirator will be adequately instructed to ensure the correct respirator is issued. Each job site will have sufficient respirator models and sizes so as to be acceptable to and properly fit each user.

Immediately Dangerous to Life and Health (IDLH) Atmospheres: Only a full-face SCBA respirator with a minimum service life of 30 minutes, a pressure-demand supplied air respirator or a combination full face piece pressure-demand supplied-air respirator (SAR) with auxiliary self-contained air supply will be used in IDLH atmospheres.

Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

49.3.4. Medical Screening

Employees shall not be assigned to tasks requiring use of a respirator until it has been determined that they are physically able to do the work and use the equipment. A physician shall determine the qualification of each individual for use of a respirator. This may be done through the use of a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire. In instances where the response to the medical questionnaire or the initial medical exam demonstrates a need, there will be a follow-up medical examination. Employees shall be re-examined annually to ensure they can continue the use of respirators.

Pulmonary function testing is required for some workers by OHS standards. When these are required, accurate spirometry testing, interpretation and follow-up must be performed for the effective screening and surveillance of workers exposed to respiratory hazards. Pulmonary function testing is required for employees engaged in work where there is respiratory hazard present such as asbestos, benzene or coke oven emissions.

As well, pulmonary function tests may be required upon review of an employee's respirator medical evaluation, at the discretion of the reviewing licensed health care practitioner.

49.3.5. Fit Testing

Fit testing is required before the use of any respirator with a negative- or positive-pressure tight-fitting face piece. The test must be for the same make, model, style and size of the respirator to be used.

Because qualitative fit testing (QLFT) methods have been validated only for a fit factor of 100, a tight-fitting respirator operated in air-purifying (negative-pressure) mode can be tested by QLFT methods to validate a maximum assigned protection factor (APF) of 10.

The maximum APF that can be used for all tight-fitting respirators operated in air-purifying (negative-pressure) mode is 10 where a QLFT method is used.

49.3.5.1. Qualitative Fit Testing

Qualitative fit testing can be conducted for fit factors of up to 100 and a maximum APF of 10.

Qualitative fit testing will be accomplished by using the 3M FF-30 Qualitative Fit Test Apparatus. Safety personnel on the job site will conduct the testing. Fit testing will be conducted on an annual basis.

49.3.5.2. Quantitative Fit Testing

Quantitative fit testing must be conducted for fit factors above 100 and APFs above 10.

49.3.6. Education and Training

Employees shall be instructed and trained in the fitting (to include demonstrations and practice), wearing, need, use, sanitary care and limitations of the respiratory equipment they are to use. They will also receive training on the identification of factors that may limit or prevent the effective use of the respirator (facial hair, glasses and dental fixtures, for example).

At no time will employees be allowed to use a tight-fitting face piece when facial hair or any other factor that interferes with the sealing surface or valve function is between the sealing surface and the face piece.

Respirators shall be inspected before each use and shall not be worn when conditions prevent a good gas-tight face seal. Every respirator wearer will understand why a respirator is necessary, shall be instructed in how to properly fit and test respiratory equipment and will have full knowledge of the limitations and capabilities of the respirator.

- To assure proper protection, the face piece fit shall be checked by the wearer each time he/she puts on the respirator. This may be done by following the manufacturer face piece fitting instructions.
- Respirators shall be selected on the basis of the nature and extent of the hazards to which the worker is exposed. Work requirements and conditions shall also be factors considered in making the proper selection
- The chemical and physical properties of the contaminant as well as the toxicity and concentration of the hazardous material shall be considered in selecting the proper respirator.

Every worker required to use a respirator will be trained:

- To use the respirator effectively in emergency situations, including situations in which the respirator malfunctions
- How to inspect, put on and remove, use, and check the seals of their respirator (See Appendix A for reference)
- In the procedures for maintenance and storage of their respirator
- How to recognize factors that may limit or prevent the effective use of their respirator

Training will be conducted at least every two years for all individuals using respirators and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill
- Any other situation arises in which retraining appears necessary to ensure safe respirator use.

49.3.7. Seal Check

A user seal check must be done each time a respirator is donned. Before fit testing is done, the wearer must also do the user seal checks. Note that user seal checks are not substitutes for fit testing.

49.3.7.1. Negative Seal Check

The negative pressure seal check is done by closing off or blocking the inlet opening(s) of the air purifying elements of the respirator so that no air will flow into the face piece. The user then gently inhales and holds their breath for at least 5 seconds. The face piece should collapse slightly on the face and remain collapsed while the breath is being held. If this occurs, the test is successful. Otherwise, the user must verify the seal of the respirator to the face and adjust the face piece and harness and repeat the test. If the test cannot be successfully completed, the user should check the respirator face piece components for leakage or use a different brand/size of respirator.

49.3.7.2. Positive Seal Check

The positive pressure seal check is done by closing off or blocking the exhalation valve or breathing tube, or both, of the respirator so that no air will flow out of the face piece. The wearer exhales gently and checks for a slight positive pressure in the face piece. If no air leaks from the face piece while positive pressure is maintained, the test is successful. Otherwise the seal of the face piece must be checked and the harness adjusted and the test must be repeated. Again, if the user is not able to successfully complete this test, the respirator must be checked or another type tried.

49.3.8. **Maintenance, Sanitation and Storage**

All workers wearing respiratory protective equipment must be clean-shaven where the respirators face piece seals against the worker's face. Workers with facial hair, like beards, long sideburns, or even a two-day stubble may not wear respirators because the hair breaks the seal between the skin and the respirator mask. Wearing eyeglasses would also break the respirator seal. This means that the respirator mask will leak and not provide the needed respiratory protection.

Respiratory protective equipment that is not used routinely, but kept ready for emergency situations, must be inspected once per month by to verify its satisfactory working condition. Respirators must be:

- stored in a readily accessible location
- stored in a manner that prevents contamination
- maintained in a clean and sanitary condition
- inspected before and after every use to ensure it is in satisfactory working conditions
- maintained and used according to the manufacturers' specifications

All workers must follow the manufacturer's specific instructions for use, care, and maintenance of respiratory protection equipment.

49.3.9. **Respiratory Equipment Use**

The wearing of glasses creates special conditions that should be addressed by the project. Eyewear must not interfere with the proper sealing of the mask.

In areas where the wearer, could, due to the failure of the respirator, be overcome by a toxic or oxygen-deficient atmosphere, at least one additional person will be present at all times. Communication (visual, voice, signal line) will be maintained among all individuals present. Planning and safety considerations will be addressed in the Job Hazard Analysis. Suitable rescue equipment must be made readily available. Individuals using airline respirators in atmospheres immediately hazardous to life and health will be equipped with safety harnesses and safety lines for removal from the atmosphere if necessary. (See the Safety Manual section for Confined Space.)

49.3.9.1. **Identification of Filters, Cartridges and Canisters**

Kiewit will ensure that all filters, cartridges and canisters used in the workplace are labeled and colour-coded with the CSA or NIOSH approval label and that the label is not removed and remains legible.

49.3.9.2. Voluntary Respirator Use

Sometimes workers may wear respirators to avoid exposures to hazards even if the amount of hazardous substance does not exceed the limits set by provincial OHS standards. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. If employees provide their own respirator, they need to take certain precautions to be sure that the respirator itself does not present a hazard. Employees should do the following:

- Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning, care and warnings regarding the respirator's limitations.
- Choose respirators certified for use to protect against the contaminant of concern. Respirators must be certified by NIOSH or CSA. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
- Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapours or very small solid particles of fumes or smoke.
- Keep track of your respirator so that you do not mistakenly use one belonging to someone else.

49.4. RESPIRATORY PROTECTION PROGRAM MONITORING AND REVIEW

Continuous monitoring of the workplace as necessary to ensure the project respiratory program is being effectively implemented. The evaluation should include questions of employees required to use respirators to assess the employees' views on program effectiveness and to identify any problems. Any problems identified during this assessment shall be corrected. Factors to be assessed include, but are not limited to:

- Respirator fit (including the ability to use the respirator without interfering with effective workplace performance).
- Appropriate respirator selection for the hazards to which the employee is exposed.
- Proper respirator use under the workplace conditions the employee encounters.
- Proper respirator maintenance.

50. OCCUPATIONAL HYGIENE

50.1. PURPOSE

Occupational Hygiene monitoring on a project is essential to the detection, assessment and control of stresses at work that may have health effects in the short or long term. Such stresses may be chemical or physical in nature and specialized techniques are needed to evaluate and control them.

This program outlines how worker exposure hazards will be addressed in the workplace including the interpretation of technical data, conducting research and assisting in the development of guidelines and procedures that support workplace health and wellness.

Kiewit is committed to taking all measures reasonably necessary to protect workers from exposure to a hazardous biological or chemical agent because of the storage, handling, processing or use of such an agent in the workplace. The measures taken shall include the provision and use of both engineering and administrative control methods. Application

This code of practice is intended to provide a framework for managing silica dust in the workplace. This will be achieved through the implementation of an ongoing program consisting of silica hazard identification, evaluation, control, and worker surveillance.

50.2. GENERAL PROVISIONS

50.2.1. Testing

The Determining whether results from monitoring indicate an acceptable exposure level will be based on the Occupational Exposure Limits (OELs), accepted occupational hygiene practices and professional judgment. To help guide this determination, an action level will be used. The action level is the point at which hazard controls will be recommended and will be set at 50 percent of the applicable OEL, where there is little historical data present. Where sufficient historical data is available, the action level will be calculated using accepted occupational hygiene practices. Where occupational exposure limits do not exist, other recognized standards and professional judgment will be used to determine at which point hazard controls are required.

Where the exposure results are below the action level, the exposure level will be deemed acceptable. However, recommendations for controls may still be made to address worker comfort or due diligence issues.

Where the exposure results are above the action level, the implementation of, or modification to, hazard controls must be made. Where an OEL has been exceeded, the affected worker is to be informed of the nature and extent of the excess exposure and immediately protected from further excess exposures.

Where the exposure results cannot be clearly interpreted, further on-site exposure assessment will be required.

50.2.2. Environmental Hazards

A hazard may be chemical, biological or physical in nature:

- A chemical hazard is caused by any chemical capable of causing bodily injury or illness
- A biological hazard is caused by any biological organism that is infectious or pathological to humans
- A physical hazard is caused by sound, light, vibration or radiation that could result in an occupational injury or illness.

There are a number of occupational hygiene related hazards that have specific regulatory requirements. For these hazards, additional programs or standards require development and will work in conjunction with this program.

Specific procedures are required for the following:

- Asbestos
- Radiation
- Bio-safety
- Indoor environmental quality
- Mercury
- Silica
- Workplace Hazardous Materials Information System (WHMIS)

50.2.3. Hazard Elimination

Hazard elimination is the control of an environmental agent that has the potential to produce a risk to health. This can be achieved by:

- Eliminating the agent
- Reducing the exposure/dose produced by the agent to as low as is reasonably practicable

The options available to control emissions emanating from the source of an environmental agent are summarized in the occupational hygiene model.

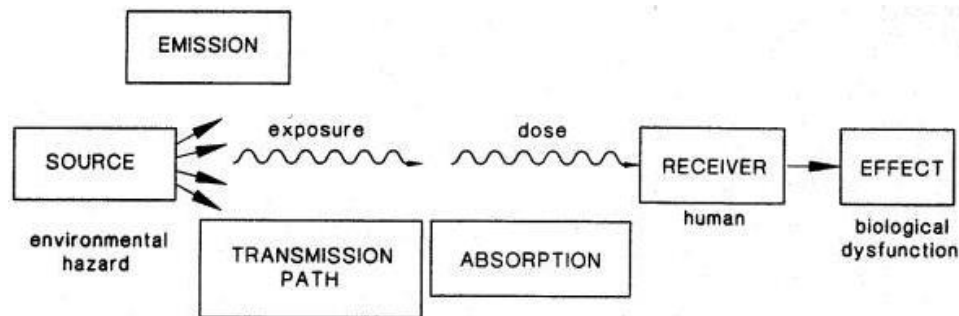


Figure 1: Occupational Hygiene Model

There are six domains where interception of, or reaction to, an environmental agent can occur; as shown by the boxes above.

50.2.3.1. **Source**

The source has the potential to release the environmental agent into the work environment. Can the source be eliminated or substituted with another less hazardous material? Can the entire process be changed to improve performance and, simultaneously, reduce the environmental hazard?

50.2.3.2. **Emission**

If the source is a chemical or biological material, can contamination from the source be controlled at the point of emission by means of enclosure (for example, the use of a chemical safety cabinet) or with local exhaust ventilation (for example, the use of a chemical fume cupboard)?

50.2.3.3. **Transmission Path**

Can the environmental agent be controlled along its transmission path by a physical barrier, by exhaust or supply ventilation, or by separating the source from the people by means of a very large distance? This last option lessens exposure by natural dilution for materials and by the inverse-square intensity reduction for physical agents (like sound and radiation).

50.2.3.4. **Absorption**

Can the significance of a potential exposure be reduced by absorption, which will minimize the passage of the environmental agent into the body? Personal protective equipment is an example of this control strategy. Another example is the use of an agent that lacks absorption or penetration properties. This is demonstrated in the use of irrespirable fibres in insulation material, and the use of soft radiation (which does not penetrate clothing or the skin) in tracer research.

50.2.3.5. **Receiver**

One aspect of receiver control is to set a minimum contact time in which a person is exposed to the agent. In a heat stress situation, an important control strategy is to limit the time in each hour that a worker spends in the hot environment. Similarly, in the case of occupational strains, great emphasis is placed on task variation on an hour-to-hour basis to limit the time spent in any one postural state. For those agents having an occupational exposure standard, receiver control action is to withdraw the worker from the process when exposure or dose limits are reached. Lead workers are traditionally transferred into 'low-lead' areas if their blood lead level reaches an established limit.

50.2.3.6. **Effect**

Effect control seeks to identify the presence of biological dysfunction. It is particularly useful for the mechanical, ergonomic and psychosocial factors where no quantifiable exposure standards have been established. For such factors, the detection of dysfunction in its early stages is an important mechanism for the identification of excessive exposures and/or the presence of the intolerant individual.

50.2.4. Hierarchy of Controls

Control measures vary in their effectiveness. The methods that are potentially the most effective are placed at the top of a preferred hierarchy of control options and used first, where practicable, in designing the hazard control system.

The interventions identified may be a mixture of the hierarchy in order to provide exposure that is as low as is reasonably practicable.

- Elimination is eliminating the hazard whenever possible.
- Substitution can be done by providing an alternative that is capable of performing the same task and is safer to use.
- Engineering methods achieve control without the need for active participation by the workforce and, as such, are generally considered the more effective.
- Administrative control methods rely on active management leadership and workforce participation to be effective.

The hierarchy of control can thus be listed as follows:

<i>Engineering</i>	<ul style="list-style-type: none"> • Elimination: the hazard is eliminated or de-energized. • Substitution: substitute a less potent hazard. • Isolation: effective segregation of the hazard from people by physical containment, guarding, shielding, ventilation, distance, etc.
<i>Administrative</i>	<ul style="list-style-type: none"> • Work procedures, training and supervision. • Personal protective equipment. • Receiver control by minimizing time of exposure. • Effect control through early intervention for reversible disease.

Engineering controls will be implemented where practicable. Where engineering controls have been implemented but personal protective equipment is still required, all employees will be trained on the use and maintenance of the equipment. See Personal Protective Equipment section.

Workers who come into direct contact with identified hazards as part of their job duties will be entered into a company-funded medical surveillance program. These examinations will be performed as per provincial and federal guidelines.

The Occupational Hygiene Program provides information to workers to allow for informed decision-making regarding exposure to hazardous agents in the workplace.

51. SILICA CODE OF PRACTICE

51.1. PURPOSE

Kiewit has a duty to protect their workers from silica dust exposure on construction projects during chipping, jackhammering, cutting, cleaning, grinding and drilling concrete, and when mixing grout. Studies show that when these operations are conducted without using dust controls, workers are exposed to airborne silica concentrations at levels far above the occupational exposure limits. Effective controls are available to protect workers from harmful exposure.

A combination of control measures will be required to achieve this objective. We commit to being diligent in our efforts to select the most effective control technologies available, and to ensure that the best practices, as described in this exposure control plan (ECP), are followed at our worksites.

The work procedures we establish will protect not only our workers but also any other workers on-site who are not involved in these operations. Due to the significant risk posed by respirable silica, it is critical that all personnel involved in operations that could potentially create silica dust take specific action to ensure that, as much as possible, a hazard is not created.

51.2. APPLICATION

This code of practice is intended to provide a framework for managing silica dust in the workplace. This will be achieved through the implementation of an ongoing program consisting of silica hazard identification, evaluation, control, and worker surveillance.

51.3. PROGRAM ELEMENTS

The silica management program shall consist of the following elements, at a minimum:

- Evaluation of exposure levels
- Dust control
- Dust hazard awareness training
- Personal protective equipment/respiratory protection
- Medical surveillance
- Record-keeping

51.4. RESPONSIBILITIES

Due to the significant risk posed by silica, it is critical that all personnel involved in operations that could potentially create silica dust take specific action to ensure that, as much as possible, a hazard is not created.

51.4.1. Employer

The employer is responsible for:

- Ensuring that the materials (e.g., tools, equipment, personal protective equipment) and other resources (i.e., worker training materials) required to fully implement and maintain this exposure control plan (ECP) are readily available where and when they are required.
- Providing a job-specific ECP for each project, which outlines in detail the work methods and practices that will be followed on each site. Considerations will include:

- Availability and delivery of all required tools/equipment
- Scope and nature of grinding work to be conducted
- Control methods to be used
- Level of respiratory protection required
- Coordination plan
- Conducting a periodic review of the effectiveness of the ECP. This would include a review of the available dust-control technologies to ensure these are selected and used when practical.
- Initiating sampling of worker exposure to concrete dust when there are non-standard work practices for which the control methods to be used have not been proven to be adequately protective.
- Ensuring that all required tools, equipment, and personal protective equipment are readily available and used as required by the ECP.
- Ensuring supervisors and workers are educated and trained to an acceptable level of competency.
- Maintaining records of training, fit-test results, crew talks, and inspections (equipment, PPE, work methods/practices).
- Coordinating the work with the prime contractor and other employers to ensure a safe work environment.

