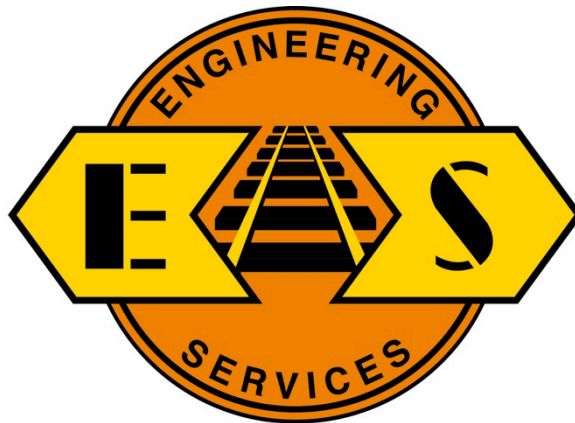


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# Public Project Manual

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*For any activity or project  
that may involve the railroad*



**a Genesee & Wyoming Company**

Prepared by Public Projects Department  
Revision: April 2019

## Section 01 – General Information

1.01	Table of Contents	01
1.02	Introduction	02
1.03	Basic Information in this Manual	03
1.04	Definitions and Common Terms	04
1.05	Payment of Railroad Cost and Expenses	06
1.06	Insurance Requirements for Public Projects	07
1.07	Railroad Flagging Requirements	07
1.08	Engineering Reviews and Construction Monitoring	08
1.09	Real Estate	09
1.10	Project Requirements	10
1.11	Construction Submission Criteria	12
1.12	Railroad Property Safety	23

## Section 02 – Types of Projects

2.01	Public Road Crossing Openings and Closures	24
2.02	Highway-Rail Grade Crossing Warning Devices	25
2.03	Highway-Rail Grade Crossing Surface Maintenance	27
2.04	Parallel Road Construction and Maintenance	28
2.05	Overhead and Undergrade Bridges	29
2.06	Cleaning and Painting of Bridges	42
2.07	Quiet Zones	44

## Section 1.02 – Introduction

Indiana & Ohio Railway Company (the Railroad) is a subsidiary of Genesee & Wyoming Inc. (G&W), the largest holding company in the U.S. of regional and short line railroads. G&W has more than 100 subsidiary railroads in 41 U.S. states and four Canadian provinces serving thousands of communities and customers. G&W also has a major rail freight presence in Australia and Europe.

Each G&W subsidiary railroad is its own separate legal entity with local decision making to best meet customers' needs. G&W's North American railroads are organized in six operating regions that provide a consistent focus on safety, operating standards, and marketing.

G&W railroads receive corporate staff support in areas such as accounting, engineering, legal, mechanical, real estate, and other functions.

The Public Projects Department (PPD) at G&W is part of Engineering Services with the goal to support the railroads. PPD is also tasked to support outside agencies by streamlining the flow of outside party projects and initiatives.

PPD is involved in a wide variety of projects initiated by government agencies, local businesses, and others. Accurate and timely communication of information between the Railroad and these parties improves planning, relationships, and successful completion of projects. The information in this manual explains important steps project sponsors should follow to streamline their projects and proposals.

G&W railroads place the highest priority on the safety of the public and their employees. Therefore, any activity that has the potential to adversely impact safe railroad operations must be evaluated by the Railroad. This manual is intended to be a general guide for reference to the Railroad's minimum requirements and standards. The Railroad reserves the right to deviate from any of the requirements or standards set forth in this manual.

We look forward to working together to serve the common goal of the safe operation of trains. We hope the information provided in this manual makes it easier to work together as a team.

*Jacob Smith*  
Director of Public Projects

## Section 1.03 – Basic Information in this Manual

This manual is intended to be a general guide, but it in no way overrides the express guidance, requirements, or standards of the Railroad. As a tool only, the information herein is intended for broad use and each project will be reviewed by PPD and the Railroad to ensure the safest actions are taken.

Any subject not covered in the manual should be routed to PPD for review.

Any activity that either directly or indirectly impacts railroad property must have approval by the Railroad.

