SAFETY & HEALTH MANAGEMENT PLAN

FOR THE

AT&T MOBILITY PROJECT

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AT&T Mobility Project ES&H Execution Plan

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Date: 29 July 2019

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Date: 7 Aug 2019

Date: 07 Aug 2019

Date: __________________
1.0 PURPOSE
The purpose of this Safety & Health Management Plan is to define a consistent and uniform approach for implementing quality site specific ES&H processes, plans and procedures for the Bechtel AT&T Mobility Project (hereafter "Project") and to give guidance on the applicable Corporate Bechtel ES&H Core Processes and SWPP procedures to be followed. This plan is also developed to implement the Bechtel Infrastructure GBU OHSAS 18001:2007 management system and be consistent with Bechtel's Corporate Leadership Covenants and Vision & Values.

It is the endeavor and policy to achieve successful ES&H integration and implementation on the project site by complying with established site procedures and contractual obligations. This Safety and Health Management Plan defines the "how to" implement a successful ES&H Program.

All Policies and Procedures outlined in this program are intended to meet or exceed those covered by state, federal and/or local regulation, codes and standards for contractors. If any ES&H Directive/initiative; and/or Bechtel Policy/Procedure; and/or any state, federal, or local regulation; and/or any national or international recognized codes and standards applicable to the work scope not otherwise outlined in this plan for contractors is more stringent, it will supersede the Plan, Policy or Procedure outlined herein. If any ES&H Directive or Bechtel Policy/Procedure, and/or state, federal and/or local regulation; and/or any national or international recognized codes and/or standards applicable to the work scope is revised then the revision is required to be followed from the required implementation date as set by the authority having jurisdiction. Any variance or exception to policies, procedures, processes and/or any referenced material in this plan for any entity or contractor will require prior approval between Bechtel Project ES&H Management and the entity or contractor parties agreed to as per the contract. The Bechtel Project-specific Jobsite Work Rules and Project's ES&H Life Critical Work Requirements will be strictly adhered to for all violations of any of these processes that have the potential to cause serious injury or death to self or fellow workers.

This Safety & Health Management Plan shall be reviewed annually and revised as necessary. Between the annual reviews, it may be necessary to implement additional requirements or improve the identified plans and processes.

2.0 SCOPE
This Safety & Health Management Plan developed for the Bechtel AT&T Mobility Project will be achieved through a management system utilizing Corporate Bechtel ES&H (BESH) Core Processes (CP’s), Bechtel Construction (BCOI) Standard Work Process Procedures (SWPPs), Bechtel Project-specific ES&H Processes/Plans designed to meet compliance with client, Bechtel, our stakeholders and Specific Directives/Initiatives, which includes procedures for developing and implementing the Safety & Health Management Plan, safety management system implementation, hazardous substances control, incident reporting, and training. All the requirements of Bechtel ES&H Core Processes are incorporated into the Project Safety & Health Management Plan by reference. Specific and detailed supplemental ES&H procedures which have been developed are referenced in the Safety & Health Management Plan. Any deviation to specific processes and/or procedures requires documented approval in accordance with Bechtel Policies.

This Safety and Health Management Plan is written to:
- Provide all project employees (Bechtel manual and non-manual, Joint Venture Partner, agency, subcontractor, vendor/supplier, etc.) with ES&H expectations and challenge their abilities to participate in creating and maintaining a zero-incident work environment.
- Instruct and guide all project personnel on the development and implementation of the project specific Safety & Health Management Plan and all other supplemental ES&H procedures.
- Provide all employees with the proper training necessary to identify and incorporate ES&H considerations as related to construction/industrial hazards, at-risk behaviors, and unsafe conditions in the work environment.
- Provide sequencing requirements for the effective implementation of all processes contained within this document.
- Educate the Bechtel Project teams of the content of the Safety & Health Management Plan, and to identify the ES&H communication and reporting requirements for the project.
- Educate all project personnel on the environmental, safety and health regulations and requirements that will be strictly enforced on the project.
- Identification of interested parties that are affected by the project’s ES&H Performance such as customer(s)/client(s), OSHA, state/local municipalities, the public/community, employees, contractors and suppliers.

The Bechtel Senior Project Manager is responsible to implement the Safety & Health Management Plan by making this a “Required Reading” document for all Bechtel non-manuals and supervisors, including subcontractors (where feasible), along with applicable BESH CPs and SWPPs as per the Project Training Matrix.
3.0 ACKNOWLEDGMENT OF SAFETY & HEALTH MANAGEMENT PLAN ACCEPTANCE

All Bechtel AT&T Mobility Project General/Lower-tier Contractors (Subcontractor) shall recognize that compliance with the Bechtel Safety & Health Management Plan does not relieve it of the obligation to identify and address hazards not covered by its terms or the terms of the Bechtel AT&T Mobility Project Safety & Health Management Plan. Subcontractor agrees that it is responsible for compliance with all federal, state and local ES&H regulations, and revisions thereto, to ensure the safety of site workers, site visitors and the public. Any Subcontractor safe practice that differs from the safety requirements and processes in this Safety & Health Management Plan may only be implemented if it meets or exceeds the requirements contained herein, as well as the requirements of all applicable ES&H laws, rules and regulations. Nothing contained in this Safety & Health Management Plan precludes the implementation and application of Subcontractor's ES&H Program provisions that meet or exceed the requirements contained herein.

All Subcontractors performing work for the Bechtel AT&T Mobility Project at any project/market jobsite are required, at a minimum, to meet/implement the requirements of the "Bechtel AT&T Mobility Projects Environmental, Safety and Health Plan" as well as all applicable ES&H laws, rules and regulations.

Prior to becoming an approved Bechtel Subcontractor, your firm must agree to adopt the "Bechtel AT&T Mobility Project Safety & Health Management Plan" and its implementing procedures, including all roles, responsibilities and requirements as identified by the plan, as your firm’s standard Safety & Health Management Plan for all work performed at any jobsite on the Bechtel AT&T Mobility Project.

Subcontractor shall carefully review and implement the standards set forth in this Bechtel AT&T Mobility Project Safety & Health Management Plan. To accept the terms of this "Bechtel AT&T Mobility Project Safety & Health Management Plan," go to the external Bechtel Communications Environmental, Safety and Health Website via http://www.bechtel.com/safety-and-health-form.html. After accepting the terms of the Safety & Health Management Plan, click the “I agree to implement” box, fill out the requested contact information, and then click “Submit.” By clicking “Submit,” a transcript will be sent to Bechtel to inform us that you have accepted the terms of the “Bechtel AT&T Mobility Project Safety & Health Management Plan.” Subcontractor shall also comply with all applicable requirements detailed in the Bechtel Subcontractor Field Environmental Compliance Plan (SFECP) available at http://www.bechtel.com/safety-and-health-form.html.


4.0 ES&H MANAGEMENT SYSTEM

This Bechtel AT&T Mobility Project Safety & Health Management Plan (hereafter “SHMP”) and the Environmental Management Plan (26134-000-GPP-GAM-00004) will implement the requirements of the OHSAS 18001:2007 Occupational Health and Safety Management Systems (OHSMS) and ISO 14001:2015 Environmental Management System (EMS), respectively.

The Bechtel Senior Project Manager and the project management team are responsible for implementing the Infrastructure Health & Safety policy, Health & Safety management system, and the allocation of resources for implementing all the requirements. The structure of the OHSMS for project implementation are as follows:

- OH&S Policy
- Hazard identification, risk assessment and determining controls
- Legal and other requirements
- Objectives and programs
- Resources, roles, responsibility, accountability and authority
- Competence, training and awareness
- Communication, participation and consultation
- Documentation and document control
- Operational control
- Emergency Preparedness and Response
- Performance measurement, monitoring and evaluation of compliance
- Incident investigation, nonconformity, corrective action and preventive action
- Control of records
- Internal Audit
- Management Review

5.0 BECHTEL INFRASTRUCTURE H&S POLICY

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5.1. Bechtel Corporate ES&H Policy/Program

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The Bechtel Environmental, Safety and Health Core Processes will be implemented on the Project and have been developed to address the different subjects that fall within the ES&H boundaries. These processes are the foundation of the Safety & Health Management Plan and the Project Environmental Management Plan (PEMP). This OHSAS 18001:2007 compliant SHMP provides the structure for the Environmental, Safety & Health services that Bechtel provides during all phases of project execution.

Effective implementation of the Bechtel Core Processes requires an understanding of the key cornerstones of Bechtel’s Environmental, Safety and Health (ES&H) program and a commitment to making ES&H excellence a personal and company value.

The “Zero Incident” philosophy is founded on the belief that every occupational injury/illness is preventable and that the commitment to totally preventing and eliminating injuries/illness must be constantly pursued on a daily basis and integrated into every aspect of work planning and work execution.

Bechtel Policy 111 and Management Instruction 111.01 describe the company’s dedication to ES&H effectiveness and outline corporate ES&H responsibilities for Bechtel Global Business Units, Corporate Services and EPC Functions engaged in providing services to Bechtel customers.

The Bechtel Project has adopted the Bechtel Infrastructure H&S Policy that is in accordance with the OHSAS 18001:2007 standard. The Bechtel Project SHMP has been built to meet the requirements of the OHSAS 18001:2007 standard.

6.0 ES&H RESPONSIBILITIES

Reference: BESH CP101 Organization and Responsibilities

Throughout the organization Bechtel has clearly defined environmental, safety and health roles and responsibilities for all disciplines, including subcontractors.

6.1. Senior Project Manager

The Senior Project Manager shall ensure that Environmental, Safety and Health Performance receive priority attention in the review, planning, and completion of work. At all levels, personnel must:

- Recognize, understand and accept their responsibility as it pertains to ES&H.
- Lead by Example, promoting a ‘Walk the Talk’ environment.
- Openly commit to the “Zero Incident Performance” philosophy and maintain high environmental, safety and health visibility.
- The Senior Project Manager will promote an atmosphere that encourages continual improvement practices while striving for Zero Incidents. Key to this effort is adequate pre-planning and the use of resources such as Methods of Procedure (MOPs) and Job Safety Analyses (JSAs).

BESH CP-101 clearly establishes responsibility for all activities associated with Environmental, Safety and Health on the Bechtel Project including the implementation of applicable Environmental, Safety and Health Core Processes. This must be effectively communicated to every person on site. The Senior Project Manager has the responsibility to ensure sufficient resources are available to implement, develop, and maintain environmental, safety and health performance throughout the life of the project, including:

- Promoting the “Zero Incident” philosophy.
- Provide leadership and support for the Environmental, Safety & Health Manager (ES&HM).
- Communicate the project environmental, safety and health expectations, where necessary.
- Continually promotes an ‘Open Door’ policy which encourages employees to report any type of issues immediately. Actively coaches Bechtel employees on importance of having Questioning Attitudes and importance of giving timely answers for all questions.
- Actively participate in ES&H workshops and reviews, where necessary.
- Set an exemplary example to their peers, subcontractors, and client personnel in terms of commitment to the SHMP and demonstration of the Bechtel Leadership Covenants and the Bechtel Visions and Values.
- Provide support for the implementation of all Bechtel and Project ES&H Requirements

6.2. Project ES&H Manager (ES&HM) / Market ES&H Lead

ES&HM or Lead, in conjunction with the Senior Project Manager / Market Project Manager, is responsible for implementing and administering the SHMP and supplemental ES&H procedures applicable to the project. The ES&HM or Lead serves as the cognizant expert in matters relating to ES&H and, like all employees, will have the authority to stop work in the event of imminent danger to the safety and health of workers, the public, or the
environment. Work activity may resume only after the joint concurrence of the Market Project Manager and ES&HM or Lead. The ES&HM/Lead’s responsibilities include, but are not limited to:

- Advise the Project / Market Project Manager on best practice and Bechtel ES&H program developments.
- Set an exemplary example to their peers, contractors, and client personnel in terms of commitment to the ES&H program and demonstration of the Bechtel Leadership Covenants and the Bechtel Visions and Values.
- Review the program and report back to the Bechtel Project / Market Project Manager, on its effectiveness and means of improvement.
- Attend professional development and continuing educational programs and courses, where available.
- Promote the “Zero Incident” philosophy.
- Coordinate safety activities with the Bechtel customer.
- Conduct periodic ES&H assessments.
- Conduct ES&H orientations to acquaint employees with conditions, safe work practices, and procedures.
- Monitor subcontractor compliance with the ES&H requirements.
- Coordinate Workers’ Compensation insurance reporting requirements.
- Train and provide advice to employees on ES&H regulations, assessments, and process activities.
- Actively participate in the Project ES&H Committee Team for ES&H improvement.
- Provide information to employees regarding their emergency response responsibilities.
- Interpret ES&H requirements as they apply to project and/or market operations/tasks.
- File ES&H performance reports, and other ES&H reports as required by the Customer and Bechtel.
- Advise employees of hazardous conditions/concerns or near miss incidents.
- Assist in facilitating and/or conducting accident/incident investigations.
- Review the entire ES&H plans for the project.
- Review, inspect, and inventory all monitoring equipment to be used and review the calibration, use, and documentation requirements.
- Determine personal protective equipment and expendable supplies needed by the project/market to ensure the safety and health of the worker, the public, and the environment.
- Coordinate and track project, market, and subcontractor team personnel medical surveillance and training qualifications.
- Verify and update all required ES&H postings, warnings, and signs applicable to the project work/hazards.
- Verify that all personnel who enter controlled areas are qualified to do so.
- Verify that emergency numbers, including physicians and hospital locations, are valid and posted.
- Represent the project/market during any governmental agency inspections.
- Participate in weekly ES&H Assessments.
- Ensures the ES&H Directives are implemented at the project.
- Management representative of OHSAS.

6.3. Market Project Manager

The Market Project Manager will lead by example, modeling the behavior expected from all employees performing work. The Market Project Manager will:

- Set an exemplary example to their peers, contractors, and client personnel in terms of commitment to the ES&H program and demonstration of the Bechtel Leadership Covenants and the Bechtel Visions and Values.
- Champion the communication of policies and expectations to the project team with regards to ES&H.
- Provide leadership and support to the Market Environmental, Safety & Health (ES&H) Lead.
- Champion the Market ES&H Committee for ES&H Improvement and attend scheduled meetings of the Team.
- Ensure that employees are informed of hazardous conditions / concerns or near miss incidents.
- Communicate to the project team that the emphasis on cost, schedule, and quality will not override the value and importance of ES&H implementation.
- Participate in formal ES&H assessments and interact with all personnel and organizations to identify methods to improve safe work practices.
- Promote open communication, co-operation, and trust between Bechtel and its employees, its contractors, and subcontractors, and customers with focus on optimizing ES&H.
- Promote ES&H performance expectations to the entire market team.
- Recognize outstanding ES&H performance in order to increase commitment and participation (i.e. positive reinforcement).
- Facilitate compliance with applicable statutory regulations and all requirements of the ES&H Plan.

6.4. **Project Field Engineer (PFE)/ Construction Manager (CM) is responsible for:**
- Ensuring that risks are eliminated in the design of temporary work and construction aids are adequate for safety purposes.
- Conducting risk assessments and designs safe work methods.
- Reviewing designs issued for construction, coordinates with designers, and implements design amendments where a risk is identified.
- Ensuring compliance with all SWPPs, including but not limited to Method of Procedure (MOP), Overhead Lifting & Rigging Plans, Excavation and Trenching, Working On / Near Energized Equipment.
- Setting a model example to their peers, contractors, and client personnel in terms of commitment to the SHMP and demonstration of the Bechtel Leadership Covenants and the Bechtel Visions and Values.
- Participating in periodic safety assessments and establishing expectations for Field Supervision, in coordination with the ES&HM/Lead.
- Assisting in the investigation of all accidents or incidents as requested by the ES&HM.

6.5. **Field Supervision (includes Subcontractor Supervision)**
Field Supervision will be a model example to their peers, subcontractors and the Customer to the SHMP. Field Supervision (which includes but is not limited to, Managers, Construction Managers, Lead / Field Coordinators, Contracts Administrators, Superintendents, General Foreman/Foreman and Crew Leads, including field supervision of all subcontractors and lower tier contractors) will:
- Be thoroughly familiar with Bechtel Project ES&H policies and procedures and with their individual responsibilities regarding implementation and enforcement.
- Be a model example to their peers, contractors, and client personnel in terms of commitment to the ES&H program and demonstration of the Bechtel Leadership Covenants and the Bechtel Visions and Values.
- Provide positive recognition to crew leads and craft members for working safely.
- Be directly involved in implementing the Bechtel Project ES&H requirements applicable to their area of responsibility.
- Take all reasonable action to optimize the safety and health of each employee under his/her control.
- Complete the Bechtel New Hire ES&H Orientation (Passport), Supervisor ES&H Orientation, and any additional required ES&H-related training as applicable to the job position.
- Ensure direct reports complete Bechtel New Hire ES&H Orientation (Passport) process and any additional required safety training for the employee based on the employee’s job assignment.
- Emphasize the protection of equipment and property in their area of responsibility.
- Promote, support, and actively participate in the “Zero Incident” philosophy.
- Facilitate, participate, and conduct daily Job Safety Analyses (JSAs), Methods of Procedure (MOPs), and specific safety permit/plan briefings. Communicate project safety/hazard information and review the information necessary for the employee to work in a safe manner.
- Implement immediate action to correct reported or observed unacceptable ES&H conditions and/or behaviors. Supervisors are obligated to report any knowledge of violations or wrongdoings and will ensure information is not concealed or hidden regarding safety violations and/or accidents/incidents.
- Responsible for firm, fair and consistent application of the Jobsite Work rules to manual and non-manual personnel under their purview regarding ES&H.
- Continually coach employees in safe practices and recognize those who demonstrate safe behaviors.
- Conduct ongoing assessments of the work areas and take necessary corrective actions to eliminate substandard practices, conditions, and/ or behaviors.
- Conduct safety meetings and submit minutes to the Market ES&H Lead / Contracts Administrator.
• Assist in the implementation of the Emergency Response Plan.
• Ensure all incidents, accidents, and injuries/illnesses are reported immediately to the Market ES&H Lead.
• Assist in incident/accident and near miss investigations and the preparation of required reports.
• Take active responsibility to complete / close-out corrective actions resulting from field safety assessments and/or incident/accident investigations in a timely fashion.
• Participate in weekly safety assessments.
• Enforce ES&H-related work rules and take actions to ensure compliance.
• Evaluate the safety performance of assigned employees and report the findings to the Market Project Manager / Construction Manager.
• Participate in pre-work planning and risk analysis and the preparation of required documents (JSA, MOP, etc.).
• All supervisory personnel may be held individually liable for the conduct of those under their direction and control.
• Enforcement of project Jobsite Work Rules and take action, as required, to ensure consistent compliance. Ensure Life Critical Work Requirements are consistently enforced at all times.

6.6. Subcontracts Department will:
• Ensure that the division of ES&H responsibility is clear and unambiguous in all contractual agreements between Bechtel and any other entity.
• Be thoroughly familiar with Bechtel’s ES&H policies and procedures and with their individual responsibilities and ensure requirements are implemented and enforced.
• Set a model example to their peers, contractors, and client personnel in terms of commitment to the ES&H program and demonstration of the Bechtel Leadership Covenants and the Bechtel Visions and Values.
• Ensure all subcontractors are contractually obligated to work in compliance with the SHMP.
• Monitor subcontractor work activities to ensure all subcontractors work in compliance with the SHMP.
• Issue Stop Work Orders to subcontractors as advised by the Market Project Manager and ES&HM/Lead for failure to comply with the SHMP, or if there is an immediate danger to life or health (IDLH) hazard. Notification is required immediately to the ES&HM/Lead and Market Project Manager after the work has been stopped, area/equipment secured, and all employees removed to a safe area.

6.7. Procurement/Purchasing will:
• Ensure that only Bechtel ES&H-approved safety and health equipment is purchased.
• Consider not only initial cost purchasing a hazardous material but also the cost of removal of that unused hazardous materials for the project.
• Ensure that Safety Data Sheets (SDS) are requested with every purchase order that involves chemicals and/or chemical substances in compliance with the Bechtel Project Hazard Communication Program (26134-000-GPP-GHX-00011).
• Ensure warehouses are in compliance with this SHMP and applicable laws and regulations.
• Consider the size and weight of consumables with respect to manual handling requirements.
• Ensure Vendors are informed prior to deliveries on information to be in compliance with this plan and that all Delivery Drivers receive necessary visitor orientations.
• Support and coordinate vehicle delivery, receipt inspections, and maintenance, including communication with vendors/suppliers.

6.8. Subcontractors are additionally responsible for all contractual obligations and:
• Actively participating in the Bechtel “Zero Incident” philosophy.
• Implementing the requirements of this Safety & Health Management Plan, at a minimum.
• Ensuring all work operations follow the Safety & Health Management Plan.
• Ensuring all employees work in compliance with the Safety & Health Management Plan.
• Providing a safe and healthy working environment for their personnel.
• Attending contractor/subcontractor kick-off meeting, pre-construction meetings, contractor/subcontractor safety meetings, and any other meeting involving ES&H, as requested.
• Ensuring new hires attendance at Bechtel New Hire ES&H Orientation (Passport) Training.
• Ensuring employees are provided and have completed any specialized training as required by the employee’s job
6.8. Subcontractors
Are responsible for:

- Conducting daily and weekly audits to monitor compliance with Bechtel Project ES&H requirements and subcontractor ES&H program requirements, where more stringent.
- Designating in writing one or more qualified Safety Supervisor(s) for the subcontractor and any sub-tier contractors.
- Conducting periodic safety meetings for supervisors and employees.
- Ensuring all incidents, accidents, and injuries/illnesses are reported immediately to the Bechtel ES&HM/Lead and/or designated Bechtel representative.
- Jointly conduct root cause analysis investigations for accidents/incidents and near miss incidents with Bechtel ES&H and market management personnel.
- Providing copies of incident investigation reports, statistical reports, injury/illness reports, and other documents as requested by Bechtel.
- Maintaining current copies of applicable ES&H codes and standards as applicable.
- Complying with all applicable federal, state, and local regulatory requirements, including OSHA recordkeeping requirements.
- Actively participating in the near miss reporting system.
- Participating on the Bechtel Project / Market ES&H Committee.
- Complying with the applicable Bechtel Project Drug and Alcohol (26134-000-GPP-GHX-00002) program requirements.

6.9. All Employees
Are responsible for:

- All employees are expected to stop any unsafe act or condition regardless of employer, craft or position.
- Accepting individual responsibility for their personal safe behaviors.
- Maintaining a proactive role in the implementation of the Safety & Health Management Plan and the “Zero Incident” philosophy.
- Working in a safe manner at all times.
- Learning and abiding by ES&H practices and procedures applicable to their work tasks and reporting substandard practices, conditions, or behaviors to their supervisor.
- Immediately report all injuries, incidents, and near misses to their supervisor and the ES&HM/Lead.
- Assist the ES&HM/Lead with incident investigation.
- Complying with the requirements of the Safety & Health Management Plan.
- Participating in weekly safety assessments in the field.

7.0 PROJECT DEVELOPMENT AND PLANNING PROCESS

This describes a method to integrate the project schedule and ES&H activities throughout the life of the project, integrating ES&H into the project from the business development activities to the closeout and turnover to the client for operations.

The Bechtel Project will be required to establish and maintain a Health & Safety (H&S) Risk Register. The H&S Risk Register shall be completed by the Project ES&HM or designee and reviewed at least annually following consultation with the project team and with applicable contractors. Reviews may occur after an incident or where significant change in the work process has taken place. The H&S Risk Register shall be used as the basis for setting health and safety objectives and targets. A Risk Assessment shall include as a minimum the hazard identified, risk and control measures in place. A Risk Assessment Matrix will also aid in providing a quantitative risk score.

The Bechtel Project’s compliance obligations include any mandatory legal requirements and other obligations adopted voluntarily and are related to the scope of work that is identified in the specific project H&S Risk Register. Compliance obligations can include, if applicable:

- Requirements from governmental entities or other relevant authorities;
• International, national and local laws and regulations;
• Requirements specified in permits, licenses or other forms of authorization;
• Orders, rules or guidance from regulatory agencies;
• Judgements of courts or administrative tribunals;
• Customer contractual obligations;
• Agreements with community groups, non-governmental organizations, public authorities, stakeholders and other interested parties;
• Relevant organizational requirements or industry standards; or
• Voluntary principles or codes of practice.

A register is maintained to identify the legal requirements and other compliance obligations on the Bechtel Project to capture location-specific requirements. The project register is developed and maintained by the Project ES&H Manager and Environmental Lead (or ES&H representative, if no Environmental Lead is assigned to the location). Updates to legal and other compliance obligations are monitored through various outlets, i.e. OSHA and EPA Newsletters. The Bechtel Project Legal and Other Requirements Register (26134-000-2HY-GHX-00003) shall be documented and maintained through the project’s document management system.

8.0 ES&H ORIENTATION, TRAINING, AND DEVELOPMENT
Reference: BESH CP102 Training and Development

Environmental, Safety and Health related training will be performed within the guidelines of the Project’s Safety & Health Management Plan and the Project ES&H Orientation, Training & Development Plan (26134-000-GPP-GHX-00001) with support from the Bechtel ES&H Department, Market Project Manager and his/her staff.

Listed below are some of the key requirements of the Project training and development plan:

• The Project Environmental, Safety and Health Manager (ES&HM) is responsible for the development of all training pertaining to ES&H and will work with the Site Manager to ensure that the required training is provided per the Project Training Matrix and documented on the training roster. The Project ES&HM is responsible to ensure the requirements of the GBU ES&H Directives and Initiatives are included in the training. Annual Refresher training will be conducted as indicated in the Project Training Matrix.

• Environmental Training has been developed by the Project Environmental Lead (PEL). The ES&HM or their designee will assist in this training.

• A comprehensive New Hire ES&H Orientation training class has been developed for the Project. All employees of Bechtel, and its subcontractors, shall be required to attend, at a minimum, the project-specific New Hire ES&H Orientation.

• The Market Project Manager or their designee will take an active part in the opening portion of the presentation at the New Hire ES&H Orientation reviewing expectations on their obligation to Stop Work and correct unsafe hazards/conditions and unsafe behaviors immediately when identified.

• All supervisors shall complete Supervisors’ ES&H Orientation training upon promotion, hire, or transfer. This orientation will outline the duties and responsibilities of the supervisor regarding ES&H and provide guidance on how to handle violations of the Job Site work rules. Supervisors’ ES&H Orientation and training will be conducted by the Market ES&H Lead or designee and documented via the Supervisor ES&H Orientation Checklist (26134-000-GPP-GHX-00001, Attachment C).

• All supervisors, including subcontractor and/or sub-tier contractor, will be required to read the Project Safety & Health Management Plan and be trained by their management and/or safety representative on its contents that are applicable to their scope of work. Required Reading will be given to Bechtel non-manual and direct-hire personnel as indicated on the Training Matrix.

• Visitors and vendors shall adhere to all project environmental, safety and health rules and regulations. Visitors or vendors who will be on the project for more than a total of five days, and/or who will perform work in the construction areas, are required to attend the New Hire ES&H Orientation. Supervisors responsible for such visitors and vendors shall enforce strict adherence to the project work rules.

• The Job Safety Analysis (JSA) and Method of Procedure (MOP) Process shall be used by all Bechtel employees on the project, as applicable. The ES&HM or assigned ES&H personnel will conduct JSA/MOP training during new hire orientation. Training needs shall be continually assessed to determine additional training which may be required as the project phase’s proceeds.
A pre-job brief will be held daily at the start of each shift. Crew Leads of each crew shall conduct these meetings to include information regarding the work plan for the shift, safe work processes, required PPE, safety topic, daily project progress briefs, any information relevant to work locations or conditions, and hazard mitigation steps to promote a safe work environment for all employees. Superintendents and ES&H personnel will assist with these meetings as required. These meetings should promote a positive attitude and provide an opportunity for open discussion with employees.

- A project safety meeting shall be held for all project personnel, including Bechtel manual and non-manual employees, and subcontractors. The Market Project Manager, Market Construction Manager, the ES&HM and/or discipline superintendents will lead the meeting. Information regarding project ES&H statistics, promoting safe work practices, and identifying improvement opportunities shall be discussed.

8.1. Communications and Correspondence

Project markets shall establish methods of communication to ensure employees, visitors, and other interested parties are informed, aware, knowledgeable and knowledge is maintained in the content of this Safety & Health Management Plan and project specific requirements.

- Training
- Campaigns
- Workshops
- Method of Procedure (MOP) / Job Safety Analysis (JSA)
- Tool Box Talks
- Lessons Learned
- All Hands Meeting Topic
- Project Alerts
- Regulatory / Industry Updates

All methods of communication shall be evaluated to ensure an understanding by the personnel receiving the communication. Spoken and written communication methods shall be available and provided in the native languages of those receiving the communication.

8.1.1. Toolbox Talks

Bechtel and its subcontractors shall conduct a weekly toolbox Environmental, Safety and Health talk that covers messages/lessons learned that are applicable to the work employees are performing. Subcontractors may elect to create their own weekly topic or to use an ES&H communication provided by Bechtel. Documentation of these weekly meetings, the topics discussed, and the names of the attendees shall be retained, and subcontractors shall provide the documentation upon request. If needed, the Bechtel Market ES&H Lead will provide examples of several Environmental, Safety and Health topics for discussion.

8.1.2. ES&H Bulletins/Other Important Safety Information

ES&H Alerts and Bulletins provided by Bechtel shall be reviewed and utilized as applicable with documented completion of review available to Bechtel upon request. Subcontractors must cascade all of this information to their lower-tier contractors.

9.0 DRUG AND ALCOHOL POLICY

Bechtel and its Subcontractors, consistent with contractual obligations, will be required to establish and manage a Drug and Alcohol Abuse Testing Process and have their personnel tested at the employer’s expense. Subcontractors shall provide in writing assurance that all their employees and their sub-tiers’ employees are included in their companies’ Drug and Alcohol Testing Program, which meets or exceeds the Bechtel Project Drug and Alcohol Policy. Upon Bechtel request, subcontractors shall provide verification, in writing, of completed Drug and Alcohol tests (random, pre-employment, post-accident, reasonable suspicion) for those employees who are currently on the project. Compliance with this requirement will be a condition of site access.

The following describes the specific circumstances that will require Drug and Alcohol Abuse Testing:

a) Pre-employment:

  Employment offers are contingent upon successful completion of a test for Drug and Alcohol Abuse. Collection
methods and procedures shall be consistent with those established in the subcontract employment policies and/or in coordination with local contracting testing laboratories, as may be applicable.

b) Reasonable Suspicion:
All employees will submit to drug and/or alcohol testing when there is reason to believe that they may be using or are under the influence of prohibited drugs or alcohol while at work. Reasonable suspicion must be established by responsible supervision based on specific, objective facts and reasonable inferences drawn from observations indicating that drugs are being used, the employee may be under the influence of alcohol, or evidence that an employee has tampered with a Drug and Alcohol Abuse test.

- Arrests and convictions for drug or alcohol related offenses may also be cause for reasonable suspicion testing.
- Reports of drug or alcohol use when provided by a credible source must be independently corroborated prior to testing for reasonable suspicion.

c) Post-Accident (Work-Related):
Any employee whose performance either contributed to or cannot be completely discounted as a contributing factor in a work-related accident will be subject to Drug and Alcohol Abuse testing. Testing will be performed as soon as possible after the accident and after medical attention has been rendered, if applicable. When possible, tests should be collected no more than 8 hours after the time of the incident.

d) Random or Unannounced:
As permissible under local laws and regulations, employees will be subject to random, unannounced Drug and Alcohol Abuse testing. The selection of employees for random testing shall be made by either of the following two methods:

- Uniform, unannounced testing of designated employees occupying a specified area, element or position; or,
- A statistically random computer-generated sampling of such employees based on a neutral criterion, such as employee identification numbers.
- At least 10% of the total number of manual employees and 10% of the non-manual employees will be selected for random testing on an annual basis.
- Where feasible, each subcontractor is required to utilize a third-party administrator to manage the generation of the random testing lists.

e) Unannounced Follow-Up Testing
In those cases where an employee returns to work after the employee has tested positive for drugs and/or alcohol, and has completed a substance abuse recovery program, the employee may be subject to unannounced follow-up testing prescribed by a substance abuse professional (SAP). The prescription will include frequency and duration of the testing program.

Other Key Elements

a) Testing:
- As permitted by local and state laws, instant drug and alcohol testing (urine or saliva) will be the preferred method of testing. Positive instant tests must be sent to a Department of Health and Human Services (DHHS) / SAMHSA certified laboratory for confirmation testing. All positive drug test results must be reviewed by a Medical Review Officer (MRO) before a confirmed result is reported as positive. Collections and testing must meet DHHS guidelines (Refer to Urine Specimen Collection Handbook for Federal Agency Workplace Drug Testing Programs).

b) Alcohol:
- An alcohol test is considered positive if 0.02% or greater, confirmed by either an evidential breath or blood alcohol test. Positive saliva alcohol tests must be confirmed by means of evidential breath or blood alcohol testing.

c) Drugs:
- The normal drug screening panel for the project is included in Table 1 (6 panel with expanded opiates). However, if the project determines additional screening tests are required for additional substances, such as K2, bath salts, Spice, etc., samples will be collected and tested in accordance with U.S. Department of
Health and Human Services Guidelines. Bechtel permits testing that includes, without limitation, urine, breath, saliva, blood and/or hair, as part of the program.

- At a minimum, drug test shall include:

  **Table 1**
  
<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Screening Threshold – Urine</th>
<th>Confirmation Threshold – Urine</th>
<th>Screening Threshold – Saliva</th>
<th>Confirmation Threshold – Saliva</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphetamines</td>
<td>500 ng/ml</td>
<td>250 ng/ml</td>
<td>50 ng/ml</td>
<td>50 ng/ml</td>
</tr>
<tr>
<td>Cocaine Metabolite</td>
<td>150 ng/ml</td>
<td>100 ng/ml</td>
<td>20 ng/ml</td>
<td>6 ng/ml</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>300ng/ml</td>
<td>500 ng/ml</td>
<td>50 ng/ml</td>
<td>50 ng/ml</td>
</tr>
<tr>
<td>Opiates (to include expanded opiates; hydrocodone, oxycodone, hydromorphone)</td>
<td>300 ng/ml</td>
<td>300 ng/ml</td>
<td>40 ng/ml</td>
<td>40 ng/ml</td>
</tr>
<tr>
<td>Phencyclidine (PCP)</td>
<td>25 ng/ml</td>
<td>25 ng/ml</td>
<td>10 ng/ml</td>
<td>10 ng/ml</td>
</tr>
<tr>
<td>Marijuana Metabolite</td>
<td>50ng/ml</td>
<td>15ng/ml</td>
<td>12 ng/ml</td>
<td>2 ng/ml</td>
</tr>
<tr>
<td>LFAS</td>
<td>Adulterant</td>
<td>Adulterant</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

d) Disciplinary Action

- Any Bechtel or subcontractor employee(s) found to be in violation of this requirement will be removed from working on the Bechtel project, at a minimum.

### 10.0 INJURY & ILLNESS REPORTING & RECORDKEEPING REQUIREMENTS

Reference: BESH CP104 Injury and Illness Reporting and Recordkeeping  
26134-000-GPP-GHX-00014 Project Emergency Action Plan

- The administration of the project reporting requirements is the responsibility of the Bechtel ES&HM/Lead.
- The Bechtel Incident Reporting Information System (IRIS) will be used to submit monthly injury, illness, job hours, and causal data to the Bechtel corporate.
- The ES&HM/Lead shall maintain and distribute the following reports and records:
  - OSHA 300 Recordkeeping Form
  - First Report of Incident through IRIS
  - Monthly Performance Report (MPR)

**NOTE:** Subcontractors are responsible to maintain their company OSHA Injury and Illness Logs for federal and/or state OSHA Recordkeeping purposes.

- All project ES&H records shall be archived in accordance with Bechtel Corporate ES&H procedures.
- The ES&HM will be responsible for the project ES&H records and will expedite copies of project ES&H documents and records as required.
- Upon close out of the project, the ES&HM shall generate a project ES&H historical report. The report will summarize the safety achievements, lessons learned, statistical data, and other relevant information pertaining to safety for the project.
- All subcontractors and their low-tier subcontractors shall immediately, or as soon as reasonably possible, report all project-related incidents or injuries to Bechtel and the Market ES&H Lead. Subcontractors must submit a copy of any incident or injury report to the Market ES&H Lead; within twenty-four (24) hours of incident or injury/illness occurrence or when required due to incident or injury/illness re-classification.
- All subcontractors and their lower-tier subcontractors must notify the Market ES&H Lead of all near misses, property loss/damage, and/or environmental releases or impacts immediately after occurrence and follow-up with an incident report before the close of business the same day the incident was reported, and/or discovered. Upon receipt of the report, the Bechtel ES&HM/Lead shall review the report with the assigned Subcontract Administrator and the Market Project Manager and follow up as necessary. All significant near misses require a root cause analysis to be completed and documented with Bechtel ES&H.
- Each individual Bechtel Market on the Project shall develop an Emergency Calling Tree and will be followed by all market personnel.
11.0 INJURY & ILLNESS NOTIFICATION AND INVESTIGATION

Reference: BESH CP108 Incident Notification and Investigation
26134-000-GPP-GHX-00014 Project Emergency Action Plan
26134-000-GFX-GGG-00008 Incident Investigation Report Form
26134-000-GFX-GGG-00009 Utility Hit Investigation Form

Bechtel CP108 establishes the U.S. and non-U.S. Bechtel Corporate Environmental, Safety and Health (ES&H) standard criteria and process for investigating and reporting serious and other work-related incidents involving any of the following:

- Bechtel employees;
- Bechtel joint venture employees/personnel;
- Bechtel joint company employees/personnel;
- Contractor employees (regardless of tier);
- Customer personnel/loaned/seconded employees, and/or;
- Vendors/Technical Advisors
- Community members of the public.

