



STANDARD OPERATING PROCEDURE FALL PROTECTION Stanchion Anchorage

Kiewit Bridge & Marine			
Position	Name	Ownership Date	
Engineer	Emily Reid	22-Mar-2024	
Engineer	Reese Johnson	22-Mar-2024	
Superintendent	Trevor Burwell	22-Mar-2024	
Superintendent	Donald Beck	22-Mar-2024	

Revision Summary Change				
Rev	Rev Revision Date Change Description			
А	6-Jun-2024	Issued for Review		
В	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 Standard Operating Procedure (SOP) is a guide for establishing anchorage to a stanchion while working at heights.

2.0 WORK SCOPE

The scope includes operations where an employee needs to tie off to a singular stanchion as part of a fall protection permit. Each employee must be protected from a fall greater than 6 feet (4ft in WA). A stanchion can be a pre-engineered design or a manufactured anchorage point. An improvised stanchion will not be accepted under this SOP. This plan does not cover fall elimination, restraint, using a horizontal lifeline system or transfers at heights using a stanchion tie-off system.

3.0 DEFINITIONS / ACRYMONS

TERMS / ACRYNOMS	DEFINITION	REFERENCE
Stanchion	An upright/vertical and stationary support/post.	
Anchorage Point	A secure point of attachment for an SRL.	
Engineered Anchorage Point	An anchor designed by a certified engineer. The strength must be two times the expected impact force, max arrest force, from the chosen SRL multiplied by the number of users.	
Manufactured Anchorage Point	Off the shelf anchorages with capacities greater than or equal to the chosen SRL maximum arrest force. These are pre-engineered anchorages.	
Corporate Standard Definitions	Glossary	



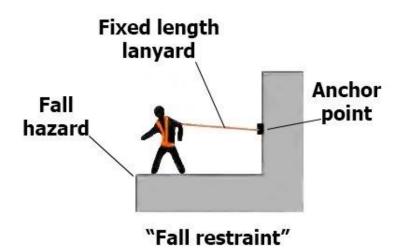
4.0 ROLES AND RESPONSIBILITIES

POSITION	ROLE AND RESPONSIBILITY
DESIGNATED	 Must review and approve <u>every</u> fall protection permit on their project.
SIGNER	 Designated by district leadership and assigned on the TSCD matrix.
DESIGNATED	Responsible for initial inspection of fall protection systems to ensure correct
INSPECTOR	installation.
PROJECT	Oversee implementation of fall protection program.
MANAGER	Ensure employees are trained and understand the fall protection requirements.
GENERAL	Review, approve fall protection permits.
SUPERINTENDENT	Ensure the fall protection hierarchy of controls is followed.
	 Ensure the fall protection permit is complete with all supporting documents attached.
SUPERINTENDENT	• 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	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	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	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

- 5.1 Prior to using a stanchion for fall protection anchorage, utilize the hierarchy of controls to determine the best method listed below. Determine if you can:
 - 5.1.1 Eliminate the Fall. The best and first option when planning work is eliminating the fall if possible. If the work can be performed on the ground, no fall hazard is present.
 - 5.1.2 Prevent the Fall. Employees will be protected from a fall using engineered controls. This includes handrails, guardrails, scaffolding, or similar methods.
 - 5.1.3 Restrain the Fall. The fall hazard is present, and no engineering controls are blocking it. A worker is physically restrained from the fall completely since they cannot reach the fall



hazard.

- 5.2 . If eliminating, preventing, or restraining the fall is not feasible for the operation, a fall protection permit is needed. If there is more than one fall hazard that does not fall under the same system, additional permits will be required.
- 5.3 When deciding to use a stanchion to anchor a fall arrest system, first consider:
 - 5.3.1 Fall Clearance: This number is calculated in the fall protection permit. It is the minimum distance required to safely prevent a worker from striking an obstruction when they fall.
 - 5.3.2 Fall Hazard: This is where a worker would fall from in an operation.
- 5.4 A stanchion can either be manufactured (pre-engineered) or engineered. The design of each stanchion includes the maximum arrest force (MAF), maximum user weight, and maximum allowable horizontal distance from anchorage. If one or more of these values is not stated in the design, reach out to the manufacturer or engineer (see attached memo regarding TSCD Risk).
 - 5.4.1 A manufactured or pre-engineered system can be purchased from a verified seller. It is important to follow the manufacturer's instructions for correct set up and use. Never deviate from the instruction manual unless there is designer approval to do so.



