

Barricades and Signs



Preparer:

*Brian Garrett*

11/12/18

Brian Garrett  
UPF ES&H Field Safety Lead

Date

Approval:

*Jamie M Horning*

11/12/18

Jamie Horning  
UPF BNI ES&H Manager

Date

*Gary F. Hagan*

11/12/18

Gary F. Hagan  
UPF ES&H Manager

Date

*Dave Ross*

11/19/18

Dave Ross  
UPF Construction Manager

Date

*John P. Howanitz*

11/21/18

John P. Howanitz  
Senior Vice President and UPF Project Director

Date

11/27/18

Effective Date

RC-UPF DMC

11/27/18 06:17

This document has been reviewed by a Y-12 DC / UCNI-RO and has been determined to be UNCLASSIFIED and contains no UCNI. This review does not constitute clearance for Public Release.

Name: *Neal Murray* Date: 11/21/18

<i>Barricades and Signs</i>
-----------------------------

## REVISION LOG

Revision	Description	Intent	Non Intent
6	This revision added clarity between barriers and barricades, changed safety acronyms to align with other safety procedures, provided additional examples for differing levels of hazards and combined sections where redundancy was present and added some additional interfacing references.	X	
5	This revision is a complete rewrite, therefore no revision bars are shown. This revision further describes the application of tags, signs, rope, tape, and barricades for warning, restricting, and/or controlling entry into areas that contain safety hazards, abnormal conditions, or where unusual operations are being performed.	X	
Previous revisions	On record	N/A	

## CONTENTS

<b>1.0 INTRODUCTION .....</b>	<b>4</b>
1.1 Purpose .....	4
1.2 Scope .....	4
<b>2.0 RESPONSIBILITIES .....</b>	<b>4</b>
2.1 Construction Manager.....	4
2.2 Environment, Safety, & Health Manager .....	4
2.3 Environment, Safety, & Health Representative .....	4
2.4 Discipline Superintendent .....	4
2.5 Supervisor .....	4
<b>3.0 PROCESS.....</b>	<b>5</b>
3.1 Tags and Signs.....	5
3.2 Signs and Barricade Information.....	7
3.3 Barricade Requirements .....	7
3.4 Warning Line System.....	10
3.5 Roadway Barrier Requirements.....	11
3.6 Excavation Barricades .....	11
<b>4.0 RECORDS .....</b>	<b>11</b>
<b>5.0 REFERENCES.....</b>	<b>11</b>
5.1 Source References .....	11
5.2 Interfacing References.....	11
<b>6.0 SUPPLEMENTAL INFORMATION .....</b>	<b>11</b>
<b>APPENDIX A Acronyms and Definitions.....</b>	<b>13</b>
<b>APPENDIX A Acronyms and Definitions.....</b>	<b>14</b>
<b>APPENDIX B Barricade and Sign Flow Chart.....</b>	<b>15</b>
<b>APPENDIX C Letter Heights Based on Viewing Distance.....</b>	<b>16</b>

## 1.0 INTRODUCTION

### 1.1 Purpose

This procedure describes the application of tags, signs, rope, tape, barriers, and barricades for warning, restricting, and/or controlling entry into areas that contain safety hazards, abnormal conditions, or where unusual operations are being performed.

### 1.2 Scope

This procedure applies equally to office, workshop, construction site, or roadways used by Uranium Processing Facility (UPF) construction site personnel, including subcontractors, during the course of the Project.

## 2.0 RESPONSIBILITIES

### 2.1 Construction Manager

The Construction Manager (CM) has the overall responsibility for ensuring the implementation of this procedure by all UPF construction site personnel.

### 2.2 Environment, Safety, & Health Manager

The Environment, Safety, & Health Manager (ESH-M) has the overall authority for interpretation of the regulations associated with the procedure and the interpretation of the procedure as to intent and application.

### 2.3 Environment, Safety, & Health Representative

The Environment, Safety, & Health Representative (ESH-R) will review compliance with the procedure through periodic field inspections and assist the supervisor and workers to determine the appropriate barrier protection for the recognized hazards.

