

# **BNSF RAILWAY COMPANY**



**GUIDELINES FOR PREPARATION OF**  
**BRIDGE DEMOLITION & REMOVAL PLAN**  
**OVER THE BNSF RAILWAY**

**OFFICE OF DIRECTOR BRIDGE ENGINEERING**  
**KANSAS CITY, KANSAS**  
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## INDEX

	<b>ITEM</b>	<b>PAGE</b>
I.	<b>General</b>	<b>1</b>
II.	<b>Bridge Removal Plan</b>	<b>2</b>
III.	<b>Procedure</b>	<b>4</b>
IV.	<b>Track Protection</b>	<b>5</b>
V.	<b>Cranes</b>	<b>6</b>
VI.	<b>Cutting Torches</b>	<b>7</b>
VII.	<b>Utilities</b>	<b>8</b>
VIII.	<b>Hazardous Material</b>	<b>8</b>
	<b>Appendix</b>	<b>9</b>

## **I. GENERAL**

### **A. The Contractor's work shall in no way impede the train operations.**

1. The words "demolition" and "removal" will be used interchangeably in this Guideline.
2. The term "Railroad" refers to the Railroad's Engineers or designated representative.

### **B. Safety takes precedence over productivity. The Contractor shall be responsible for planning and executing all procedures necessary to remove the structure in a safe, predictable manner.**

1. All employees of the Contractor and Subcontractors must be Safety Trained. Refer to <http://www.railroadsafetytraining.com>

### **C. The Contractor shall develop a demolition plan ONLY AFTER CONSULTING WITH THE RAILROAD TO GET AN ESTIMATE OF THE RANGE OF TRACK WINDOWS THAT MIGHT NORMALLY BE AVAILABLE FOR THE JOB SITE.**

1. A Track Window is the elapsed time between approaching trains.
2. An estimate of the availability of Track Windows can be used by the Contractor to design a demolition plan. The estimated Track Window is a guideline and not to be considered as a guarantee for available working time.
3. A Track Window is highly variable, depending on the location. Low speed - low train density tracks have predictable Track Windows. The opposite is true for high density- high speed main tracks. The Railroad can furnish a range of Track Windows that might be expected at a specific location under normal train traffic conditions.
4. Plan the demolition procedures based upon the smallest ESTIMATED Track Window. Do not assume the longest Track Window will be available on any given day. Do not assume the same Track Windows will be available from one day to the next.

### **D. The Railroad's tracks and property shall be protected at all times.**

1. Removal procedures shall take into account SEVER WEATHER CONDITIONS, including high winds, heavy rains and snowfall accumulation.
2. The contractor shall ensure that all areas adjacent to active tracks shall remain free from hazards.
  - a) Trainmen must have an unobstructed walkway available parallel to all active tracks.
  - b) All open excavations shall be protected with fencing.
  - c) Do not store materials or equipment within 25 feet of the centerline of an active track.
3. Protect the project area from vandalism.
  - a) Do not leave debris where vandals could place it on the tracks to drop it onto the tracks from an overhead structure.

- b) Secure all heavy equipment from potential movement by vandals.
- c) Do not store flammable materials on railroad right of way. Remove combustible waste materials daily. Do not store fuel or other flammable liquids on railroad right of way.

**E. All demolition materials and scrap shall be disposed of outside the Railroad right-of-way at no expense to the railroad. At the conclusion of the project, the area must be left in a clean and graded condition to the exclusive satisfaction of the Railroad.**

**F. No work is allowed within 25 feet of the nearest track unless protected by a Railroad Flagman. When trains approach the work site, all demolition activity within 50 feet of the track shall stop until the entire length of the train has passed the work site.**

**G. The staged demolition of any portion of a structure over or adjacent to operational tracks will not jeopardize the stability of other parts of the structure awaiting demolition.**

- 1. Where multiple tracks are involved, the demolition plan should be engineered as much as practical such that no more than one track is rendered impassable at any given moment.

**H. No blasting will be permitted on Railroad's right-of-way.**

## **II. BRIDGE REMOVAL PLAN**

**A. The Contractor shall submit a detailed Bridge Removal Plan to the Railroad. The Bridge Removal Plan shall encompass the following:**

- 1) Provide a scale drawing showing the plan view, elevation and location of the structure and locations of any access roads needed on railroad right of way to access the job site. The as-built drawings may be used for the submittal provided the removal steps are clearly marked and legible.
- 2) Indicate the position of all railroad tracks below the bridge. Identify each track as mainline, siding, spur, etc. Identify locations where temporary crossings will be installed to cross equipment over each track.
- 3) List in sequential order, all procedures necessary to remove the bridge in a safe and controlled manner. Include step by step details of each sequence and the elapsed time required to execute the sequence. The removal plan must specify which, if any, sequences will render a track impassable to trains during execution of the sequence. If more than one track is adjacent to the work area, specify which tracks will be impassable during execution of each sequence.
- 4) Include text, drawings or photos to communicate the types of equipment that will be utilized. Include diagrams showing the position of the equipment in relation to the tracks. Where cranes are to be used, furnish the lifting capacities of the crane at the anticipated radius and the weights of components to be removed.