51.4.2. **Supervisor**

- The supervisor (foreman and lead hand) is responsible for:
- Obtaining a copy of the ECP from the employer, and making it available at the worksite
- Selecting, implementing, and documenting the appropriate site-specific control measures
- Providing adequate instruction to workers on the hazards of working with silica-containing materials (e.g., concrete) and on the precautions specified in the job-specific plan covering hazards at the location
- Ensuring that workers are using the proper respirators and have been annually fit-tested, and that the results are recorded
- Directing the work in a manner that ensures the risk to workers is minimized and adequately controlled
- Communicating with the prime contractor and other sub-contractors to ensure a safe work environment

51.4.3. Worker

The worker is responsible for:

- Knowing the hazards of silica dust exposure
- Using the assigned protective equipment in an effective and safe manner
- Setting up the operation in accordance with the site-specific plan
- Following established work procedures as directed by the supervisor
- Reporting any unsafe conditions or acts to the supervisor
- Knowing how and when to report exposure incidents

51.5. WHAT IS SILICA?

Silica is the basic component of sand and rock. The best known and most abundant type of crystalline silica is quartz. Some common silica-containing materials include:

- Concrete, concrete block, cement, and mortar
- Masonry, tiles, brick, and refractory brick
- Granite, sand, fill dirt, and top soil
- Asphalt-containing rock or stone
- Abrasive used for blasting

Silica is so common that any workplace activity that creates dust can expose workers to airborne silica.

51.6. SILICA DUST EXPOSURE

If you do any of the following activities, you are at risk of breathing silica dust:

- Chipping, sawing, grinding, hammering, or drilling of rock, concrete, or masonry structures
- Crushing, loading, hauling, or dumping of rock
- Many building demolition processes
- Power cutting or dressing stone
- Facade renovation, including tuck-point work
- Abrasive or hydro blasting of concrete
- Clean-up activities such as dry sweeping or pressurized air blowing of concrete or sand dust
- Tunneling, excavation, or earth moving of soils with high silica content

51.6.1. Health Hazards from Silica Exposure

- The disease initially causes fatigue and shortness of breath. If exposure continues, it can lead to chest pain, heart problems (difficulty breathing can strain the heart), and severe cough, respiratory failure and death.
- When the dust is inhaled deep into the lungs, microscopic particles of silica can cause scar tissue to form in the lung tissue, which restricts the lungs' ability to extract oxygen from the air. This damage is permanent, but symptoms of the disease may not appear for many years.
- Long-term or heavy short-term exposures to airborne silica dust can cause a disabling, sometimes fatal lung disease called silicosis.
- A worker may develop any of three types of silicosis, depending on the concentrations of silica dust and the duration of exposure:
 1. Chronic silicosis—develops after 10 or more years of exposure to crystalline silica at relatively low concentrations;
 2. Accelerated silicosis—develops 5 to 10 years after initial exposure to crystalline silica at high concentrations; and
 3. Acute silicosis—develops within a few weeks, or 4 to 5 years, after exposure to very high concentrations of crystalline silica.
- Exposure to crystalline silica has also been linked to other diseases, including bronchitis and tuberculosis.
- Crystalline silica dust (e.g., quartz dust) is also a carcinogen (cancer-causing).

51.7. RISK IDENTIFICATION AND ASSESSMENT

Kiewit commits to developing knowledge and expertise about these controls, and establishing policies/procedures to protect workers from harmful exposure and to minimize reliance on respirators. Effective engineering controls such as HEPA vacuum attachments and wetting methods, which control silica dust at its source, are readily available. These controls have been proven to reduce airborne dust levels significantly when selected and operated in accordance with best practices. We know that engineering controls alone do not reduce airborne silica to safe levels; so in most cases other control measures, including respiratory protection, will be necessary.

51.8. WORKER EXPOSURE MEASURES

The Occupational exposure limit (OEL) for crystalline silica (including quartz) is 0.025 milligrams per cubic meter (mg/m³). This is a concentration to which nearly all workers could be exposed for eight hours a day, five days a week, without adverse health effects. However, as a suspected carcinogen, crystalline silica is also an ALARA (as low as reasonably achievable) substance and exposures must be reduced to levels as low as reasonably achievable below the OEL.

Studies show that when construction work tasks involving the drilling, chipping, grinding, cutting, and sawing of concrete and concrete products are conducted without using effective dust controls, workers are exposed to airborne silica concentrations at levels far above the OEL.

If a contractor wishes to use dust control methods for which worker exposure data is not available, the employer may need to conduct air sampling in order to ensure that the control methods are adequate. Remember, workers can be exposed to silica dust during cleanup activities and may expose their families if contaminated clothing is improperly handled.

Kiewit will reduce or eliminate worker exposure to silica dust by selecting a combination of the following controls listed in order of preference:

1. Elimination and substitution
2. Engineering
3. Administrative
4. Personal protective equipment Requirements for Cast-In-Place Concrete

51.9. CONTROLS

51.9.1. Elimination and Substitution

We recognize the importance of planning the work in order to minimize the amount of silica dust generated.

- During the project planning phase, we will advocate for the use of methods that reduce the need for cutting, grinding, or drilling of concrete surfaces (e.g., formwork planning).
- Whenever possible, we will schedule work when concrete is still wet, because we know that much less dust is released at that time.

51.9.2. Engineering Control of Dust

Our dust control systems may employ three well-established techniques:

- Local exhaust ventilation (LEV)
- Wet dust suppression (WDS)
- Restricting or isolating the work activity with barriers or full enclosures (this may be the only option where LEV or WDS is not practical or effective)

51.9.3. Local Exhaust Ventilation (LEV)

When LEV is used in our work:

- Vacuum attachment systems to capture and control the dust at its source whenever possible.
- Dust control systems (used regularly and well maintained).
- Grinding wheels operated at the manufacturers' recommended rpm (operating in excess of this can generate significantly higher airborne dust levels).
- Retrofit shrouds or exhaust cowlings for corner grinding; use manufacturer-specified rpm speeds and a well-maintained HEPA vacuum.
- Diamond stone grinders, which allow for the use of a more efficient suction casing on the grinder, whenever practicable.

- HEPA or good quality, multi-stage vacuum units approved for use with silica dust. [The vacuum units should be capable of creating a target airflow of at least 70 cfm. This should achieve a face velocity at the shroud of about 1.3 m/s (260 fpm)—the higher the face velocity, the more dust captured at source.]
- Work planning, so that concrete grinding can be completed when wet (dust release can be significantly reduced).
- Good housekeeping work practices (for example, use vacuums with high-efficiency particulate air (HEPA) filters, or use wet sweeping).
- Train workers and supervisors on how to properly use and maintain the equipment.

51.9.4. **Wet Methods for Dust Control**

When water spray systems are used in our work:

- Pneumatic grinders will be used instead of electric-powered grinders if water is the method of control.
- Pressure and flow rate of water will be controlled in accordance with tool manufacturers' specifications (for cutting saws, a minimum of 0.5 litres of water per minute should be used).
- When sawing concrete or masonry, we will use only saws that provide water to the blade.
- Wet slurry will be cleaned from work surfaces when the work is completed, using a wet vacuum or wet sweeping.

51.9.5. **Barriers and Enclosures**

When barriers or enclosures are used in our work:

- The Superintendent will determine the type and design of barrier or enclosure (based on the work activity and the work area) and ensure it is constructed in accordance with the work plan. A control zone must be in place that includes adequate signage.
- We will use commercially available negative air units when constructing a full enclosure.

51.9.6. **Administrative Controls**

- Exposure control plans and the site risk assessment/work plan will be submitted to the general contractor prior to the start of work.
- We will establish procedures for housekeeping, restricting work areas, personal hygiene, worker training, and supervision.
- As part of our project planning, we will assess when silica dust may be generated and plan ahead to eliminate or control the dust at the source. We recognize that awareness and planning are key factors in the prevention of silicosis.
- Warning signs will be posted to warn workers about the hazards of silica and to specify any protective equipment required (for example, respirators).
- When practicable; work that generates silica dust will be conducted after hours, when access to other unprotected workers cannot be restricted.

51.9.7. Personal Protective Equipment

- Respiratory Protection - Refer to Respiratory Protection procedure
- Protective Clothing

Workers will wear protective clothing as specified in our task-specific safe work procedures to prevent contamination of worker clothing. Workers will not use compressed air to clean themselves, their clothing, or their equipment.

51.9.8. Education and Training

Kiewit will train all workers potentially exposed to airborne silica dust in the following:

- Hazards associated with exposure to silica dust
- The risks of exposure to silica
- Signs and symptoms of silica disease
- Safe work procedures to be followed (e.g., setup of enclosures, disposal of silica waste, personal decontamination)
- Use of respirators and other personal protective equipment (e.g., donning and doffing of personal protective equipment, and cleaning and maintenance of respirators)
- Use of control systems (e.g., LEV and wet methods)
- How to seek first aid (for example, the location and use of eyewash stations)
- How to report an exposure to silica dust

51.10. SAFE WORK PROCEDURES

Silica related tasks require Safe work procedures with task specific instructions, such as:

- Safe operation of all equipment, including dust control attachments and related equipment
- Vacuum maintenance
- Silica dust housekeeping procedures
- Worker decontamination procedures (i.e. hand washing)

Silica Safe Work Procedures

The work methods in the following table are acceptable, provided that the respirator selection is adhered to. The following control options will be used to eliminate or reduce the risk to workers from the hazards of silica dust exposure, unless air monitoring information suggests otherwise:

Power Tool	Dust Suppression	Respirator Type
Grinder	Hepa Vacuum Attachment	Respirator with P100 filters
Hand Drill	Hepa Vacuum Attachment	Respirator with P100 filters
Hammer Drill	Hepa Vacuum Attachment	Respirator with P100 filters
Gas Powered Saw	Water Suppression Attachment	Respirator with P100 filters
Coring Machine	Water Suppression Attachment	Respirator with P100 filters

Note: Silica monitoring should be conducted to establish the appropriate respiratory protection

51.10.1. Power Tool Procedure

- Select one or more of the methods described in the table above.
- Review the JHA and Site Specific Silica Exposure Control Plan and ensure all dust control equipment is available.
- Establish a control zone around the work area to restrict access to all workers (i.e. Caution: Silica Exposure Sign).
- Inspect all dust control equipment and tools to make sure they are in good working order.
- Use and maintain all tools as specified by the manufacturer.
- Ensure that workers inspect their respirators before start-up.
- Monitor dust release from equipment during use. When tools and equipment are working properly, very little dust should be visible in the air. Stop work if excessive dust is observed.
- Refer to Silica Dust Housekeeping Procedures.

51.10.2. Rock Crushing Procedure

- Review the JHA and Site Specific Silica Exposure Control Plan and ensure all dust control equipment is available.
- Establish a barrier around the work zone to restrict access by unprotected workers (i.e. Caution: Silica Exposure Sign).
- Inspect all water suppression dust control equipment to make sure everything is in good working order.
- Install water suppression equipment directed towards the pre-crush stock pile, crushing input, and the output conveyor belt.
- Use and maintain all water suppression equipment according to the manufacturer's specifications.
- Ensure that workers inspect their respirators before start-up.
- Monitor dust release from equipment during use. When tools and equipment are working properly, very little dust should be visible in the air. Stop work if excessive dust is observed.

51.10.3. HEPA Vacuum Maintenance Procedure (HILTI VC20U)

- Disconnect the supply cord plug from the power outlet.
- Open the two catches.
- Lift the vacuum cleaner top section away from the waste material container.
- Use a cable tie to close the plastic dust bag below the punched holes.
- Remove the plastic dust bag.
- Clean the waste material container.
- Fit a new plastic dust bag (see instructions printed on it) in the waste material container.
- Fit the vacuum cleaner top section onto the waste material container.
- Close the two catches.
- Dispose of waste materials to prevent secondary exposure.

51.10.4. Silica Dust Housekeeping Procedure

- Dry sweeping and the use of compressed air are prohibited for removing dust and debris containing silica. Work areas and equipment covered by dust will be cleaned at the end of every shift using a HEPA filter vacuum.
- Wet cleanup may also be used to remove dust.
- Waste material will be placed in a dumpster and will be removed at least weekly. The location and method used to store waste will not allow silica-containing dust to re-enter the workplace.
- Supervisors are responsible for ensuring that work areas are free from dust at the end of each shift.

51.10.5. Abrasive Blasting of Concrete Surface Procedure

- Abrasive blasting equipment shall be inspected and be in good condition before being put into service.
- Abrasive blasting equipment shall be used according to manufacturer recommendations.
- The Contractors shall develop blast cleaning procedures that identify and address health hazards associated with this work.
- Sand or any form of silica shall not be used for abrasive blasting.
- Wet abrasive blast cleaning should be used to reduce the quantity of dust.
- Contractors shall completely isolate blast cleaning work by barrier or canvas (hoarding material) and warning notices are posted
- Precautions shall be taken against electrostatic discharges. The metal casing and frame of the compressor and all other metal equipment in the area including scaffolding shall be grounded. Metal parts of the work piece shall be bonded together.
- All hoses shall be constructed of conductive rubber or be metal-braided to provide an electrical bond between hose and coupling. Hoses incorporating single bonding wires between couplings shall not be used
- The lance shall be fitted with a device” Dead man” controls should be installed on the lance that shut off the blast when released by the operator.
- Whip checks shall be installed on hose-to-hose connections
- The abrasive blasting equipment shall be kept under constant observation by the workers. The compressor shall not be left operating unattended
- Inspections, operation and maintenance of blast cleaning equipment shall be done by competent personnel assigned to the task.
- Safety helmets, overalls with hoods, gloves, safety boots, goggles or face visor, hearing protection and respirators/air hoods with a suitable protection factor shall be worn,
- All breathing air shall conform to the latest CSA Breathing Air Standard.

51.11. TRAINING AND EDUCATION

The site shall implement a comprehensive training program and will outline the content, delivery, evaluation and periodic review of training. The training program shall be developed by the employer and submitted to the Kiewit management for review. The content of the training program shall consist of both general and site-specific elements, including, but not limited to:

- Health hazards and potential risks of silica exposure
- Nature of silica exposure (tasks, procedures, equipment, processes and areas that could result in/contribute to silica exposure)
- Method of assessing and evaluating silica exposure
- Control of silica hazards, including engineering, administrative and personal protective equipment
- Safe work procedures for the handling, use and release of silica
- Personal hygiene procedures
- Overview of the Kiewit silica management program and its subcomponents
- Administrative processes related to medical reports, the handling of confidential information, communication and follow-up.

51.12. HEALTH SURVEILLANCE

For workers who are regularly exposed to silica dust, health monitoring and medical examinations such as lung function tests (LFT) and chest x-rays are highly recommended and should be considered for the early detection of potential changes to the respiratory system.

51.13. SILICA SPECIFIC BEST PRACTICES/SAFE WORK PROCEDURES

- | | |
|---|---|
| 1. Silica Decontamination Procedure | 16. Chipper – Flat Bit |
| 2. SCU Filter & Bin Cleaning | 17. Chipper Pointed Bit |
| 3. Vacuum Disposal & Filter Cleaning | 18. Grinder – Wire Wheel |
| 4. Clean Hoarding | 19. Exhaust Ventilation Duct Removal |
| 5. Hilti Grinder | 20. Air Monitoring |
| 6. Wet & Dry Disposal | 21. Anemometer Use |
| 7. Drilling with Hilti Drill | 22. Wash Rock |
| 8. Clean up Outside Containment | 23. Cutting Concrete |
| 9. Drilling with Air Drill | 24. Mixing Grout – Large Scale |
| 10. Full Face Respirator | 25. Mastercron Application |
| 11. Half Face Respirator | 26. Air Needler for Rebar Cleaning |
| 12. PAPR | 27. Cleaning concrete Grout off Misc. Metal |
| 13. Mixing Grout – Small Scale | 28. PAPR cleaning |
| 14. Hilti Vacuum Cleaning and Maintenance | 29. Mobile Silica Decontamination |
| 15. Air Hammer and Needle Gun | |

51.13.1. Other Applicable Forms and Information

1. Silica Risk Assessment Matrix
2. Silica Toolbox Talk
3. Site-specific silica exposure control plan
4. Silica Training & Awareness For

52. HYDROGEN SULPHIDE (H₂S)

Hydrogen sulphide is a powerful and deadly gas which smells like rotten eggs at low concentrations, and has a sweet smell at high concentrations. Workers should not rely on only the smell as a warning. At high concentrations, H₂S may overcome one's sense of smell. The result could be instant death. Long exposure to low concentrations will also deaden the sense of smell.

Kiewit's policy is to use breathing apparatus when the working atmosphere contains more than 10 ppm H₂S. Personal monitors alarm at 10 ppm. When the monitor alarms, evacuate to a safe area and let your supervisor know immediately. Do not attempt to re-enter the area without breathing apparatus. All employees working on sites where a risk of H₂S is present must be adequately trained.

52.1. WHERE IS HYDROGEN SULPHIDE FOUND?

H₂S is often found in oil and natural gas deposits, and in some mineral rock. It may also form when organic material such as manure or vegetable matter breaks down without oxygen. This may happen, for example, with sewage in a septic tank. H₂S is often a by-product in the making of pulp and paper, fertilizers, glues, dyes, plastic wrap, and other products.

Workers are likely to find H₂S in:

- The pulp and paper industry, where H₂S is a by-product of wood breaking down into pulp
- The petroleum industry, especially at oil and natural gas wells; in refineries, where H₂S is removed from natural gas and oil; and in pipelines used to carry unrefined petroleum
- The construction industry, where H₂S could be released during excavation work in swamps or old landfills
- Sewers, sewage treatment plants, manure tanks, and other places where organic material breaks down without oxygen
- Iron smelters, coke ovens, and other places where H₂S may be a by-product
- In some mines and tunnels where mineral rock may contain H₂S

52.2. H₂S WARNING SIGNS

With high levels of H₂S, poisoning can be swift and deadly with little warning. A worker who is not wearing protective equipment may pass out quickly. The body may tremble, and death may follow in seconds or minutes as a result of breathing failure. Recent evidence has shown irreversible brain damage from acute high doses.

At lower levels of the gas, the following symptoms may appear a few minutes after exposure, or be delayed for several hours:

- Eye irritation - soreness, light sensitivity, seeing "rainbows" around bright lights, or a gritty pain with a spasm of the eyelids known as "gas eye"
- Breathing irritation - sore nasal passages; sore throat; a tight, burning feeling in the chest; or fluid buildup in the lungs
- Other symptoms - headache, confusion, nausea, disorientation, or vomiting

52.3. PHYSICAL PROPERTIES

H₂S is explosive. It will ignite and explode when subjected to a spark or ordinary flame, in any concentration from 4% to 44% of the air. It is also soluble in water and oil, so it may flow for a considerable distance from its origin before escaping above ground, or in an entirely unexpected place. Because the vapour (gas) is heavier than air, it may travel for a long way until ignited and then flash back towards the source.

