



STANDARD OPERATING PROCEDURE FALL PROTECTION EQUIPMENT ANCHORAGE

Kiewit Bridge and Marine		
Position	Name	Ownership Date
Superintendent	Henry Friedrichs	22-Mar-2024
Superintendent	Trae Brown	22-Mar-2024
Superintendent	Ryan Hambright	22-Mar-2024

Revision Summary Change		
Rev	Revision Date	Change Description
A	6-Jun-2024	Issued for Review
B	26-Jul-2024	Issued for Final KBM DSM Review
01	3-Oct-2024	Issued for Use



NOTE: Revision history will be an alpha revision Rev. A, B, etc., until “Issued for Use”. At that point it will be issued with a two-digit numeric revision Rev. 01, 02, etc.



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1.0 PURPOSE

This SOP serves as a document to outline requirements to build fall protection permits for tying off to equipment.

2.0 WORK SCOPE

This scope covers utilizing equipment as a fall protection anchorage point.

3.0 DEFINITIONS / ACRYMONS

TERMS / ACRYNOMS	DEFINITION	REFERENCE
Fall Protection System	Any of the following: fall prevention, fall restraint, fall arrest.	
Corporate Standard Definitions	Glossary	



4.0 ROLES AND RESPONSIBILITIES

POSITION	ROLE AND RESPONSIBILITY
DESIGNATED SIGNER	<ul style="list-style-type: none">• Must review and approve every fall protection permit on their project.• Designated by district leadership and assigned on the TSCD matrix.
DESIGNATED INSPECTOR	<ul style="list-style-type: none">• Responsible for initial inspection of fall protection systems to ensure correct installation.
PROJECT MANAGER	<ul style="list-style-type: none">• Oversee implementation of fall protection program.• Ensure employees are trained and understand the fall protection requirements.
GENERAL SUPERINTENDENT	<ul style="list-style-type: none">• Review, approve fall protection permits.• Ensure the fall protection hierarchy of controls is followed.• Ensure the fall protection permit is complete with all supporting documents attached.
SUPERINTENDENT	<ul style="list-style-type: none">• Develop the fall protection permit with the goal of eliminating fall risk by following the hierarchy of controls (eliminate, prevent, restrain, arrest, administrative).• Verify the craft have appropriate training, understand the plan/permit.• Verify the permit is being adhered to in the field.• Ensure all approvals are obtained.• Ensure the team is trained on the inspection process and it is being tracked.• Confirm rescue equipment is available.
FIELD ENGINEER	<ul style="list-style-type: none">• Participate in development of the fall protection permit.• Confirm fall distance vs fall clearance required.• Verify that the crew has the correct fall protection equipment.• Track and document all fall protection equipment and device inspections.• Verify the permit is being adhered to in the field.• Confirm rescue equipment is available.
FOREMAN	<ul style="list-style-type: none">• Participate in the development of the fall protection permit.• Verify the permit is being adhered to in the field.• Ensure all craft employees working on the permit are properly trained to utilize their fall protection equipment and devices.• Review fall protection permit with crew prior to task and confirm signed off.• Confirm rescue equipment is available.
CRAFT	<ul style="list-style-type: none">• Follow the fall protection permit being utilized in the field.• Only use fall protection equipment you have been trained to use.• Inspect all fall protection equipment and devices prior to every use.



5.0 PROCEDURE- EQUIPMENT ANCHORAGE

Set up equipment per manufacturers recommendations.

- 5.1 Verify maximum radius/boom angle to safely hold 5,000 lbs. for a single user tie off and 10,000 lbs. for a second user.
 - 5.1.1 Use only NEW rigging/shackles designated and marked "Fall Protection Use Only".
 - 5.1.2 Develop a fall protection permit incorporating the specific piece of equipment. The permit will use the manufacturer's load chart for the determined radius and loads.
- 5.2 Establish LOTO procedure for the equipment (Reference the attached graphic for more information on locking out/tagging out the equipment).
 - 5.2.1 Move equipment into position and execute the LOTO for the equipment.
- 5.3 Install fall protection system according to the permit.
 - 5.3.1 Execute inspection process of the installation.
- 5.4 Verify the crew understands the details of the fall protection permit.
- 5.5 Execute planned work.
- 5.6 Remove all fall protection from the fall protection equipment at the end of the operation.
- 5.7 Remove the LOTO and confirm the equipment is 100% operational.
- 5.8 Store all fall protection rigging in a secure location so the fall protection tie-off components will not be accessed for general lifting and rigging operations.



