Ames Procedural Requirements

APR 8715.1
Effective Date: August 12, 2025
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COMPLIANCE IS MANDATORY

Subject: Chapter 27 – Construction Safety Management

Responsible Office: Code QH / Occupational Safety, Health, and Medical Service Division

CHANGE LOG

Status [Baseline /Revision /Cancelled]	Document Revision	Date of Change	Description
Baseline	0	9/15/2020	Baseline revision of this chapter
Revision	1	04/01/2025	Major revisions to consolidate other chapter requirements into this chapter specifically outlining the electrical and LOTO requirements that apply to construction safety requirements. Added the appropriate OSHA and industry references. Revised it into three easier sections that include responsibilities, general requirements, and submittals.

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PREFACE

P.1 PURPOSE

a. This chapter provides safety requirements and procedures for all construction (New or Remodeling), alterations, and/or repairs a contractor or subcontractor would perform as per 29 CFR 1926.13(a) through (c) definition of Construction. OSHA further defines construction work within 29 CFR 1910.12(b), is any construction, alteration, and/or repair, including painting and decorating of a structure. In order for work to be construction work the employer need not be a construction company. The construction industry standard applies "to every employment and place of employment of every employee engaged in construction work the terms "construction", "completion" or "repair" mean all types of work done on a particular building or work site. (See OSHA Standard Interpretation 1910.12 – Contractors and the criteria for applying the Construction Work Standard – 1996-02-01 and 2003-11-18 - Construction vs. Maintenance).

b. The Government considers the general contractor to be the "controlling authority" for all work site safety and health, which includes general contractor personnel, subcontractors, visitors, etc. General contractors are responsible for informing their workforce, subcontractors, and Government support personnel of the safety provisions under the terms of the contract and the penalties for noncompliance. It is the responsibility of the general contractor to coordinate work and prevent one subcontractor from interfering with or creating hazardous working conditions for another. General contractor is to inspect subcontractor operations and ensure that accident prevention responsibilities are being carried out.

P.2 APPLICABILITY

a. This directive requirement applies to all ARC civil servants and contractor employees, other Government agency employees, all tenant leases, and their employees, NASA Research Park, visitors, and other organizations who perform construction activities within ARC and Moffett Field.

b. Clarification for all construction safety requirements is provided by Occupational Safety, Health, and Medical Service Division.

c. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote discretionary privilege or permission, "should" denotes a good practice and is recommended, but not required, "will" denotes an expected outcome, and "are/is" denotes descriptive material.

d. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

P.3 AUTHORITY

a. Safety and Health Regulations for Construction, 29 CFR 1926

b. Occupational Safety and Health Standards, 29 CFR 1910

c. Occupational Safety and Health Standards, 29 CFR 1904

d. NPR 8715.1, NASA Safety and Health Programs

P.4 APPLICABLE DOCUMENTS AND FORMS

a. 10 CFR Part 20 Standards for Protection Against Radiation

b. APR 8500.1 Environmental Procedural Requirements

c. APR 8553.1 Environmental Management System

d. APR 8715.1 Chapter 4, Mishap Reporting and Investigating

e. APR 8715.1 Chapter 8, Laser, Microwave, and other Nonionizing Safety

f. APR 8715.1 Chapter 10, Pressure Systems Safety

g. APR 8715.1 Chapter 30, Asbestos Management Plan

h. APR 8715.1 Chapter 35, Lead Management Plan

i. APR 8715.1 Chapter 56, Legionella

j. ARC 874, Excavation Permit[1]

k. ANSI/ASSE A10.3, Safety Requirements for Powder Actuated Tools[2]

l. ANSI/ASSE Z87.1, Occupational and Educational Personal Eye and Face Protection Devices[3]

m. ANSI/ASSE Z89.1, Industrial Head Protection[4]

n. ANSI/ASSE Z89.2, Safety Requirements for Industrial Protective Helmets for Electrical Workers, Class B[5]

o. ANSI/ISEA 107, High Visibility Safety Apparel and Accessories[6]

p. American National Standard (ANS) A11.1-1965, R1970

q. ANSI/ASSP Z359, Fall Protection Code[7]

r. ANSI/SAIA A92 Aerial Work Platforms Standards

s. FAA Form 7140.1, Notice of Proposed Outdoor Laser Operations[8]

t. Nuclear Regulatory Commission (NRC) NUREG/BR-0024[9]

u. NRC Form 241, Report of Proposed Activities in Non-Agreement States, Areas of Exclusive Federal Jurisdiction, or Offshore Waters[10]

v. NFPA 10, Standard for Portable Fire Extinguishers[11]

w. NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work[12]

x. NFPA 70 National Electrical Code

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[1] ARC Plant Engineering Branch
[2] ANSI/ASSE A10.3: https://www.assp.org/standards
[3] ANSI/ASSE Z87.1: https://www.assp.org/standards
[4] ANSI/ASSE Z89.1: https://www.assp.org/standards
[5] ANSI/ASSE Z89.2: https://www.assp.org/standards
[6] ANSI/ISEA 107: https://www.assp.org/standards
[7] ANSI/ASSP Z359: https://www.assp.org/standards
[8] FAA Form 7140.1: https://www.faa.gov/forms
[9] NRC NUREG/BR-0024: https://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0024/
[10] NRC Form 241: https://www.nrc.gov/reading-rm/doc-collections/forms/nrc241info.html
[11] NFPA 10: https://www.nfpa.org/
[12] NFPA 51B: https://www.nfpa.org/

y. NFPA 70E, Standard for Electrical Safety in the Workplace[13]

z. California Manual on Uniform Traffic Control Devices (CAMUTCD)[14]

aa. Fire Prevention Standard (FPS) – 9

bb. Fire Prevention Standard (FPS) – 2

cc. 49 CFR 172-173 Transportation of Hazardous Materials Regulations

dd. 10 CFR 34 Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations.

ee. IEEE 1584 Arc Flash Hazard Calculations

ff. FAR 52.242-14 Suspension of Work

gg. OSHA Publication 3071 Job Hazard Analysis

P.5 MEASUREMENT/VERIFICATION

a. Verification of conformance to requirements in this directive are measured through Center and Responsible Organizational management reviews, self-assessments, and subsequent analysis and reports of conformance to requirements, as well as periodic internal audits.

P.6 CANCELLATION

a. APR 8715.1 Chapter 27, Construction Safety Management, dated September 15, 2020.

Eugene Tu
Director

DISTRIBUTION STATEMENT:

Internal and external distribution.

[13] NFPA 70E: https://www.nfpa.org/
[14] CAMUTCD: https://dot.ca.gov/programs/traffic-operations/camutcd

CHAPTER 27 CONSTRUCTION SAFETY MANAGEMENT

27.1 **Responsibilities**

27.1.1 Occupational Safety, Health, and Medical Services Division (Code QH) shall:

a. Ensure to designate a safety professional who is competent as the Center's Construction Safety Program Manager.

b. Provide construction safety oversight for construction projects.

c. Provide Certified Asbestos Consultants (CAC) for assessment and oversight for all projects that pose a potential or actual disturbance of materials that contain asbestos. The CAC determines the presence/absence of asbestos containing materials by:

(1) Reviewing and evaluating asbestos-abatement plans, specifications, and abatement contractor submittals prior to abatement

(2) Verifying that those personnel who perform asbestos abatement work on NASA property have appropriate training and credentials to perform their assignments.

(3) Periodically inspecting the abatement area and contractor/subcontractor for compliance with the Ames Asbestos Management Plan.

(4) Coordinate with the COR to ensure proper notification is provided to building occupants prior to starting abatement work.

d. Provide a California Department of Public Health (CDPH) Certified Lead Inspector/Assessor and/or a Project Monitor for assessment and oversight for all projects that pose a potential or actual disturbance of materials containing lead.

e. Provide updates and information on construction safety regulatory changes to Ames Research Center (ARC), evaluate, and minimize their impact to the Center.

f. Review and provide comments on all building permits prior to the start of construction projects.

g. Review and provide comments on all contractor safety plans and all associated documentation prior to the start of construction projects.

h. Email the Contracting Officer (CO) and Contracting Officer Representative (COR) listing any serious or repeatable noncompliance violations for their active construction jobsites upon discovery of violation.

i. Attend preconstruction meetings to communicate safety expectations and provide guidance to the COR, project managers, and contractor personnel.

j. Accompany all regulatory agency personnel on all visits to construction sites.

Note: If Facilities Engineering and Real Property Management Division request a Construction Safety and Health 30-Hour OSHA training, Code QH can assist with scheduling a course.

27.1.2 **NASA Ames Construction Safety Specialist** shall:

a. Be the point of contact for all construction safety activities.

b. Conduct daily jobsite inspections for compliance.

c. Notify the general contractor's Site Safety Health Officer (SSHO) of any hazards observed during jobsite inspection.

d. Provide professional safety technical advice related to construction activity, including:

(1) Review of contractor's safety and health submittals in accordance with the deliverables section of this document and associated safety documentation submitted to the COR to ensure compliance with OSHA and Ames Health and Safety Procedural Requirements.

(2) Review construction permits to integrate complete and applicable safety requirements into safety plans, drawings, and specifications.

(3) Review project documents during the design phase.

(4) Periodically review contractor documentation on the jobsite.

(5) Attend preconstruction meetings.

(6) Verbally notify the COR, and CO if a mishap occurs during a jobsite inspection. Remind them to contact Code QH Mishap program manager.

e. Submit an email to the CO and COR listing any serious or repeatable noncompliance violations for their active construction jobsites upon discovery.

f. Notify the CO and COR immediately when the SSHO is not actively conducting the duties as specified in this chapter. Follow up with an email response to the CO and COR.

g. Maintain an electronic copy of all daily construction site inspection and safety and health submittals for the duration of the project.

h. Ensure Hot Work Permits issued by the Fire Prevention Officer are posted at the jobsite.

27.1.3 **NASA Ames Health Unit** shall:

Upon request, provide emergency medical treatment to construction workers who have experienced an acute injury or illness while working on Ames Research Center.

27.1.4 **Acquisition Division (Code JA)** shall:

a. Ensure contractor complies with the applicable regulations, codes, and ARC policies.

b. Ensure that the Occupational Safety, Health, and Medical Service Division (Code QH) has reviewed all construction of facility project designs prior to the bid proposal process.

c. Ensure all general contractor and subcontractor safety and health submittals are provided to the Occupational Safety, Health and Medical Service Division (Construction Safety Specialist) for review in accordance with Chapter 27, section 27.3 – Submittals.

d. Consult with NASA Ames Construction Safety Program Manager to determine the level of safety professional oversight that would be required for a construction project and for the qualification of the SSHO.

e. Ensure suspension of work (FAR 52.242-14) will not be lifted until the deficiencies are corrected with concurrence from the NASA Ames Construction Safety Program Manager.

f. Review past safety performance prior to contractor selection including incident rates, lost time accidents, and Experience Modification Rate (EMR).

g. Notify the Occupational Safety, Health, and Medical Services Division when the selected contractor has an EMR above 1.25.

27.1.5 **NASA Ames COR / Project Manager** shall:

a. Follow current version of APR 8715.1, Chapter 27, Construction Safety Management for all construction projects. Chapter 27 is the Center's construction safety requirements and supersedes any construction document or spec provided to the general contractor that may include safety requirement.

b. Ensure the general contractor and subcontractor complies with this chapter, OSHA, 29 CFR 1926, General Contractor Site Specific Safety Plan (SSSP), and associated safety submittals for the project.

c. Submit the general contractor and subcontractor safety and health submittals to the appropriate Code QH representative at a minimum ten (10) business days for review prior to starting any construction activities. See section 27.3 – Submittals.

d. Consult with Code QH representative for verification of the type of safety and health submittal based on the scope of work.

e. Ensure the appropriate Code QH representative is assigned to concur with safety and health submittals (e.g., Electrical, Lockout/Tagout [LOTO], Job Hazard Analysis [JHAs], SSHO rep., etc.).

f. Notify the CO and Ames Mishap Program Manager (Code QH) immediately upon notification of an accident or mishap. Coordinate with the general contractor to create and report all incidents via the NASA Mishap Information System (NMIS) at http://q.arc.nasa.gov/IncidentReporting.html within twenty-four (24) hours.

g. Invite the appropriate Code QH representative(s) to participate in pre-construction and weekly progress meetings to discuss construction safety concerns, issues, and planning activities.

h. Provide notification to the building occupants at a minimum 10 business days before construction work begins.

i. Communicate with the building Facility Service Manager (FSM) and/or applicable supervisor to obtain information on potential hazardous materials that may be released through a roof exhaust stack pipe connected to fume hood prior to roof work. Provide the information to the general contractor.

j. Ensure that only NASA Environmental Division-designated personnel (Code JQ) sign hazardous waste manifest(s).

k. Ensure that existing utilities (e.g., electrical, gas, steam, etc.) requiring shutoff are identified and a LOTO plan has been developed. See section 27.3 – Submittals – Lockout/Tagout.

l. Ensure the "Construction Permit" is not issued until Code QH representative in the appropriate discipline (e.g., Fire, Safety, and Asbestos) approves the design plan.

m. Ensure legionella control features in water and ventilation systems, as stated in APR 8715.1 Chapter 56. Examples of legionella control features include avoidance of dead legs in water systems, effective water temperature controls, and proper placement of building air intakes.