## Guidelines for Preparation of Bridge Demolition and Removal Plan over the BNSF Railway

- 5) For every sequence, specify the minimum horizontal clearance from centerline of track and the minimum vertical clearance above top of rail for equipment, falsework, rubble shields and temporary supports. If a crane is to be utilized, include clearances for the backswing radius of the crane counterweight and the position of the outriggers. (Refer to the attached frame protection diagram for the minimum allowable vertical and horizontal clearances.)
- 6) If the removal plan includes concrete demolition, include the details of rubble control such as maximum anticipated size of rubble, drop distance, shield size and shield position.
- 7) The Bridge Removal Plan will indicate locations and types of temporary supports, shoring, cables or bracing required. Refer to current standard drawing 106613 "General Shoring Requirements" "Guidelines for Design and Construction of Falsework for Structures" and "Guidelines for Design and Construction of Shoring Adjacent to Active Railroad Tracks", and the appropriate Federal, State and local regulations and building codes.
- 8) If any temporary supports interfere with the natural drainage along the Railroad right-of-way, a temporary drainage diversion plan shall be included in the Bridge Removal Plan. The drainage plan shall route all surface water away from the railroad tracks.
  - a) Do not block drainage in side ditches with debris.
  - b) Do not place footing blocks in drainage ditches.
  - c) Surface runoff must be diverted away from the footing block excavations to avoid saturation of the underlying supporting soils.
- 9) The Demolition Plan shall include details, limits, and locations of protective shields or other measures designed to protect the rails, ties and ballast from falling debris. Include details of catchment apparatus necessary to protect the tracks from rolling debris that may fall onto side slopes. Include the design load for the shields for both the maximum static load and the maximum anticipated impact loads from falling debris. Specify the type of equipment that will be utilized to remove the debris and shields from operational tracks.
- 10) Protection of the track ballast section must be provided to avoid contamination of the rock with fine dust and mud produced during demolition activities. Filter fabric or some other effective means of prevent ballast contamination should be incorporated into the Demolition Plan.
- 11) All overhead and underground utilities in the area affected by removal of the bridge shall be located on the drawings, including any fiber optic, railroad signal, and communication lines.
- 11) Indicate the limits of demolition of substructures, including depths and dimensions of excavations that might be necessary to demolish buried footings.
- 12) The Demolition Plan should include details of planned on-site fire suppression.

**B. The Contractor shall submit to the Railroad: three (3) complete sets of the Bridge Removal Plan for review and comments.**

## Guidelines for Preparation of Bridge Demolition and Removal Plan over the BNSF Railway

1. The Plan shall be sealed by a Civil or Structural Engineer registered in the state where the proposed demolition will take place.
2. A minimum of four (4) weeks shall be expected for the Railroad's review after the complete submittal is received.
3. No removal operations will be permitted over the Railroad right of way until the submitted material has been reviewed and approved.

**C. Approval and/or comments furnished by the Railroad in the course of review of the Contractor's Removal Plan will not relieve the Contractor of the ultimate responsibility for the safe and secure demolition of the structure.**

### **III. PROCEDURE**

**A. The Bridge Removal Plan must be executed such that stability is continuously maintained for the standing portions of the structure over all tracks.**

- 1) All members of the structure being demolished must be continuously supported to resist high winds, including wind buffets and suction forces generated by high speed trains.

**B. Prior to proceeding with bridge removal, the sealing Civil or Structural Engineer, or his authorized representative, shall inspect all components of the temporary support shoring, including temporary bracing and protective coverings, insuring conformity with the working drawings.**

- 1) The sealing Engineer shall certify in writing to the Railroad that the work is in conformance with the drawings and that the materials and workmanship are satisfactory.
- 2) A copy of this certification shall be available at the job site at all times.

**C. Well in advance of planned work, coordinate the removal schedule with the Railroad.**

- 1) No work is allowed within 25 feet of the nearest active track unless protected by a Railroad Flagman.
- 2) All the removal work within 25 feet of the nearest active track shall be performed during the Track Windows granted by the Railroad Flagman.
- 3) When trains pass the work site, all demolition activity within 50 feet of the track shall stop until the entire length of the train has passed the work site.