6.0 REFERENCES

See attached for reference:

- Equipment Tie-Off Procedure Graphic
- Handrail Removal – Forklift Tie-Off Fall Pro Permit

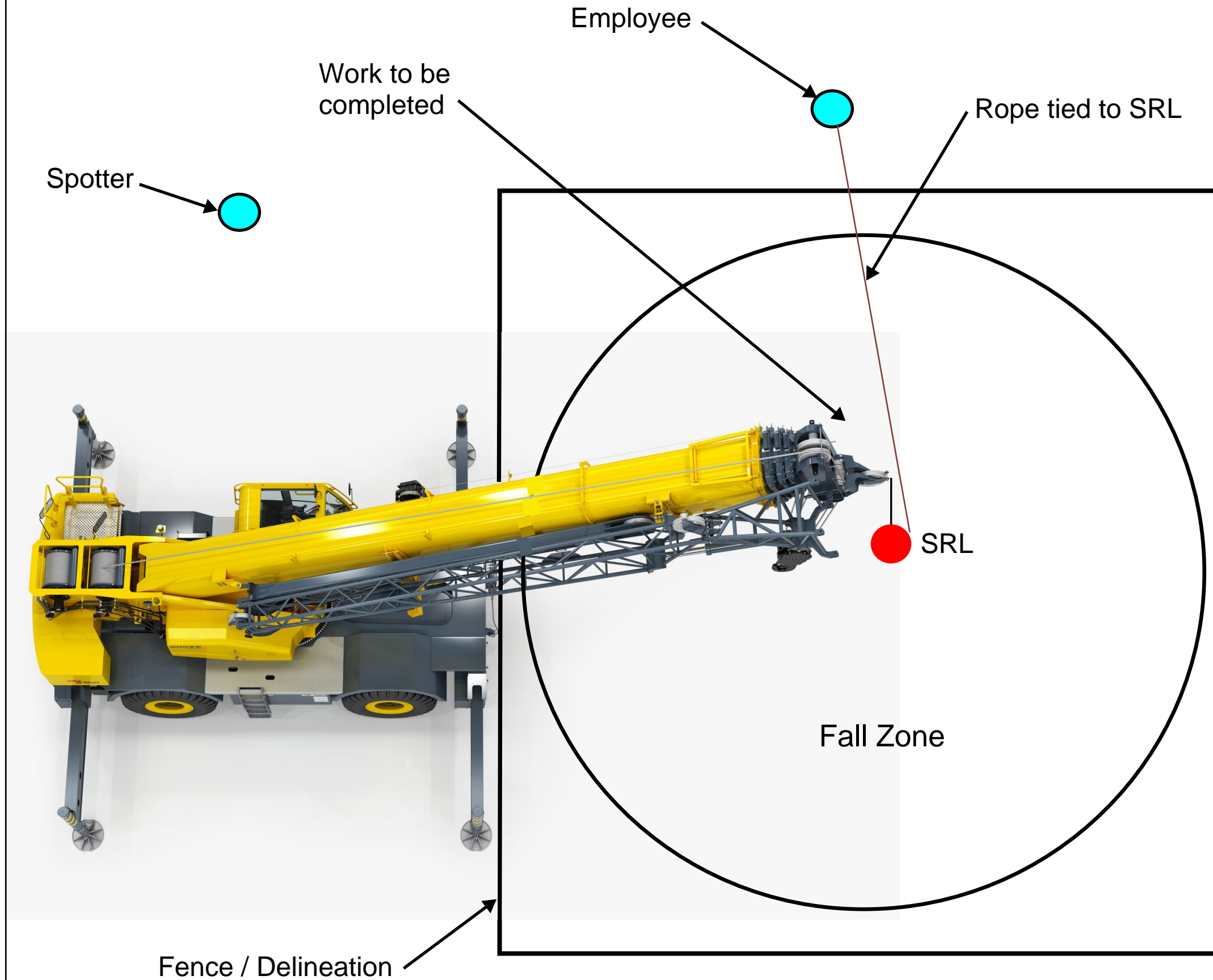
[LSA Guidelines](#)