- Color: H₂S is a colorless gas.
- Odor: H₂S has a distinctive offensive smell commonly referred to as rotten eggs. If this smell is detected, leave the area immediately. DO NOT rely on your nose as a detection device.
- Density: H₂S is heavier than air, beware of low lying areas.
- Explosive limits: H₂S will explode mixed with the right proportion of air.
- Flammability: H₂S will burn with a distinctive blue flame; this produces another hazardous gas, sulphur dioxide.
- Solubility: H₂S will dissolve in liquids.

52.4. SAFE EXPOSURE LEVELS

OH&S Permissible Exposure Limit (PEL) for a ceiling concentration is 10 ppm hydrogen sulphide, a level which may not ever be exceeded without respiratory equipment.

Toxicity:

1-5 PPM	Smell of "rotten eggs"
10 PPM	8 hour occupational exposure limit.
20-150 PPM	Nose and throat feel dry and irritated, eyes sting, itch. Prolonged exposure may cause coughing and shortness of breath.
150-200 PPM	Rapid loss of smell.
200-250 PPM	Major irritation to the nose, throat, lungs, headache, nausea, vomiting and dizziness. Prolonged exposure can cause fluid build-up in lungs which can be fatal.
300-500 PPM	Symptoms same as above but more severe. Death can occur in 1-4hours.
500 PPM+	Immediate loss on consciousness, death is rapid, sometimes immediate.

52.5. H₂S AND PREVENTATIVE MEASURES

The hazards and potential for employee exposure inherent in these operations require the following:

1. Perform a hazard analysis that includes atmospheric testing to address the hazards of the process and engineering and other control measures to ensure worker safety, including a complete evaluation and assessment of process systems handling waste products, by-products, and/or un-reacted process components. Recommendations made, including recommended engineering changes, should be promptly implemented.
2. Assure that work plans and written procedures are clear and that they provide complete instructions for the safe performance of work activities.
3. Assure that employees, including contract employees, are trained in applicable procedures and safe work practices, and that the employees understand and adhere to the current operating procedures of the process.
4. All work performed where there is actual H₂S can only be performed under a safe work permit.
5. Pre-entry atmospheric testing is required prior to entering areas with potential H₂S exposure.
6. Atmospheric monitoring is required at all times, by way of personal and or static monitoring devices.
7. Emergency evacuation, response/rescue plans must be in place prior to work in potential H₂S exposure areas.

While the risk of incidents cannot be entirely eliminated due to un-intentional release, these procedures and practices will reduce the potential for exposure to H₂S.

52.5.1. Engineering Controls

Systems that contain H₂S, or have the potential to contain it, must be completely assessed to ensure that valves capable of releasing the H₂S to the atmosphere are permitted to be opened only when absolutely necessary, and that are then vented to a safe location. The valves must also be capable of being locked out.

Sewer systems for draining tanks or drums which present potential exposure to H₂S should be constructed so that they are closed, vented to a safe location, or not opens to the atmosphere. Alternatively, appropriate respiratory protection should be worn before these systems are used.

A valve configuration on an industrial process should be such that only the valves used for routine use as part of the normal process are readily capable of being opened. If the valves are required to be opened for occasional shut down operations, they must be locked and tagged in the closed position to preclude erroneous opening during routine operations.

Valves that must remain available for immediate use in emergency operations should be clearly labeled as such, so that they are not inadvertently opened during operations.

52.6. MONITORING AND DETECTION EQUIPMENT

Personnel working in areas where there is potential exposure to H₂S must be supplied with personal monitoring equipment. Alternatively, stationary monitors could be installed. Personal or stationary monitors must be capable of sounding an audible alarm or warning.

Wind direction should be monitored for proper upwind muster point location. This can be accomplished by use of wind socks.

52.7. SIGNAGE AND LABELLING

Where H₂S is present all piping and valves that carry the gas must be clearly identified. Workers must also have easy access to the safety data sheet (SDS) for H₂S. Wherever an H₂S exposure or release is possible, warning signs bearing “Hydrogen Sulfide” plus precautions must be posted just outside or at the entrances to the area.

52.8. RESPIRATORY PROTECTION

Respirators must be provided when effective engineering controls are not feasible, or while they are being instituted, when such equipment is necessary to protect the health of the worker.

Under circumstances where individuals may be exposed to an unknown concentration of hydrogen sulphide or some other hazardous chemical, back-up personnel with appropriate respirators and emergency equipment must be present.

- Air-purifying respirators (APRs) must not be used where H₂S levels are above the 10 ppm Ceiling Limit. These respirators, when fitted with the appropriate acid-gas cartridges, may be used for escape only.

The protection factor of APRs, with the proper filter cartridges, can approach or exceed the IDLH for H₂S (100 ppm). Concentrations above the IDLH can quickly block a worker’s sense of smell, so the worker would not be able to smell the gas if it seeped in around the respirator seal or penetrated through the filters.

- In areas with high H₂S levels or where an H₂S leak has occurred, workers must wear one of the following two types of breathing protection:

1. Positive-pressure, self-contained breathing apparatus (SCBA)

This consists of an air cylinder, which is normally worn on the back, and a full-face mask to protect the eyes and face. A hose connects the face mask to the regulator and the air cylinder. “Positive pressure” means that the air pressure in the mask is higher than the air pressure outside the mask. This reduces the chance of toxic gases entering the face piece.

2. Positive-pressure, supplied-air (airline) respirator

This consists of an airline attached to a regulator and a full-face mask. The worker must also wear an “escape” air bottle to allow escape if the air supply is cut off.

At sites with a high risk of exposure, workers must have easy access to escape respirators, or must carry them while working. An SCBA must be used for escape

where workers might have to flee from high H₂S levels or over long distances where escape air-purifying respirators would not provide enough protection.

Review the Respiratory Protection procedure for additional information on this topic.

52.9. **TRAINING**

All current and new employees on jobs with H₂S in the area should receive training in SWPs covering all aspects of the job, with emphasis on safe work practices. Where appropriate, training should also include field observations (on-the-job training) by qualified supervisory personnel, including verification that workers have satisfied the training requirements.

Training must include H₂S hazards identification, elimination and control methods as well as exposure and emergency requirements.

52.10. **CONFINED SPACE**

Confined Spaces must be tested, ventilated, and confirmed safe before workers enter them.

Whenever a worker enters a confined space, such as a tank, the worker must follow strict work practices, including a permit system. Make sure that the Confined Space Entry Standard is followed, that the air is continually monitored for the presence of H₂S, and that an attendant is stationed outside a confined space. Both of the worker in the confined space and the worker stationed outside should wear supplied air and lifelines. In addition, rescue equipment must be immediately available.

Review the Confined Space Code of Practice for additional information on confined space requirements.

52.11. **EMERGENCY RESPONSE**

Site specific emergency response planning must be developed for operations and areas with potential H₂S exposure. Emergency response planning must take into account the following:

- H₂S Monitoring and Detection
- Emergency communication and coordination with offsite emergency services.
- Rescue Plan
- Muster/Emergency Assembly areas – multiple locations to account for wind direction/upwind location.
 - Wind direction should be monitored to ensure the proper upwind muster area.
- Emergency Response Drills – testing the preparedness and effectiveness of the plan.

Review the Emergency Preparedness procedure for additional information on the topic.

52.12. FIRST AID

If H₂S causes the eye irritation, stinging or watering, see the first aid attendant. Flush the eyes with lukewarm water immediately, for at least 30 minutes. If the eyes keep itching, see a doctor as soon as possible.

If a worker is overcome by H₂S:

- To attempt a rescue in an area with high H₂S levels, wear only a positive-pressure, self-contained breathing apparatus (SCBA), or a full-face, supplied air (airline) respirator with an “escape” air bottle.
- Move the worker to fresh air and give oxygen, if available.
- If the worker is having trouble breathing or is not breathing, start assisted ventilation using a pocket mask, and add oxygen to the mask if available. If the worker has no pulse, begin cardiopulmonary resuscitation (CPR). Because the body rids itself of H₂S if removed from the exposure, it is critical to continue to give the worker assisted ventilation with oxygen until medical aid arrives.

Transport the worker to the nearest hospital as soon as possible.

53. HEXAVALENT CHROMIUM

53.1. PURPOSE

It is our policy to protect our employees from exposure to Hexavalent Chromium exposures that may be encountered while welding or torch-cutting on stainless steel or chromium-containing materials. All employees who perform work operations which put them at risk for Hexavalent Chromium exposure will be covered by the requirements outlined in this section.

Before working around operations which expose workers to Hexavalent Chromium, all parties will be properly trained on how to follow the procedures outlined in this section.

53.2. SCOPE

All parties that perform welding or torch-cutting on stainless steel or chromium-containing materials will be covered under this program.

53.3. DEFINITIONS

Base metal: Pipe, plate, or other material configuration used to create physical structure requiring welding

Confined Space: A confined space, for purposes of this procedure, can be defined as a space in which air flow is extremely limited (Ex: Inside of a tank or vessel, a manhole, etc.). Classifying a space as having confined air flow may or may not constitute a non-permit or permit confined space. A separate assessment should be used for this purpose, in accordance with Kiewit Confined Space requirements.

Cr(VI): Hexavalent Chromium

Engineering Controls: A means of mitigating a hazard that changes the process in order to reduce employee exposure. An example of this would be the use of a fume extractor, not PPE.

FCAW: Flux Core Arc Welding. A wire feed welding process that uses a shielding gas from a flux contained within the tubular electrode with or without the use of additional shielding gas

Filler metal: Material used in the metal arc process to join base materials

GMAW: Gas Metal Arc Welding - Continuous wire fed process (MIG, metal inert gas)

GTAW: Gas Tungsten Arc Welding (TIG, heli-arc)

HEPA Filter: A high efficiency filter that is capable of removing up to 99.97% to a particle size of 0.3 microns.

Open air: No air restrictions or enclosure (Free air)

Overall Chrome Content: highest potential amount of overall chrome content when factoring base material combined with filler metals

Restricted air: Some restricted air movement (such as inside a building, an open top vault, welding hooch, or non-confined temporary structure such as hording which in many cases will be used to protect welding electrical arc.

SMAW: Shielded Metal Arc Welding (stick)

WPS (Welding Procedure Specification): Document used to provide technical information regarding welding

Welding classification: Specific welding operation identifier (WOI)

Welding process: Specific mode of introducing filler metal to base materials being joined

WOI: Welding Operation Identifier (% chrome, process, environment)

53.4. **RESPONSIBILITIES**

53.4.1. The Project Manager will be responsible for implementation of the program.

53.4.2. Superintendent's responsibilities include:

- Identify activities/operations which require the implementation of the Hexavalent Chromium Program
- Coordinate with the safety department to determine whether operation will require additional air sampling
- Create a detailed, written plan (Job Hazard Analysis), to include:
- Engineering controls that will be used or required by the potential exposure
- Type of respiratory protection that will be required by the job
- Conduct Initial Training with each affected employee, using the "Hexavalent Chromium Training Checklist".
- Conduct any necessary refresher training in order to ensure that all parties are able to comply with the requirements of this procedure
- Enroll affected employee's in onsite medical surveillance

53.4.3. Safety Manager's responsibilities include:

- Ensure initial training of Hexavalent Chromium Mitigation Program is conducted
- Data tracking of employee exposures found on Hexavalent Chromium Mitigation Checklists
- Ensure that continuous air monitoring and data collection is being conducted where necessary.

53.5. PROCEDURE

53.5.1. Classification of Processes

Due to the extensive amount of procedures which will be covered under this procedure, a classification system using Similar Exposure Groups (SEGs) will be used. The information that will be used to determine chrome content and the welding process used will be found on the Welding Procedure found in the Work Pack. The WPS will provide parties with the chrome content.

Kiewit will use the following system to determine each identifier for similar exposure groups, when identifying Hexavalent Chromium welding classifications: # - Letter - Letter;

Example: 1OF (group 1, open air, Flux core process)

Overall Chrome Content – To determine the first character in the Welding Operation Identifier (WOI), the filler and base materials will be classified using the following group numbers.

Group 1: Chrome content less than 10%

Group 2: Chrome content greater than 10% but less than 20%

Group 3: Chrome content greater than 20%

Environment – The following identifiers will be used to describe the environment in which a process will take place. This classification should always default to the more restricted classification, if there is any doubt in determination.

O – Open air, no restrictions for welding gas to naturally clear area

R – Restricted air; some barrier creating restriction for welding gases to naturally clear area (Ex: Welding hooch)

C – Confined Space; a space in which air flow is extremely limited (Ex: Enclosed Tank or Vessel)

Process – The type of welding will influence the degree of exposure.

S – Stick (SMAW)

T – TIG / (GTAW)

G – Gas metal arc (GMAW)

F – Flux core, wire feed (FCAW)

A table of all of the potential Welding Operation Identifiers can be found on the matrix located at the end of this procedure. Once the WOI has been identified, refer to this

matrix to determine the control measure for the work being performed. Further description of each Control Measure can be found in Section 46.5.3 of this procedure.

53.5.2. **Exposure Controls**

Provincial OHS standards and good industrial hygiene practices require the use of engineering controls as a primary means of abatement for chromium exposures. For welding, local exhaust ventilation is a recognized engineering control. Local exhaust ventilation, such as fume extractors, is able to eliminate the contaminant at the source and prevent significant exposure when properly used. A best practice in any Hexavalent Chromium generating process would be the use of local ventilation to prevent exposure, in addition to required controls.

Once the option to use engineering controls has been exhausted, the Project will rely on personal protective equipment for protection from hexavalent chromium exposures. Respiratory protection is a requirement of this procedure in the Yellow and Red control levels of Hexavalent Chromium exposure. Because hexavalent chromium is linked to lung cancer, workplace exposures must be reduced to levels that are as low as reasonably achievable. More stringent respiratory requirements are in place for higher exposures due to the limited amount of protection provided by particular styles of respirators.

Skin absorption is a route of exposure for some liquids and leaching agents containing hexavalent chromium. Dusts and debris generated during welding activities is not a concern for skin absorption, but should be dealt with in a manner consistent with general hygiene practices for workers engaging in welding activities.

In any control measures where a barricade is necessary, signage shall also be used to warn other workers of the hazard at a safe distance from operations generating exposure to Hexavalent Chromium.

53.5.3. A specific set of requirements is in place for each of the three Control Measure Classifications. They are as follows:

CONTROL MEASURE GREEN

- Proper Washing and Hygiene Practices

CONTROL MEASURE YELLOW

- Half-Face N95 Respirator (Minimum)
- Barricade 10' from CrVI Operation
- Proper Washing and Hygiene Practices

CONTROL MEASURE RED

- Half-Face N95 Respirator at Minimum, Verify Historical Data before Use

- Barricade 10' from CrVI Operation
- Confined Space Requirements, if necessary
- Proper Washing and Hygiene Practices

53.6. **HYGIENE PRACTICES**

53.6.1. **General**

Working around Hexavalent Chromium, in any concentration, requires several good hygiene practices. When welding or cutting on a material controlled under this procedure, these practices must be followed:

Do not smoke, chew tobacco, eat, or drink, near an activity which releases Hexavalent Chromium.

Do not store food, drink, cigarettes, or chewing tobacco near an activity which releases Hexavalent Chromium.

Wash hands after working with materials where contamination of Hexavalent Chromium may occur. Workers may use portable hand wash stations with soap and water, or skin-cleaning agents such as Hygenall, LeadTech wipes, or similar products.

After work has completed a HEPA Vacuum will be made available for employees to clean their clothing and/or PPE. Vacuum use for personnel should be focused towards removing loose debris that may have accumulated near the head, neck, hands, and boots.

Clean your respirator after use by using a respirator wipe. Do not store reusable respirators with spent filters intact.

53.6.2. **Disposal of Contaminated Materials**

Used respirator cartridges, disposable respirators, and HEPA vacuum filters or pre-filters will be placed in general waste containers. Historical Toxicity Characteristic Leaching Procedure (TCLP) Analysis has revealed that these wastes do not have any accumulate any detectable quantities of Hexavalent Chromium.

53.6.3. **Medical Surveillance**

Medical monitoring will be provided for all employees who will work in Control Measure **Yellow** or **Red** for at least 30 days in a year. This medical monitoring will be provided within 30 days of an assignment that will result in an annual 30-day exposure. The medical examination will be repeated no less than annually if exposure continues, as well as within 6 months of employee termination.

The Superintendent will inform the Safety Department of new employee's in need of medical surveillance in order to ensure that employees undergo surveillance promptly.

A physician or other licensed health care professional will determine the content of the medical examination. At minimum the examination will include:

A medical and work history with emphasis on exposures and symptoms of

hexavalent chromium

A physical examination of the skin and respiratory tract

53.6.4. **Monitoring**

Exposure determination was initially conducted based on OSHA's 29 CFR 1926.1126(d)(3) Performance Orientated Option. This is the basis of the classification system, or Similar Exposure Groups (SEGs), used to classify the operations covered under this procedure.

Kiewit will periodically monitor exposures of Hexavalent Chromium as deemed necessary to validate historical data, control measures, or when a new material or process is introduced that cannot be logically placed into an existing Similar Exposure Group.

53.7. **TRAINING**

All employees will be trained on the Hexavalent Chromium Mitigation Procedure prior to performing work that could result in Hexavalent Chromium exposure. Additional training will take place as needed to ensure that the program is understood by all covered parties.

Training must include the following:

- The contents of the Hexavalent Chromium Provincial OHS standard standards
- Hexavalent Chromium hazards, control measures and PPE
- Worker responsibilities and safe work procedures for specific Hexavalent Chromium related tasks.
- The purpose and a description of the medical surveillance program

53.8. **RECORDKEEPING**

Each worker engaged in medical surveillance will be added to a record to ensure that follow-up medical surveillance takes place in a timely manner.