- Efficient reporting of all significant near misses, incidents, accidents, and injuries to management is of paramount importance. The reporting process will be followed as outlined in BESH CP108 and documented on the Investigation Reports.
- The Project/Market will develop a site-specific Emergency Calling Tree to provide proper instructions on reporting requirements for all near misses, first aid cases, injuries requiring treatment beyond first aid, serious, multiple and fatal accidents, property damage, utility hit/service interruptions, and environmental incidents occurring on the Bechtel project.
- The Emergency Calling Tree shall include client/customer notification requirement and the Emergency Calling Tree shall be disseminated to and understood by all administrative and supervisory personnel.
- All Lost Time Injuries require an initial Root Cause Analysis (RCA) to be submitted within 72 hours after the incident.
- All injuries shall be reported to the immediate supervisor and Bechtel Market ES&H Lead upon occurrence and shall receive proper evaluation and treatment.
- Subcontractors will adhere to all accident/incident and near miss notification and investigation procedures and report documentation.
- Any observation of a risk, condition or near miss incident that could cause serious injury or damage to property and/or the environment must be reported immediately to the appropriate supervisor and an incident report completed.
- It is the responsibility of every employee to correct, or if not feasible, report an unsafe condition or incident.
- The project shall encourage the reporting of near miss incidents and potential hazards by constant reminder in safety meetings and through positive reinforcement mechanisms.
- All employees are responsible for reporting near misses to their supervisor and the Bechtel Market ES&H Lead immediately. Employees shall be informed of near miss reporting requirements through the New Hire ES&H Orientation, and during periodic safety meetings.
- All reported near misses shall be fully investigated and documented on the Incident Investigation Report form. Supervision and the ES&HM/Lead shall perform a root cause analysis and develop recommendations to prevent reoccurrence.
- The responsible ES&H Lead shall review all near miss data with the Market ES&H Committee for the development of additional corrective actions.
- Corrective actions will be assigned and monitored by the Market Project Manager, the Market Construction Manager, and the Market ES&H Lead.
- Bechtel Project/Market Management will provide incident notification to the Client in accordance with the project agreement.

12.0 GOVERNMENTAL AGENCY INSPECTIONS AND INVESTIGATIONS

Reference: BESH CP112 Government Interface and Legal Requirements
These requirements ensure the proper coordination and resolution of ES&H inspections conducted by governmental agencies. The general requirements presented herein are applicable (either in whole or in part) to ES&H inspections conducted at any Bechtel Project location by any government agency representative.

Listed below are some of the key points of this process:

- The Market Project Manager and the ES&HM/Lead shall continually require and support that the execution of work is in compliance with Bechtel, Federal, state, and municipal laws and regulations.
- The ES&HM shall provide technical support as needed to ensure that supervisors are provided the necessary technical information enabling them to comply with applicable standards.
- Understanding and maintaining consistent application of the regulatory standards will be enhanced by supervisor training sessions described in this Safety & Health Management Plan.
- The Market Project Manager and ES&HM/Lead must be notified immediately if OSHA, EPA, or any other federal, state, or local government agency seeks to conduct an investigation or inspection relative to any project construction activity, sub-contractors included. The Bechtel ES&HM/Lead will escort the inspector through process of inspection and follow requirements of Bechtel Core Process 112 – Governmental Agency Inspections and Investigations.
- Subcontractors will participate in all inspections and investigations relative to their scope of work and activities.
- The Project/Market Emergency Calling Tree will be followed by all project personnel.
- ES&H will record all information related to government agency inspection/investigation and/or citation/prosecution in the Bechtel Incident Reporting Information System (IRIS) and upload copies of any related correspondence to or from the government agency.

13.0 SUBCONTRACTOR SELECTION AND MANAGEMENT

Reference:  BESH CP113  Subcontractor Selection and Management
26134-000-GFX-GGG-00005 Subcontractor Safety and Health History Questionnaire

This process establishes the Bechtel Corporate standard and defines the environmental, safety and health (ES&H) criteria and process to be applied to Subcontractors on Bechtel Projects. It includes identification of risk, Subcontractor evaluation, selection and compliance while on a Bechtel managed site. For the purpose of this section, "Subcontractor" is used to mean subcontractors or contractors responsible for performing work under Bechtel's direction in its three possible roles as general contractor, construction manager and agent, or private contractor acting in its own name; and "subcontract" is used to mean subcontract or contract as used in Bechtel’s three possible roles as general contractor, construction manager and agent, or private contractor acting in its own name.

Listed below are some of the key aspects and requirements of this process:

- During Bidder Prequalification, a Subcontractor Safety and Health History Questionnaire (26134-000-GFX-GGG-00005) shall be completed and reviewed by the ES&HM/Lead or their designee. Only those bidders meeting the requirements of section 3.1 and 3.2 of Bechtel ES&H Core Process 113 are approved for inclusion on the bid list.
- Prior to commencement of work on a Bechtel project, each subcontractor and their lower-tier subcontractors shall adopt the Bechtel Project Safety & Health Management Plan.
- All plans, forms, reports, notices, and documentation required to be submitted to Bechtel by CP-113 shall be transmitted to Bechtel's Contract Administrator. If a response is required from the ES&HM/Lead, the "need" time for such response shall be identified by the requesting party.
- Each subcontractor and their lower-tier subcontractors shall, upon request, provide confirmation of compliance in the random, for-cause, reasonable suspicion, and post-accident/incident drug and alcohol testing in accordance with the Bechtel Project drug and alcohol policy.
- Each subcontractor and their lower-tier subcontractors shall designate an Environmental, Safety and Health Representative to the project. Dependent on scope of work a determination for the number of ES&H Representatives need to provide adequate coverage will be included in the Pre-Qualification Risk Review and communicated to the contractor at the Pre-Bid Award Meeting. Pre-approval of the key personnel through review of qualifications will also include review of subcontractor ES&H Representatives by the ES&HM/Lead. The Contract Administrator shall schedule a weekly meeting with all designated Subcontractor Management/ES&H Representatives and the ES&HM/Lead in accordance with the Subcontractor Safety Process.
● The Bechtel ES&HM/Lead and the Market Project Manager shall determine Environmental, Safety and Health coverage provided by the project. The potential risk and the number of employees shall be main factors in making the determination.

● The assigned Contract Administrator shall ensure and schedule each subcontractor and lower-tier subcontractor for the New Hire ES&H Orientation and other required safety training conducted by Bechtel ES&H Department.

● The Contract Administrator shall communicate the reporting requirements to each subcontractor. The Contractor Administrator shall require the subcontractors to submit these reports to them within a timely manner to facilitate the reports being forwarded to the Bechtel ES&H Department.

● Subcontractors on Bechtel projects will work in compliance with Bechtel’s Project Safety & Health Management Plan, Bechtel’s Project Jobsite Work Rules, and at a minimum no less stringent than federal, state, and/or local regulations regardless of the approval of the subcontractors submitted ES&H Plan.

● Subcontractors and lower-tier subcontractors shall maintain a file of all incident investigations concerning occupational injuries and illnesses and submit to the ES&HM/Lead as described below:
  o ES&H Statistical Report - weekly and monthly submittal
  o Completed Employer’s First Report of Injury or Illness - per occurrence with RCA and OSHA 300 Recordkeeping update upon employer determination of case.
  o Event/Accident/Incident Investigation Reports (Injury, Illness, Near Miss, Utility Hit/Service Interruption, Property Damage, and/or Environmental Release or Impact) utilizing the project Incident Investigation Form (26134-000-GFX-GGG-00008) or other investigation report form as identified by Bechtel - per occurrence with completed RCA including Bechtel approved Corrective Action Plan request by the ES&HM/Lead and no later than 24 hours upon notification of request.
  o Employee Training Records upon request by the ES&HM/Lead and no later than 24 hours upon notification of request.
  o Immediate notification of inspections conducted by governmental agencies or any workplace hazard(s) affecting the health or safety of other subcontractor employees at the project including Bechtel employees.
  o All documentation requested by the ES&HM/Lead in the event of any Event/Accident/Incident (Injury, Illness, and/or Property Damage) and no later than 24 hours upon notification of request.

13.1. Project Kick-Off/Pre-Mobilization Meeting
Upon award of work, all Subcontractor Management and supervisory personnel shall attend a Bechtel-sponsored Kick-off/Pre-Mobilization meeting, where Bechtel's SHMP requirements and expectations shall be described for Bechtel Subcontractors. This will be repeated annually.

Before site mobilization, a meeting shall be held between Bechtel and its Subcontractor (including lower-tier subcontractors, as necessary) to review specific ES&H-related aspects of the contract, scope of work, and resolve questions that either party may have regarding the contractual ES&H requirements.

13.2. Field Kickoff Meeting
Subcontractor supervision and a Bechtel Construction and/or Environmental, Safety and Health representative designee shall attend a Field Mobilization Kickoff prior to starting construction on the initial site of a contract. A Field Kickoff meeting shall also be performed prior to construction start for lower-tier contractors.

14.0 ES&H COMMITTEE
Reference: BESH CP107 ES&H Committee and Program Review

Bechtel projects support "Zero Incidents" and the success and continual improvement of the entire Safety & Health Management Plan and Project Environmental Management Plan requires more than just participation by the employees. It requires that every person be given and accept OWNERSHIP of the process. One way of facilitating that ownership is through the formation of individual Project Market ES&H Committees.

Listed below are some of the key requirements of the Market ES&H Committee process:

● The Market Project Manager is responsible for and champion of the Market ES&H Committee. Team members will consist of representatives from Bechtel Supervision manual/non-manual employees and Subcontractor Supervision. Members will rotate as determined by the committee.

● The initial activities of the team will be to implement the Zero Incident process by completing the following activities:
15.0 ENVIRONMENTAL, SAFETY AND HEALTH ASSESSMENTS

Reference: 
- BESH CP110 Inspections, Monitoring & Corrective Actions 
- BESH CP111 Assessments and Audits 
- 2HP-H37-00043 Infrastructure ES&H Internal Audits 

The Bechtel Project ES&H Assessment Process is a method used for gathering reliable data through inspection, observation, and inquiry to identify program strengths as well as opportunities for improvement. Items/activities that exhibit exemplary compliance or an innovative approach to ES&H processes should also be identified during this process.

Listed below are some of the key aspects and requirements of this process:

- Identification and correction of unsafe acts, conditions, or equipment is the ongoing responsibility of all project personnel.
- The purpose of the assessments is to facilitate upstream measurement and provide continual improvement measures.
- Weekly and daily ES&H field ES&H assessments will be performed in accordance with project / market expectations developed by the ES&HM/Lead and Project Construction Manager. These inspections shall include all areas, locations, and disciplines of the project including construction office locations.
- Subcontractor and lower-tier subcontractor supervisors shall assess their work areas for unsafe conditions and practices using assessment checklists as determined by the Bechtel project. Subcontractor shall monitor the closure of corrective actions to completion and feedback closeout of corrective actions to Bechtel and affected personnel.
- Monthly ES&H Self-Assessments of the ES&H Core Processes contained in the Safety & Health Management Plan shall be conducted. The Project Construction Manager and ES&HM will develop an assessment matrix, assigning the employees the Safety Core Processes to be assessed.
- The ES&HM/Lead is responsible for reviewing the assessment and providing technical direction regarding resolution of action items.
- Weekly inspections will be documented. Responsibility and time frames for corrective actions shall be assigned and tracked to closure. Feedback shall be provided on the corrective action closeout to the assessor and/or work crew(s) being assessed.
- Any project employee, Bechtel or subcontractor, who witnesses an “imminent danger” situation shall immediately cease that work activity, remove personnel from the area, secure the work area, and immediately contact the Project Environmental, Safety & Health Manager, and/or designated Bechtel representative.
- All hazards shall be assessed by each crew foreman during JSA meeting prior to task assignment as per CP-105 and communicated to all employees.
- Project ISO 14001 and OHSAS 18001 surveillance audits are conducted periodically through a documented internal audit schedule by the GBU ES&H Function. This process identifies non-conforming ES&H practices and ensure that corrective actions and preventative actions are undertaken to avoid negative ES&H consequences.
- Formal ES&H Assessments are conducted annually through a documented internal assessment schedule by Bechtel Corporate ES&H. This process identifies non-compliant ES&H practices to Bechtel Corporate ES&H Core Process requirements and ensure corrective actions and preventative actions are undertaken to avoid negative ES&H consequences.
16.0 PROJECT ES&H OBJECTIVES
Reference: Bechtel Corporate Policy 111 Environmental, Safety & Health
          BESH CP105 Risk Assessment and Objectives
          26134-000-2HY-GHX-00002 Project ES&H Objectives

Bechtel projects shall implement and maintain documented ES&H objectives. These objectives are agreed on an annual basis as part of the management review process. Objectives are documented and aimed at ensuring compliance with Bechtel Corporate Policy 111: Environmental, Safety and Health and the Statement of Principles. They are set with the aim of ensuring legal compliance and the prevention of injury and ill health.

Overall responsibility for achieving the ES&H objectives lies with the Senior Project Manager of the particular Bechtel project. Progress on achieving objectives is periodically reviewed by the ES&HM and formally reviewed by Project Management as part of the management review process.

17.0 MANAGEMENT REVIEW
Reference: BESH CP107 ES&H Committee and Program Review

Management Review of the Bechtel Project Safety & Health Management Plan will be conducted by Bechtel annually and will be attended by Bechtel Senior Management. The purpose of the review will be to verify the ES&H programs suitability, adequacy, effectiveness, and continual improvement. Interim management reviews may be performed if the need is identified by the responsible ES&HM or member of the Senior Management team.

In addition to an annual management review of the SHMP, performance against the SHMP will be reviewed more frequently through scheduled ES&H meetings.

The ES&HM will prepare the Management Review and it will be comprised of the annual objectives, policy, performance summaries, and recommendations. It will be distributed at the Management Review meeting for reference. Similarly, reports focused on performance data and program execution will be prepared for ES&H meetings.

The agenda for Management Reviews will include the following elements:

I. Introduction and Purpose
II. Status and Changes
   o Actions from previous management reviews
   o The organization and scope of work
   o External and internal issues affecting the ES&H Program
   o Needs and expectations of interested parties (stakeholders)
   o Compliance with legal and other obligations
   o Significant aspects, risks, and opportunities
   o ES&H Plans and Policy statement
III. Objectives and targets
   o Progress made in risk management
   o New or updated objectives
IV. ES&H performance, including trends in:
   o Risk management and incidents
   o Nonconformities, corrective actions, and continual improvement
   o Inspections and monitoring data
   o Fulfilment of compliance legal and other obligations
   o Audit and assessment results
   o Training, awareness, and recognition programs
   o Consultation and participation of workers
V. Adequacy of Resources
VI. Communications (internal and external)
VII. Opportunities for Improvement
   o ES&H Program and plans
   o Training and awareness
   o Coordination and communication
   o Innovation
   o Resources
   o Documentation
The outputs of the Management Review will include:

- Conclusions on the continuing suitability, adequacy, and effectiveness of the SHMP;
- Decisions related to any changes to the SHMP including resources;
- Actions, if needed, when ES&H Objectives have not been achieved;
- Changes or additions to ES&H Objectives or policy; and
- Decisions related to continual improvement initiatives and opportunities.

Issues covered during a Management Review, and the actions agreed upon, will be documented in meeting minutes. Assigned actions will be tracked through closure. The same documentation process will be used for ES&H meetings. Documents associated with Review Meetings and ES&H meetings will be entered into the respective Document Management system. Meeting minutes will be made available to employees and relevant information will be distributed to the workers.

18.0 PROJECT COMPLETION AND CLOSEOUT
Reference: BESH CP115 Program Completion and Closeout

The project closeout process describes the actions associated with project initiation and closure. It is the intent of this process to provide standardization by defining ES&H-required close out activities and deliverables.

The following guidelines are established in Bechtel Core Process 115 Program Completion and Closeout:

- Project Close Out
- Project Historical & Lessons Learned Information

19.0 DOCUMENTATION CONTROL
Reference: BESH CP120 Document and Data Management
26134-000-G30-GAK-00001 Project Document Retention Procedure

All Bechtel project supplied & approved documents will go through the project document-controlled database. Revisions to the Safety & Health Management Plan and/or project-specific ES&H plans and procedures are allowed and are required to be tracked per occurrence by the ES&HM. The ES&HM will perform a yearly review of this plan and include all revisions into the plan. A copy of this plan and annual revisions will be input into Document Control database for Record Retention.

20.0 OPERATIONAL CONTROLS (FIELD EXECUTION REQUIREMENTS)
The processes described in this section of the Safety & Health Management Plan reflect Bechtel, industry practices and regulatory requirements and provide protection to employees, project personnel and neighboring communities.

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<tr>
<td>20.1</td>
<td>Life Critical Work Requirements</td>
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<td>20.2</td>
<td>Jobsite Work Rules</td>
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<tr>
<td>20.3</td>
<td>Stop Work Authority</td>
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<td>20.4</td>
<td>Site Information Binder</td>
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<td>20.5</td>
<td>Job Safety Analysis (JSA) / Method of Procedure (MOP)</td>
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<td>20.6</td>
<td>Emergency Action Plan</td>
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<td>Housekeeping</td>
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<td>20.8</td>
<td>Hazard Communication (HazCom) Program</td>
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<td>Manual Material Handling (Back Injury Prevention and Protection)</td>
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<td>Safe Use of Hand and Power Tools</td>
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<td>Dropped Object Prevention and Protection</td>
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<td>Excavation and Trenching</td>
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<td>20.14</td>
<td>Barricades and Signs</td>
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20.15 Vehicle Safety Management / Mobile Equipment Personnel Interface (MEPI)
20.16 Traffic Control Zone Safety
20.17 Cranes, Lifting and Rigging Operations
20.18 Erecting Towers and New Platforms on Existing Sites
20.19 Energy Isolation and Lockout / Tagout (LOTO)
20.20 Electrical Safety
20.21 Electromagnetic Energy (EME) / Radio Frequency (RF)
20.22 Confined Space Entry
20.23 Fall Prevention and Protection
20.24 Safe Use of Scaffolds and Ladders
20.25 Safe Use of Aerial Lift Devices
20.26 Fire Prevention and Protection
20.27 Welding, Cutting, and Other Hot Work
20.28 Illumination / Night Work
20.29 Heat and Cold Stress Prevention
20.30 Drinking Water and Ice
20.31 Medical Services and Medical Treatment
20.32 Workers’ Compensation / WC Collective Bargaining Agreement
20.33 Bloodborne Pathogens
20.34 AED Requirements
20.35 Occupational Health and Industrial Hygiene
20.36 Respirable Crystalline Silica
20.37 Air Surveillance Program
20.38 U.S. Asbestos Management Program
20.39 Occupational Exposure to Lead

20.1. Life Critical Work Requirements
Reference: 26134-000-GPP-GHX-00003 Project ES&H Life Critical Work Requirements (LCWR)
It is the responsibility of all Bechtel project personnel to comply with and abide by the Bechtel Project Life Critical Work Requirements, as well as all ES&H processes and procedures. These rules shall apply without failure when non-compliance is observed. Refer to the Bechtel Project Life Critical Work Requirements for more information. All employees must acknowledge by signature and completion of the Life Critical Work Requirements Acknowledgment form (26134-000-GPP-GHX-00003, Attachment B). Life Critical Work Requirement training shall be incorporated in the New Hire ES&H Orientation and training provided periodically thereafter through toolbox talks, refresher training, and/or other means of communication as determined by the Bechtel project.

20.2. Jobsite Work Rules
Reference: 26134-000-GPP-GHX-00001 (Attachment B) Employee and Subcontractor Jobsite Work Rules
It is the responsibility of all Bechtel project personnel to read, understand and comply with the project-specific jobsite work rules at all times while working on a Bechtel Project. All personnel, including subcontractor and sub-tier employees, must acknowledge by signature and completion of project’s Employee and Subcontractor Jobsite Work Rules. The form will be provided for acknowledgment during New Hire ES&H Orientation training.
20.3. **Stop Work Authority**

All Bechtel project personnel have the right to a safe and healthy work environment. In the event of imminent danger to the safety and health of workers, the public or the environment, any and all personnel have both the right and responsibility to stop work. Work activity will resume following concurrence amongst those that stopped work, Subcontractor supervision, Bechtel market management and ES&HM/Lead, that appropriate measures have been implemented to facilitate safe work.

**NOTE:** In the event construction activity discovers any unanticipated site conditions (e.g., contaminated material, cultural resources) all construction work **MUST STOP**, and the discovery reported immediately to the Bechtel market representative. Work may not resume until cleared by the Bechtel market representative.

20.4. **Site Information Clipboard, or Binder**

Bechtel and its subcontractor(s) shall maintain on site (via binder, clipboard or other appropriate means) and make available to all lower-tier subcontractors and employees:

- A copy of the Bechtel Project Safety & Health Management Plan.
- Daily Job Safety Analysis (JSA) for the current activities being performed.
- A SARC (Site Acquisition Release to Construction) document. (Exemption to this requirement include Sweep Testing, Punch List Close Out, Warranty Work that do not disturb materials/surfaces identified as environmental triggers.).
- Professional Certification/Qualification Cards (i.e., OSHA 10-30, First Aid/CPR, Aerial Lift, Scaffold Erector/User, Qualified Electrical Worker (QEW), Operator/Rigger/Signal-person, Flagger, Sweep Testing, Coax Connector, etc.).
- Copies of Competent Tower Climber and Rescue Cards and NWSA Telecommunications Tower Technician certifications (to be kept at ground level to avoid climbers having to descend tower to verify cards).
- Applicable supplemental documents (i.e. Method of Procedure, Safe Work Permit/Plan, daily inspection/checklists, etc.).
- Bechtel Market Emergency Calling Tree.

20.5. **Job Safety Analysis (JSA) / Method of Procedure (MOP)**

Reference:  BESH CP105   Risk Assessment and Objectives  
BESH CP106  Hazard Analysis  
26134-000-GFX-GGG-00004  Job Safety Analysis (JSA)  
SWPP 4MP-T81N-01108  Method of Procedure (MOP)

The Job Safety Analysis (JSA) will be used by supervisors and employees for each work assignment to analyze the job for potential hazards that could occur while performing that specific job. The project’s JSA, Method of Procedure, and supplemental safety checklist plans will identify specific work tasks, hazards, and requirements to be implemented prior to start of work. The system involves employees in identifying and discussing the ES&H applications for the assigned work. The Supervisor will discuss the hazards of the job with their employees while completing the JSA and identifying the appropriate risk reduction technique. Additionally, there will be specific ES&H Plans requiring review with project personnel involved in or affected by certain High-Risk activities.

Listed below are some of the key aspects and requirements of this process:

- The Job Safety Analysis (JSA) will be used by supervisors and employees for each work assignment to analyze the job for potential hazards that could occur while performing that specific job. The system involves employees in identifying and discussing the safety applications for the assigned work. The Supervisor will discuss the hazards of the job with their employees while completing the JSA form.
- Subcontractors and their low-tier contractors will have the option to utilize the JSA or have the Bechtel ES&HM/Lead approve their pre-job task analysis form/card prior to starting work at the site. The ES&HM or designee shall determine if these pre-job task analysis form/cards is comparable to the JSA process.
- Key JSA philosophy:
  - Pre-job evaluation of risks performed by workers.
  - Places job planning into the hands of the workers.
  - Encourages group participation and shared learning.
  - Enhances worker's ownership of safety program.
  - Facilitates best approach to work execution.
• Supervisors will ensure employee involvement in the JSA process is optimized by:
  o Ensuring that all employees under his/her charge are trained in the JSA process.
  o Establishing a system to follow-up with his/her crews to verify the JSA process is being correctly implemented.
  o Requiring employees to participate in an individual JSA review prior to the start of each shift or new task.

• Upon completion of the JSA, supervisors will review the work requirements identified on the JSA with the employees.

• The employees performing the work and supervisor will sign the JSA indicating their understanding of its contents. The JSA will be displayed and available for review in the immediate work area.

• The JSA shall be re-evaluated after prolonged breaks (i.e. lunch, weather delays, etc.) to ensure accuracy and capture any changes to the work activity or the work conditions.

• JSA’s are to be collected and retained by Bechtel and its subcontractors. Subcontractors shall submit completed JSA’s to the Bechtel Market ES&H Lead and Contracts Lead upon request. The Bechtel or subcontractor field supervisor is responsible for ensuring that JSA’s are properly completed and returned. JSA’s are to be reviewed for proper usage/completion by the Bechtel Market ES&H Lead and maintained on file according to the project’s document control procedure (26134-000-G30-GAK-00001).

• JSA’s that are evidence to any accident or incident investigation will be retained with the applicable investigation files.

**Method of Procedure (4MP-T81N-01108):**

• The use of a Method of Procedure (MOP) in conjunction with the JSA shall be required for specific tasks that are determined by the Bechtel Senior Project Manager/Market Project Manager, ES&HM/Lead, or the task supervisor, due to the complexity, risk or peculiarity of the task.

• Examples of specific tasks that may require a MOP are:
  o High risk jobs such as those listed on the MOP
  o New jobs or tasks that present unusual or unknown hazards
  o Major job tasks and categories that will be repeated frequently
  o Jobs or tasks that have historically experienced a repeated or significant rate of accidents, injuries, exposures, or near misses
  o Jobs or tasks that, in the professional judgment of the responsible project Environmental, Safety and Health personnel, require a formal MOP

• The Market ES&H Lead or designee shall provide the necessary training to all employees during New Hire ES&H Orientation.

**20.6. Emergency Action Plan**

**Reference:**
- BESH CP114 Emergency Preparedness
- SWPP 4MP-T81N-01401 Telecommunications Emergency Planning
- 26134-000-GPP-GHX-00014 Project Emergency Action Plan

The Bechtel Project, including the individual Bechtel market’s, and subcontractors are responsible for establishing and implementing an effective emergency response plan that addresses the actions personnel should take in an emergency situation and provides direction on how and when to appropriately activate notification and emergency procedures. All Bechtel project personnel shall be instructed to seek appropriate treatment and to report all injuries immediately to their supervisor and authorized Bechtel representative.

**20.6.1. Emergency Action Plan (EAP)**

The Bechtel project and Bechtel project markets shall develop a written EAP. The EAP shall be communicated and made readily available for employees to review upon request. At a minimum, the written EAP shall address the following potential emergency scenarios:

• Cell site emergencies created and/or caused by the work scope being performed (injury/illness, property loss, process interruption).

• Natural disasters (i.e. earthquakes, wildfires, hurricanes, etc.) and inclement/severe weather (i.e. lightning, tornadoes, flash flooding, dust storms, etc.) applicable to the Bechtel market geographic location.

• High-Angle Rescue and Response.

• Cell site (caused by work scope), automobile and equipment fires.
• Public demonstrations or civil disturbances affecting work.
• Acts of Violence / Threats (i.e. terrorism, active shooter, workplace violence, bomb threats, etc.)

NOTE: Subcontractors’ EAP shall be available for review by Bechtel.

In addition, an EAP shall address the administration and on-going management of the following emergency response elements:
• Procedures for reporting of emergencies by all personnel (including subcontractor and lower-tier employees).
• Emergency rescue equipment that is suitable and readily available.
• Appropriate first aid and CPR training for designated employees.
• Timely notifications to appropriate law enforcement authorities, building owners/superintendents and Bechtel in the event of any cell site emergency.
• Remote work locations.
• Appropriate security measures to protect employees in potentially unsafe work locations.
• Office building and cell site evacuation routes (the location of safe exits and evacuation routes for every work site location) and a process for the accounting of personnel.

20.6.2. Severe Weather

Weather conditions shall be monitored prior to site mobilization and throughout the workday by Bechtel and its subcontractors by the use of specialized equipment, weather internet sites, local news media and/or NOAA weather radio (for information from the National Weather Service Forecast Office) for the issuance of severe weather watches and/or warnings for the applicable regions of work.

The following resources provide local weather condition monitoring and storm tracking:
• Battery Powered NOAA Weather Radio (Weather Warnings and Alerts)
• SkyScan Lightning Detector
• National Weather Service (Weather Warnings and Alerts) http://www.weather.gov/
• GroundTruth’s WeatherBug webpage and application (Storm Tracking and Weather Radar Maps) https://www.weatherbug.com/
• WeatherBug’s Spark lightning detection application https://www.weatherbug.com/alerts/spark/
• Weather Underground (Storm Tracking and Weather Radar Maps) www.weatherunderground.com
• The Weather Channel (General Forecast Information) www.weather.com

When it has been determined that a severe weather condition exists, the following actions shall be taken:

a. Shelter in Place – If the storm is severe without the threat of tornados or flash flooding, employees will seek shelter in their Shelter Location as identified on their JSA.

b. Site Evacuation – If the weather system shows potential for flash flooding or tornadic activity, employees will evacuate the project site if adequate shelter or protective facilities are not available.

20.6.3. Lightning Alerts

The project will primarily rely on WeatherBug’s Spark lightning application for surrounding detection and current forecasting information related to detecting lightning strikes. The following criteria will be used to determine safe field working conditions during thunderstorm activity.

• 20-40 miles — The responsible crew lead will begin continuous monitoring of local weather conditions to determine the speed and direction of the potential storm and its forecasted impacts (via means/methods described above). Tower Climbing activities and Overhead Lifting and Rigging operations shall be evaluated for potential impact at this distance.

• 10-20 miles — Lightning strikes detected at this distance, the responsible crew lead will notify crew members of the potential approaching storm. The crew lead shall allow for enough time for employees to safely secure materials and descend from elevated locations in preparation for an approaching storm. Overhead Lifting and Rigging operations shall be evaluated for potential impact and must be authorized by Bechtel to commence at this distance.
• **3-10 miles** — Lightning strikes detected at this distance, the responsible crew lead will shut down all work at height. All outdoor rooftop work, tower top work, work from aerial lifts and scaffolds, capstan/hand hoist and crane operations shall be shut down. Work at outdoor ground level may continue

*The responsible crew lead shall then notify their respective supervision and Bechtel Field Coordinator.*

• **0-3 miles** — Lightning strikes detected at this distance, all outdoor work activities and indoor electrical work shall cease. Personnel shall seek appropriate shelter in a covered, grounded facility or structure.

*The responsible crew lead shall notify their respective personnel to seek appropriate shelter within a grounded, covered structure. The crew lead shall then notify their respective supervision and Bechtel Field Coordinator.*

• **All Clear** — Each crew at a cell site location under the lightning protocols shall wait a minimum of 15 minutes before downgrading to the next lightning protection category or action level.

*For example: If the project is under a 0-3 lightning alert and no lightning strikes have been detected within 0-3 miles of the cell site for approximately the last 15 minutes, the project can be downgraded to the next lower level of action/protection of the 3-10 mile range, etc. Please note this process is not an exact science and will ultimately be managed by evaluating the overall local weather conditions as well as the forecasted projections from the sources available to the project at that time.*

The Job Safety Analysis (JSA) shall be utilized to document cell-site specific response actions in the event of an emergency during the course of or caused by the daily work activities. The response actions shall take into account plans for high-angle rescue, confined space, excavation, and others as necessary. Emergency phone numbers shall be documented on the JSA for each cell site location and weather conditions noted and monitored, as necessary, for potential inclement weather impacts throughout the course of the shift.

### 20.7. Housekeeping

Reference:  
- BESH CP201 Housekeeping  
- SWPP 4MP-T81N-02102 Housekeeping  
- 26134-000-GPP-GAM-00007 Project Field Environmental Compliance Plan  
- 25736-000-GPP-GHX-00005 Project Waste Management Procedure

Good housekeeping is a fundamental and necessary activity required by all personnel working on the Bechtel Project in order to maintain a safe and healthy work environment. Clean and tidy work areas hold fewer hazards for all personnel. Incidents, injuries and illnesses can be avoided, and productivity improved, where good housekeeping is a daily occurrence. All supervisors, including subcontractor and lower-tier contractors are required to enforce and routinely monitor work areas.

General housekeeping requirements include:

- Work areas, passageways, stairways and all other areas shall be kept free of debris, equipment and materials.
- Electric welding leads, cords, wires, electrical cables, hoses and other temporary systems shall be kept at least 7ft off the ground surface.
  - If not practical or feasible, cable protectors (i.e. line backers, yellow jackets, etc.) utilized to route cables through at ground level or cables shall be routed away from the walking/working surface.
- Supervisors are required to ensure that walking surfaces are suitable for personnel to use to safely access work areas. This includes areas prepared by earthmoving equipment or while working on rooftops or other locations. Field supervisors, including subcontractor and lower-tier contractors, are responsible for monitoring work areas and ensuring the necessary conditions and precautions are taken to prevent injuries associated with substandard walking and working surfaces.
- Appropriate trash containers shall be strategically placed and used for disposal of scrap materials and other generated debris.
- Liquids and aerosols such as paints, solvents, thinners, oils and greases, as well as any other material or containers that have contained chemicals, shall be disposed of in accordance with the Bechtel project hazardous waste procedures (25736-000-GPP-GHX-00005) and regulatory requirements.
- All solvent waste, oily rags and flammable liquids must be kept in fire-resistant covered containers until removed from the worksite.
- Storage areas will be kept clean and materials will be stored or placed in an orderly manner.
- Eating areas will be kept clean and free of all food scraps, wrappers, cups and other disposable items.
• All scrap lumber, waste material and rubbish shall be removed from the immediate work area as the work progresses.
• Ensure all nails are removed from wood prior to storing and stacking the materials neatly for re-use or disposal.
• Floors shall be kept clean, dry (as possible), slip-resistant and free of waste, unnecessary material, oil, grease, protruding nails, splinters, holes or loose boards.
• Equipment and materials in work areas will be limited to actual needs and will be stored in a manner to protect combustible material from ignition sources.
• Equipment and materials shall not be stored within 6 feet of any floor/wall opening or hoist way.
• For more information on waste management, refer to the Project Field Environmental Compliance Plan (26134-000-GPP-GAM-00007).
• The surface areas shall be maintained in a clean and, to the extent possible, dry condition.
• Every floor, work area and passageway shall be kept free from protruding nails, splinters, holes or loose boards.
• Construction areas shall be cleaned and arranged by safe means on a daily basis to prevent tripping, slips and fire hazards.
• Containers shall be supplied for the separation of waste. Those containers intended to be used for the containment of combustible, flammable or toxic wastes shall be constructed of metal and equipped with covers. Containers shall be emptied at regular and frequent intervals.
• Means shall be available for spill containment. Spills shall be cleaned up by individuals trained to handle the material, and shall be done promptly and disposed of properly. (Consult the SDS for proper handling instructions.)
• Aisles and passageways shall be kept clear and in good repair with no obstruction across or in aisles.

20.8. Hazard Communication (HazCom) Program

Reference: BESH CP202 Hazard Communication Program
26134-000-GPP-GHX-00011 Project Hazard Communication Program
26134-000-GPP-GAM-00004 Environmental Management Plan (EMP)

The purpose of the hazard communication program is to evaluate the hazards of all chemicals/materials produced or brought on site and provide chemical hazard information to employees. Bechtel and its subcontractors shall comply with OSHA 29 CFR 1910.1200, as a minimum, including any additional applicable hazardous material regulations.


The Bechtel Project Hazard Communication Program (26134-000-GPP-GHX-00011) shall be followed by all Bechtel manual and non-manual personnel. The program describes project specific actions to be undertaken to manage hazardous materials properly, prevent incidents, and reduce waste generation onsite.

The procedure describes:
• Evaluation and Approval of New Hazardous Materials;
• SDS Inventory;
• Receipt of Hazardous Materials;
• Storage of Hazardous Materials;
• Disposition of Hazardous Materials;
• Training;
• Recordkeeping;
Audits/Assessments.

Listed below are some of the key subjects of this process:

- Bechtel Procurement shall coordinate purchasing activities with Market ES&H Leads and will ensure that all purchase orders include a request for a Safety Data Sheet (SDS), where required. All SDS’s sent to the project shall be forwarded to the Environmental, Safety and Health Department for review and approval, as well as communication to the project of new products.

- Hazard Communication Training requirements associated with this program shall be completed in the New Hire ES&H Orientation.

- The ES&HM shall be responsible to monitor the effectiveness of the training provided. A Safety Self-Assessment of the requirements regarding training and compliance with this Safety Core Process shall be completed by ES&H. Improvement recommendations shall be given to the Senior Project Manager.

- Labeling of hazardous substances shall be in accordance with the site-specific procedure.

- Bechtel shall develop a chemical inventory list and update accordingly. Bechtel owned or leased warehouse storage areas will have responsible supervisors assigned to monitor and ensure compliance with the Hazard Communication Program and Environmental Management Plan (26134-000-GPP-GAM-00004).