[LSA Toolkits](#)

[Glossary](#)

Procedure:

- 1). Setup and use equipment in accordance with manufacturer's recommended procedures and follow the Kiewit equipment policy.
 - 2). Check lift chart to ensure equipment has 5000 lb capacity per user at anchorage point.
 - 3). Connect fall protection to to:
 - a. Crane
 - b. Picking hook on forklift
 - c. Choker on picking frame
 - d. Picking device
 - e. Excavator
- **ALL RIGGING USED FOR FALL PROTECTION SHALL BE IDENTIFIED AND ONLY BE USED IN FALL PROTECTION APPLICATIONS.**
- 4). Tie a rope to the SRL connection point in order to pull from above fall zone to connect D-ring outside of the fall hazard zone.
 - 5). Position equipment to maintain 5000lb capacity per worker.
 - 6). Operator to turn off and/or dog off equipment.
 - 7). Operator will now be hole watch and spotter to ensure equipment is not operated. If the operator is not present then hang a sign on the door handle locking the equipment out for fall protection safety.
 - 8). The employee performing work will use the rope pull the SRL connection to themselves and connect to D-ring. (Employee must stand behind fencing/delineation to connect SRL to D-ring).
 - 9). The employee may now perform work.
 - 10). Employee must be outside of the fenced/delineated area to unhook from their SRL.
 - 11). Remove and store SRL and fall protection rigging.



Equipment Tie-off Options:

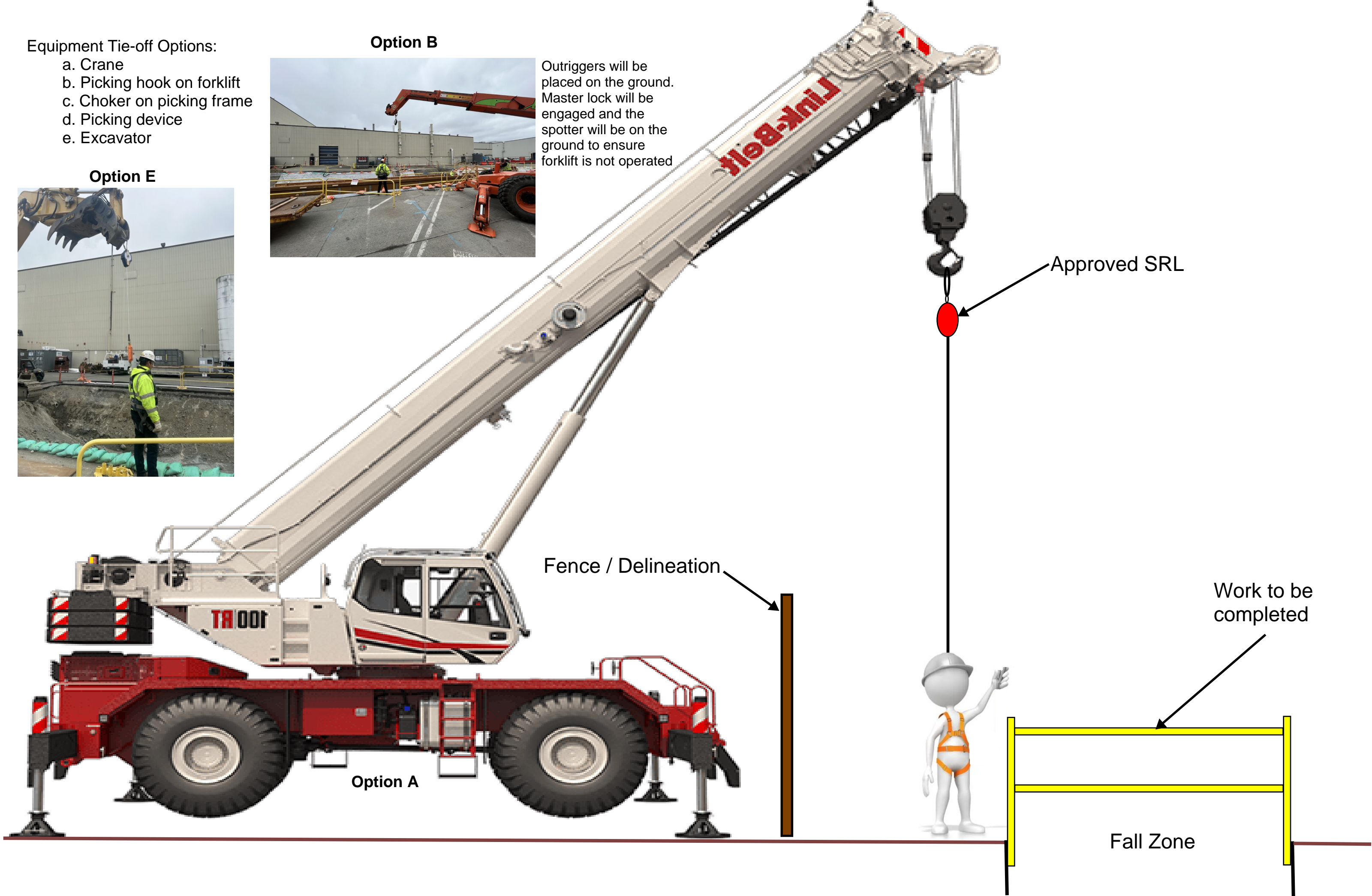
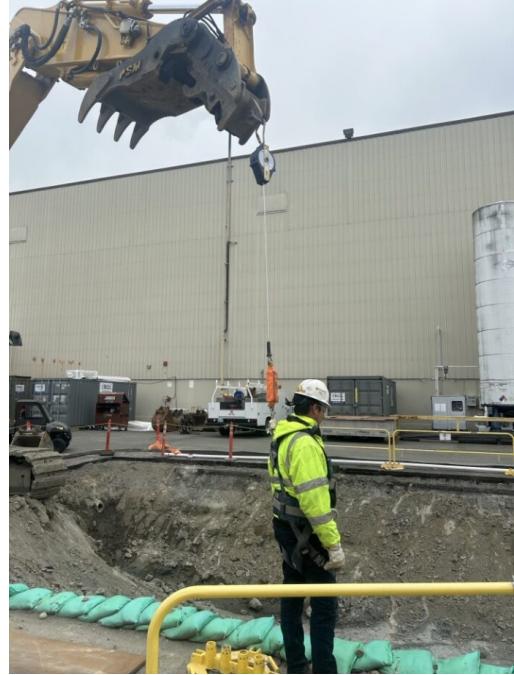
- a. Crane
- b. Picking hook on forklift
- c. Choker on picking frame
- d. Picking device
- e. Excavator

Option B



Outriggers will be placed on the ground. Master lock will be engaged and the spotter will be on the ground to ensure forklift is not operated