27.1.6 Tenant Project Manager shall:

a. Ensure the general contractor and subcontractor complies with this chapter and OSHA, 29 CFR 1926, General Contractor SSSP, and associated safety submittals for the project.

b. Submit all general contractor and subcontractor safety submittals for review to the Development Support Office (DSO). NASA Ames Construction Safety Program Manager has at a minimum ten (10) business days to review and concur with submittals, work cannot proceed until concurrence. See section 27.3 – Submittals.

c. Notify the Code DT NASA Research Park Office Account Manager and Occupational Safety, Health, and Medical Services Division (Code QH) at 650-604-5602 immediately upon notification of an accident or mishap.

d. Invite the appropriate DSO representatives and NASA Ames Construction Safety Program Manager to participate in pre-construction and weekly progress meetings when necessary to discuss construction safety concerns, issues, and planning activities.

Note: In 27.1 responsibilities section, tenant projects only need to follow sections 27.1.6 and 27.1.8.

27.1.7 **Contractors shall**:

a. Comply with this chapter and OSHA Standard 29 CFR 1926 construction safety requirements base on the scope work.

b. Comply with the approved general contractor SSSP and the associated safety and health submittals for the project.

c. Exercise supervisory authority for the construction activities on the jobsite.

d. Ensure any unforeseen hazards encountered during the daily inspection are immediately addressed.

e. Ensure that all employees are trained and appropriately certified for the activities they are conducting per their scope of work on the jobsite.

f. Ensure that all workers are made aware of the jobsite hazards through the development of Job hazard analysis (JHAs). See section 27.3 – Submittals – JHA.

g. Assign a SSHO who is in position of authority for safety oversight and capable of identifying existing and predictable hazards in the surrounding jobsite to ensure compliance with contract safety and health requirements and SSSP. See section 27.2.8 – SSHO qualification.

h. Conduct daily jobsite safety inspections, document the inspections, and make available upon request. The delegated SSHO should consider inspecting the jobsite more than once a day when hazardous work is occurring on the jobsite.

i. Ensure the SSHO participates in developing and reviewing all safety submittals associated with the project.

j. Ensure work stops if the SSHO leaves the jobsite.

k. Consider delegating an Alternative (Alt.) SSHO if project requires the active SSHO to leave the jobsite for a period of time.

l. Ensure the delegated Alt. SSHO meets the requirements and qualifications outline in Section 27.2.8 and the SSSP will be resubmitted to the Government for review and approval prior to delegating the Alt. SSHO.

m. Ensure the delegated Alt. SSHO is familiar with the work as the assigned SSHO to support the jobsite during the SSHO's absence.

n. Ensure any subcontractor representative that will co-share SSHO or Alt. SSHO complies with this chapter. See section 27.2.8.

o. Ensure the SSHO can be identifiable at all times when work is being conducted. This includes any subcontractor co-sharing the role.

p. Notify the COR upon discovery of any health and safety deficiency that the contractor cannot immediately resolve.

q. Notify the COR immediately when a regulatory agency personnel (e.g., OSHA) comes onto the jobsite.

r. Notify the COR immediately after a close call or a mishap occurs in accordance with section 27.2.5.

s. Ensure when a close call or mishap occurs at the jobsite an investigation is conducted, and the report is provided to the COR within 1 working day of the mishap.

t. Ensure all safety submittals are signed off by the COR before work begins in accordance with section 27.3 – Submittals.

u. Ensure that no deviation from the approved SSSP and associated safety submittals occur without the written approval from the COR and concurrence from Construction Safety Specialist.

v. Ensure the general contractor reviews and approves all their subs safety submittals prior to submission to the COR for review and concurrence in accordance with section 27.3 – Submittals.

27.1.8 **Site Safety and Health Officer (SSHO)** shall:

a. Be present and identifiable on the jobsite at all times when work is being performed.

b. Conduct a daily inspection of the jobsite, document the inspection using a checklist, and ensure the inspection document is available at the jobsite for review.

c. Ensure that items such as broken equipment, defective tool, and any other safety hazards are immediately mitigated.

d. Participate in developing and reviewing all safety submittals associated with the project.

e. Ensure safety and health submittals such as, but not limited to a JHA are updated when the scope of work or task changes.

f. Participate in mishap investigations in accordance with section 27.2.5.

27.2 General Requirements

27.2.1 Employee Training

Contractor shall:

a. Ensure all personnel receive the required safety and health training prior to initiation of the respective work activities.

b. Ensure all training that is required by the SSSP, this chapter, and OSHA applicable standards has been completed, is current, and proper documentation has been provided to the COR, ARC or Tenant Project Manager and the Occupational Safety, Health, and Medical Services Division.

c. Ensure the training instructor is competent through relevant education and experience to conduct training in the area(s) being taught.

d. Include training records and certifications with the employee's name, date of training, type of training received, expiration dates of training and signed by training instructor. Provide the certificates in the appendix of the SSSP.

27.2.2 Utility Pre-Outage Coordination

Contractors shall:

a. Apply for and gain approval for all utility outages in writing via submittals through the COR, ARC or Tenant Project Manager in advance per contract specification and drawings. Thirty days notification is required for occupants of facilities. This time will need to be budgeted into any utility outage request. See section 27.3 – Submittals – Lockout/Tagout (LOTO). Submit LOTO plan with outage request.

b. Attend a pre-outage coordination meeting with the COR, ARC or Tenant Project Manager that includes the NASA Ames utility representative. The meeting is held after the outage request has been approved in writing and prior to beginning work on the utility system. The purpose of the meeting is to review the scope of work and the LOTO procedures for worker protection.

27.2.3 **Hazard Control**

Contractor shall:

a. Ensure jobsite hazards are adequately controlled to prevent injury and illness. Provide pre-task planning, jobsite training, inspections, hazard identification, hazard controls, and management commitment to eliminate hazards, jobsite authority to remedy recognized hazards, and adequate records documentation. The general contractor is responsible for ensuring each subcontractor complies with the requirements covered within this chapter.

b. Ensure that if any severe hazard exposure or imminent danger is identified, personnel stop work, secure the area, then develop a plan to safely remove the exposure, control the hazard, and perform actions to restore and maintain safe working conditions.

27.2.4 **Protection of the Public and Federal Employees from Asbestos and Lead**

27.2.4.1 Work will not be performed in any area occupied by the public or federal employees unless specifically permitted by the COR and the CO.

27.2.4.2 Notification of Asbestos / Lead:

a. The Occupational Safety, Health, and Medical Services Division in coordination with the COR will notify the following groups prior to starting abatement work:

   (1) Employees who work or will be working in or adjacent to an area that abatement work will occur.

b. Sign Placement:

   (1) Signs need to be placed to alert and inform the viewer in sufficient time to take appropriate evasive actions to avoid the potential harm from the hazard.

   (2) Safety signs need to be placed where they are legible, non-distracting, and not hazardous in themselves.

27.2.5 **Accident Scene and Notification**

27.2.5.1 In the event of fires, explosions, chemical spills, illness, injuries, and other emergencies, call 650-604-5555 or 911 from a cell or other external phone and ensure to follow the list below.

a. Be prepared to relay the following information to the dispatcher:

   (1) Location of emergency

   (2) Nature of the emergency (e.g. fire, medical, chemical, etc.)

   (3) Number of persons injured

(4) If known, a brief description of the accident (to include the type of equipment involved, if any, Personal Protective Equipment (PPE) used, etc.)

(5) Remain on the line with the dispatcher until they release you.

b. Then notify the appropriate party as directed in section 27.1.7(r) and the Occupational Safety, Health, and Medical Services Division at 650-604-5602.

c. Preserve the conditions and any evidence of the accident scene within the jobsite. The government may conduct their own investigation.

d. Provide a written incident report to the COR, ARC Project Manager, or Tenant Project Manager no later than 24 hours of the initial notification. At a minimum provide the following information without personally identifiable information:

(1) Event date and time

(2) What happened (i.e. briefly describe the activity that was occurring)

(3) Where the event happened (general location and specific location)

(4) Action taken to address hazards associated with the event

(5) Point of contact information

e. Ensure to report the types of work-related incidents to OSHA and to the Ames Mishap Program Manager as specified in 29 CFR 1904.39 Reporting fatalities, hospitalizations, amputations, and losses of an eye as a result of work-related incidents to OSHA. Copies of all mishap documents must be provided to the Ames Mishap Program Manager.

f. Notify both OSHA Region 9, San Francisco Office at 415-625-2547 or OSHA's toll-free number 800-321-6742 and Occupational Safety, Health, and Medical Services Division at 650-604-5602 within the following timeframes:

Incident Type	Timeframe Requirement for Reporting Incidents Directly to OSHA	Requirement for Reporting Incidents to Landlord's Occupational Safety, Health, and Medical Services Division
1 or more work-related fatalities	Within 8-hours	As Soon as Possible
3-work-related in-patient hospitalizations	Within 24-hours	As Soon as Possible
1 or 2 - work-related in-patient hospitalizations	Within 24-hours	As Soon as Possible
Amputations	Within 24-hours	As Soon as Possible
Employee's loss of an eye	Within 24-hours	As Soon as Possible

27.2.6 **Display of Safety Information**

a. Within one (1) calendar day after commencement of work, erect a safety bulletin board at the jobsite.

b. Posted items are required to be durable to withstand the outdoor elements such as rain and sun. Replaced frequently so they remain legible.

c. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method acceptable to the COR, ARC Project Manager, or Tenant Project Manager and concurrence with Code QH that includes all mandatory information for employee and visitor review shall be deemed as meeting the requirement for a bulletin board.

d. Items posted on the bulletin board shall include but not limited to:

(1) Confined space entry permit.

(2) Hot work permit.

(3) Excavation permit.

(4) OSHA posting. See the required US Department of Labor (USDOL) posters available for download on the USDOL website at https://www.dol.gov/general/topics/posters

(5) Emergency information such as numbers to call for emergency assistance, name, and location of designated medical facility.

(6) Contact information of key NASA and contractor personnel working on the project.

(7) SSSPs, JHAs and associated documentation.

e. Maintain project related reference materials and make them available to personnel working at the jobsite, including but not limited to equipment manufacturer's manuals and safety related information to protect employees.

27.2.7 Fire Protection in Construction

27.2.7.1 **Hot Work**

Contractor shall:

a. Obtain a written permit from the Ames Fire Prevention Office at 650-604-3112 prior to welding, cutting, or operating an open flame-producing device outside a designated shop and post the permit at the jobsite prior to performing any hot work.

b. Ensure a fire watcher is present during the hot work and for additional 30 minutes who:

(1) Meets the requirements provided in Fire Prevention Standard (FPS) – 9, and 29 CFR 1910.252(a)(2)(iii)(A)(1) through (A)(4). Is equipped with a fire extinguisher and trained to use it following the requirements in 29 CFR 1910.252(a)(2)(iii)(B). Contact the Ames Fire Prevention Office for copy of FPS-9.

c. At least forty-eight (48) hours prior to start of hot work, coordinate with Ames Facilities Maintenance Fire Alarm Shop at 650-604-5212 if the hot work requires shutdown of any fire detection or fire suppression system.

d. Review the location of the nearest fire alarm boxes and emergency services dispatch phone number which is call 650-604-5555 or 911 from a cell or other external phone with personnel.

e. Ensure that all fire watchers, welders, and their apprentices are familiar with and trained to the requirements provided in FPS – 9, NFPA 51B, 29 CFR 1910.252 and 1910.253.

f. Obtain a new permit if the hot work is modified and/or the location of the hot work requires a change.

g. Direct questions regarding a fire or post emergency response/reporting to the Ames Fire Marshal at 650-604-3112.

h. Follow the OSHA Letter of Interpretation dated January 11, 1999 by Mr. High, subject on Storage of gas cylinder on construction sites; clarification of "in storage." https://www.osha.gov/laws-regs/standardinterpretations/1999-07-08

27.2.7.2 **Impairments to Fire Protection Systems**

Contractor shall:

a. Follow the requirements covered under FPS – 2 with Appendix when performing a fire system installation, maintenance, testing, repair, or other operations which requires impairment of a fire system greater than 4 hours duration. Contact the Ames Fire Prevention Office for copy of FPS-2.

b. Ensure the protection system impairment procedures apply to the following systems. This includes planned or emergency outages of the system or devices:

   (1) Fire alarm system

   (2) Detection system

   (3) Special suppression system (CO_2, Clean Agent, Dry Chemical, Water Spray)

   (4) Automatic sprinkler systems

   (5) Standpipe and hose systems

   (6) Fire pumps and water storage tanks

   (7) Underground piping and control valves

c. Coordinate all scheduled fire system impairments as per section 27.3 and submit the document called FPS-2 Appendix A – Fire Protection Impairment Notice for review at: NASA Ames Fire Prevention Office, Bldg. 15, Room 122; (650) 604-3112.

d. Ensure that any fire protection systems are not left disabled during off-business hours unless approved by the Fire Marshal and Facility Maintenance Division. Additional requirements are to be address within FPS-2.

e. Ensure to follow the fire prevention impairment procedures methods of impairments and restoration.