Hexavalent Chromium Mitigation Matrix

W.O.I

Open Air		
1OS	less than 10% chrome, open air, stick	Maintain Ventilation; Proper Washing and Hygiene
1OF	less than 10% chrome, open air, flux core	Half-face N95 respirator; Proper Washing and Hygiene
1OT	less than 10% chrome, open air, TIG	Maintain Ventilation; Proper Washing and Hygiene
1OG	less than 10% chrome, open air, Gas metal arc	Maintain Ventilation; Proper Washing and Hygiene
Restricted Air		
1RS	less than 10% chrome, restricted, stick	Maintain Ventilation; Proper Washing and Hygiene
1RF	less than 10% chrome, restricted, flux core	Half-face N95 respirator; Proper Washing and Hygiene
1RT	less than 10% chrome, restricted, TIG	Maintain Ventilation; Proper Washing and Hygiene
1RG	less than 10% chrome, restricted, Gas metal arc	Maintain Ventilation; Proper Washing and Hygiene
Confined Space		
1CS	less than 10% chrome, confined space, stick	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
1CF	less than 10% chrome, confined space, flux core	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
1CT	less than 10% chrome, confined space, TIG	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
1CG	less than 10% chrome, confined space, Gas metal arc	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
Open Air		
2OS	between 10% and 20% chrome, open air, stick	Maintain Ventilation; Proper Washing and Hygiene
2OF	between 10% and 20% chrome, open air, flux core	Half-face N95 respirator; Proper Washing and Hygiene
2OT	between 10% and 20% chrome, open air, TIG	Maintain Ventilation; Proper Washing and Hygiene
2OG	between 10% and 20% chrome, open air, Gas metal arc	Maintain Ventilation; Proper Washing and Hygiene
Restricted Air		
2RS	between 10% and 20% chrome, restricted, stick	Half-face N95 respirator; Proper Washing and Hygiene
2RF	between 10% and 20% chrome, restricted, flux core	Half-face N95 respirator; Proper Washing and Hygiene
2RT	between 10% and 20% chrome, restricted, TIG	Maintain Ventilation; Proper Washing and Hygiene
2RG	between 10% and 20% chrome, restricted, Gas metal arc	Maintain Ventilation; Proper Washing and Hygiene
Confined Space		
2CS	between 10% and 20% chrome, confined space, stick	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
2CF	between 10% and 20% chrome, confined space, flux core	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
2CT	between 10% and 20% chrome, confined space, TIG	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
2CG	between 10% and 20% chrome, confined space, Gas metal arc	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
Open Air		
3OS	over 20% chrome, open air, stick	Maintain Ventilation; Proper Washing and Hygiene
3OF	over 20% chrome, open air, flux core	Half-face N95 respirator; Proper Washing and Hygiene
3OT	over 20% chrome, open air, TIG	Maintain Ventilation; Proper Washing and Hygiene
3OG	over 20% chrome, open air, Gas metal arc	Maintain Ventilation; Proper Washing and Hygiene
Restricted Air		
3RS	over 20% chrome, restricted, stick	Half-face N95 respirator; Proper Washing and Hygiene
3RF	over 20% chrome, restricted, flux core	Half-face N95 respirator; Proper Washing and Hygiene
3RT	over 20% chrome, restricted, TIG	Maintain Ventilation; Proper Washing and Hygiene
3RG	over 20% chrome, restricted, Gas metal arc	Maintain Ventilation; Proper Washing and Hygiene
Confined Space		
3CS	over 20% chrome, confined space, stick	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
3CF	over 20% chrome, confined space, flux core	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
3CT	over 20% chrome, confined space, TIG	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene
3CG	over 20% chrome, confined space, Gas metal arc	Half-Face N95 Respirator, confined space requirements as needed, Proper Washing and Hygiene

PROACTIVE SAFETY PROGRAMS (Sections 54-62)

54. CRAFT VOICE IN SAFETY (CVIS)

54.1. PURPOSE

Craft Voice in Safety (CVIS) creates a culture where everyone has a voice. Craft are taking care of craft, in a partnership with management, through ownership, communication and prevention to achieve our goal of “Nobody Gets Hurt”.

54.2. SCOPE

When implementing CVIS program on a project, projects must follow these guidelines and ensure they follow the Kiewit CVIS manual.

54.3. ROLES AND RESPONSIBILITIES

54.3.1. Craft Voice in Safety (CVIS):

- Two types of CVIS members: ON tools, OFF tools;
- On or off tools depends on the project’s needs; and
- All CVIS members report directly to project management.

54.3.2. CVIS Member Guidelines

- Lead by example;
- Assist in organizing CVIS events;
- Communicate incident findings;
- Have the responsibility for bringing craft recommendations to every CVIS meeting, including field challenges and wins;
- Maintain and support safe work practices and procedures at all times, in all work areas;
- Mentor new hires;
- Develop personal relationships with craft;
- Take a leadership role in safety training:
 - There are many different ways to incorporate CVIS into the culture of a project.
 - CVIS must be introduced and explained at the orientation stage.
 - Other opportunities for CVIS members, including: Mass Meetings, Tool Training and Safety Rodeos.
- Recognize and communicate safety challenges to the committee and management;
- Assist in the development and review of programs and policies;

- Correct unsafe conditions and behaviors in the field at a peer-to-peer level;
- Be the liaison between senior management and craft to facilitate a One Team approach;
- Be proactive, guide and motivate fellow craft towards a more positive safety culture;
- Communicate achievements/accomplishments to the project; and
- Protect confidentiality of information:
 - CVIS members need to be able to build trusting relationships with the craft.
 - Members will not disclose confidential information when issues are reported.
 - CVIS will not broadcast any private CVIS information (including photos) on social media.
 - The end goal is to separate the issue from the individual, so we are able to address any corrective actions without fear of discipline or retaliation.
- Pictures will be taken only to promote a positive safety culture and permission should be granted before taking someone's picture.

54.3.3. CVIS Chairpersons and Co-Chairs Responsibilities

- Run meetings in an orderly and timely fashion;
- Ensure meetings are conducted in a respectful manner;
- Limit discussions exclusively to safety-related topics;
- Make sure all members are heard and engaged;
- Mentor and train CVIS members;
- Delegate CVIS tasks;
- Provide positive leadership;
- Facilitate communication between shifts;
- Act as a liaison to management;
- Follow up on action items and;
- Take a leadership role in all other CVIS duties to ensure the committee is effective;
- Develop a group CVIS e-mail distribution list; and
- Promote CVIS participation with subcontractors.

54.3.4. CVIS Do's

- Be approachable and available;
- Be the voice of your peers;
- Address issues (good & bad) with individuals/crews immediately;
- Provide on-the-spot feedback;
- Close out issues in a timely manner, and report actions during the weekly meeting;
- Respond to each suggestion – either positive or negative – while providing explanations for the response;
- Ensure that a manager attends each meeting;
- Document management attendance in the minutes;
- Communicate positive safety efforts;
- Communicate the CVIS meeting minutes and distribute them across the project;
- Maintain a positive relationship with management;
- Be a problem solver;
- Treat everyone equally;
- Make adjustments as needed if plans/policies are not working effectively; and
- Establish communication with other CVIS committees.

54.3.5. CVIS Don'ts

1. Don't be a disciplinarian;
2. Don't become a safety cop; and
3. Don't forget where you came from (craft).

54.3.6. Traits of a Good CVIS Member

Ideal CVIS members are:

- Positive and influential;
- Recognized as safety champions by peers;
- Strong leaders with the desire to make a difference;
- Appropriately knowledgeable about their trade;
- Proactive and motivated;
- Watches out for their team naturally;
- Responsible both on- and off-site;
- Participate and engage in all aspects of safety;
- Great listening and communication skills;
- Willing and able to learn while keeping an open mind; and
- Respectful

54.3.7. Foremen / Superintendents

- Allow CVIS members enough time to perform their duties;
 - CVIS Meetings;
 - CVIS walks with management;
 - Training;
 - Safety Rodeos;
 - Orientation.
- Make recommendations for CVIS members;
- Support and promote the CVIS culture – this is key to the success of the program;
- Deliver and discuss CVIS-supplied items; and
- Ensure that CVIS action items are addressed appropriately and in a timely manner.

54.3.8. Senior Management

- Ultimate responsibility for the success of the program based on support and promotion;
- Provide a cost code to ensure CVIS members can perform CVIS functions to relieve costs from operations;
- Attend weekly meeting between CVIS and senior management (Project Manager, Assistant Project Manager or Construction Manager);
 - All efforts should be made to have the same manager attend CVIS meetings.
- Listen and help resolve items brought forward by CVIS members in a timely manner;
- Along with CVIS, will collectively decide on an appropriate amount of weekly time, support and resources to carry out duties;
- Promote the CVIS culture with clients (clients may sit in on meetings from time to time);
- Share incident reports company-wide from each project;
- Provide a suitable location for the meetings;
- Provide information about upcoming work or operations;
- Provide feedback and reasons why decisions are made on action items;
- Allow CVIS to run the meeting;
- Provide members with training, mentorship and coaching;
- Allow CVIS to get involved in preventative mitigation measures on the project (pre-incident, risk reduction, pre-planning); and
- Conduct chairman evaluations every six months.

54.4. RECRUITMENT, SELECTION AND REPRESENTATION

54.4.1. Initial Start-Up

Before establishing a CVIS committee, the project must start with one of the following options (listed in order of preference):

1. **Start with an experienced CVIS member; or**
2. **Appoint an appropriate craft supervisor in a temporary (3-6 months) role to kick start the program; or**
3. **Project manager selects two leaders from the craft to start the program.**

54.4.2. Establish Committee

- Initial start-up of the CVIS committee will begin when the first craft is hired;
 - After the 10th craft person is hired, a chairman will be named.
 - With more than 10 craft, the committee will have one representative from each trade.
- After initial start-up, committee is responsible for electing the remaining members;
- Members should be craft employees in a non-supervisory role;
- A CVIS team should be diverse; ideally with someone from each trade, shift and major subcontractor;
- The number of people on the committee should be contingent with the needs of the project;
- CVIS members are chosen and voted in from a volunteer or recommended list;
- Recommendations for potential CVIS members are encouraged from everyone (before voting on membership, a conversation should take place with the candidate to see if they want to participate);
- Chairman and/or co-chairs are voted on once the committee is established by CVIS members.;
- Quality over quantity is the priority in developing the CVIS team;
- It is recommended that new committees should review best practices from other CVIS teams on other projects;
- Subcontractors (partners) will be involved:
 - Major subcontractors (to be determined by the project) will have a member on the committee, and
 - All subcontractors are welcome to participate in meetings and/or become full members of the CVIS committee.
- CVIS members should be visibly identifiable; and

- CVIS members will wear a blue safety vest or a black hard hat, both to have the CVIS logos; and
- Each project will have a CVIS board with photos of the members placed in a highly visible area (i.e., orientation or lunch room).
- CVIS member training (recommended).
 - Speak Up / Listen Up; and
 - Relevant nobodygetshurt.com modules.

54.4.3. Reason to Remove a CVIS Member from the Committee

- Member is not meeting the expectations of the committee as identified, based on CVIS roles and responsibilities.

54.4.4. Removal Process of a CVIS Member

- Member is not meeting expectations and is talked to by chairman/co-chair;
- Improvement plan is discussed; and
- Management is advised of the action taken.

If no improvement is observed by the committee by the next meeting the member is scheduled for, the committee votes to remove or keep the member;

The above process applies for both regular members and the chairman/co-chair.

54.4.5. How to Monitor and Measure CVIS Effectiveness

- A review of committee and member effectiveness should occur a minimum of two times per year;
- Determine whether or not concerns are being brought to the table; Determine whether or not concerns are being brought to the table;
- Monitor the status of action items through items being closed; and
- Conduct a survey to determine the construction crafts' view of the CVIS program (as needed).

54.4.6. A CVIS Committee Member's Length of Service

- Rotate members every 3-6 months;
- Chairman may keep key/core members longer, if needed to maintain the integrity of the committee;
- Former CVIS members may be reinstated;
- Recommendation is a 20% maximum rotation at one time; and
- All members are expected to recommend a replacement.

54.4.7. Pros of Term Limits

- Former members continue to build the CVIS culture in the field;
- Helps the committee to stay fresh; and
- Prevents burn out.

It may not be in your best interest to rotate the subcontractors every three months. Any member may step down at any time. The expectation is for a replacement to be recommended.

54.5. MEETINGS: STRUCTURE AND AGENDA

54.5.1. How Often

- CVIS committee is to meet weekly – multiple meetings may be needed to include each shift; and
- At the discretion of the CVIS chairman and project manager, based on the project needs or requirements (brain storming sessions for campaigns or policy reviews, etc.).

54.5.2. Who Attends

- All efforts by CVIS members need to be made to attend all meetings;
 - If unable to attend, notice needs to be provided to the chairman by a CVIS member or supervisor as soon as possible. The member will provide any information that he/she has gathered from the field to be presented at the meeting; and
 - Minutes will be provided to all members of the committee for review.
- One consistent senior management representative (project manager, assistant project manager or construction manager is required to attend the weekly meetings;
- CVIS may allocate a certain amount of time without management involvement, if required to discuss action items or facilitate CVISspecific discussions;
- A safety representative is strongly encouraged to attend the weekly meetings;
- There is an open invitation to all subcontractor representatives to attend the weekly meetings; and
- Meeting minutes are to be taken by a non-CVIS member to allow all members to remain engaged in the meeting.

54.5.3. How to Handle Multiple Shifts

- One chairman or individual leader for normal five (5) and two (2) working rotations;
- When able, there should be one cross-shift meeting held for day and night shifts;
- On a rotation job or turnaround schedule, there should be multiple co-chairs leading multiple meetings; and

- When the above options are not feasible, communication (i.e., phone call, e-mail, notes) are to be provided to other CVIS members.

54.5.4. **Agenda**

Meetings shall be structured in an efficient manner, allowing for all relevant topics to be addressed as noted below:

A. Call to Order

- Introduce any new members or guests;
- Delegate a note taker for the meeting minutes (not a CVIS member);
- Document start time of meeting in the minutes; and
- Remind members of time constraints and the importance of staying focused on the meeting discussion/topics.

B. Sign In

- Document attendees and absentees on meeting minutes; and
- Address Absenteeism after the meeting.

C. Introduction of New Business and Round Table

- Members are to share a brief description of any new items; and
- Discussion for each new item is to take place during the open table forum and should be short and to the point.

D. Review Status of Old Business

- Review status of old business and identify areas that are open, closed or in progress; and
- Provide an update on open action items that have been open for a long period of time and may require more attention.

E. Open Table Discussions

- Review new business items slated for discussion in greater detail;
- Action items will be prioritized and addressed by individuals assigned by the team; and
 - Action items must be corrected or addressed within the defined time frame.
- Additional items to be discussed during CVIS meetings include: project incidents, trends, upcoming risks, construction update, challenges and proactive initiatives.

- F. Delegation of upcoming meetings or assignments to an individual (i.e., safety call, mass meetings, follow up, safety rodeo, action item, etc.)

54.6. CVIS COMMUNICATION

Effective communication and documentation of CVIS efforts is a crucial step in the organization and implementation of the CVIS program. CVIS communication vehicles include:

- Mass safety meetings with CVIS involvement
- Participate in craft orientation presentation;
- CVIS members schedule to be communicated by management;
- CVIS information boards located in orientation room and other strategic areas;
- Content to be posted on CVIS information boards; and
 - Photos of CVIS members;
 - Meeting minutes (updated);
 - Upcoming events (safety training); and
 - Anonymous input (i.e., suggestion box or white boards).
- CVIS forms of communication to the project.
 - Newsletters
 - Bulletin board
 - TVs (camp's closed circuit TV)
 - Flyers
 - Banners
 - Nobodygetshurt.com
 - Safety rodeos
 - Mass meetings
 - Milestone events/BBQs

54.6.1. CVIS Documentation

The CVIS group will maintain a project CVIS information binder that will include:

- An up-to-date description about the minutes;
- A copy of the CVIS manual;
- CVIS achievements; and
- Contact information for CVIS members and others (safety, supervision)

54.7. CVIS BEST PRACTICES

- Be patient with the evolution of CVIS - it takes time to evolve;
- Network with other CVIS committees;
 - 1st Choice: a few members of the new CVIS team to visit a mature CVIS program (committee members, supervision, safety); or
 - 2nd Choice: have an experienced/ successful CVIS member visit your project.
- Nobodygetshurt.com is a good resource for CVIS committee members;



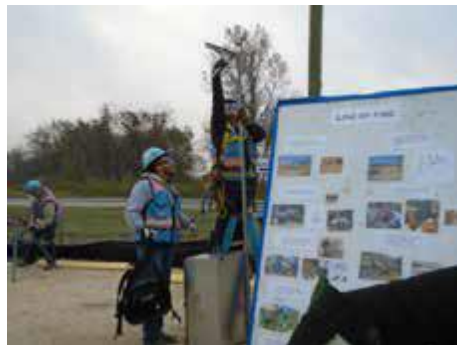
- CVIS committees should have no more than 15 members at one time during a weekly meeting (ratio = 1:20);
- At a minimum, each trade should have one representative on the CVIS committee;
- Use a CVIS note pad to document craft concerns;



- Post a "You asked. We did." board;

You Asked...	We Did.	You Asked...	We Did.
Weekly Mass Meetings	CVIS is now MFTSDC (week of Mass Meetings) implementation Review the current situation progress with CVIS to discuss what's working and what's not. Add make the necessary changes to the program and roll-out to the other areas. Implementation Team will continue to implement and provide the next. Example Review the ongoing progress for the next 30 days come to the implementation Our CVIS roll-out with members with their help. They will review their experience with their own review. Implementation Management to review CVIS members. Implementation	CSAs	90% of our CSAs are now in the field. Implementation Implementation in CVIS meetings and events. Implementation Focus on members in the field. Implementation 1 per day. Implementation Implementation in the field. Implementation
Mentor Program	Review the ongoing progress for the next 30 days come to the implementation Our CVIS roll-out with members with their help. They will review their experience with their own review. Implementation Management to review CVIS members. Implementation	DSRs, Safety Tours	Partners from (CSAs/MS) individuals are appearing about something specifically from another perspective. Implementation Safety Tours. Some improvement opportunities, Safety to take safety in the safety from individual and monitor on how to that more improvement opportunities. Implementation Bring to look at particular use case for leading practices. Implementation Get more feedback from CVIS on safety improvement opportunities. Implementation Developed ideas for implementation on field. Implementation
CVIS	CVIS is now and MFTSDC (week of Mass Meetings) implementation Review the current situation progress with CVIS to discuss what's working and what's not. Add make the necessary changes to the program and roll-out to the other areas. Implementation Team will continue to implement and provide the next. Example Review the ongoing progress for the next 30 days come to the implementation Our CVIS roll-out with members with their help. They will review their experience with their own review. Implementation Management to review CVIS members. Implementation	Safety Campaigns	Partners from (CSAs/MS) individuals are appearing about something specifically from another perspective. Implementation Safety Tours. Some improvement opportunities, Safety to take safety in the safety from individual and monitor on how to that more improvement opportunities. Implementation Bring to look at particular use case for leading practices. Implementation Get more feedback from CVIS on safety improvement opportunities. Implementation Developed ideas for implementation on field. Implementation
Mining The Diamond	CVIS is now and MFTSDC (week of Mass Meetings) implementation Review the current situation progress with CVIS to discuss what's working and what's not. Add make the necessary changes to the program and roll-out to the other areas. Implementation Team will continue to implement and provide the next. Example Review the ongoing progress for the next 30 days come to the implementation Our CVIS roll-out with members with their help. They will review their experience with their own review. Implementation Management to review CVIS members. Implementation	Orientation/Training	Partners from (CSAs/MS) individuals are appearing about something specifically from another perspective. Implementation Safety Tours. Some improvement opportunities, Safety to take safety in the safety from individual and monitor on how to that more improvement opportunities. Implementation Bring to look at particular use case for leading practices. Implementation Get more feedback from CVIS on safety improvement opportunities. Implementation Developed ideas for implementation on field. Implementation
Detailed Execution Plans (DEP)	CVIS is now and MFTSDC (week of Mass Meetings) implementation Review the current situation progress with CVIS to discuss what's working and what's not. Add make the necessary changes to the program and roll-out to the other areas. Implementation Team will continue to implement and provide the next. Example Review the ongoing progress for the next 30 days come to the implementation Our CVIS roll-out with members with their help. They will review their experience with their own review. Implementation Management to review CVIS members. Implementation	SOS Program	Partners from (CSAs/MS) individuals are appearing about something specifically from another perspective. Implementation Safety Tours. Some improvement opportunities, Safety to take safety in the safety from individual and monitor on how to that more improvement opportunities. Implementation Bring to look at particular use case for leading practices. Implementation Get more feedback from CVIS on safety improvement opportunities. Implementation Developed ideas for implementation on field. Implementation
JRAs	CVIS is now and MFTSDC (week of Mass Meetings) implementation Review the current situation progress with CVIS to discuss what's working and what's not. Add make the necessary changes to the program and roll-out to the other areas. Implementation Team will continue to implement and provide the next. Example Review the ongoing progress for the next 30 days come to the implementation Our CVIS roll-out with members with their help. They will review their experience with their own review. Implementation Management to review CVIS members. Implementation	FFI	Partners from (CSAs/MS) individuals are appearing about something specifically from another perspective. Implementation Safety Tours. Some improvement opportunities, Safety to take safety in the safety from individual and monitor on how to that more improvement opportunities. Implementation Bring to look at particular use case for leading practices. Implementation Get more feedback from CVIS on safety improvement opportunities. Implementation Developed ideas for implementation on field. Implementation

- Build a relationship with front line supervision;
- Host CVIS safety rodeos;



- 99% of CVIS members should be ON tools in the field;
- CVIS members should always be training their replacement;
- Once CVIS, Always CVIS (stickers or shirts) for graduated members;



- Public speaking skills desirable when selecting CVIS members;
- CVIS should provide an update at JV meetings;
- CVIS members work with everyone from every trade;
- CVIS 5-minute video (helps clarify what the program is all about); and
- CVIS participation in the New Hire

55. RISK REDUCTION TASK FORCE

55.1. PURPOSE

The purpose of this policy is to provide guidelines for implementing an effective Risk Reduction Task Force (RRTF) continuous improvement program.