Option E



Approved SRL

Fence / Delineation

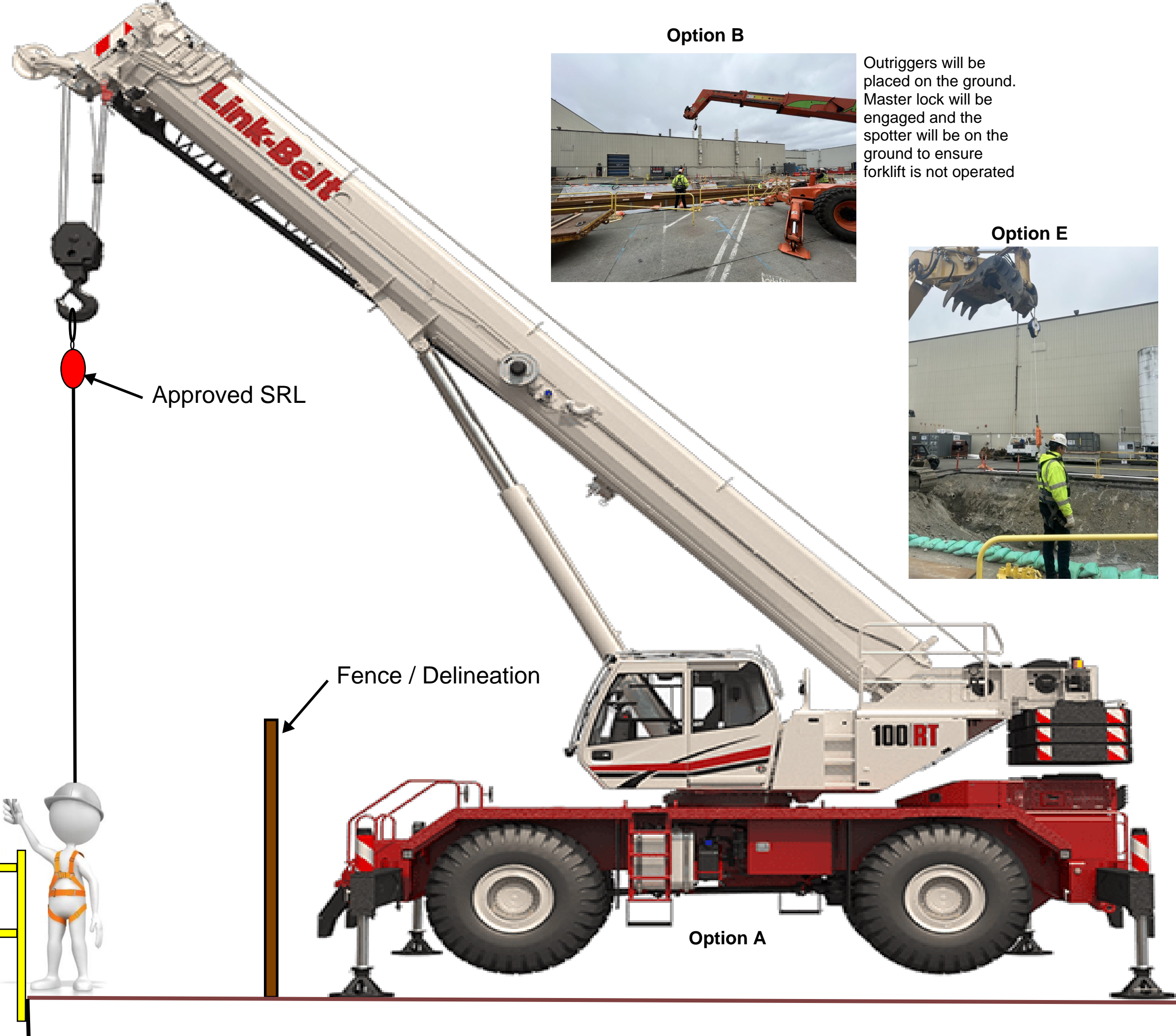
Work to be completed

Option A

Fall Zone

Equipment Tie-off Options:

- a. Crane
- b. Picking hook on forklift
- c. Choker on picking frame
- d. Picking device
- e. Excavator

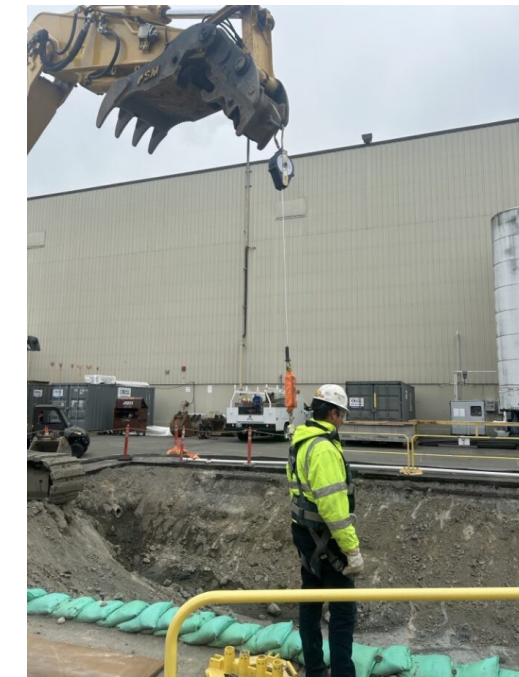


Option B



Outriggers will be placed on the ground. Master lock will be engaged and the spotter will be on the ground to ensure forklift is not operated

Option E



Project: CB WTP STEP

Created by: Ryan Hambricht



Plan #: 1 Rev: 1

Date Opened: 5/23/2024 Expiration Date: 12/31/2024

Scope of Work: Shaft Prep & Access Handrail Install

**Must be specific (i.e. deck level, bent location, work package #, etc.)

- Eliminate
- Prevent

Every operation performed at heights where the fall hazard cannot be eliminated by performing work at grade or prevented through the use of engineered controls such as guardrails or scaffold must have a completed Fall Protection Permit.