**D. All substructures shall be removed to at least 3 feet below the final finished grade or at least 3 feet below base of rail whichever is lower, unless otherwise specified by the Railroad.**

**E. All debris and refuse shall be removed from the railroad right of way by the Contractor. The premises shall be left in a neat and presentable condition to the exclusive satisfaction of the Railroad. Soils contaminated by fuel spills, hydraulic oil leaks, etc. will be removed from railroad right of way and replaced to the exclusive satisfaction of the Railroad.**

**F. The work progress shall be reviewed and logged by the Contractor's Engineer. Should an unplanned event occur, the Contractor shall inform the Railroad and submit a procedure to correct or remedy the occurrence.**

**G. Beam removal and all other demolition procedures shall take place as much as practicable with equipment positioned above the track. In the rare case that beams require removal from below the structure, the following steps shall be taken before beams are allowed to straddle the tracks:**

- 1) Certain territories with high density train traffic, especially where multiple main tracks are affected, may not grant Track Windows on all tracks simultaneously. Beam removal from the underside of structures may not be possible unless the procedure can be accomplished in very short Track Windows or be engineered such that only one track is affected.
- 2) The work shall be scheduled well in advance with the Railroad's Service Unit Superintendent subject to the Railroad's operational requirements for continuous train operations. The beam removal plan must be engineered to minimize the Track Window time.
- 3) The rails, ties and ballast shall be protected. No equipment will be crossed over or placed on the tracks unless pre-approved by the Railroad.
- 4) The beams shall be blocked to prevent the beams from coming into contact with the rails. Blocking shall not be placed on the rails or ties.
- 5) Upon approach of a train, the beams and all personnel and equipment will be moved a position to provide a minimum of 15 feet horizontal clearance and 21 ft. vertical clearance from the nearest rail. Care must be exercised to insure that crane booms are rotated to a position parallel with the track.

#### **IV. TRACK PROTECTION**

**A. The track protective cover shall be constructed before beginning bridge removal work and may be supported by falsework or members of the existing structure. See the attached "Track Shield Detail and Frame Protection Detail" for additional requirements. The following are examples of protective covers that may be acceptable:**

- 1) A decking supported by the bridge or a suspended cover from the bridge above the track clearance envelope.
- 2) A track shield cover over the tracks per the attached detail.

- 3) A framed cover outside the track clearance envelope.
- 4) A catcher box or loader bucket under decking and parapets overhanging the exterior girders.
- 5) Protection of the track ballast section must be provided to avoid contamination of the rock with fine dust and mud produced during demolition activities. Filter fabric or some other effective means of prevent ballast contamination should be incorporated into the Demolition Plan.

**B. Construction equipment shall not be crossed over or placed on the tracks unless the rails, ties and ballast are protected against damage.**

- 1) Track protection is required for all equipment including rubber tired equipment.
- 2) A list of equipment to be crossed over or positioned on the tracks along with the intended method of protection shall be submitted to the railroad for approval prior to use at the job site.

**C. Temporary haul road crossings shall be either Timbers or Precast Concrete Panels. The type of crossing shall be determined by the Railroad.**

- 1) Solid timbers or ballast with timber headers shall be used between multiple tracks.
- 2) If the job site is accessible to the public, all temporary haul road crossings shall be protected with barricades or locked gates when the Contractor is not actively working at the site.
- 3) Installation and removal of temporary track crossings for equipment shall be scheduled well in advance with the Railroad.

## **V. CRANES**

**A. When cranes are operated over or adjacent to the tracks the following is required:**

- 1) The Contractor shall verify that the foundations and soil conditions under the crane and crane outriggers can support the loads induced by the crane under an assumed maximum capacity lift. The size and material type of crane mats shall be rigid and of sufficient capacity to safely distribute the crane loads.
- 2) Front end loaders and backhoes cannot be used in place of a crane to lift materials over the tracks. These types of equipment do not have the necessary safety features built into the machines to circumvent overloading and tipping. Only cranes with the rated capacity to handle the loads may be used.
- 3) Additional track protection may be required for a crane when crossing over the track. The protection methods shall be submitted to the Railroad for review and comment well in advance of intended use.

6) Cranes and other equipment utilizing outriggers shall not place outriggers on the tracks or ballast.

7) Cranes or crane booms shall not be positioned within the track clearance envelope without Railroad Flagman protection. Cranes operating from a position farther than 25 ft. from the nearest track will need a Railroad Flagman present if the boom length is such that it could fall onto a track.

8) During passage of a train, the Crane Operator must stop all movements. Crane Operators shall remain in the cab with motor at idle with the load lines, boom, rotation and travel controls locked and stationary until the full length of the train has passed the job site.

## **VI. CUTTING TORCHES**

### **A. When a cutting torch or welding equipment is used in the demolition process, the following steps shall be taken:**

- 1) Fire suppression equipment is required on-site.
- 2) Do not use a torch over, between, or adjacent to the tracks unless a steel plate protective cover is used to shield against sparks and slag coming into contact with timber ties. Care shall be taken to make certain the use of a steel plate does not come in contact with the rails. See "Track Shield Details" for other requirements. Details of the shield shall be submitted to the Railroad for approval.
- 3) Wet the ties below the steel plate and wet other timbers and flammable demolition debris located near cutting areas.
- 4) Monitor the work site for at least three hours after cutting has ceased to detect a smoldering fire.