20.8.2. **Subcontractors**

Subcontractors shall develop, implement and adhere to a Hazard Communication Program that meets the minimum requirements contained in *OSHA 29 CFR 1910.1200*. In addition, Subcontractor shall provide this same information, as required, to lower-tier subcontractors.

Subcontractor has overall responsibility for the program. This includes reviewing and updating the program, as necessary. Copies of the written program shall be provided upon request. As a minimum, Subcontractors shall adhere to the following requirements on the Bechtel Project:

20.8.2.1. **Hazard Evaluation Procedures**

Subcontractors shall seek prior approval from the Bechtel ES&HM/Lead to bring any chemicals onto the job site. This will be discussed in the pre-mobilization meeting with each subcontractor.

Subcontractor shall compile and maintain, on site, a chemical inventory list of hazardous chemicals/materials known to be in the subcontractors possession at the site. Personnel who may be exposed to hazardous chemicals need to know what those chemicals are and how to protect themselves. The hazardous chemicals list covers a variety of physical forms including liquids, solids, gases, vapors, fumes and mists.

20.8.2.2. **Safety Data Sheets (SDSs)**

Subcontractor is responsible for obtaining and maintaining SDSs of all chemicals used during their work operations. Subcontractor employees shall be provided ready access to SDSs via their supervisor.

20.8.2.3. **Labels and Other Forms of Warning**

Labels list, at minimum, the chemical identity, appropriate hazard warnings and the name and address of the manufacturer, importer or other responsible party. Subcontractor is responsible for ensuring:

- All hazardous chemicals/materials in containers, including secondary containers are properly labeled and updated, as necessary, and that newly purchased materials are labeled.

- Proper labeling of any shipped containers.

20.8.2.4. **Training**

Employees who work with hazardous chemicals/materials shall receive initial awareness training and any necessary retraining on safe use of those hazardous chemicals/materials.

The training provided shall emphasize these elements:

- Summary of the standard and the written Hazard Communication Program, including what hazardous chemicals are/may be present, the labeling system used, and access to SDSs information.

- The chemical and physical properties of hazardous materials (e.g., flash point, reactivity, etc.) and methods/signs that can be used to detect the presence or release of these chemicals/materials.

- The physical hazards of chemicals/materials (e.g., potential for fire, explosion, etc.).
Health hazards, including signs and symptoms of exposure, associated with exposure to chemicals/materials and any medical condition that would be known to aggravate that exposure.

- The procedures to protect against chemical/material hazards (e.g., engineering controls; work practices or methods to assure proper use and handling of chemicals; personal protective equipment required, along with its proper use and maintenance; and procedures for reporting chemical emergencies).
- OSHA-mandated training pertaining to the Globally Harmonized System for Classification and Labeling of Chemicals (GHS)

### 20.9. Personal Protective Equipment

#### Reference:
- BESH CP205  Personal Protective Equipment
- 26134-000-GPP-GHX-00008  Project Respiratory Protection Program
- 26134-000-GPP-GHX-00009  Project Hearing Conservation Program
- 2HO-E050-00001  Bechtel Hand Protection Procedure

Information regarding proper use and requirements of Personal Protective Equipment (PPE) are provided in New Hire ES&H Orientation and pre-job briefs by field supervision. All supervisors are responsible to ensure that their crew members are aware of the safety equipment needed at the time of assigning work, or upon issuance of equipment.

Bechtel and its subcontractors shall monitor for compliance with the following requirements, and shall take immediate corrective action when non-compliance is observed:

#### 20.9.1. Head Protection
- Bump caps and metallic hard hats or caps are prohibited.
- Certain types of protective headgear (such as those manufactured by Petzl and others) are permitted for tower climbing and rescue operations, so long as they meet the requirements of ANSI Z89.1. Climbing headgear is inadequate and may not be worn if the work does not involve climbing.
- Welders are subject to the same head protection requirements, even during welding operations.
- Hard hats with a front brim are required to be worn with the brim forward at all times while on site, except:
  - During lunch and break periods, providing no work is in progress in the immediate break area.
  - When operating equipment with fully enclosed cabs.
- Hard hats shall not be altered in any way. Hard hats shall conform to ANSI Z89.1, Class G & E.
- Chinstraps or hard hat tethers shall be worn when performing elevated work (greater than 6 feet).

#### 20.9.2. Eye Protection
- All personnel on the project shall wear approved protective eyewear while on site. Eyewear must meet the requirements of ANSI Z87.1.
- Safety glasses are required to be worn at all times on site, except:
  - During lunch and break periods, providing no work is in progress in the immediate break area.
  - When operating equipment with fully enclosed cabs.
- Tinted lenses (including tinted prescription glasses) are prohibited inside buildings or other structures with limited illumination.
- Persons who require prescription or corrective eyeglasses shall use ANSI-approved prescription safety glasses, goggles or over-the-glass (OTG) safety glasses.
- Prescription safety glasses must have ANSI-approved side shields. (Note: ANSI-approved side shields shall not be used with non-ANSI-approved eyewear.)
- All grinding operations shall be performed with a full-face shield and spoggles or goggles.
  - Spoggles incorporate the use of a soft, laminated foam gasket to protect from dust and small particulates from entering the eye.
- Welders shall wear dual eye protection while welding (i.e., safety glasses worn under the welding helmet).

#### 20.9.3. Respiratory Protection
- If the hazards require employees to wear respiratory protection, Subcontractor shall develop and implement a comprehensive respiratory protection program for the affected employees that, at

- Bechtel direct-hire employees will be subject to the Bechtel Project Respiratory Protection Program (26134-000-GPP-GHX-00008).

20.9.4. Hearing Protection

- If a job-related hearing / noise hazard is extreme or prolonged and requires a form of hearing protection, subcontractors shall develop and implement a hearing conservation program in accordance with OSHA 29 CFR 1910.95 for the affected employees. This includes the mandatory use of protective equipment when sound levels reach 90 decibels (dBA) (TWA) and implementation of other requirements associated with the 85 dBA (TWA) action level.

- Bechtel direct-hire and non-manual employees will be subject to the Bechtel Project Hearing Conservation Program (26134-000-GPP-GHX-00009).

- Hearing Protection will be worn when the decibel readings reach 85dBA and 105dBA TWA.

- Approved hearing protection shall be worn by all personnel whenever in designated areas.

- Work areas shall be established with signage posted where hearing protection may be required.

- At least two different types of hearing protection shall be made available to project employees.

20.9.5. Foot Protection

- At a minimum, sturdy leather work boots/shoes are required. In addition, the following requirements shall apply where hazards warrant additional foot and shin protection:
  - Steel or composite toe (safety-toed), sturdy leather or GORETEX work boots that comply with ANSI Z41 or ASTM F2412-05 to protect against foot injuries from rolling or falling objects.
  - Additional foot protection, such as shin protection, metatarsal guards, etc. shall be worn whenever the job being performed creates a potential for injury to the foot, lower leg and/or ankle.
  - Boots shall have a 1/2-inch well-defined heel and slip-resistant sole allowing for safe climbing of ladders and towers.
  - Steel shanks may be required if there is a potential puncture hazard.
  - Boots must be replaced if metal protrudes through leather uppers, steel shank or metatarsal guard is showing.

20.9.6. Hand Protection

All personnel engaged in work shall wear gloves appropriate for the scope. Specifically:

- Cut Resistant Gloves (ANSI Level A4) with a Level 2 Puncture Resistance rating.

- Worn when handling sharp objects or using a project-approved knife or unprotected blade.

- Appropriate work gloves shall be worn when working on or at any Bechtel project work location.

- All personnel engaged in fiber optic, wire or coaxial cable cutting, stripping, or grounding installation shall wear appropriate cut resistant gloves for the operation.

- Work gloves shall not be required when work activities require the ability to complete detailed work with the fingers, such as terminating wiring. Generally, work gloves should not be worn when operating rotating tools or equipment, such as a conduit threader, drill press, or other rotating machinery.

- Subcontractors shall be responsible for furnishing the appropriate work gloves to its personnel.

- Work gloves shall be promptly replaced when they become damaged (e.g., holes and/or tears).

20.9.6.1. Dielectric Gloves

- Leather gloves are required for work on 12-50 volt (nominal) electrical systems.

- Insulated gloves are required for energy isolation work and when in the proximity of 51-240 volt (nominal) energized systems (refer to NFPA Standard 70E).

- A Bechtel approved Method of Procedure (MOP) is required for work on energized systems over 50 volts (refer to SWPP 4MP-T81N-03312).

20.9.6.2. Chemical Gloves (Neoprene, Nitrile, Rubber, Latex)

- Worn when handling chemical products and as identified by the specific chemical product’s Safety Data Sheet (SDS) and/or handling potentially contaminated or infectious substances (i.e. spill/release and/or bodily fluid cleanup).
20.9.6.3. **Welding Gloves (Heavy leather or MIG/TIG)**
   - As required (contact Bechtel ES&H)

20.9.6.4. **Specialty Gloves (i.e. Vibration resistance, impact resistant, etc.)**
   - As required (contact Bechtel ES&H)

20.9.7. **Personal Fall Protection Equipment**
   - Refer to Section 20.23 for information on fall protection issues.

20.9.8. **High-Visibility (Hi-Viz) Clothing**
   - Hi-Visibility vests, as a minimum, will be required to be worn by personnel during the following activities:
     - Operating heavy equipment (i.e. mini-excavator, telehandler, etc.) is present in the work environment
     - Work in proximity to active public rights-of-way (i.e. road, rail, etc.)
     - Work in active traffic control work zones as permitted by the authority having jurisdiction
     - Night work
   - Where work is controlled by a traffic control permit and/or performed in active rights-of-way, Hi-Viz clothing shall adhere to the requirements of the authority having jurisdiction. (i.e. ANSI Class II or greater)

20.9.9. **Dress Requirements**
   - All personnel are required to wear clothing appropriate for the work being performed. Long pants to the ankle, shirts with sleeves at least 4 inches in length, and sturdy leather work shoes/boots are required.
   - Extra caution must be used when working near moving machinery to prevent clothing and body parts from being caught by moving components.
   - Clothing soaked with grease, paint, thinners, solvents, fuels or similar materials shall not be worn.

**NOTE:** Failure to adhere to any of these Personal Protective Equipment requirements shall result in disciplinary action up to and including removal from the site.

Reference: BESH CP TBD (formerly CP110) Manual Material Handling (Back Injury Prevention Program)

This section establishes the proactive approach needed to apply proper material handling techniques and reduce and/or eliminate back injuries. Back-Injury Prevention precautions must be established at the beginning of the project and addressed when applicable.

Listed below are some of the key requirements of this process:

- The project will implement a manual lifting weight maximum of not to exceed beyond the employee’s physical means or not more than 50 lbs. per person, whichever is lesser. Bechtel and subcontractor employees will comply with the elements of the program.
- The ES&HM/Lead or their designee will conduct initial Back Injury Prevention education during the New Hire ES&H Orientation.
- The Market ES&H Lead will provide awareness and prevention training periodically in the Weekly Toolbox Meetings.
- Supervision will monitor the Back-Injury Prevention Program.

20.11. **Safe Use of Hand and Power Tools**
Reference: BESH CP200 General Safe Work Practices
BESH CP205 Personal Protective Equipment
BESH CP206 Powder Actuated Tools
BESH CP226 Electrical Equipment and Assured Grounding

Employees using hand and power tools may be exposed to the hazard of falling, flying, abrasive or splashing objects; harmful dusts; fumes; mists; vapors; or gases. Employees using hand and power tools shall be provided with the personal protective equipment necessary to protect them from these hazards.
Following these five basic safety rules can reduce/prevent most hazards involved in the use of power tools:

1. Keep all tools in good condition with regular maintenance.
2. All tools must be used in accordance with manufacturer recommendations.
3. Examine each tool before use – do not use a tool if damage or a defect is noted.
4. Operate the tool according to the manufacturer instructions.
5. Provide and use the right protective equipment for both the tool and activity.

**NOTE:** Tool lanyards are mandatory when using tools at heights. “Danger, Do Not Enter” barricades may be necessary to protect employees and members of the public below overhead operations.

20.11.1. **Power Tool Precautions**

Power tools can be hazardous when improperly used. Depending on the type of power tool and the power source used (e.g., electric, pneumatic, liquid fuel, hydraulic, powder-actuated), precautions must be taken. Personnel shall be trained in the use of all power tools they need to use. They shall understand the general safety precautions and potential hazards associated with use of that tool, including specific manufacturer use instructions.

Power tool users shall observe the following general precautions:

- Always be aware of other workers in your immediate area that may be affected by the use of that tool.
- Never carry tools by the cords or hoses. Tools that must be raised or lowered from one elevation to another shall be placed in tool buckets or raised by hand lines.
- While working overhead on towers, rooftops, etc., barricades or other positive means to safeguard employees working below shall be installed.
- Damaged or defective tools are to be taken out of service, tagged “Do Not Operate,” and stored in a controlled area until appropriate repairs have been made.
- Tools are not to be altered in any way and shall be operated in accordance with manufacturer specifications.
- Tools required to have guards shall be operated with guards in place.
- Persons who operate ground compactors (e.g., rollers, chisel impact hammers, etc.) shall wear appropriate protective footwear.
- Disconnect tools when not in use, before servicing, and when changing accessories, such as blades, bits and cutters.
- Job-made tools of any kind are prohibited on Bechtel projects (such as tools made of rebar, rigging equipment, or equipment that is modified in any way).
- Metallic measuring tapes or metal fish tapes shall not be used on or near exposed energized conductors, power lines and/or other related equipment.
- Tools shall not be thrown.
- Tools shall not be left unsecured on scaffolds, platforms or other elevated places where they might fall and endanger employees below.
- Impact tools such as chisels, punches, drift pins and hammers that become worn, mushroomed or cracked shall be removed from service.
- Proper apparel must be worn. Loose clothing, ties or jewelry might be caught in moving parts.
- Only manufacturer-approved extensions shall be used for added leverage on any tool.
- Tools with sharp edges shall be stored and handled in a manner that prevents risk of injury.
- Tool handles shall be kept clean of oil and grease.

20.11.1.1. **Grinders**

- Portable grinders will be provided with hood type guards with side enclosures that cover the spindle and at least 50% of the wheel. All wheels will be inspected regularly for signs of fracture.
- Grinders must be equipped with a constant pressure switch.
- The rated speed of the grinding wheel shall be checked prior to use to ensure that it is rated to be equal to or greater than the maximum speed of the grinder.
- User must follow all manufacturers’ requirements for mounting grinding wheels, to include:
o The mounting nut shall not be tightened excessively.

o Grinders shall be unplugged from the power source (electrical or pneumatic) before changing wheels

- Users shall ensure that portable grinders are properly configured for use for a left- or right-handed person, as applicable – portable grinders must be used with side handles installed, as required by the manufacturer (using a grinder without the safety handle in place is prohibited).

- Bench grinders will be equipped with deflector shields and side cover guards. Tool rests will have a maximum clearance of 1/8-inch (3 mm) between the wheel and grinding stone.

- Supervision shall ensure that frequent light dressings on bench grinders are performed.

- When operating a bench grinder, users shall stand off to one side until the wheel has come up to full speed.

- Personnel shall conduct a “ring test” before using a bench grinder (i.e., gently tap the wheel with an object and there should be a metallic tone or “ring”. If there is a “dead” sound, the wheel shall be taken out of service).

- Electric bench grinders shall be equipped with an anti-restart feature to prevent restart after an electrical power outage.

- Shop machines (e.g., drill presses, fixed saws, bench grinders, etc.) shall be effectively fastened or secured in place to prevent movement during operation and use.

20.11.1.2. Saws

- Band Saws
  o All portions of band saw blades will be enclosed or guarded, except for the working portion of the blade between the bottom of the guide rolls and the table.
  o Band saw wheels will be fully encased.

- Portable Circular Saws
  o Portable, power-driven circular saws will be equipped with guards above and below the base plate or shoe.
  o The lower guard will cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work.
  o The lower guard will automatically return to the covering position when the blade is removed from the work.

- Radial Saws
  o Radial saws will have an upper guard that completely encloses the upper half of the saw blade. A device that will automatically adjust to the thickness of and remain in contact with the material being cut will guard the sides of the lower exposed portion of the blade.
  o Radial saws used for ripping will have non-kickback fingers or dogs.
  o Radial saws will be installed so that the cutting head will return to the starting position when released by the operator.
  o Swing (or Sliding Cut-Off) Saws:
    - All swing or sliding cut-off saws will be provided with a hood that will completely enclose the upper half of the saw.
    - Limit stops will be provided to prevent swing or sliding type cut-off saws from extending beyond the front or back edges of the table.
    - Each swing or sliding cut-off saw will be provided with an effective device to return the saw automatically to the back of the table when released at any point of its travel.
    - Inverted sawing of sliding cut-off saws will be provided with a hood that will cover the part of the saw that protrudes above the top of the table or material being cut.

- Table Saws
  o Circular table saws will have a hood over the portion of the saw above the table, so mounted that the hood will automatically adjust itself to the thickness of and remain in contact with the material being cut.
Circular table saws will have a spreader aligned with the blade, spaced no more than 1/2-inch behind the largest blade mounted in the saw. This provision does not apply when grooving, dadoing, or rabbeting.

Circular table saws used for ripping will have non-kickback fingers or dogs.

Feeder attachments will have the feed rolls or other moving parts covered or guarded so as to protect the operator from hazardous points.

Push sticks will be used when feeding material.

20.11.1.3. Electric Tools
Employees using electric tools must be aware of several dangers. The most serious is the possibility of electrocution. To protect the user from shock, portable electrical tools shall utilize one or more of the following:

- Three–wire cord that is grounded through a permanent, code-approved power source.
- Double-insulated properties.
- Use Ground Fault Circuit Interrupter (GFCI) electrical outlets in a damp or wet atmosphere.

20.11.1.4. Pneumatic Tools
There are several dangers encountered in the use of pneumatic tools. One of the main dangers is being hit by one of the tool attachments or by a fastener. To protect employees from hazards, users shall follow the additional requirements below:

- Air supply hoses exceeding ½-inch internal diameter shall be protected by excess flow valves to prevent “whipping” in the event of hose separation or failure.
- Properly rated whip-checks shall be attached at all air hose connections and/or fittings between the compressor, the air hose, and/or the tool.
- Working with noisy tools (e.g., jackhammer) requires proper use of hearing protection.
- When using pneumatic tools, employees must check that the tools are fastened securely to the hose by a positive means to prevent them from becoming disconnected (i.e., Chicago Fitting pin, whip checks, etc.).
- The pressure of compressed air used for cleaning purposes must be reduced to 30 psi or less. Compressed air shall not be used for cleaning or blowing dust from any part of the body or clothing.
- A safety clip or retainer must be installed to prevent attachments, such as chisels on a chipping hammer, from being unintentionally shot from the barrel.
- Jackhammers can cause fatigue, strains and cumulative disorders; heavy rubber grips and special ergonomic gloves (vibration-resistant gloves) shall be utilized to reduce these effects.
- Workers operating a jackhammer or chipping hammer must wear safety glasses, face shield (secondary protection), and metatarsal guards.

20.11.1.5. Tools Powered by Gasoline or Other Fossil Fuels
The most serious hazard with fuel–powered tools comes from fuel vapors that can burn or explode under the right conditions. To prevent this from happening, employees shall follow these requirements:

- Gasoline-powered tools shall not be used in unventilated areas or confined spaces.
- Gasoline shall be dispensed from only UL/FM-approved safety cans. These cans shall be properly labeled and stored when not in use.
- An in-service fire extinguisher of the appropriate class (i.e., Class B or ABC) and size must be readily available in the area where fuel-powered tools are used.
- Use extreme care while handling, transporting and storing fuel and always handle according to proper procedures for flammable liquids.
- Before the tank for a fuel–powered tool is refilled, the user must shut down the engine and allow it to cool to prevent accidental igniting of hazardous vapors.

20.11.2. Powder-Actuated Tools
All employees using powder-actuated tools must receive training and be certified in the use and operation of the tool(s) to be used. Training and certification for one type of tool does not allow personnel to operate all types of powder-actuated tools. General safety precautions for the use of powder-actuated tools include:
A Bechtel-approved Method of Procedure (MOP) is required for the use of powder-actuated tools.

These tools should not be used in an explosive or flammable atmosphere.

Before using the tool, the employee should inspect it and ensure that all moving parts operate freely.

Warning signs shall be posted in areas where powder-actuated tools are being used.

The tool should never be pointed at another person.

The tool should not be loaded unless it is to be used immediately. A loaded tool should not be left unattended, especially where it would be available to unauthorized persons.

Hands should be kept clear of the barrel end. To prevent the tool from firing accidentally, two separate motions are required for firing: one to bring the tool into position, and another to pull the trigger. The tools must not be able to operate until they are pressed against the work surface with a force of at least five pounds greater than the total weight of the tool.

If a powder-actuated tool misfires, the employee should wait at least 30 seconds, then try firing it again. If it still will not fire, the user should wait another 30 seconds and then carefully remove the load. The defective cartridge should be put in water.

Safety glasses, face shields, and hearing protection shall be worn when using a powder-actuated tool.

The muzzle end of the tool must have a protective shield or guard centered perpendicularly on the barrel to confine any flying fragments or particles that might otherwise create a hazard when the tool is fired. The tool must be designed so that it will not fire unless it has this kind of safety device.

All powder-actuated tools must be designed for varying powder charges so that the user can select a powder level necessary to do the work without excessive force.

Control shall be maintained over the powder-actuated charges. Each cartridge shall be accounted for and properly stored. No live or spent cartridges shall be left on the ground or disposed of in site trash cans or other unauthorized onsite or off-site containers.

If the tool develops a defect during use, it should be tagged, taken out of service immediately, and not used until repaired.

### Hand Tools

For the purpose of cutting applications, it is required that a self-retracting safety knife is utilized when the task requires the use of a knife. The blade retracts automatically when it loses contact with the material being cut, even when the thumb slide is in the extended position.

The use of all unguarded utility knives, personal pocket knives and box cutters is prohibited.

Tie wraps, boxes, etc., will be cut with snips or guarded knives.

When working with tools at heights, always use a tool lanyard to secure tools from falling.

**NOTE:** Unguarded knives such as common utility knives, personal pocket knives and box cutters are prohibited on Bechtel project jobsites.

### 20.12. Dropped Object Prevention and Protection

Reference: 26134-000-GPP-GHX-00013 Project Dropped Object Prevention and Protection Plan

A critical risk on the Bechtel Project is the control of loose tools and materials. The Bechtel Project Dropped Item Control and Prevention Plan has been developed to establish guidelines to prevent dropped tool and/or material incidents which could lead to personal injury or equipment damage.

The Plan outlines the loose tool and material control expectations for the project. This includes:

- Employee Responsibilities
- Training
- Required Safe Work Practices
- Scaffold Housekeeping and Maintenance
- The reporting of incidents
- Reaction to an incident
- The means of measuring compliance with the plan

As a minimum, Bechtel and its subcontractors shall adhere to the following dropped object prevention and protection precaution requirements:
• All hand and power tools shall be tethered with a properly rated tool lanyard or other approved means, where a dropped object potential exists.
• Barricades with hazard and ownership signage shall be properly erected and maintained when an overhead hazard exists.
• Work area evaluations shall be conducted on a regular basis to identify hazards or other impacts leading to the potential for a dropped tool or materials. Non-essential tools and materials shall not be staged or stored on elevated work platforms. Tools and materials must not be stored unsecured at elevations.
• Never handle loose items and materials at height without a proper working surface or without establishing an effective exclusion zone boundary underneath the work area.
• Manually handling tools and materials at height without tethers, lanyards, or other means of securement shall be avoided where practical and feasible. Manually handling tools and materials without dropped object controls requires a firm manual grip (positive control) to be maintained on the tool or material to prevent it from becoming a dropped object.
• All temporary elevated working surfaces shall be constructed with a complete guardrail system equipped with toe-boards and debris netting applied from the work surface to the top rail, where feasible.
• Rope and Gin / Well Wheel (or Head Block) systems shall be rated appropriately with a safe working load (SWL) posted. Consideration must be given to the weight of the load and the applied individual force necessary to raise/lower the load in determining the safe working load.
• Properly rated canvas bags shall be utilized for raising and lowering loose tools and materials. Buckets, pales, or other containers without a rated lifting point shall not be utilized in a hand hoisting system.
• Overhead Protection shall be used to provide protection to employees and the general public at lower elevations for designated walkways with no capability or authorization to re-route foot traffic away from the overhead work / dropped object hazards.

20.13. Excavation & Trenching
Reference:   BESH CP218   Excavation and Trenching
BESH CP234   Utility Clearance
SWPP 4MP-T81N-03202 Site Excavation and Backfill
SWPP 4MP-T81N-03205 Utility Avoidance

20.13.1. Subsurface Utility Avoidance
This section provides guidance in the steps necessary to obtain utility clearance before personnel perform subsurface work or work activities where overhead utilities are present. Nothing in this section is intended to take the place of or override the requirements that may be applicable to any governing jurisdiction, municipality, or other controlling authority (e.g., client requirements). In the absence of such requirements, those contained herein and within Bechtel SWPP 4MP-T81N-03205 Utility Avoidance shall be mandatory. Refer to the Project ES&H Life Critical Requirements for violations of these processes.
• Employees will be trained in the steps necessary to obtain clearance to perform subsurface work or to work where overhead utilities are present.
• Advanced planning will be performed for all work to identify any overhead utility lines, pipe racks, or other potential hazards.
• Local agencies (i.e. public works, Miss Utilities, etc.) will be contacted to review locations of planned work for identification of potential utilities traversing the work areas.
  o Ensure that all utilities, both public and private, have been located and documented.
• Specific requirements will be established and implemented for utility clearance prior to work commencing.
• All utility clearance records will be maintained for historical reference.
• Requirements for access and/or work operations within the specific utilities Right-of-Way Zone for underground natural gas lines shall be strictly adhered to at all times.
• A SARC (Site Acquisition Release to Construction) document has been reviewed, is on site, and any planned subsurface penetrations shall comply with any restrictions documented in the SARC.

**NOTE:** A subsurface investigation using appropriate locating devices is required prior to making any subsurface penetration, regardless of depth or mechanism of penetration.
20.13.1.1. Prior to Construction
During the “Bid Walk” or “Pre-Con,” consider the following:
- Review as-built drawings for the building, facility or area.
- When possible, interview the landowner or knowledgeable representative.
- Use local one-call system (811, Miss Utility, Miss Dig, etc.) for subsurface location of public utilities.
- Use a private locator for private property commodities that the one-call system is not obligated to locate.
- Survey the entire work area to include the immediate surrounding areas for potential hazards:
  - Utilities that have actual physical presence entering or exiting within the surrounding area
  - Signage that suggests utility is present
  - A review of the surrounding area for unmarked service to vent risers, hydrants, manholes, utility vaults, valve caps, generators, light poles, irrigation systems, traffic controls, cable boxes, transformers, etc.
- Utilize site drawings to note the potential risks for all “known” utilities.
- Mark the proposed excavation with the appropriate markings such as “white paint” prior to locating utilities.
- Obtain confirmation from the one-call and private locators that all surveys are complete and documented. A copy of the locate finding must be on site.
- Reconcile variances among the expected and marked utilities.
- Define the potholing plan and methods, as required.

If no response is received from the utility service, do not proceed with excavations until all information has been reviewed by Subcontractor and Bechtel.

The following Summary Guide Table should be used for the purpose of evaluating methods to locate utilities:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>CONCRETE STRUCTURES</th>
<th>SOIL / PAVED SURFACES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Boring</td>
<td>GPR</td>
<td>GPR</td>
</tr>
<tr>
<td>Demolition</td>
<td>Radiography (X-Ray)</td>
<td>Pipe Tracing</td>
</tr>
<tr>
<td>Saw Cutting</td>
<td></td>
<td>EM Metal Detector</td>
</tr>
<tr>
<td>Drilling</td>
<td></td>
<td>Passive (50/60 Hz)</td>
</tr>
<tr>
<td>Excavating</td>
<td>N/A</td>
<td>Line Locator</td>
</tr>
<tr>
<td>Trenching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directional Boring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plowing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LOCATION METHOD</th>
<th>MATERIALS DETECTABLE</th>
<th>EFFECTIVE DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPR</td>
<td>Metals, Plastics, Terra-Cotta and Concrete</td>
<td>10’ (400 MHz)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16” (1.6 GHz)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10” (2.3 GHz)</td>
</tr>
<tr>
<td>Radiography (X-Ray)</td>
<td>Metals and Plastics</td>
<td>N/A</td>
</tr>
<tr>
<td>Passive (50/60 Hz) Line Locator</td>
<td>Power Conduit</td>
<td>12” to 36”</td>
</tr>
<tr>
<td>Pipe Tracing</td>
<td>Copper, Aluminum, Steel and Cast Iron</td>
<td>10’ - ideal conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>EM Metal Detector</td>
<td>Metal or Pipe with Metallic Reinforcement</td>
<td>6.5’ to 14’</td>
</tr>
</tbody>
</table>

20.13.1.2. Pre-Job Conference and Line Identification
- Invite utility company representatives to the pre-construction job walk.
- Contact utility owner and understand their method for locating utilities. Colors and symbols have been adopted by most utilities subscribing to Underground Service Alert (USA). Consult your local service for utility identification. Note that not all utility companies and localities subscribe to locating services. In these cases, each utility owner must be contacted and its method of locating must be understood and followed.

**NOTE:** Utility companies generally will not locate on private property. The private property owner must be contacted, and arrangements made to locate underground utilities.

<table>
<thead>
<tr>
<th>Color</th>
<th>Utility</th>
<th>Symbol</th>
<th>Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Water</td>
<td>W</td>
<td>Fire Alarm</td>
</tr>
<tr>
<td>Orange</td>
<td>Communication CATV</td>
<td>FA</td>
<td>Telephone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TEL</td>
<td>Railroad</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R</td>
<td>Television</td>
</tr>
<tr>
<td>Green</td>
<td>Sewer and Water Drainage</td>
<td>S</td>
<td>Sewer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D</td>
<td>Storm Drain</td>
</tr>
<tr>
<td>Red</td>
<td>Electric</td>
<td>L</td>
<td>Street Lighting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>Electric</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T</td>
<td>Traffic Signal</td>
</tr>
<tr>
<td>Yellow</td>
<td>Gas Oil Steam</td>
<td>G</td>
<td>Gas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Co. Name</td>
<td>Oil and Chemical</td>
</tr>
<tr>
<td>Pink</td>
<td>Temporary Survey</td>
<td></td>
<td>Survey Markings</td>
</tr>
<tr>
<td>Purple</td>
<td>Reclaimed Water</td>
<td></td>
<td>Reclaimed Water</td>
</tr>
<tr>
<td>White</td>
<td>-</td>
<td></td>
<td>Proposed Excavation</td>
</tr>
</tbody>
</table>

### 20.13.1.3. Utility Locating (Potholing), Marking and Protection

All utilities must be physically located by one or more of the following methods:
- Utilities shall be located, initially, through methods such as Ground Penetrating Radar, Subsurface Utility Tracing, Lateral Identification, and Directional Boring Profile Mapping by both public and private utility locate services, where required.
- Non-destructive vacuum extraction (potholing) shall be used to verify existence of and determine the exact location of the marked utility when known utilities and/or grouping of utilities does not allow for other means of verification.
- Pot-holing via hand digging is an accepted method as long as hand digging occurs with non-conductive tools when locating underground utilities and appropriate cave in controls measures are implemented, where required.

**NOTE:** Non-conductive and insulated tools require UL Listing and M&TE test records. Without proper use, care and maintenance, tools can lose their protective properties.

### 20.13.1.4. During Construction

- Perform adequate potholing to positively identify known or suspected underground utilities.
- Pothole 24 inches on either side of the utility marking in an effort to positively locate the service.
• If unable to locate the utility via potholing, as described in the table below, you must contact the appropriate one-call service and/or private location company to re-mark prior to excavating.

**NOTE:** *Most one-call services and the locates subsequently provided are only valid for 15 days or less.*

• If a known utility runs continuously parallel (within 5 feet) of proposed excavation/boring, the existing utility shall be located via potholing at distances as defined below:

<table>
<thead>
<tr>
<th>Linear Feet of Parallel Trench</th>
<th>Minimum Quantity of Potholes</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>2</td>
</tr>
<tr>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>200</td>
<td>3</td>
</tr>
<tr>
<td>250</td>
<td>4</td>
</tr>
<tr>
<td>500</td>
<td>6</td>
</tr>
</tbody>
</table>

Potholing will be performed based on the following parameters:
- <100LF………… (2) Potholes Minimum
- =100LF………… (1) Pothole at start
  - (1) Pothole at 50LF
  - (1) Pothole at end
- >100LF………… (1) Pothole at start
  - (1) Pothole every 100 LF or less
  - (1) Pothole at end

• If the work is to be conducted within the confinements of a fenced-in, leased site location with multiple carriers or other similarly complex environments:
  ○ All trenching activities are to be performed by hand or by other acceptable non-destructive methods (air knife, vacuum extraction, etc.) to minimize damage to underground facilities and personal injury.
• Open trenches and excavations must be barricaded as per section 20.13.3 and 20.14.
• Brace, sheet or shore exposed utilities.

20.13.1.5. *Work Within Structures*

• Use as-built drawings for the building, facility or exterior area to aid in identifying utilities and embedded structural members.
• Prior to penetrating walls, ceilings, floors, paved areas, sidewalks, ground surfaces or any other surface, the location of any potential subsurface object(s) must be determined so that these features will be avoided.
• Use of a GFCI Drill Stop (GFCI designed to automatically terminate power to the tool when initial contact is made with grounded metal) is required when core drilling or drilling for post-installed anchor installation.

**NOTE:** *Cutting of rebar, embedded tensioned members or other embedded structural members is not permitted. Cutting of embedded structural objects may only take place after obtaining the appropriate written engineering approval(s).*

20.13.1.6. *Documentation*

Bechtel and its Subcontractors shall complete the following documentation:
- Locate Request Administration number (LRA#) on the “Utility Locate Tracking Log” (26134-000-GFX-GGG-00010)
- Based on the depth of trenching and excavation activities, completion of an Excavation Permit (26134-000-GFX-GGG-00011) and/or Daily Excavation & Trench Safety Report (26134-000-GFX-GGG-00012) may be required.

20.13.1.7. *Utility Hits*

• If damage occurs to a utility, implement the Emergency Action Plan.
• Immediately contact the affected utility company using emergency numbers from the JSA if a public utility is hit. Contact the landlord concerning building damage.
• Follow Bechtel procedures using the Emergency Calling Tree.
• Incident shall be investigated with corrective actions and preventive actions documented, communicated and tracked to closure.
• Complete a Utility Hit Investigation Report (26134-000-GFX-GGG-00009) and supply to Bechtel.
20.13.2. **Horizontal Directional Drilling (HDD)**

At a minimum the following steps shall be taken when performing Horizontal Directional Drilling:

- Bechtel and its Subcontractors shall:
  - Ensure that all operators and drilling crew members have been trained per the manufacturer’s requirements.
  - Have a method for effective two-way communication along the length of the bore path.
  - Identify and implement any traffic control measures as identified per the authority having jurisdiction permit and/or Section 20.16 of this SHMP.
  - Comply with the subsurface utility avoidance requirements defined in Section 20.12.1.

- Prior to drilling activities, the work crew shall review the Bore Profile Map and perform a walk down of the bore path to identify any overhead, surface, and subsurface hazards including any evidence of any existing utilities that were not previously marked. Such evidence may include pedestals, pole risers, drops, manhole covers, storm drain outlets, meters, utility structures, etc.

- The drill head shall be tracked to ensure it follows the pre-planned path, as identified in Bore Profile Map. A tracking device utilizing electromagnetic fields to detect and track the drill head shall be used. Prior to drilling, the drill operator shall walk the drill path with the tracking receiver to identify and mark sources of interference. Sources of interference may include but are not limited to:
  - Traffic sensing loops and pads
  - Electrical dog fences
  - Buried utility lines with trace lines that transmit high frequency signals
  - Transmitters such as radio and TV transmission facilities
  - Underground tanks or other structures
  - Towers and vehicles
  - Reinforced concrete roadways, sidewalks, and driveways
  - Steel or cast-iron pipes
  - Salt water

- The following specific PPE shall be required:
  - Hard Hat
  - Safety Glasses
  - Dielectric Footwear (meeting the requirements of ASTM F1117) – safety toed footwear (Operator and Crew within 10’ of the rig or drill string)
  - Electrically Insulated Gloves (Operator Only)
  - High visibility vest

- Pipe wrenches shall not be used to separate pipe. Tongs shall be used instead.
- Poly-pipe shall be restrained when cut.
- No worker except the operator shall be allowed to contact the equipment or pipe string while in operation.
- Should an electrical strike occur, the operator shall not dismount the rig until it has been de-energized.
- Pushing of back reamer is prohibited if bore path has any deviations vertical or horizontal from a straight path (back reamer cannot be guided). In such cases, the back reamer shall be removed and the bore head with sonde reinstalled to ensure that the head is locatable and can be guided.
- In the event a gas line is hit during drilling, all personnel shall evacuate upwind of the area. The supervisor/crew lead shall contact emergency services, the utility company, and initiate the emergency calling tree.