27.2.8 Qualification of the Site Safety and Health Officer (SSHO) shall:

a. Be a Competent or Qualified person (See Appendix A for definitions).

b. Have completed the OSHA 30-hour training course covering 29 CFR 1926, Standards for Construction Industry and be certified by an OSHA Authorized Online-Outreach Training Provider or an OSHA Authorized Outreach Training Institute. Training certificate must be current and less than five-year-old.

c. Have a minimum of one year or more of experience working in construction as the safety and health officer responsible for overseeing and ensuring the workers adhere to safety regulations at the jobsite and **CANNOT BE THE SUPERINTENDENT**. The COR, ARC or Tenant Project Manager and Occupational Safety, Health, and Medical Services Division may require additional years of experience due to the project size and scope of work.

d. Be included in a formal letter of designation provided by general contractor, approving the role and responsibility of the individual who will take on the responsibilities per sections 27.1.7(g) and 27.1.8. The SSHO OSHA 30 in construction certificate assuring required qualifications will also be included in the SSSP along with the letter of designation for review.

e. Have experience of at least one year, knowledge and certification such as in Fall Protection, Scaffold, Confined Space, Forklift, Aerial lift, that NASA or OSHA requires for specific specialized training if the scope of work demands it. The COR, ARC or Tenant Project Manager in consultation with Occupational Safety, Health, and Medical Service Division, will review credentials for those areas of expertise.

Note: For small and short duration contracts, the CO, COR, ARC or Tenant Project Manager and the Occupational Safety, Health and Medical Services Division may modify SSHO requirements in writing, which includes the delegation of SSHO position.

27.2.8.1 For minor maintenance, alteration, and repair including painting and decorating support service project, the COR, ARC or Tenant Project Manager and Occupational Safety, Health and Medical Services Division may adjust the above qualifications of the SSHO in writing. The minimum adjusted qualifications for the SSHO shall include:

a. Having completed the OSHA 10-hour training course covering 29 CFR 1926, Standards for Construction Industry, and being certified by an OSHA Authorized Outline-Outreach Training Provider or an OSHA Authorized Construction Provider.

b. Having a minimum of one year or more of experience assigned as the safety and health officer responsible for construction safety oversite on construction projects and knowledge within the scope of work.

Note: Section 27.2.8.1 applies to NASA Ames – Code JC, Facilities Engineering and Real Property Management Division.

27.2.9 Obstructions

27.2.9.1 Any construction activities and repair replacement at a minimum but not limited to including painting and decorating operations shall not cause obstructions in buildings without the approval from the government as per the sections covered in 27.3 – Submittals. Examples of things to not obstruct:

a. Corridors, aisles, stairways, doors, exits, fire protection panels and equipment.

27.2.10 Fences and Barricades

Contractor shall ensure:

a. The outdoor project jobsite area(s) and contractor lay-down area(s) are enclosed with a 6-foot-high chain link fence and gates that is maintained in good condition during the life of the contract and removed upon completion and acceptance of the work.

b. Temporary barricades are utilized whenever safe public access to paved areas such as roads, parking areas, or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of pedestrian or vehicular traffic. Also, they need to be securely placed, clearly visible, and adequately illuminated to provide sufficient visual warning of the hazard during both day and night.

c. Fencing is erected at all open excavations and tunnels to control access by unauthorized people. Fencing must be installed to be able to restrain a force of at least 250 pounds against it.

d. Lights, barriers, signals, signs, passageways, detours, and other human traffic-control items are erected and maintained to protect the public.

e. Fire hydrants are still accessible to the fire department.

27.2.11 Weather Plan

27.2.11.1 **Severe Storm**

In the event of a severe storm, the contractor shall:

a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

b. Check surrounding area, including roofs, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

c. Ensure that temporary erosion controls are adequate.

d. Cover piles of soil to prevent runoff when rainstorms are forecast.

e. Install stormwater curb guards and drain covers as needed to prevent runoff.

27.2.11.2 **Wind**

The contractor shall adhere to the following outdoor work restrictions unless the manufacturer has more stringent requirements:

a. No work on aerial lift, or scaffolding, and no lifting of personnel in buckets or crane baskets may occur during steady state winds of 20.7 mph (18 knots) or greater or gusts of 25 mph or greater.

b. Before starting a crane lift, a competent person evaluates and addresses the effects of the ambient wind on the load and on crane stability.

c. During steady state winds of 35 mph (30 knots) or greater, the contractor supervisor immediately:

(1) Conduct a walk of their areas for unsecured items (except for areas already covered in the above section).

(2) Secure at ground level all loose or unanchored items, equipment, supplies and material during steady state winds.

27.2.12 Hazard Communication Program

27.2.12.1 All contractors involved in a project working with hazardous materials shall:

a. Describe in the SSSP the approach to providing training to workers regarding the details of the hazard communication program.

b. Follow the requirements covered in 29 CFR 1910.1200 and at a minimum but not limited to:

(1) Provide the location of Safety Data Sheets (SDSs) and inventory of hazardous materials.

(2) Ensure workers are trained on the hazard communication program, labeling the hazardous materials and location of SDS's on the jobsite.

(3) Ensure all hazardous materials containers are labeled and maintained properly.

c. Receive approval from the COR or their designated representative prior to bringing any hazardous material onto the jobsite. Allow a minimum of ten (10) working days for processing of the approval.

d. Follow APR 8500.1 Ames Environmental Procedural Requirements and APR 8553.1 Ames Environmental Management System.

27.2.13 **Sanitation**

The contractor shall ensure:

a. Potable water and storage meet OSHA standard 1926.51(a).

b. A toilet and a hand washing facility for every 20 employees of each sex, is located within a quarter mile walk, or if not feasible, at the closest point of vehicular access.

c. Additional requirements needing compliance under sanitation can be found under OSHA 1926 Subpart D.

27.2.14 **Illumination**

The contractor shall ensure:

a. The construction areas, aisles, stairs, ramps, runways, corridors, etc., where work is in progress is lighted with either natural or artificial illumination. The minimum illumination requirements per OSHA 1926.26 are as follow for work any work area(s).

b. The minimum illumination intensities listed in Table D-3 while any work is in progress:

(1) Lighting Standards & Types

a. Five foot-candles – General construction area lighting.

b. Three foot-candles – Concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance.

c. Five foot-candles – Indoors: warehouses, corridors, hallways, and exit ways.

Note: For areas or operations not covered above, refer to the American National Standard A11.1-1965, R1970, Practice for Industrial Lighting, for recommended values of illumination.

27.2.15 **Concrete and Masonry**

The contractor shall ensure:

a. No employee is permitted to apply following components through a pneumatic hose (Cement, sand, and/or water mixture) unless the employee is wearing the required and appropriate PPE.

b. Any required equipment and tools are operated in accordance with OSHA 29 CFR 1926 Subpart Q, section 702 such as but not limited to – Masonry saws, Concrete pump systems, Power concrete trowels, Concrete mixers.

c. Any formwork is designed, erected, supported, and braced to be capable to support without failure all vertical and lateral loads. Drawing or plans, are to be available at the jobsite.

d. Any shoring and reshoring equipment, vertical slip forms, or steel reinforcement is secured or supported to prevent overturning and/or to prevent a collapse in accordance with OSHA 29 CFR 1926 Subpart Q, section 703.

e. Any precast concrete wall units, structural framing and tilt-up wall are erected and protected in accordance with OSHA 29 CFR 1926 Subpart Q, section 704.

f. Any lift-slab is designed and planned by a register professional and that all requirements within OSHA 29 CFR 1926 Subpart Q, section 705 is met when such as, but not limited equipment is being utilize – Jacks and/or lifting units.

g. When masonry walls are being constructed a means of limited access zone is established and confirms to OSHA 29 CFR 1926, Subpart Q, section 706.

27.2.16 **Steel Erection**

The contractor shall ensure:

a. All the required documentation, methods of verification, testing and collection of field-cured samples are done based on the appropriate ASTM standards and other applicable requirement outline within 29 CFR 1926 subpart R.

27.2.17 **Demolition**

The contractor shall ensure:

a. A competent person conducts a survey in accordance with 29 CFR 1926 Subpart T and APR 8500.1 and APR 8553.1 Environmental.

27.2.18 **Excavations**

The contractor shall:

a. Obtain an excavation permit (ARC 874) from Ames Plant Engineering at (650) 604-0079 five (5) business days prior to excavating six (6) inches or deeper.

    (1) Post the permit at the jobsite.

b. Assign a point-of-contact (POC) for work conducted inside a facility prior to starting work.

c. Ensure the POC obtains a copy of the facility emergency evacuation procedures from the facility service manager or COR.

d. Strictly comply with 29 CFR 1926 Subpart P, Sec. 651 and 652, Subpart S, Sec. 800 and Subpart V, Sec. 956.

e. Where excavation of six inches or more in depth is required, a subsurface utility scan is performed prior to start on the excavation.

    (1) Any location methodology that uses radiation such as radiography or density gauges must be done according to section 27.2.20 Radioactive Materials and Radiation Producing Equipment.

    (2) Coordinate with the COR and the professional surveyor whenever contract work involves concrete chipping, saw cutting, or core drilling.

        Note: Reinforcing steel used in concrete construction makes utility lines extremely difficult to identify.

    (3) Track utility markings and maintain them for continual visual contact.

f. Hold daily coordination meetings, attended by the COR or NASA Building Inspector, with the excavation personnel to coordinate work activities for the day.

g. Outline the excavation site with white construction paint.

h. Have a competent person perform soil classification and provide site control in accordance with 29 CFR 1926, Subpart P, App A – Soil Classification.

i. Have tabulated data, such as tables and charts, approved by a registered professional engineer (PE) and available at the jobsite specifying the sizes, types, and configuration of the materials to be used in the protective system.

j. Ensure the protective system used in a 20 feet or greater excavation is designed by a registered professional engineer.

k. Conduct daily inspections of the excavation, adjacent areas, and protective systems by a competent person.

l. Stop work if the competent person identifies a situation that could result in a possible cave-in, failure of protective systems, hazardous atmospheres, or other hazardous conditions.

m. Use LOTO procedures to isolate utility systems in circumstances where utilities are unable to be positively identified. De-energize underground high voltage prior to pneumatic or machine power excavation or subsurface demolition activities within the vicinity

Note: The use of historical drawings does not alleviate the contractor from meeting this requirement.

n. Conduct an atmosphere test before employees enter an excavation greater than 4 feet (1.22m) in depth. If any atmosphere deficiencies are identified, refer to section 27.2.19.2.

27.2.18.1 Hand-dig Requirements shall apply:

a. To excavations within 24 inches in all directions of a marked located utility line.

b. When any adjacent construction work is expected to come within 3 feet of an underground utility system to expose the system at several locations.

c. To dig a pilot trench when called for on the Excavation Permit for all underground utility work along the centerline of new trenches and down to the bottom elevation of the new utility.

Note: Machine excavation may proceed only after it is determined that all existing utilities have been identified and protected.

27.2.18.2 Protection of Personnel during Excavation shall include:

a. Placing a stairway, ladder, ramp, or other safe means of egress within a trench excavation that is 4 feet (1.22m) or more in depth so as to require no more than 25 feet (7.62m) of lateral travel for employees.

b. Ensuring no employee is permitted underneath loads handled by lifting or digging equipment.

c. Instructing employees to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.

d. Ensuring the use of a warning system (such as barricades, hand, or mechanical signals, or stop logs) when mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation. If possible, the grade should be away from the excavation.

e. Only operating trenching machines with digging chain drives when the spotter/laborers are in plain view of the operator.