Fall hazards cannot be eliminated or prevented for this operation because: _____

The handrail must be installed around the shaft to set up access to the shaft

Identify the fall hazards to be controlled with this plan: _____

Falls into the shaft after the cover is removed

Complete all sections flagged with planned hazard control method

<input type="checkbox"/> Restrain Requires General Superintendent Approval	<input checked="" type="checkbox"/> Arrest Above D-Ring Anchorage Requires General Superintendent Approval	<input type="checkbox"/> Administrative **Requires District Safety Manager Approval to prevent fall via warning lines
<input type="checkbox"/>	<input type="checkbox"/> Arrest Below D-Ring Anchorage Requires Aponsor / Area Manager Approval	
<input type="checkbox"/>	<input type="checkbox"/> Arrest Transfer @ Heights Requires Project Manager Approval	

Restrain Can some or all of the fall hazard(s) be reasonably eliminated by using FALL RESTRAINT methods*

Anchorage

- Improvised Anchorage Point(s) - 1000lb min cap.
- Engineered Anchor Point(s) - Attach
- Horizontal Restraint Line(s) - Attach
- Manufactured Anchorage Point(s) - Attach

Connector

-
-
-
-

SRL anchored farther from the edge than SRL length
 Fixed length rope, lanyard, cable, etc.
 Adjustable length rope, lanyard, cable, etc.
 Other: _____

Arrest Please select the components utilized in the fall arrest system (check all that apply)

Anchorage

- Improvised Anchorage Point(s) - 5000lb min cap.
Describe: 8.5T New & Tagged Shackle
- Engineered Anchorage Point(s) - Attach
- Horizontal Life Line(s) - Attach
- Manufactured Anchorage Point(s) - Attach
- Mobile Elevated Work Permit (MEWP)

Anchorage Connector - Attach

- Beam Strap
- Wire Rope Cable
- Beam Clamp
- Concrete Wedge Anchor
- Concrete D-Ring Anchor
- Other: _____

Self Retracting Lifeline (SRL)

- Nano-Lok Edge
- Ultra Lok Edge
- Rebel SRL-LE
- Smart Lock SRL-LE
- Other (with District Safety Manager Approval): _____

DSM Signature

Arrest System Capacities and Restrictions

Anchorage (if less than 5,000 lb min cap.)
 Maximum Arrest Force (MAF) _____
 Maximum User Weight _____
 Maximum Number of Users _____
 Maximum Allowable Horizontal Distance from Anchorage _____

Anchorage Connector

Maximum Arrest Force (MAF) _____
 Maximum User Weight _____
 Maximum Number of Users _____
 Maximum Allowable Horizontal Distance from Anchorage _____

SRL

Maximum Arrest Force (MAF) _____
 Maximum User Weight _____
 Maximum SRL Length _____
 (If more than one SRL may be utilized choose worst case)

UTILIZE CAPACITY AND RESTRICTION SECTION TO IDENTIFY COMPONENT COMPATIBILITY (i.e. SRL MAF is greater than Anchorage MAF, SRL allows user to travel 16ft while Anchorage allows 8ft. All data may not be present for each component, but planner must recognize when more data is needed based on planned use.