### Common Types of Public Projects

- **Highway-Rail Grade Crossings:** Closure, removal, installation, and alterations of public highway-rail grade crossings.
- **Bridges Over Railroad:** Construction, reconstruction, rehabilitation, repair, removal, painting, and maintenance of bridges over the Railroad by outside parties.
- **Parallel Roads/Facilities:** Construction, reconstruction, modification, removal, and maintenance of parallel roads or other public facilities affecting railroad property or operations.
- **Entry on to Railroad Property:** Temporary rights of entry onto railroad property and utility installation licenses.
- **Other Projects Involving Rail Corridors:** Publicly sponsored projects involving or altering railroad facilities or its property. These projects may be on, above, adjacent to, or otherwise have the potential to impact the property.
- **General Engineering Consultants (GEC):** Although the PPD is the primary point of contact, GECs provide additional engineering services as directed by the Railroad to assist the Railroad in managing public projects.

## Section 1.04 – Definitions and Common Terms

- **Agency** – The project sponsor (i.e., state DOT, local agencies, private developer, etc.)
- **AREMA** – American Railway Engineering and Maintenance-of-Way Association – the North American railroad industry standards group. The use of this term shall be in specific reference to the AREMA Manual for Railway Engineering.
- **Basis for Design (BOD)** – The developed scope of a project needed to bid out the project.
- **Construction Engineering Inspection (CEI)** – Consultant who oversees the construction operations who is authorized to act on behalf of the Railroad to ensure that only the safest and least impactful practices are being performed.
- **Contractor** – The agency’s representative retained to perform the project work.
- **Engineer** – G&W engineering representative or a GEC authorized to act on their behalf.
- **Employee in Charge (EIC)** – An employee or designated contractor qualified to protect a project team during an operation, activity, or project.
- **Flagman/Flagger** – A qualified EIC with the sole responsibility protect the outside public and contractors while facilitating the safe passage of trains.
- **General Engineering Consultant (GEC)** – Consultant who has been authorized to act on the behalf of the Railroad. GECs perform preliminary engineering, construction inspection, and monitoring under the direction of the engineering personnel. GEC personnel also perform day-to-day administration of certain types of projects.
- **Notice to Proceed (NTP)** – Authorization by the project sponsor allowing the Railroad, its appointed consultants, and subcontractors to proceed out of PE and move into construction.
- **Order of Magnitude (OOM)** – A high-level estimate to quantify the estimated total value of the project. Typically the estimate is marked up to account for the project unknowns.
- **Potential to Encroach** – Any activity having the possibility of impacting railroad property or operations, defined as one or more of the following:
  - Any activity where access onto railroad property is required.
  - Any activity where work is being performed on the Railroad’s Right of Way (ROW).
  - Any excavation work adjacent to railroad tracks or facilities, within the theoretical railroad live load influence zone, or where the active earth pressure zone extends within railroad property.
  - The use of any equipment that, if tipped and laid flat in any direction (360 degrees) about its center pin, can encroach within twenty-five feet (25’-0”) of the nearest track. This is based upon the proposed location of the equipment during use and may be a function of the equipment boom length.
    - Note that hoisting equipment with the potential to foul must satisfy the 150% factor of safety requirement for lifting capacities.
  - Any activity where the scatter of debris or other materials has the potential to encroach within twenty-five feet (25’-0”) of the nearest track.
  - Any activity where significant vibration forces may be induced upon the track structure or existing structures located under, over, or adjacent to the track structure.

