



Caltrans / Industry Falsework Advisory Team

Meeting Agenda – March 3, 2022 (Wednesday)

Location: WebEx Meeting

Time	Topic	Speaker
10:00 – 10:05	Welcome and WebEx Overview (Check you are muted)	Jim Nicholls
10:05 – 10:20	<p>Follow up from previous meeting (9/2/2021) action items</p> <ul style="list-style-type: none"> • Temporary barriers adjacent to existing sidewalks/Ped facility <ul style="list-style-type: none"> ○ Addressed in Temporary Barrier Systems Guideline (Attachment 1) ○ Required per 12-4.03C(2) - K-rail both sides of vehicle openings through falsework ○ 16-2.02C Construction – place temporary barrier to separate temporary pedestrian facilities from traffic and equipment  <ul style="list-style-type: none"> • Tracking steel grades <ul style="list-style-type: none"> ○ Mark beams with size and grade (see pic below) ○ Assume beams with no markings are A36 ○ Could be handled similar to timber grades with COC ○ Timber is visually graded, and steel is not  <ul style="list-style-type: none"> • 150% post load at traffic openings 	Jim Nicholls



Caltrans / Industry Falsework Advisory Team

	<p>Follow up from previous meeting (9/2/2021) action items (continued)</p> <p>Minutes :</p> <ul style="list-style-type: none">• Temporary barriers adjacent to existing sidewalks/Ped facility<ul style="list-style-type: none">○ Requirements for temporary barriers and pedestrian covers was presented○ Reviewed Caltrans guidelines for placing temporary barriers adjacent to existing curbs (Attachment 1) • Tracking Steel Grades<ul style="list-style-type: none">○ Marking beams is one option, but would be costly for contractors with large inventories○ Assume A36 when beams are not labeled○ It is difficult to identify steel grade since it is not visually graded○ Providing a certificate from contractor for the beams is a preferred option by some○ Some use color coding in conjunction with a legend in the shop drawings○ Comment was made that labeling the beam size and grade is preferable to color coding○ Comment made the color on the beams fades and is difficult to determine what color is used○ There was no consensus of what best option to identify beams with 50 ksi steel○ Temporary Structure Technical Team (TSTT) will discuss this issue further and bring options to next meeting○ Goal is to find a convenient method to identify beams in the field • 150% post load at traffic openings<ul style="list-style-type: none">○ This requirement remains in the Spec and the TSTT will discuss further	
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Caltrans / Industry Falsework Advisory Team

<p>10:20-10:35</p>	<p>UPRR/BNSF Guidelines for Temporary Shoring</p> <ul style="list-style-type: none"> • New guidelines dated December 7, 2021 • Significant changes in new guideline <p>Link to new RR guideline presentation</p> <p>Minutes:</p> <ul style="list-style-type: none"> • The changes to the railroad shoring guidelines was presented in a PowerPoint presentation • Some team members requested a copy of the PowerPoint 	<p>Jim Nicholls</p>
<p>10:35 – 10:45</p>	<p>Specification Changes</p> <ul style="list-style-type: none"> • RSS 12-3.20 <i>Temporary Barrier Systems</i> <ul style="list-style-type: none"> ○ K-rail not allowed after January 1, 2027 ○ Temporary barrier Spec revised until new requirements take effect ○ RSS 12-3.20 includes minimum clear area width table as discussed at last FWAT meeting • RSS 60-2.02A(4)(b) <i>Bridge Removal – Quality Control</i> <ul style="list-style-type: none"> ○ Similar requirements as section 48-2 for Temporary Structure Engineer ○ Engineer may assign a representative ○ See Section 60-2.02A(4)(b) below: <p>60-2.02A(4)(b) Quality Control</p> <p>For bridge removal work plans signed by a registered engineer, the engineer signing the work plan must confirm the conditions at least one day before the start of bridge removal activities by visual inspection. Discuss the condition of the structure with the contractor's project superintendent and Engineer at the site.</p> <p>For bridge removal activities, the engineer signing the work plan must:</p> <ol style="list-style-type: none"> 1. Be registered as a civil engineer in the State 2. Have experience in bridge removal plan design or bridge removal construction inspection 3. Be present at all times during bridge removal activities. 4. Ensure compliance with the authorized work plan. 5. Stop the operation if it is unsafe. Prior to resuming operations, submit a proposed revision to the authorized work plan to remedy the unplanned occurrence. 6. Prepare a daily engineering report for removal activities. The report must describe work activities for each day and the condition of the remaining structure. The report must be sealed and signed by an engineer who is registered as a civil engineer in the State. <p>The Engineer signing the work plan may assign a representative to perform the bridge removal activities specified in section 60-2.02A(4)(b). The Engineer signing the work plan must submit a letter that is sealed and signed certifying that the representative:</p> <ol style="list-style-type: none"> 1. Is registered as a civil engineer in the State 2. Has experience in bridge removal plan design or bridge removal construction inspection 3. Is familiar with the authorized work plan 4. Will attend at least 1 job site visit with the contractor's project superintendent and the Engineer to discuss the authorized work plan at least 1 day prior to beginning the bridge removal activities 	<p>Jim Nicholls</p>