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5.4.2 An engineered stanchion is any stanchion that is designed and approved by an engineer for use in the field (i.e. a KIE designed post). Engineered stanchions could also include permanent material or temporary material, that is already a part of your operation. (i.e. a vertical strongback in a TSCD design). Workers can be tied off to these posts if there is engineering to support it. It is important to give the designer all applicable information about the anchorage point you want to use, so they can accurately design a safe system. Typically, this system is costly and takes more time due to the engineering needed.



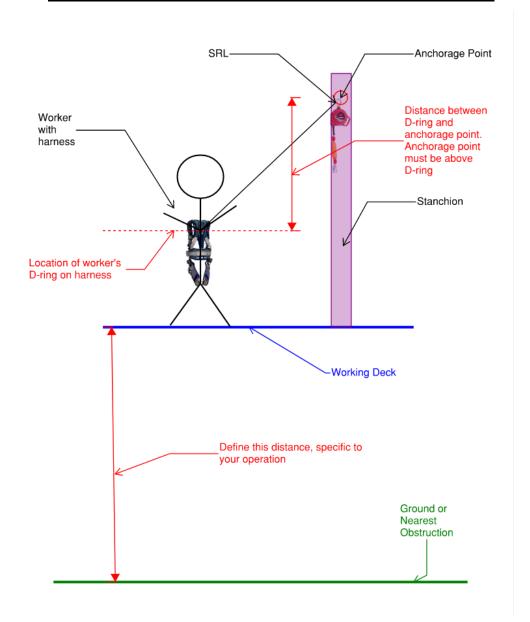
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- 5.4.3 An improvised stanchion is not applicable for this SOP. If you identify a stanchion on your project, whether it is permanent material or TSCD that you believe could serve as an anchorage point, reach out to KIE. With accurate information, KIE can provide drawings and calculations confirming whether the stanchion can be used or not. For using an improvised tie-off, refer to the Improvised Anchorage SOP.
- 5.5 Draw a sketch of the worst-case scenario. The worst-case scenario uses the distance to the closest obstruction a worker would contact if they fell. Specify the stanchion, fall protection equipment clearance from the IFU, and the distance to the fall hazard.
 - 5.5.1 Delineate areas where an employee can and cannot access.
 - 5.5.2 Identify the work deck the employees will be accessing. If the work deck changes elevation, ensure a worker can still tie off at or above their D-ring.
 - 5.5.3 Identify the specific stanchion used, the anchorage point, SRL type, and harness. Include all manufacturer's data in your fall protection permit.



5.5.4 Locate where the stanchion is placed. Make sure it is placed in an area where the employees can reach the tie-off point and stay within their working limits. Decide if more than one stanchion needs to be used.



Example sketch of the information specified in your permit

- 5.6 Try to make all connections to stanchions above the D-ring.
 - 5.6.1 If the anchorage point is below the D-ring, consider making the stanchion taller or move the stanchion to a higher elevation. If tying off below the D-ring is the safest option, the permit must be approved by the Sponsor/Area manager. Follow the Corporate Fall Protection Policy.



5.6.2 The anchorage point on the stanchion is pre-determined by either the engineer or the manufacturer's instructions, depending on the system you are using. The anchorage point shall never be changed or altered, as this could affect the integrity of the system.

5.7 Calculate the Fall Clearance

- 5.7.1 Fall clearance is the sum of the SRL fall distance (from the manufacturer's manual) and the additional fall distance from an anchorage device. Add 3'-3" to this if the worker will be kneeling at all during the operation.
- 5.7.2 Be sure to use the correct chart in the SRL manual. They can be separated by the user's weight, which can affect the fall clearance.
- 5.7.3 The setback distance, or how far a worker can move away from the anchorage point, affects your fall clearance. Typically, the greater the setback distance, the greater your fall clearance is. It is best to plan a system where a worker does not need to move far away from the anchorage point.
- 5.7.4 The anchorage height is the distance from the working deck to the anchorage point on the stanchion.