20.13.3. **Excavation and Trenching**

The Bechtel Project projects shall implement requirements that provide effective safety measures and methods to protect personnel who are required to work in and around excavations and trenches. Refer to the Project Jobsite Work Rules and the Project ES&H Life Critical Requirements for violations of these processes. Such methods of protection include, but are not limited to:

- Cave-in prevention (sloping, benching, trench boxes, shoring, etc.)
- Ingress and egress requirements
- Edge protection (barriers, warnings, signs, etc.)
- Permitting and inspection requirements

The project shall refer to SWPP 4MP-T81-03202 (Site Excavation and Backfill) and SWPP 4MP-T81N-03205 (Utility Avoidance) for requirements pertaining to the protection or personnel working in and around excavations and trenches.

All the requirements of SWPP 4MP-T81-03202 are incorporated into this section by reference. Listed below are some of the key requirements of this process:

- Requirements for access and/or work operations within the specific utilities Right-of-Way Zone for underground natural gas lines shall be strictly adhered to at all times.
- The ES&HM/Lead will conduct specific Excavation and Trench awareness training for all project personnel in the New Hire Orientation.
- Subcontractors are responsible to provide Excavation Competent Person training to its personnel. Documentation of Excavation Competent Person training shall be provided to the Bechtel Project upon request.
- An Excavation Permit (26134-000-GFX-GGG-00011) must be completed prior to the commencement of excavation and trenching activities 5 feet in depth or greater. All excavations shall have an engineered drawing for reference showing location of underground utilities. In the absence of engineering drawings, utility location practices as identified in Section 20.13.1 and in SWPP 4MP-T81N-03205 shall be performed.
  - Excavations and trenches 20 feet in depth or greater shall be designed by a Registered Professional Engineer (PE)
- Adequate ingress/egress such as stairs and ladders are required within 25 feet of each worker in all trenches greater than 4 feet.
- Trenches or Excavations left open for extended periods and/or overnight will need a hard barricade with signage established a minimum of 2 feet from the edge of the excavation/trench. Additionally, provisions for appropriate protective excavation/trench opening covers shall be considered and installed where practical and feasible.
- Spoil piles (excavated material) shall be kept a minimum of 2 feet from excavation edge.
- Where the stability of adjoining buildings, walls, or other structures, including sidewalks and pavement, is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.
  - Use of support systems for structure stabilization and/or undermining shall be reviewed and approved by Bechtel
- The supervisor responsible for the work is accountable for initiating the Excavation Permit and obtaining the competent person approval signature.
- The excavation competent person is responsible for ensuring the excavation is safe to enter and must complete a daily inspection prior to access and after significant weather events. The daily inspection shall be documented on the Daily Excavation/Trench Safety Report (26134-000-GFX-GGG-00012) before entrance. The Market Project Manager and the ES&H Lead are responsible to ensure that the project has one or more competent persons. Subcontractors are responsible to ensure a competent person is involved with and on-site during all excavations.
- The supervisor responsible for the work will ensure proper signs, warnings and barricades are in place and maintained at the excavation.
- The supervisor responsible for the work shall ensure that required access and egress is provided and is maintained at the excavation.

Entering an excavation or trench 5 feet in depth or greater, or directing others to enter, without prior documented formal assessment of the excavation or trench by a competent person is not permitted. Performing Excavating with unqualified personnel, without permits (as required), and/or not following permit requirements is not permitted. Failure of any employee to follow any excavation safety requirements that has the potential to cause serious injury or death to self or fellow workers is a violation of this safety requirement. Willful violations of project excavation and trenching requirements by any project employee, Bechtel or subcontractor, may result in removal from the project. Refer to the ES&H Life Critical Work Requirements and Project Jobsite Work Rules.
20.13.3.1. Competent Person
The competent person shall:
- Conduct daily inspections of excavations, adjacent areas and protective systems for evidence of situations that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions prior to the start of each shift and as needed throughout the shift. This inspection shall be documented on the Daily Excavation and Trench Safety Report.
- Inspect after every precipitation event or other occurrence that could increase the hazards.
- Remove employees from the excavation or trench if any of these hazards exist.

20.13.3.2. Soil Classification
It is important that supervisors understand and recognize the different types of soil:

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable Rock</td>
<td>Natural solid mineral material that can be excavated with vertical sides and remain intact while exposed.</td>
</tr>
<tr>
<td>Type A Soil</td>
<td>Examples include clay, silty clay, sandy clay, clay loam, and sometimes, silty clay loam and sandy clay loam.</td>
</tr>
<tr>
<td>Type B Soil</td>
<td>Examples include silt, silt loam, sandy loam and sometimes silty clay loam and sandy clay loam.</td>
</tr>
<tr>
<td>Type C Soil</td>
<td>Examples include granular soils like gravel, sand loamy sand, submerged soil, soil from which water is freely seeping, and submerged rock that is not stable.</td>
</tr>
</tbody>
</table>

20.13.3.3. Determination of System
Bechtel and its Subcontractors shall protect employees from cave-ins by an adequate protective system such as:
- Sloping
- Benching
- Shoring systems
- Shielding systems

The determination and design of a protective system shall be based on careful consideration of the following:
- Depth of the cut
- Anticipated changes in the soil due to air, sun and water infiltration, as well as ground movement caused by vehicle/equipment vibration and/or blasting
- Soil classification and earth pressures

20.13.3.4. Sloping and Benching
For excavations and trenches 5 feet in depth or greater (but less than 20 feet) and sloping and/or benching controls are determined for cave-in protection, the following slope angle of repose or bench dimension requirements shall apply based on the soil type:

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Maximum Allowable Slope (H:V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable Rock</td>
<td>Vertical (90°)</td>
</tr>
<tr>
<td>Type A</td>
<td>¾ : 1 (53°)</td>
</tr>
<tr>
<td>Type B</td>
<td>1 : 1 (45°)</td>
</tr>
<tr>
<td>Type C</td>
<td>1½ : 1 (34°)</td>
</tr>
</tbody>
</table>

Additional requirements:
- Excavations or trenches containing different types of soils (layered soils) shall be sloped or benched to the requirements of the weakest identified soil type. If a more stable layer lies under a less stable layer, then each layer can be classified individually.
- Type C soil shall only be sloped. Benching Type C soil is prohibited.
20.13.3.5. **Shoring Systems**
Shoring systems are typically timber or aluminum-hydraulic systems comprised of cross braces, uprights, and walers. Use of timber or hydraulic shoring systems shall be designed by a competent person and design approved by Bechtel prior to excavation and trenching activities. A Method of Procedure (MOP) shall be developed by the responsible Bechtel or subcontractor supervisor. The MOP shall identify, as a minimum, the proper and effective installation sequence of the shoring system.

20.13.3.6. **Trench Shields**
Trench shields or trench boxes may be portable or permanent and shall be capable of withstanding forces generated by a cave-in. They shall be used and maintained in accordance with the manufacturer’s requirements and in a manner that prevents employee exposure to hazards. If equipment or materials are damaged, a competent person shall determine if they are suitable for continued use and document the review. Additional precautionary measures/actions include:

- Predictable failures such as sliding, falling or kick-out shall be prevented by properly securing connections.
- Systems shall be installed and removed to protect employees from cave-ins, structural failures or being struck by the trench system members. Disassembly shall progress from the bottom to the top. Members shall be released slowly to determine the potential for failure.
- Backfilling shall progress with the removal of the systems from the excavation. Subcontractor shall retain the services of an independent, certified material testing laboratory to perform any required testing and Subcontractor shall maintain any/all testing records. Records shall be traceable to the specific placement.
- Subcontractor shall develop dewatering and storm water/pollution protection plans as required by either the project and/or local requirements. Subcontractor shall submit plan(s) to Bechtel for review not less than (30) calendar days or as directed by Bechtel. A notice to proceed must be returned to Subcontractor prior to the commencement of work.
- Subcontractor shall obtain Bechtel acceptance on construction water supply sources used for backfilling operations.
- Backfilling operations shall be undertaken in a manner that avoids damage to underground commodities.
- Excavation of material shall not exceed 2 feet below the bottom of the support members. This level shall be permitted if the system has been designed to this excavated trench depth and there is no loss of material from behind the support system.

20.14. **Barricades and Signs**
Reference: BESH CP212 Fall Protection
BESH CP214 Barricades and Signs
26134-000-2HY-GHX-00004 MEPI Hazard Control Plan

This section describes the installation and maintenance of barricades and warning signs on the project. Bechtel and its subcontractors will restrict entry into and/or provide warning about areas that contain safety hazards, abnormal conditions, or in which unusual operations are being performed. Refer to the Project ES&H Life Critical Requirements for violations of these processes.

These instructions shall apply equally to the office, workshop, warehouse, site, public, roadway or remote locations used by Bechtel and/or subcontractor personnel during the course of the project.

For the purpose of this procedure, a **barricade** is defined as a system designed to warn of a hazard and physically identify the hazard’s parameters. Barricades (also referred to as barriers) can be “soft” or “hard” in construction, depending on the intended use and the nature of the hazard being protected. Listed below are some of the key requirements of this process:

- Information is provided in the New Hire ES&H Orientation with detailed instruction provided by supervisors.
- The crew supervisor/lead is responsible for barricades being properly erected, maintained and for identification of potential hazards.
Barricades will be placed in conjunction with signs or tags on potential access sides, which identify the hazard and list the name of the responsible supervisor. Barricades must be removed promptly when the hazard no longer exists.

Excavations and floor openings shall be barricaded with substantial material (not barricade tape); or a rigid cover labeled as such.

“Red Danger Tape” shall only be used if there is an immediate exposure to serious injury or death. When no longer required, all barricade tape, signs and tags shall be removed with no remnants left behind. All barricades erected are required to have the appropriate signs and/or tags.

Solid barriers (hard barricades) are used to protect against exposure to long-term hazards, restriction of access, and/or fall protection. A solid barricade is a wooden or metal guarding device, capable of withstanding a 200-pound force from any direction, that is placed around a floor/ground hole or floor/ground opening to keep persons from walking into said hole or opening during any time the hole or opening cover must be removed.

The crew supervisor/lead is responsible for barricades being properly erected, maintained and for identification of potential hazards.

Barricades are established to restrict people from hazardous areas. Disregarding, bypassing, defeating, tampering with, and/or unauthorized removal of “Danger” barricades is not permitted. Employees are not permitted inside of any “Danger” designated barricade unless they are part of the crew briefed on hazards and involved in work tasks to eliminate the hazard. Employees are only permitted inside of a “Danger” designated barricade upon obtaining permission from the supervisor of the barricaded work area. Supervisors shall only allow personnel inside a “Danger” barricaded work area if they have been briefed on the hazards and they are involved in work tasks to eliminate the hazard. Failure of any employee to follow any barricading safety requirements that has the potential to cause serious injury or death to self or fellow workers is a violation of this safety requirement.

20.14.1. Road Barricading
Barricades across or next to a roadway shall be protective barricades. The responsible contractor shall ensure that:

- Wooden barricades with appropriate signs or equivalent flashing lights are erected and in good working order.
- All barricade systems installed in public and/or private roadways shall be documented in a written traffic control plan, communicated prior to installation with the appropriate roadway authority, and approved as necessary.
- Appropriate amber flashing lights shall be attached to all barricades in place after dark to alert vehicle traffic of their presence.
- Written traffic control plans must be available at each work site. Written documentation shall be provided prior to the start of work and made available demonstrating all affected employees have been adequately trained on the approved written traffic control plan for that work area.
- If a barricade system cannot be used because of city requirements (i.e., sidewalks or walking paths), then a dedicated safety watch shall be used with vests to monitor the area.

**NOTE:** All roadway barricading systems and configurations shall meet the requirements of the Manual on Uniform Traffic Control.

20.14.2. Safety Warning Signs (4/1)
Safety warning signs shall be used to provide personnel with important safety information concerning the hazards inside any warning or protective barricaded area. The signs or tags must be attached so they can be read from all potential access points. Identification tags and signs should include date, reason, person and contact information.

General Requirements:

- Consideration should be given to signs exposed to high levels of ultraviolet radiated light (i.e., desert conditions), as the signs and warning tape will fade.
- Signs and warning tape shall be regularly cleaned and replaced when damaged.
- All emergency exits, passageways, fire doors, first aid stations, eye wash stations and emergency muster points shall be highlighted with safety condition signs.
- Warning signs shall be erected and displayed for fire hazards, electrical equipment, openings, overhead working, noisy areas, utilities, overhead power lines, and other hazards.
- Mandatory signs shall be provided for enforcing the use of personal protective clothing and equipment and providing specific instructions appropriate to the task or condition.
- Prohibition signs will be displayed for restricting access or entry, no smoking areas, no parking and any other unauthorized acts.

20.15. Vehicle Safety Management / Mobile Equipment Personnel Interface (MEPI)

Reference: BESH CP229 Vehicle Safety Management
26134-000-GPP-GHX-00004 Project Vehicle Safety Management Plan (VSMP)
26134-000-2HY-GHX-00004 MEPI Hazard Control Plan
26134-000-GPP-GHX-00015 Project Safe Driving Program
SWPP 4MP-T81-02304 Heavy Equipment Operator Qualification

The Project Vehicle Safety Management Plan is established to provide guidance and direction on vehicle safety issues, including on/off project vehicle operations, heavy equipment operator qualification and safe operations, and establishing minimum controls for protecting personnel from vehicles/mobile equipment. The requirements set forth in this Vehicle Safety Management Plan (VSMP) will serve as a resource to the Bechtel Project. Key components of the VSM Plan are:

- Establishing, evaluating and updating the Project Mobile Equipment Personnel Interface (MEPI) Hazard Control Plan at a minimum of every 90 days from issuance until project closure.
- Eliminate and/or reduce personnel exposure to potentially dangerous vehicle situations through proper planning and sufficient pedestrian/personnel controls from operating equipment.
- Develop a project specific procedure to identify, manage, and control hazards relating to motor vehicle and heavy equipment operations;
- Establish guidelines and responsibility for project site conditions to ensure site layouts promote the safe vehicle operations outlined in this procedure;
- Establish guidelines for project drivers and passengers;
- Control operations that move people and/or personnel from a point of entry/storage to/from the project;
- Establish qualifications and training guidelines for employees who are required to operate vehicles as a normal part of their assigned duties;
  - Bechtel manual and non-manual employees who will be required to drive/operate Bechtel owned, leased, rented, or other controlled motor vehicles shall be permitted to drive through the Project Safe Driving Program
- Establish inspection and maintenance guidelines to ensure that employees operate vehicles that are properly maintained and appropriate for use;

The site-specific Equipment/Vehicle Operation Rules and Equipment/Vehicle Equipment Inspection Checklists will be followed by all employees including Bechtel, subcontractors, and low-tier contractors. Perform MEPI Assessments at specific Project Phases and close out any action items identified in a timely manner.

Operation of any type of motorized vehicle or equipment by unqualified personnel, beyond their safe working capacity, and/or not in accordance with the Manufacturer’s Instructions/Guidelines, the project VSMP, the Bechtel ES&H Core Processes, and/or Standard Work Process Procedures is not permitted. Failure of any employee to follow any safety requirements during the operation of any type of vehicle or mechanical equipment that has the potential to cause serious injury or death to self or fellow workers is a violation of these safety requirements.

- All Subcontractors shall deem their employees/operators qualified and authorized to operate specific construction equipment prior to its use.
- Operators shall wear seatbelts at all times when operating any piece of construction equipment.
- Workers in the vicinity of operating equipment shall wear high visibility reflective vests.
- Mobile equipment shall be equipped with automatic backup alarms.
- Personnel, other than the operator, shall not ride on the equipment unless equipment is provided with an approved passenger/demonstrator seat equipped with seatbelt protection.
- Personnel shall not walk or work under loads on cranes/hoists.
- Personnel shall stay clear of the swing radius (cranes, counterweights, etc.).
- Mobile equipment shall not be left unattended unless the controls are placed in the park position and the parking brake, if provided, is set. When parked on a grade, the wheels or tracks of mobile equipment shall be either chocked or turned into a bank.
20.16. Traffic Control Zone Safety

These requirements are intended only for short duration work on roads where traffic control permits are not required by state or municipal requirements. Where required by state or municipal requirements, the proper permitting shall be obtained prior to site mobilization and traffic control plan execution. The Work Zone Safety Plan/Traffic Control Plan shall be on site at the work location and adhered to at all times.

20.16.1. Temporary Work Zone Component Areas

A temporary traffic control work zone includes the entire section of roadway from the first advance warning sign through the last traffic control device, where traffic returns to its normal path and conditions. A well-designed work zone contains six distinct component areas:

- Advance Warning Area
- Approach Area
- Transition Area
- Longitudinal Buffer Area Work Area
- Work Area
- Termination Area

Physical space permitting, each component area should be present in some form in most work zones. Two or more of the component areas may be combined in situations where traffic volume, speed and visibility do not permit the use of all of the above individually. For example, a longitudinal buffer area (LBA) is not possible in a mobile work operation nor required where Traffic Control Persons are used, and a termination area is generally not required in low speed urban situations.

In laying out a work zone, attention must be given to provisions for the safe access to and egress from the work area for work vehicles.

The six key component areas are described below in the order that drivers encounter them:

1. **Advance Warning Area** – The space between the warning signs and transition area; tells motorists what to expect.
2. **Approach Area** – Informs drivers what action to take.
3. **Transition Area** – The space between the advance warning area and buffer space; allows motorists to move out of normal traffic path (a taper is applied here).
4. **Longitudinal Buffer Area** – The space between the transition area and the work area; provides an additional margin of safety for motorists and workers. A longitudinal buffer area or a buffer vehicle is not required where traffic is controlled by means of traffic control persons, remote control devices, or portable traffic controls signals or temporary traffic signals.
5. **Work Area** – The work area is where the work takes place. It is set aside for workers, equipment and material storage.
6. **Termination Area** – The space beyond the work area that transitions the motorist to normal driving conditions.

**NOTE:** All roadway barricading systems and configurations shall meet the requirements contained within the Manual on Uniform Traffic Control Devices (defined by federal/state).

20.16.2. Short Duration Work

Short duration work refers to stationary maintenance, construction or utility activities which require a separate work space that is continuously occupied by workers and/or equipment for more than 30 minutes and less than one 24-hour period.

20.16.3. Lighting of Work Area

Workplace lighting shall comply with Section 20.28 of this SHMP. This lighting must not interfere with motorists’ ability to navigate the work zone.
20.16.4. **Roadway Lighting Through a Work Zone**

Illumination of the driver’s path through a construction work zone may assist the driver in making timely decisions, partially compensate for an undesirable alignment, or lessen the visual impact of an illuminated work area on the driver.

20.16.5. **Preparation Before Beginning Work**

The necessary approvals and/or permits shall be obtained prior to the start of work requiring the establishment of a work zone. Preliminary tasks to be completed before beginning work on the road include:

- Perform the initial work site evaluation.
- Determine the category and duration of the work to be undertaken.
- When feasible, select hours of work outside peak traffic volume periods.
- For short duration work, determine the posted speed limit and hourly and daily traffic volumes in order to establish the signing and channelization requirements for the worksite (a three-minute count of traffic at the site multiplied by 300 will give a workable estimate of the daily volume). The purpose of this brief count is to determine whether the road is a low volume or high volume road. Normally, roadwork is not done in peak traffic periods, and hence it is appropriate to take the count in off-peak periods. If roadwork must be done in peak traffic periods, the traffic count should be made in the peak period.
- Prepare a traffic control plan in compliance with regulatory requirements prescribed under the appropriate traffic control documents in the jurisdiction of the project, in detail appropriate to the complexity of the work project. Ensure all responsible parties understand the plan before the site is occupied. Any changes in the traffic control plan should be approved by an authorized individual/position.
- Notify the police, fire department, ambulance services, transit authorities and the appropriate road authority, if required, and any other agencies that may be affected by the maintenance or construction activities.

**NOTE:** All employees entering or engaged in work activities within a “Work Area” must wear a high visibility reflective vest that meets authority having jurisdiction code requirements.

20.17. **Cranes, Lifting, and Rigging Operations**

**References:**
- BESH CP214 Barricades and Signs
- BESH CP219 Suspended Personnel Platforms
- BESH CP223 Cranes and Lifting Operations
- BESH CP234 Utility Clearance
- SWPP 4MP-T81-01901 Crane Operation Qualification
- SWPP 4MP-T81-01902 Rigger, Signalperson, Competent Person Rigger Qualification
- SWPP 4MP-T81-01903 Construction Rigging Work Operations
- SWPP 4MP-T81N-01906 Telecommunications Overhead Lifting and Rigging Operations
- 3DG-T04G-50003 Network Planning – AM Tower EME Safety Considerations

20.17.1. **Certifications / Qualifications**

These requirements are intended for all project personnel, including subcontractors and sub-tier contractors. All the requirements of Bechtel SWPP 4MP-T81N-01906 are incorporated by reference hereafter.

For all lifting operations, Bechtel and its subcontractors must use qualified crane, capstan hoist or drum hoist operators. Verification of operator qualification must be made available upon request. The following specifies the certification requirements for crane, drum and capstan hoist operators, as well as signalperson and dedicated spotter:

- **Crane Operators**

  Must be qualified in accordance with OSHA and ASME B30.5 to operate their crane (note: ASME B30.5 classifies boom trucks as cranes). Verification of qualification may take the form of either:

  a. Valid certification card from the National Council for the Certification of Crane Operators (NCCCO) for the class of equipment being operated, or,
  
  b. Letter or other written document from Subcontractor or Subcontractor's crane training organization attesting that the “operator meets the qualification requirements of OSHA 29 CFR 1926.1427 and ASME B30.5-2003 section 5-3.1.2." Additionally, the crane operator must possess a valid medical certificate (DOT/CDL physical exam).

- **Drum Hoist Operators**
Must be qualified in accordance with ASME B30.7, and must possess a valid medical certificate (DOT/CDL physical exam). Verification of qualification may take the form of either:
   a. Evidence of having passed a written and practical exam covering the operation of base-mounted drum hoists, in accordance with ASME B30.7, or,
   b. Statement from their employer that they have substantial experience operating a base-mounted drum hoist.

- **Capstan Operators**
  The Capstan Operator must be qualified, either through formal training or documented 1-year work experience. This person must also be a Qualified Rigger as written in OSHA 1926.1425C. Trainee capstan hoist operators must be under the direct supervision of an experienced capstan hoist operator. The supervisor must be physically present on the ground, must continually instruct and monitor the trainee, and must be able to immediately intervene should a problem arise.

- **Qualified Rigger**
  a. A Rigger is a subcontractor or direct-hire employee, who is responsible for attaching rigging gear, (i.e., shackles, slings, etc.) from the load to the mechanical lifting equipment.
  b. A Qualified Rigger is a Rigger who is recognized as a Qualified Rigger per a recognized qualification program pursuant to OSHA § 1926.1404 and 1926 §1425.
  c. A Qualified Rigger is knowledgeable and has experience, background and/or training in rigging hoisting and lifting methods, is capable of identifying existing and predictable hazards in the surroundings or working conditions and has authorization to take prompt corrective measures to eliminate the hazardous condition.
  d. Must be OSHA qualified to perform those tasks for which OSHA requires a Qualified Rigger; must be used during assembly/disassembly and other activities when workers must be in the fall zone to handle a load.
  e. A Qualified Rigger may need certification from the specific jurisdiction being worked in.

- **Signalperson**
  a. Must be OSHA-qualified pursuant to OSHA 1926.1419 through 1926.1422 and 1926.1428.
  b. The documentation of the signalperson's qualifications must be available at the worksite.
  c. The documentation must specify each type of signaling (e.g., hand signals, radio signals, etc.) for which the signalperson is qualified.

- **Dedicated Spotter (Power Lines)**
  This person meets the requirements of OSHA 1926.1428 (Signalperson Qualifications) and his/her sole responsibility is to watch the separation between the power line and the equipment, load line and load (including rigging and lifting accessories) and ensure thorough communication with the operator that the applicable minimum approach distance is not breached.

20.17.2. **General Requirements**
Bechtel and its subcontractors performing work shall ensure that:
   a. A competent person rigger is assigned and available as the person in charge of any lifting operation. A competent person rigger is an employee who is responsible for attaching rigging gear (i.e., shackles, slings, etc.) from the load to the mechanical lifting equipment. This person shall be knowledgeable and have experience, background and/or training in rigging, hoisting, lifting and signaling methods. Comply with applicable OSHA and other federal standards, state, county or local regulations, and customer restrictions and job site specific requirements, as necessary.
   b. Rigging hardware and materials are inspected before use, configured correctly, and properly attached to the lifting equipment.
   c. Availability of information, procedures and equipment necessary to move loads without injury to personnel and without damage, either to the site or the equipment.
   d. Substandard or unsafe equipment or methods are not used to move loads.
   e. All loads are “dogged-off” (positive hoist latching device engaged) until unsafe equipment is repaired or methods are revised so that the lift can be completed in a safe manner.
   f. All capstan hoists are equipped with a rope locking device.
   g. A Pre-Lift Safety Checklist (4MP-T81N-01906, Attachment B) is completed and maintained at site.
h. The applicable forms are completed for all “critical lifts”, including:
   - Crane Lift Data Sheet and Layout (4MP-T81N-01906, Attachment C-1 and C-2).
   - Drum Hoist and Gin Pole Operation Planning Form (4MP-T81N-01906, Attachment D).
   - Capstan Hoisting Operation Plan and Datasheet (4MP-T81N-01906, Attachment E).

**NOTE:** See additional requirements in Section 20.17.4.

i. Steel or hardwood mat assemblies are provided and/or installed under crane and boom-truck outriggers at all times. Boom-trucks are considered cranes.

j. Identify voltage of any power lines (overhead or underground) in the vicinity of the work area and maintain distances to energized conductors as required by Section 20.17.14. Contact the utility company to determine voltage – never estimate or rely on the opinions of others. Utilize a dedicated spotter to assure proper clearances are maintained. If proper clearances cannot be maintained, contact the power company to de-energize and ground the lines. See Section 20.17.14 for additional requirements.

k. Provide spreader bars or lifting beams that meet all requirements of ASME B30.20, specifically:
   - Designed by a qualified engineer with a 3:1 factor of safety against yield strength.
   - Capacity and self-weight indicated on the bar.
   - Load tested to 125% of rated capacity.

l. Provide slings that meet all requirements of ASME B30.9. Each sling shall have a legible capacity tag, including wire rope and chain slings. Note: Synthetic slings must be padded.

m. Provide lift equipment and rigging hardware requirements, including method of removal following execution of the lift.

n. Ensure access of lift and transportation equipment into and out of the lift area.

o. For other lifting gear, provide hardware that is rated for “overhead lifting purposes.”

p. Provide man baskets that meet all requirements of OSHA 29 CFR 1926.1431(e) and are designed by a qualified engineer with a 5:1 factor of safety against yield.

q. Determine soil conditions and site terrain to verify access for lifting equipment and to ensure stability at the location of the lift.

r. Determine if a lift falls into the “critical lift” category (Refer to Section 20.17.4).

20.17.3. **Inspections**

Daily inspection shall be performed by the equipment operator, in accordance with manufacturer’s recommendations, to ensure lifting equipment and systems are in good working condition and do not require repair, adjustment or lubrication prior to use. If repair or adjustments are performed, the equipment and systems inspection shall be repeated prior to use.

- All crane, hoist and capstan equipment shall undergo a full inspection periodically (at least annually).
- Cranes shall be inspected daily and annually on the appropriate Bechtel forms (4MP-T81N-01906, Attachment F-1 and F-2) in accordance with ASME B30.5.
- Drum hoists shall be inspected daily and annually on the appropriate Bechtel forms (4MP-T81N-01906, Attachment G-1 and G-2) in accordance with ASME B30.7.
- Capstans shall be inspected daily on the appropriate Bechtel forms (4MP-T81N-01906, Attachment H).
- Gin poles shall be inspected daily and annually on the appropriate Bechtel forms (4MP-T81N-01906, Attachment I-1 and I-2).

20.17.4. **Lift Categories and Classifications**
In addition to the requirements of 20.17.3 and 20.17.4, Bechtel and its subcontractors are also responsible for adhering to requirements associated with the following lift classifications:

- Critical / Super Critical lift categories include the following scenarios:
  a. A lift over an occupied area (i.e., occupied buildings, sidewalks, roadways, etc.).
  b. Lifts in the vicinity of power lines.
  c. Lifts requiring the crane to be set up over underground building structures or transportation tunnels.
  d. Any lift where the payload weight is 30 tons or greater.
  e. Where any part of the crane or load encroaches onto or over highway, roadway or railroad rights of way, unless the corridor is shut down to traffic.
  f. All crane-suspended personnel basket lifts (i.e., man baskets).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Low-risk</th>
<th>Critical</th>
<th>Supercritical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifts over personnel occupied areas (i.e., buildings, sidewalks, etc.)</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Lifts in the vicinity of power lines</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Lifts requiring the crane to be set up over underground building structures or transportation tunnels</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Where any part of the crane or load encroaches onto or over highway, roadway or railroad rights of way, unless the corridor is shut down to traffic</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Suspended work-platform (manbasket) lifts</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Any lift requiring the utilization of a Gin Pole and/or a winch/hoist.</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Use of a Capstan Hoist over 600 lbs. (272.2 kg) or 75 percent of the rating of the limiting component of the system.</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Any lift involving sensitive, costly, or schedule-critical equipment which are classified by the MM as critical lifts</td>
<td></td>
<td>x</td>
<td></td>
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<tr>
<td>Lifts over 75 percent of the capacity of the &quot;crane&quot; (chart or reeved capacity)</td>
<td></td>
<td>x</td>
<td></td>
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<tr>
<td>Lifts over 90 percent of the capacity of the &quot;crane&quot; (chart or reeved capacity)</td>
<td></td>
<td></td>
<td>x</td>
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<tr>
<td>Lifts over operating equipment or operating plant</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Load drifting operations</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Lifts requiring the assistance of the local utility company</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Lifts over occupied buildings or operating facilities</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>When set up over critical underground services</td>
<td></td>
<td></td>
<td>x</td>
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<tr>
<td>All Lifts with helicopters</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Unusual or complex lifts that exceed the Communications PRE’s skills and knowledge base</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Any lift classified by the MM as being super-critical</td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

Verbal plan and skill of the trade

Requires review and approval by a Bechtel PRE (or CRE)

Requires review and approval by a Bechtel CRE
g. Any lift required the utilization of a Gin Pole and/or winch/hoist.

h. Use of a Capstan Hoist where the payload is over 600lbs. or over 75 percent of the rating of the limiting component of the system.

i. Any lift involving sensitive, costly, or schedule-critical equipment which are classified by the Market Project Manager as critical lifts.

j. Lifts exceeding 75% of the crane capacity.

k. Lifts over operating equipment or operating plant.

l. Load drifting operations.

m. Lifts requiring two or more cranes.

n. Lifts requiring the assistance of the local utility company.

o. Lifts with helicopters over areas defined by the FAA as “congested areas.” Generally, this is defined as areas that people utilize or inhabit (non-wilderness areas).

p. Lifts where the crane boom or payload swings directly above or directly under energized power lines. Lifts adjacent to power lines are not considered critical if the clearance provisions of Section 20.17.14 are followed.

q. Project management may classify any lift that involves sensitive, costly or schedule-critical equipment as critical lifts.

Bechtel and its subcontractors shall develop a written Critical / Lift Plan and submit to Bechtel for written approval. The approved “critical lift” or “lift” plan shall be available at the site during all lifting activities and address the following items:

- Lift data sheet (4MP-T81N-01906, Attachment C-1 and C-2)
  a. Crane configuration and counterweights
  b. Boom/jib length
  c. Radius
  d. Weight of hook block, crane attachments, wire rope
  e. Weight of rigging
  f. Payload weight
  g. Radius
  h. Capacity

- Copy of the crane capacity chart

- Plan view sketch, to scale and dimensioned, indicating location of:
  a. The crane in relation to the payload pick site/location and set location.
  b. Any above-ground or underground utilities, buildings or other obstacles, interferences, etc.
  c. Swing or travel path of boom.
  d. Boom and payload clearances to obstructions, utilities, buildings, interferences, etc.
  e. Crane mat and outrigger locations.
  f. Crane assembly/disassembly area or requirements.

- Elevation view sketch, to scale, indicating clearances between boom and the payload and the boom and any obstructions, such as buildings.

- List of rigging gear, and a sketch of the rigging arrangement.

- Description of the communications or signaling method to be used by equipment operators and rigging crews.

- Description of the payload to be lifted:
  a. Description and location of the rigging attachment points.
  b. Payload weight, including weight of any attachments.
  c. Payload dimensions.

- Special considerations:
  a. Effects of the wind.
  b. Soil or ground bearing considerations.
c. Rigging calculations.
d. Other special precautions.

- Submit the following qualifications or certificates, as applicable:
  a. Crane operator qualification documentation.
  b. Rigger competency documentation.
  c. Crane annual (periodic) inspection certificate.
  d. Spreader bar or lift beam test certificate.
  e. Certification that man basket is in compliance with 29 CFR 1926.1431(e).
  f. Sling or other lifting device load test certificates must be made available upon request.

20.17.5. **Lifts Over Occupied Areas**

When lifting over occupied buildings, an evaluation shall be made by the subcontractor to determine if a critical lift rigging plan is required. It is intended that light lifts made over a structurally sound roof do not require a critical lift rigging plan; however, where there is a concern of roof failure or injury resulting from a dropped load, a critical lift rigging plan shall be prepared and submitted by the subcontractor. When the subcontractor is unclear on whether a critical lift rigging plan is required, the Project Rigging Engineer or Subject Matter Expert (SME) will make the final determination.

**Critical lift rigging plan required:**

a. Load is in excess of 1000 pounds and there are tenant-occupied areas (areas other than for maintenance, storage or equipment) immediately below the building roof structure.

b. The building roof structure under the load path is obviously questionable about supporting any additional weight (i.e., skylights, glass-covered atriums, damaged or deteriorating roofs).

**Critical lift rigging plan NOT required:**

a. Load is less than 1000 pounds and the roof is stone-covered asphalt and supports existing ventilation equipment. Roof loading restrictions shall be obtained from the building owner prior to placement of a load.

b. Load is less than 200 pounds and the roof supports personnel foot traffic under the entire load path. Roof loading restrictions shall be obtained from the building owner prior to placement of a load.

20.17.6. **Lifts with Helicopters**

- A Bechtel representative shall be present during all helicopter operations.
- Helicopter lifts shall be performed in accordance with the following regulations and specifications:
  a. 29 CFR 1926.551 (OSHA, Helicopter Lifting)
  b. 14 CFR 133 (FAA, Rotorcraft External Load Operations)
  c. ASME B30.12 (Handling Loads Suspended from Rotorcraft)
- The following required permits must be submitted during the lift planning phase:
  a. Copy of the Operator’s FAA-issued Rotorcraft External-Load Operator Certificate, including the name of the Chief Pilot who is approved by the FAA for conducting Rotorcraft External-Load operations.
  b. Registration number(s) of the rotorcraft operator candidate(s) that will be used for lifting.
  c. Copy of the local permit (or application) required to perform the helicopter operation, if one is required.
- For helicopter lifts, a critical lift rigging plan shall be submitted to Bechtel for approval. In addition to the documents in Section 20.17.2, 20.17.3 and 20.17.4, the following must be included in the rigging plan:
  a. Copy of the operation plan, approved and signed by the FAA Flight Standards District Office.
  b. Copy of the approved city or local permit required to perform the helicopter operation, if such permit is required.
  c. Maximum gross weight of the rotorcraft-load combination.
  d. FAA-approved hook load rating for the helicopter to be used for this operation, per the flight manual.
  e. Load rating for the hook that will actually be used.
  f. Rated load of hoist and load line, if a hoist is used.
  g. Sketch of the rigging arrangement, with dimensions.
  h. Size and rated capacity of all slings, shackles, spreaders.
i. Written statement regarding how static charge protection will be provided.

j. Pre-flight inspection checklist form specifically indicating hoist, hook, pendant, sling inspection and criteria.

If present in the operational area, the location and elevation of any power lines shall be detailed on a sketch of the lift area. The voltage and owner of the power lines shall be indicated on the sketch. The Bechtel Project Rigging Engineer or SME, Subcontractor, Chief Pilot, and owner of the power lines shall determine if the lift can be performed safely in accordance with electrical clearance requirements per the Project SHMP, Section 20.17.14. If not, the power lines must be de-energized and visibly grounded during the lift. The owner of the power lines must grant written approval of the method. This approval shall be included in the critical lift rigging plan.

A pre-lift job overview and safety briefing shall precede the lift. The helicopter crew, personnel assigned to the task, and the Bechtel representative must attend the briefing. The purpose of the meeting is to brief the helicopter crew with specific installation requirements, and to have the helicopter crew brief the workers on ground-level safety requirements during rotorcraft operations. The Bechtel representative shall initiate the meeting, assure that the appropriate topics are properly discussed, and document attendance.

To ensure site security during helicopter lifts, no unauthorized personnel shall be allowed in the loading area, setting area, or under the flight path of the loaded helicopter. Effective barricading methods must be utilized to prevent the general public from entering the work area during the lift. The barricade method chosen should consider the site location and the extent of nearby activity.