Caltrans / Industry Falsework Advisory Team

	<p>Specification Changes (continued)</p> <p>Minutes:</p> <p>RSS 12-3.20</p> <ul style="list-style-type: none">• RSS 12-3.20 was discussed in last FWAT meeting and the draft table of clear distances will not change in the final RSS• Comment made the contract plans need to provide better details on the location of temporary barriers when space is limited <p>RSS 60-2.02A(4)(b)</p> <ul style="list-style-type: none">• Discussed the RSS and its similarities to what is found in 48-2• Comment was made that a better option to having a PE onsite would require a more robust work plan• Item #5 requiring the engineer to stop the operation when unsafe was a concern with many of the team• Comment made the engineer does not have the authority to stop the work• Many times, the engineer is employed by a subcontractor• Requiring an PE onsite provides an additional level of safety• Some consider requiring a PE onsite for overhangs and minor structures is excessive• The PE onsite could be overly conservative creating a situation for disagreements• The field personnel (superintendent) many times have more experience in how to complete the operation that the PE• The requirement of having a PE onsite for Demo and falsework operations is creating a shortage of engineers• The TSTT will discuss item #5 further and respond in next FWAT	
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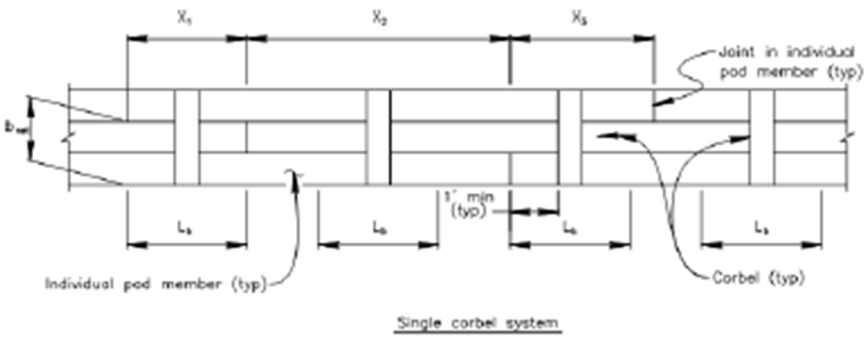
<p>10:45 – 11:00</p>	<p>Load duration factors per NDS</p> <ul style="list-style-type: none"> NDS Table 2.3.2 <div style="text-align: center;"> <p>Table 2.3.2 Frequently Used Load Duration Factors, C_D¹</p> <table border="1" style="margin: auto;"> <thead> <tr> <th>Load Duration</th> <th>C_D</th> <th>Typical Design Loads</th> </tr> </thead> <tbody> <tr> <td>Permanent</td> <td>0.9</td> <td>Dead Load</td> </tr> <tr> <td>Ten years</td> <td>1.0</td> <td>Occupancy Live Load</td> </tr> <tr> <td>Two months</td> <td>1.15</td> <td>Snow Load</td> </tr> <tr> <td>Seven days</td> <td>1.25</td> <td>Construction Load</td> </tr> <tr> <td>Ten minutes</td> <td>1.6</td> <td>Wind/Earthquake Load</td> </tr> <tr> <td>Impact²</td> <td>2.0</td> <td>Impact Load</td> </tr> </tbody> </table> <p><small>1. Load duration factors shall not apply to reference modulus of elasticity, E, reference modulus of elasticity for beam and column stability, E_{min}, nor to reference compression perpendicular to grain design values, $F_{c,⊥}$, based on a deformation limit. 2. Load duration factors greater than 1.6 shall not be used in the design of structural members pressure-treated with water-borne preservatives (see Reference 30), or fire retardant chemicals. Load duration factors greater than 1.6 shall not be used in the design of connections or wood structural panels.</small></p> </div> <ul style="list-style-type: none"> Duration used for duration of maximum load Falsework is seldom subjected to maximum loading for more than 7 days Structures that require stressing may load temporary structures for longer than 7 days <p>Minutes:</p> <ul style="list-style-type: none"> Team agreed that the 1.25 duration factor would apply in most temporary structure situations Engineering judgement will need to be applied in cases where maximum loading occurs for longer than 7 days 	Load Duration	C_D	Typical Design Loads	Permanent	0.9	Dead Load	Ten years	1.0	Occupancy Live Load	Two months	1.15	Snow Load	Seven days	1.25	Construction Load	Ten minutes	1.6	Wind/Earthquake Load	Impact ²	2.0	Impact Load	<p>Jim Nicholls</p>
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<p>11:00 – 11:15</p>	<p>Falsework Adjacent to Traffic with Skewed Bents</p> <ul style="list-style-type: none"> 48-2.02B(4) <i>Special Locations</i> considers adjacent to roads as supporting members over roadway or post nearest roadway See Attachment 2 for skewed bent example Edge of pavement used to define adjacent to traffic <p>Minutes:</p> <ul style="list-style-type: none"> Many think the requirement for traffic restraints is not an issue, but the 150% post load is Comment made that only the closest bent should be considered adjacent to traffic and bents behind or partially behind should not The TSTT discussed limiting the distance (x/h), but found it difficult to settle on a distance Suggested using 25' and some found that too far Most from Industry would like to eliminate the 150% post load requirement The TSTT will revisit the 150% load requirement 	<p>Jim Nicholls</p>																					