5.8 Other factors to consider include:

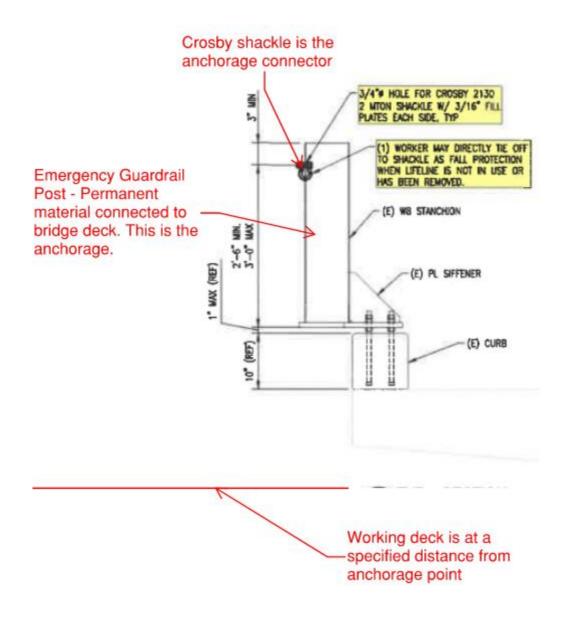
- 5.8.1 There is one person attached to a Secure-a-Span stanchion at any given time. Refer to manufacturer's specific information. Make sure this rule is followed in the field. Refer to the 3M Secure-a-Span post memo. For any other type of stanchion, check with the design to confirm if one or two workers can be tied off at once. The working radius could change if two people are tied off versus one.
- 5.8.2 Have a rescue plan if a fall occurs and describe the plan on your permit. Make sure this plan is feasible at any time your permit is in use.
- 5.8.3 Transferring at heights. If a worker will need to transfer at height, follow the Transfer at Heights SOP.
- 5.8.4 Attach all engineering and supporting documents/memos onto your permit.
- 5.9 Once the fall protection permit has been made, obtain approval from the appropriate designated signer. Inspect the tie-off system and green tag before using. Follow the fall protection inspection checklists SOP here.



5.10

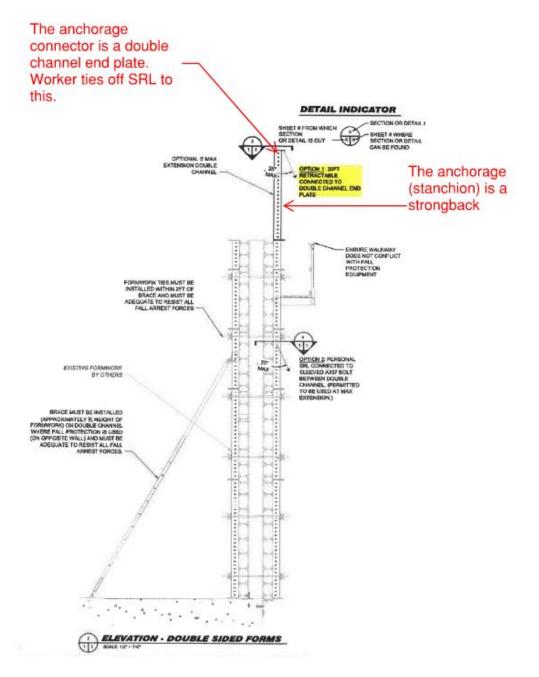
6.0 STANCHION EXAMPLES

- 6.1 Guardrail Stanchion
 - 6.1.1 Engineered anchorage point (permanent material)

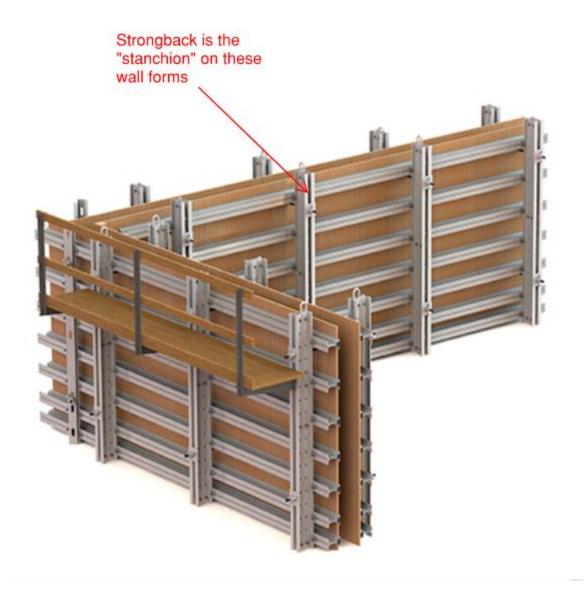




- 6.2 TSCD
 - 6.2.1 Wall Forms (Engineered Anchor Point)