55.2. SCOPE

All Staff and Craft are able to participate in RRTF efforts which are supported by Management, Supervision, Safety and CVIS.

RRTF empowers the craft to identify potential risks in their operations and challenges them to come up with improvements that eliminate or reduce the risks identified.

This allows the craft to effect change in the workplace and eliminate risks before incidents have the potential to occur.

55.3. ROLES AND RESPONSIBILITIES

55.3.1. Project Manager

The Project Manager is responsible to ensure this policy is being carried out on their worksite.

55.3.2. Supervisors

Each supervisor will ensure that the employees are familiar with the program. The supervisor will ensure Staff and Craft are trained and understand the RRTF process.

Supervisors will encourage RRTF in their operations and coach workers on identifying and eliminating risks.

Supervisors will review craft recommended RRTF ideas and ensure the appropriate action plans are initiated to reduce the identified risks; including modification of plan/process, alternate tools or equipment, revision and/or development of Safe Operating Procedures, additional training, etc.

Supervisors will ensure the Risk Reduction Template is completed for each Risk Reduction.

55.3.3. Employees

All staff and Craft workers are responsible to ensure that they review the tasks that they are to perform to determine if an alternate safer method can be done. Whether the task involves process, tools/equipment used, PPE required, and Safe Operating Procedures.

Employees will then review their risk reduction initiative with their supervisor and ensure appropriate mitigation is implemented to reduce the risks identified.

55.4. **TRAINING AND IMPLEMENTATION**

Training for Risk reduction is provided by supervisors by means of communication, in the form of toolbox talks, PTI's, and ongoing coaching in the field on identifying and mitigating risk.

55.5. RISK REDUCTION TEMPLATE/EXAMPLE

RISK REDUCTION TASK FORCE

Date: February 25, 2015

Task: Weighing materials

Current Process: At the warehouse, workers receive a lot of freight. One of the first checks when lifting boxes is a test lift.

Hazard Identified: Workers were doing a rough guess on the weight of the material for some materials. Workers had no way of identifying over weight materials.

Corrective Measures: Warehouse organized a weigh scale station to accurately identify the weight of materials. Workers will also label the material with the weight for others to reference.



56. DROPPED OBJECT PREVENTION

56.1. OBJECTIVE

It is the objective of Kiewit to completely eliminate dropped objects and drop hazards on every project through the implementation of a Stop the Drop Program.

56.2. SCOPE

This procedure establishes minimum expectations in order to mitigate the risk of damage to property or personnel done by dropped or falling objects. It is the expectation that all tools and materials that could be considered drop hazards are secured with primary and secondary drop prevention systems.

56.3. BACKGROUND

Kiewit is consistently striving to create a safer workplace for its employees and stakeholders. According to the Canadian Bureau of Labor Statistics, there were 52,260 injuries due to falling objects in the last reporting period, 2014. This means that an injury caused by a dropped object occurs every ten minutes in the Canada. This number is steadily increasing year to year. "Struck by falling object or equipment" fatalities are up 6% year over year according to the most recently available data. As an organization committed to safety, Kiewit expects that all its employees must focus on actions and procedures to prevent falling and/or dropped objects. Every project must incorporate and implement these procedures into their work plans.

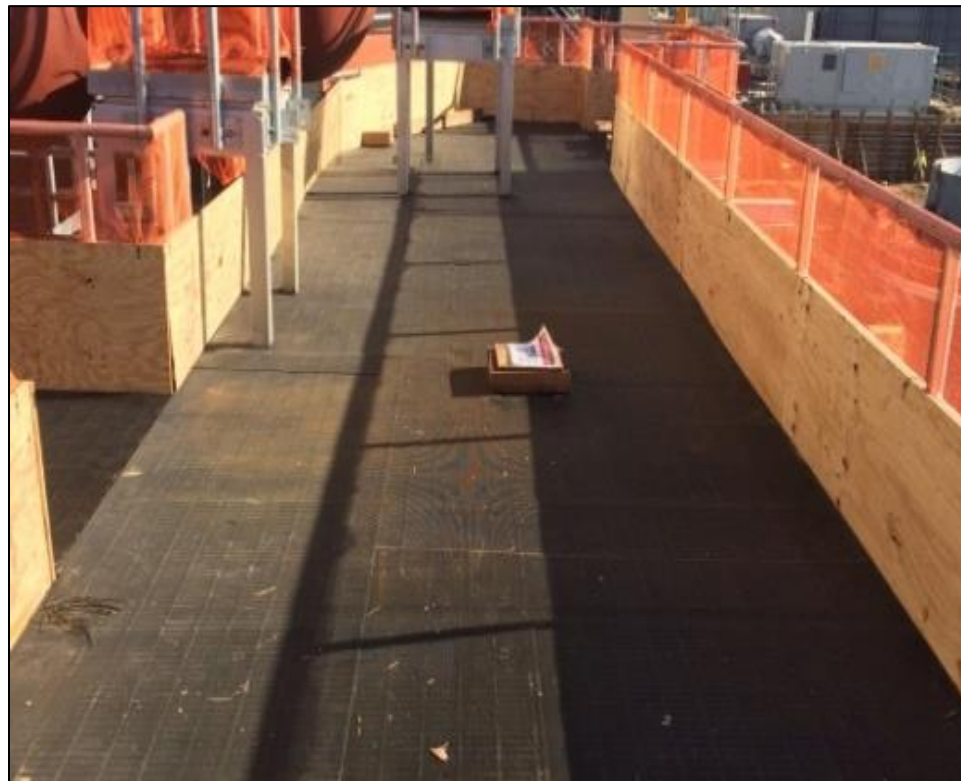
Hand tools and materials can become drop hazards in three ways:

1. During usage when vigorous use and other factors can cause the user to lose control of the tool.
2. During transportation of tools to or from location of work, collisions, lack of control and other factors can cause tools to be dropped.
3. After use tools can be unintentionally left behind or placed aside on the working surface where they are no longer secured or being controlled.

56.4. DEFINITIONS

56.4.1. Primary Drop Prevention System

Fully decked work surface with no openings larger than 1". The deck must have handrails, toe boards, and safety netting (secured at top and the bottom) or plywood installed at the handrail and toe board. All work is performed inside the handrails.



Secondary Drop Prevention System

Secondary Drop Prevention Systems are when the potential to drop and object is 6' or over and the Primary Drop Prevention System is not in place. This system utilizes devices to secure a tool or object to an employee or stationary structure. Examples of a Secondary Drop Prevention System are tool lanyards/tethers, tool pouches, tool belts, tool holsters, spill control buckets, additional tool attachment points, etc.

Drop Hazard

Any tool, material or object that has an opportunity to fall from elevation to a lower level causing potential for damage to property, injury or death.

Mitigation

The elimination or reduction of the frequency, magnitude, or severity of exposure to risks by the minimization of the potential impact of a threat or warning.

Anchorage

A secure point of attachment for lifelines, lanyards or deceleration devices that are independent of the means of supporting or suspending a person.

Attachment Point

A device designed and utilized for creation of a connection point on a tool to which the user can connect a tether or lanyard. Examples may include D-Rings with Quick Wrap Tape and/or Heat Shrink, Quick Spins, etc. These devices are to be considered part of a Primary Drop Prevention System. All attachment points must be certified as third party tested for dynamic load by the manufacturer.

Tool Lanyard/Tether

An extension made of durable material that is designed to prevent an object from being dropped. These will typically utilize a connection point on either end of the tether for securing an object to a worker or stationary item. These devices are to be considered a Primary Drop Prevention System. All tool lanyards must be certified as third party tested for dynamic load by the manufacturer.

Tool Bucket

A bucket designed for the purpose of carrying tools and materials. These tool buckets must be capable of being closed and secured in order to prevent the contents of the tool bucket from being spilled out. All tool buckets being utilized by Kiewit Power Constructors must utilize a closure system. They also must be load rated and third party tested for static load by the manufacturer. These devices are to be considered a Primary Drop Prevention System.

56.4.2. Tool Pouch

A bag or pouch that is designed to secure its contents (nuts, bolts, nails, screws, small hand tools, etc.) from being spilled or dropped. Many tool pouches allow the user to remove a tool for

use while preventing it from becoming a drop hazard through use of tethers, retractables, etc. These devices are to be considered a Primary Drop Prevention System.

Tool Holster

A bag or pouch designed to secure single tools or items (hammers, wrenches, levels, radios, bottles, etc.) in order to keep them easily accessible while, in use with other necessary components, preventing them from becoming drop hazards. These devices are to be considered a Primary Drop Prevention System.

Tool Belt

A device that is designed to ergonomically support and manage other dropped prevention items such as, lanyards/tethers, pouches, and holsters on the person of the worker. These devices, while in use with other necessary components that prevent attached objects from becoming drop hazards, are to be considered a Primary Drop Prevention System. All tool belts must be third party tested for static load by the manufacturer.

Controlled Access Zone (CAZ)

An area with potential to be impacted by drop hazards currently present in a work-in-progress above. These CAZ's are to be secured with red rope, red chain or hard barriers to prevent unauthorized entry. Barricades must have signage stating the hazard stating the hazard and who to contact for information. CAZ must be used with tool tethering systems and are a Secondary Drop Prevention System. **Safety Net**

A device installed beneath work-in-progress to catch falling objects or personnel. These devices are to be considered a Secondary Drop Prevention System.

Tool Canopy

A structure designed to rest over an area that is capable of withstanding the impact force of dropped objects or tools. This structure is to be considered a Secondary Drop Prevention System.

Static Load

Maximum Static Load, or Tensile Strength, refers to the maximum load an object can withstand before failing. This measurement does not take into account Drop Distance or Velocity.

Dynamic Load

Maximum Dynamic Load refers to the load an object can withstand without failing when dropped from a specified Drop Distance. Maximum Dynamic Load is usually much less than Maximum Static Load due to the dramatic increase in force caused by the velocity of a falling object.

Hierarchy Of Controls

Tools

1. Eliminate the hazard – work to be complete on the ground instead of heights
2. Prevent the hazard – work to be complete at heights inside of a primary protection system.
3. Prevent the hazard – work to be completed at a heights and 6' or greater from an unprotected edge where something could fall.
4. Tool Tethering – work will be completed at heights with tools that are tether ready from the manufacturer.
5. Tool Tethering – work will be competed at heights with aftermarket or site installed tool tethers.

Materials

1. Work will be completed on the ground
2. Materials will be stored 6' or more from edge
3. Small tools and materials stored within 6' of the edge should be kept in bags with drawstrings or zippers for top closures
4. If material are required to be stored for more than one shift, netting will be substituted for plywood.

LSA Safeguards

- Are tools secured from dropped objects using approved tethers and materials?
- Have tool tethers and dropped objects equipment been inspected?
- Is the area below the dropped object hazard (CAZ) properly barricaded/signed?
- Are people inside the CAZ while work is occurring at heights?
- Is edge protection in place on handrails, floor openings and penetrations?
- Are matierals stored in a manner to prevent dropped objects?

RESPONSIBILITIES

Management/Supervision is responsible for:

- a. Communicating the expectation that dropped objects will be eliminated and ensuring that this procedure is implemented.
- b. Coordinating assessments to ensure implementation and effectiveness of these guidelines.
- c. Ensuring employees have appropriate equipment and materials to implement the procedure effectively.
- d. Ensuring workers have necessary opportunity for required training.

Safety is responsible for:

- a. Communicating this procedure and supporting information to applicable employees.
- b. Conducting assessments to evaluate the procedure's effectiveness.
- c. Conducting necessary training with applicable employees.

All Employees are responsible for:

- a. Notifying his or her supervisor of any drop hazards within their scope of work.
- b. Conducting work only once all drop hazards have been eliminated or properly mitigated.
- c. Stopping work if hazardous conditions prevent the job from being done safely.
- d. Immediately reporting any dropped or fallen objects.
- e. Including potential drop hazards in Job Hazard Analyses and Pre-job Planning

TRAINING

All employees working at heights must be trained on Authorized User Training on Dropped Objects hazard control and identification. The training must include:

- a. The nature of drop hazards and dropped objects in the workplace
- b. Correct procedures and equipment use for drop prevention
- c. Purpose and application of applicable Primary and Secondary Drop Prevention Systems
- d. Proper storage and handling of equipment and materials at height
- e. Reporting requirements for incidents and near misses
- f. Proper use of tethers on various tool.
- g. Training must include requirements for extreme housekeeping.

Training Frequency

Authorized User Training for Dropped Objects need to be take every two years, provided the policy, procedures, types of fall protection or equipment have not changed. If the policy, procedures, fall protection or equipment have changed the training will be required at the time of the changes.

If at anytime an employee is not performing up to the standards of the Authorized User Training for Dropped Object, they may require supplemental training or possible re-training.

PRIMARY DROP PREVENTION SYSTEMS CRITERIA

Eliminate Drop Potential

- Fully decked work area with no gaps larger the 1"
- Handrail, toe board, and netting secured top and bottom
- All work happens with the handrail

Below are types of Primary Drop Prevention Systems

Safety Netting

In applications where the utilization of safety nets are necessary, nets should be designed specific sized webbing approved by the manufacturer for use based on the specific task, location and type of tools/materials being used. Forged steel safety hooks or shackles will be used to fasten the net to its supports. Nets should be installed as closely below the work in progress as is deemed practicable, but never more than 25 feet below. Safety nets shall be hung, maintained and tested in accordance with the manufacturer's instructions as well as the requirements set forth by the Occupational Safety and Health Administration found in CFR 1926.502. Nets designed for use to prevent falling objects shall not be used as fall protection for human beings. These nets may be deployed below fall protection nets in these cases. When falling object nets are used alone, signs will be posted informing employees that "Fall Protection is still required in work areas above placed netting." Inspections of safety netting should occur weekly and defective netting will not be deployed.

Toe Boards

When being used as a secondary drop prevention system, toe boards will be erected along the edge of overhead work in order to protect employees below. Toe boards will be capable of withstanding a force of at least 50 lbs. in any downward or outward motion. Toe boards will be at least 3 ½ inches tall with no greater than ¼ inch clearance over the working surface.

Controlled Access Zones (CAZ)

Controlled Access Zones are to be clearly marked with red rope, red chain or hard barricades to restrict access. Supervisor over the operation will ensure barricades and signage are in place. No one will access the CAZ while work is being conducted overhead, this includes workers from that crew. CAZ for overhead hazards are 10' with a 1' for every additional 10'. For example: Crew working at 32' in elevation will require a 12' CAZ. That being said the area will need to be assessed for deflection.

Guardrail Systems

If guardrail systems are to be engaged as a secondary drop prevention system, they will need to be inspected to ensure any openings are not large enough for tools or materials to pass through.

HUMAN PERFORMANCE

Extreme Housekeeping

Trash and waste should be kept in appropriate bins that are to be placed in convenient locations across the workplace. When at height, these are to be stored in tool buckets, pouches, etc., with a system that closes and prevents spillage until the material can be properly stored in a waste bin. Employees should clean as they go, and maintain an orderly work area, resulting in a lower chance for dropped material. Tools and other materials should also be kept in an organized, orderly fashion.

Material handling and Trash removal from elevations:

- Trash and materials being raised or lowered from elevated decks will be loaded into skip boxes or other containers designed for hoisting;
- No materials shall be stacked or piled higher than the lowest side of the container;
- The skip box or container shall be rigged with a 4 way bridle and the rigging shall be inspected daily;
- All gin wheels shall be installed and inspected by the scaffold department and shall have the load rating on the wheel. The area below the hoisting wheel will be barricaded while hoisting is in progress;
- No material, tools or any other objects will be thrown or tossed;
- Trash cans will be established at all decks and will be collected and dumped into a skip box for removal from the decks;
- Plastic buckets will not be used to hoist material;
- Material and work tables will not be placed against hand rails or areas exposed to leading edges without first installing hard barricades to prevent un-intentional dropping.

All elevated landings equipped with a removable barricade will have an exclusion zone barricade and designated tie off points for the workers rigging the material. This barricade will have significant signage and all zero tolerance policies will apply.

Barricade tape will be removed as soon as the operation is complete and the hazard no longer exists.