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11:15 – 11:20	HDPE Plates for Redundant System for Temporary Support <ul style="list-style-type: none">• Update Minutes: <ul style="list-style-type: none">• No update on the used of HDPE plates• Jim will contact Brian Mapel about status of testing	Jim Nicholls / Brian Mapel
11:20 – 11:45	Temporary Decking <ul style="list-style-type: none">• Caltrans temporary decking plan included in contract drawings• Design calculations required when decking is not shown in contract documents• See Attachment 3• Should there be an option to use a temporary decking design other that what is shown? Minutes: <ul style="list-style-type: none">• Team agreed options would be helpful• Many contractors have material on hand that could be used more efficiently and economically• The experience of most of the team members is that epoxy anchors work better that mechanical anchors. They are less likely to come loose• Comment made the 9” spacing in the Caltrans standard plan is too close and reduces the capacity of the anchors• The use of neoprene under the plates would better distribute the load and some already apply this detail• The comment was made that the requirements of section 48-4 are not applied uniformly across the state.• Requiring an installation and maintenance document would be helpful• Team agreed the option to use both standard plans and contractor designed plans is preferential• Specifying minimum loads and factors of safety would aid in the contractor designed plates• TSTT will discuss this issue and provide options in next FWAT meeting	Jim Nicholls / Hogni Setberg