27.2.19 **Confined Space Entry**

27.2.19.1 Contractors entering and working in a permit-required confined space shall:

a. Follow the requirements of OSHA 29 CFR 1926, Subpart AA.

b. Have a competent person coordinate with the COR to complete a confined space hazard evaluation form that identifies hazardous conditions and entry requirements for all confined spaces for each task requiring a confined space entry permit.

c. Have a written permit space program that complies with 29 CFR 1926.1204 implemented at the construction jobsite and available for inspection prior to and during entry operations.

d. Have all the necessary equipment available to conduct a permit-required entry as specified in 29 CFR 1926.1204(d)(1) through (9).

e. Evaluate the permit-required space atmosphere to determine if acceptable entry conditions exist before changes to the space's natural ventilation are made and before entry is authorized.

f. Constantly monitor the atmosphere for hazardous conditions, at a minimum for air deficiencies and toxic gases and vapors.

g. Share the results of any atmosphere testing with each authorized entrant in accordance with 29 CFR 1926.1204.

h. Assign an attendant outside the permit-required space for the duration of the entry operation.

i. If an attendant is assigned to respond to multiple spaces, indicate policies and procedures within the confined space program as to how the attendant will respond to an emergency affecting one or more of those permit-required spaces without distraction from the attendant's responsibility.

j. Designate each person specifically to supervisor, attendant, and entrant roles as stated in the permit.

k. Develop and implement procedures summoning rescue emergency services for rescuing entrants from a permit-required space.

l. Notify the NASA Ames Emergency Dispatch prior to entry and after entry has been completed if Ames Fire Department is going to act as the rescue emergency services to assure rescue operations are available by calling 650-604-5416.

m. Ensure procedures include closing off and cancelling the permit when the entry operations have completed.

n. Coordinate with the COR to notify other trades if the workplace contains one or more permit spaces, by posting danger signs or by any other equally effective means.

Note to paragraph 29 CFR §1926.1203(b)(1): A sign reading "DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" or using another similar language may satisfy the requirement for a sign.

o. Take effective measures to prevent unauthorized employees from entering a confined space.

p. Coordinate with the COR if there is a need to deviate from the permit.

27.2.19.2 Atmosphere Testing Gas Protection

a. All contractors working within a confined space shall:

(1) Have one or more employees properly trained and experienced in operation and calibration of gas testing equipment that are on duty during times workers are in confined spaces with the primary function to test for gas and operate testing equipment.

(2) Test for flammable gases, vapors, toxic gases, and oxygen deficiencies, then document at least every fifteen (15) minutes or more often when the characteristics of ground or experience indicate gases or vapors may be encountered, unless equipment of constant supervisory type with automatic alarm is employed. Special requirements, coordination, and precautions will apply to areas that contain a hazardous atmosphere or, by virtue of their use or physical character, may be oxygen deficient.

(3) Test for flammable and toxic gases and vapors before workers are permitted to enter an excavation after an idle period exceeding thirty (30) minutes.

(4) Create a permanent record of readings daily, indicating the concentration of flammable and toxic gases, point of test, and time of test.

27.2.20 **Radiation and Laser Safety**

27.2.20.1 The use of radioactive material sources, radiation generating devices, particle accelerators, lasers, or high-power radiofrequency/Microwave transmitters for construction activities are only permitted to be used on Ames Research Center property with the consent of the Radiation Safety Officer (RSO).

27.2.20.2 The most common construction related activities involving radiation/radioactive material that require authorization include:

a. Industrial Radiography.

b. Soil Compaction testing utilizing a nuclear density gauge.

c. Handheld X-ray fluorescence analyzers using either an x-ray tube or gamma source.

27.2.20.3 The most common construction related activities involving nonionizing radiation sources that require authorization include:

a. Laser Range Finders.

b. Laser scanners.

c. Microwave and Radio Frequency transmitters and radar (not including universal low intensity items such as cell phones, Wi-Fi devices, walkie-talkies, and utility location devices when used as designed by the manufacturer).

27.2.20.4 Radioactive Materials and Radiation Producing Equipment

27.2.20.5 The contractor shall:

a. Maintain copies of the documentation as stated in the submittal section at the jobsite.

b. Perform all radiation testing in compliance with radiation safety requirements set forth in 10 CFR Part 20 Standards for Protection Against Radiation.

c. Transport radioactive materials in accordance with DOT radioactive material transport regulations listed in 49 CFR 172-173.

d. Lock and secure radioactive materials when not in use.

e. Immediately report to the RSO and the COR any radiological health hazard, emergency, or loss of ionizing radiation source at the center.

f. Comply with APR 8715.1 Chapter 8 requirements concerning the use of transmitters.

g. Consent to radiation safety audits by the RSO or designee at any time.

27.2.20.6 The contractor shall perform the following additional requirements when performing industrial radiography:

a. Ensure that “Notice of Radiation Testing” postings are placed at all entrances to all buildings affected by the radiography at least 24 hours prior to the time of radiography.

b. Ensure that Division Managers, Branch Chiefs, CORs, contractors, and other managers of any affected facility are notified at least 24 hours prior to the radiography to assure that any disruptions to their operations are understood. The notification informs them that affected areas will need to be clear of all personnel for the timeframe of the radiography.

c. Ensure that Moffett Field Dispatch (650-604-5416) is notified of building access restrictions and any blocked roadways that could impact potential emergency service efforts prior to commencing radiography and after access restrictions are lifted following the radiography.

d. Ensure that radiographic operations are only conducted between the hours of 5pm and 5am on normal business workdays. Radiographic operations conducted during daytime hours are only permitted during holidays and weekends.

e. Ensure that radiographic operations do not commence until the RSO, or designee has performed a radiation safety audit to ensure compliance with all requirements set forth in 10 CFR 34.

f. Perform non-destructive testing in accordance with accepted industry standards and Nuclear Regulatory Commission (NRC) NUREG/BR-0024 for radiographies when using NRC licensed radioactive materials unless otherwise approved.

g. Notify the COR upon completion of radiological operations.

h. Ensure all radiological postings and boundaries are removed from the affected buildings at completion of use.

27.2.20.7 Laser Safety Requirements for Indoor and Outdoor Use

a. Contact the Nonionizing-RSO for any questions about policies and to obtain the procedure templates and forms required to perform the following activities. The Nonionizing-RSO can be reached at 650-604-3979 and the Assistant Nonionizing-RSO at 650-604-4548.

b. Construction lasers are limited to Class 3R and are not often used at night and would not be expected to create a direct or indirect hazard when operated as intended. OSHA regulations require authorized construction laser operators to carry proof of qualification to operate the laser (29 CFR 1926.54) and contain controls appropriate to use. No additional control measures are required when used as intended. However due to the location of NASA Ames on an airfield there are additional laser safety requirements from the FAA. See section 27.3.10.

27.2.20.8 Radiofrequency and Microwave Use

The contractor shall ensure the following requirements are met for Microwave and Radio Frequency (RF) transmitters (not including universal low intensity items such as cell phones, Wi-Fi devices, walkie-talkies, and utility locators when used as designed by the manufacturer):

a. Ensure the use of transmitters receive authorization from the Nonionizing Radiation Safety Committee and Nonionizing-RSO.

b. NASA Ames personnel and on-site hard badged contractors take online RF safety training. For other construction contractors or users, the Nonionizing-RSO will provide a training handout to be read and signed by all workers and then returned to the Nonionizing-RSO prior to use being authorized.

c. Contact the NASA Ames Nonionizing-RSO for any questions about policies and to obtain the procedure template and forms required to perform the above activities. The Nonionizing-RSO can be reached at 650-604-3979 and the Asst. Nonionizing-RSO at 650-604-4548.

27.2.21 Electrical Power Transmission

All contractors shall ensure:

a. To obtain all relevant hazardous condition of the site from the COR, so it can be communicated to the workers in a timely manner.

b. To obtain any unique hazardous condition present at the site from the COR.

c. All findings found outside the initial awareness of relevant or unique hazardous conditions are to be reported within 48 hours to the COR.

d. Coordination between NASA staff support and contractor support are established.

27.2.22 **Electrical and Lockout / Tagout (LOTO)**

27.2.22.1 All contractors involved in electrical work shall:

a. Perform work in accordance with the current edition of the NFPA 70 National Electrical Code, NFPA 70E Standard for Electrical Safety in the Workplace, 29 CFR 1926 Construction Industry Regulations & Standards, and contract referenced documents.

b. Ensure all workers are trained in accordance with NFPA 70, NFPA 70E, 29 CFR 1910.332, and 29 CFR 1910.147.

c. Ensure contractor develops a SSSP outlining the work on or near Electric Power Generation, Transmission, and distribution equipment addressing such as Substation, the Emergency Power Plant, and overhead and underground 15 kilovolt (kV) power distribution systems.

d. Ensure that any underground electrical vault (Confined Space) is safe for entry before entering to conduct work. (See section 27.2.18 for excavation requirements and section 27.2.19 for requirements on confine space entry)

e. Ensure excavation of six inches or more in depth is required, a subsurface utility scan is performed prior to start on the excavation. (See section 27.2.20 for requirements on surface scanning equipment)

f. Ensure to de-energize and ground all underground cables to be cut and positively identify cables to be cut using an impulse cable phasing utility device.

g. Perform all high voltage cable cutting remotely using hydraulic/piercing cutting tool.

h. Ensure when racking in/out or live switching circuit breakers, there is no additional person other than the switch operator and observer are allowed in the approach boundaries during the actual operation.

i. Coordinate with the COR prior to making connection(s) into any part of ARC electrical power distribution system.

j. Ensure planning of work near exposed energized parts must result in minimizing exposure to the exposed energized parts. Use of electrical outages that are clear from any energized electrical sources is the preferred method. When working in energized substations, only qualified and authorized electrical workers shall be permitted to enter.

k. Select the appropriate PPE based on the requirements of NFPA 70E.

l. Size portable extension cords in accordance with manufacturer ratings for the tool to be powered. Provide suitable portable extension cord for environment being used. Ensure that portable extension cords meet the requirements of NFPA 70 and OSHA 29 CFR 1926. Immediately remove from service all damaged extension cords.

m. Provide Ground-Fault Circuit Interrupter (GFCI) for all 120-volts, single phase 15- and 20-ampere outlets which are not part of the permanent wiring of the building or structure and are in use by the employees as per NFPA 70E.

n. Comply with the requirements in Section 27.2.2 Utility Pre-outage.

27.2.22.2 Contractors performing electrical work in walls, ceilings and floors shall:

a. Perform a subsurface site survey for penetrations of greater than 2 inches. (See section 20.2.20)

(1) Ensure enough clearance is provided to prevent the unexpected contact with any utilities when penetrating any subsurface.

(2) Scan for utilities that may be affected by drilling, cutting, etc.

b. Clearly mark surfaces with the survey findings and provide a survey report to the COR.

c. Implement appropriate controls to ensure the work is done safely when utilities are present.

d. Any location methodology using radiation such as radiography or the use of density gauges must be done according to section 27.2.20.

27.2.22.3 Arc Flash Warning and Labels

Contractors shall:

a. Provide warning labels per NFPA 70E for electrical equipment installed.

b. Post label conspicuously on or near the equipment that states "WARNING -- Arc Flash and Shock Hazard -- Appropriate PPE Required." Labels created for all voltage classes equal to or greater 50V throughout a facility to the furthest downstream panel per IEEE 1584.

27.2.22.4 Lockout/Tagout (LOTO)

All contractors performing a LOTO shall cover at a minimum but not limited to the following components:

a. Submit a LOTO plan as per section 27.3 – Submittals.

b. To have systems properly isolated from hazardous energy as per NFPA 70E, Article 120.

(1) Identify qualified and authorized personnel performing LOTO.

(2) Ensure the proper PPE worn by the employee meets requirement levels of protection such as for electrical in accordance with NFPA 70E, Article 130.

c. Identify all equipment and energy sources

(1) Examine the areas which identifies the equipment and system components to determine which sources of energy are used during their operation or if any residual energy is still retained after the shutdown so components being worked on will be at a state of zero energy.

i. Identifiable energy sources such as: Hydraulic, Pneumatic, Thermal, Spring Energy or Gravity which may require draining or bleeding, blocking movable parts, releasing of spring energy, or lowering suspended part to a rest position.

d. Notify affected parties

(1) Ensure the specifics of any upcoming shutdowns are communicated to all affected and authorized users on the construction site.

e. De-energize

(1) Ensure the LOTO plan identifies the qualified worker who will verify the complete isolation of any system redundancy and potential stored energy.

(2) Ensure all equipment, machinery, or system components are shut down and placed in a state of zero energy. For electrical systems, zero voltage verification is to be conducted by the qualified worker and witnessed for zero voltage by everyone working on the equipment downstream.

(3) Ensure prior to starting work on the equipment, machinery, or system component, the general contractor and their subcontractor personnel are to verify and witness the equipment is at a zero energy state.