- Any other work that poses the potential to disrupt rail operations, threaten the safety of railroad employees, or otherwise negatively impact railroad property, as determined by the Railroad.
- **Preliminary Engineering (PE)** – The review and development of the project scope or project discovery that typically includes a site visit, design or design review, and estimate to complete the project.
- **Public Projects Department (PPD)** – A member of the G&W Public Projects team or assigned GEC representative.
- **Request for Proposal (RFP)** – The process by which a design-build contractor is selected and awarded to complete the project.
- **Right of Entry (ROE)** – Formal document applied for through the G&W Real Estate Department.
- **Right of Way (ROW)** – Railroad Right of Way as well as any railroad property and facilities. This includes all aerial space within the property limits and any underground facilities.
- **Theoretical Railroad Live Load Influence Zone** – 1 horizontal to 1 vertical theoretical slope line starting at bottom corner of tie.
- **Top of Rail (TOR)** – This is the base point for clearance measurements. It refers to the crown (top) of the steel rail, the point where train wheels bear on the steel rails. Use the higher of the two rails when track is superelevated.
- **Track Structure** – All load-bearing elements that support the train. This includes, but is not limited to, the rail, ties, appurtenances, ballast, sub-ballast, embankment, retaining walls, and bridge structures.
- **Vertical Clearance** – Distance measured from TOR to the lowest obstruction, within six feet (**6'-0"**) of the track centerline, in either direction.

## Section 1.05 – Payment of Railroad Cost and Expenses

### Summary

The project types addressed in this manual typically do not directly benefit railroad operations. In some cases, they create risk to and challenges for railroad operations and impact the Railroad's ability to serve its customers and the American economy. For these reasons, the Railroad seeks payment for its costs and expenses incurred in connection with project reviews and construction.

### Types of Reimbursable Costs and Expenses

Costs reimbursable by the project sponsor in connection with the project include, but are not limited to:

- The Railroad's labor and support services
- Sums paid to railroad consultants and subcontractors
- Engineering reviews and CEI
- All out-of-pocket expenses
- Costs for equipment, tools, materials, and supplies
- Telephone, facsimile, and mailing expenses
- Real estate or legal reviews
- Cost for flagging or other action to protect rail operations and infrastructure

### Key Points

- Preliminary engineering is usually initiated by the project sponsor with a commitment to reimburse for the project discovery and engineering services.
- The Railroad will not begin its preliminary engineering review until a PE agreement or other legal reimbursable agreement is provided.
- PE costs typically range between \$10,000 to \$30,000 depending on the project.
- All funding sources must be identified up front, and any time funding sources change, the Railroad must be immediately informed. All special funding requirements must be identified prior to the commencement of any project, such as "Buy America" or "Buy American" requirements.
- All costs billed will be actual cost and no profit will be gained by performing services on behalf of the project.
- Construction and CEI will be estimated prior to getting an NTP.
- The Railroad will not begin construction until all applicable contracts are provided along with an NTP.

## Section 1.06 – Insurance Requirements for Public Projects

### Summary

For any project that is performed on, above, or adjacent to railroad property, proper insurance must be obtained, submitted, and approved prior to work commencing. Insurance requirements will be incorporated in all applicable contracts.

The insurance requirements will be determined based on site-specific location as well as level of impact to the Railroad. Those specific requirements can be requested at the initiation of the project once the scope and project limits have been determined.

If during the project the insurance coverage expires or lapses, the agency or its contractor, as applicable, is responsible for notifying the Railroad and ceasing all work until the requirements have once again been met and approved by the Railroad.

## Section 1.07 – Railroad Flagging Requirements

### Summary

In the interest of public safety and the safety of the Railroad's and project sponsor's employees and property, the Railroad will work cooperatively with agencies, consultants, contractors, and others who need to access railroad property when work brings them in close proximity to active railroad tracks to determine the appropriate flagging services needed and to make arrangements for those services.

Flagging services may only be performed by personnel qualified by the Railroad who are trained in the proper procedures related to rail operations and safety requirements, familiar with rail operations and procedures in a project area and able to communicate directly with dispatching personnel and train crews.

All costs and expenses associated with railroad flagging services are the sole responsibility of the agency, consultant, or contractor. The GEC will provide its estimated costs prior to the start of the project work or its assignment of flagging personnel, but it is up to the agency to provide the estimated number of days the flagmen are needed.

Once flagging personnel are formally assigned to a specific work location, the period of assignment can only be changed with appropriate advanced arrangements. Charges for providing flagging services beyond a normal eight-hour weekday are calculated and billed at an overtime rate.