Before moving any heavy materials or equipment onto elevated decks, the superintendent shall verify that the decks will support the weight of the material along the entire length of the chosen path.

Crews working on scaffolding will clean up, sweep off if needed, scaffold decks prior to tear down of the scaffold.

Best practise is to have trash chute system at heights with segregated waste bins below.

Extreme Access

Access will be planned prior to starting work, and the access plan will be developed in the detailed execution plan. When possible, access will be attached to structures prior to the load being lifted into place. Cords and leads are to be elevated to reduce tripping hazards. Cord hangers will be used on columns when possible. Cords and leads that cannot be elevated will be covered with cord protectors in walkways to prevent trip hazards.

Scaffolding request forms will be utilized and be submitted to the scaffolding superintendent prior to scaffolding being needed.

Access will be discussed in the daily coordination meetings.

Tool and Material Storage

Where tools or materials are stacked higher than the edge of the toe boards, screening or paneling will be constructed from the working surface to the top of the guardrail or mid-rail. This will be done for a sufficient distance to ensure these objects will not have an opportunity to become drop hazards. Unless guardrails with screening or paneling have been erected, materials should not be stored within four feet of the leading edge. All stacked materials should be stable and self-supporting.

Positive tool transfer should be utilized by employees. When transferring a tethered tool from one employee to another, “100% tie off” should be engaged. The tool should be tethered to the passing employee. Prior to handing off, the receiving employee should connect their tether to the tool as well. After positive connection has been completed, the passing employee may disconnect their tether from the tool. By utilizing this passing method, the tool never had an opportunity to become a drop hazard.

Open Holes

A hole is a gap or void six inches or more in its least dimension, in a floor, roof, or other walking/working surface. All open holes must be protected by either a guardrail system or cover. Covers are to be secured, marked with “HOLE” or similar markings, and be able to support 2x their intended load. Personal fall protection is required around open holes that have a fall greater than 6' (1.8M) and cannot be protected by a cover or guardrail system.

****Best practice if hole is left unattended or needs to be open longer than the shift a hard barricade need to be installed.*****

56.10 SECONDARY DROP PREVENTION SYSTEMS CRITERIA

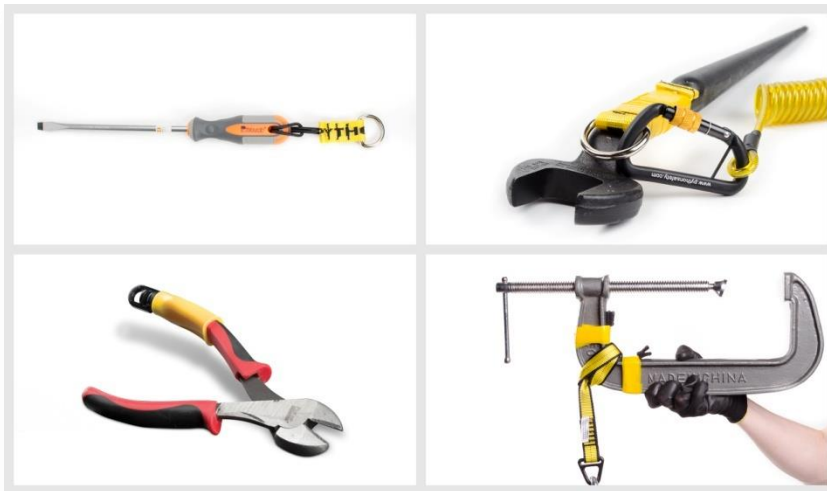
A Control Access Zone (CAZ) is not a dropped object control alone, it needs to be paired with tool tethering. Red rope, red chain, hard barricade with signage must be in place for working at heights. No one shall enter into a CAZ, including members of the crew, while work is being performed overhead. The supervisor in charge of the operation will grant permission to enter ONCE all overhead work is complete. Failure to follow this will result in disciplinary action up to termination.

Below are types of tool tethers.

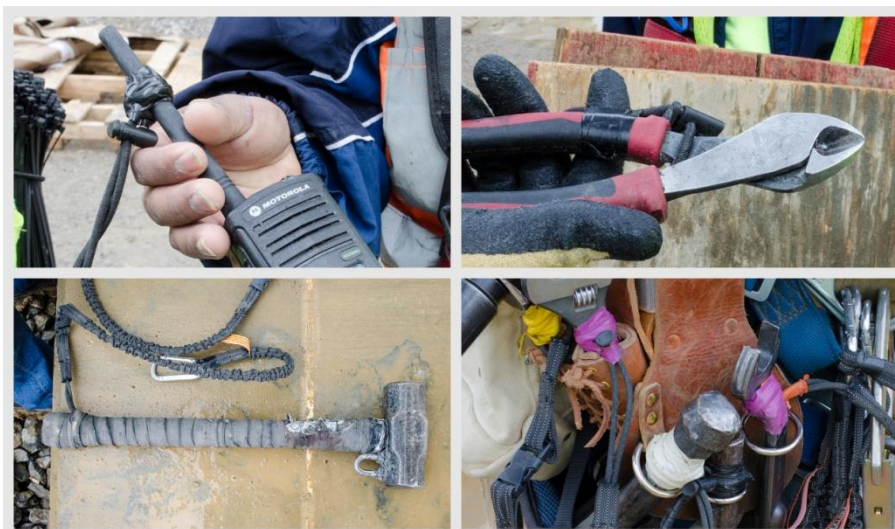
Tool Attachment Points

Prior to selecting a tool lanyard, a proper attachment point must be established on the tool. If a tool has a built-in connection point placed by the manufacturer for the purpose of drop prevention, this step is not required. All attachment points must be certified as third party tested for dynamic load by the manufacturer. Attachment points will be tested to an adequate load rating for the intended use of the tool.

Examples of **CORRECT** tool attachment:



Examples of **INCORRECT** tool attachment:



Tool Lanyards

After establishing an adequate attachment point on a tool, a proper tool lanyard will then need to be selected. These tool lanyards must be certified as third party tested for dynamic load from the manufacturer. They must also be tested to an appropriate load rating for the tool to be tethered.

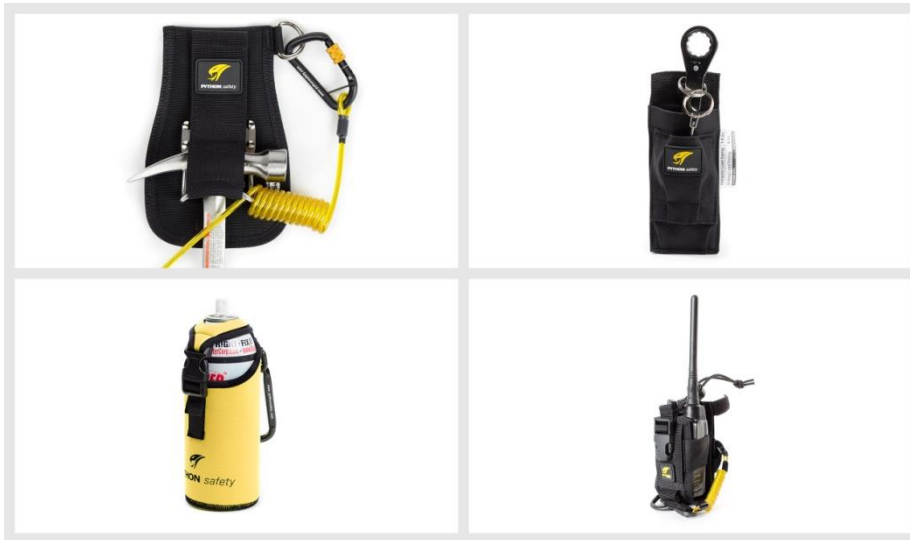
Examples of **CORRECT** lanyard selections for different sized tools



Tool Holsters and Pouches

For some tools and objects, a tool holster or tool pouch may be appropriate. Tools used in these holsters should weigh less than or equal to the manufacturer stated load-rating.

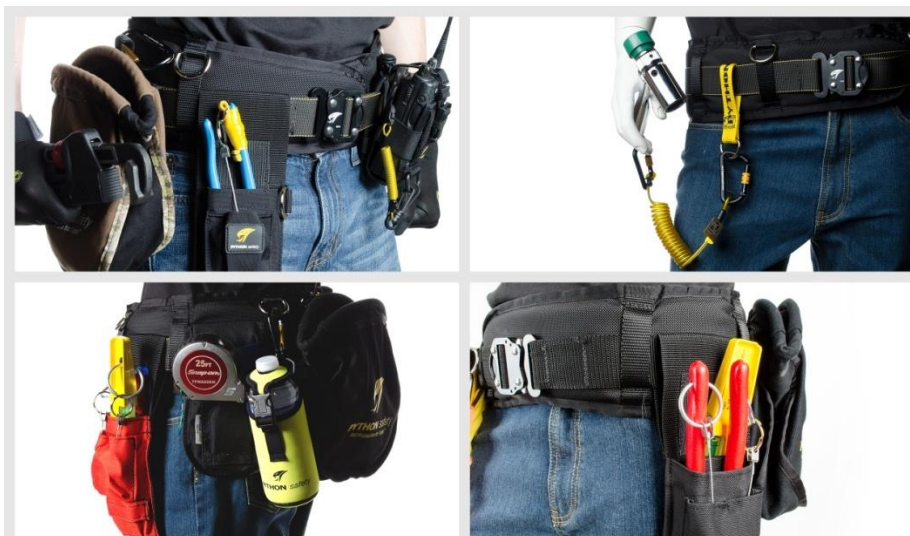
Examples of holstered tools:



Tool Belts

Upon choosing a proper method for tethering, it becomes necessary to select a proper anchor point for the remaining end of the tethering device. For many small tools, connecting to the worker can be the best option. This is only acceptable for tools weighing less than 5 lbs. D-Rings on fall protection harnesses that are certified by the manufacturer for being used as a tool connection point are a good option. Tool Belts designed with tether points are also acceptable. These must utilize connection points and must be certified as third party tested for static load by the manufacturer.

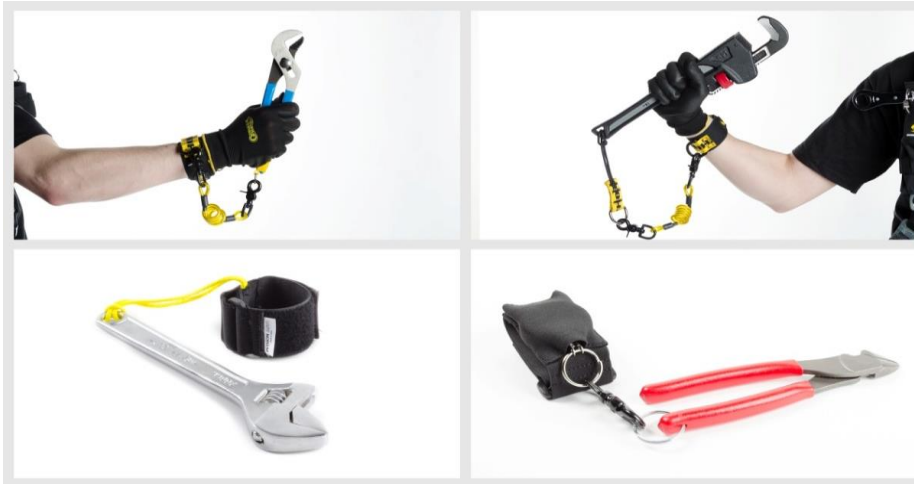
Examples of tethered tools utilizing tool belts:



Wristbands

Another acceptable option for tethering to the human body is with the use of a wristband. Wristbands must never be utilized with tools over 5 lbs. They must also be certified by the manufacturer as having been third party tested for dynamic load.

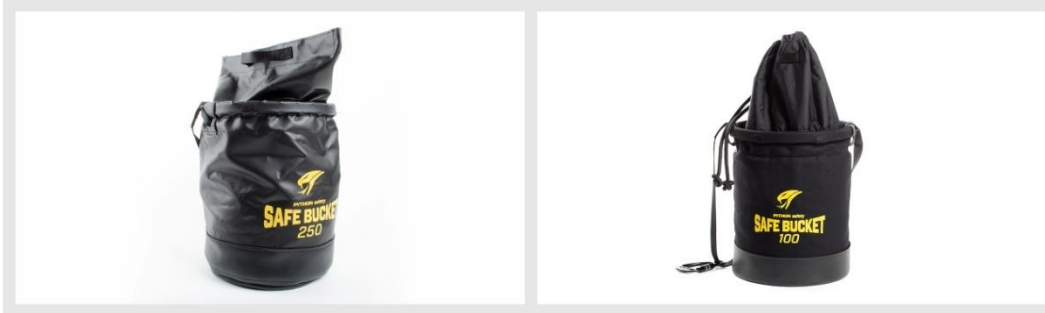
Examples of tethered tools utilizing wristbands:



Tool Buckets

For the safe transportation of tools and materials, buckets may be utilized only if they are manufactured with a closure system which allows the user to secure the contents of the bucket from potential spills. All buckets will be load rated by the manufacturer and third party tested for static load.

Examples of tool buckets with closure systems:



Controlled Access Zones (CAZ)

Controlled Access Zones are to be clearly marked with barricades or caution/danger tape to restrict access. Only employees directly engaged in the activity conducted overhead will be admitted into a Controlled Access Zone. Controlled Access Zones are to be used as a secondary drop prevention system along with the use of primary applications.

SUPPORTING ILLUSTRATIONS

Impact Force of a Dropped Object

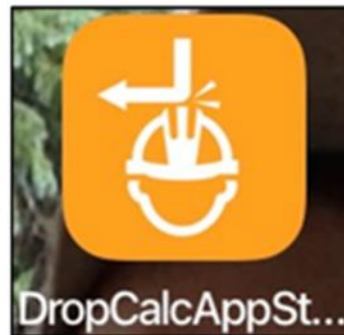
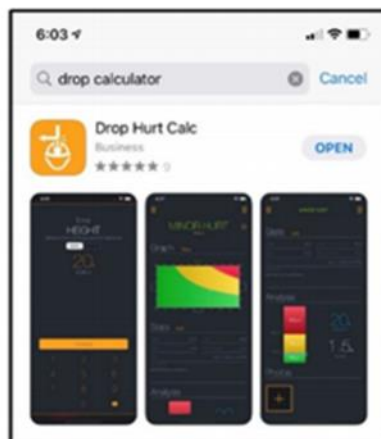
Measured in pounds per square inch

		Weight of Dropped Object (pounds)									
		1	2	3	4	5	6	7	8	9	10
Drop Height (feet)	300	434	867	1,301	1,735	2,168	2,608	3,036	3,469	3,903	4,337
	200	354	708	1,062	1,416	1,771	2,125	2,479	2,833	3,187	3,541
	150	307	613	920	1,227	1,533	1,840	2,147	2,453	2,760	3,067
	100	250	501	751	1,002	1,252	1,502	1,753	2,003	2,253	2,504
	50	177	354	531	708	885	1,062	1,239	1,416	1,593	1,771
	20	112	224	336	448	560	672	784	896	1,008	1,120
	10	79	158	238	317	396	475	554	633	713	792
6	61	123	184	245	307	368	429	491	552	613	

SERIOUS
SEVERE
FATAL

56.10.1.1 Drop Hurt Calculator

Impact force can be calculated for a dropped object using the Drop Hurt Calculator, this can be found in the Apple App. Store. This app should be used to classify a dropped object. All of the safeguards listed in this manual should be used to mitigate the potential of a dropped object.



57. BEHAVIOUR BASED SAFETY (BBS)

57.1. PURPOSE

All Kiewit employees are obligated to never walk past an unsafe act or condition. The expectation is that employees will intervene and correct the unsafe act or condition. The BBS program is designed to capture this information on an observation card so the information can be tracked as a leading indicator.

The focus of the BBS Program is the evaluation of peers by peers, and includes corrective action and feedback on both safe and at-risk behaviors.

The intent is to proactively recognize those safe behaviors that are used at our work site by our employees and subcontractors and modify those behaviors that would be considered an inappropriate risk. The program should help to encourage a culture of looking out for each other.

It is important to observe and recognize positive behaviours as well as negative. Recognize people for working safe increases the chances of the safe behaviour repeating itself and strengthens the safety culture on the project.

Note: everyone has clear responsibility for safety and is expected to practice the “highest degree of safety”. This program is designed to help us change behaviours so that safety becomes part of the SWP and is widely valued across the company. It is designed as a motivational tool to get employees “involved”.

57.2. DATA COLLECTION AND TRENDING

All employees on projects with BBS programs will contribute a minimum of one card submitted per week. Collection of data from the cards and will populate charts to display areas of concern based on staff employee and trades worker observations. Follow-up with craft is an important part of the success of the program.

57.3. FOLLOW-UP

Follow-up is required for the following:

- Immediate follow-up of any outstanding safety issues.
- Any observation cards with safety issues but missing the intervention portion. Supervisors must follow-up with workers to ensure hazards have been properly addressed.
- Ongoing follow-up with all personnel about the current trends coming from the program.

57.4. PROCEDURE

- Craft employees will all have access to observation cards which must be filled out when observing an operation.
- Workers are encouraged to complete an observation card at any time.

57.4.1. Observe

- The employee will complete the card as they observe the operation, filling in all sections and writing a response in each of the fields of the card.
- Observations should be done on both safe or at risk behaviors.

57.4.2. Positive behaviors include:

- Immediately correcting unsafe conditions and behaviors;
- Changing the way they usually do their job to a safer method;
- Reminding co-workers about taking safety precautions;
- Consistently wearing their personal protective equipment;
- Consistently using safety program procedures
- Reminding co-workers that they should be wearing personal protective equipment—motivating them;
- Providing feedback to supervisors.

57.4.3. Approaching Others

The employee will give constructive feedback to their fellow employee that they observed. This program is no fault, no blame. Positive feedback will be given for good work, and suggestions for correcting unsafe acts and conditions will be given for any areas for improvement.

57.4.3.1. Negative behaviors include:

- Not wearing personal protective equipment or using general safety equipment;
- Not following safety procedures or programs, such as fall protection, or lock-out and tag-out;
- Taking shortcuts.

57.4.3.2. Why do we approach others?

- We don't want to see anyone get hurt;
- They are taking a risk that could cause injury to themselves or others;
- We want to recognize positive acts and positive behaviors;
- A worker's observation and approach to stop an unsafe act or behavior may save a life...do not take that chance and walk by.

57.4.3.3. How should we approach others?

- Make an introduction and ask to see the worker's Quad Fold JHA. Ask the worker about what he or she is doing. Talk with people—not down to them;
- Always start on a positive note when possible. If an at-risk behavior needs to be corrected, discuss possible options to correct the situation or complete the work in a safe manner. Avoid making people defensive. Let them be a part of the solution. We want them to learn, not feel threatened.