### 2.4 Discipline Superintendent

The Discipline Superintendent (DS) is responsible for being thoroughly familiar with this procedure and their individual responsibilities regarding compliance with and implementation of this procedure, pre-planning work activities to identify the appropriate barricade to use, authorizing the use of danger barricades, overseeing the installation and removal of danger barricades and communicating the identified hazards to supervisors and/or work crews.

**NOTE:** *Discipline Superintendents may delegate authority to authorize the use of danger barricades to designee supervision (general foremen/foremen); however, the delegation of such authority does NOT relieve the DS of the responsibility to ensure that danger barricades are used in accordance with the provisions of this procedure.*

### 2.5 Supervisor

The Supervisor is responsible for identifying activities or conditions that may create a barricade requirement, directing the installation and removal of barricades, signs/tags and ensuring that the identified control measures are in place and maintained until the completion of the job task.

## 3.0 PROCESS

### 3.1 Tags and Signs

#### 3.1.1 Tag and Sign Types

Tags and signs can be used independent of barricades, but barricades shall utilize tags and signs to provide specific warnings and/or other essential information about the hazard(s) that exist beyond the barricade. Barriers do not require tags or signs.

Several different types of tags and signs are available and include Danger, Caution, Warning, Notice, Information Only, and Restricted Access. Each of these signs can have either pre-printed or hand written hazard identification. Tags and signs utilized on UPF construction sites include, but are not limited to, the following:

- **Danger** - Shall be used **only** where an immediate hazard exists. Examples include High Voltage, Hexavalent Chromium, Permit Required Confined Space, Noise Conditions >100dBA (Double Hearing Protection), Abrasive Blasting, Crane Counterweight Swing Radius, Pneumatic Pressure Testing, Overhead work at any height where dropped tools/materials pose a danger hazard, and Respiratory Protection Required.



- **Warning** - Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury, possibly death. Examples include Warning Line System and road work where personnel may be present.



- **Caution** - Shall be used only to warn against potential hazards or to caution against unsafe practices. Examples include Noise Conditions > 85dBA and <100 dBA (Single Hearing Protection), Non-Permit Confined Space, Low Clearance Areas, and Wet/Slippery Surfaces.



- **Restricted Access** - Used for safety of personnel or protection of property. Examples include Wet Paint, Do Not Enter, Limited Approach Boundary, and Authorized Personnel Only.



- **Radiological** – Used ONLY where radiological hazards are or may be present. Examples include: Radiography Area and Radiation Area.



- **Notice/Information** - Provides safety information. Examples include Construction Zones, Personal Protective Equipment (PPE) free zones, No Dark Lenses Beyond this Point, Designated Smoking Areas, and Laydown areas.



Additional Signs/Specifications include the following:

- **Directional Signs** – Shall be white with a black panel and a white directional symbol. Any additional wording on the signs shall be black letters on the white background.
- **Exit Signs** – When required, shall be lettered in legible red letters, not less than six (6) inches high, on a white field, and the principal stroke of the letters shall be at least three-fourths (3/4) of an inch in width.
- **Traffic and Road Signs** – Provide information to operators of motor vehicles including, but not limited to Speed Limit, Pedestrian Crossing, Stop, Curve, One Way, Two Way, Work Crew Ahead, Flagmen Ahead, and Do Not Enter. DOT signage required on public roads.
- **Fire Signs** – Provide information on fire extinguisher locations.
- **Prohibition Signs** – Provide information on prohibited actions such as no smoking and no parking.
- **Emergency Signs** – Provide information on emergency equipment such as eyewash/shower stations, automated external defibrillators (AED), and emergency stokes baskets.

### 3.1.2 Tag and Sign Requirements

When installing tags or signs, ensure that tags/signs are printed on a material suitable for the environment (e.g., metal or plastic); laminated signage is prohibited for field use. Ensure that the following information is provided on all signs:

- Description of the hazard(s).
- Instructions for reader as applicable.