The GEC will coordinate the flagmen and should be the primary point of contact for scheduling, including changing the working schedule or duration the flagmen are required.

### Conditions

The following are conditions that may require the use of a flagman by the Railroad:

- When any entity is working on, near, or adjacent to active railroad tracks.
- When an outside party is using railroad property or performing operations that may affect railroad property or facilities (including occasions when a party has been given express permission to enter railroad property or perform such operations under the terms of the applicable contracts).
- When work off railroad property has the potential to impact railroad property or operations.
- When off-highway construction equipment is crossing the railroad at a private or public crossing.
- When oversized equipment or highway vehicles are to cross the railroad at a private or public crossing.
- In other instances, as determined by the Railroad.



## Section 1.08 – Engineering Reviews and Construction Monitoring

### Summary

Any project proposals that may affect or be near the Railroad's right of way must be evaluated by the Railroad. To initiate a project, a PE agreement or other applicable contract is required to identify the project sponsor and the scope, define the tasks to be accomplished, and specify the payment required. Once the plans and scope are approved by the Railroad, the project can proceed into construction.

The purpose of PE is to identify issues related to safety, engineering, customer service, operations, legal and regulatory matters, expense, risk, and other considerations specific to any proposed project. The Railroad's review is only to determine that the plans and improvements constructed are in accordance with the Railroad standards and satisfy the Railroad's requirements. Plans should be submitted early in project development to ensure that the Railroad requirements can be incorporated up front. If property is leased, the review might require additional party signoff.

### Cost and Timing

Prior to commencing with engineering, design, or reviews, a legal document or associated PE agreement must be executed where the outside party will bear the cost of the design or design reviews (**see Section 1.05**). This includes the cost of railroad employees as well as GEC support. The scope includes attending meetings, site surveys, reviewing plans, preparing plans, correspondence, and any other activity to support the review of the project and development of scope.

It is the goal of PPD to have a design review turned around within 30 to 45 days depending on the level of effort. It is in the interest of all parties to complete the PE review before commitments are made or construction steps begin. The Railroad and its GEC will work with the project sponsor to schedule PE and construction to meet project schedule objectives whenever possible, considering available resources.

### Construction Monitoring

To ensure the safety of the public and railroad employees, maintain quality rail service to customers, and to protect railroad assets, the Railroad may require construction monitoring (in addition to flagman protection) of the project. The construction monitoring will be conducted by the Railroad and its GEC at the expense of the project sponsor.

Construction monitoring includes intermittent or continuous on-site presence of the Railroad or its GEC during construction activities. The following typically applies:

- The construction project sponsor, owner, or agency in charge will pay for the cost of construction monitoring. Construction monitoring will be specified, and the estimated cost will be included in the construction agreement for the project.
- Construction monitoring is in addition to railroad-required flagging.
- Construction monitoring includes the Railroad's review and approval of all plan changes and required contractor submissions during the construction phase of the project.
- The project sponsor is responsible for its safety and the safety of its property, contractors, and employees. The GEC, as part of its construction monitoring, will review the work site for activities that could interfere with safe operation of the Railroad.
- The GEC is only responsible for monitoring the general work activities for safety and impact to the Railroad and its property and not for managing the overall project work. Any observed unsafe acts or conditions will be reported immediately to the project sponsor or contractor representative.

## Section 1.09 – Real Estate

### Summary

All projects that modify or impact the Railroad's property must be reviewed by the G&W Real Estate Department to determine property descriptions, ownership, and implications. Any rail line requiring special handling due to a lease or property agreement must be taken into consideration when performing engineering reviews and providing project acceptance.

All parties accessing the Railroad's ROW for investigative activities or for the performance of construction work are required to have a written agreement with the Railroad fully detailing each party's responsibilities. Activities by others with the potential to affect the Railroad's property, operations, and/or personnel without actually entering the Railroad's property must also be reviewed by the Railroad and appropriate arrangements and agreements completed.