All components of the system are compatible or planned utilization is within restrictions

MAX USER WEIGHT FOR LE APPLICATION IS 310LBS PER 3M SRL LIMITATIONS

Superintendent Signature

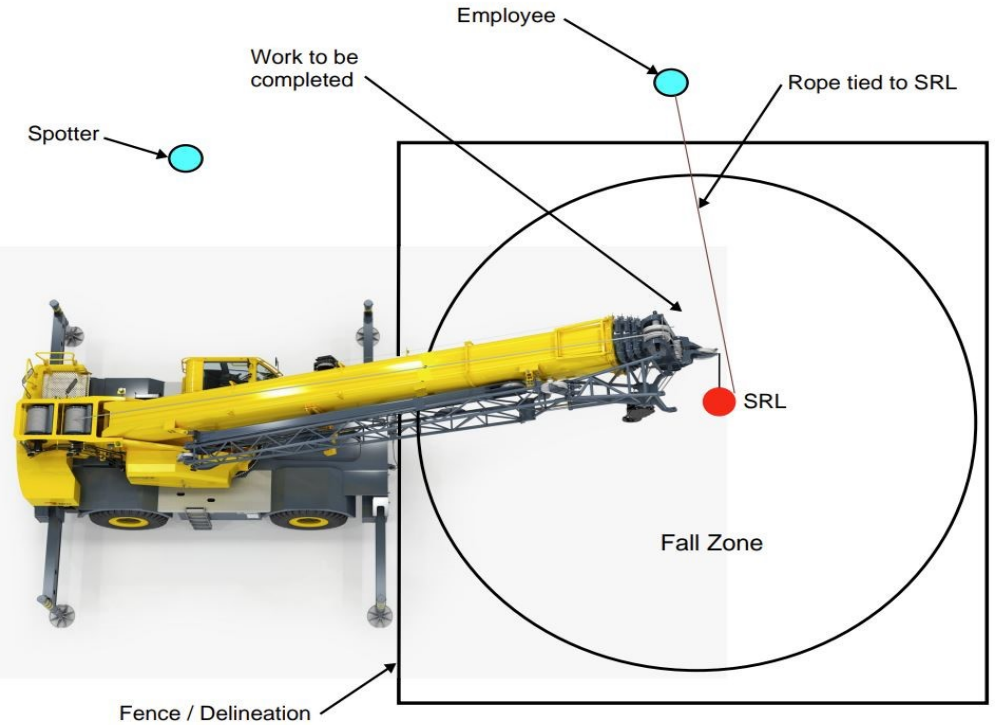
Administrative

Describe the plan for administrative restrictions if utilized to prevent a fall via Warning Lines.

Sketch of Worst Case Scenario for Worker Positioning in Fall Restraint/Arrest/Administrative Controls Plan. Include and Identify All System Components. If Transferring at Heights, Include Description of Sequence.

Procedure:

- 1). Setup and use equipment in accordance with manufacturer's recommended procedures and follow the Kiewit equipment policy.
 - 2). Check lift chart to ensure equipment has 5000 lb capacity per user at anchorage point.
 - 3). Connect fall protection to:
 - a. Crane
 - b. Picking hook on forklift
 - c. Choker on picking frame
 - d. Picking device
 - e. Excavator
- **ALL RIGGING USED FOR FALL PROTECTION SHALL BE IDENTIFIED AND ONLY BE USED IN FALL PROTECTION APPLICATIONS.**
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 - 9). The employee may now perform work.
 - 10). Employee must be outside of the fenced/delineated area to unhook from their SRL.
 - 11). Remove and store SRL and fall protection rigging.



Arrest

Clip of Fall Clearance Chart Utilized from SRL Manual - Highlight Fall Distance

(If more than one SRL may be utilized clip worst case here, attach all manuals used to plan)

SRL: 130 - 310 lbs (59 - 140 kg)		B							
		<4 ft (1.2m)	4 ft (1.2m)	5 ft (1.5m)	6 ft (1.8m)	7 ft (2.1m)	8 ft (2.4m)	9 ft (2.7m)	>10 ft (3m)
A	8 ft (2.4m)	X	X	X	X	X	X	X	X
	10 ft (3m)	X	X	X	X	X	X	X	X
	20 ft (6.1m)	X	X	X	X	X	X	X	X
	30 ft (9.1m)	X	X	X	X	X	X	X	X
	50 (15.2)	X	X	X	X	X	X	X	X
	70 ft (21.3m)	X	X	X	X	X	X	X	X