#### 3.1.2.1 Temporary Construction Signs and Tags

Temporary signs or tags are used where a hazard is created from construction activities or the use of mobile equipment for a specific hazard which may extend beyond a single shift. Examples of activities that would require temporary signs/tags include the following:

- Open Excavations
- Roof Work
- Overhead hazards

- Welding operations
- Use of electric or pneumatic powered hand tools
- Operation of mobile equipment.

In addition to the information just listed, include the following:

- Contact name (position or name)
- Contact information (phone number or radio channel)

### **3.2 Signs and Barricade Information**

#### **3.2.1 Signage Implementing a Controlled Distance**

Signs identifying hazards may be affixed to mobile equipment and machinery independent of barricading. Signs may establish specific distances where controls are utilized. If the hazard has a distance associated with a machine or piece of equipment, then the boundary distance is to be included on the sign. The sign must be legible at the distance where the controls are to be implemented, and with the hazard and boundary clearly identified. Use **Appendix D** to determine the approximate size of the lettering needed for the distance application. Examples of these include the following:

- Vacuum truck
- Concrete placing boom truck
- Soil compaction equipment
- Excavation machinery (loader, track hoe, etc.).

**3.2.2** Many construction activities involve working in locations for short durations of a few hours to a couple of weeks. Soft barricades and tags, for both cautionary or danger conditions, are used to protect worker from distractions and outside intrusion, and also protect pedestrians from hazards that result from the work activities. Examples of these situations include the following:

- Work from ladders
- Use of power tools (e.g., grinding and cutting)
- Welding
- Excavating work
- Crane swing areas.

Supervision, with the assistance from an ESH-R as requested, determines temporary worksite barricade and tagging requirements.

Tag information is to meet the requirements presented in **Section 3.1.2**.

### **3.3 Barricade Requirements**

#### **3.3.1 General Barricade Requirements**

- Barricades are to be established prior to creating hazards.
- During the planning process, the responsible supervisor evaluates work activities and conditions to identify any caution or danger hazards. For any cautionary or dangerous conditions or processes that are identified, include actions in the JHA for barricade placement, installation, and removal after task completion.
- Barricades must be complete.

<i>Barricades and Signs</i>
-----------------------------

- The work area shall be entirely isolated and identified.
- Permanent structures that prevent entry may be used as part of the barricade (e.g., Concrete walls, Concrete Vehicle Barriers, Orange Jersey Barriers, Fencing, or other similar hard barrier/barricades).
- The barricaded area will be of sufficient size to afford appropriate protection. If this condition cannot be met, then consideration must be given to keeping materials from falling or protruding outside of the barricaded area. A general rule for barricade erection is one (1) foot out for every two (2) feet up. If that is not possible, then the supervisor should be contacted for help.
- Tags and signs must be visible from every side. Best practice is to have a sign/tag at access/egress point.
- Establish entry/exit point(s) to the barricaded area to prevent personnel from stepping over, crawling under, or altering the barricade to gain access or egress.
- The use of Caution or Danger tape is prohibited as edge protection for fall hazards 6 feet or greater in height.
- Install barricades/signs to be visible and warn workers. **Appendix C** presents examples of letter heights based on viewing distance, respectively.
- Secure barricade boundary markers (tape, rope, chain, cable, etc.) to stanchions or fixed structural points.
- Workers using the barricade may leave the area unattended for breaks and lunch by following these steps:
  - If hazards for which the barricade was erected do not exist while workers are away, then reconfigure the barricade to allow passage. Avoid laying barricades and signage onto floors or other walking surfaces, but rather relocate and store away from walkways.
  - If hazard(s) for which the barricade was erected continues to exist while workers are away, barricade remains intact.
- Separate construction barricades are not required when working within a permanent (hard) barricade; however, appropriate barricade signs or tags will be posted.
- If caution or danger soft barricades are expected to exist past the work crew's shift, then ensure the following:
  - The responsible supervisor evaluates the hazard level and determines whether the existing soft barricade is adequate or if a hard barricade is needed to protect personnel from the exposed hazard.
  - If a hard barricade is needed, then establish using wooden or metal guardrails. Attach or post signs or tag(s) to identify the hazard(s), responsible supervisor, method of contact, and other pertinent information.
  - On the next scheduled work shift, with the direction and approval of the responsible supervisor, remove the hard barricades and re-establish the temporary caution or danger barriers to allow work to resume.