### **B. Extensive overhead cutting may require more robust fire suppression equipment and precautions than what would normally be required for routine cuts.**

- 1) On days when extensive torch cutting is planned, the Contractor shall have a larger water supply on hand or take other measures as needed to effectively suppress fires.
- 2) Overhead torch cutting and welding must cease upon approach and passage of a train.
- 3) Extensive torch cutting shall not take place during high winds.
- 4) Contractor will clear vegetation and other combustible debris from the surrounding work areas prior to engaging in extensive torch cutting.

## **VII. UTILITIES**

**A. The demolition operations shall be planned such that the utility lines are operating safely at all times. The utility lines shall be protected if affected by demolition operations. All the work associated with utility lines should be coordinated by the contractor with the respective utility companies.**

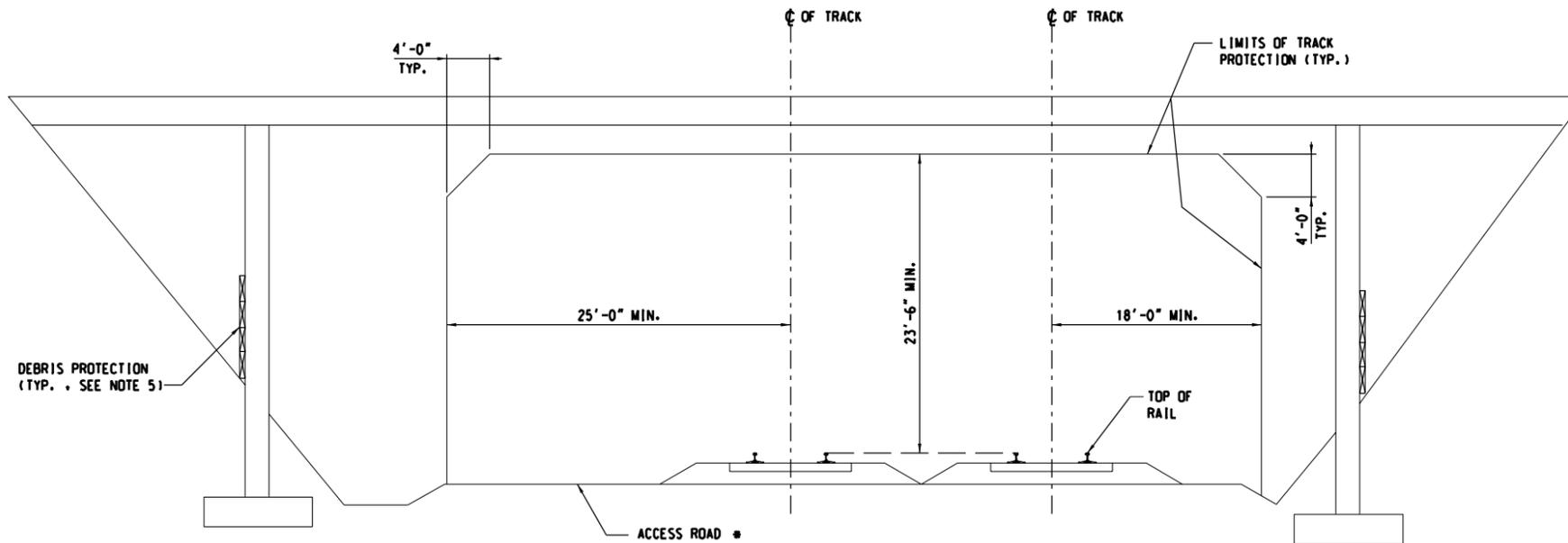
## **VIII. HAZARDOUS MATERIALS**

**A. If any hazardous materials are discovered, provide material protection as specified in local hazardous material codes and immediately contact the Railroad.**