20.17.7. Drifting Operations

Drifting operations are typically required when setting a load through a side opening in a building, such as a doorway or open window. Crane hook access is typically restricted by floors above, requiring the load to be side-shifted, or drifted, into position. The load cannot be fully released from the hook onto the floor until its center of gravity (CG) is inside the building. The load line of the crane must not deviate from vertical. It must not be pulled sideways, or bent around the top frame of an opening. Additionally, the rigging must not be allowed to contact, abrade or bend around the top frame of the opening. There are several ways to safely accomplish this:

a. Using chain falls or other adjusting devices in the rigging in order to shift the load CG with respect to the load line once one edge of the load has been landed.

b. Using a counterbalance frame to insert the load into the opening. There must also be a plan for handling the counterbalance frame once unloaded.

c. Drifting operations or other operations similar to those described above require submittal of detailed critical lift rigging plans. Step-by-step sequencing information and force redistribution calculations are required on the plans.

d. It is preferred that drifting operations be eliminated altogether; for example, by landing the load on a temporary platform outside the opening, detaching the crane, and rolling the load into place.

e. Minor manual pushing or pulling necessary to adjust the load into its final position is not considered a drifting operation.

20.17.8. Person in Charge

For every lifting operation, Subcontractor shall designate a Person In Charge (PIC) to have overall control to ensure implementation of the safe system of work. That person must be available on site during operations he/she controls. The PIC must have adequate training and experience to carry out these duties competently. The PIC may have other duties, but may not be the Crane Operator for that operation. The PIC is responsible for:

a. Completing the Pre-Lift Safety Checklist (4MP-T81N-01906, Attachment B) and conducting rigging operations in accordance with all applicable regulations, Bechtel, customer and jobsite-specific requirements, as necessary.

b. Identifying existing and predictable hazards in the surroundings or working conditions and taking prompt corrective measures.

c. Planning the lifting operation and providing such planning, selection of equipment, instruction and supervision as is necessary for the task to be undertaken safely.

d. Ensuring that adequate inspection and maintenance of the equipment has been carried out.

e. Identifying defects and incidents and ensuring that necessary corrective action is taken.
f. Coordinating, directing and controlling the lifting operations.

g. Stopping the operation whenever an unsafe condition is identified or suspected, or if the operation is inconsistent with the plan.

h. Complying with applicable OSHA standards and federal, state, county or local regulations, including customer restrictions and job site-specific requirements, as necessary.

i. Ensuring that rigging hardware and materials are inspected before use, configured correctly and properly attached to the lifting equipment.

j. Ensuring the availability of information, procedures and equipment necessary to move loads without injury to personnel and without damage either to the site or the equipment.

k. Ensuring that substandard or unsafe equipment or methods are not used to move loads.

l. Ensuring that all loads are dogged-off (positive hoist latching device engaged) until unsafe equipment is repaired or methods are revised so that the lift can be completed in a safe manner.

20.17.9. **Below-the-Hook**

Bechtel and its Subcontractor shall be responsible for the following below-the-hook related requirements:

a. Knowing and understanding the prevailing legislative rigging requirements of the jurisdiction in which the work will be performed.

b. Providing and using rigging in accordance with prevailing legislative requirements of the jurisdiction in which the work will be performed. Where there are no legislative requirements, standards equivalent to OSHA 1926.251, ASME B30.9, and ASME B30.20 shall be used.

c. Providing legible capacity tags on ALL slings.

d. Verifying that the PIC ensures that daily inspection of all below-the-hook rigging has been performed each day of use.

e. Ensuring Crane Suspended Personnel Platform (man baskets or personnel work platforms) include documentation and certificates stating compliance to the prevailing legislative requirements of the jurisdiction in which the work will be performed. Where there are no local/state legislative requirements, the provisions found in 29 CFR 1926.1431(e) shall be used. Use of the Personnel Lift Plan (26134-000-GFX-GGG-00013) and the Suspended Personnel Platform Checklist (26134-000-GFX-GGG-00014) are required.

f. Submitting evidence that ALL utilized spreaders were designed or verified by a competent engineer, and have valid load test certificates to 125 percent of rated capacity.

g. Submitting evidence that all Crane Suspended Personnel Platforms (man baskets or personnel work platforms) were designed or verified by a competent engineer.

20.17.10. **Lift Equipment Operators**

Only qualified lifting equipment operators are authorized to operate lifting equipment on a Bechtel job site. Lift equipment operators are responsible for the following:

a. Meeting all requirements for the type and class of equipment being operated and maintain valid qualification documents.

b. Performing and documenting a daily thorough inspection (refer to SWPP 4MP-T81N-01906) to ensure equipment is in good working condition and does not require repair, adjustment or lubrication prior to use.

   o If repair, adjustment or lubrication is performed, the equipment inspection shall be repeated prior to use. If the equipment is due for monthly or annual inspections, as defined by the equipment manufacturer, ensure that required inspections are performed.

c. Determining if the equipment is safe to perform its function and addressing any concerns with the equipment that need to be resolved (and/or repaired, as necessary) with their supervisor prior to performing a lift.

d. Verifying the lift equipment readiness by completing a daily checklist once the repairs are complete.

e. Performing a final check to ensure all applicable lift criteria are met upon satisfactory completion of the daily checklist.

f. Determining if the lift is safe to perform and addressing any concerns with the PIC / supervisor that need to be resolved prior to performing a lift. If at any time during the lift there is an unexpected problem, concern or situation that arises, the operator shall secure the lift and notify the responsible Bechtel personnel.
g. Securing the lifting equipment upon successful completion of the lift and preparing for demobilization and, when necessary, transport. Qualification documentation shall be submitted with all critical lift rigging plans. For other lifting operations, qualification documentation shall be produced upon request.

h. Complying with all applicable jurisdictional codes, standards and regulations including customer restrictions and job site-specific requirements.

i. Operating assigned lift equipment within the specifications provided by the manufacturer’s operator manuals, load charts and operator notes. This includes pre-start and post-start inspection, maneuvering skills, shutdown and securing procedures.

j. Producing upon request and maintaining valid certifications, as applicable, for the class of equipment to be operated.

Utilizing crane information and monitoring systems (onboard computers) when they are installed on the crane. Cranes operators will not disable or tamper with these systems.

20.17.11. Safe Use of Suspended Personnel Platforms

20.17.11.1. Personnel Lift Plan

Prior to any use of a crane suspended personnel platform (man basket), a Personnel Lift Plan (26134-000-GFX-GGG-00013) AND a Critical Lift Plan (refer to Section 20.17.4) shall be completed. A separate plan must be completed each time the conditions of the lift change (e.g., each set-up location of the crane, change in lift points, intended lift locations, etc.).

The steps for properly completing the Personnel Lift Plan are as follows:

- The required general information, as stated in the job description section of the Personnel Lift Plan form, shall be provided.

  NOTE: Hoisting employees in a personnel platform is prohibited except when the use of conventional means of reaching the worksite, such as personal hoist, ladder, stairway, aerial lift, elevated work platform, or scaffold, would be more hazardous or would not be feasible because of the structural design of tower or other worksite conditions.

- If use of the suspended personnel platform is deemed appropriate, Bechtel and/or its subcontractor shall submit a Critical Lift Plan (see section 20.17.4) AND the Personnel Lift Plan (26134-000-GFX-GGG-00013) to Bechtel for review and acceptance prior to the lift operation.

- The equipment checklist and calculated total allowable weight of the suspended personnel platform under loaded conditions shall be completed in Section 3 of the Personnel Lift Plan. The responsible supervisor completing the section shall attach appropriate documents as required in Section 3 and sign at the bottom.

- The responsible supervisor shall inspect the suspended personnel platform prior to its use and complete Section 4 of the Personnel Lift Plan (Man Basket Inspection Checklist). A visual inspection, checking for the condition of the basket and lifting bridle/slings (signs of rust, corrosion, damage, and cable condition) shall be made prior to use.

20.17.11.2. Trial Lift

Prior to hoisting personnel in a suspended personnel platform, a trial lift meeting, a trial lift of the unoccupied personnel platform, final inspection of all equipment, and then a trial lift of the occupied platform shall be conducted. The trial lift shall be documented on the Personnel Lift Plan.

A trial lift meeting shall be held prior to the trial lift to discuss safety topics associated with the lift. Personnel required to attend the meeting include:

- Equipment operator
- Signal person(s)
- Employee(s) to be lifted
- Supervisor responsible for the lift

The meeting must be repeated whenever there is a change in any of the above personnel.

A trial lift of the unoccupied personnel platform, with a test weight attached that is 125 percent of platform rated capacity, shall be made. The platform shall begin at ground level (the level at which employees shall have to enter the platform) and shall stop at each location where it is to be hoisted and positioned.
The trial lift shall be conducted prior to placing personnel on the platform. The equipment operator shall determine that all systems, controls and safety devices are operating properly. The equipment operator shall also verify that the crane may be operated to all lift points without going beyond 50 percent of the crane’s rated capacity (as determined from the crane’s capacity chart, based on the required radius, boom angle, and boom length for that particular lift).

The supervisor shall conduct a final visual inspection of the crane, rigging, personnel platform and crane base support immediately after the trial lift to determine if the testing exposed any defects or adverse conditions. Any defects found during the inspections shall be corrected before hoisting personnel.

After the trial lift inspection, and just prior to hoisting personnel, the occupied platform shall be hoisted a few inches off the ground and inspected to ensure that it is secure and properly balanced.

20.17.11.3. Platform Repairs

After any repair or modification of the suspended personnel platform, the platform and rigging shall be proof-tested to 125 percent of the platform’s rated capacity by holding the platform in suspension for 5 minutes. The platform shall not be used for hoisting personnel until the proof-testing requirements are satisfied.

20.17.11.4. Suspended Personnel Platform Inspection

The Suspended Personnel Platform Checklist (26134-000-GFX-GGG-00014) shall be followed to perform the safety inspection of any suspended work platform.

20.17.12. Towers

The sequence of initial tower construction of guyed towers shall be evaluated to minimize complexity and risks associated with construction.

Bechtel and/or the responsible subcontractor shall develop a Method of Procedure (MOP) that has been reviewed and sealed by a Professional Engineer licensed in the state where the site is located. The MOP shall be uniquely produced for the specific site and outline all steps in the installation process. The MOP shall be submitted to Bechtel or its Subcontractor and reviewed with the responsible and affected personnel prior to the start of tower erection.

20.17.13. AM Hazards, Static Electricity Discharge Due to Induced Current

Proper precautions shall be taken for crane and hoisting work at all worksites that are designated as AM Hazard Sites.

Cranes and hoist lines shall be grounded. This applies to cranes being erected, used and disassembled. A crane shall be grounded at the rotating upper works supporting the boom. A base-mounted drum hoist shall be grounded at its frame. The minimum requirements of the grounding lead shall be 1/0 flexible copper strand cable (welding cable), 600V jacket. The grounding lead shall be bonded to the cell site’s grounding grid. For cranes, provision shall be made such that the grounding cable is free to move as the crane’s upper works rotates and does not get tangled or catch on obstructions or personnel. Grounded jumper cables shall also be attached to materials being handled by boom equipment and hoist lines. Workers shall attach the ground cable to the load using nonconductive poles having large crocodile clips or similar protection. If non-conductive slings or other nonconductive rigging components are being used, additional jumper cables shall be used to assure all components of the rigging assembly and hook are bonded to the load or to ground. Workers handling the load or who may come in contact with the hook or revving of the crane or hoist shall be grounded using wrist straps.

A trial lift shall be performed prior to performing the lift operation at sites determined as AM Hazard sites. The trial lift will ensure the equipment grounding and additional controls are effective and crane electronics are not impacted by AM frequency transmission.

**NOTE:** All connecting devices must be manufactured for rigging and hoisting operations. DO NOT use devices such as carabiners, hose clamps or mule tapes which are manufactured for use in other applications.


There is an area surrounding every energized power line that is referred to as the absolute limit of approach. It is strictly forbidden to breach this zone with any part of a lifting device (e.g., boom, load line, rigging) or with a suspended load unless the line has been de-energized or insulated.

Per Bechtel Corporate ES&H (BESH) Core Process (CP) 223, Cranes & Lifting Operations, and BESH CP 234, Utility Clearance, the absolute limit of approach distances are the following:
As such, it is mandatory that:

a. The voltage shall be identified.
b. Where possible, the line shall be deenergized and grounded
c. Where not possible, lifting operations shall be planned to maximize the clearances and maintain the tabulated minimum distances.

**NOTE:** These clearances are much greater than stipulated by OSHA 29 CFR 1926 Subpart CC


If restrictions are encountered at a cell site where the requirements of Section 20.14.14 cannot be complied, it is required to:

a. Plan the work to maintain the maximum distance possible from the power line, never less than the OSHA stipulated distances appropriate to the voltage, as identified in 29 CFR 1926.1408 & 1926.1409.

b. Institute the OSHA precautionary measures as identified below:

   o Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite, or

   o Establish encroachment prevention measures (using flags or a device such as a range limit device or range control warning device) that are more than the identified minimum clearance distances identified in Tables A and B from the power line and prohibit the operator from operating the equipment past those boundaries

   o Determine with the utility provider the voltage of the power line and that no part of the equipment, load line or load (including rigging and lifting accessories) could get closer than the minimum clearance distance to the power line permitted under Table A and B below. Ensure that NO PART of the equipment, load line or load gets closer to the power line than the minimum approach distances by implementing the Encroachment Prevention Precautions identified by Table A or B, based on the voltage.

c. Prepare and submit a Method of Procedure (MOP) outlining requirements and actions that shall be taken to eliminate risk of potential contact with overhead lines, personnel injury and property damage.
### Table A: Minimum clearance distances (≤350kV):

<table>
<thead>
<tr>
<th>Voltage (kV)</th>
<th>Minimum clearance distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 50</td>
<td>10</td>
</tr>
<tr>
<td>&gt;50 to 200</td>
<td>15</td>
</tr>
<tr>
<td>&gt;200 to 350</td>
<td>20</td>
</tr>
</tbody>
</table>

### Table B: Minimum Clearance Distances (>350kV):

<table>
<thead>
<tr>
<th>Voltage (kV)</th>
<th>Minimum Clearance Distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;350 to 500</td>
<td>25</td>
</tr>
<tr>
<td>&gt;500 to 750</td>
<td>35</td>
</tr>
<tr>
<td>&gt;750 to 1,000</td>
<td>45</td>
</tr>
<tr>
<td>&gt;1,000</td>
<td>Determined by the utility/owner</td>
</tr>
</tbody>
</table>

20.17.14.2. Encroachment Prevention Measures

In the event a safe boundary needs to be established, the following encroachment measures must be followed:

a. Conduct a planning meeting with the crane operator and the other workers who will be in the area of the equipment or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution. If tag lines are used, they must be non-conductive.

b. Erect and maintain an elevated warning line, barricade or line of signs equipped with flags or similar high-visibility markings at the minimum clearance distance. If the operator cannot see the elevated warning line, a dedicated spotter must be used to signal the operator that the crane is passing the marked line.

c. Additionally, you must use at least one of the following precautions: A proximity alarm, a dedicated spotter, warning device, range limiter or insulating link.

20.17.14.3. Post Lift

- Once the lift has been safely completed and the load has been secured in its final position:
  1. The rigging crew shall remove all tag lines, rigging and temporary barriers.
  2. Equipment operator(s) shall remove all hauling and lifting equipment from the area (if no longer needed).
  3. The implementing work group shall restore the work area for future construction work.

- The implementing work group shall ensure that hauling and lifting equipment that is no longer required for the project is safely disassembled, loaded onto transport equipment and removed from the construction site.

20.18. Erecting Towers and New Platforms on Existing Sites

Reference:
- BESH CP223 Cranes and Lifting Operations
- BESH CP234 Utility Clearance
- SWPP 4MP-T81-01902 Rigger, Signalperson, Competent Person Rigger Qualification
- SWPP 4MP-T81-01903 Construction Rigging Work Operations
- SWPP 4MP-T81N-01107 Telecommunications Competent Tower Climber
- SWPP 4MP-T81N-01906 Telecommunications Overhead Lifting and Rigging Operations
- SWPP 4MP-T81N-03205 Utility Avoidance

20.18.1. Requirements for Erecting Towers

Bechtel project personnel, including subcontractor and lower-tier contractors, shall possess the necessary skills to safely install, dismantle and rig towers. No one should attempt to install or dismantle any tower or tower component without the necessary skills and experience. The responsible supervisor shall ensure crew members are physically capable of safely performing assigned tasks.

20.18.2. Planning Erection of Towers

A competent person shall supervise and direct the installation for all construction means, methods, techniques, sequences and procedures. Prior to the start of tower erection, the responsible competent person shall:

- Develop and submit a detailed Method of Procedure (MOP) to Bechtel for review and approval.
- Ensure there is an emergency response plan in place that has been reviewed with all site personnel prior to commencing work.
• Obtain and review tower erection drawings, installation and/or erection manuals as part of the Method of Procedure (MOP) review.
• Inspect the tower foundation to ensure it is installed per design. Concrete strength shall be verified to meet or exceed the minimum strength criteria.
• Identify any potential hazards, such as overhead power lines or buildings, and identify the proper precautions to be followed for crane operations.
• Assess whether the tower can be assembled on the ground (this would reduce fall hazards associated with the task).
• Ensure that tools, cranes, rigging and machinery brought to the site are in good condition and properly equipped with safeguards.
• Select appropriate ladders for the task and inspect to ensure that ladders are in good condition.
• Ensure the means of electrical grounding meet local and national codes. Cranes may also need to be grounded when working near or around power lines.
• Ensure that supervisors and their employees review the Method of Procedure in detail, ensuring the work activity, hazards and control measures for each significant task are understood by all. The MOP review shall be included during the daily Job Safety Analysis (JSA) pre-job brief.
• Develop rigging plans in compliance with the requirements of the Overhead Lifting and Rigging Operations (Section 20.17 and SWPP 4MP-T81N-01906).
• Ensure tower erectors/climbers adhere to the Tower Climber requirements of this document (refer to Section 20.23).
• Select the most appropriate means of accessing the tower. Consideration shall be given to the use of crane suspended personnel platforms or aerial lifts.
• Ensure that tower erection activities are not performed during severe weather (heavy winds, lightning, ice, etc.).
• Check condition of pegs, safety climb and other structural connections to ensure safe climbing surface/anchor points.

20.18.3. **Tower Delivery and Offloading**

Special care shall be taken during unloading, hauling, and offloading to prevent personnel injury or damage to the tower and component parts.

• Laydown area boundaries shall be established and communicated to all personnel.
• Wheels of the delivery vehicle shall be properly chocked to prevent unexpected movement while unloading.
• Tag lines of appropriate length shall be used when lifting tower components by crane or other lifting devices (boom truck, gin poles, etc.).
• Do not roll or drop any sections from the truck to the ground. Do not drag or stack the components in such a way that personnel injury or damage may occur.
• Tower components shall be inspected and verified that all components are present and in satisfactory condition. The manufacturer shall be contacted for any missing or damaged parts.
• The use of damaged, overloaded or misused parts is prohibited.
• Blocking/cribbing should consist of hard wood lumber or other suitable materials placed in such a manner that will allow the removal of slings and rigging.

20.18.4. **Erecting Towers**

Personnel shall:

• Maximize ground assembly to reduce potential fall hazards to employees.
• Install climbing pegs, step bolts or ladder sections while the tower pieces are still on the ground.
• Check that all bolting has been completed and tightened to AISC standards. Double worker verification is a good practice.
• Check material grade on structural bolts (A325 or A490).
• Some towers supply nut locking devices that shall be used when required.
Prior to lifting the first piece of steel, plan for the installation, use and removal of temporary vertical lifelines (rope and/or retractable) used for fall protection. In most cases, excessively long sections of lifeline may be eliminated if a ground crew member attaches independent lifelines to each new section being raised. Rope lifelines shall be tethered to the tower or weighted to allow free travel and operation of rope grab devices (refer to Section 20.23).

- Install the permanent safety climb as soon as physically possible (as soon as the components are available to do so).
- Use tag lines of sufficient length when lifting tower components by crane or other lifting devices (boom truck, gin poles, etc.).
- Install antenna mounts to the maximum extent possible on the ground, rather than at elevation.
- Ensure that any temporary or permanent attachments (antenna support arms/boom gates/platforms) to the tower or structure do not interfere with the climbing ladder, step bolts or safety climb device.

### 20.18.5. Specific Towers/Poles

#### 20.18.5.1. Monopole Slip Joints

Slip joint assemblies require the proper amount of overlap. The manufacturer's structural drawings usually list the design slip value and the allowable overlap range and target values. Inspection of the internal area of the slip joint and mating surfaces should be conducted prior to erection; a clean inside surface free of galvanizing build up or debris will save problems during the installation and allow a proper fit.

#### 20.18.5.2. Guyed Towers

- Cranes should be used to the maximum extent possible in guyed tower installation.
- Guyed towers are not self-supporting at any height. Use of temporary steel guys may be required.
- When it is impractical to use a crane, use a tugger/winch and/or gin pole as an acceptable alternative.
- Use of tugger/winch and/or gin poles requires a Method of Procedure (MOP) and the following at a minimum:
  1. Operator training;
  2. Careful planning to ensure load rating; and
  3. Condition of equipment verified satisfactory before use.

#### 20.18.5.3. Self-Supporting or Lattice Towers

- Caution must be taken when erecting pre-assembled horizontal sections from the assembly area to the vertical position. Racking may cause damage to the assembly. A second crane or tail hook may be required depending on the size of the assembly.
- Face spread dimension center to center of anchor bolts circles should be per manufacturer's tolerances.
- Maximum difference between any two foundation elevations should be per manufacturer’s tolerances.
- Wave guide devices shall not be used as personal fall protection anchorage points.
- Personnel shall not use wave guide devices for climbing.

### 20.18.6. Platform Installations on Existing Towers

Prior to climbing:

- Conduct pre-climb safety meeting and document completion on the provided JSA form.
- Inspect the tower from the ground for missing members, obvious structural damage, bent supports, excessive corrosion, insects and bird nests, ice build-up, etc. (use of binoculars is recommended).
- Inspect the safety climb device and ensure that it is free of obstructions, in good condition, and correctly attached at both ends.
- Ensure that the step bolts are aligned, evenly spaced, and completely secured throughout the structure.
• Ensure that the area to be accessed is free from obstructions.
• Determine the potential exposure to RF radiation near or in front of any operating antenna.
• Identify possible anchorage points for fall protection devices.
• Identify nearby hazards (power lines, AM transmission sources, and other RF generating sources, etc.).

**NOTE:** Appropriate control measures shall be developed to adequately address identified hazards. Upon inspection, if a tower is deemed unsafe to climb, the responsible Bechtel Representative or ES&HM/Lead shall immediately notify.

### 20.19. Energy Isolation and Lockout/Tagout

**Reference:**
- **BESH CP221**  
  Lockout Tagout Procedure
- **SWPP 4MP-T81N-01308**  
  Telecommunications Systems and Equipment Safety Tagging / Lockout

This section provides guidance on effective controls against the release of hazardous energy of all types, including but not limited to:

- Pressure (pneumatic, hydraulic, etc.)
- Mechanical (dynamic and kinetic)
- Electrical
- Thermal (steam, heat, etc.)

The project shall adhere to SWPP 4MP-T81-01308 (Telecommunications System and Equipment Safety Tagging / Lockout), at a minimum, and the requirements contained within pertaining to the lockout/tagout and isolation of hazardous energy.

All the requirements of SWPP 4MP-T81-01308 are incorporated into this section by reference. Listed below are some of the key requirements of this process:

- Each project employee, Bechtel, and subcontractors involved in a lockout/tagout procedure will be formally trained in this lockout/tagout procedure or equivalent (refer to Section 20.20).
- Basic information and hazard identification regarding the Lockout/Tagout Procedure is provided at New Hire ES&H Orientation and periodically at Weekly Safety Meetings.
- Due to the importance of compliance with this procedure the Market Project Manager and the Project Construction Manager with the assistance of the ES&HM/Lead shall ensure that all supervisors and affected personnel are trained on the Lockout/Tagout Procedure. The training must be documented.
- Any machinery, equipment, component, and/or system with any type of stored hazardous energy, which has the potential to expose an individual to harm, shall be locked and tagged and all residual/stored energy relieved prior to any work activities. The removal and/or tampering of any tag and/or lock installed for the safety of personnel without proper authority is not permitted. Failure of any employee to follow work processes for electrical and/or stored hazardous energy in any Bechtel Standard Work Process Procedure that has the potential to cause serious injury or death to self or fellow workers is a violation of this safety requirement. Willful violations of the project lockout/tagout procedure by any project employee, Bechtel or subcontractor, may result in removal from the project. Refer to the Bechtel Project Jobsite Work Rules and ES&H Life Critical Requirements for violations of these processes.

#### 20.19.1. General Requirements

- Subcontractors may utilize their own procedure for safety tagging with prior Bechtel review and authorization, but in no case shall more than one procedure be used on a single site. Tagging or lockout is required for hazardous energy in the presence of an energy source or a future potential source while working on the equipment.

**NOTE:** Where Subcontractors receive approval to utilize an in-house Energy Isolation and Lockout/Tagout procedure, Subcontractor shall be responsible to train its employees on the specific requirements of the procedure and provide documentation of training upon request. Additionally, Subcontractors Energy Isolation and Lockout/Tagout procedure shall meet or exceed the minimum requirements of Bechtel SWPP 4MP-T81N-01308.

- Only trained, skilled and qualified personnel shall perform or be involved in energy isolation and lockout/tagout activities.
  - Employees affected by energy isolation activities shall be trained to the applicable Energy Isolation and Lockout/Tagout procedure.
• Verify that all safety precautions and adequate protections are in place to perform the work tasks safely.
• Re-establish system configuration and remove lockout/tagout devices following completion of the work protected by lockout/tagout.
• Locks are the preferred means of isolation. If possible, isolation points shall be locked safely without causing interference with adjacent equipment (e.g., multiple breakers in a distribution panel). Disconnecting a cable and tagging is acceptable, as long as exposed energized cables or terminals are properly insulated/isolated. Where operational procedures prohibit locks, or in situations where no physical means of locking devices may exist, tagging only is acceptable.
• The secure placement of a tag or lock on an energy isolating device, disconnect switch or circuit breaker indicates that the equipment or system being controlled may not be operated until the lockout/tagout device is removed. Push buttons, selector switches and other control circuit devices are not energy isolating devices.

20.20. Electrical Safety

Reference:
- BESH CP221 Lockout Tagout Procedure
- BESH CP226 Electrical Equipment and Assured Grounding
- SWPP 4MP-T81N-01308 Telecommunications Systems and Equipment Safety Tagging / Lockout
- SWPP 4MP-T81N-03312 Telecommunications Working On or Near Energized Circuits

This section identifies the Electrical Safety requirements intended for all Bechtel project personnel, including subcontractor and sub-tier contractors. This section includes the requirements of Bechtel SWPP 4MP-T81N-01308 Energy Isolation & Lockout/Tagout, SWPP 4MP-T81N-03312 Working On or Near Energized Circuits, and Bechtel Core Process (CP) 226, Electrical Equipment and Assured Grounding. The project shall adhere to the identified procedures by reference and any additional electrical safety requirements contained within this section.

20.20.1. General Safe Work Practices

All the applicable provisions of the National Electrical Code (NEC) shall be followed:
• Only qualified employees shall be permitted to perform energy isolation (lockout/tagout) and/or work on, near or with energized electric circuits.
• Employees shall be prohibited from working near any part of an electric power circuit that an employee could contact in the course of work, unless the employee is protected against shock by de-energizing the circuit and grounding it or by guarding it effectively by insulation or other means.
• If the exact location of underground electric power lines is unknown, employees using jackhammers or hand tools shall wear/use insulated protective gloves and dielectric footwear.
• Electrical panels shall not be left open or unattended except while actively being worked on. Personnel working on the panel shall not leave the panel unsecured.
• There shall be no exposed panel blanks.
• Only authorized personnel shall have access to panel boxes. Access to panel boxes is limited to authorized/qualified personnel only through locks, controlled zones, monitor, etc.
• If site conditions require work within the minimum clearance distances of overhead power lines (as identified in Section 20.17.14) and engineering controls cannot adequately assure safe working conditions, a written Method of Procedure (MOP) must be submitted to Bechtel for review and approval.
• Site personnel shall consider static electricity, electromagnetic energy sources, conductive cables, and equipment on sites when evaluating jobsite hazards and incorporate the necessary control measures in the daily JSAs.
• All electrical tools shall be in good working order, including protective insulation.
• Electrical cords shall be visually inspected daily. Damaged cords must be removed from service and tagged “defective” immediately.
• Equipment powered by electricity shall be de-energized before repair or adjustments are performed.
• Ground Fault Circuit Interrupters (GFCIs) shall:
  o Be provided for all outdoor power receptacle outlets (e.g., temporary wiring during construction).
  o Be provided for all areas having a moist or wet atmosphere where electrical equipment or portable electric tools may be used.
  o Be inspected and checked periodically.
20.20.1. **Working On or Near Energized Circuits**

**General Requirements:**

The requirements herein apply to work performed in the United States on any energized circuit or component regardless of electrical current type. Additionally, it governs work performed on components that are in the “proximity” of other energized components at 600 volts or less.

**NOTE:** No component or system shall be worked “HOT” if the rated voltage is more than 50V (nominal) without a Bechtel-approved Energized Electrical Work Permit (EEWP) per SWPP 4MP-T81N-03312.

- The responsible Bechtel field supervisor and ES&HM/Lead shall be notified prior to commencing any work on or near exposed energized components.
- Electrical hazards shall be evaluated for de-energization, where practical and feasible, prior to starting any electrical work and coordinated through the customer. In all cases, the preferred method to perform any work on an electrical component is to de-energize and lockout/tagout all circuits as identified in Section 20.19 and SWPP 4MP-T81N-01308.
- Each cell site shall be evaluated independently to determine specific energy isolation potential based on power configurations and other pertinent data. Working on or near any exposed energized electrical equipment shall only be permitted after the work group has determined that energy isolation cannot be accomplished, with Bechtel concurrence.
- Only systems that are rated 50 volts or less Direct Current (DC) nominal to ground may be worked on in direct contact. If the 50 volts or less DC system or component cannot be isolated, the responsible work crew shall:
  - Complete a risk assessment utilizing the Job Safety Analysis (JSA) for each site, based on specific configurations and data.
  - Under no conditions shall any Alternating Current (AC) component or system be worked on “Hot” without a Bechtel-approved Energized Electrical Work Permit (EEWP) and/or Method of Procedure (MOP). Additionally, a Bechtel-approved Energized Electrical Work Permit (EEWP) shall be required for working on any energized DC component or system at a rated voltage greater than 50 volts (nominal).
  - A site-specific emergency action plan shall be documented and in place for each work site, including identification of electrical sources and emergency shutdown procedures.
  - The Method of Procedure (MOP) / Job Safety Analysis (JSA) shall be reviewed with the entire crew to ensure that each employee is aware of all known hazards in the designated work area. All crew members must sign the JSA acknowledging their review prior to starting work. The signed MOP/JSA shall be maintained at the site until work is completed.
  - A minimum of two personnel shall be provided to perform work on energized electrical components or systems. The person performing the actual hands-on work must be a Qualified Electrical Worker (QEW) or a Special Equipment Qualified Person (SEQP), as authorized by Bechtel. The other person shall be the B/SO. The individual appointed as the B/SO shall be identified on the corresponding JSA along with the applicable emergency phone numbers.
  - Qualified Electrical Workers (QEW’s) that meet one of the following criteria shall be designated and utilized when working on or near energized circuits (work that is performed in or about electrical equipment in which there are exposed, energized components) and provide the documentation of employee qualifications to Bechtel prior to start of work:
    - Documented completion of an electrical apprenticeship program.
    - Certified as an Industrial Electrician through the National Center for Construction Education and Research (NCCER) and 48 months’ work experience.
    - Certified as an Electrician Journeyman (by a Craft Certification Program approved by Bechtel).
    - Possess a State Master Electrician License or State equivalent.
    - Possess certification as a Journeyman Electrician (i.e., IBEW or equivalent).
    - Documented proof of a minimum of five (5) years working experience as an electrician with a licensed contractor.
  - Special Equipment Qualified Persons (SEQP) may be designated and utilized, upon Bechtel authorization, when working on or near energized DC circuits 50 volts (nominal) and less, on specific equipment or tasks. The SEQP must be trained and knowledgeable of the construction and operation of the equipment.
involved or a specific work method and be trained to recognize and avoid the electrical hazards that might be present with respect to that equipment or work method. The following specific tasks may be performed on or near energized circuits 50 volts (nominal) DC or less by a Special Equipment Qualified Person (SEQP):

1. Installing snap-in breakers
2. Performing voltage checks on DC power devices
3. Installing protective barriers around live DC electrical components to allow for safe working conditions near the isolated components
4. Working on a Squid, DC-2, DC-6, DC-9, NEMA DC-12 outdoor cabinet

- Bechtel and its Subcontractors shall each be responsible for developing an SEQP training program in accordance with NFPA 70E article 110.2 - Training Requirements, to ensure their SEQP workers receive specific training for the specific equipment or tasks assigned. SEQP workers shall meet the requirements for a "Qualified Person", per NFPA 110.2(A)(1). The contractor must maintain a list of their Special Equipment Qualified Persons (SEQP) and make the list available to Bechtel upon request.

- A Buddy/Safety Observer (B/SO) shall be provided for all energized electrical work. The B/SO shall maintain a valid First Aid/CPR/AED certification and be willing and trained to perform an "Emergency Contact Release" rescue. The B/SO shall remain outside the Arc Flash Boundary (AFB) and prevent others from unauthorized entry into the AFB. Additionally, this person must be knowledgeable of the location and operation of the device to de-energize the equipment that is being worked on. First Aid/CPR/AED Training certifications shall be provided of the B/SO to Bechtel prior to start of any work.

- The Arc Flash Boundary (AFB) shall be 4'-0" for work performed on or near all exposed energized systems rated at less than 50 volts.

- A flash hazard analysis or use of the tables method in accordance with NFPA 70E and as documented in a Bechtel Energized Electrical Work Permit (EEWP) / Method of Procedure (MOP) shall be conducted to determine the AFB for all rated voltages exceeding 50 volts.

- "DANGER" red and black barrier tape with appropriate signage and/or tags, at a minimum, shall be installed as a visible barrier to caution unauthorized entry into the AFB from all accessible directions.

- A 10-lb. capacity, adequately rated fire extinguisher shall be available at each work site when performing work on or near exposed energized systems.

- Prior to commencing work, personnel must ensure the area is dry, adequately illuminated and free of obstructions or debris that may become a hazard or interfere with the work activity.

- Blind reaching in and around energized electrical equipment, components, systems, or its enclosures of any voltage is prohibited.

- In all cases, inadvertent contact shall be avoided for systems rated 50 volts and less (nominal). If the exposed energized circuit cannot be insulated, the Qualified Electrical Worker (QEW) or Special Equipment Qualified Person (SEQP) wearing the appropriate PPE shall maintain the following minimum approach distances:
  1. Any component where the nominal voltage to ground is 50 to 120 volts – 1 inch.
  2. Any component where the nominal voltage to ground is 208, 240, 277 or 480 volts – 3 inches.

- Ensure that other unrelated carrier/vendor workers in the immediate work vicinity (inside of shelter) are kept outside of shelter while any DC power electrical hot work is being performed.

- When working in proximity to exposed energized circuits that cannot be de-energized, the energized circuit shall be insulated with protective shielding where appropriate to prevent accidental contact. (Temporary barriers shall be installed by a qualified person.)

- Care shall be taken to properly store tools not in use. Tools shall not be placed on top of cabinets or another item where they could possibly fall into energized components.

- Prior to pulling a conductor through any area with exposed energized components, the ends of the conductors shall be sufficiently protected with an insulating material of the same rating as the conductor itself. If a pulling device is used, it must be of a nonconductive material.

- Adequate illumination shall be required and installed (where required) prior to performing any energized electrical work.

**Personal Protection Equipment/Tools**
• All Qualified Electrical Workers who will be performing work within the AFB and/or act as the B/So shall comply with the following minimum PPE requirements:
   1. Wear a non-conductive hard hat.
   2. Wear non-conductive safety glasses.
   3. Wear a flame resistant, long-sleeved shirt or coveralls with a minimum Arc Rating of 4 cal.

**NOTE:** Arc Flash PPE can be selected utilizing two separate methods. (1) an incident energy analysis in accordance with NFPA 70E – 130.5(G); or, (2) Arc Flash PPE Category table’s method in accordance with NFPA 70E – 130.7(C)(15).

4. Wear hearing protection (ear canal inserts).
5. Remove all conductive material (watches, rings, earrings, etc.) prior to beginning work.
6. Wear heavy-duty leather gloves when performing electrical work, at a minimum. Note: Gloves may be temporarily removed to perform a task that requires better finger dexterity.
7. Utilize insulated/insulating tools specifically manufactured per ASTM F1505 (rated for 1000VAC/1500VDC (For less than 50VDC, 600V rated equipment is acceptable)
8. Workers shall utilize non-conductive floor mats and other physical barriers (per ASTM D-1048, F-479, 712) to prevent/minimize electrical shock when performing energized electrical work.