If a right of entry or utility license, or any applicable agreement is required for the project, the agency or its contractor, as applicable, will need to work directly with the G&W Real Estate Department to enter all contracts into place prior to commencing work on the property.

Construction and improvement projects involving railroad property may require a conveyance of property rights, subject to adequate consideration and corporate approvals. Such projects include, but are not limited to:

- Highway – rail grade crossings
- Bridges over/under the railroad
- Parallel roads/facilities
- Road/bridge widening projects

Further clarification can be requested by contacting the PPD and the appropriate G&W Real Estate Department specialist.

## Section 1.10 – Project Requirements

### Summary

The project requirements set forth in this Section 1.10 shall apply to any project, subject to the terms or conditions of any applicable contracts. The Railroad representative shall have final authority in all matters affecting the safe maintenance of railroad operations and property, and his or her approval shall be obtained by the agency or its contractor for methods of construction to avoid interference with railroad operations and property and all other matters contemplated by these requirements.

The agency or its contractor shall arrange and conduct its work so that there will be no interference with railroad operations, including train, signal, telephone, and telegraphic services, or damage to railroad property or to poles, wires, and other facilities of tenants on its property or right of way. The agency or its contractor shall store materials so as to prevent trespassers from causing damage to trains or property. Whenever work is likely to affect the operations or safety of trains, the method of doing such work shall first be submitted to the Railroad for approval, but such approval shall not relieve the agency or its contractor from liability in connection with such work. No work shall be performed without it first being approved by the Railroad.

If conditions arising from or in connection with the project require that immediate and unusual provisions be made to protect train operation or property, the agency or its contractor shall make such provisions. If the Railroad determines that such provisions are insufficient, the Railroad may, at the expense of the agency or its contractor, require or provide such provisions as may be deemed necessary, or cause the work to cease immediately.

If the agency or its contractor violate or fail to comply with any of the requirements in the section, the Railroad may:

- Require the agency and/or the contractor to vacate its property;
- Withhold monies due the agency and/or the contractor;
- Require the agency to withhold monies due to the contractor; and
- Cure such failure, and the agency and/or any contractor shall reimburse the Railroad for the cost of curing such failure.

### Notice to Start Work

The agency or its contractor shall not commence any work on railroad property or ROW until it has entered into all applicable contracts and received all requisite approvals from the Railroad. Thereafter, unless otherwise specified in such applicable contracts, the agency or its contractor must:

- Notify the Railroad in writing of the date that it intends to commence work on the project. Such notice must be received at least 10 business days in advance of the date the agency or its contractor proposes to begin work on railroad property. The notice must refer to the specific project agreement. If flagging service is required, such notice shall be submitted at least thirty (30) business days in advance of the date scheduled to commence the work.
- Obtain authorization from the Railroad to begin work on the property, such authorization to include an outline of specific conditions with which it must comply.
- Obtain from the Railroad the names, addresses, and telephone numbers of railroad personnel who must receive notice under provisions in the construction agreement. Where more than one individual is designated, the area of responsibility of each shall be specified.

### Hauling across Railroad

If the agency or its contractor desires access across the Railroad's property or tracks at a location other than an existing and open public road crossing in or adjacent to the construction of the project, the agency or contractor must first obtain the permission of the Railroad and shall execute any applicable contracts as described in **Section 1.09** Real Estate herein.

### Cooperation & Delays

The agency or its contractor shall arrange a schedule with the Railroad for accomplishing stage construction involving work by the Railroad. In arranging its schedule, the agency or contractor shall ascertain from the Railroad the lead time required for assembling crews and materials and shall make due allowance therefore.

The agency or its contractor may not charge any costs or submit any claims against the Railroad for hindrance or delay caused by railroad traffic; for any work done by the Railroad or other delay incident necessary for safe maintenance of railroad traffic; or for any delays due to compliance with these requirements. Agency and contractor shall cooperate with others participating in the construction of the project to the end that all work may continue to move forward.