(4) Ensure a written verification is produced for all complex LOTO procedures or on all simple lockouts of voltage systems greater than 600V prior to starting work on the de-energized equipment.

(5) Ensure de-energized circuits have been inspected daily when work continues on all parts and attachments to ensure they are secured. Daily inspections are to include verification of zero voltage in accordance with NFPA 70E.

f. Apply locks, tags, and locking devices

(1) Ensure applying locks, tags and locking devices meet the requirements of 29 CFR 1910.147 and NFPA 70E.

g. LOTO release

(1) Once the work is complete and all personnel have been confirmed to have cleared the area and re-energize or restore the equipment or system to its normal state or operation.

27.2.23 **Scaffold**

Contractors shall:

a. Ensure each scaffold and scaffold component, erectors, dismantlers, and users comply with 29 CFR 1926.451, 1926.452, 1926.454 and 1926 Subpart L – Appendix A Scaffold Specs.

b. Ensure each scaffold is designed to support, without failure, its own weight and at least 4 times the maximum load meeting the requirements of 29 CFR 1926 Subpart L – Appendix A.

c. Ensure each user receives training and/or re-training by a qualified person in the subject matter to recognize the hazards associated with the type of scaffold and to understand the procedures to control or minimize those hazards meeting the requirements in 29 CFR 1926.454. The training shall include the following areas, such as but not limited to:

(1) Electrical hazards, fall hazards and falling objects in the work area

(2) The proper use of the scaffold, and the proper handling of materials on the scaffold

(3) The maximum intended load and the load-carrying of the scaffolds used, and any other pertinent requirements

(4) Ensure that required fall protection is used and the scaffolding plan is followed.

d. Provide safe access when the scaffold platforms are more than 2 feet (0.6 cm) above or below in accordance with 29 CFR 1926.451(e)(1).

e. Access scaffold platforms greater than twenty (20) feet maximum in height by means of a scaffold stair system with an adequate gate.

f. Ensure that daily documented inspections are performed by a competent person.

g. Protect employees from falling objects when work above is being performed.

h. Not use side brackets on self-supported scaffold systems to extend scaffold platforms to store material.

i. Ensure that supported scaffolds are set on base plates, mud sills, or other adequate firm foundation.

j. Ensure scaffold assembly and disassembly are under the supervision and direction of a competent person qualified in scaffold as per 29 CFR 1926.451(f)(7).

27.2.24 **Mobile Cranes, Hoists, Mobile Elevating Working Platforms (MEWP) (Aerial Lifts, Scissor Lifts, Boom Lifts), and Powered Industrial Trucks (PIT) (Forklifts, Rough Terrain Forklifts)**

27.2.24.1 Mobile Crane Contractors shall:

a. Follow the requirements covered in 29 CFR 1926 Subpart CC.

b. Notify the COR or Project Manager ten (10) business days in advance of any cranes entering the center so that notifications can be made to the Lifting Devices and Equipment Manager (LDEM).

c. Submit all documentation to the LDEM for review. See section 27.3.

d. Document any deficiency found during the pre-operational check and remove from service until steps are taken to correct deficiency.

e. Ensure only Original Equipment Manufacturer (OEM) equipment is utilized and acceptable for critical and non-critical lifts.

f. Ensure that manufacturer's original markings are legible on the rigging hardware to include the name or trademark of the manufacturer, grade, material type, working load limit (WLL) and size.

g. Ensure that PPE is available and worn to include appropriate gloves, hard hats, safety glasses, safety shoes or other PPE as needed.

h. Ensure that the mobile crane is erected on a ground that is firm, drained and graded sufficiently, and that supporting materials such as blocking, cribbing, pads, or mats to be used are adequate to support and level the crane (e.g., crane pads can be made of wood, composite wood, composite plastic, composite fiberglass, and/or metal).

i. Ensure work near or around power lines will comply with OSHA 1926.1408(h), Table A operating near de-energized and grounded electrical power lines.

j. Ensure that outdoor hoisting operations do not take place if winds are above 20 knots (23 mph) steady state or gusts exceed 35 knots (40 mph). Weather will also be a consideration before lift operations occur such as rain or lightning.

k. Ensure that loads will not be lifted over the cab or over the front area of the truck mounted crane unless approved by the crane manufacturer and qualified person.

l. Ensure to provide to the LDEM the three types of inspection for review: Daily, Monthly, and Annual (Periodic).

m. Ensure crane operators and riggers follow the listed items below:

(1) Crane operations are only to be conducted by properly licensed operators and riggers.

(2) Before any operation is conducted by the operator and rigger, the company must provide the following current documentation to verify that they are properly trained and licensed in the operation of the crane which they are intending to operate:

i. National Certified Crane Operators License

ii. Rigger Certification Card

iii. Medical Certificate

(3) Ensure crane operators are not engaged in activities that distract their attention while operating the equipment (i.e., cell phones – unless used for signaling purposes, iPods, etc.).

n. Ensure the Rigging Plan lists at a minimum:

(1) A drawing of the load and rigging with information about the lift point or points, center of gravity, slings angle and tensions.

(2) Sizes and Capacity of rigging gear.

(3) Weights and load chart deductions.

o. Ensure that all rigging is proof tested to their respective ASME standard proof testing values, with the following exceptions:

(1) Proof load tests for alloy steel chain, wire rope, metal mesh, synthetic rope, synthetic round slings, and synthetic web slings can only be performed by the manufacturer or the sling's user with manufacturer's written permission and procedures with LDEM concurrence. Substitution of this requirement can be replaced with a load test factor of 1.

(2) For lifting interfaces, such as eyebolts, pad eyes, D-rings, lifting lugs, etc., permanently attached to the load (i.e., they will not be removed from the load prior to its use), analysis may be substituted to verify the integrity of the interface, subject to LDEM approval.

p. Ensure a Critical Lift Plan and Critical Lift Checklist and Hazard Analysis is completed and submitted to the COR, or Project Manager when any of the following conditions exist:

(1) The load exceeds 75% of the crane's load chart.

(2) Whenever the load and/or travel radius is expected to travel over any portion of an occupied building.

(3) The load exceeds 100 tons.

(4) If the lift involves multiple cranes, a system must be instituted by the controlling entity to coordinate operations.

(5) The crane is being used to lift personnel.

(6) Or the LDEM has determined that the plan and checklist are necessary.

27.2.24.2 Hoists and Winches shall:

a. Follow the requirements covered in 29 CFR 1926 Subpart CC.

b. Ensure before first use, all new, extensively repaired, extensively modified, or altered hoists and winches are to undergo a proof load and periodic load test.

c. Ensure all load and operational tests are to be performed by qualified personnel according to written (specific or general) technical operating procedures.

d. Ensure an inspection of the hoist or winch and lifting components is to be performed after each load test and prior to the hoist or winch being released for service to ensure there is no damage.

27.2.24.3 MEWPs shall:

a. Follow the requirements covered in 29 CFR 1926 Subpart L, section 453.

b. Ensure not to use any MEWP system as a crane.

c. Ensure to operate the MEWP according to manufacturer's instructions and ANSI/SAIA A92 Standard for the specific type of lift equipment.

d. Ensure that the proposed MEWP meets the height requirement and work capacity by conducting a hazard evaluation prior to its use.

e. Ensure certified operators are trained to operate the appropriate model of MEWP and additional individuals in the lift are trained in fall protection and MEWP operation.

f. Ensure that prior to each use, a preoperational check is completed to ensure readiness of equipment and anticipated use.

g. Ensure a survey of the area of use has been completed for all hazards anticipated such as overhead, high voltage, holes, drop offs, depressions, mud, loose or un-compacted dirt, path of travel and any other hazardous condition. The operator may establish exclusion zones by barricades if necessary.

h. Ensure the MEWP is never loaded beyond its capacity.

i. Ensure personnel maintain all tools, body parts, and materials inside the MEWP.

j. Ensure the MEWP used by the worker close to circuits under load will be operated in accordance with OSHA standards 1926 under Subpart N, O and CC – 1408(h) – Table A for power lines up to 350kV.

k. Ensure no operation of the MEWP is conducted outdoor when winds are equal or above 20 knots (23 mph) or if gusts exceed 25 knots (29 mph).

l. Ensure to consider weather conditions such as lightning and rain before beginning work.

m. Ensure a body harness with an adjustable lanyard or Self Retracting Lifeline (SRL) is rated to be used below the D-ring and connected to an approved anchor point in the basket while working.

n. Ensure a documented daily inspection is kept readily available and accessible.

Note: NASA Ames recognizes the current ANSI A92 MEWP due to the requirement to follow the manufacturer manual.

27.2.24.4 PIT

Contractors shall:

a. Follow the requirements covered in 29 CFR 1910 Subpart N, section 178.

b. Follow the manufacturer's recommendations and instructions.

c. Ensure that each type of PIT has an owner's manual readily available.

d. Ensure the operator has been certified to operate the appropriate class of PIT.

e. Ensure that prior to each use, a preoperational check is completed to ensure readiness of equipment and anticipated use.

f. Ensure that a survey of the area of use has been completed for all hazards anticipated such as overhead, high voltage, holes, drop offs, depressions, mud, lose or un-compacted dirt, path of travel and any other hazardous condition. The operator may also establish exclusion zones by barricades if necessary.

g. Ensure the PIT used by the worker close to circuits under load will be operated in accordance with OSHA standards 1926 under Subpart N, O and CC – 1408(h) – Table A for power line up to 350kV.

h. Ensure to consider weather conditions such as lightning and rain before beginning work.

i. Ensure a documented daily inspection is kept readily available and accessible.

27.2.25 **Pressure Systems**

27.2.25.1 Follow the requirements of APR 8715.1 Chapter 10. The most stringent requirements govern when inconsistencies arise.

27.2.26 **Asbestos and Lead**

27.2.26.1 Contractors involved in an asbestos or lead related work shall comply with the requirements of APR 8715.1 Chapter 30 and Chapter 35.

27.2.26.2 Contractors shall notify the COR immediately upon discovery of any previously unidentified potentially asbestos containing materials (PACM), Lead, or undetermined hazardous material.

27.2.27 **Silica Requirements**

27.2.27.1 Contractors shall follow 29 CFR 1926.1153. Table 1 of OSHA standard 29 CFR 1926.1153(c)(1) lists what operations and conditions warrant respirator use or properly implement engineering controls and work practices if used correctly can avoid having to use respirators.

27.2.28 **Fall Protection**

27.2.28.1 Contractors shall:

a. Ensure to follow 29 CFR 1926 Subpart M. and current ANSI/ASSP Z359 for fall protection equipment.

b. Establish a site-specific fall protection plan when workers are working at an unprotected side or edge at 6 feet or greater above a lower level or from an aerial lift or other elevated working surface and can be part of the SSSP. See section 27.3.7.

c. Maintain training records containing the name of the trained employee, date of the training, and the signature of the person who conducted the training and make the records available upon request.

d. Ensure the employee is re-trained if the fall protection system changes and/or if an employee's actions demonstrate a lack of understanding of the fall protection plan.

e. Consider the use of the hierarchy of fall protection as indicated below:

    (1) Hazard elimination – Whenever possible, attempt to change the nature of the task so that it is not necessary to use fall protection.

    (2) Passive fall protection – Such as physical barriers between the worker and the fall hazard when established prevents the worker from falling (e.g., guardrails, vertical netting, covers, etc.)

(3) Fall restraint system – The system which could be permanent or temporary which will prevent a worker from reaching the fall hazard zone.

(4) Fall arrest system – The system which could be permanent or temporary that allows a worker to fall but arrests the fall safety before the worker strikes the ground.

(5) Administrative controls – The work practice or procedure designed to warn a person they are approaching a fall hazard. Administrative controls may include warning lines with visible flags, flashing lights, or other methods.

27.2.28.2 Guardrail System (Passive Fall Protection) should be considered when the working height is 6 feet or more above the walking working surface; this also includes the edge of excavations greater than six feet in depth. Guardrail system shall meet the following criteria:

a. Top rail – 42 inches, +/- 3 inches above the walking/working level.

b. Mid-rail – Located midway between the top rail and the walking/working level.

c. Toeboard – For elevated walking/working platforms where employees working below are exposed to falling objects. Toeboard must be four inches in height and must be securely fastened.

d. The system used should be smooth to prevent punctures, lacerations or snagging of clothing.

e. The ends of the top rail shouldn't overhang the terminal posts, except when such overhang does not present a projection hazard.

f. When a hoisting area is needed, a chain, gate or removable guardrail section must be placed across the access opening when hoisting operations are not taking place.

Note: It is important to remember that the working level is that level where the work is being done. Someone working on a stepladder next to an edge may raise their working surface well above the walking surface.