• When performing the following activities near exposed energized systems rated between 50-240 volts (nominal), the Qualified Electrical Worker or Special Equipment Qualified Person (as authorized by Bechtel) shall wear low voltage rated gloves, face shield or Arc Flash suit hood with a minimum Arc Rating of 4, and flame-resistant pants, in addition to the PPE requirements above:
   1. Removing or opening a bolted cover from an enclosure which may contain energized conductors.
   2. Inserting or pulling fuses.
   3. Drilling or penetrating areas that may contain energized conductors.
   4. Inserting or removing plug-on components onto conductors, such as a breaker in a distribution panel that may be energized.
   5. Working near bare, energized conductors.
   6. Installing/removing temporary protective shielding.
   7. Operating a circuit breaker or fuse switch with the cover removed.

**NOTE:** Flame Resistant (FR) shirt and pants shall have an Arc Rating of 4 per NFPA 70E. As an alternative to FR pants, regular weight, untreated denim cotton blue jeans with a minimum of 12 oz/yd² fabric weight may be worn. An alternative to wearing both a FR shirt and pants is to wear FR coveralls with a minimum Arc Rating of 4.

• Ensure that the manufacturer’s recommendations regarding testing and inspection of PPE have been followed. Personnel shall perform and document on the JSA a visual inspection of all PPE prior to beginning work at the site.

20.20.2. **Overhead Power Lines**

• Approach distances between work and overhead power lines shall comply with Section 20.17.14 for activities involving operating heavy equipment, aerial lift operations, and/or overhead lifting / hoisting activities.

• For activities involving equipment in transit (travel) only underneath overhead power lines, considering the equipment is in transit with no load and boom-type (or similar) structures completely lowered, the following OSHA 29 CFR 1926.600(a)(6) equipment clearance requirements shall apply:
  - A minimum clearance of 4 feet for voltages <50kV
  - A minimum clearance of 10 feet for voltages ≥50kV, but ≤345kV
  - A minimum clearance of 16 feet for voltages >345kV, but ≤750kV

• Encroachment beyond the identified minimum clearance distances requires a Bechtel approved Method of Procedure (MOP)

• Loads being moved near overhead power lines shall never be guided by hand.

20.20.3. **Electrical Training**

Electrical training programs provided to affected employees, including QEW’s and SEQP’s, shall cover these basic elements:
• Lockout and tagging of conductors and parts of electrical equipment.
• Safe procedures for de-energizing circuits and equipment.
• Application of locks and tags.
• Verification that the equipment has been de-energized.
• Procedures for re-energizing the circuits or equipment.
• General safe work practices when working around electricity.

20.20.4. **Construction/Testing Work in the EME/RF Energy Environment**

A work plan is required for all service affecting work to be performed on any EME/RF feed line system component and/or equipment. The plan shall adhere to the minimum requirements identified in this section and consist of an annotated drawing showing isolation boundaries, a list of actions, or any other form that clearly identifies the requirements. It shall include telephone contacts and a list of active sectors that must be shut down.

**NOTE:** The plan for EME/RF work shall be provided by the responsible supervisor, reviewed by the authorized Bechtel market representative, and posted at the work site prior to commencing work.

Personal RF monitor requirements shall be identified. Use of these devices is recommended whenever possible and shall be mandatory where existing EME/RF systems may be energized. Use of a personal RF monitor is not a substitute for a planned test program to verify energy sources are shut down.

Use of voltage monitoring equipment is recommended whenever UPS (Uninterruptible Power Supply) and/or battery systems are installed and energized.

20.20.4.1. **RF Feed Line Isolation Criteria**

All actively transmitting RF feed lines and/or RF system equipment shall be isolated where possible. Verbal verification shall be made that the transmitter at the site has been taken out of service or that it shall continue to operate in specific sectors and the cutover shall be made in the operating energized condition. Clearly defined status shall be received from the Network Operations Control Center (Operator) or equipment provider responsible for energizing of the system. These issues shall be defined in the formal plan.

Insulating covers shall be installed on all coaxial connections that are exposed and ready for connection/reconnection. This includes the jumper, feed line, equipment ports and antenna leads.

Prior to breaking any connections at the antenna or any other location on transmit or receive RF feed lines, positive identification must be made that the correct feed line is being worked. Once identified, transmit lines and dual-purpose transmit/receive lines must be marked with tags containing the label "Danger, Do Not Operate." Receive lines shall be marked with tags containing the label "Caution, Restricted Operation."

20.20.4.2. **Cutovers with Sectors Transmitting and Receiving**

Transmit/receive lines shall be tagged as “Danger” whenever connected to a radio or transmission cabinet and their status is not verified as de-energized.

Cell site equipment may be cut over while on line. In cases where transmit lines must be disconnected, they shall be de-energized and tested for RF to verify the condition prior to disconnecting. They shall be retagged as “Caution” during the cutover.

When the cutover is complete and all of Subcontractor’s equipment removed, the tags shall be removed and Operations notified that the work is complete. Where more than one subcontractor has placed a tag, each subcontractor is responsible to remove only his tag.

20.20.4.3. **Cutovers with Station Offline**

In cases where the cell station cutover is made while the station is offline, the provisions detailed in Section 20.16.6.1 remain applicable.

20.20.4.4. **Emergency Procedures**

If an emergency change or closure is issued, all work within the scope shall be discontinued until the System/Component Tagging System can be restored or changed by the closure.

The responsible supervisor shall ensure that affected personnel working under the tag held by an unavailable subcontractor understand that the tags/locks are to be removed.
The responsible supervisor shall clear all affected personnel from performing work within the tag boundaries. Once affected personnel have been cleared, the responsible supervisor shall remove all tags and locks and ensure that special protective measures have been restored.

20.20.4.5. **Routine Work Completion**

The responsible supervisor shall verify that planned work is complete, the system configuration is safe to be energized, and all tags under his jurisdiction have been removed. All tags shall be destroyed upon removal.

20.20.4.6. **Danger - Do Not Operate/Do Not Remove Tag and Caution - Restricted Operation Tag**

The following tags are examples. Other tags that provide the same information may be used upon concurrence by Subcontractor. Revised tags shall be submitted as a part of the plan.

“Danger – Do Not Operate” and “Caution – Restricted” tags shall not be hung on the same component.

“Caution – Restricted Operation” tags shall not be used for personal protection when isolating against a hazardous energy source.

### 20.21. Electromagnetic Energy (EME)/Radio Frequency (RF)

**Reference:**

- BESH CP302  Occupational Health and Industrial Hygiene
- 3DG-T04G-50003  Network Planning – AM Tower EME Safety Considerations
- 3DG-T04G-50006  Network Planning – Maximum Permissible Exposure
- 26134-000-GPP-GHX-00005  Project EME/RF Exposure Control Plan
- 26134-000-GPP-GHX-00006  Project Industrial Hygiene Plan

The Bechtel Project shall adhere to the Project EME/RF Exposure Protection Program (26134-000-GPP-GHX-00005). All requirements of the EME/RF Exposure Protection Program are included in this section by reference. At a minimum, personnel with potential exposure to EME/RF shall ensure the following general precautionary requirements are met.

- All personnel entering an EME/RF-controlled area shall be trained as required. Training shall include the measures that may reduce potential exposure. Subcontractors are responsible to provide EME/RF Awareness training to its personnel, in accordance with the Project EME/RF Exposure Protection Program, and provide documentation of training to Bechtel upon request.
- Only authorized entrants shall be allowed access to cell sites.
- Obey all posted signs.
- Assume all antennas are active.
- Notify owners and disable appropriate transmitters prior to working on the system.
- Maintain minimum 10 feet clearance from all antennas.
- Do not stand or work in front of antennas.
- Use personal RF monitors while working near EME/RF sources. Subcontractors are responsible to provide or ensure RF monitors are available and in use by its personnel. RF monitors shall be maintained and properly calibrated in accordance to the manufacturer recommendations.
- Never operate transmitters without shields.

**NOTE:** If EME exposure cannot be reduced to within the occupational exposure limits by following the general precautionary measures mentioned above, then Subcontractor shall utilize personal monitoring equipment. It will be the responsibility of Subcontractor to determine occupational exposure.

### 20.22. Confined Space Entry

**Reference:**

- BESH CP217  Confined Space Entry
- 26134-000-GPP-GHX-00006  Project Industrial Hygiene Program
- 26134-000-GPP-GHX-00012  Project Confined Space Program

The Project Confined Space Program (26134-000-GPP-GHX-00012) establishes specific confined space requirements that will be followed, and entries shall be made only by qualified personnel in accordance with the Confined Space Program identified permitting process. Refer to the Project Jobsite Work Rules and the ES&H Life Critical Requirements for violations of these processes. Listed below are some of the key requirements of this program:

- Each confined space will be initially evaluated by the Bechtel ES&HM/Lead and the responsible Bechtel Construction Lead / Superintendent utilizing the Confined Space Identification and Hazard Evaluation Form
A space shall be classified as a confined space if the space meets all of the following characteristics:
   a. Large enough and so configured that a person can bodily enter and perform assigned work
   b. Has limited or restricted means for entry and exit

A confined space is considered a Permit-Required Confined Space if the space meets any one of the following additional characteristics:
   a. Contains or has potential to contain a hazardous atmosphere (*i.e.* oxygen deficient/enriched, combustible/flammable or toxic gas/fume/vapor)
   b. Contains a material that has the potential for engulfing the entrant(s)
   c. Has an internal configuration such that an entrant could become trapped and/or asphyxiated
   d. Contains any other recognized serious safety or health hazard (*i.e.* unguarded rotating equipment, exposed energized circuits, hazardous chemicals, fall potential, etc.)

If a space meets the initial characteristic requirements for a confined space but does not meet any of the permit-required confined space characteristics and the proposed work will not create a potential for such characteristics, the space will be classified as a Non-Permit Confined Space.

Entry into a Non-Permit Confined Spaces requires the following, at a minimum:
   - Approved Confined Space Identification and Hazard Evaluation Form
   - Documented initial air monitoring on the air monitoring log (26134-000-GPP-GHX-00012, Attachment B) prior to entry, each day of entry
   - Crew Supervisor and Entrants shall be trained in Confined Space Entry and documentation of training verified
   - Posted Confined Space signage and adequate barricading

Entry into a Permit-Required Confined Space requires the following, at a minimum:
   - Approved Confined Space Identification and Hazard Evaluation Form (26134-000-GPP-GHX-00012, Attachment A)
   - Permit-Required Confined Space Entry Permit (26134-000-GPP-GHX-00012, Attachment C)
   - Method of Procedure (MOP)
   - Confined Space Attendant
   - Documented initial air monitoring prior to entry and continuous air monitoring thereafter
   - Confined Space Entry Log
   - Crew Supervisor, Attendant, and Entrants shall be trained in Confined Space Entry, including the specific roles and responsibilities, and documentation of training verified
   - Documented Rescue Plan
   - Posted Confined Space signage and adequate barricading

The ES&HM/Lead or designee shall periodically assess the confined space process for compliance.

The ES&HM/Lead or designee will conduct specific Confined Space Entry training for authorized entrants, attendants, and entry supervisors of confined space work.
   - Subcontractors are responsible to provide training for its employees in accordance with 29 CFR 1926 Subpart AA – Confined Spaces in Construction. Documentation of training for employees performing confined space entry activities shall be made available to Bechtel upon request.

Required rescue equipment shall be onsite for use. Rescue plans shall be developed by the responsible supervisor and provided to Bechtel ES&HM/Lead for review.

Willful violations of the Confined Space Procedures by any project personnel, Bechtel or subcontractor, may result in removal from the project. Any unauthorized entry into a designated confined space is not permitted. Failure to follow the safety requirements of the Confined Space Process/Procedure and/or perform duties as a supervisor, entrant, and/or attendants that might cause serious injury or death to self or fellow workers is a violation of this safety requirement. Refer to the Project Work Rules.

20.22.1. **Hazard Identification**

Bechtel and its Subcontractors shall identify potential spaces on the site related to their scope of work that may expose employees to confined space hazards. A sign stating “Danger - Confined Space - Permit
Required for Entry” (or similar) shall be posted at each entry point of all confined spaces required to be entered.

20.22.2. **Preventing Unauthorized Entry**

The following controls shall be implemented to inform all employees of the existence, location and danger posed by confined spaces:

- Warning signs shall be used to inform employees of the existence of a confined space.
- JSAs shall be used to plan and communicate the hazards and control measures to be taken while working in any confined space.
- A completed and Bechtel-approved confined space entry permit, in accordance with the Bechtel project Confined Space Program, shall be required prior to entering any confined space.
- Crew supervisors and affected personnel shall be Confined Space trained and training verified prior to commencing confined space entry.

20.22.3. **Pre-Entry Evaluation**

Each confined space will be initially evaluated by the Bechtel ES&HM/Lead and the responsible Bechtel Field Coordinator / Superintendent utilizing the Confined Space Identification and Hazard Evaluation Form for determination of confined space classification – Permit Required Confined Space or Non-Permit Confined Space.

- A space shall be classified as a confined space if the space meets all of the following characteristics:
  a. Large enough and so configured that a person can bodily enter and perform assigned work
  b. Has limited or restricted means for entry and exit

- A confined space is considered a Permit-Required Confined Space if the space meets any one of the following additional characteristics:
  a. Contains or has potential to contain a hazardous atmosphere (i.e. oxygen deficient/enriched, combustible/flammable or toxic gas/fume/vapor)
  b. Contains a material that has the potential for engulfing the entrant(s)
  c. Has an internal configuration such that an entrant could become trapped and/or asphyxiated
  d. Contains any other recognized serious safety or health hazard (i.e. unguarded rotating equipment, exposed energized circuits, hazardous chemicals, fall potential, etc.)

20.22.4. **Written Entry Permit**

a. Entry into a confined space classified as Non-Permit shall require the following:

- A completed Confined Space Identification and Hazard Evaluation form authorized by Bechtel
- Documented initial air monitoring prior to entry confirming absence of a hazardous atmosphere

b. A “Permit-Required Confined Space Entry Permit” shall be completed before any “authorized entrant” enters a classified permit-required confined space.

- The responsible crew supervisor shall complete the Confined Space Entry Permit and associated Method of Procedure (MOP) and provide to Bechtel for review and approval.
- Permits shall expire at the completion of the shift, or if any pre-entry conditions change.
- The duration of the permit may not exceed the time required to complete the assigned task, or one shift, whichever comes first.
- Permits shall be available for review at the time of entry to all authorized entrants by posting it at the entrance.

**NOTE:** Entry is considered whenever the plane of a confined space is breached by any part of an employee’s body.

20.22.5. **Confined Space Entry Procedures**

The Crew Supervisor responsible for work to be performed in a confined space shall be the “entry supervisor” who is responsible for authorizing entry and completing the entry permit. The Bechtel ES&H Lead or designee is responsible for verifying that all the required precautions are being followed and approving the Permit-Required Confined Space Entry Permit. The following procedures shall be followed to prepare, issue and cancel entry permits:
The entry supervisor shall:
1. Conduct an assessment in the field of the space to be entered.
2. Review the Permit-Required Confined Space Entry Permit, obtain approval, and verify that all tests are conducted.
3. Ensure that procedures and equipment specified by the permit are in place before approving permit and allowing entry.
4. Complete a JSA and discuss hazards and precautions with authorized entrants prior to entry.
5. Ensure that the direct-reading air monitoring device is calibrated per the manufacturer’s recommendations.
6. Ensure that pre-entry air monitoring is performed and no contaminants/hazardous atmosphere are present.
7. Remain on site while work is performed in the confined space.

The attendant shall:
1. Conduct the initial test and continuously monitor the internal atmosphere of the confined space with a calibrated direct-reading instrument for oxygen content, flammable gases and vapors, and potential toxic air contaminants.
2. Stand by and maintain a continuous means of communication with the authorized entrants while the space is occupied.

**NOTE:** The attendant shall NEVER enter the confined space, even during an emergency. If necessary, summon help and stand by the entry hatch or opening to render assistance.

The authorized entrants shall:
1. Review the permit and sign the entry/exit log prior to entering the confined space.
2. Install continuous ventilation to reduce the risk of a hazardous atmosphere, as required by permit.
3. Evacuate the confined space whenever conditions warrant or when directed by the attendant.
4. Employees shall sign the entry/exit log upon exiting the space.

20.22.6. **Rescue Equipment**
Rescue provisions shall be planned, prepared and incorporated into the JSA and Confined Space Entry Permit for each confined space entry. The rescue equipment and provisions shall be commensurate to the hazards posed by the confined space (e.g., self-contained breathing apparatus, body harness with retrieval lines, tripod or rescue rigging). All personnel involved in the confined space task shall be informed of the rescue measures. Rescue apparatus shall be rigged, deployed and established prior to confined space entry.

20.22.7. **Training**
All personnel affected by the confined space program shall be effectively trained on confined spaces so that they acquire the understanding, knowledge and skills necessary for the safe performance of the duties assigned. Training shall be conducted in accordance with OSHA 29 CFR 1926 Subpart AA.

Subcontractors shall comply with the requirements of the Project Confined Space Program (26134-000-GPP-GHX-00012) and provide Confined Space training to its employees in accordance with OSHA 29 CFR 1926 Subpart AA. All related training materials and documents shall be maintained by Subcontractor and made available upon request.

20.23. **Fall Prevention and Protection**
Reference: BESH CP201 Housekeeping
BESH CP205 Personal Protective Equipment
BESH CP212 Fall Protection
BESH CP214 Barricades and Signs
BESH CP215 Floor and Wall Openings
BESH CP216 Roofing Work
SWPP 4MP-T81N-01107 Telecommunications Competent Tower Climber

20.23.1. **General Requirements**
- Free Climbing is prohibited on all Bechtel projects.
- Fall prevention and/or protection is required whenever the work being performed presents a fall hazard of 6 feet or greater.
Personnel that climb (towers, chimneys, etc.) or complete controlled descent / industrial rope access applications shall complete Competent Tower Climber Training through one of the Bechtel-approved training providers and in accordance with NATE Tower Climber Fall Protection Training Standard (NATE CTS).

Personnel that utilize fall restraint or arrest, but do not climb, shall be trained and qualified by successfully completing Fall Prevention and Protection training that meets the requirements of OSHA 29 CFR 1926.503.

Personnel shall be protected by an engineered system or other appropriate personal protective equipment (PPE). Protective systems may include, but are not limited to, the use of guardrail systems or restraint systems.

A competent person (as defined in Section 21.0) must assess jobsite conditions and ensure that 100% fall protection is enforced.

Subcontractors shall provide and install all required fall protection systems as applicable to their scope of work.

20.23.2. Primary Fall Protection Systems
Primary fall prevention systems provide walking and working surfaces in elevated areas which are free from floor openings and are equipped with standard guard rail systems on all open sides and with closure apparatus for ladder openings or other points of access when required.

Use of such prevention systems would normally eliminate the risk of falls and, subsequently, eliminate the need for any other type of fall protection methods.

20.23.2.1. Guard Rail Systems
Standard guard rail systems consist of the following elements:
- A top rail of 2 X 4 in. lumber or equivalent material approximately 42 in. above the walking/working surface;
- A mid-rail at approximately 21 in. above said surface;
- A 4-inch tall toe board mounted at the walking/working surface.

Upright support post spacing must not exceed 8 ft and the entire system must be capable of supporting 200 lbs. force in any direction with minimum deflection. These systems are used to guard open sides of floors, platforms and walkways in elevated areas.

20.23.2.2. Floor Opening/Hole Covers
Floor opening/hole covers are used to close openings and holes in floors, platforms and walkways. These covers must be capable of supporting the maximum potential load to which they may be subjected. The cover must completely cover the opening/hole and be secured against accidental displacement. At a minimum the hole covers must be at least ¾ inch plywood. These covers must be marked "FLOOR OPENING – DANGER – DO NOT REMOVE."

20.23.2.3. Scaffolding
Refer to Section 20.24 for fall protection requirements related to Scaffolding systems.

20.23.2.4. Aerial Lifts (Articulating Boom, Scissors, etc.)
Refer to Section 20.25 for fall protection requirements related to Aerial Lift equipment.

20.23.2.5. Suspended Personnel Platforms
Personnel riding in or working from personnel baskets (also referred to as suspended personnel platforms) must wear an approved safety harness/lanyard system and secure their safety lanyard to the lift basket anchorage point at all times, or to a collar chain/sling that is attached to the crane hooks. Refer to Section 20.17.11 (Suspended Personnel Platforms) for full requirements associated with the use of crane suspended personnel platforms.

20.23.3. Personal Fall Arrest Systems (PFAS)
These systems must be worn and used in the absence of primary fall prevention systems. When secondary fall protection systems are utilized, 100% tie-off to an appropriate anchorage point including while transitioning is required when personnel are exposed to the potential fall hazard. Secondary fall protection systems shall include, but are not limited to:

- Anchorage Points
• Anchorage Connectors/Adapters
• Safety harness/Lanyard system
• Horizontal life lines/running lines
• Vertical life lines/self-retracting reel life lines
• Fall Restraint
• Safety Nets

20.23.3.1. Anchorage Points
Anchorage utilized in fall arrest systems must be independent from all other uses and capable of supporting 5000 lbs. per employee attached, or designed, installed and used under the supervision of a qualified person as part of a complete personal fall arrest system which maintains a safety factor of at least two.

**NOTE:** Antenna mounts, step bolts (climbing pegs), and gin poles are not structural members, and attaching fall protection equipment to these items is prohibited.

20.23.3.2. Anchorage Adapters
Anchorage adapters provide the capability to connect a full body harness and lanyard system to an anchorage point when connector compatibility is not achievable directly to the anchorage point with the lanyard system.

Anchorage adapters must be capable of supporting 5,000 lbs. per employee attached, or designed, installed and used under the supervision of a qualified person as part of a complete personal fall arrest system which maintains a safety factor of at least two.

Anchorage adapters shall be manufactured and designed for the intended purpose. Anchorage adapters must be used in accordance with manufacturer instructions. Additionally, employees shall be trained in the installation and use of the various anchorage adapters, such as:

• All-Purpose Anchor Adapters
  o Web/cable tie-off adapters (i.e. beam strap, wire rope choker, cheater)

• Steel Anchor Adapters
  o Fixed beam anchor
  o Sliding beam anchor (i.e. beam slide/glide)

• Steel Anchor Adapters *(continued)*
  o Sliding rail anchor (i.e. rail slide)
  o Connector Toggle anchor

• Concrete Anchor
  o Concrete wedge anchor
  o Concrete d-ring (screw-in) anchor
  o Concrete parapet anchor
  o Drop-thru anchor

• Other/Specialty Anchor Adapters
  o Door/Window frame anchor
  o Flat and pitched roof anchors
  o Freestanding counterweight systems

20.23.3.3. Safety Harness/Lanyard Systems
Fall protection in the form of full body harnesses and lanyards must be used in situations where it is impracticable to provide primary fall protection systems.

**A. Harnesses:**

• Only full body harnesses shall be utilized in fall arrest systems, body/waist belts are prohibited.
• Whenever full body safety harnesses are used they must be secured via a fall arrest lanyard to a secure anchorage point, running line or arrester device.
• The dorsal (back) d-ring of the harness shall be utilized in fall arrest and restraint systems.
• Use of a sternal (chest) D-ring for fall arrest purposes requires approval by the Project ES&H Manager.
D-rings located at the waist and/or shoulder shall not be utilized with fall arrest devices.

- Full body harnesses must be properly fit to the user and the rated capacity shall not be exceeded.
- Field modifications to any part of a full body harness is prohibited.
- Employees must be trained in the proper use and inspection of the harness and to the manufacturer instructions.
- Harnesses must be removed from service if involved in a fall arrest event.

### B. Lanyards:

Fall arrest lanyards must be provided with the harness system in order to reduce the shock loading in the event of a fall. The lanyard and anchorage point should limit the maximum free fall to six (6) ft or less.

- Tie-off to an anchor point should occur at shoulder height or above
- Tie-off to an anchor point positioned at an employee’s feet requires proper planning and shall be approved by the Bechtel ES&HM/Lead.
- User-rated capacities of fall arrest lanyards shall not be exceeded.
- The fall arrest lanyard shall be attached to the dorsal (back) D-ring.
- Only one lanyard connector can be attached to the dorsal (back) D-ring of the full body harness at a time.
  - The attachment of multiple lanyard connectors to a D-ring presents a potential for connectors to interact in the event of a fall, which could cause a failure or detachment of the connector from the D-ring.
- Connectors (i.e. snap hook, pelican hook, carabiner, etc.) utilized in fall arrest systems shall be double action, at a minimum.
- Connectors utilized in fall arrest systems shall be compatible with the anchorage point or anchorage point adapter to which it is attached.
- Connector attachment must not present a potential side load impact or impact with the connector gate.
- Fixed length 6 ft shock-absorbing lanyards shall not be utilized when total fall distance (measured from the anchor point) is less than 18.5 ft.
- Double-leg (twin lanyard) shock absorbing lanyards shall be utilized when employees are required to transition from one location or anchorage point to another while exposed to a fall hazard.
- A shock-absorbing lanyard leg shall not be utilized to wrap around (choke) an anchorage point and connect back to itself (tie-back), unless specifically designed for that purpose.
- Self-Retracting Lanyards (SRL’s or Yo-Yo’s), when utilized, shall limit the free fall distance to 2 ft or less.
- SRL’s shall be installed overhead and use shall not present a swing (pendulum) fall hazard into adjacent structures.
  - Where SRL’s are designed to be utilized in a horizontal position, strict adherence to the manufacturer’s installation recommendations shall be required.
- Each retractable lifeline device shall be equipped with a rope tag line for extending the device to elevations below the point of attachment.
- Positioning lanyards are to be utilized for work positioning only and are not designed for fall arrest capabilities.
- Positioning lanyards shall be attached to an anchorage point capable of supporting 3,000 lbs., at a minimum.
- Positioning lanyards are to be attached to D-rings at the harness belt location for work positioning purposes.
- D-ring extender lanyards shall only be utilized with SRL’s or Vertical Lifeline systems. Use of D-ring extenders with shock-absorbing lanyards is prohibited as it creates a free fall distance of greater than 6 ft.
- User-rated capacities for D-ring extender lanyards shall not be exceeded.
20.23.3.4. **Fall Restraint**

Fall restraint shall be evaluated prior to implementation of a fall arrest system. Fall restraint utilizes a full body harness, lanyard, and anchorage point, but in a manner that attachment to the anchorage point prevents an individual from accessing the fall hazard. Therefore, fall restraint prevents contact with the hazard and prevents a free fall from occurring.

20.23.3.5. **Horizontal Life Lines/Running Lines**

- Lifeline systems are points of attachment for fall protection lanyards and must be capable of supporting at least 5,000 lbs. per employee.
- Horizontal lifelines/Running lines shall be mounted horizontally and are generally intended to provide mobility to personnel working elevated areas.
- As structures are erected, priority shall be given to the consideration of proper lifeline placement.
- Horizontal lifelines shall be installed and maintained by a trained and competent person(s) knowledgeable in the rigging practices necessary to safely install and maintain the system. A minimum safety factor of 2 must be maintained at all times.
- Lifelines shall not be used for any purpose other than fall protection.
- Lifelines in use shall be inspected weekly (by the competent person who installed them).
- Lifelines shall be of a unique color to ensure they are easily identifiable and are used only as lifelines.
- Running line systems can be used to provide a secure anchorage point for safety harnesses.

**NOTE:** Consideration must always be given to the installation of lines and supports onto steel members while at ground level and before being lifted into position.

- Horizontal lifelines engineered onsite shall be composed of wire rope/cable shall be of one-half inch cable as a minimum and shall be secured on each end by at least three cable clamps.
- Softeners shall be placed where lifelines contact sharp edges of beams to prevent damage to lifeline. Alternate materials for specific cases (e.g., use of synthetic fiber rope) must be approved by the site ES&H.
- Synthetic rope horizontal lifeline systems shall be manufactured and designed for the intended purpose.
- Use of synthetic rope horizontal lifeline systems shall adhere to the manufacturer instructions.
- Unless otherwise identified by the manufacturer, attachment directly to the synthetic rope with fall arrest lanyard connector is prohibited.
- Intermediate supports shall be adequate to minimize sag and vertical deflection under loading.
- Horizontal lifelines should be positioned so as to provide points of attachment at least waist level or higher for personnel utilizing them.
- Lifelines shall be arranged to provide adequate mobility in all areas of the structure while maintaining 100% fall protection for personnel.
- Personnel installing lifelines shall be protected from falls at all times by use of retractable lanyards or tie off to structural steel, etc.

20.23.3.6. **Vertical Life Lines/Self-Retracting Reel Life Lines**

Vertical lifelines are used for personal fall protection when vertical mobility is required. These lines may be comprised of static lifelines made of synthetic fiber rope or wire rope/cable equipped with approved, compatible rope/cable grabs, or, they may consist of self-retracting reel type lanyard/lifelines attached directly to a safety harness.

**A. Static Rope**
Static rope lifelines with rope grabs are required for each person working from spiders/sky-climbers and two-point suspension scaffolds. These types of lifelines can also be used to provide fall protection for other operations such as scaffold erection and structural steel erection where tie-off points are limited, and vertical mobility is required.

Static rope lifelines must be anchored independent of other systems at the top and be capable of supporting 5000 lbs.

Permanently installed vertical lifelines (i.e. communication towers, fixed ladders, etc.) shall be inspected for condition prior to use and documented periodic inspections shall be made available or coordinated with the owner.

**NOTE:** Softeners shall be used where lifelines contact sharp edges; i.e., beam flanges.

- Static rope lifelines of synthetic fiber rope shall be approved by the ES&HM/Lead.
- Sliding rope grabs approved for the size rope used are the only method for securing a safety lanyard to a vertical lifeline. Lanyards shall not be attached to lifelines by means of knots or loops.
- Rope grabs shall be positioned on the lifeline at least above the shoulders of the user.

### B. Retractable Reel Life Lines/Self Reeling Arrest Devices

Retractable lifeline devices shall be secured by means of properly-rated fall protection carabiners and wire rope chokers or synthetic slings. Rope (synthetic or natural fiber) shall not be used to secure these devices. These attachment methods must be capable of supporting 5000 lbs. impact loading.

Retractable lifelines may also be used to provide fall protection to structural ironworkers during erection prior to installation of other fall protection systems.

#### 20.23.3.7. Safety Nets Systems

- Safety nets may be used in some situations, as secondary fall protection. Use and installation of nets when required will be addressed with the Bechtel ES&HM/Lead.
- Only qualified personnel shall install nets in accordance with the net manufacturer’s specifications.
- The erection of safety nets must be carefully planned and supervised and only undertaken by properly trained operatives.
- Nets should be fitted as close to the working surface as possible, but in any case, must not be lower than 6 ft below the work.
- The initial sag of the net should be 1/4 to 1/5 of the total span of the net, and as the net will be displaced vertically in the event of a fall; there must be a further clearance of 6 ft from the lowest point of the net.
- Nets must be inspected after any fall, prior to each use, and at regular intervals (e.g., at least weekly).

#### 20.23.4. Inspection and Care of Equipment

Bechtel and its Subcontractors shall ensure personnel who use PFAS:

- Inspect for wear, damage and other deterioration prior to each use.
- Have their fall protection/arrest equipment components formally inspected and documented by a competent person at least annually.
- Tag all defective equipment and remove from service.

#### 20.23.5. Work Activities on Roofs with Unprotected Side/Edges

Unprotected sides and edges can be defined as any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches high where the fall hazard is 6 feet or greater. Below are the project requirements for employees performing work activities on roofs with unprotected side/edge and/or on any other roof with similar hazards.

As part of the required pre-construction planning, designated market-selected individuals (e.g. Field Coordinators, Superintendent (BCS), Subcontractor reps, and/or ES&H) shall conduct a detailed plan via an Unprotected Rooftop Method of Procedure (26134-000-GFX-GGG-00007).

The Unprotected Rooftop MOP will identify what type of fall protection is required and available. If conventional fall protection methods (e.g. Guardrails, Parapet Walls) are not practical or feasible, Fall Restraint Systems or Personal Fall Arrest Systems can be used, or the determination of alternate fall protection measures if
conventional fall protection measures are infeasible. The Unprotected Rooftop MOP shall be reviewed and approved by the Bechtel Field Coordinator and Market ES&H Lead.

Employees performing work on a roof with an unprotected side/edge shall be protected by one of the following:

a. Primary Systems:
   - **Guardrails** – Standard guardrail systems shall consist of a top rail at 42 inches, mid-rail at 21 inches, and a 4-inch toe board mounted at the walking/working surface. Upright support post spacing must not exceed 8 feet and the entire guardrail system must be capable of supporting 200 lbs. in any direction with minimal deflection (+/- 3 inches) and completely surround the crew's work area.

b. Secondary Systems:
   - **Fall Restraint System** – A system that would prohibit an employee from reaching the unprotected side/edge.
   - **Personal Fall Arrest System (PFAS)** – A personal fall arrest system uses a combination of an anchorage harness and a shock absorbing lanyard, vertical lifeline, horizontal lifeline or retractable lifeline.

   **NOTE:** The difference between the restraint system and the personal fall arrest system is the anchorage requirements. Restraint requires the anchorage to support 3,000 pounds. The PFAS requires the anchorage to support 5,000 pounds per person attached.

c. **Warning Line System:** A warning line shall consist of ropes, wires or chains supported by stanchions or an equivalent material and positioned **15 feet** from the roof’s unprotected side/edge. The warning line must be installed to meet the following requirements:
   - The rope shall be flagged at 6-foot intervals with high-visibility material.
   - The installed system must be sturdy and able to withstand repetitive daily usage.
   - If rope is used, it must have a minimum tensile strength of 500 pounds.
   - The use of a Warning Line System requires a Site Fall Protection Plan to be developed and Market ES&H approval.

   **NOTE:** No employee shall be allowed in the area between a warning line and the leading edge without proper PFAS.

20.23.5.1. **Exception for Pre-Construction Rooftop Access**

Field Coordinators/Site Acquisition Coordinators must review and evaluate roof access prior to pre-construction walk to determine requirements for fall protection, based on building drawings and/or design details, and document on the JSA. In certain situations, during the initial evaluations of building roofs prior to the start of construction, where there are no primary or secondary fall prevention or protection systems in place, access would be allowed for the following activities, as long as employees are able to maintain 15 feet from all unprotected sides/edges:
   - Field Coordinators performing initial work scope evaluations;
   - Engineering performing initial building assessments;
   - ES&H performing pre-construction assessments;
   - Conducting initial building assessments with Building Owner.

20.23.6. **Tower Climber and Rescue**

20.23.6.1. **General Requirements**

- Only personnel trained and certified to the requirements within the NATE Tower Climber Fall Protection Training Standard (CTS) will be allowed to perform elevated work on structures requiring climbing (towers, chimneys, etc.) or while completing controlled descent applications. These requirements apply to all Bechtel project personnel, including subcontractors and lower-tier contractors.

   **NOTE:** Society of Professional Rope Access Technician (SPRAT) and/or Industrial Rope Access Trade Association (IRATA) training certification may be utilized in lieu of Tower Climber training certifications in accordance with NATE CTS. SPRAT and/or IRATA certifications will only be accepted under circumstances in which industrial rope access / controlled descent applications over the sides of buildings or similar structures is required. All SPRAT and/or IRATA
The following minimum certifications shall be maintained to the latest edition of the NATE Tower Climber Fall Protection Training Standard:

- Authorized Climber
- Authorized Rescuer
- Competent Climber
- Competent Rescuer

A Competent Climber and Competent Rescuer (may be the same individual) shall be onsite at all times during tower climbing activities. The Competent Climber shall oversee and monitor tower climbing activities and the Competent Rescuer shall be responsible for the implementation of any rescue activities, with the assistance of an Authorized Rescuer where necessary.

The employer shall standardize all fall protection equipment used within the company to ensure equipment meets the requirements of ANSI Z359. Employee supplied equipment must be authorized by the employer and meet all company and regulatory requirements before use.

Under no circumstances will homemade equipment be permitted for use as fall protection equipment.

The employer shall maintain a record of all training to demonstrate compliance with this procedure and applicable federal and state requirements.

A competent person shall conduct periodic assessments (at least annually) of the effectiveness of user training and determine the need for more training and/or retraining. Training assessments may be evaluated by several techniques. Personnel should demonstrate their working knowledge of personal fall arrest systems, equipment and procedures through a written or practical demonstration, or both.

The employer shall establish and implement procedures and provide equipment for prompt rescue of employees in the event of an emergency. This includes, but is not limited to, having at least two employees on site who are trained in rescue and ensuring that proper rescue equipment is on site, easily accessible and in satisfactory working condition with inspection documented on the JSA when elevated work is in progress.

The employer shall train (or retrain) an employee whenever there is reason to believe an employee lacks the understanding and/or skill. Circumstances where retraining is required include, but are not limited to, situations where:

- Changes in the workplace render previous training obsolete; or
- Changes in types of fall protection systems or equipment to be used render previous training obsolete; or
- Inadequacies in an affected employee’s knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skills.

The employer shall verify training and/or have their employees trained as outlined in this procedure.

Rescue training shall be conducted at least annually, or more frequently when new equipment/personnel are introduced into the rescue program.

The employer shall ensure all personnel who climb complete annual rescue refresher training.

The employer shall conduct periodic assessments to ensure compliance with this procedure.

The employer shall ensure compliance by their employees with the written JSA and the on-site rescue plan, including trained rescue personnel and available rescue equipment.

**20.23.6.2. Transfer of Climber Training Between Companies**

The employer may NOT “grandfather” training conducted by a previous employer via train-the-trainer.