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<p>11:45 - 11:50</p>	<p>Pad Splice Locations</p> <ul style="list-style-type: none"> Falsework manual section 8-2.08 <i>Joints in Individual Pad Members</i> requires joints in pads to be outside the effective bearing length or at the midpoint between corbels Simplified approach based on requirements of section 8-2.08 Alternatively, supplemental pads can be used <p>CHAPTER 8, FOUNDATIONS AUGUST 2021</p>  <p>Minutes:</p> <ul style="list-style-type: none"> It is difficult to predetermine the joint locations due to not knowing what material lengths that are in the field Many contractors prefer to randomly space the splices The use of supplemental pads requires longer corbels and increased material The preference for many is to add corbels for splices that are not outside the bearing area or at midpoint Adding corbels is the typical fix when splices are not located as shown in the falsework manual TSTT will discuss adding the option to add corbels at random splice locations to the Falsework manual Shop drawings should show splice locations and the alternative to add extra corbels When splices for interior pads fall under the corbels, they are not visible and can be located close to the edge Most agreed pads seldom fail and redistribute the loading Additional requirement to stagger the joints 4' when using additional corbels TSTT will consider adding additional corbels to the Falsework manual and will present at next FWAT meeting for comment 	
<p>11:50 – 11:59</p>	<p>Round Table</p> <p>Minutes:</p> <ul style="list-style-type: none"> Team agreed in person meeting are valuable Next meeting will be in Sacramento in person if possible 	<p>Open Discussion</p>
<p>12:00</p>	<p>Adjourn</p>	<p>All</p>



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Action Items:

Items from Meeting on 9/2/21

1. CT will research Spec requiring temporary barriers at pedestrian covers when placed over an existing sidewalk. Topic will be on next FWAT agenda.
2. TSTT will revisit the 150% post load adjacent to traffic and add to next FWAT agenda
3. TSTT will discuss the tracking of steel grades and add to next FWAT agenda

Today's Action Items

1. Tracking steel grades will be discussed with TSTT and options will be presented at next FWAT meeting
2. 150% post load requirement will be revisited by the TSTT
3. Requirement for PE onsite stopping operation if unsafe will be discussed with TSTT and topic will be discussed at next FWAT meeting
4. Jim will call Brian Mapel about status of HDPE testing
5. TSTT will discuss options to deck plates and present to FWAT at next meeting



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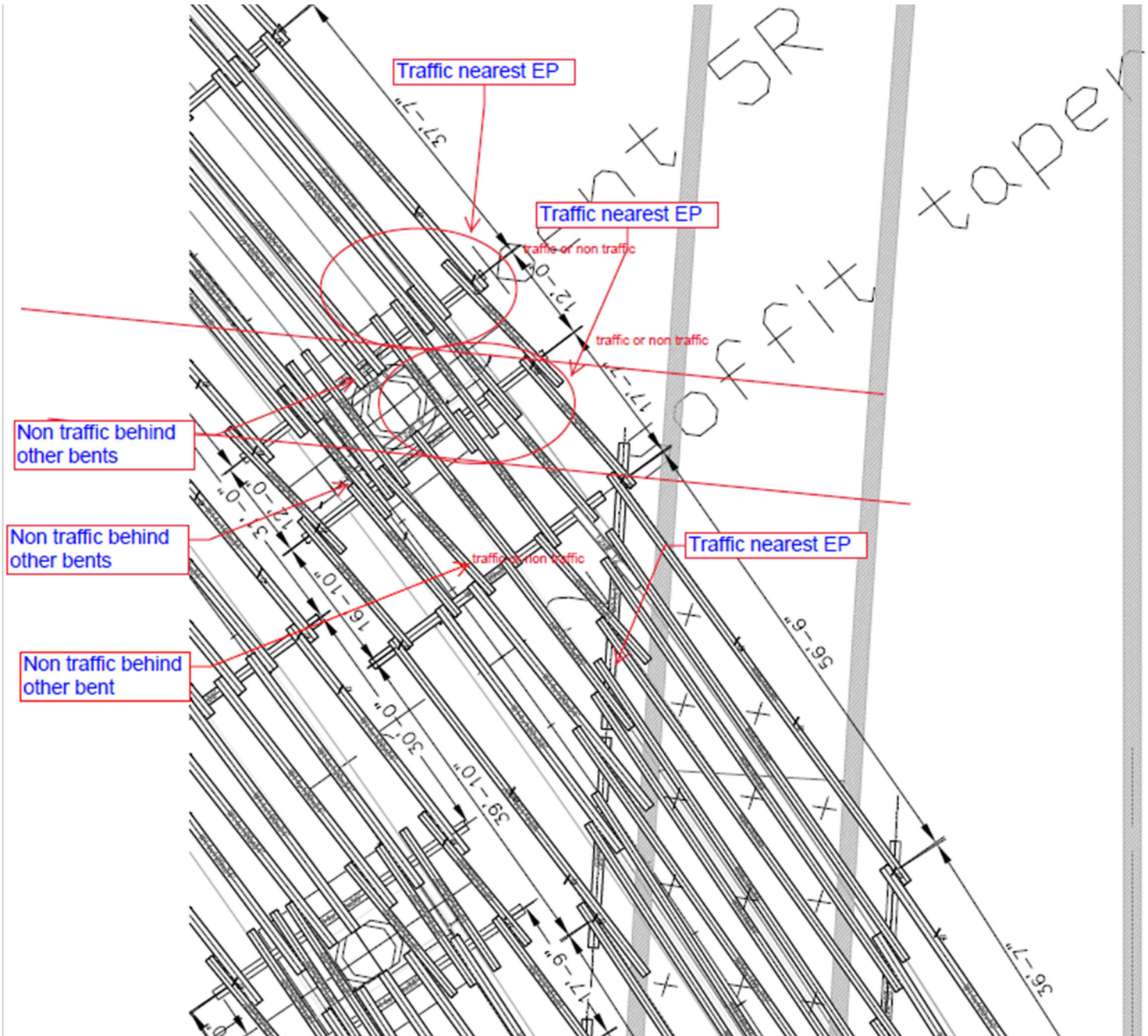
Attachment 1