**NOTE:** *If a hard barricade cannot be achieved and a soft barricade will remain beyond shift, the DS and ESH-R shall provide authorization to allow the use of the soft barricade. This activity shall be documented on the Safety Task Analysis Risk Reduction Talk (STARRT) card and one of the signs/tags on the barricade shall be signed, providing an expiration date not to exceed seven (7) calendar days. General foremen/foremen are not authorized to approve this activity.*



<i>Barricades and Signs</i>
-----------------------------

### 3.3.2 Caution Barricade Requirements

- Use Caution Barricades to ensure that workers are aware of physical hazards or changing conditions.
- Personnel can pass through a caution barricade only after they have recognized the hazard and determined that it is safe to proceed through the area. If personnel are unsure of safe passage contact responsible person listed on sign/tag and request permission to enter.

### 3.3.3 Danger Barricade Requirements

A Danger Barricade protects personnel from a condition or process that has the potential to cause serious injury or illness.

- Other than authorized workers, only ESH-Rs have unrestricted access to conduct observations/inspections of work activities after review of STARRT card and permission to enter granted. All other personnel not authorized or associated with the work are required to STAY OUT of the area.
- Responsible supervisor verifies the barricade and postings are made and documented on the STARRT card.
- If an individual who is not part of the work activity requires access into a danger barricaded area, the workers shall perform the following:
  - Pause the work activity and place the danger hazard in a safe configuration.
  - Remove a portion of the barricade to provide access and allow the individual (for example, an engineer performing an inspection) access to the area. If an aerial lift or scissor lift is required for the inspection, an overhead safety watch can be utilized as a standalone action without the need for additional barricading.
  - When the individual finishes the task and leaves, the work area is again established as danger-barricade area and work is resumed.

**NOTE:** *Danger barricades shall only be established for single work scope task(s). Multiple scopes of work shall not use the same barricaded boundary.*

### 3.3.4 Hard Barricade Fabrication Requirements

Guardrail systems are constructed using wood, metal or a combination of both. Wooden top and mid-rails must be made from two- by four-inch (2x4) boards; a toe plate must be used on all guardrails for floor holes/openings or wall openings (including platform level), and must be made from one- by four-inch (1x4) or two- by four-inch (2x4) board, or equivalent; and vertical support posts made from two- by four-inch (2x4) board or greater. Metal top and mid-rails must be made from 1½-inch nominal size or larger; a toe plate must be used on all guardrails for floor holes/openings or wall openings (including platform level) and made from one quarter-inch by four-inch (¼x4) flat metal plate, or equivalent; and vertical support posts must be made from one-and-a-half-inch (1½") nominal size or larger. Guardrail systems requirements are as follows:

- Top edge height of top rails, or equivalent guardrail system members, shall be 42 inches plus-or-minus three inches (+/-3") (i.e., 39 to 45 inches) above the walking/working level. When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria of this section.
- Mid-rails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches high.

<i>Barricades and Signs</i>
-----------------------------

- Mid-rails, when used, shall be installed at a height midway between the top edge of the guardrail system and the walking/working level.
- Screens and mesh, when used, shall extend from the top rail to the walking/working level and along the entire opening between top rail supports.

**NOTE:** *If screen or mesh (e.g. pearl weave) is used in lieu of a toe board, it must be approved and installed by a competent person.*

- Intermediate members (such as balusters), when used between posts, shall be not more than 19 inches apart.
- Other structural members (such as additional mid-rails and architectural panels) shall be installed such that there are no openings in the guardrail system that are more than 19 inches wide.
- Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds applied within two (2) inches of the top edge, in any outward or downward direction, at any point along the top edge.