The employer may choose to retrain newly hired employees or may accept an employee’s Tower Climber training from a previous employer, so long as the training provided to the employee originated from one of the approved training vendors and to the current edition of the NATE CTS.

To accept previous Tower Climber training, the employer shall:

- Verify the training was provided by a Bechtel-approved training vendor
- Verify the training from the authorized training provider is still valid.
- Verify the training was not from an in-house training course.
1. Verify the training was not from a previous employer’s Train-The-Trainer provided course.
2. Provide training on the company's policies, procedures and equipment to ensure that each climber has the ability to comply with all regulations and guidelines, and is able to perform safe climbing and rescue techniques in accordance with the company’s policies and safety equipment provided.
3. Verify the climber’s skills through a demonstrated competency evaluation conducted by an employer-designated competent person (4MP-T81N-01107, Attachment D).
4. Deem the climber “competent” and authorize the climber to climb on behalf of their company.
5. Provide the climber with verifiable documentation that will satisfy the purpose of a valid Tower Climber certification in the field to demonstrate that all of the above requirements have been met.

- A train-the-trainer approach may be utilized, provided the trainer has successfully completed the advanced requirements to qualify as a competent trainer through one of the acceptable vendors identified in this part. Any other in-house training or equivalent may be considered on a case-by-case basis.

20.23.6.3. Responsibilities

A. Employer SHALL:
- Choose a training vendor from the list of approved vendors provided by Bechtel, or develop an in-house tower climber and rescue training program and submit to Bechtel for acceptance.
- Tower Climbing and Rescue training shall meet the requirements of the NATE Tower Climber Fall Protection Training Standard (CTS).
- Ensure tower climbers complete and maintain valid tower climber/rescue training certification.
- Instruct climbers on company policies and procedures to safely perform elevated work and rescue.
- Verify the climber’s skills through a demonstrated competency evaluation conducted by a company-designated competent person.
- Document rescue competency evaluations (4MP-T81N-01107, Attachment D) after initial training, and at least annually thereafter.
- Deem the trained climber “competent” and authorize the climber to climb on behalf of their company through the documented competency evaluation.
- Ensure that each climber has the ability to comply with all regulations and guidelines and is able to perform safe climbing and rescue techniques through the company’s policies and safety equipment provided.
- Complete and document inspections of all climbing/fall protection equipment annually.

B. Jobsite Supervisor/Leadman/Foreman SHALL:
- Conduct a pre-job safety communication of the safe work plan to all employees prior to commencing work. This includes all sub-tier workforce personnel.
- Ensure all elevated work activities are included in the Job Safety Analysis (JSA) for the jobsite.
- Ensure only certified tower climbers perform elevated work.
- Ensure tower climbers possess and make available valid proof of completed, approved Tower Climber certification.
- Ensure all Personal Fall Arrest System (PFAS) components meet inspection requirements and are being worn properly prior to allowing elevated work to commence.
- Ensure rescue equipment and trained personnel are on site to perform rescue. Elevated work shall not be performed without another competent tower climber and rescue equipment being available for immediate rescue response.
- Monitor tower climber personnel work practices (behavior) and worksite conditions.
- Enforce the policy of NO “Free Climbing” or “Riding the Line” while performing elevated work. On-site supervisors who allow free climbing may be removed from the project pending investigation.
- Immediately correct unsafe conditions and work practices.
- Immediately report incidents/accidents to Bechtel (Field Coordinator, Market Lead or ES&H / Designated Safety Representative).
20.23.6.4. Climbing Policies and Practices

- The employer shall have a competent person inspect the tower for damage, deterioration, structural deficiencies, functionality of safety features, and available anchor points prior to employees being allowed to climb.
- The employer shall have at least two employees on site at all times when elevated work is in progress. A Competent Climber and Rescuer (may be the same person) shall be onsite at all times.
- The employer shall, at a minimum, have two employees on site that are trained and hold current certifications in adult basic first aid and CPR.
- Tower climbers shall comply with all requirements of the tower climber and rescue approved curriculum and training provided.
- Tower climbers shall carry valid wallet cards or similar documentation that identifies and verifies competencies. Wallet cards shall include:
  - name of training organization,
  - instructors name and signature,
  - date of training,
  - expiration date,
  - rescue refresher training date.
- Tower climbers shall participate in a pre-climb meeting prior to each climb.
- Tower climbers shall inspect Personal Fall Arrest System (PFAS) components prior to each use.
- Tower climbers shall immediately remove from service any components of a PFAS that are found to be defective.
- Tower climbers shall comply with the “No Free Climbing” policy while performing elevated work. Anyone observed in violation of the “No Free Climbing” policy will be removed from the project immediately and permanently.
- Tower climbers shall utilize a full body harness as part of their Personal Fall Arrest System (PFAS). *Body belts shall NOT be used.* Climbing without the proper use of an approved Full Body Harness will carry the same consequences as Free Climbing.
- Tower climbers shall wear clothing that does not interfere with safe climbing and avoid wearing loose fitting clothing, bootlaces and jewelry.
- Tower climbers shall never connect fall protection equipment to step bolts, pegs and other non-rated anchorages for fall protection unless engineering documentation exists to support acceptable use.

20.23.6.5. “Riding the Line”

- Riding the line is prohibited on a Bechtel job sites.

**NOTE:** Persons observed riding a line without written permission shall be removed from the site immediately. The responsible Subcontractor may also be subject to consequences.

20.23.6.6. Rappelling

- Rappelling is strictly prohibited.
- Any person observed rappelling shall be removed from the site immediately and indefinitely.
- As an alternate option, a “controlled descent” plan shall be submitted to Bechtel for approval.

20.23.6.7. Controlled Descent Applications

The Competent Climber (or Industrial Rope Access Supervisor) shall work together with the responsible Bechtel Field Coordinator and the personnel performing the controlled descent (or industrial rope access) to develop a site-specific Controlled Descent Plan (CDP). During the preconstruction walk-down, the Competent Climber (or Industrial Rope Access Supervisor) shall consider anchor points, rope re-directs, rope falls, equipment requirements, drop zone, barricade requirements, and the rescue plan.

The Competent Climber (or Industrial Rope Access Supervisor) shall complete the Controlled Descent Plan (4MP-T81N-01107, Attachment G) detailing the work to be performed and the equipment to be used, as well as a detailed rescue plan. The Controlled Descent Plan also includes questions that will be addressed for each section, including the layout, scope of work, and hazards inherent to that site.
The rescue plan should be detailed on the CDP, including (but not limited to): anchor points for the rescue ropes (must be a separate 5,000-lb. anchor point from the climber), the specific equipment to be used in the rescue, the type of rescue to be performed, the role of emergency medical services in the rescue plan, and the location of the rescue equipment during construction activities.

Once the plan is complete, it should be compiled into a package (in electronic format) that contains the following items:

- The completed Controlled Descent Plan.
- A legible, scanned copy of the climber/rope access certificates for all workers named on the CDP.
- A current rope log for each rope to be used in the controlled descent as well as the rescue ropes that are to be a part of the on-site rescue kit.
- Photos (anchor points, rope re-directs, rope falls, drop zones barricade requirements and any special areas of concern).
- Drawing/sketch (site drawing or a legible sketch showing the details of the controlled descent, such as anchor points, rope re-directs and rope falls).

The package shall be attached to an email and forwarded to the responsible Field Coordinator/Foreman for review. The Field Coordinator/Foreman is responsible to ensure that all special requirements are addressed and suitable solutions are reached to ensure compliance with all applicable policies, procedures and regulations. Once the Field Coordinator/Foreman has reviewed the CDP and is satisfied that it meets all requirements, he/she will forward it to the Bechtel Lead Field Coordinator, Market ES&H Lead, and Bechtel Superintendent (if direct-hire) for review and approval. The Field Coordinator/Foreman will also coordinate the correction of any deficiencies found in the plan.

**NOTE:** If it becomes necessary to install anchor points to complete your work, you must ensure that you consult all of the affected functions (engineering, site acquisition, ES&H, etc.) as there will be ramifications to installing this equipment (engineering design changes and installation requirements, procurement of the proper man-rated equipment, and possibly abatement of Lead Based Paint and/or Asbestos Containing Materials).

- All plans must be submitted to the Lead Field Coordinator, Market ES&H Lead, and Bechtel Superintendent (if direct-hire) a minimum of 24 hours in advance of the planned work.
- All amendments and changes to an approved CDP must be submitted through the same channels as noted above for approval. No changes may be executed in the field without the prior written approval of the Lead Field Coordinator and Market ES&H Lead.

### 20.23.6.8 Jobsite Requirements

- Only Competent Climbers certified to the NATE Tower Climber Fall Protection Training Standard (or SPRAT/IRATA certified technicians) with demonstrated experience in controlled descent (or rope access) operations are permitted to perform controlled descents.
- A copy of the CDP shall be maintained on site at all times, incorporated into the JSA, and reviewed with all employees on site.
- Controlled descent systems shall include at least two independent lines for adequate protection: one line for work positioning and one line for fall arrest. The use of only one line shall be considered the same as Free Climbing and is strictly prohibited. Any person observed utilizing a single line for fall protection shall be removed from the jobsite immediately.
- Controlled descent methods must incorporate the use of at least one automatic fall arrest device. Violation of this requirement will carry the same consequences as that of Free Climbing.
- Rope lines utilized in controlled descent applications shall be restricted for personnel use only and shall not be used to hoist materials.
- All anchor points and rope re-directs used in the controlled descent will be capable of withstanding a 5,000-lb. load. The use of inadequate anchor points will carry the same consequences as Free Climbing.
- Tool lanyards shall be in use at all times. A drop zone that excludes public access and addresses potential damage to property must be maintained underneath the work area (Subcontractor is responsible for acquiring the necessary permits for any street or sidewalk closures and have them posted and available on-site during construction).
20.23.7. Safely Accessing Antennas from Support Arms/Booms

Bechtel and its subcontractors shall evaluate the potential hazards associated with accessing antenna support arms/booms and develop a suitable approach prior to performing the task. Traditionally, it has been an acceptable industry practice to rely on fall protection as the only means to protect an employee while working on an antenna support arm. Issues such as adequate working surface for the individual to access/work hands free, primary points of anchorage for fall arrest, and anticipated man-loading on the antenna support arm/boom gates, etc., were not formally addressed. Subcontractors shall follow the process below before engaging in this type of work.

20.23.7.1. Evaluate Fall Hazards

When evaluating fall hazards, Subcontractor shall assess the fall hazards and the available control measures:

- Eliminate the fall hazards associated with the work task entirely (for example, perform as much work as possible at ground level).
- Utilize fall prevention controls by selecting the most suitable controls from the following:
  - Guardrail systems (e.g., work platforms with approved handrails, scaffolds, etc.)
  - Mechanical lifting systems (e.g., JLG, scissor lift, man baskets, etc.)
  - Climbing systems (e.g., stairways, fixed or portable ladders, etc.)
  - Work positioning systems (e.g., controlled descent)
- Utilize a Personal Fall Arrest System (PFAS), including all required components and additional hardware:
  - Full body harness (required)
  - Shock-absorbing lanyards (required)
  - Connectors (required)
  - Suitable anchorage capable of supporting 5,000 lb. or at least twice the anticipated load if engineered and designed. (T-arms, spider arms, and/or platform arms are not suitable anchor points)
  - Lifelines (additional hardware)
  - Rope grabs (additional hardware)
  - Controlled descent device (additional hardware)

20.23.7.2. Develop Approach to Manage Fall Hazards

When developing the approach to manage fall hazards, Subcontractor shall meet these requirements:

- Antenna support arms must be rated to support the weight of the total anticipated load (employee, materials, tools, etc.).
- When positioning lanyards are not in use, adequate work surfaces must be available for the employee to work hands-free. Where structures do not have a permanent “safe-climb” device, the use of a Y-lanyard is required for fall arrest and the “clip-and-climb” method employed to access the tower for the installation of a temporary life line.

If the above requirements cannot be met, an alternate means of access must be utilized.

**NOTE:** "Rappelling" will not be an acceptable work practice for accessing elevated work locations (Refer to Section 20.23.6.7. and SWPP 4MP-T81N-01107 for details on Controlled Descent applications).

20.23.8. Working Safely Around Floor and Wall Openings

20.23.8.1. General Requirements

When it is necessary to create floor holes or wall openings, the supervisor shall implement the following safeguards to protect the employees and public:

- All floor holes and wall openings shall be adequately covered and appropriately marked (e.g., “FLOOR HOLE - DANGER, DO NOT REMOVE.”)

**NOTE:** The use of barricade tape as a physical protection around holes or openings is prohibited.

- To avoid the potential for overloading, no material shall be stored on any floor hole cover or against a wall opening cover.
• A metal plate is acceptable to cover a wall opening as long as it can withstand a 200-pound force without failure from any direction.
• Every floor hole into which employees can walk shall be guarded by a standard railing with toe boards on all exposed sides or a floor hole cover of standard strength and construction.
• Floor hole covers for a circular, square or rectangular shape floor hole shall extend a minimum of 4 inches from the edge of the entire hole being covered.

20.23.8.2. Temporary Flooring Covers
When a floor opening exceeds 40 inches at its narrowest dimension, temporary flooring of sufficient strength for the anticipated loads shall be required. Specifically:
• Temporary flooring shall be covered with ¾-inch exterior-grade plywood or equivalent. In addition, these covers shall be secured to prevent them from slipping or being displaced by personnel traffic.
• Temporary flooring can be solid 2-inch (5.1 cm) lumber positively secured to prevent displacement from personnel traffic.

20.23.8.3. Skylights
Skylights do not provide sufficient strength to support the weight of a typical worker and shall be treated as “open holes.”

Personnel working/walking near a skylight shall:
• Discuss, in detail, the area(s) during the JSA development; and,
• Provide employee(s) with suitable fall prevention/protection system pursuant to Section 20.23, Fall Prevention and Protection.

20.24. Safe Use of Scaffolds and Ladders
Reference: BESH CP212 Fall Protection
BESH CP213 Scaffolding
BESH CP222 Portable Ladders Inspection and Control
SWPP 4MP-T81-02103 Scaffold Control and Management

It shall be a requirement at all Bechtel projects to implement effective controls to ensure the safe erection, use, and disassembly of scaffolding. The Project shall refer to SWPP 4MP-T81-02103, Scaffold Control and Management, as a minimum, for requirements pertaining to safe scaffolding. Refer to the Project Jobsite Work Rules and the ES&H Life Critical Requirements for violations of these processes.

All the requirements of SWPP 4MP-T81-02103 are incorporated into this section by reference.

All scaffolds erected and used shall comply with all federal/local requirements. Scaffold erection, modification, moving or dismantling must be done by trained and qualified scaffold erectors under the supervision of a competent person. Personnel who use scaffold to perform work shall be provided scaffold user awareness training based on the overall hazards associated with scaffold use and safe use practices.

NOTE: Training shall be provided through state/local jurisdiction approved training vendors, where applicable. (i.e. Cal OSHA, NYC Department of Buildings (DOB), etc.)

General requirements include:
• Scaffold erectors shall use 100% fall protection while erecting scaffolding.
• All scaffolds shall be built complete, where possible, including a standard 42-inch high handrail and mid-rail 21 inches from work platform, both rigidly secured, with complete decking and toe boards. Toe boards shall be securely fastened. There shall be no more than a ¼-inch space between the toe board and scaffold deck. Toe boards shall be built from 1-inch x 4-inch lumber or equivalent.
• Scaffolds higher than 50 feet above the base plates must be approved by a qualified/certified engineer. A registered professional engineer must design any scaffold exceeding 125 feet in height.
• Scaffolds and their components shall be capable of supporting, without failure, at least four times the maximum intended load. Materials must be evenly distributed on platforms and not concentrated in one area.
Platforms shall be tightly planked for the full width of the scaffold and they shall extend over the end supports between 6 inches and 12 inches. A cleat or equivalent shall be used on the bottom edges of the plank to prevent slippage. All scaffold planking shall be scaffold grade or equivalent.

Scaffold legs shall be set on base plates placed on foundations or mudsills that are adequate for supporting the maximum intended loads. **The use of bricks and/or blocks is prohibited.**

Any scaffold accessories such as braces, trusses, legs or ladders that are damaged shall be immediately repaired or replaced.

Scaffolds should be properly braced with cross braces and/or diagonal braces to laterally secure vertical members. The length of cross braces should automatically square and align vertical members so the erected scaffolds are always plumb, square and rigid. Manually propelled mobile scaffolds shall be laterally braced with a horizontal diagonal brace in addition to a cross brace.

Cross braces shall be used as only the top-rail or the mid-rail, but never both. A cross brace may be used as the top-rail if the intersecting point of the cross brace is 42-inches (+/- 3 inches) above the working level. A cross brace may be used as the mid-rail if the intersecting point of the cross brace is 21-inches (+/- 3 inches) above the working level.

All scaffolds shall be provided with an appropriate means of access (i.e. ramp, stair system, access ladder). Access ladders shall extend at least 36 inches above the platform.

- Scaffold access ladders 20 feet in length or greater shall be equipped with Self-Retracting Lanyard of sufficient length at the top of the ladder for ascending and descending purposes. The self-retracting lanyard connector shall be affixed with a tagline to allow for the lanyard to stay retracted when not in use.

- Swing Gates shall be installed where possible at ladder access points.

- When the scaffold erection has been completed, a scaffold tag shall be placed at the scaffold access point indicating the scaffold is ready for use.

  - Green-tagged supported scaffolds provide employees a working surface and environment free of fall hazards. Green-tag supported scaffolds shall be plumb, level, designed with a means of safe access (stairs, attachable ladder, or ramp), fully decked/planked at the working levels, and be equipped with a full guardrail system.

  - Yellow-tagged supported scaffolds provide employees with an elevated working surface but is incomplete and presents a fall exposure at any of the working levels. Yellow-tagged scaffolds require 100% tie-off at all times. Based on the type of scaffold system, users shall be trained in the appropriate anchorage points on the scaffold. Consideration shall be given to a fall arrest anchor point separate from the scaffolding system, if practical and feasible.

  - Red-tagged or un-tagged supported scaffolds shall not be accessed by scaffold users. Red-tag scaffolds represent the scaffold system is being erected, dismantled, modified, or repaired, and may only be accessed by the qualified scaffold erectors to complete the install, removal, modification or repair. Fall protection requirements apply for accessing red-tagged scaffolds.

- The use of scaffold tagging is mandatory. A competent person shall tag all scaffolds. No one shall work from an untagged or red-tagged scaffold.

- Prior to use, scaffolds shall be visually inspected and documented on the scaffold tag. Deficiencies shall be reported to supervision and a competent scaffold person for immediate corrective action.

- Scaffolds shall be provided with a No. 18, ½-inch (1.3 cm) wire mesh or equivalent, between toe board and the top-rail (i.e., Tenzar Safety Netting, Pearl Weave, etc.). If not practical or feasible, a barricaded exclusion zone shall be established a pre-determined safe distance from the base of the scaffold.

- A rolling scaffold height shall not exceed four times the minimum base dimension. The wheels shall be locked when employees are on the scaffold. Employees are prohibited from riding scaffolds when they are being moved.

- All casters used with scaffolding shall have rubber treads and positive locks to hold the scaffold in position. Casters shall be locked when the scaffold is being erected or used.

- Caster ratings are the limiting factor in calculating the maximum allowable load for scaffolds. Because caster ratings vary, the manufacturer’s specifications for the rating of casters in use shall be verified.

- Adjusting screws shall be installed only between the base plate and the vertical frame section. The use of adjusting screws with casters is prohibited. Extending adjusting screws beyond 12 inches is prohibited.
When the height of a scaffold exceeds four times the smallest width of the base, it shall be secured to the building or structure at every other lift and every 30 feet (9.1 m.) horizontally. Out-riggers shall be used when it is impractical to secure the scaffold to the structure.

Scaffold planks are not to extend over the end supports more than 12 inches (30.5 cm) or less than 6 inches (15.24 cm). Scaffold planks shall be secured to prevent movement.

Scaffold components manufactured by different manufacturers shall not be intermixed.

Suspended scaffolds include single-point (i.e. spider baskets, ski climbers, etc.) and multi-point systems (i.e. swing stage, window washer, etc.). Personnel riding in or working from suspended scaffolds shall be trained in the specific suspended scaffold system for use and be equipped with an approved fall arrest system. Each suspended scaffold user shall be provided an independent lifeline and rope/cable grab to which their lanyard shall be secured when aloft at all times.

Use of mounted work platforms (i.e. baker boards) shall require a Bechtel-approved Method of Procedure (MOP) prior to platform installation and use. 100% tie-off to an appropriate anchor point shall be required at all times.

20.24.2. General Ladder Requirements

- Portable ladders shall be manufacturer-certified as ANSI Type 1A or 1AA only.
- Ladders shall be constructed of wood or fiberglass. Metallic and/or conductive ladders are prohibited.
- Job-made ladders are prohibited.
- Folding, multi-purpose ladders (e.g., Versa-ladder) are prohibited on the project.
- Tripod ladders (ladders with three legs) are prohibited on the project.
- Trestle ladders are not to be used to support scaffold planking.
- Joining two ladders together is prohibited on the project.
- Straight ladders shall not be longer than 20 feet.
- Extension ladders shall not be longer than 36 feet.
- Stepladders and platform ladders shall not be longer than 12 feet as determined by the front rail.
- Ladders may not be painted, except for the platform and top rail, which shall be painted to warn users that these are not steps. The side rail may be painted to comply with quarterly inspection requirements.
- All portable ladders shall be equipped with nonskid safety feet and must be placed on a stable base. The access areas at the top and bottom of ladders in use shall be kept clear of obstructions.
- Portable ladders shall be secured from displacement prior to use. A ½-inch rope shall be spliced to the top back rung of stepladders or to the third rung from the top of straight and extension ladders to provide a means for ladder tie-off.
  - If ladder tie-off is not practical or feasible, the portable ladder shall be physically held in position.
- The side rails of all ladders shall extend 36 inches above the landing. When this is not practical or feasible, grab rails shall be installed. All ladders in use shall be tied, blocked or otherwise secured to prevent displacement.
- The foot of a ladder, where possible, shall be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is one-quarter of the working length of the ladder (the length along the ladder between the foot and the support).
- Employees shall always face the ladder when climbing up or down.
- When portable ladders (step or extension) are used as a stationary work platform, employees shall utilize appropriate fall protection/restraint equipment when work elevation exceeds six or more feet.
- As a minimum, fall arrest systems shall be implemented by personnel utilizing ladders within 6 feet (plus the height of the ladder rung being worked from) of guardrail systems or protection systems for leading edges / unprotected sides or edges. For example, working 5 feet in height from a ladder would require the ladder to be positioned at least 11 feet away from guardrail systems or implement a fall arrest system when working from the ladder.
- All access ladders 20 feet in length or greater shall be equipped with a self-retracting lanyard at the top of the ladder. The self-retracting lanyard connector should be affixed with a tagline to allow for the lanyard to stay retracted when not in use.
• Two or more people shall not work from the same ladder unless it is specifically designed for two people. Special pre-task planning should be conducted before employees use a two-person stepladder.

• Ladders shall never be used in the horizontal position as scaffolds or work platforms.

• The top two steps of a regular stepladder shall not be used as a step.

• When ascending or descending ladders, personnel shall use both hands and maintain three points of control. Materials or tools shall not be carried in hands while using ladders.

• Carrying tools while climbing or descending ladders is prohibited. A hoist rope and bag should be secured nearby ladders to hoist tools and equipment.

• Personnel ascending or descending fixed ladders equipped with a fall arrest or ladder safety system purposes shall be appropriately attached to the fall arrest system prior to access and upon egress from the ladder.

**NOTE:** Beginning 19 November 2018, U.S.-based projects will be required to design/install permanent plant fixed ladders in accordance with OSHA 29 CFR 1910.28(b)(9). Permanent plant fixed ladders installed prior to 19 November 2018 must transition or replace non-compliant ladders by 18 November 2036.

• Portable ladders shall be inspected at regular intervals and inspections documented. Personnel who use ladders (portable or fixed) are responsible to inspect ladders before each use.

• Bends, dents, cracks, loose or missing rivets, disconnected braces, and corrosion can seriously weaken a ladder. The area around rivet points on fiberglass ladders shall be carefully inspected for hairline stress cracks. Any defective ladders shall be destroyed or removed from use immediately.

• Ladders with broken or missing rungs, broken or split side rails, or other damage shall be tagged and removed from service.

• A competent person shall inspect all ladders every three months (quarterly). These inspections will be documented using the Ladder Inspection Checklist. Each ladder shall be inspected, easily identified and the inspections kept on file for the life of the ladder. All defective ladders will be tagged and removed from service immediately. Use the following inspection identification marking scheme, or comparable, every quarter:

  **Quarterly Color Code**
  1. Yellow - January, February, March
  2. Green - April, May, June
  3. Red - July, August, September
  4. Blue - October, November, December

• When not in use, ladders shall be stored on racks in a location protected from the elements, with good ventilation, away from excessive heat.

• Materials are not to be stored on ladders.

• Ladders being transported by motor vehicles shall be properly supported and secured. Supporting points shall be made of material such as wood or rubber-covered iron pipe to minimize chafing and the effects of vibration and movement during transport.

• Ladders over 12 feet in length shall be carried by two employees.

20.25. Safe Use of Aerial Lift Devices

Reference:  
  BESH CP212    Fall Protection
  BESH CP224    Articulating Boom Platforms

20.25.1. General Requirements and Training

Personnel who operate or use aerial lifts (JLG, scissor lifts, articulating boom platforms, etc.) shall be trained (including demonstrated proficiency) and authorized by their employer prior to using the equipment. Training documentation shall be maintained onsite and made available to Bechtel upon request.

In addition, personnel shall:

• Operate and use all aerial lifts in accordance with the manufacturer’s operator’s manual and safe operation instructions.

• Conduct a documented inspection of the aerial lift daily whenever use of a lift is anticipated and prior to operation.
• Ensure all warning placards on the machines are legible and all personnel are familiar with the operator’s manual.
• Ensure malfunctioning lifts are tagged “OUT OF SERVICE” and notify the responsible supervisor immediately. The equipment shall not be operated until repaired in accordance with manufacturer specifications.
• Ensure the controls are plainly marked.
• Use equipment only on level ground.
• Wear full body safety harnesses and tie-off to the manufacturer’s provided anchorage point within the platform. This includes all aerial lifts (scissor lift, etc.).
• Not load platforms/baskets in excess of the designed working load (the weight of personnel in the basket is counted as part of the load).
• Not alter or modify the aerial lift without the aerial lift manufacturer’s written authorization or approval.
• Utilize aerial lifts for lifting personnel and small hand tools.
• Tool, materials, and other loose equipment stored inside the aerial lift basket shall be effectively secured from displacement and becoming a dropped object. All tools shall be properly tethered with a tool lanyard/tether of sufficient capacity.
• Ensure there is sufficient clearance before moving under any overhead obstruction or when working near electrical lines. The use of a spotter is also required when working near electrical lines.
• Not walk under a boom to gain access to the platform.
• Not tie the platform off to any structure for any reason.
• Stand on the platform floor. Standing or sitting on the railing is prohibited.
• Always look in the direction the machine is moving.
• Not rest the boom or basket on a steel structure of any kind.
• Aerial Lifts will not be used to gain access onto any elevated structure, unless no other means of access are available or feasible. If personnel must exit an aerial lift basket at height onto another elevated structure, an Aerial Lift Exit MOP (26134-000-GFX-GGG-00006) shall completed by the responsible supervisor and approved by the Bechtel Field Coordinator and ES&HM/Lead.
• Ensure that a fire extinguisher of appropriate class and size is in the basket.
• Erect barricading or use a flag person when operating in high-traffic areas.
• Keep hands off the external portion of the basket when raising or lowering the basket.
• Not raise baskets with cords, leads or hoses tied to the handrail. A tagline or other approved means must be used to raise these items when the basket is in position to work.

Reference:  
26134-000-GP200  General Safe Work Requirements
26134-000-GP201  General Safe Work Requirements
26134-000-GP202  General Safe Work Requirements
26134-000-GP211  General Safe Work Requirements
26134-000-GPP-GHX-000011  General Safe Work Requirements

Housekeeping and fire prevention are emphasized in the New Hire ES&H Orientation and shall remain a high priority at all times throughout the project. Both will be focused on by all supervisors and during all inspections and audits. Housekeeping, fire prevention and protection will be profiled in the job safety meetings on a regular basis.

Bechtel and Subcontractors will develop, implement and maintain strict housekeeping practices as an integral part of daily activities. General requirements include:
• Housekeeping is a fundamental and necessary activity on any project and is the responsibility of every individual working on the project.
• Combustible and flammable waste must not be allowed to accumulate in any work area.
• Scrap and combustible materials must be removed from structures, partly completed buildings and completed buildings as soon as it is generated.

NOTE: Burning of excess construction materials (wood, cardboard, trash, etc.) at the work site is forbidden. Proper fire prevention planning includes strict adherence to local fire codes, ordinances or established local burn bans.
• Flammable and combustible materials must not be stacked or stored against any temporary or permanent building, structure, storage facility, or near exits, stairways, and any other areas normally used for safe passage of personnel.

• Only approved containers and portable tanks shall be used for the storage and handling of flammable and combustible liquids. UL/FM-approved metal safety cans shall be employed for the handling and use of flammable liquids in quantities greater than 1 US gallon (3.8 L).

• Rags, fabric, and timber contaminated with any hydrocarbon product must be contained in a properly labelled, closed metal container and removed daily from the workplace to a safe disposal area.

• Smoking will be strictly prohibited in specific areas and buildings. No Smoking areas will be clearly identified. Smoking shall be prohibited at or near operations that constitute a fire hazard. These types of areas may be open field/pastures (especially if a local regulatory burn ban is in place), third-party properties that may have combustible material present, inside shelters that house smoke-sensitive detection equipment, etc.

• Appropriate firefighting equipment shall be immediately available in the work area and shall be maintained in a ready state. As a minimum, Bechtel and its Subcontractors shall ensure each crew is equipped with a 10lb ABC-rated fire extinguisher.

• Fire extinguishers shall be conspicuously marked, and clear access to each shall be maintained.

• Fire extinguishers shall be inspected, tested and maintained in accordance with National Fire Protection Association (NFPA) standards.

• Each fire extinguisher shall be replaced immediately after discharge with another fire extinguisher that is fully charged and of the proper size and type.

• Permanent locations (i.e. offices, warehouses, etc.), maintenance, and inspections of fire extinguishers shall be the responsibility of ES&HM/Lead or their designee.

• Supervisors are responsible to ensure only trained and authorized personnel for the specific type equipment are assigned activities involving cutting, burning, welding, and/or grinding operations.

• A Welding Method of Procedure (MOP) shall be developed, approved by Bechtel, and compliance maintained by all project personnel including subcontractors performing Hot Work activities.

• Supervisors shall ensure that combustibles are removed, covered, or minimized, from the source of hot work.

• All hazards of compressed gas cylinders will be addressed prior to use by the supervisor with the employee. Refer to Section 20.27 for requirements on compressed gas cylinders.

• Permanent Plant equipment will be covered and protected from hot work activities.

20.26.1. Flammable and Combustible Liquids

• Approved, properly labeled storage cabinets shall be supplied for the storage of flammable liquids in quantities exceeding 15 U.S. gallons.

• Flammable and combustible liquids shall not be stored in areas used as exits, stairways or passageways, and shall not adversely affect the means of egress.

• Smoking shall be prohibited where refueling activities are in progress. Clear and legible signs shall be posted.
• Combustible liquids, including oil or grease, shall be stored in containers or storage tanks labeled with contents and tank capacity. Each tank shall be:
  o Capable of withstanding working pressures and stresses compatible with the type of liquid stored.
  o Maintained in a manner that prevents leakage.
  o Located in an area free of combustible materials.
  o Vented or otherwise constructed to prevent development of excessive pressures or vacuum as a result of filling, emptying or atmospheric temperature changes.

20.27. Welding, Cutting and Other Hot Work

Reference:
- BESH CP201 Housekeeping
- BESH CP202 Hazard Communication Program
- BESH CP205 Personal Protective Equipment
- BESH CP211 Fire Prevention and Protection
- BESH CP225 Compressed Gas Cylinders
- 26134-000-GPP-GHX-00011 Project Hazard Communication Program

Unless noted on the drawings of the tower structure, no welding (including exothermic welds), cutting or drilling will be permitted at any time. All repair or alteration shall be done per Architect and Engineer’s drawings and after consultation with the Bechtel Project/Market Representatives to ensure that all other methods have been considered in place of exothermic welding. Prior to performing any hot work on a building or tower structure, a method of procedure (MOP) must be developed by the subcontractor and approved by Bechtel.

Appropriate firefighting equipment (extinguisher) shall be immediately available in the work area and shall be maintained in a ready state.

20.27.1. Compressed Gas Cylinders

Compressed gas cylinder valves shall be closed whenever (1) work is finished, (2) the cylinders are empty, or (3) the cylinders are moved. Furthermore, compressed gas cylinders shall:
- Be secured in an upright position at all times, except for short periods when being carried or hoisted.
- Cylinders lifted from one elevation to another shall be lifted only in racks or containers designed for that purpose. Slings shall not be used to hoist cylinders.
- Be stored/located away from potential exposure to sparks, hot slag or flames. If these cannot be avoided, fire-resistant shields shall be provided.
- Not be used as rollers.
- Cylinders shall be separated (oxygen from fuel gas) by a 5-foot-high barrier with a 1-hour fire rating or by a distance of 20 feet. Gas cylinders shall be secured in place during use and storage.
- Be stored in well-protected, ventilated, dry locations, at least 20 feet from highly combustible materials, and away from egress routes such as stairways and elevators.
- Be returned to the main storage area when empty.
- Not be transported with gauges attached. The gauges shall be removed from cylinders and protective caps installed during transportation.
- Fuel gas hose and oxygen hoses shall be easily distinguishable and shall not be interchangeable.
- When parallel sections of oxygen and fuel gas hose are taped together, not more than four inches out of 12 inches can be covered by tape.
- All hoses and torches associated with the use of acetylene, oxygen and fuel gas must be inspected at the beginning of each shift of work. Defective hoses must be removed from service.
- Hoses, cables and other equipment must be kept clear of passageways, ladders and stairs.

20.27.2. Welding and Cutting

- Only authorized and qualified personnel shall perform all welding, cutting and cad-welding operations.
- Valves on fuel gas shall not be opened more than 1½ turns. If a special wrench is required for closing the valve, the wrench shall be left in position on the stem at all times or until the task is completed and the caps are replaced.
- Torches shall be lighted by friction lighters or other approved devices only. Matches and other open flame devices (personal lighter) are prohibited.
Cylinders, all hose apparatus and connectors shall be kept free of oil and grease, and not handled with oily or greasy hands or gloves.

Oxygen/fuel gas systems shall be equipped with approved backflow valves, flash arresters and pressure relief devices.

Equipment shall be disconnected from the source when left unattended (torches shall not be left attended in a confined space).

All personnel shall use the proper personal protective equipment and clothing when performing or assisting in cutting and welding operations (burning glasses, shields, gloves, etc.).

Welding leads and equipment shall be properly maintained and inspected before use. Defective equipment shall not be used and shall be reported to supervision.

Arc welding and cutting operations shall be shielded by appropriate screens, shields or other safeguards for the protection of personnel or materials exposed to sparks, slag, falling objects or the ultraviolet (UV)/infrared (IR) radiation of the arc.

The frame of all arc welding and cutting machines will be effectively grounded when the machine’s power outlets are being employed as a power source if ground fault interrupter is not being used.

If electrode holders are to be left unattended, the electrodes shall be removed and the holder placed where it is protected from unintentional contact.

Welding machines shall be turned off when being moved or when the welder must leave work for any length of time.

No welding or cutting shall be completed near flammable paints, compounds or dust.

Pipelines containing flammable liquids or gases shall not be used as a ground.

Electrical cables shall not be used as a ground.

Where a preservative coating is present, the coating shall be removed or alternative methods used for a sufficient distance in each direction to prevent appreciable heating of the coating.

Electric welding equipment, including cable, shall meet the requirements of the United States National Electric Code.

Electric welding leads shall be kept off the walking surface in an elevated position.

Welding leads or cords that cross a pathway or roadway shall be protected from damage.

Welding leads with broken insulation shall be taken out of service until repaired.

Ground leads can be repaired with tape, as long as the safe current carrying capacity is not compromised.

20.27.3.  Exothermic Weld Requirements (Cad-Weld)

Follow the guidelines contained in the SDS and manufacturer’s instructions for both the starting and welding materials.

Igniter materials shall be stored in an approved container and kept away from extreme heat, sparks and moisture.

When using igniter material, do not look directly into the “flash,” as it could cause temporary blindness.

Leather gloves and long-sleeve protection shall be used to help prevent contact burns.

Avoid moisture and contaminants in the mold and materials being welded. Contact of molten weld metal with moisture or contaminants may cause weld metal to spew out of mold.

The proper way to rid a mold of moisture is to slowly heat it with a torch. In the absence of a torch, a “dummy” weld may be made using scrap conductors.

Never use mud or other materials to stop leakage from a mold. Only factory-approved sealers should be used. Mold leakage is a good indication the mold is worn and may need replacement.

Do not use worn or broken molds. Do not alter molds or accessories.

The exothermic weld reaction shall only be initiated by manufacturer approved methods. Never use a match or open flame to start a reaction. Serious burns may result.