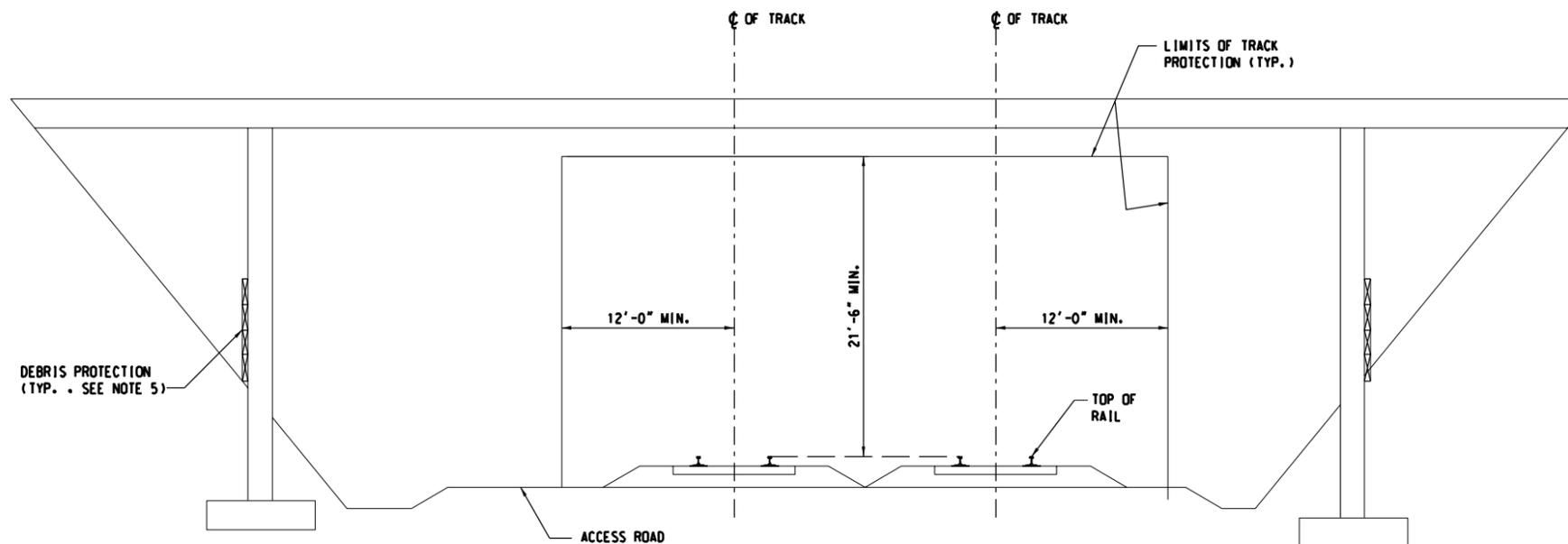
- 1) If pipelines are attached to the structure, pipes must be purged of flammable or hazardous materials prior to beginning demolition.
- 2) Fuel spills, hydraulic fluid releases, equipment oil leaks or any other release of contaminants must be reported to the Railroad. Contaminated soils must be removed and replaced to the satisfaction of the Railroad.

## **APPENDIX – BNSF-UP Demolition Drawings**

- Demolition Frame Protection Details (Sheets 1 of 3 & 2 of 3)
- Demolition Track Shield Details (Sheet 3 of 3)