### 3.4 Warning Line System

Fall protection/prevention hazards will be assessed and evaluated for each elevated work situation based upon the work to be performed. When establishing and using warning line systems, comply with the following provisions:

- Erect the warning line no closer than six (6) feet measured perpendicularly from the roof's edge.
- When erecting a warning line, do the following:
  - Use warning lines made of rope (cannot be red, yellow, or combined yellow and magenta in color), wire, or chain.
  - Affix highly visible flagging at no less than six (6) foot intervals along the warning line system and affix intermittent warning signs from all approach directions along the warning line system.
  - Use stanchions to support the warning line.
  - The warning line is supported such that its lowest point (including sag) is no less than 34 inches from the walking/working surface and highest point no more than 39 inches from the walking/working surface.
- With the warning line (rope, wire, or chain) attached, the stanchions are to resist (without tipping over) a force of at least 16 pounds applied horizontally against the stanchion, 30 inches above the walking/working surface, perpendicular to the warning line, and in the direction of the roof edge.
- The warning line rope, wire, or chain is to have a minimum tensile strength of 500 pounds, and, when attached to the stanchions, is to be capable of supporting, without breaking, the loads applied to the stanchions as prescribed in the previous step.
- Workers outside (beyond) the warning line system are required to utilize a fall protection system.
- After the fall hazard is eliminated, the worker responsible for eliminating the hazard is to remove the warning line system.

### 3.5 Roadway Barrier Requirements

- Barriers across or next to a roadway will be semi-permanent concrete vehicle barriers (CVB) or orange Jersey barriers, and will include roadway signs or equivalent to alert vehicle traffic when personnel are working in or adjacent to the roadway..
- Flashing amber lights or reflective strips will be required at semi-permanent barricades left after dark on roadways to alert vehicle traffic to their presence.
- Place orange Jersey barriers or CVB blocks adjacent to roadways to provide increased protection for vehicles or equipment when a vehicle roll-over hazard exists (e.g., ditches, embankments, excavations, etc.). These barriers may also be spread apart and interconnected with wire cable to provide a continuous barrier.

### 3.6 Excavation Barricades

- Install barricade at least six (6) feet from open edges of excavations, whenever possible.
- Excavation barricades across or next to site access ways with foot traffic only will be made of semi-permanent material and include signs or equivalent (i.e., temporary “orange” fencing).
- Excavation barricades across or next to a roadway with the potential for vehicle impacts will follow the controls in **Section 3.5**, “Roadway Barrier Requirements.”

## 4.0 RECORDS

None

## 5.0 REFERENCES

### 5.1 Source References

10 CFR 851, *Worker Safety and Health Program*

29 CFR 1926 Subpart G, *Signs, Signals, and Barricades*

29 CFR 1926 Subpart M, *Fall Protection*

ANSI Z525.2-2002, *Environmental and Facility Safety Signs*

Nuclear, Security & Environmental (NS&E) ES&H Manual 4SM-6BH-F0001, NS&E-214,  
*Barricades and Signs*

### 5.2 Interfacing References

Y17-95-64-822, *UPF Site Excavation and Backfill*

Y73-95-100, *UPF Dropped Object Prevention*

UPF-CP-212, *UPF Fall Prevention and Protection*

## 6.0 SUPPLEMENTAL INFORMATION

Appendix A, *Acronyms and Definitions*

*Barricades and Signs*

Appendix B, *Barricade and Sign Flowchart*

Appendix C, *Letter Heights Based on Viewing Distance*

## APPENDIX A Acronyms and Definitions

(Page 1 of 2)

### ACRONYMS:

<b>CM</b>	Construction Manager
<b>CVB</b>	Concrete Vehicle Barrier
<b>DS</b>	Discipline Superintendent
<b>ESH-M</b>	Environment, Safety, & Health Manager
<b>ESH-R</b>	Environment, Safety, & Health Representative
<b>OSHA</b>	Occupational Safety and Health
<b>STARRT</b>	Safety Task Analysis Risk Reduction Talk