Only weld items the mold is designed for as defined by the manufacturer.

Make sure that the material being welded fits in the mold properly and that the mold closes tightly around them.

Avoid breathing concentrations of smoke.
When welding to pipe or vessels, consider the following:
- The effect welding may have on structural members and thin wall pipe or vessels.
- Pipe of vessels that are pressurized or contain (or have contained) flammable, explosive or hazardous materials should be evaluated in the case of a melt-through or hot molten weld metal coming in contact with any flammable, explosive or hazardous materials.
- Never use incompatible weld materials and molds.
- All exothermic welding activities on a building or tower structure shall be avoided at all times unless no other means is feasible, and a method of procedure (MOP) must be developed by the subcontractor and approved by Bechtel Welding Engineer and Bechtel Construction Management.

20.28. Illumination / Nightwork
Reference: BESH CP230 Night Work
26134-000-GPP-GHX-00006 Project Industrial Hygiene Program
The responsible supervisor should plan work as far as practicable to limit the need for night work. When night work is required, the responsible supervisors shall ensure:
- The responsible Bechtel Market Project Manager or designee has been informed and authorizes work to be performed.
- All necessary precautions have been implemented.
- Instructions and spotters are provided for the movement of heavy equipment/trucks around the work.
- Proper Hi-Viz vests and/or clothing are worn by all personnel
  - Where work is performed in public rights-of-way (i.e. roadway) or under the requirements of a traffic control permit, Hi-Viz vests and/or clothing shall conform the authority having jurisdiction Hi-Viz requirements (i.e. ANSI Class II or greater)
- Adequate barriers are provided around areas where hazards may exist, and such hazards are clearly lit.
- Lighting provided is adequate, and personnel are not working in the shadows.
- JSAs and risk assessments have been completed as required by the nature of the work.

20.28.1. Planning Requirements
- Allow affected employees time for adequate rest and recovery from night shift work.
- Extended shifts shall be monitored to reduce fatigue and mental stress, especially if they require heavy physical or mental exertion.
- Plan to have an adequate number of personnel available to maintain appropriate break schedules.
- A daylight Pre-Construction Site Walk-Down and Inspection shall be conducted prior to the initiation of night shift work activities. A similar Crew Lead Night Shift Walk-Down shall be performed.
  - Document all hazards and/or potential hazards identified on the walk-down and requirements reviewed to mitigate any or all potential and identified hazards.
  - A JSA shall be completed for each specific site covering night operations, including all hazards and requirements to mitigate all identified situations noted during site walk-down.
- Identify Bechtel points of contact for each shift when work is being performed.
- Bechtel Representative shall be present at selected locations to monitor night operation activities. Identify and implement, at a minimum, two-person teams for high-risk area site visits.
- All safety barriers shall be in place prior to night operations, unless access is restricted.
- Establish clear communication path by use of radios or similar technology (i.e., tower to ground, etc.).
- Notify local law enforcement, as required.
- Comply with all local jurisdictional requirements:
  - Work Hours
  - Noise Limitations
  - Light Limitations

20.28.2. Area Lighting
The following general requirements for area lighting shall be followed:
- All points of exit, pathways and muster points shall be clearly illuminated and marked.
- Ladder access and egress shall be clearly illuminated.
- Tower lighting shall be positioned in a manner that illuminates all work areas.
- Lighting should be provided in confined spaces, and back-up lighting shall be provided in case of power failure.
- Lighting poles and other metal poles shall be grounded and the circuit fitted with GFCIs.
- Cables supporting temporary lighting shall be routed to ensure they do not present a hazard.
- All lighting fixtures shall be installed in a secure manner to prevent accidental movement or falling.
- All lighting fixtures shall be certified (e.g., UL listed).
- Temporary electrical/lighting installations shall meet all the requirements of the National Electrical Code or applicable local code.
- Light bulbs attached to lighting strings and extension cords shall be protected by lamp guards.
- Broken or defective bulbs shall be promptly replaced.
- Metal-case sockets shall be grounded.

20.28.3. **Light Equipment Inspections**

Perform regular inspection and maintenance of lighting equipment:
- Each light source and associated lighting equipment shall be inspected prior to use.
- Extension cord has 3-prong ground plug.
- Bulb protective guards and devices are in place and fully operable.

20.28.4. **Illumination Table**

The following table indicates the minimum levels of area illumination required for the type of work indicated:

<table>
<thead>
<tr>
<th>Work Activity</th>
<th>Lux Measurement</th>
<th>Foot Candle Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior movement only</td>
<td>10</td>
<td>1.0</td>
</tr>
<tr>
<td>Handling material</td>
<td>30</td>
<td>3.0</td>
</tr>
<tr>
<td>General rough work</td>
<td>30</td>
<td>3.0</td>
</tr>
<tr>
<td>Interior working places</td>
<td>30</td>
<td>3.0</td>
</tr>
<tr>
<td>Interior reinforcing</td>
<td>50</td>
<td>5.0</td>
</tr>
<tr>
<td>Concrete placement</td>
<td>50</td>
<td>5.0</td>
</tr>
<tr>
<td>Bricklaying</td>
<td>100</td>
<td>10.0</td>
</tr>
<tr>
<td>Office lighting</td>
<td>100</td>
<td>10.0</td>
</tr>
<tr>
<td>Bench work/plastering</td>
<td>200</td>
<td>20.0</td>
</tr>
<tr>
<td>Interior workshops</td>
<td>300</td>
<td>30.0</td>
</tr>
<tr>
<td>Drawing boards</td>
<td>300</td>
<td>30.0</td>
</tr>
</tbody>
</table>

20.29. **Heat and Cold Stress Prevention**

Reference: BESH CP314 Heat and Cold Stress Prevention

The responsible employer shall provide heat/cold stress training to all its employees. The training shall, at a minimum, address the following:
- Employer heat/cold illness program
• Definition of terms related to heat/cold illness
• Recognizing the early warning signs/symptoms of heat- and cold-related illness
• Preventative measures
• First aid and emergency response
• Evaluating work conditions to protect from or eliminate heat/cold illness exposure
• Injury/illness reporting procedure

When working outside in a high heat or low temperature environment, the responsible supervisor shall have a method to monitor temperature in the work area. In cases where employees’ exposure to these environments cannot be appropriately reduced, foreman/supervisor should consider suspending work.

20.29.1. **Heat Stress Control**
When the ambient temperatures are expected to reach and be sustained at or above 85°F during the work shift, the foreman or supervisor is to implement the following appropriate engineering and administrative control methods:

• Establish on-site location for shade
• Establish adequate water quantity and potable water source
• Direct site personnel to drink plenty of water before, during and after performing work activities in heat stress conditions.

**NOTE:** To maintain adequate hydration, it is recommended that workers drink approximately 1 quart of water per hour throughout their work shift.

• Water is provided in a sanitary condition (refer to Section 20.30) and is replaced on a daily basis.
• Set up ventilation equipment if appropriate.
• Encourage site personnel to take preventative rest breaks in the shade as needed.
• Whenever possible, perform work activities in shaded areas or during cooler times of the day (evening or early morning).
• Monitor workers for signs of sudden and severe fatigue, nausea, dizziness, lightheadedness or profuse, sustained sweating.
• Implement a work/rest regimen.
• Allow time for worker acclimatization.

20.29.2. **Cold Stress Control**
When the ambient temperatures are expected to reach and be sustained at or below 20°F during the work shift, the foreman or supervisors are to implement the following appropriate engineering and administrative control methods:

• Provide heated warming locations for workers
• Ensure personnel have access to PPE
• Plan work so it is performed away from windy, drafty or unprotected areas
• Implement a rotating schedule to minimize personnel exposure
• Implement a work/rest regimen
• Evaluate personal protective equipment for usability in cold weather

20.30. **Drinking Water and Ice**
Reference: BESH CP228 Drinking Water and Ice

During the pre-job planning phase, consideration shall be given to the provision of drinking water for employees and others associated with the tasks to be performed. Provision of sufficient drinking water should also be a key factor in the on-site health and hygiene arrangements. Listed below are some of the key requirements of this process:

• Consideration shall be given to those working in extreme conditions, prevailing weather conditions or remote locations
• An integral part of the drinking water program is a consistent approach to hygiene and the prevention of contamination of drinking water.
• The following requirements pertain to the provision of drinking water:
o Only potable water will be used for drinking water
o Only approved potable water systems shall be used to distribute drinking water.
o Bottled water may be used in lieu of a potable water system.
o If the use of potable water system is in use. Drinking water shall be tested at least monthly, or in accordance to project requirements, for water quality.
o In case of a water supply interruption due to a broken line, perform a water quality test before the line is placed in service. Contact the ES&H Department for test results.

20.31. Medical Services and Medical Treatment
Reference: BESH CP300  Medical Services and Management
This section establishes guidelines to provide necessary medical services and treatment to the Bechtel manual and non-manual personnel and establishes expectations for subcontractors regarding medical provision to its employees on Bechtel projects.

Listed below are some of the key requirements of this process:

• Arrangements for medical facilities will be established by the ES&HM/Lead (or the responsible subcontractor equivalent) to provide off-site medical services for all personnel on the project.
  o Subcontractors are responsible for providing transportation for Offsite Medical Care and Emergency Medical Treatment for their employees.

• The responsible employer, supervisor, and ES&HM/Lead (or subcontractor equivalent) shall review the restrictions and evaluate available work based on any employee job restrictions due to a work-related injury or illness. The Foreman and Superintendent will monitor the assigned work activities of employees on restricted duty to ensure compliance with established restrictions.

• The ES&HM/Lead shall monitor the claims management for all Bechtel medical cases. The subcontractor ES&HM/Lead (or equivalent) or designated ES&H representative shall monitor the claims management for any subcontractor medical cases. This will be accomplished by closely following the provisions and guidelines of Workers’ Compensation Insurance provider. The ES&HM/Lead shall work closely with subcontractors regarding occupational injury case management to the extent allowable.

• The Bechtel Medical Representative (or subcontractor equivalent) shall notify the ES&HM/Lead (or subcontractor equivalent) of any medical claim that has the potential for complications or difficulties outside of typical medical management. The Bechtel ES&HM/Lead will notify the responsible project management personnel.

• The project supports restricted or modified duty to employees that sustained a work-related injury or illness. Employees who are assigned restricted duty by a physician will present these restrictions to the ES&HM/Lead (or subcontractor equivalent) prior to returning to work.

• The ES&HM/Lead shall use the Bechtel Incident Reporting Information System (IRIS) to record all medical information and Bechtel project safety data, including job hours, statistical performance, etc. IRIS shall be utilized to report and status safety and health performance to project personnel, and the regional office.

• The ES&HM/Lead shall arrange for the posting and distribution of a periodic safety performance summary.

20.32. Worker’s Compensation / WC Collective Bargaining Agreement
Reference: BESH CP316  Workers Compensation
The project will follow the site-specific Risk Management guidelines and reporting procedures established in accordance with Bechtel CP-316. The Bechtel Project ES&H Manager / Market ES&H Lead is responsible for appropriate reporting compliance.

20.33. Bloodborne Pathogens
Reference: BESH CP200  General Safe Work Practices
BESH CP205  Personal Protective Equipment
BESH CP300  Medical Services and Management
BESH CP305  Bloodborne Pathogens
26134-000-GPP-GHX-00010  Project Bloodborne Pathogen Exposure Control Plan
The purpose, scope, and requirements for implementing this procedure for all personnel who fall under these requirements will receive training by a qualified person or training vendor. The ES&H is responsible for administering and monitoring compliance with the Project Bloodborne Pathogen Exposure Control Plan (26134-000-GPP-GHX-00010). The Bloodborne Pathogens Plan, in accordance with Bechtel CP-305, will be followed by all

Listed below are some of the key requirements of the Bloodborne Pathogen Exposure Control Plan:

- The Bechtel project’s employee-based emergency response team members will fall under this procedure.
- Employees who could reasonably anticipate being exposed to blood or body fluids as a result of performing their job duties are responsible for strict compliance and will be offered proper vaccinations by the project at no expense.
- Information regarding this procedure is provided in New Hire ES&H Orientation. All Bechtel personnel shall comply with the Project Bloodborne Pathogens Exposure Control Plan. Subcontractors shall be responsible to develop, administer, and comply with their own Bloodborne Pathogen Exposure Control Plan in accordance with OSHA 29 CFR 1910.1030.
- Personnel shall adhere to all PPE requirements meeting the minimum standard set forth in Section 20.9 of this SHMP and the Project Bloodborne Pathogen Exposure Control Plan.

20.34. AED Requirements

Reference: BESH CP315 Automated External Defibrillator (AED) Requirements

This section establishes requirements for all Bechtel project locations that will have an automated external defibrillator (AED) on-site. Subcontractors shall be responsible for establishing its own AED requirements and managing the AED program per the established requirements for any subcontractor-owned AED devices. Listed below are some of the key requirements of this process:

- The AED Coordinator is the designated person responsible for the implementation and administration of the AED program. The AED Coordinator will:
  - Serve as the liaison between the sponsoring physician, the local emergency medical services (EMS) or local equivalent organization, the governing authority over work site AED programs, Bechtel Medical Services and management team.
  - Adopt written operational policies and procedures related to the use of the AED.
  - Maintain necessary records and documentation related to the AED program.
  - Report the use of the AED to the sponsoring physician, local EMS, Bechtel medical Services Administration and any other required authority (in accordance with applicable local laws).
  - Reports all malfunctions of the AED to the manufacturer and to the Food and Drug administration.
  - Facilitates the required inspection and maintenance of the AED and keeps documentation of inspection and maintenance.
  - Assures AED operators are trained through a nationally recognized AED training program (check local law for specific approved programs).
  - Conduct post AED use debriefing.

20.35. Occupational Health & Industrial Hygiene

Reference: BESH CP301 Medical Surveillance
BESH CP302 Occupational Health and Industrial Hygiene
BESH CP311 Respiratory Protective Equipment
BESH CP312 Hearing Conservation Program
26134-000-GPP-GHX-00005 Project EME/RF Exposure Control Plan
26134-000-GPP-GHX-00006 Project Industrial Hygiene Plan
26134-000-GPP-GHX-00007 Project Respirable Silica Exposure Control Plan
26134-000-GPP-GHX-00008 Project Respiratory Protection Program
26134-000-GPP-GHX-00009 Project Hearing Conservation Program

The Bechtel Project has established an Industrial Hygiene Plan (26134-000-GPP-GHX-00006) for identifying risk and addressing reduction and control measures for exposures to chemicals, noise and occupational illnesses. From these generated reviews, the potential injuries, occupational illnesses, and health surveillance requirements can be made, as may be required, under the following headings:

- Audiometric Testing – Whenever there is long-term (chronic) exposure to high noise levels
- Respiratory Pulmonary Function Tests – Users of respiratory protection equipment, including SCBA, and supplied air systems.
• Optometry and Color Vision – Users of equipment and electrical trades, crane operators and persons potentially exposed to UV and/or IR radiation.
• Blood and Urine Testing – Users of organic solvents and lead.
• Skin Lesions and Dermatitis – Exposure to dusts organic solvents, UV and IR radiation, and cement.

These functions may be performed through an off-site facility.

20.36. Respirable Crystalline Silica
Reference: BESH CP301 Medical Surveillance
BESH CP302 Occupational Health and Industrial Hygiene
BESH CP311 Respiratory Protective Equipment
BESH CP317 Occupational Exposure to Carcinogens, Mutagens, and Teratogens
26134-000-GPP-GHX-00006 Project Industrial Hygiene Plan
26134-000-GPP-GHX-00007 Project Respirable Silica Exposure Control Plan
26134-000-GPP-GHX-00008 Project Respiratory Protection Program
2HO-E010-00001 Bechtel USA Respirable Crystalline Silica – Management Procedure

The Bechtel Project has established a Respirable Crystalline Silica Dust Control Plan (26134-000-GPP-GHX-00007) to promote a safe working environment by limiting exposure to respirable crystalline silica dust during construction activities and meet the requirements set forth in the Bechtel Corporate USA Respirable Crystalline Silica Management Procedure (2HO-E010-00001-001). The identified respirable silica dust action level (0.025 mg/m³) and occupational exposure level (0.05 mg/m³) determines when precautionary measures are required and what level of control(s) is necessary. The procedure does not apply to non-dust producing activities where exposures are expected to be well below the action level of 0.025 mg/m³, such as wet mixing operations; pouring concrete footers and foundations; removing concrete formwork and applying silica-containing coatings. Additional requirements identified in the plan include, but is not limited to:

- Training
- Work Planning
- Medical Surveillance
- Hazard Sources and Risks
- Work Practices and Controls
- Recordkeeping

20.37. Air Surveillance Program
Reference: BESH CP302 Occupational Health and Industrial Hygiene
BESH CP311 Respiratory Protective Equipment
BESH CP313 Air Surveillance Program
26134-000-GPP-GHX-00006 Project Industrial Hygiene Plan
26134-000-GPP-GHX-00007 Project Respirable Silica Exposure Control Plan
26134-000-GPP-GHX-00008 Project Respiratory Protection Program
26134-000-GPP-GHX-00012 Project Confined Space Program

This section provides guidance for air surveillance of atmospheric contaminants for the purpose of determining background, general work area, perimeter, and breathing zone contaminant levels. Listed below are some of the key requirements of this process:

- The ES&HM/Lead or their designee will perform direct method air sampling for oxygen, combustible gases, and screening for commonly encountered organic and inorganic gases.
- The ES&HM/Lead will interface with the Bechtel Industrial Hygiene group when indirect method air monitoring is required for contamination identification and accurate quantification.
- Interpret regulations associated with this Procedure;
- Select, maintain, calibrate, and use instrumentation necessary for monitoring / sampling of airborne contaminants;
- Maintain sampling / monitoring records onsite;
- Evaluate air surveillance data to determine exposure, exposure potential, exposure trends, and necessary control measures; and
- Ensure monitoring and sampling is conducted in adherence with the Project's sampling strategy.
Direct reading instruments may be used for detection of toxic gases, vapors, particulates, etc. in near real time, providing results without laboratory analysis. These include confined space multi-gas monitors, photo ionization detectors, colorimetric tubes and infrared analyzers.

The purposes of air monitoring with direct reading instruments include determining:

- Need for personnel / area sampling;
- Levels of gases / vapors present, such as carbon monoxide, hydrogen sulfide and organic vapors;
- Concentrations of particulate present;
- Oxygen deficient / excessive atmospheres, and
- Explosive atmospheres.

Project work facilities will have direct-reading instrumentation available during drilling, excavation into known and / or suspected contaminated areas or other major intrusive activities to monitor for, at a minimum, oxygen, combustible gases, hydrogen sulfide and total volatile organic compounds.

Direct-reading instruments are used to screen for commonly encountered organic or inorganic gases, such as methane and hydrogen sulfide. Direct-reading aerosol monitors may also be used to quantify total particulate levels resulting from intrusive activities. It is important to note that many potentially toxic inorganic, semi-volatile, or particulate compounds do not elicit a response from commonly used direct reading instruments.

Air monitoring for specific potentially toxic compounds may also be conducted to aid in assessing the adequacy of personal protective equipment (PPE).

All Bechtel and subcontractor employees shall comply with the Project Industrial Hygiene Program (26134-000-GPP-GHX-00006), Respiratory Protection Program (26134-000-GPP-GHX-00008), Confined Space Program (26134-000-GPP-GHX-00012) and Respirable Silica Exposure Control Plan (26134-000-GPP-GHX-00007).


Reference: BESH CP302 Occupational Health and Industrial Hygiene
          BESH CP317 Occupational Exposure to Carcinogens, Mutagens, and Teratogens
          26134-000-GPP-GHX-00006 Project Industrial Hygiene Plan
          2HO-E010-00003 Bechtel USA Asbestos Management Procedure

As a general rule, asbestos inspection and asbestos abatement are the responsibility of the project client/owner, and Bechtel will not perform, subcontract, or manage this work. Prior approval by Bechtel senior management must be obtained in accordance with Bechtel Policy 222 and Legal Instruction 124 for any departure from this general rule.

If the owner/customer requires that asbestos be part of Bechtel’s scope of work, asbestos inspection should be conducted by qualified external consultants and contractors, working under Bechtel’s general supervision. Preferably, asbestos abatement should also be conducted by qualified external consultants and contractors, working under Bechtel’s general supervision.

Alternatively, Bechtel may direct hire the asbestos abatement work. If external consultants and contractors are used, they must be properly trained, certified, licensed, and registered in accordance with federal, state, and local requirements. As provided above, in order for Bechtel to retain and supervise external asbestos consultants and asbestos abatement contractors or to direct hire any related work on a project, prior approval by senior management must be obtained in accordance with Bechtel Policy 222 and Legal Instruction 124. All Bechtel and subcontractor employees shall comply with the Bechtel USA Asbestos Management Procedure (2HO-E010-00003-001) and the Project Industrial Hygiene Program (26134-000-GPP-GHX-00006).

20.39. Occupational Exposure to Lead

Reference: BESH CP302 Occupational Health and Industrial Hygiene
          BESH CP317 Occupational Exposure to Carcinogens, Mutagens, and Teratogens
          26134-000-GPP-GHX-00006 Project Industrial Hygiene Plan
          BESH-IH C-009 Bechtel Occupational Exposure to Lead Procedure

Bechtel Projects shall adhere to Bechtel Corporate ES&H Occupational Exposure to Lead procedure (BESH-IH C-009) for work activities that expose or have a potential to expose employees to an airborne concentration of lead of 30 micrograms per cubic meter ($\mu g/m^3$) or greater. For work activities that expose personnel to a contact hazard of lead or suspect lead containing materials, a minimum of awareness training shall be required.

This procedure provides guidance in establishing compliance with the requirements for protecting personnel against occupational exposure to lead and lead-containing compounds/substances. It applies to all Bechtel operations worldwide. It provides guidance for hazard identification, exposure monitoring, and methods of compliance, respiratory
protection, protective work clothing, hygiene facilities, housekeeping, medical surveillance, training and hazard communication, and recordkeeping. The procedure applies to the following activities:

- Dismantling or salvaging structures where lead or materials containing lead are present;
- Removal or encapsulation of materials containing lead;
- New construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof that contain lead or materials containing lead;
- Cutting or welding on lead or materials containing lead;
- Soldering, brazing, or welding with lead alloys;
- Abrasive blasting on lead or materials containing lead;
- Spray painting, grinding, or scraping paints containing lead;
- Installing products containing lead or materials containing lead;
- Lead contamination/emergency cleanup;
- Transportation, disposal, storage, or containment of lead or materials containing lead.

Compliance with this procedure does not relieve the project of any obligation to comply with all applicable federal, state and host country regulations governing lead or lead containing materials. If other applicable legal standards are more stringent, they take precedence.

21.0 DEFINITIONS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable access conditions</td>
<td>Conditions that shall exist before a tower owner or Bechtel will grant permission to climb.</td>
</tr>
<tr>
<td>Acceptable entry conditions</td>
<td>The conditions that must exist to allow entry into a confined space and to ensure that authorized entrants can safely enter, work in, and exit the space.</td>
</tr>
</tbody>
</table>
| Aerial lift                  | An aerial lift is any vehicle-mounted device used to elevate personnel, including:  
                                  |   • Extendable boom platforms,  
                                  |   • Aerial ladders,  
                                  |   • Articulating (jointed) boom platforms,  
                                  |   • Vertical towers, and  
                                  |   • Any combination of the above. |
| AISC                        | American Institute of Steel Construction                                  |
| Anchorage                   | A secure connecting point or a terminating component of a fall protection system or rescue system capable of safely supporting the impact forces applied by a fall protection system or anchorage subsystem. |
| ANSI                        | American National Standards Institute                                    |
| ASME                        | American Society of Mechanical Engineers                                  |
| ASTM                        | American Society for Testing and Materials                                  |
| Attendant                   | An individual stationed outside the confined space who monitors the authorized entrants and who performs all assigned attendant’s duties as defined by the permit. |
| Authorized entrant          | An employee who is authorized to enter a confined space.                   |
| Authorized person           | A person approved or assigned by the employer to perform a specific type of duty or duties or to be at a specific location or locations at the jobsite. |
| Barricade                   | A device that identifies a hazard and its parameters.                      |
| BESH                        | Bechtel Corporate Environmental, Safety, and Health                       |
| Blanking or blinding        | The absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate. |
| CDL                         | Commercial Driver License (requirements vary by state)                     |
| CFR                         | Code of Federal Regulations                                                |
| Climbing supervisor         | Person (such as the employer, foreman, or crew leader) responsible for determining if acceptable tower climbing conditions are present at the tower where the work is planned, for authorizing the climb and overseeing climbing operations, and for terminating the work as required by this section. |
| Combustible gas             | A gas that burns when mixed with air or oxygen and an ignition source.     |
| Competent person            | One who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and |
who has authorization to take prompt corrective measures to eliminate such hazards and conditions. **This person is specifically identified by the employer based on required training and prior experience.**

### Competent rescuer
An individual designated by the employer who by training, knowledge and experience is capable of the implementation, supervision and monitoring of the employer’s fall protection rescue program.

**Confined Space (Permit-Required)**
A confined space that has one or more of the following characteristics:

- a) Contains or has a potential to contain a hazardous atmosphere.
- b) Contains a material that has the potential for engulfing an entrant.
- c) Has an internal configuration such that an entrant could become trapped or asphyxiated by inwardly conveying walls or by a floor which slopes downward and tapers to a smaller cross section.
- d) Contains any other recognized serious safety or health hazard.

**Confined Space (Non-Permit)**
A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

**Conductive testing**
Geophysical method used to trace cables and water and gas distribution lines using audio frequency.

**Connector**
A device that is used to couple (connect) parts of a PFAS together. It may be an independent component of the system (such as a carabiner), or an integral component of part of the system (such as a buckle or D-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

**Core Process (CP)**
Bechtel Environmental, Safety and Health Core Process

**Cutover**
The process of disconnecting existing lines, connecting to new equipment, and reconnecting existing facilities.

**Deceleration device**
Any mechanism, such as a rope grab, rip stitch lanyard, specially woven lanyard, tearing or deforming lanyard, or automatic self retracting-lifeline/lanyard, which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limits the energy imposed on an employee during fall arrest.

**Deceleration distance**
The vertical distance between the user's fall arrest attachment at the onset of fall arrest forces during a fall, and after the fall arrest attachment comes to a complete stop.

**Designated person**
See “Authorized Person”

**Direct Reading Instrument**
Tool utilized for detecting and measuring worker exposure to gases, vapors, aerosols, and fine particulates suspended in air, and provide real-time or near real-time measurements.

**DOT**
Department of Transportation

**Effectively grounded**
The term means intentionally connected to earth through a ground connector or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent buildup of voltages which may result in undue hazard to connected equipment or to persons.

**EME**
Electromagnetic Energy: That portion of the spectrum commonly defined as the radio frequency region, which shall include the microwave frequency region. Also called Electromagnetic Radiation.

**Entry (confined space)**
The action by which a person passes through an opening into a confined space. Entry includes: ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant’s body breaks the plane of an opening into the space.

**Entry permit**
The written or printed document that is provided by the employer Subcontractor to allow and control entry into a confined space and that contains the information specified in this ES&H Program.

**Entry supervisor (confined space)**
The person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry.

**ES&H**
Environmental, Safety, and Health

**FAA**
Federal Aviation Administration

**FCC**
Federal Communications Commission

**FHA**
Flash Hazard Analysis

**Floor hole**
Any gap or void measuring 12 inches (30.5 cm) or less at its largest dimension, but more than 1 inch (2.5 cm) at its smallest dimension, in any floor, roof, or platform through which materials, but not persons, may fall, such as a belt hole, pipe opening, or
| **Floor opening** | Any gap or void measuring 12 inches (30.5 cm) or more at its smallest dimension in any roof, floor, or platform through which a person could fall. |
| **Free fall** | The act of falling before the personal fall arrest system begins to apply force to arrest the fall. |
| **Free fall distance** | The vertical displacement of the fall arrest attachment point on the employee's body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, lifeline, and lanyard elongation but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur. |
| **Full Body Harness (FBH)** | A component with a design of straps which is fastened about the person in a manner so as to contain the torso and distribute the fall arrest forces over at least the upper thighs, pelvis, chest and shoulders with means for attaching it to other components or subsystems. |
| **FPB** | Flash Protection Boundary |
| **GBU** | Bechtel Global Business Unit |
| **GHS** | Globally Harmonized System of Classification and Labelling of Chemicals |
| **Ground-fault circuit interrupter (GFCI)** | A device for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit. |
| **Guarded** | Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach to a point of danger or contact by persons or objects. |
| **Hazardous atmosphere** | An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury, or acute or chronic illness from one or more of the following causes:  
- Flammable gas, vapor, or mist in excess of 10 percent of its lower explosive limit LEL  
- Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent  
- Atmospheric concentration of any substance that could result in employee exposure in excess of the appropriate dose, OSHA PEL, or TLV as specified by the American Conference of Government Industrial Hygienists (ACGIH)  
- Any other atmospheric condition that is immediately dangerous to life or health or that poses a long-term danger to life or health |
| **Hazardous substance** | A substance which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, an irritant, or otherwise harmful is likely to cause injury. |
| **Immediately dangerous to life or health (IDLH)** | Any condition that poses an immediate threat of loss of life, will result in irreversible or immediate severe health effects, or will result in eye damage, irritation, or other conditions that will impair escape from a confined space. |
| **Intrinsically safe** | Equipment and associated wiring in which any spark or thermal effect, produced either normally or in specified fault conditions, is incapable, under certain prescribed test conditions, of causing ignition of a mixture of flammable or combustible material in air in its most easily ignitable concentration. |
| **Isolation (confined space)** | The process by which a confined space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages. |
| **Job Safety Analysis (JSA)** | A work planning and hazard assessment process that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment, breaking the job down into its component steps. This is best done by jointly analyzing each step in order of occurrence with the affected employee. Next, each step is evaluated to determine the hazards and at-risk behaviors that exist or that might occur; then develop the appropriate control measures to mitigate the identified hazards. Finally, the job steps, hazards, and control measures are reviewed with the employees before they perform the job. |
| **Label** | Any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals. |
Lanyard: A component consisting of a flexible rope, wire rope or strap, which typically has a connector at each end for connecting to the body support and to a fall arrester, energy absorber, anchorage connector or anchorage.

Leading Edge: The edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.

Lifeline: A component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

Life Critical Work Requirement: Safe work requirements that, if not adhered to, have the potential to cause serious injury or death to oneself or fellow workers.

Lockout/Tagout: The secure placement of a tag or lock on an energy isolating device, disconnect switch, or circuit breaker to indicate that the equipment or system being controlled may not be operated until the tagging/locking device is removed. Push buttons, selector switches, and other control circuit devices are not energy isolating devices.

Lost Time Injury (LTI): A work-related injury or illness which results in day(s) away from work.

Maximum Intended Load: The total load of all persons, equipment, tools, materials, transmitted loads, and other loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time.

NATE: National Association of Tower Erectors

NATE Authorized Climber: An individual with the physical capabilities to climb, who may or may not have previous climbing experience, and has been trained in fall protection regulations, the equipment that applies to communication structure work, and instruction for proper use of the equipment.

NATE Authorized Rescuer: An individual with the documented training and skills assessment to effectively perform self and assisted rescue techniques.

NATE Competent Climber: An individual with the physical capabilities to climb; has actual tower climbing experience; is trained in fall protection regulations including the equipment that applies to tower work; is capable of identifying existing and potential fall hazards; and has the employer’s authority to take prompt corrective action to eliminate those hazards.

NATE Competent Rescuer: An individual designated by the employer, who by training, knowledge, and experience, is capable of the implementation, supervision, and monitoring of the employer's fall protection rescue program and is authorized to write the individual site/day rescue plan.

NATE CTS: National Association of Tower Erectors Tower Climber Fall Protection Training Standard

NCCCO: National Commission for the Certification of Crane Operators

Near Miss: An unplanned event or condition which has the potential to cause death, injury/illness, property damage, and/or environmental impact, but did not actually result in human injury/illness, property damage or environmental impact.

NEC: National Electrical Code (U.S.)

NFPA: National Fire Protection Association

NFPA 70E: Electrical Safety in the Workplace standard

NWSA: National Wireless Safety Alliance

OH&S Management System (OHSAS 18001): A set of interrelated or interacting elements of an organization which establishes Health and Safety policies and objectives, and processes to achieve those objectives.

OSHA: Occupational Safety and Health Administration

Oxygen deficient atmosphere: An atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen enriched atmosphere: An atmosphere containing more than 23.5 percent oxygen by volume.

Partial body irradiation: Exposure of a portion of the body to electromagnetic energy.

Personal fall arrest system (PFAS): A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, and full body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

Personal RF Monitor: A device used to measure and monitor the EME (Electromagnetic Energy) in an area within a defined frequency range.

Pneumatic: Containing or operated by air or gas under pressure.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>Powder actuated tool</td>
<td>A tool or machine, which drives a stud, pin, or fastener by means of an explosive charge.</td>
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<tr>
<td>Qualified person</td>
<td>One who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.</td>
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<tr>
<td>Radiation protection guide</td>
<td>Radiation level which should not be exceeded without careful consideration of the reasons for doing so.</td>
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<td>Recordable Injury (REC)</td>
<td>A work-related injury or illness which results in one or more of the following:</td>
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<tr>
<td></td>
<td>a) Death</td>
</tr>
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<td></td>
<td>b) Days away from work</td>
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<td></td>
<td>c) Restricted work or transfer to another job</td>
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<td></td>
<td>d) Medical treatment beyond first aid</td>
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<td></td>
<td>e) Loss of consciousness</td>
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<td></td>
<td>f) A significant injury or illness diagnosed by a physician or other licensed health care professional</td>
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<td>RF</td>
<td>A frequency or band of frequencies suitable for telecommunications.</td>
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<tr>
<td>Rope Access</td>
<td>A technique using safety ropes, normally incorporating two separately secured systems, one as a means of access and the other as a secondary system, used with a harness in combination with other devices, for access to and from as well as suspension at the place of work.</td>
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<tr>
<td>Rope grab</td>
<td>A deceleration device which travels on a lifeline and automatically engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/lever locking, or both.</td>
</tr>
<tr>
<td>Safety factor</td>
<td>The ratio of the ultimate breaking strength of a member or piece of material or equipment to the actual working stress or safe load when in use.</td>
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<tr>
<td>Scaffold</td>
<td>Any temporary elevated platform (supported or suspended) and its supporting structure (including points of anchorage), used for supporting employees or materials or both.</td>
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<tr>
<td>Self-Retracting Device (Lifeline / Lanyard)</td>
<td>A deceleration device which contains a drum and wound line which may be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.</td>
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<tr>
<td>Shall</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Should</td>
<td>Recommended</td>
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<tr>
<td>SME</td>
<td>Subject Matter Expert</td>
</tr>
<tr>
<td>Snap-hook</td>
<td>A connector comprising a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snap-hooks are generally one of two types:</td>
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<tr>
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<td>1) Automatic-locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection, or</td>
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<tr>
<td></td>
<td>2) Non-locking type with a self-closing keeper, which remains closed until pressed open for connection or disconnection.</td>
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<tr>
<td>Suitable</td>
<td>That which fits, and has the qualities or qualifications to meet a given purpose, occasion, condition, function, or circumstance.</td>
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<tr>
<td>SWPP</td>
<td>Bechtel Construction Standard Work Process Procedure</td>
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<tr>
<td>Testing (confined spaces)</td>
<td>The process by which the hazards that may confront entrants of a confined space are identified and evaluated. Testing includes specifying the tests that are to be performed in the confined space.</td>
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<tr>
<td>Tie-off</td>
<td>The act of an employee, wearing personal fall protection equipment, connecting directly or indirectly to an anchorage. It also means the condition of an employee being connected to an anchorage.</td>
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<tr>
<td>Tower</td>
<td>A structure designed primarily to hold broadcast, radio, wireless internet, cellular communications, and/or microwave relay systems.</td>
</tr>
<tr>
<td>Tower Climber</td>
<td>Professional technicians who perform inspections, maintenance and repair work on guyed, monopole and self-supporting towers and other tower systems which house broadcast, radio, wireless internet, cellular communications, and/or microwave relay systems.</td>
</tr>
<tr>
<td><strong>Unprotected Side/Edge</strong></td>
<td>Any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches high.</td>
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<tr>
<td><strong>Utility identification services</strong></td>
<td>Underground utilities mapped by induceing a signal onto a subsurface utility and tracing the signal as it moves along or within the utility.</td>
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<tr>
<td><strong>UL/FM</strong></td>
<td>Underwriters laboratories/Factory Mutual</td>
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<tr>
<td><strong>Wall opening</strong></td>
<td>A gap or void at least 30 inches (76.2 cm) high and 18 inches (45.7 cm) or more wide in any wall or partition through which persons may fall to a lower level, such as doorways, chute openings or rigging openings.</td>
</tr>
<tr>
<td><strong>Weatherproof</strong></td>
<td>So constructed or protected that exposure to the weather will not interfere with successful operation. Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes are not a factor.</td>
</tr>
<tr>
<td><strong>Whole body irradiation</strong></td>
<td>Exposure of the entire body to electromagnetic energy or in which the cross section of the body is smaller than the cross section of the incident radiation beam.</td>
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</tbody>
</table>