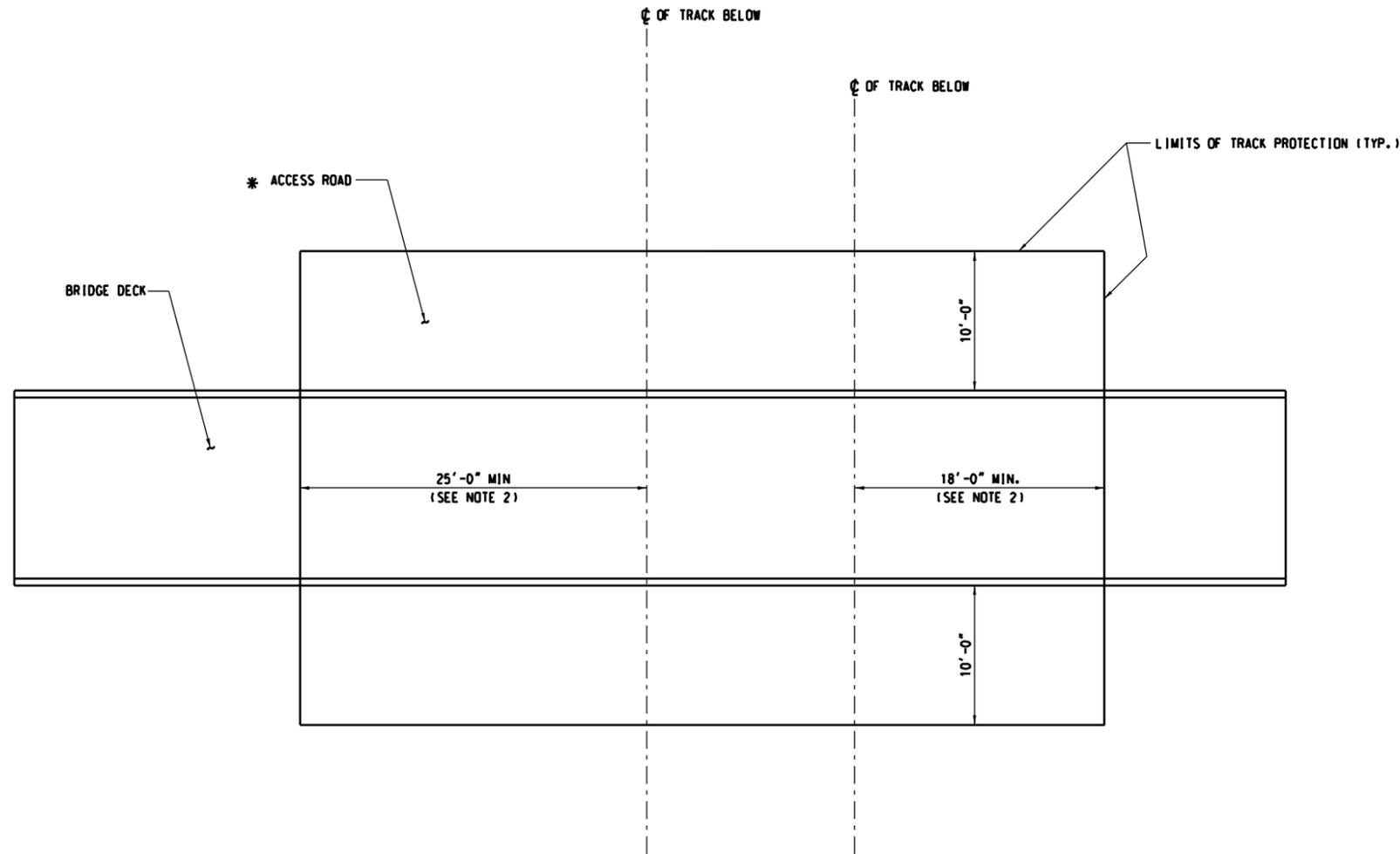
**BRIDGE ELEVATIONS  
STANDARD LIMITS OF PROTECTION FOR FRAME PROTECTION**



**BRIDGE ELEVATION  
MINIMUM LIMITS OF PROTECTION FOR FRAME PROTECTION  
(SPECIAL PERMISSION REQUIRED, SEE NOTE 1)**

1. THE STANDARD LIMITS OF PROTECTION NOTED ARE THE MIN. CLEARANCES ALLOWED WITHOUT SPECIAL PERMISSION FROM THE RAILROAD. THE REDUCED CLEARANCES NOTED MAY BE ALLOWED BY THE RAILROAD. SPECIAL PERMISSION FOR THE REDUCED CLEARANCES IS REQUIRED FROM THE RAILROAD AND PUBLIC AGENCY.
2. THE PROTECTION FRAME SHALL AS A MINIMUM MATCH THE DEMOLITION LIMITS SHOWN AND EXTEND PAST THE BRIDGE WIDTH AS SHOWN ON THE ATTACHED DEMOLITION PLAN SHEET.
3. FOR ADDITIONAL CLEARANCE AND PROTECTION INFORMATION REFER TO CONTRACT EXHIBITS.
4. THE PROTECTION FRAME SHALL PREVENT DEMOLITION DEBRIS, DUST AND FINE MATERIAL FROM FALLING INTO THE RAILROAD TRACKS, ACCESS ROAD OR TRAINS. THE FRAME SHALL BE DESIGNED BY THE CONTRACTOR TO SUPPORT THE ANTICIPATED DEMOLITION LOADS, AND IN ACCORDANCE WITH CALTRANS FALSEWORK MANUAL FOR STRUCTURES OVER THE RAILROAD.
5. DEBRIS PROTECTION IS REQUIRED NEAR THE BASE OF THE SIDE SLOPES AND ADJACENT TO ROADS USED BY DEMOLITION EQUIPMENT TO PREVENT DEBRIS FROM ROLLING ONTO TRACK. ACCESS ROAD OR DITCH. USE TIMBERS AS REQUIRED TO STOP LARGE PIECES OF ROLLING DEBRIS.
6. ANY ACTIVITY WITHIN 25 FEET OF THE NEAREST RAIL OF A TRACK REQUIRES A FLAGMAN.