### DEFINITIONS:

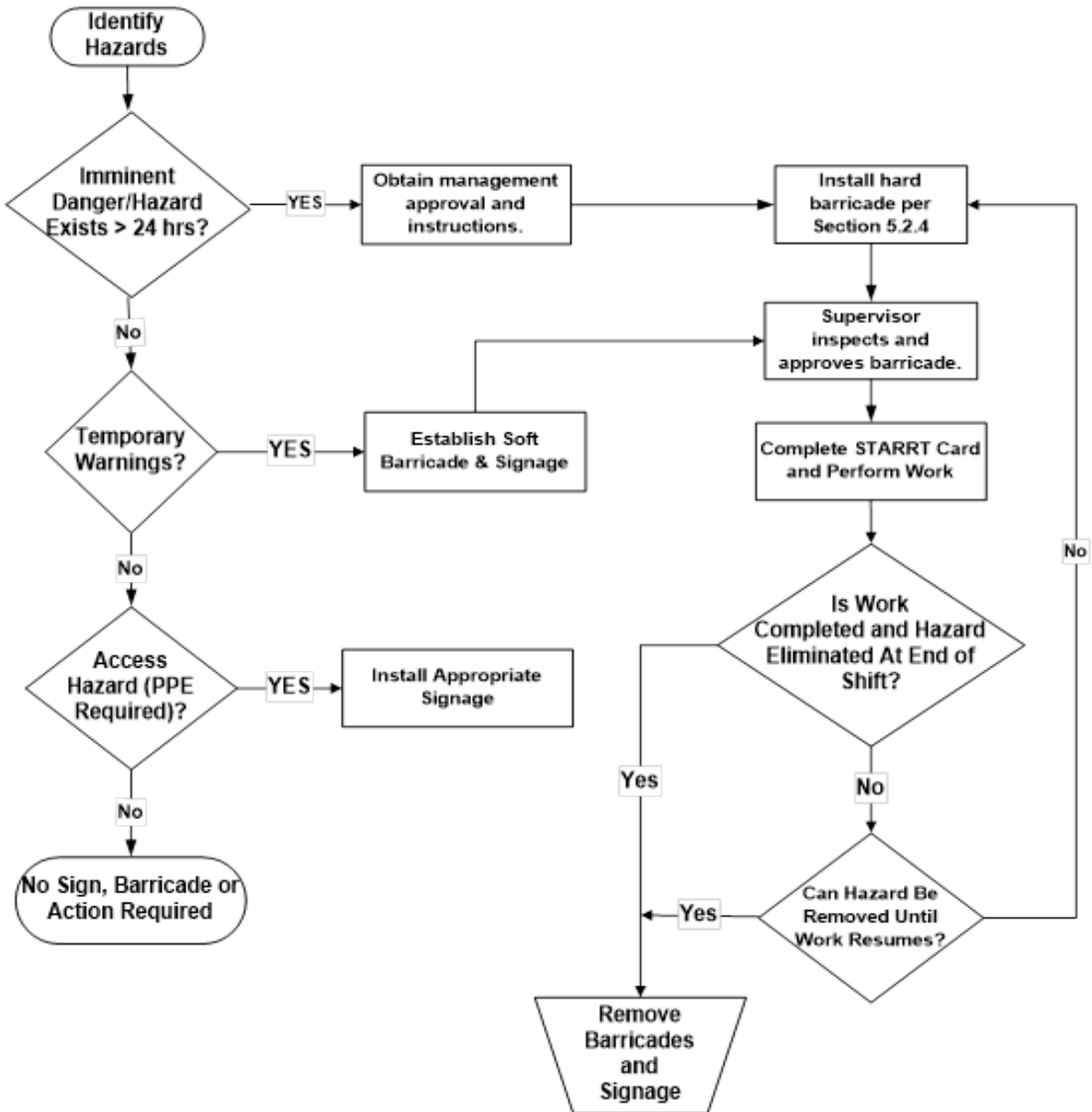
<b>Barricade</b>	A system designed to warn of a hazard and physically identify the hazard's parameters.
<b>Barrier</b>	A system designed to prevent/protect against the inadvertent interface between personnel and rollover hazards with vehicles/equipment including but not limited to concrete jersey barriers, water-filled plastic jersey barriers, and DOT median barriers.
<b>Cautionary Condition</b>	A condition or process that does not present an immediate hazard to life and/or health, but has the potential to cause injury/illness, either because of its operating configuration, or due to possible changes in surrounding conditions that would allow development of a hazardous environment. Cautionary conditions are posted by barricades of yellow and black tape/rope and/or signs/tags.
<b>Concrete Vehicle Barriers</b>	A hard barricade generally used adjacent to roadways to provide increased protection against vehicles or equipment.
<b>Danger Condition</b>	A condition or process that presents a high probability of causing serious injury, illness, death, significant property damage, and/or significant environmental impact. Imminent danger areas will be barricaded using the appropriate red and black tape or rope and signs/tags.
<b>Guardrail System</b>	A barrier with a top rail at 42 inches, +/-3 inches, and a mid-rail capable of withstanding 200 pounds of force applied.
<b>Hard Barricade</b>	A solid system made of metal or wood or concrete and used to protect against exposure to long-term hazards, restriction of access, and/or fall protection.
<b>Isolate</b>	To place barricading (soft or hard) around all sides of an area to restrict or control worker access.
<b>Low Slope Roof</b>	A roof having a slope less than or equal to 4 inches to 12 inches (vertical to horizontal).