57.4.3.4. How do we handle imminent danger?

- Imminent danger is a workplace hazard that puts a worker or others at immediate risk of death or serious physical harm;
- Intervene immediately;

- Ensure the worker is clear and safe before beginning the discussion;
- Be firm (not angry).

57.4.4. **Report**

After the observation is complete the employee will turn the completed card in to their supervisor. The supervisor will make sure that all hazards have been completed and conduct any follow-up as required. The supervisor will turn in all cards to the safety department for trending.

It is very important that no other name appears on the Behavior Observation Card other than the name of the person doing the observation.

57.4.5. **Training**

Employees will receive observation/intervention training during orientation.

58. BLOODBORNE PATHOGENS

58.1. PURPOSE

If the project has the potential to expose employees to blood or other infectious fluids then the project will implement this Blood borne Pathogens Program. This program is designed to eliminate or minimize employee exposure. The administrative mechanism necessary to minimize or eliminate occupational exposure to Hepatitis B virus (HBV), Human Immunodeficiency virus (HIV), and other blood borne pathogens must be provided.

58.2. SCOPE

This program applies to all employees with occupational exposure to blood or other potentially infectious materials.

58.3. RESPONSIBILITIES

The Project Manager has the responsibility to:

- Implement a blood borne pathogens program;
- Assure exposure determinations have been completed;
- Develop and implement methods of compliance to prevent contact with blood or other potentially infectious materials;
- Make Hepatitis B vaccination assessable to employee with occupational exposure;
- Implement post-exposure and follow-up evaluations, when required;
- Develop and provide employee training on the communication of hazards, which includes: labels, warning signage, training programs and maintenance of training records;
- Develop and implement a recordkeeping system; and
- Conduct an annual review of this procedure to ensure adequate and up-to-date protection is provided.

58.4. PROCEDURE

58.4.1. Infectious Materials

Universal precautions, which means to assume that all human blood and bodily fluids are treated as if known to be HBV or HIV infected, is a recognized approach to infection control. These precautions will be the principal means by which affected employees will prevent or minimize contact with blood or other potentially infectious materials.

For the purpose of this plan the phrase “other potentially infectious materials” includes the following:

- Cerebrospinal fluid (spinal column)
- Synovial fluid (joints)
- Pleural fluid (chest cavity)
- Peritoneal fluid (abdominal cavity)
- Amniotic fluid (surrounding fetus)
- Pericardial fluid (surrounding heart)
- Seminal secretions
- Vaginal secretions
- Any other body fluid that is visibly contaminated with blood
- All body fluids in situations where it is difficult or impossible to differentiate between body fluids
- Any unfixed tissue or organ (other than intact skin) from a human (living or dead)

58.4.2. Work Practice Controls

- There will be readily available hand washing facilities that are to be used immediately following inadvertent, unprotected exposure or the removal of personal protective equipment.
- There will be continuous availability of antiseptic hand cleansers, soaps, clean cloths, paper or antiseptic towels when hand-washing facilities are not readily available.
- Employees are required to wash their hands immediately or as soon as feasible after removal of gloves or other personal protective equipment.
- Employees are required to wash hands or any other exposed skin with soap and water, or flush mucous membranes with water immediately or as soon as feasible following contact with blood or other potentially infectious materials.
- All procedures involving blood or other potentially infectious materials are to be performed in such a manner as to minimize splashing, spraying, spattering and the generation of droplets of these substances.

- Equipment which may become contaminated with blood or other potentially infectious materials is to be inspected prior to servicing or shipping and will be decontaminated as necessary unless it can be demonstrated that the decontamination of such equipment is not feasible.
- A readily observable label must be attached to equipment that has not been decontaminated stating which portions remain contaminated. This information will be conveyed to all potentially affected employees, servicing representatives and/or representatives of the manufacturer as appropriate prior to their handling, servicing or shipping the equipment, so that proper precautions may be taken.
- Contaminated needles and other contaminated sharps shall not be bent, recapped, or removed except when there is no other feasible way. Bending, recapping or needle removal must be accomplished through the use of a mechanical device or a one-handed technique.

58.4.3. **Personal Protective Equipment**

Appropriate personal protective equipment (i.e. equipment which does not permit blood or other potentially infectious materials to pass through or reach the employee's work or street cloths, skin, eyes, mouth, or other mucous membranes) shall be made readily accessible and in sufficient quantity to each affected employee. This equipment would typically include:

- Gloves (single use, disposable)
- Gowns (paper or cloth)
- Eye Protection (goggles or safety glasses with side shields)
- Pocket Mask (paper)

Employees trained and authorized to provide first aid and CPR for resuscitation purposes shall use personal protective equipment which does not permit blood or other potentially infectious material to pass through to or reach the employee.

Hypoallergenic gloves, glove liners, powder less gloves, or other similar alternatives shall be readily accessible to those employees who are allergic to the gloves normally provided.

58.4.4. **Housekeeping**

It is imperative the workplace remain in a clean and sanitary condition in order to avoid unnecessarily exposing employees to potentially infectious materials. All equipment, environmental and working surfaces shall be cleaned and decontaminated after contact with blood or other potentially infectious materials.

Contaminated surfaces will be decontaminated using an appropriate disinfectant immediately after any spill of blood or other potentially infectious material.

Inspections will be performed following every spill to ensure all environmental surfaces remain clean and sanitary.

58.4.5. Disposal

Regulated Waste includes any disposable materials which have come in contact with blood or other potentially infectious materials. These items include:

- Disposable gloves
- Pocket masks
- Paper towels
- Antiseptic towelettes

Regulated wastes are to be placed in containers that are:

- Closeable
- Constructed to contain all contents and prevent leakage
- Labeled
- Closed prior to removal

Sharp containers shall be:

- Closable
- Puncture resistant
- Labeled
- Leak proof on the sides and bottom

If outside contamination of the regulated waste container occurs, it is to be placed in a labeled, leak proof container.

Containers must be:

- Easily accessible
- Maintained upright throughout use
- Replaced routinely and not be allowed to overfill

58.4.6. Hepatitis B Vaccination

All employees who have occupational exposure through their routine job duties are to have the hepatitis B vaccine and vaccination series provided to them by a licensed physician. This vaccination will be made available after the employee has received the prescribed training and within 10 working days of their initial assignment.

Exceptions will be considered in cases where the employee can show the complete hepatitis B vaccination series was received. Antibody tests that have revealed the employee is immune to the vaccination are inadvisable due to medical reasons. Release of medical records must be completed.

58.4.7. **Post-Exposure Evaluation and Follow-Up**

Following a report of an employee exposure incident each employee will be provided a confidential medical evaluation and follow-up which includes:

- Documentation of the routes of exposure and circumstances under which it occurred.
- Identification and documentation of the source individual unless prohibited by federal, state or local law.
- Testing of the source individual's blood after consent is obtained in order to determine HBV and HIV infectivity. If consent is not obtained a determination must be made that there is, in fact, a legal basis for non-consent.
- When the source individual is already known to be infected with HBV or HIV, testing for the source individual's known HBV or HIV status need not be repeated.
- Results of the source individual's testing are to be made available to the exposed employee. This individual will also be informed of applicable laws and regulations concerning disclosure of the identity of an infectious status of the source individual.
- After consent is obtained the exposed employee's blood will be collected as soon as feasible and tested.
- The health care professional responsible for the employee's hepatitis B vaccination will be provided a copy of the OSHA Standard.
- The health care professional evaluating an employee after an exposure incident must be provided:
 - Description of the exposed employee's duties;
 - Documentation of the routes of exposure and surrounding circumstances;
 - Results of the source individual's blood test, if available; and
 - A copy of the standard.
- A copy of the evaluating health care professional's written opinion must be received within 15 days of the evaluation. It is to be limited to whether hepatitis B vaccinations are indicated and if the vaccination has been received
- The health care professional's written opinion for post-exposure evaluation and follow-up will be limited to the following:
 - The employee has been informed of the results
 - The potential existence of medical conditions resulting from exposure to blood or other potentially infectious materials which require further evaluation

- Whether Hepatitis B vaccinations are indicated and if the vaccination has been received

58.4.8. Training

Training for all employees with occupational exposure shall be as follows:

- At the time of initial assignment involving tasks where occupational exposure may take place.
- At a minimum of annually, thereafter, and the annual training shall be provided within one year of their previous training.
- Additional training when changes such as modification of task or procedures or institution of new tasks or procedures affect the employee's occupational exposure.
- Training material shall be appropriate in content and vocabulary to educational level, literacy, and language of employees.

The training program shall contain at a minimum the following elements:

- An accessible copy of the regulatory text of the OSHA standard 29 CFR 1910.1030 and an explanation of its contents;
- A general explanation of the epidemiology and symptoms of blood borne diseases;
- An explanation of the modes of transmission of blood borne pathogens;
- An explanation of Kiewit's Blood borne Pathogen Procedure and the means by which employees can obtain a copy of the written plan;
- An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials;
- An explanation of the use and limitations of methods that will prevent or reduce exposure including appropriate engineering controls, work practices, and personal protective equipment;
- Information on the types, proper use, location, removal, handling, decontamination and disposal of personal protective equipment;
- An explanation of the basis for selection of personal protective equipment;
- Information on the hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated, and that the vaccine and vaccination will be offered free of charge.
- Information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials;
- An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available;
- Information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee following an exposure incident;

- An explanation of the signs and labels and/or color coding required; and
- An opportunity for interactive questions and answers with the person conducting the training.

58.4.8.1. Training Records

Training records will be maintained for 3 years will include the following information:

- Dates of the training sessions
- Instructional summary
- Names and qualifications of the instructors
- Names and job titles of all persons attending

58.4.9. Labeling

Warning labels will be affixed on all containers in which contaminated materials have been placed. They will be either fluorescent orange or orange-red and bear the word "BIOHAZARD".

58.4.10. Recordkeeping

Retainable records include:

- Name and social security number of the employee
- A copy of the employee's hepatitis B vaccinations status including the dates of all the hepatitis B vaccinations and any medical records relative to the employee's ability to receive vaccination.
- A copy of all results of examinations, medical testing, and follow-up procedures
- A copy of the health care professional's written opinion
- A copy of the health care professional's written opinion
- These records must be kept confidential and maintained for at least the duration of employment of the affected individual plus thirty (30) years; and
- Not disclosed or reported without the employee's express written consent to any person within or outside the workplace except as required by the OSHA standard or by law.

58.4.11. Exposure Determination

Those affected may include members of the Emergency Response Team, First Aid Trained Personnel who may be responding to medical emergencies on the jobsite, and employees involved in cleaning up material(s) that may have been exposed to infectious materials.

59. ERGONOMICS: MUSCULOSKELETAL INJURIES

59.1. PURPOSE

The purpose of this program is to provide a safe working environment and minimize musculoskeletal injuries (MSIs) in the workplace by promoting and maintaining and implementing an effective musculoskeletal program.

59.2. ROLES AND RESPONSIBILITIES

59.2.1. Project Manager

The Project Manager is responsible to ensure this policy is being carried out on their worksite and to help minimize the likelihood of acquiring MSIs through elimination, engineering, administration, and personnel protective equipment controls where ever practicable. The Project Manager must also ensure that all the necessary resources and training have been identified and implemented in accordance to legislative requirements and company standards. These requirements must be made readily available to all employees.

59.2.2. Employee

Employees are responsible to ensure that they understand the musculoskeletal program and for informing Kiewit management of any safety concerns related to musculoskeletal injuries.

59.2.3. Supervisors

Each supervisor will ensure that the employees are familiar with safe work practices regarding proper ergonomic techniques, lifting and handling loads, awkward body positions, excessive force, forceful exertions, workplace factors, and repetitive motion. Potential solutions and reduction of occurrence will be identified to illustrate preventative measures.

59.3. MUSCULOSKELETAL INJURIES (MSIs)

Musculoskeletal Injuries are also referred to as:

- Repetitive Strain Injuries (RSIs)
- Repetitive Motion Injuries (RMIs)
- Cumulative Trauma Disorders (CTDs)
- Work-related Upper Limb Disorders (WRULDs)

All of the injuries and disorders involve the bones, joints, ligaments, tendons, muscles, and other soft tissue. There is evidence of a cause-and-effect relationship between workplace exposures to awkward body positions, forceful exertions, repetition, and vibration to disorders of the neck, shoulders, arms and hands.

There are two main types of MSIs most encountered include:

- Overexertion
- Overuse

In overexertion injuries a tissue, muscle, tendon, or ligament becomes damaged because of a single traumatic event resulting in a sprain, strain, or tear.

Overuse involve repetitive small injuries that add up over time, taking hours, days, months, or years to appear.

In these cases, the combination of endless repetition, use of forceful exertions, awkward body position, and reduced rest does not give the body enough time to recover in these cases.

59.4. **TRAINING AND IMPLEMENTATION**

Training about MSI's, which is to be performed on a regular basis, and to be provided by supervisors and superintendents by means of regular communication, in the form of toolbox talks, PTI's, and other scheduled or non-scheduled meetings. Topics are determined by the nature of work being performed and include;

- Awkward body positions
- Forceful exertion
- Repetitive motions

59.4.1. **Awkward Body Positions**

Awkward body positions may be due to location and orientation of the work being done. Factors that contribute to it may include poor work station design, product design, tool design, and work habits. Potential solutions include:

- Frequent changes of position
- Avoiding forward and downward bending, constant positions, twisting the body, and consistent use for an extended period of time.

59.4.2. **Forceful Exertions**

Forceful exertions are commonly used when lifting, pushing, pulling, and reaching. Those who use hand tools are at risk due to the amount of force needed to use, hold, and trigger a tool. Tasks that require a worker to lift over 50lb should be avoided. Potential solutions include:

- Reducing the force required for the task by using aids and maintaining the equipment or tools
- Distributing the force
- Improving mechanical advantage by using a better-designed tool

59.4.3. Repetitive Motion

Repetitive motions wear the body down by making the muscles tired and cramped. How quickly this happens depends on how often a repetitive motion is performed, how quickly it is performed, and for how long the repetitive work continues. Potential solutions include:

- Automation of the tasks or portions of it by using machinery
- Job rotation, diversity, and enrichment
- Frequent breaks

59.5. PREVENTING BACK PAIN AND STRAIN WHEN LIFTING

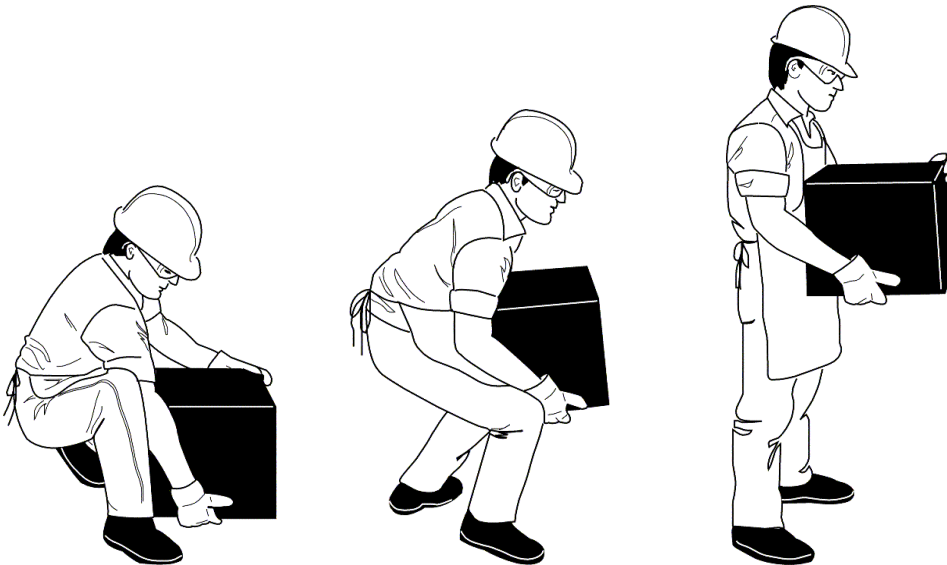
There are many causes of back pain including overuse, overexertion, overloading, overstretching, injuries, disease, and age-related changes. "Overexertion injuries result from overloading or overstretching muscles, tendons, and ligaments. Overloading exceeds their strength and overstretching exceeds their range of motion. Overuse injuries result from using muscles, tendons or ligaments so much that they become damaged.

To prevent or alleviate back pain and strain note the following:

1. Muscles need to be challenged, so activity is good for you.
2. Give your body the chance to adapt to loads of increasing weight and allow it time to recover.
3. Muscle endurance has more protective value than muscular strength.
4. When handling loads and objects manually, keep the lifting principles in mind:
 - a) Keep the natural curve in your back when lifting, lowering, and moving.
 - b) Contract your abdominal muscles during lifting, lowering, and moving.
 - c) Avoid twisting by bracing your back
 - d) Keep load as close to the belly as possible.

59.5.1. How to Lift

1. Stand close to the load with both feet firm on the floor or ground, about shoulder width apart. Point toes out.
2. Squat down close to the load with back straight, knees bent, stomach muscles tight.
3. Place hands on diagonally opposite corners of the load so one hand pulls it toward you and one lifts.
4. Grip load firmly with your whole hands, not just the fingers.
5. Bring the load as close as possible to your body. Keep weight centered over the feet. Tuck arms and elbows into your side and your chin into your neck.
6. Stand up slowly, keeping your back straight and letting your legs do the lifting.
7. Ensure you have a good grip and can see where you are going.
8. Take small steps, keeping the load close to your body and no more than waist high.
9. If you must change direction while carrying the load, don't twist. Change direction by moving feet.



59.5.2. How to Lower Load

1. Lower the load slowly, bending your knees so your legs do the work.
2. Position hands so the fingers don't get caught under the load.
3. Place load on the edge of the surface and slide it back.
4. To lift a heavy or awkward load, lift with another person. Look for somebody about the same height and decide who will say where and when to move. At the signal, lift and rise

together following proper procedures. When you are ready to move, keep the load at the same level and move together, then unload together.

DO NOT LIFT OVER 50LB PER PERSON

59.6. FATIGUE MANAGEMENT

The management of fatigue is something of importance for Kiewit, due to the nature of the work that we, as a company, experience and the potential consequences of fatigue-related incidents.

59.6.1. Definition of Fatigue

Fatigue is the state of feeling very tired, weary or sleepy resulting from insufficient sleep, prolonged mental or physical work, or extended periods of stress or anxiety. Boring or repetitive tasks can intensify feelings of fatigue. Fatigue can be described as either acute or chronic.