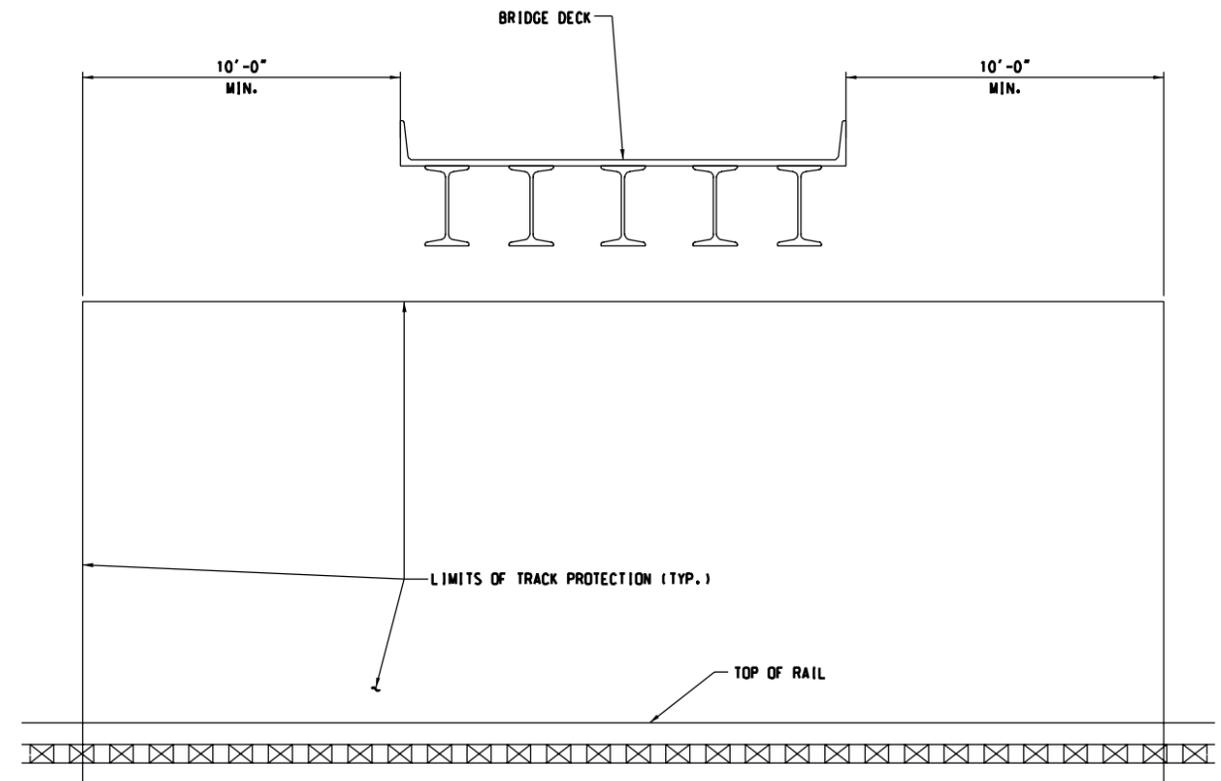
• IF NO ACCESS ROAD USE MIN. DIMENSION FROM OTHER SIDE OF DETAIL



**BRIDGE PLAN**  
STANDARD LIMITS OF PROTECTION FOR FRAME PROTECTION

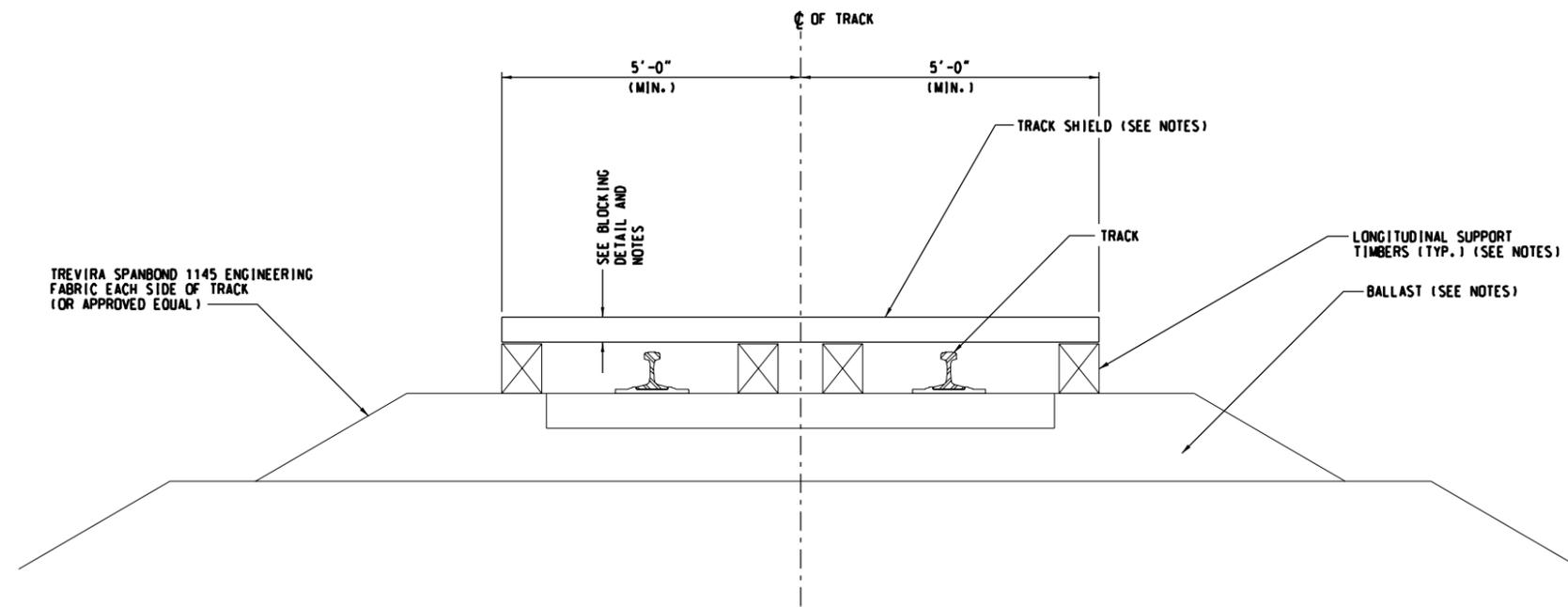
**NOTES:**

1. SEE GENERAL NOTES ON BRIDGE ELEVATION SHEET.
2. STANDARD LIMITS OF PROTECTION ARE SHOWN. FOR MIN. LIMITS OF PROTECTION DIMENSIONS, SEE BRIDGE ELEVATION. MINIMUM LIMITS OF PROTECTION.

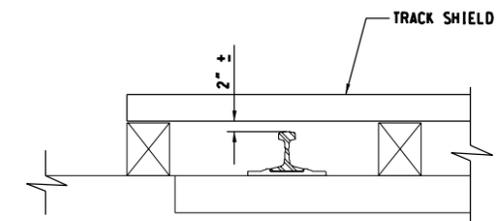


**BRIDGE DECK CROSS SECTION**  
STANDARD LIMITS OF PROTECTION

\* IF NO ACCESS ROAD, USE MIN. DIMENSION FROM OTHER SIDE



**TRACK SHIELD DETAIL  
FOR DEBRIS FALLING FROM BRIDGE DECK REMOVAL  
(WHEN TRACK TIME WINDOW IS AVAILABLE)**



**BLOCKING DETAIL**

**NOTES:**

1. A FLAG MAN IS REQUIRED AT ALL TIMES DURING THE USE OF A TRACK SHIELD.
2. THE TRACK SHIELD SHALL BE DESIGNED BY THE CONTRACTOR AND SHALL BE OF SUFFICIENT STRENGTH TO SUPPORT THE ANTICIPATED LOADS, INCLUDING IMPACT AND PUNCTURE. THE SHIELD SHALL PREVENT MATERIALS AND EQUIPMENT OR DEBRIS FROM FALLING ONTO THE RAILROAD TRACK. ADDITIONAL LAYERS OF MATERIALS SHALL BE FURNISHED AS NECESSARY TO PREVENT FINE MATERIALS OR DEBRIS FROM SIFTING DOWN UPON THE TRACK.
3. THE SHIELD SHALL BE PREFABRICATED AND FURNISHED WITH LIFTING HOOKS TO SIMPLIFY REMOVAL.