27.2.28.3 Skylights

a. Contractors shall consider a skylight as an opening when present on a roof.

b. A standard guardrail or skylight screen capable of supporting at least 200 pounds shall be provided around the opening to prevent workers from falling through to the surface below.

27.2.28.4 Personal Fall Protection Systems

Contractors using personal fall protection equipment shall:

a. Implement the "Buddy System" or have an observer to render assistance when and if required.

b. Ensure all fall restraint system components meet the current requirements of the ANSI/ASSP Z359 standards.

c. Ensure all personal fall arrest system components meet the current requirements of the ANSI/ASSP Z359 standards.

d. Ensure to use and inspect fall protection equipment in accordance with manufacturer's instructions, but at a minimum prior to use by the authorized person and at least annually by the competent person.

e. Ensure to remove equipment from service on the jobsite if it is found to be stressed, worn, rigid or missing a piece.

f. Ensure to use the appropriate fall protection equipment when selecting equipment as a fall arrest system or fall restraint system. Only locking snap hooks may be used. Body belts are prohibited on the jobsite.

27.2.29 **Use of Explosives (Powder-Actuated Tools)**

27.2.29.1 A powder-actuated tool shall not be used or brought to the jobsite, except as provided in this section. Contractors shall:

a. Be thoroughly trained in the particular tool used before entering the jobsite and exercise extreme care at all times.

b. Possess a certificate of training issued by the authorized manufacturer of the tool being used and be able to produce the certificate upon request. Submit a copy of the certificate to the Ames Construction Safety Specialist prior to work.

c. Obtain a Hot Work permit prior to using powder-actuated tools. See the Hot Work section of this chapter for additional information.

d. Use powder-actuated tools in accordance with the manufacturer's specifications and 29 CFR 1926.302(e) standard.

e. Wear appropriate PPE such as safety glasses or goggles, safety shoes, and hearing protection.

f. Provide notice and signage stating at a minimum “POWDER-ACTUATED TOOL IN USE” to all occupants before the tool is fired in laboratory or office areas. Persons in adjacent workplaces may be startled or even injure themselves when unexpectedly exposed to the noise generated by a powder-actuated tool.

g. Test the tool each day before loading to verify safety devices are in proper working condition in accordance with the manufacturer's recommended procedure. Immediately remove from service and tag any tool found not in proper working order, and/or that develops a defect during use, until it is properly repaired.

h. Secure tool when left unattended.

i. Use the correct shield, guard, or attachment recommended by the manufacturer.

j. Obtain the Safety Data Sheet (SDS) for the cartridges and keep with the equipment at the jobsite.

k. Only bring cartridges for one (1) day of work at the jobsite and remove unused cartridges at the end of each day.

27.2.30 **Personal Protective Equipment (PPE)**

27.2.30.1 The minimum proper PPE on the jobsite that is not otherwise covered in another section of this chapter shall:

a. Be inspected prior to use to ensure it is in good shape.

b. Be long pants and shirts with sleeves.

c. Not be loose fitting clothing or jewelry that may get caught in tools or machinery.

d. Be shoes that protect the feet such as steel or composite toed boots.

e. Be a minimum of ANSI/ASSE Z87 safety glasses with side shields.

f. Be a face shield and safety glasses that works with a hard hat when grinding or other operations that require face protection.

g. Be goggles that are worn when greater eye protection is needed.

h. Be the correct lens for the welding job.

i. Be ear plugs or earmuffs at a minimum but limit use to when grinding, using impact hammers or other equipment that create high noise levels (above 85 dB).

j. Be hard hats that comply with ANSI/ASSE Z89.1.

k. Be hard hats that comply with ANSI/ASSE Z89.2 when workers that may be exposed to high voltage or can be burned.

l. Be the correct welding helmets that protect the head and eyes from injury.

m. Be reflective apparel such as jackets, shirts, or vests that shall comply with ANSI/ISEA 107, Class 3 requirements.

n. Not be nylon jackets, shirts, or vests when performing hot work such as welding, gas, or plasma cutting.

o. Be the appropriate leather gloves while welding, handling building materials and moving equipment to prevent cuts, abrasions and burns.

p. Be the appropriate gloves (such as nitrile gloves) when handling chemicals.

27.3 **Submittals**

27.3.1 All submittals shall comply as follows:

a. All safety and health submittals are to comply with applicable OSHA standards and this chapter. Any other federal construction safety standards such as the U.S. Army Corps. of Engineers EM 385-1-1 or State construction safety standards are not applicable to any construction project at ARC or Moffett Field. For further clarification contact the construction safety program manager or the construction safety specialist from the ARC Occupational Safety, Health, and Medical Service Division.

b. The general contractor is to submit, for record only, their company Safety and Health Program.

c. The general contractor is to submit site-specific safety and health submittals for review in accordance with this chapter and OSHA 29 CFR 1926 applicable requirements based on the scope of work.

d. The safety and health submittals must be processed through the appropriate point of contact such as the COR, ARC Project Manager, or Tenant Project Manager and submit to the ARC Occupational Safety, Health, and Medical Service Division for review.

e. The general contractor is to understand all safety and health submittals have a minimum ten (10) business days for review upon receipt by ARC Occupational Safety, Health, and Medical Service.

f. Work cannot start without a review of the safety and health submittal and **signed-off** by all NASA representative(s).

Note: Although NASA Ames Research Center operates within the State of California, which may typically require a construction company to comply with certain state guidelines and laws regarding Environmental, Air Quality, and local County laws. NASA Ames Research Center is a Federal Agency which is required to follow Federal OSHA standards and not the state-approved Plan known as Cal/OSHA Title 8 Regulations.

27.3.2 **Site Specific Safety Plan (SSSP)**

27.3.2.1 The general contractor SSSP shall be submitted as per section 27.3.1. See appendix A for SSSP definition.

(1) If the general contractor develops the subcontractor safety submittal such as a SSSP, the subcontractor is to provide a letter of concurrence accepting the policy of the submittal that will be attached to the submittal and submitted in for government review. This documentation is to be kept at the jobsite and made available for review upon request. The same requirements apply to all other safety and health submittals such as, but not limited to; JHAs, Confined Space Plan, Excavation Plan, Fall Protection Plan, etc.

(2) All subcontractor safety and health submittals are to be reviewed and approved by the general contractor prior to submitting into the government. A written statement needs to be included with the safety submittal and needs to indicate date of review and approval with the name of the general contractor reviewer. The statement needs to explain how it complies with the scope of work in accordance with the general contractor's contract, the regulatory standards of 29 CFR 1926, and applicable requirements within this chapter.

(3) All subcontractor's safety and health submittals will be reviewed by the Ames construction safety specialist or appropriate ARC Occupational Safety, Health, and Medical Service representative for compliance prior to concurrence with the submittal.

Note: The written statement validates to the Government that the general contractor SSHO has performed a formal review of their subcontractor's safety submittal and it meets the applicable requirements outlined within this chapter and 29 CFR 1926.

27.3.2.2 The SSSP shall include, at a minimum, the health and safety program policies based on the scope of work and contractor's approach with the following minimum requirements but not limited to:

a. Project Details – Names, title, and phone number of the general contractor's jobsite Org Chart team, project name, contract or task number, accurate project description, location, training records and credentials of the proposed SSHO, plan preparer, and a signature sheet.

b. Scope of work – Outline in detail the specific type(s) of work to be performed on the jobsite (e.g. new construction, support, or remodeling work, etc.), duration of the work, any unusual site condition or exposure, and a brief overview of activities the subcontractor(s) will perform.

c. Responsibilities and lines of authority – Statement of the employer's implementation of their safety plan, accountability of personnel responsibility for safety at all levels from general contractor to the subcontractors and include the designation of the SSHO and their credentials.

d. Develop and Implement controls – Explain how the company and subcontractors will address all the potential hazards, as well as the safety procedures on the specific scope of work. Things to consider when developing this section, the type of PPE that will be worn by the workers, and how to manage fall hazards, special hazards and considerations, incident reporting, emergency preparedness, etc.

e. Hazard Communication – Specify information on potential hazardous materials that are planned to be used on the jobsite, location of SDSs. Ensure to cover a spill procedure such as when storing fuels, chemicals, or coatings, etc. which requires mitigation, and waste containment procedures.

f. Training records – List of mandatory training certifications that are applicable to this project (e.g., confined space, fall protection, crane operator, rigger, respiratory protection, etc.) and any requirement for periodic retraining/recertification. (Must be available upon request)

g. Emergency response and contacts – Provide contacts and indicate procedures on how individuals' roles and responsibilities will be for an emergency response and how the communication will be between the general contractor and NASA ARC. Also include the medical services provider contact and directions.

h. Safety and Health daily inspections – Provide details on the following (Inspection records must be available upon request):

(1) Who will conduct safety inspections.

(2) Process to record daily inspections, deficiency tracking system, follow-up procedures daily, etc.

i. Schedule – A schedule of at least one Safety Toolbox meeting a week that includes topics related to hazards that employees will encounter at the jobsite.

27.3.2.3 Once work begins, if changes are made to the approved general contractor safety submittal or concurred subcontractor safety submittal such as the SSSP or JHA due to changes in scope of work that creates a need for a new revision to the safety procedures or hazardous conditions, it shall be resubmitted to the COR, ARC Project Manager, or Tenant Project Manager (see section 27.3.1).

27.3.3 **Job Hazard Analysis (JHA)**

27.3.3.1 A Job Hazard Analysis is the risk assessment used to analyze hazards associated with job tasks which with on identifying and controlling hazards. The JHA focuses on the relationship between the worker, the task, and the work environment. The goal is to identify existing and potential hazards, assessing the risk and identify methods to eliminate or protect against the potential hazard.

Note: OSHA Guidelines on JHAs: https://www.osha.gov/Publications/osha3071.pdf

27.3.3.2 The general contractor (when performing the work) shall submit JHAs specific to the scope of work as per section 27.3.1. Subcontractor JHA submittals are to follow the sections mentioned above.

27.3.3.3 JHAs will contain each of the sections identified below (see Appendix C for an example of a JHA):

a. Job Task (Activity) or steps Description: Provide the specific sequence of steps for the listed activity. Examples of activities include but no limited to; operation of heavy equipment, specific environment conditions (such as Asbestos/Lead work, Confined Space, Excavation, etc.) or use of powered hand tools.

Note: Avoid making the breakdown of steps so detailed that it becomes unnecessarily long or so broad that it does not include basic steps.

b. Hazard Description: Identify the unsafe condition or practice that could cause injury, illness, or property damage. Using the tasks listed, identify the hazards related to the work being performed as an example but not limited to; flying debris from drilling or cutting, moving machinery parts, fire, toxic emission or repetitive tasks, heavy lifting, etc.

c. Hazard Controls: Identify how to eliminate the hazard or mitigate the impact of the hazard. Consider using some of the hierarchy of control methods – Engineering Controls, Administrative Controls, and lastly PPE (write down specific type of equipment). Eliminate or mitigate the hazards by writing down all the possible controls for each of the hazards identified in each of the tasks. There may be several controls that can be used for each hazard.

Note: A standard operating procedure (SOP) may be required if an engineering control or administrative control is used to eliminate or mitigate the hazard in a JHA.

27.3.3.4 The contractor shall review the JHA with employees performing the work.

27.3.3.5 Any developed JHAs shall always be posted on jobsite bulletin board available to employees for reference during work (see section 27.2.6).

27.3.4 Confined Space Entry Plan

27.3.4.1 The general contractor shall submit a Site-Specific Confined Space Entry Plan along with their training documentation as per section 27.3.1. The subcontractor submittals are to follow the sections mentioned above. The site-specific plan shall include but not limited to:

a. Identify permit space(s) and site plan showing the location.

b. Pre-entry hazard assessment.

c. Eliminate or control the hazards and maintain safe entry conditions for the duration of entry.

d. Establish entry procedures and prepare an entry permit

e. Training records for employees performing the entry supervisor, attendant, and entrants on the entry operations and their responsibilities.

f. Emergency Procedures.

g. Other information depending on type of work or approach.

27.3.4.2 See section 27.2.19 of this chapter: Confined Space Entry

27.3.5 Excavation Permit

27.3.5.1 The contractor shall obtain an excavation permit from NASA Ames Engineering Branch (Code JCM) at 650-604-0079 and submit the completed permit to Code JCM for review and approval. Post the permit after approval at jobsite prior to performing excavation of six (6) inches or deeper.

Note: An excavation permit is not a safety submittal, it is a separate requirement from a site-specific excavation safety plan.