SRL: 311 - 420 lbs (140 - 191 kg)		B					
		<6 ft (1.8m)	6 ft (1.8m)	7 ft (2.1m)	8 ft (2.4m)	9 ft (2.7m)	>10 ft (3m)
A	Min	X	X	X	X	X	X
	10 ft (3m)	X	X	X	X	X	X
	20 ft (6.1m)	X	X	X	X	X	X
	30 ft (9.1m)	X	X	X	X	X	X
	50 (15.2)	X	X	X	X	X	X
	70 ft (21.3m)	X	X	X	X	X	X

Arrest

Fall Clearance Calculation

a) SRL Fall Distance from Manual

(If more than one SRL may be utilized fill out each)

- Nano-Lok Edge _____
- Ultra Lok Edge _____
- Rebel SRL-LE _____
- Smart Lock SRL-LE 7'
- Other (with District Safety Manager Approval): _____

b) Additional fall distance from anchorage device (i.e. sag from a Horizontal Lifeline)

Value _____

c) If worker will be kneeling add 3ft for c) value

Value 3'

d) Fall Distance

- Largest Value from a)-10'
- Distance from b) _____
- Kneeling add from c) + 3'
- Total Fall Distance -13'
- Worst Case Fall Distance-8'6
- (from working surface closest to obstruction)

IF FALL DISTANCE IS GREATER THAN FALL CLEARANCE AND WORK CANNOT BE COMPLETED THROUGH ANY OTHER MEANS, THIS PLAN MUST BE APPROVED BY DISTRICT MANAGER AND EXECUTIVE VICE PRESIDENT OR UTILIZE A PREVIOUSLY APPROVED SOP

Restrain

Arrest

Administrative

Confirm Rescue Plan can be performed for arrest.

The Operator will slowly raise the line of the crane (by doing so will raise the unconscious employee's body) until it clears the edge of the casing. Operator will then slowly swing to remove the worker from over the hole and place them on the ground to be treated.

Restrain

Arrest

Administrative

Describe Inspection Responsibility, Procedure, and Frequency

Inspection Procedure:

Superintendent inspect complete system setup before initial use. Employee using system inspect before use.

Inspection Frequency: Inspect before each use

Lists system inspectors

NAME:

NAME:

NAME:

Restrain

General Superintendent Approval Required for Fall Restraint

I have evaluated the operation. All fall hazards cannot be removed through fall elimination or prevention methods, and a fall restraint system is needed. I approve the use of the fall restraint system as described in this permit.

General Superintendent or Above Signature

Arrest

Above D-Ring Anchorage

General Superintendent Approval Required for Fall Arrest

I have evaluated the operation. All fall hazards cannot be removed through fall prevention/restraint methods, and a fall arrest system is needed. I approve the use of the fall arrest system described in this permit.

General Superintendent or Above Signature

Arrest

Below D-Ring Anchorage

Sponsor / Area Manager Approval Required for Fall Arrest w/Below D-Ring Anchorage

I have evaluated the operation. All consideration has been made to incorporate fall arrest anchor points that are above the height of the user's D-ring. It has been determined that this is not feasible, and below D-ring anchorage must be utilized to complete the work safely.

Job Sponsor / Area Manager Signature

****A completed copy of this permit must be sent to the District Manager, Division Manager, and Executive Vice President****

Arrest

Transfer @ Heights

Project Manager Approval Required for Transfer at Heights

I have evaluated the operation. Transfer at heights (use of an MEWP to gain access to an elevated work area where a fall exposure is present) is necessary and can be completed safely per this plan.

Project Manager Signature

Administrative

District Safety Manager Approval for use of Administrative Controls

I have evaluated the operation. All fall hazards cannot be removed through Kiewit's hierarchy of controls and a system of administrative controls may be used to complete the work.

District Safety Manager Signature

This permit shall be reviewed and signed before the operation is started and every two weeks at a minimum.

I understand the hazards of this operation and have received necessary training & instruction on the items described in this plan.

Name: _____
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The plan described must be inspected daily to verify that the installation and use of ALL system components is correct.

If at any time the system does not match the installation or use of the described plan, the operation must be stopped until:

- 1) An investigation is completed as to why the system and installation do not match.
- 2) Corrections are made to the installation and use of the system so that it reflects what is on the described plan.
- 3) The described plan is changed to reflect the current installation and use of the system.

Any instance where the plan is changed, everyone utilizing the system must understand the changes and new instructions before work continues.