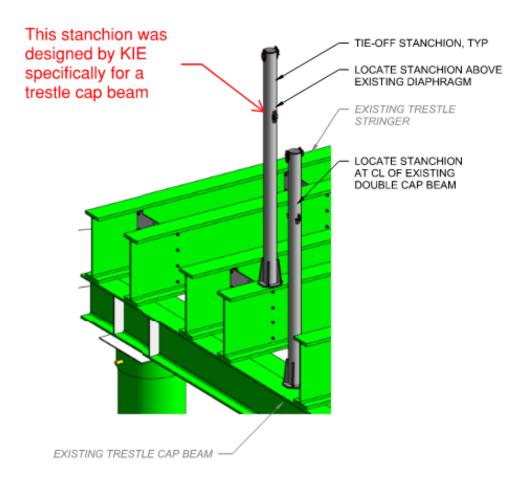








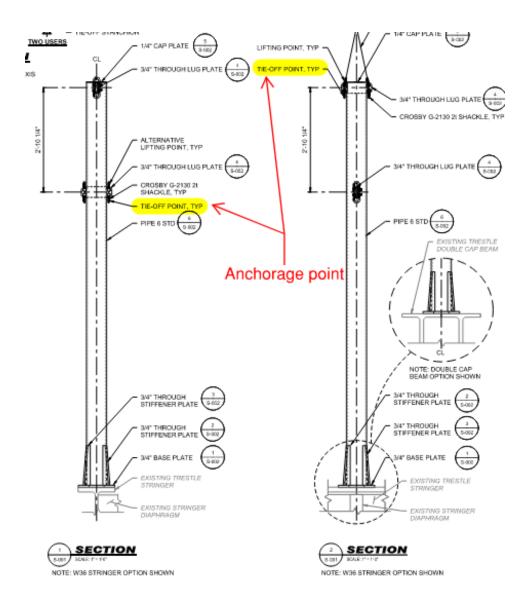
- 6.3 KIE Designed Stanchion
 - 6.3.1 Engineered anchorage point. (KIE designed stanchion)





FALL PROTECTION: STANCHION TIE OFF

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7.0 REFERENCES

Fall Protection Guide

Corporate Fall Protection Policy

Tie off to Secure-a-span post - 1 person max

Low Clearance on Vertical Surfaces SOP

Working From MEWPs SOP



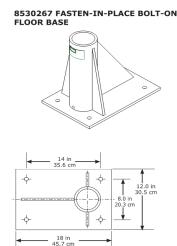
MEMORANDUM

DATE:	April 17, 2024
TO:	Senior Safety Managers
CC:	Division Managers; District Managers
FROM:	Alicia Edsen, Owen Berg
SUBJECT:	3M Horizontal Lifeline System and Accessories / TSCD Risk

FOR IMMEDIATE DISTRIBUTION

Kiewit Infrastructure Engineers (KIE) has been made aware of an error in the 3M literature for the DBI-SALA 8530267 FASTEN-IN-PLACE BOLT-ON FLOOR BASE. The current literature from 3M shows a fourhole pattern (shown on the right) and states the anchors must have a required pull-out strength of 19,500 lbs. **The actual floor base from 3M now has a six-hole pattern and has increased required pullout strengths. 3M Engineering has communicated through email the following required pull-out strengths:**

- 22,500 lbs. if the (4) outside anchor holes are used OR
- 15,000 lbs. if all (6) anchor holes are used