## APPENDIX A Acronyms and Definitions

(Page 2 of 2)

<b>Signs</b>	A posting bearing information, advisory, or a warning of hazards, which is temporarily or permanently affixed or placed at locations where the hazards exist.
<b>Soft Barricade</b>	A system of tape, rope, chain, cable, or other flexible materials to identify, warn, restrict, or control worker access to an area where a hazard exists. Soft barricades shall be installed at a sufficient height with signs/tags posted on all approachable sides, to warn workers, typically between 36 and 60 inches above grade. Soft barricades shall not be used as edge protection.
<b>Tags</b>	Temporary postings, usually attached to a piece of equipment or part of a structure (e.g., scaffolding), to warn or inform workers of a condition or requirement. Tags are also used in conjunction with barricades to provide specific warnings and/or other essential information about the hazard(s) that exist beyond the barricade.
<b>Temporary Fencing</b>	Plastic or metal fencing supported by posts, used to establish a temporary control zone/area such as an excavation that is properly sloped or benched.
<b>Warning Line</b>	A boundary used for low slope roof work, established by rope, wire, or chain with visible flagging and supported by stanchions.
<b>Warning Line System</b>	A warning line erected on a low slope roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work (including other trades working on roof) may take place without the use of a guardrail, body harness, or safety net system to protect employees in the area.

### APPENDIX B Barricade and Sign Flow Chart



## APPENDIX C

### Letter Heights Based on Viewing Distance

(In accordance with ANSI Z535.2-2002)

#### Signal Word (DANGER, WARNING, CAUTION)

Signal Word Letter Height (Inches)	Viewing Distance (Feet)
4.00	50.00
3.00	37.50
2.50	31.25
2.00	25.00
1.50	18.75
1.00	12.50
0.75	9.375
0.50	6.25
0.25	3.125

Minimum letter height for the signal word (danger, caution, notice, etc.) shall be one unit of height for every 150 units of safe viewing distance.

#### Words Height for the Body of the Sign

Word in Body Letter Height (Inches)	Viewing Distance (Feet)
2.0	50.00
1.0	25.00
0.8 (default to 1" or Greater)	20.00
0.4 (default to 0.5" or Greater)	10.00
0.2 (default to 0.25" or Greater)	5.00

Minimum letter height for other words on the sign shall be one unit of height for every 300 units of safe viewing distance.