Signs and symptoms of fatigue include:

- Tiredness
- Sleepiness, including falling asleep against the individual's will (micro sleeps)
- Irritability
- Depression
- Giddiness
- Loss of appetite
- Digestive problems
- An increased susceptibility to illness

In addition to physical signs and symptoms of fatigue, fatigued workers may be impaired in their ability to perform mental and physical tasks. These impairments can take many forms:

- Slowed physical reaction speed and speed of thought
- Failure to respond to stimuli, changes in the surroundings and information provided
- Incorrect physical or mental actions
- Flawed logic and judgment and an inability to concentrate
- Increases in memory errors, including forgetfulness
- Decreased vigilance
- Increased tendency to risk-taking

Fatigue can also result in long-term health problems such as:

- Digestive problems
- Heart disease

- Stress
- Mental illness

59.6.2. Causes of Fatigue

Fatigue results from insufficient rest and sleep between activities. The interrelated causes of fatigue include:

- The time of day that work takes place
- The length of time spent at work and in work-related duties
- The type and duration of a work task and the environment in which it is performed
- The quantity and quality of rest obtained prior to and after a work period
- Activities outside of work, such as second jobs and family commitments
- Individual factors such as sleeping disorders

Acute fatigue is caused by immediate episodes of sleep deprivation. (These are commonly due to long periods of wakefulness from excessively long shifts or night shifts without adequate daytime rest.) Causes of fatigue can result from features of the work and workplace and from features of a worker's life outside work. Levels of work-related fatigue are similar for different individuals performing the same tasks. Work-related fatigue is measured and managed at a project level. Non-work-related causes vary considerably between individuals. Non-working-related fatigue is best managed at an individual level.

59.6.2.1. Work-Related Causes of Fatigue

Work-related fatigue can result from:

- Schedule design (for example: too many consecutive shifts)
- Aspects of the tasks being undertaken (for example: a greater workload within standard shifts)
- Features of the working environment (for example: noise or temperature extremes)

59.6.2.2. Non-Work-Related Causes of Fatigue

Causes of non-work-related fatigue include:

- Sleep disruption because of ill family members

- Strenuous activities outside work such as second jobs
- Sleep disorders
- Inappropriate use of alcohol, prescription drugs and illegal drugs

59.6.3. Program

Like other risks associated with construction, the risks from fatigue need to be controlled in order to fulfill the Kiewit organization's duty of care. The fact that individual behavior outside of work can have a considerable influence on fatigue does not reduce the obligation to address the issue consistently using the principles of risk management, including following the hierarchy of control.

The sensitive nature of many of the issues involved in this area means that Kiewit must take special care in undertaking the fatigue management process. It is an important factor in the protection of the workforce.

Kiewit's approach is flexible enough to respond to the varying needs of the workforce. Sensitivity to the communication and consultation requirements of those who work shift work and extended consecutive days is critical. Those who work nights require special attention and focused communication strategies.

On a site, the Project Manager holds the fundamental responsibility for controlling the risks associated with fatigue, and is the authority in cases of extended hours or days worked. However, employees are responsible for ensuring that their behavior does not create or exacerbate risks.

In accordance with the Occupational Health and Safety Acts for provinces and territories, all Kiewit employees must conform to the set-out guidelines regarding the number of hours that can be worked in a particular period.

59.6.3.1. Important Considerations

- Pay attention to general physical fitness and good health habits.
- Find out about and understand the potential health and safety effects of shift work.
- Learn how to recognize and reduce stress through physical fitness, relaxation techniques and taking leisure seriously.
- Workers experiencing fatigue over extended periods of time shall develop some coping strategies, such as working more slowly, checking work more thoroughly, using memory reminders, relying on fellow workers and choosing to carry out less critical tasks.

60. STRETCH AND FLEX

60.1. INTRODUCTION

The stretch and flex program is intended to provide the necessary warm-up routine in order to prevent workplace injuries and improve the quality of life for all Kiewit employees. Collectively, we would like to stress that all of the exercises described in this guide should only be performed to the level you feel comfortable. Stretching and core exercises can be challenging, and they should never be done to the point where it becomes painful.

60.2. FIT FOR DUTY

Kiewit recognizes the importance of ensuring that all workers are fit for duty before the start of each shift. The Stretch and Flex Program is vital to this process. Every morning at the start of shift, stretch and flex is carried out. Stretch and flex consists of a variety of exercises that allow supervisors to observe whether anything is out of the ordinary. While workers are doing their daily stretches, out-of-the-ordinary aches and pains, balance deficiencies and other irregularities can be noted and appropriate action taken.

60.3. STRETCHING GUIDELINES

- Workers will follow the guidelines within the Kiewit stretch and flex poster for this program.
- Always perform a light warm-up prior to stretching. For example, a 3-5 minute walk is adequate.
- Perform all of the stretches and exercises at your own pace and to the level at which you feel comfortable.
- Always perform static exercises where you stretch to the point you feel comfortable, and then maintain that position for the described length of time. Make sure you do not bounce during any stretching exercise. This could lead to tearing of the muscles involved. If the exercises become painful, or the muscles start to shake, release the stretch slightly.
- Do not hold your breath during any of the exercises. Breathing will allow the muscles to relax more, providing a better stretch experience.

60.4. CORE INTRODUCTION

We rely on our “core” every day to perform every activity we do. Without it, we would stumble all over the place, not be able to hold anything, and we especially would not be able to do any kind of work. The core consists not only of the abdominal muscles, but also the oblique’s, erectors, and all of the muscles in what are known as the pelvic floor, or the base of the pelvis.

The core provides strength and flexibility so we can bend, twist, sit, stand, and lift things. By creating a stable, strong base for these muscles we can optimize strength and flexibility in every activity we do.

61. HAND PROTECTION

61.1. POLICY

This program will act as a guideline for the site specific hand plan. This plan is designed to address the planning for education, identification, mitigation and elimination of potential hand risks.

Gloves are to be worn at all times on-site. Gloves must be worn by everyone.

61.2. SITE SPECIFIC HAND PLANS

61.2.1. Training

All supervisors and workers must be trained on the site specific hand plan requirements and understand their responsibilities.

61.2.2. Communication and Awareness

Projects shall communicate expectations during start-up and throughout the project. Efforts should be made to communicate lessons learned, case studies from past incidents and relevant project hand protection initiatives to stay current and consistent at all stages of construction.

61.2.3. Communication Outlets:

- Tool Box Talks
- Posters / Signage
- Safety Summits, Rodeo's, Mass Meetings
- District Safety Call

61.2.4. Planning:

Identify specific hand hazards and mitigation on the JHA.

- Ensure Crush Points are identified in the JHA.
- Utilize Best Practices for tool selection, high risk operations when developing the JHA.
- Projects to develop site specific Glove Selection Poster to identify gloves required trade and by task.
- Ensure the proper gloves are on site.
- Utilize the site specific Glove Poster when developing the JHA.
- Ensure the right tools for the job are used.
- Ensure workers have small tool training.

61.2.5. Behavioral

- Review lessons learned and case studies based on current project risks.
- Utilize Proactive Programs to keep heightened awareness on the job and strive for continuous improvement:
 - CVIS
 - Behaviour Based Safety
 - Risk Reduction Task Force

61.2.6. Monitor and Measure Performance

- Focused Safety Tours
- Assessments and Audits
- Incident Root Cause Analysis
- Tracking and Trending leading/lagging indicators

61.3. GENERAL PROVISIONS

The following hand protection guidelines will be followed:

- Employees must take reasonable precautions against task-specific hazards to prevent hand injuries;
- The selection of gloves for protection against thermal exposure, punctures, cuts, impact and chemicals with high toxicity will be approved by the work site supervisor;
- Never use hands to perform a task that can be performed by a tool. For example, use a brush or a rag to wipe away debris – not hands;
- Never wear rings, bracelets or other hand jewelry when working with power tools with moving parts;
- Keep machine guards in place and in good working order;
- Always be aware of crush points (i.e. gears, pulleys, hinges) on each job. Avoid placing hands and fingers near these points;
- Treat all minor injuries, such as cuts and abrasions, immediately;
- Never ignore the first signs of dermatitis or other skin disorders.

61.3.1. Selection of Gloves

Use the following guidelines when developing the site specific Glove Selection Poster:

- Cloth or canvas gloves are most effective in protecting hands against dirt, rough surfaces, wood splinters and some temperature ranges;
- Leather gloves will protect hands against sparks, chips, ragged and jagged edges and moderate heat;
- Kevlar gloves with a minimum cut resistance of 4 will be worn when working with tools that have sharp blades, with sheet metal, or with any other surface that can cut. Never wear metal mesh gloves when working on or near electrical equipment;
- Aluminized gloves will provide protection against flames and extremely high temperatures;

- Impervious gloves (neoprene, latex, vinyl, PVC) should be worn when handling chemicals and hazardous substances that may damage the skin. Because there are so many different types of impervious gloves, it is important to make sure that the selected gloves will protect the hands against the specific substances;
- Each project will create a glove poster defining which gloves are used for each task / discipline.

61.3.2. **Cuts and Punctures**

To prevent cuts and punctures:

- Store tools so that cutting edges are protected;
- Do not operate tools unless all guards are operable and in place;
- Always disconnect the power source before changing blades, knives, bits or other sharp accessories;
- Keep all cutting edges sharp to avoid kickbacks, slips and tool breakage;
- Be alert for cuts and punctures from pointed tools, wires, nails, steel and masonry chips, and wood splinters.

61.3.3. **Crush Points and Line of Fire**

To prevent crush point injuries:

- Line of fire must be identified in the JHA prior to any operation starting
- Always lock out all power sources and test to ensure they are inoperable before working on any mechanical equipment;
- Avoid crush points when handling all materials;
- Never place fingers or hands through moveable equipment openings.
- Project will evaluate crush points and establish ways for all employees to keep their hands out of the line of fire (ex. Finger saver tools).

61.3.4. **Chemical Injuries and Burns**

To avoid chemical injuries and burns:

- Never attempt to use or handle any chemical until its corresponding safety data sheet has been reviewed. This will identify its dangers and PPE requirements;
- Be aware of and avoid contact with hot steel and equipment parts, open flame and chemicals;
- Stay alert and use the proper hand protection, such as gloves, tapes, guards, barrier creams and clean personal hygiene.
- The SDS must be at the work location prior to starting the operation and referenced in the JHA.

62. HEARING CONSERVATION

62.1. POLICY

All employees working in a high noise level environment shall be monitored and protected against exposure to excessive noise. This is a guide to exposure limits, and control measures required to promote hearing conservation in the workplace.

62.2. GENERAL PROVISIONS

62.2.1. Exposure

When preliminary noise level surveys indicate that an employee is exposed to a level that equals or exceeds the action level, monitoring by a competent person on site will be required. Monitoring will be repeated whenever a change in production, process, equipment or controls increase noise exposure to the extent that:

- Additional employees may be exposed at or above the action level
- The attenuation provided by engineering controls or hearing protection being used by employees might be rendered inadequate

62.2.2. Mitigation

The first mitigation measure used by Kiewit when it is practicable is any possible engineering control to protect workers from exposure to a sound level greater than the limit.

When engineering controls are not possible, hearing protectors are used (selected as per Table 2, below) to ensure workers are not exposed to noise that exceeds the action levels indicated in Table 1 (below) over an eight-hour time period.

62.2.3. Personal Protective Equipment (PPE)

Hearing protection will be made available at no cost to all employees exposed to the action level. Hearing protection shall be replaced as necessary.

The company shall ensure hearing protection is worn by those employees who are exposed to action level noise.

62.2.4. Training

Training shall be provided in the proper use of hearing protection and will include:

- The effects of noise on hearing
- The purpose of hearing protection
- Attenuation of various types and advantages for selection, fitting, use, and care
- The purpose of audiometric testing and an explanation of the test procedures

62.2.5. Testing

The project shall maintain an accurate record of all audiometric testing and noise exposure measurements.

Audiometric test records shall be retained for the duration of each worker's employment.

Noise exposure measurements shall be retained for two years.

All records required to be kept shall be provided upon request to employees, former employees and representatives designated by individual employees.

62.2.5.1. Noise Dose

A worker's noise dose depends on three major factors:

- Intensity (also known as loudness), measured by a noise level meter and expressed in decibels. The abbreviation for decibel is "dB".
- Frequency (also known as pitch), measured using an "A" weighted filter on the noise level meter. When A-weighting is selected on a meter, only noise that is hazardous to the human ear is measured.
- Duration (also known as time), measured by the clock.

All three factors combine to result in a noise dose. Change one of the factors, and the noise dose changes.

62.2.5.2. Regulations

Workers whose noise exposure exceeds 85 dBA Lex must be included in a "Noise Control and Hearing Conservation Program". 85 dBA Lex means 85 decibels of sound (intensity), measured with "A" weighting network on a sound level meter (frequency), lasting for 8 hours (duration), or the equivalent.

Equivalent noise dose levels:

Noise Level (dBa)	Duration
85 dBa	8 Hours
88 dBa	4 Hours
91 dBa	2 Hours
94 dBa	1 Hour
97 dBa	30 Minutes
100 dBa	15 Minutes
103 dBa	7.5 Minutes

Table 1 – Noise Exposure Limits: Canadian Jurisdictions

Jurisdiction (Federal, Provincial, Territorial)	Continuous Noise		Impulse / Impact Noise	
	Maximum Permitted Exposure Level for 8 hours: dB(A)	Exchange Rate dB(A) +	Maximum Peak Pressure Level dB (peak)	Maximum Number of Impacts
Canada (Federal)	87	3	-	-
British Columbia	85	3	140	-
Alberta	85	3	-	-
Saskatchewan	85	3	-	-
Manitoba	85	3	-	-
Ontario (includes ceiling level of 140 dBC)	85	3	-	-
Quebec	90	5	140	100
New Brunswick	85	3	140	-
Nova Scotia	85	3	140	100
Prince Edward Island	85	3	-	-
Newfoundland (references ACGIH TLVs)	85	3	-	-
Northwest Territories	85	5	140	100
Nunavut	85	3 or 5*	140	-

+ When 3 dB exchange rate is used, there is generally no separate regulation for impulse/impact noise. The equivalent sound exposure level (L_{ex}) takes impulse noise into account in the same way as it does for continuous or intermittent noise.

Table 2 – Selection of Hearing Protection Devices

Maximum equivalent noise level (dba ex)	CSA Class of Hearing Protection	CSA Grade of Hearing Protection
< 90	C, B or A	1,2,3 or 4
<95	B or A	2, 3 or 4
<100	A	3 or 4
<105	A	4
<110	A earplug + A or B earmuff	3 or 4 earplug + 2,3 or 4 earmuff
>110	A plug + A or B earmuff and limited exposure time to keep sound reaching the workers eardrum below 85 dba Lex.	3 or 4 earplug + 2,3 or 4 earmuff and limited exposure time to keep sound reaching the workers eardrum below 85 dba Lex

Exchange Rate: as the sound level increases above the criterion level, the allowed exposure time must be decreased. The allowed maximum exposure time is calculated by using an exchange rate, also called a “dose-trading relation” or “trading ratio.” The exchange rate is the amount by which the permitted sound level may increase if the exposure time is halved.

63. LIFE SAVING ACTIONS

63.1. POLICY

All Sponsored projects shall focus on potential outcome of an incident or event instead of actual outcome when determining the resources allocated to prevent Life Changing Events.

63.1.1. Terms and Definitions:

Term	Definition
Life changing categories	Sever exposures or activities with common contributing factors that have a high likelihood of causing incidents with serious outcomes.
Safeguards	Items and/or actions that prevent an event from occurring or eliminate the potential of a severe outcome.
Life changing events	An actual or near miss event that occurred where the actual or potential result would have resulted in a loss of life or a life altering event.
Safeguard assessments	Operation-based assessments done to assure safeguards are in place during life-changing category operations
Safeguard verification	A visual checklist used by the craftspeople to assure the appropriate category safeguards are in place before they begin a task
LSA rodeos	Safety demonstrations based on life-changing categories to educate the workforce about the consequences of life changing incidents, raise awareness of safeguards and reinforce safe work practices to eliminate life-changing incidents

63.1.2. Expectations:

Each project will implement Life Saving Actions.

- Identify categories based on project specifics.
- Develop mitigation plans for each category.
- Train on the program and categories.
- Continuously update categories as the work changes
- Categories shall be posted.
 - Life Saving Actions needs to be promoted. A variety of images, logos and banners are available for projects to use.
 - It is suggested that any signage emphasizing a specific Life Saving category be visible near where the affected operation is taking place.
- Verify program execution and safeguards through regular assessments
 - The LSA assessment tool is designed to capture the leading indicators from project safety tours. It is not designed to function as a craft observation (SOS/OBS/BBS) program.

- Minimum expectations for LSA Assessments on project operations:

Personnel Required	LSA Assessment Frequency
Safety Personnel	Weekly
Construction Management & General Superintendents	Weekly
Project Weekly Safety Tour Group	Weekly

- Incidents, assessments, and observations shall be communicated.
 - This information is available through various Kietrac reports.
- Incident Investigation: All LSA events will be investigated in compliance with the district's accident/incident investigation procedure.
 - Root Cause: A root cause analysis must be performed within seven (7) days of the incident date.
 - KieTrac: When completing section 3.4 in KieTrac, the level of severity selected will automatically classify the incident as a diamond event or not.
- Per the LSA event severity chart, all level 3 (severe or severe potential), level 4 (fatality or potential fatality) and level 5 (multiple fatalities or potential multiple fatalities) are classified as LSA events

63.2. LIFE SAVING CATEGORIES:

Life Saving Categories are not limited to those listed below. If a different category is identified that pertains to a specific project the risk assessment will need to be adjusted to address those specific precursors.

- Confined Space
- Cranes
- Energy Isolation
- Excavation
- Human Equipment Interface
- Lifting and Rigging
- Maintenance of Traffic
- Temporary Structures
- Utilities
- Working at Heights

Integration with Safety Tools:

For Life Saving Actions to be proactive it needs to be integrated with safety tools. Potential tools where Life Saving Actions could be integrated include:

- Job Hazard Analysis (JHA)/Field Level Risk Analysis (FLRA)
- Observation Program
- Project Risk Assessment Analysis
- Work Packs
- Audits/Inspections

63.3. RESPONSIBILITIES:

- The Job Sponsor is responsible for identifying the Life Saving Categories on the project during the planning phase. A job-specific risk assessment will be developed for each category and will be shared with all involved employees prior to commencing work.
- Each foreman is responsible for ensuring that Life Saving signage is in place and visible when a diamond activity is performed

62.1. TRAINING:

- Training Supervisors: All supervisors are to be trained on Life Saving Actions and its application using the tools implemented by the district.
- Employee Orientation: All employees are to be trained on the Life Saving Actions to educate and aid in the reduction of the likelihood of an event occurring.