27.3.6 Excavation Plan

27.3.6.1 The general contractor shall submit a Site-Specific excavation plan along with their training documentation as per section 27.3.1. The subcontractor submittals are to follow the sections mentioned above. The site-specific plan shall include but not limited to:

a. Name of the competent person who will assess, inspect, and conduct daily safety inspections for excavation equal to or less than 5 feet or up to 15 feet of depth.

b. Indicate if the excavation is made entirely in stable rock or is less than 5 feet (1.52m) in depth and a competent person has examined the ground and found no indication of a potential cave-in.

c. Include the design of the sloping and/or benching in accordance with the tabulated data, such as tables and charts, approved by a registered professional engineer. The tabulated data should include the following:

    (1) Identification of the parameters that affect the selection of a sloping or benching system drawn from such data.

(2) Identification of the limits of use of the data, to include the magnitude and configuration of the slopes determined to be safe.

(3) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

d. A plan indicating the sizes, types, and configuration of the materials to be used in the protective system and which identifies the registered professional engineer who approved it.

e. Include scope of work, start and end date, exact location of the excavation, name and contact information of the competent person, excavation details (depth, soil type, adjacent structures such as roadways, etc.), cave-in protection to be provided, access, egress, air sampling, platforms, ramps, information on underground construction other than trenching, means to control water accumulation in the excavation, means to protect pedestrians and vehicular traffic from excavations.

f. Address, if an excavation greater than 20 feet (6.09m) in depth, a support system, shield system, and any other protective systems approved by a registered professional engineer.

27.3.6.2 See section 27.2.18 of this chapter: Excavations

27.3.7 **Fall Protection Plan**

27.3.7.1 The general contractor shall submit a Site-Specific fall protection plan along with their training documentation as per section 27.3.1. The subcontractor submittals are to follow the sections mentioned above. The site-specific plan shall include but not limited to:

a. Describe the scope of work and how it will be completed.

b. Assessment of the potential fall hazards at the jobsite.

c. Describe the fall protection methods and equipment being used.

d. Describe the assembly, maintenance, inspection, and disassembly procedures for equipment being used.

e. Address the handling, storing, and securing of tools and materials.

f. Address any potential falling hazard from an overhead walking-working surface.

g. Include a rescue plan to retrieve a fallen or suspended worker.

h. Ensure worker(s) are trained and how the instruction was completed.

i. Fall protection training records.

27.3.7.2 See section 27.2.28 of this chapter: Fall Protection

Note: A site specific fall protection plan will become a part of the contractor's overall SSSP, which addresses the contractor's approach to implementing the requirement of this chapter. The fall protection plan is a written plan prepared by a competent person, developed specifically for the jobsite where work at heights is performed.

27.3.8 **Radioactive Materials Use**

27.3.8.1 Submit radioactive material license per section 27.3.1 to Radiation Safety Officer (RSO) staff 650-604-4548 or 650-604-4825 (Occupational Safety, Health, and Medical Services Division, N237 room 106) for all use of radioactive materials and equipment at ARC.

27.3.8.2 ARC Tenant is to submit radioactive material license per section 27.3.1 to Radiation Safety Officer (RSO) Civil Servant Program Manger located at N237 room 108, phone 650-604-3979 for all use of radioactive material and equipment at ARC and/or Moffett Field.

a. If the radioactive material license is issued by the state of California or any other state, the license submittal shall be accompanied by an approved NRC Form 241 (download at https://www.nrc.gov/reading-rm/doc-collections/forms/nrc241info.html). Note that the NRC requires a minimum of three (3) days to process and approve the NRC Form 241.

b. Provide the RSO with a copy of the company's radiation safety manual as per section 27.3.1 at least ten (10) business days prior to the date that radioactive material is proposed to be brought on site.

c. Submit copies of all required certifications to perform work with radioactive material and ionizing radiation sources (e.g., IRRSP certification for radiographers) as per section 27.3.1 at least ten (10) business days prior to the date that radioactive material is proposed to be brought on site.

d. For performing Industrial Radiography, submit a completed "Notification of Radiography" form and "Notice of Radiation Testing" form to the RSO staff as per section 27.3.1 at least ten (10) business days prior to the proposed dates of radiography. Contact the RSO staff to receive copies of these forms.

e. See section 27.2.20 of this chapter: Radiation and Laser Safety

27.3.9 Radiation Generating Device Use

27.3.9.1 Submit state registration per section 27.3.1 to the RSO staff 650-604-4548 or 650-604-4825 (Occupational Safety, Health, and Medical Services Division, N237 room 106) for all radiation generating devices to be used at ARC. Radiation generating devices are defined as devices that emit electronically produced ionizing radiation. Examples of radiation generating devices subject to this include but are not limited to x-ray fluorescence, x-ray diffraction, and radiographic devices.

a. Provide a copy of the company's safe operating procedures for radiation generating device use to the appropriate point of contact as per section 27.3.1 and RSO staff 650-604-4548 or 650-604-4825 (Occupational Safety, Health, and Medical Services Division, N237 room 106). Submit application for review and approval as per section 27.3.1 at least ten (10) business days prior to the date that radiation generating devices are proposed to be brought on site.

b. See section 27.2.20 of this chapter: Radiation and Laser Safety

27.3.10 Laser Use

27.3.10.1 Submit safe operating procedures for use of any Class 3B and Class 4 lasers to the appropriate point of contact as per section 27.3.1 and Laser Safety Officer (LSO) staff 650-604-4548 or 650-604-4825 (Occupational Safety, Health and Medical Services Division, N237 room 106). Submit application for review and approval as per section 27.3.1 at least ten (10) business days prior to intended laser operations for indoor laser use and forty-five (45) days prior to laser operations for outdoor use.

c. For outdoor use of all classes of visible (400nm-700nm) lasers (Class: 1, 1M, 2, 2M, 3R, 3B, and 4) and invisible lasers for Class 3B and 4: submit a FAA form 7140-1 "Notice of Proposed Outdoor Laser Operations" (download at https://www.faa.gov/forms/index.cfm/go/document.information/documentID/186172) to the appropriate point of contact as per section 27.3.1, LSO, and Airfield Manager. A response from the FAA can take up to forty-five (45) days.

d. See section 27.2.20 of this chapter: Radiation and Laser Safety

27.3.11 **Radiofrequency (RF) / Microwave Use**

27.3.11.1 Submit safe operating procedures for use of high-power RF/Microwave transmitting devices (does not include universal low intensity devices such as cell phones, Wi-Fi devices, walkie-talkies, and utility location devices when used as designed by the manufacturer) to the Nonionizing-RSO staff 650-604-4548 or 650-604-4825 (Occupational Safety, Health and Medical Services Division, N237 room 106). Submit these forms for review and approval as per section 27.3.1 and at least ten (10) business days prior to use.

27.3.11.2 See section 27.2.20 of this chapter: Radiation and Laser Safety – Radiofrequency and Microwave use.

27.3.12 Crane Operation

27.3.12.1 The general contractor shall submit a Site-Specific lift Plan along with their training documentation as per section 27.3.1 to the Lifting Device Equipment Manager (LDEM) for review (See note below). The subcontractor (crane company) submittals are to follow the sections mentioned above. The site-specific lift plan shall include but not limited to:

Exception: Tenants projects where a crane is operated on the tenant leased property, lift plans are to be incompliance with section 27.2.24 of this chapter and reviewed and approved by the general contractor.

a. Detail of the lift plan (i.e. a list of items to be lifted/moved, including a description of each item's weight, dimensions, center of gravity, and presence of hazardous materials.)

b. Lifting equipment and rigging (ie. the type, size, model, lifting capacity, certification date and serial number of the crane to be used)

c. Lifting crew and qualification (including their roles and competencies)

d. Lifting method (applicable rigging to be used as well as precautions and safety measures)

e. Means of communications

f. Physical or environmental conditions (if any)

g. Sketch of the lifting zone (i.e. showing lifting points, methods of attachment, sling angles, load vectors, boom and swing angles, crane orientations, related capacities, and other factors affecting the equipment and lifting operation)

h. Crane certification and certificate of insurance

i. Certification of rigging hardware

Note: A pre-lift meeting to review the plan should be held before the actual lift and be attended by the crane operator, rigger(s), competent person, and others as required. Notify the LDEM in advance of all planned meetings to ensure LDEM is available and present.

27.3.12.2 The lifting crew (e.g., Crane operator, riggers, and signal person) must meet the criteria of the National Commission for the Certification of Crane Operators (NCCCO) for certification and qualification status as per 29 CFR 1926, Subpart CC.

27.3.12.3 See section 27.2.24 of this chapter: Lifting Devices and Material Handling Equipment

27.3.13 Electrical Safety

27.3.13.1 Electrical work requires a safety submittal that is site-specific base on the scope of work. See section 27.3.1.

27.3.13.2 The safety submittal shall consist of but not limited to:

a. Shock and arc flash / arc blast hazard analysis

b. Appropriate safety controls

c. Hazard mitigations

d. Personal protective clothing and equipment

e. The electrical contractor C-10 Electrical License.

f. Qualified Electrical Workers will have the following as a minimum:

(1) Active State Electrician Certification for type of work to be conducted.

i. Apprenticeship certification is authorized when under the supervision of a state certified electrician at two journeymen to one apprentice ratio.

27.3.13.3 See section 27.2.22 of this chapter: Electrical and Lockout/Tagout (LOTO).

27.3.14 Lockout/Tagout (LOTO)

27.3.14.1 LOTO Plan shall be submitted to as per section 27.3.1 and forwarded to the Electrical Safety and LOTO Program Manager of the Occupational Safety, Health, and Medical Services Division to ensure the proper sequence of de-energization is applied to all equipment, machines, or system components to ensure they remain inoperable until all work is complete. The plan shall include but not limited to:

(1) Preparer (i.e. name of preparer, name of reviewer, etc.)

(2) Implementation (i.e. name of person(s) implementing and person verifying)

(3) Notification (i.e. method of notification to those who need to know of the LOTO taking place)

(4) Equipment to be shutdown (i.e. identify all parts of any system that needs to be shutdown)

(5) Isolation (i.e. sequential operations needed to secure energy sources including LOTO)

(6) Stored energy check (e.g. identify all energy storing equipment and method to dissipate or block stored energy)

(7) Zero energy verification (e.g. identify method of zero energy verification and with which tools)

27.3.14.2 The electrical lockout procedures shall include the items above and the following:

a. Name of person in charge of the LOTO plan

b. Step-by-step procedures for LOTO with locations for the creator and reviewer to initial during LOTO including locations where absence of voltage will be conducted and verification of dissipation for all stored energy.

c. Locations of grounds and locks included on one-line

d. PPE to be worn during the LOTO

e. Picture of the arc flash label of the highest incident energy equipment being de-energized (if any equipment has over 40 cal/cm^2 ratings, provide pictures of each location and mitigations planned.)

f. Signature blocks for the following people:

(1) Creator of the LOTO plan

(2) Reviewer of the LOTO plan

(3) Participants of the LOTO plan

(4) SSHO or delegated competent person in electrical safety handling the LOTO process review

g. Signators shall validate the following:

(1) Creator of the LOTO plan: Creator states there are no known errors with the plan

(2) Reviewer of the LOTO plan: Reviewer has reviewed the LOTO plan and has validated there are no known errors in the plan

(3) Participants of the LOTO plan: Participants have reviewed, understands, and are able to safely perform the LOTO

Note: If any participants who have signed the plan and are not implementing the LOTO (e.g., scheduling conflict), the new participant of the plan is to sign the document once they have reviewed, understood, and are able to safely perform the LOTO prior to implementing the LOTO.

(4) SSHO or delegated competent person from the electrical subcontractor is to confirm the plan has identified all electrical hazards and corresponding mitigation methods are in place. They will enforce the plan as written and stop work if there is a differing site condition related to the LOTO to re-evaluate the plan for adjustment.

27.3.14.3 See section 27.2.22 of this chapter: Electrical and Lockout/Tagout (LOTO).

27.3.15 Temporary Traffic Disruption

27.3.15.1 Contractor shall submit a Temporary Traffic Control (TTC) plan prior to any construction activities that disrupt traffic as per section 27.3.1. Plan at a minimum shall include but not limited to:

(1) Erect and maintain temporary barricades to limit public access to the hazardous area (see section 27.2.9).

(2) Pavement work such as roads, parking areas or sidewalks will be barricaded to safety guard pedestrian and vehicular traffic.

(3) Provide sufficient visual warning of the hazard during both day and night, by placing barricades clearly visible with adequate illumining system.

(4) TTC will be conducted in accordance with California Manual on Uniform Traffic Control Devices (CAMUTCD).

(5) TTC plans should be prepared by a knowledgeable person who is trained to CAMUTCD requirements on fundamental principles of TTC and work activities to be performed.

(6) The TTC design, selection, and placement of the TTC devices should be based on engineering judgment, which includes the four zones: the advance warning area, the transition area, the activity area, and the termination area. The degree of detail in the TTC plan will depend entirely on the nature and complexity of the situation.