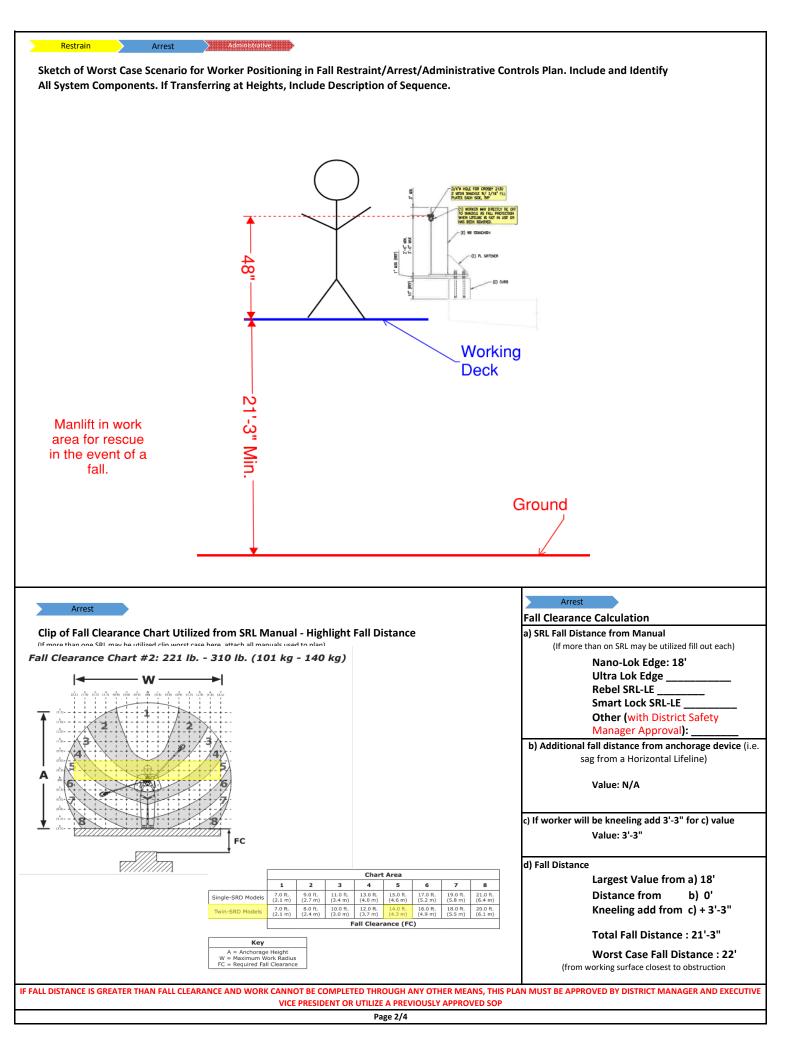
3M is currently updating its outward-facing literature, but the current literature on its website is incorrect. **Please review your current projects for any use of this product immediately.**

Additionally, it has been brought to our attention that there is confusion regarding the appropriate TSCD risk classification for Horizontal Lifeline Anchorages based on the risk attributes in TSCD Manual Table 3.10. This has been clarified in V12 of the TSCD Manual (to be released April 26, 2024) that any anchorage for a Horizontal Lifeline is Moderate Risk. For the 3M system referenced above although 3M provides the anchor pull-out strength requirements, they also state that the "installation MUST BE approved to local regulations by a qualified engineer." While this memo specifically addresses a 3M Horizontal Lifeline product, the requirement for an engineered anchorage would apply to any other manufacturer per Kiewit TSCD Policy. An Excerpt from V12 TSCD Manual Table 3.10 is shown below for your reference.

Moderate	 Designs utilizing standard job built or manufactured systems but requiring anchorage, components, or connectors required to be designed⁷.
	 Analysis of structure used for anchorage required.
	 Handrails with loading beyond standard OSHA requirements⁵.
	 Custom, project-built single-span horizontal lifelines⁶.
	Anchorage for all horizontal lifelines