Design Considerations

- Temporary barrier will deflect when impacted. The *Standard Specifications* require that the clear area behind the barrier must be kept clear. No work resources may be stored in the clear area during non-work hours.
- Work may be performed during work hours within the clear area.
- Falsework or temporary supports are not allowed within the clear area.
- For falsework or temporary supports, assume minimum footing width of 64 inches (4 – 6"x16" pads) and the length of work zone area to be protected must extend a minimum 5 feet past the new edge of deck.
- When temporary barrier is required for pavement widening, the clear area should be a minimum of 24 inches to allow space for a concrete paving machine track or for hot mix asphalt rollers to obtain compaction and joint smoothness.
- **Placement of temporary barrier systems near curbs** should be evaluated on a case-by-case basis using engineering judgment. Curbs may cause the temporary barrier system to tip over when struck, so adequate deflection distance should be provided between the temporary barrier system and the curb based on the clear area width requirements. If clear area width requirement cannot be achieved for freestanding systems, then consider staking or anchoring the temporary barrier system and allow for 1-foot clear area width for deflection. Do not place temporary barrier directly in front of curb face, if necessary place temporary barrier system on top of the curb, flush with the face of it and the clear area width must meet the requirements in Table 1. Temporary Barrier Systems Clear Area Width Requirements.
- When temporary barrier must be staked or anchored, the locations must be shown on the contract plans.
- Temporary concrete barrier installation requires large equipment and extensive labor. Significant resources are necessary for hauling precast segments to and from the project site. Because of their weight, temporary concrete barriers require more truckloads and thus a higher cost.
- Adequate space must be available within the project work zone for heavy equipment to install and remove the barriers. Lane closures may be required to complete this work.
- When long runs of temporary barrier are used, provide locations for entrances and exits from work areas.
- Barrier ends exposed to traffic must be protected and designed to reduce the effect of vehicle impacts. Include temporary crash cushions in the contract. If the

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Attachment 2





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Attachment 3

48-4.01C Submittals

Temporary decking shop drawings and calculations must include:

1. Storage location of equipment and materials that allows for 1 shift of work and placement of temporary decking within the time allowed
2. Construction sequence and schedule details
3. Cure time for concrete to be placed under temporary decking
4. Details for removing temporary decking and restoring the existing structure

If temporary decking is not shown, shop drawings and calculations must also include:

1. Design calculations, including the description, location, and value, of all loads
 2. Details of the connection between the temporary decking and the existing or new structure
-