(7) If traffic on the affected road is not visible from one end to the other, then include flagging procedures as described in Part 6, Section 6C.13 of the CAMUTCD, or traffic control signals should be used to control opposing traffic flow.

(8) Maintain training documents for personnel actively participating on the jobsite.

(9) Ensure flaggers training is included and meet the safe traffic control practices and public safety contact Technics as outline in Part 6, Section 6E.01 of the CAMUTCD.

27.3.16 Demolition Safety Plan

27.3.16.1 The contractor shall develop and submit a site-specific demolition safety plan as per section 27.3.1 outlining all potential concerns such as, but not limited to:

a. Permit(s)
b. Hazards and controls of the project site.
c. Abatement methods of hazardous materials
d. Salvage items
e. Utilities disconnections
f. Disposal of regular and contaminated debris
g. And means of protection to workers and/or adjacent property when multiple levels are involved

Note: General contractor should coordinate with their subcontractor on developing a demolition safety plan when they have been hired to primarily perform demolition. Any other type of small or minor demolition should be included in a SSSP or if applicable a JHA.

27.3.16.2 See section 27.2.17 of this chapter: Demolition.

APPENDIX A. DEFINITIONS

Authorized Person	A person approved or assigned by the employer to perform a specific type of duty or duties to be at a specific location or locations at the job-site.
Site-Specific Safety Plan (SSSP)	A comprehensive plan prepared for a specific construction site that outlines the scope of work on a project, identifies risks, and details company policies and safety practices to follow.
Competent Person	One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. [29 CFR 1926.32(f)]
Competent Person for Fall Protection	Employee trained and certified in fall protection and who can identify hazards, has the authority to take corrective actions, is knowledgeable of applicable regulations, standards, equipment, and systems, and understands the mandatory requirements for fall protection equipment and systems.
Competent Person for Scaffold	Employee trained and certified in scaffolding and who can identify hazards, has the authority to take corrective actions, is knowledgeable of applicable regulations, standards, equipment, and systems, and understands the mandatory requirements for scaffolding.
Construction Contractor (Contractor)	A business entity (i.e., person, corporation, partnership, joint venture, etc.) which has satisfied the contracting officer that they qualify as one of the following: They own, operate, or maintain a place of business regularly engaged in the construction, alteration, or repair of buildings, structures, communication facilities, or other engineering projects, including furnishing and installing of the necessary equipment; or If currently entering into a construction activity, they have made all necessary prior arrangements for personnel, construction equipment, and required licenses to perform construction work.
Construction Work	Construction work, as defined by OSHA 29 CFR 1910.12(b) is any construction, alteration, and/or repair, including painting and decorating of a structure. In order for work to be construction work, the employer need not itself be a construction company. Further, construction work is not limited to new construction; it may include the repair of existing facilities. The replacement of structures and their components is also considered construction work (See OSHA Standard Interpretation 2003-11-18 - Construction vs. Maintenance).

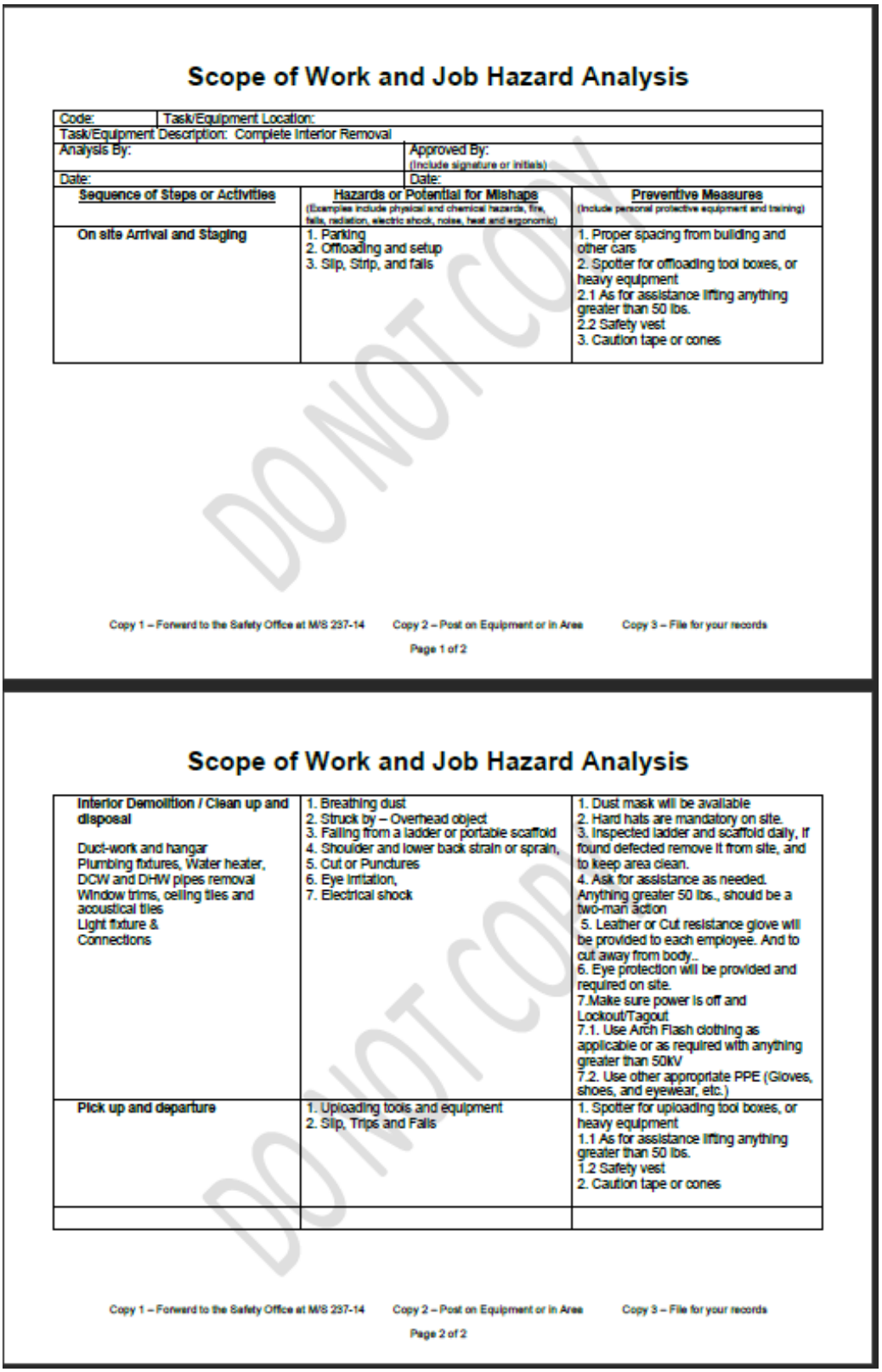
Construction, Alteration and Repair Work	Construction, alteration or repair means all types of work done by laborers and mechanics employed by the construction contractor or construction subcontractor on a particular building or work at the site thereof, including without limitation.
Contracting Officer (CO)	A person who, by appointment in accordance with procedures prescribed by the Federal Acquisition Regulations and NASA FAR Supplement, is currently a warranted Contracting Officer with the authority to enter into contracts, administer contracts, and make determinations and findings with respect thereto or with any part of such authority.
Contracting Officer's Representative (COR)	A person exercising authority and responsibility that has been specifically delegated by the CO. This individual represents the CO in the daily surveillance of the contractor and provides overall technical management of the contract. The COR's authority is limited to those items that have been specifically delegated by the CO.
Experience Modification Rate (EMR)	Factors based on claims paid for Workers Compensation Insurance for the state.
Job Hazard Analysis (JHA)	Defines the activities being performed and identifies the work sequences, the specific anticipated hazards, site conditions, equipment, materials and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.
Qualified Person	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.
Qualified Person for Fall Protection	A person in possession of a recognized engineering degree and a formal training certificate from an industry recognized trainer, training center, or an equivalent OSHA training program, who has successfully demonstrated their extensive knowledge and experience to perform structural engineering for design, evaluation, and approval of fall protection systems.
Site Safety and Health Officer (SSHO)	A Qualified and Competent person to monitor safety on the jobsite as per the requirements stipulated by this chapter and is appointed by the contractor.
Subcontractor	A person who agrees to perform any part of the labor or material requirements of a contract for construction, alteration, or repair.
Unsafe Condition	A hazardous condition that poses or has the potential to pose a risk to the health and safety of personnel or the public, and/or damaging to equipment, machinery, or the environment.

APPENDIX B. ACRONYMS

ANSI	American National Standards Institute
APR	Ames Procedural Requirement
ARC	Ames Research Center
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASSE	American Society of Mechanical Engineers
ASSP	American Society of Safety Professionals
ASTM	ASTM International, American Society for Testing and Materials
CAC	Certified Asbestos Consultant
cal/cm^2	Calories per Square Centimeter
CAMUTCD	California Manual on Uniform Traffic Control Devices
CDPH	California Department of Public Health
CFR	Code of Federal Regulations
CO	Contracting Officer
CO_2	Carbon Dioxide
COR	Contracting Officer's Representative
DOT	Department of Transportation
DSO	Development Support Office
EMR	Experience Modification Rate
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulations
FPS	Fire Prevention Service
FSM	Facility Service Manager
GFCI	Ground-Fault Circuit Interrupter
IEEE	Institute of Electrical and Electronics Engineers
ISEA	International Safety Equipment Association
JHA	Job Hazard Analysis
kV	Kilovolt
LDEM	Lifting Device Equipment Manager
LOTO	Lock Out Tag Out
LSO	Laser Safety Officer

mph	Miles Per Hour
NASA	National Aeronautics and Space Administration
NCCCO	National Commission for the Certification of Crane Operators
NEC	National Electric Code
NFPA	National Fire Protection Association
NMIS	NASA Mishap Information System
NPR	NASA Procedural Requirement
NRC	Nuclear Regulatory Commission
OEM	Original Equipment Manufacturer
OSHA	Occupational Safety and Health Administration
PACM	Potential Asbestos Containing Material
PE	Professional Engineer
PIT	Powered Industrial Truck
POC	Point of Contact
PPE	Personal Protective Equipment
RF	Radiofrequency
RSO	Radiation Safety Officer
SDS	Safety Data Sheet
SOP	Standard Operating Procedure
SRL	Self-Retracting Lifeline
SSHO	Site Safety and Health Officer
SSSP	Site Specific Safety Plan
TTC	Temporary Traffic Control
USDOL	United States Department of Labor
WLL	Working Load Limit

APPENDIX C. JOB HAZARD ANALYSIS (JHA) WORKSHEET EXAMPLE



Scope of Work and Job Hazard Analysis

Code:	Task/Equipment Location:	
Task/Equipment Description: Complete Interior Removal		
Analysis By:	Approved By: (Include signature or initials)	
Date:	Date:	
Sequence of Steps or Activities	**Hazards or Potential for Mishaps** (Examples include physical and chemical hazards, fire, falls, radiation, electric shock, noise, heat and ergonomic)	**Preventive Measures** (Include personal protective equipment and training)
On site Arrival and Staging	1. Parking 2. Offloading and setup 3. Slip, Strip, and falls	1. Proper spacing from building and other cars 2. Spotter for offloading tool boxes, or heavy equipment 2.1 As for assistance lifting anything greater than 50 lbs. 2.2 Safety vest 3. Caution tape or cones

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Scope of Work and Job Hazard Analysis

Interior Demolition / Clean up and disposal Duct-work and hangar Plumbing fixtures, Water heater, DCW and DHW pipes removal Window trims, ceiling tiles and acoustical tiles Light fixture & Connections	1. Breathing dust 2. Struck by – Overhead object 3. Falling from a ladder or portable scaffold 4. Shoulder and lower back strain or sprain, 5. Cut or Punctures 6. Eye irritation, 7. Electrical shock	1. Dust mask will be available 2. Hard hats are mandatory on site. 3. Inspected ladder and scaffold daily, if found defected remove it from site, and to keep area clean. 4. Ask for assistance as needed. Anything greater 50 lbs., should be a two-man action 5. Leather or Cut resistance glove will be provided to each employee. And to cut away from body.. 6. Eye protection will be provided and required on site. 7.Make sure power is off and Lockout/Tagout 7.1. Use Arch Flash clothing as applicable or as required with anything greater than 50kV 7.2. Use other appropriate PPE (Gloves, shoes, and eyewear, etc.)
Pick up and departure	1. Uploading tools and equipment 2. Slip, Trips and Falls	1. Spotter for uploading tool boxes, or heavy equipment 1.1 As for assistance lifting anything greater than 50 lbs. 1.2 Safety vest 2. Caution tape or cones

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