For any questions, please contact Wyatt Brice – wyatt.brice@kiewit.com

Project: Federal Way Link Extension Created by: Plan #: Rev: 1 Date Opened:	Emily Reid Jun-24 Expiration Date:	FALL PROTECTION PERMIT					
	·						
Scope of Work: <u>Tie Off To EGR Posts - To Set EGR and !</u> **Must be specific (i.e. deck level, bent location, work package #, etc.)	Strip Overhang Decks						
Eliminate 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 or deck is already above ground. The fall cannot be prevented		Fall cannot be eliminated because the overhang					
always be a fall hazard.							
Identify the fall hazards to be controlled with this plan:	This plan covers tying off to an EGB po	st to remove material from the overhang deck.					
Material can be stripped and dropped to the ground without		This can only be done after the permanent					
EGR posts have been installed on the bridge curb.		,					
Complete all sections flagged with planned hazard contro	I method - See page 3 for approvals						
Restrain Arrest	Above D-Ring Anchorage	Administrative					
Requires Designated Approver Signature Requires Designated Approv	er Signature	**Requires District Safety Manager					
Arrest	Below D-Ring Anchorage	Approval to prevent fall via warning lines					
Requires Sponsor / Area Mai							
Arrest	Transfer @ Heights						
Requires Project Manager A	pproval						
Restrain Can some or all of the fall hazard(s) b	e reasonably eliminated by using FALL	RESTRAINT methods*					
Anchorage	Connector						
Improvised Anchorage Point(s) - 1000lb min cap.		SRL anchored farther from the edge than SRL length					
Engineered Anchor Point(s) - Attach		Fixed length rope, lanyard, cable, etc.					
Horizontal Restraint Line(s) - Attach		Adjustable length rope, lanyard, cable, etc.					
Manufactured Anchorage Point(s) - Attach		Other:					
Arrest Please select the components utilized	in the fall arrest system (check all tha	t apply)					
Anchorage	Anchorage Connector - Attach	Self Retracting Lifeline (SRL)					
Improvised Anchorage Point(s) - 5000lb min cap		Nano-Lok Edge					
Describe:	Wire Rope Cable	Ultra Lok Edge					
Engineered Anchorage Point(s) - Attach	Beam Clamp	Rebel SRL-LE					
Horizontal Life Line(s) - Attach	Concrete Wedge Anchor						
 Manufactured Anchorage Point(s) - Attach Mobile Elevated Work Permit (MEWP) 	Concrete D-Ring Anchor Other:	Other (with District Safety Manager Approval):					
	L Other.	DSM Signature					
Arrest System Capacities and Restrictions	Anchorage Connector	(If more than one SRL may be utilized worst case)					
Anchorage (if less than 5,000 lb min cap.)	Maximum Arrest Force (MAF)	SRL Data Used: Nano-Lok Edge					
Maximum Arrest Force (MAF): 1350 lbs	Maximum User Weight	Maximum Arrest Force (MAF): 1,350 lbf					
Maximum User Weight: 900 lbs	Maximum Number of Users	Maximum User Weight: 310 lbs					
Maximum Number of Users: 1 Maximum Allowable Horizontal Distance	Maximum Allowable Horizontal Distance from Anchorage	Maximum SRL Length: 8' Max Allowable User Distance From Anchor					
from Anchorage: 7'		Point via Fall Distance Chart: 7'					
UTILIZE CAPACITY AND RESTRICTION SECTION TO IDENTIFU	Y COMPONENT COMPATABILITY (i.e. SR	L 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 pla	nner must recognize when more data is needed based					
on planned use.							
All components of the system are compatible or planned MAX USER WEIGHT FOR LE APPLICATION IS 3101		Superintendent Signature					
WAX OSER WEIGHT FOR LE APPEICATION IS STOL	BS PER SIVESRE LIMITATIONS	······································					
Arrest		have a suithin 10 minutes					
Describe how member of this operation will rescue a falle	•						
A manlift will be used to rescue a fallen employee. In the event of a fall, capture the fallen employee inside the manlift and unhook them from the EGR from the EGR stanchion. Have them tie off to the manlift and bring the down to the ground. If a manlift is not in the work area, ready and							
available to use in the evit of a fall, do not use this plan.							
Administrative Describe the plan for administrative restrictions if utilized to prevent a fall via Warning Lines.							
Describe the plan for administrative restrictions if utilized	to prevent a fail via warning Lines.						



Restrain Arrest Describe Inspection Responsibility, Procedure, and Frequency As part of inspection, confirm rescue plan can be performed as described As part of inspection, confirm rescue plan can be performed as described. As part of inspection, confirm rescue plan can be performed as described. As part of inspection, confirm rescue plan can be performed as described. As part of inspection, confirm rescue plan can be performed as described. As part of inspection, confirm rescue plan can be performed as described.	eryday before use and green
Restrain Designated Approver Signature Required for Fall Restraint I have evaluated the operation. All fall hazards cannot be removed through fall elimination or prevention methods, and a fall restrain 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 Designated Approver Signature Required for Fa 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.	all Arrest General Superintendent or Above Signature
Arrest Sponsor / Area Manager Approval Required fo 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. **A completed copy of this permit must be sent to the District Manager, Division Manager	Job Sponsor / Area Manager Signature
Arrest Transfer @ Heights Project Manager Approval Required for Transf	er 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.

Administrative

District Safety Manager Approval for use of Administrative Controls

Project Manager Signature

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.

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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:	Date:			

The plan described must be inspected daily to verify that the installation and use of <u>ALL</u> 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. Page 4/4

RESOURCES



PETE'S FIELD GUIDE



FALL PROTECTION MANUFACTURERS MEMOS



FALL PROTECTION EQUIPMENT GUIDE



KIEWIT FALL PROTECTION POLICY



FALL PROTECTION STANDARD OPERATING PROCEDURES



FALL PROTECTION LSA SAFEGUARDS