4. THE SHIELD SHALL BE OF SUFFICIENT STRENGTH TO SPAN BETWEEN IT'S SUPPORTS WITHOUT BEARING UPON THE RAILS AND TO WITHSTAND DROPPING RUBBLE.
5. BEFORE REMOVAL THE SHIELD SHALL BE CLEANED OF ALL DEBRIS AND FINE MATERIAL. GEOFABRIC SHALL LINE THE BALLAST SECTION TO PREVENT CONTAMINATION.
6. THE TRACK SHIELD SHALL EXTEND AT LEAST 20 FEET BEYOND THE LIMITS OF DEMOLITION TRANSVERSE TO THE EDGE OF THE BRIDGE.
7. LONGITUDINAL SUPPORT TIMBERS FOR THE SHIELD SHALL NOT EXTEND ABOVE THE TOP OF RAIL WHEN THE SHIELD IS REMOVED. BLOCKING FROM THE TOP OF RAIL TO THE BOTTOM OF THE SHIELD MAY BE ATTACHED TO THE SHIELD. REMAINING TIMBERS SHALL BE ANCHORED.
8. FOR TRAIN PASSAGE, THE RUBBLE SHALL BE REMOVED TO A MINIMUM OF 8'-6" FROM THE NEAREST RAIL AND TO AN ELEVATION NO HIGHER THAN THE TOP OF RAIL.
9. AT THE END OF THE DAY, THE RUBBLE SHALL BE REMOVED COMPLETELY TO A MINIMUM OF 10'-0" FROM THE NEAREST RAIL AND DOWN TO ORIGINAL GRADE. GEOFABRIC BARRIER SHALL BE USED TO PREVENT BALLAST CONTAMINATION BY FINE MATERIALS.
10. CARE SHALL BE TAKEN TO NOT PLACE METAL ACROSS THE TRACK RAILS. RAILROAD COMMUNICATION ARE SENT THROUGH THE RAILS AND WILL BE DISRUPTED BY A SHORT BETWEEN RAILS.
11. DETAILS SHOWN APPLY FOR TIMBER TIES. SPECIAL DETAILS ARE REQUIRED FOR CONCRETE TIES.



**DEMOLITION TRACK SHIELD DETAIL**

DATE: OCTOBER 17, 2007

SHEET: 3 OF 3