The agency and its contractor understand and agree that the Railroad does not assume any responsibility for work performed by others in connection with the project. The agency and contractor further understand and agree that they shall have no claim whatsoever against the Railroad for any inconvenience, delay, or additional cost incurred by the agency or contractor on account of operations by others.

### Storage

The agency and its contractor shall not store their materials or equipment on railroad property or where they may potentially interfere with operations unless the agency or contractor has received prior written permission. The agency and contractor understand and agree that the Railroad will not be liable for any damage to such materials and equipment from any cause and that the Railroad may move, or require the agency or its contractor to move, such material and equipment at the agency's or contractor's sole expense. To minimize the possibility of damage to the Railroad tracks resulting from the unauthorized use of equipment, all grading or other construction equipment that is left parked near the tracks unattended shall be immobilized to the extent feasible so that it cannot be moved by unauthorized persons.

### Construction

Construction work on railroad property shall be subject to the Railroad's inspection and approval. Work shall be in accordance with written specific conditions and with these requirements. The agency or its contractor shall obtain the Railroad and agency representative's prior written approval for use of explosives on or adjacent to railroad property. If permission for use of explosives is granted, the agency or contractor must comply with the following:

- Blasting shall be done with light charges under the direct supervision of a responsible officer or employee of agency or contractor.
- Electric detonating fuses shall not be used because of the possibility of premature explosions resulting from operation of two-way train radios.
- No blasting shall be done without the presence of the Railroad's CEI. At least 30 days' notice to the Railroad is required to arrange for site presence.
- Explosives shall not be stored on railroad property.

The Railroad will:

- Determine the approximate location of trains and advise the agency or contractor of the approximate amount of time available for the blasting operation and cleanup.
- Have the authority to order discontinuance of blasting if, in the Railroad's opinion, blasting is too hazardous or is not in accord with these requirements.

The agency or its contractor shall maintain all ditches and drainage structures free of silt or other obstructions that may result from their operations. The agency or contractor shall provide erosion control measures during construction and use methods that accord with applicable state standard specifications for road and bridge construction, including (1) silt fence; (2) hay or straw barrier; (3) berm or temporary ditches; (4) sediment basin; (5) aggregate checks; and (6) channel lining. All such maintenance and repair of damages due to agency's or contractor's operations shall be performed at agency's expense.

The agency shall arrange, upon approval from the Railroad, to have any utility facilities on or over railroad property changed as may be necessary to provide clearances for the proposed trackage.

The agency or its contractor, upon completion of the project, shall remove from railroad property any temporary grade crossings; any temporary erosion control measures used to control drainage; and all machinery, equipment, surplus materials, falsework, rubbish, or temporary buildings belonging to the agency or contractor. The agency or contractor, upon completion of the project, shall leave railroad property in neat condition, satisfactory to the Railroad.

## Section 1.11 – Construction Submission Criteria

### Summary

The intent of this manual is to guide outside parties and their contractors when performing work on, over, or with potential to impact railroad property. Work plans shall be submitted for review to the Railroad for all work that presents the potential to affect railroad property or operations. All work shall be performed in a manner that does not adversely impact the Railroad operations or safety; as such, the requirements of this manual shall be strictly adhered to, in addition to all other applicable standards associated with the construction.

### General

- A construction work plan is required to be submitted by the agency or the Railroad for review and acceptance prior to accessing or performing any work with potential to foul.
- The agency or its representative shall submit sets of plans, specifications, supporting calculations, detailed means and methods, and procedures for the specific proposed work activity.
- Construction submissions shall include all information relevant to the work activity and shall clearly and concisely explain the nature of the work, how it is being performed, and what measures are being taken to ensure that railroad property and operations are continuously maintained.
- All construction plans shall include a map of the work site depicting the tracks, the ROW, proposed means of access, proposed locations for equipment and material staging (dimensioned from nearest track centerline), as well as all other relevant project information. An elevation drawing may also be necessary to depict clearances or other components of the work.
- Please note that the Railroad will not provide pricing to individual contractors involved in bidding projects. Bidding contractors shall request information from the agency only.
- The contractor shall install a geotextile fabric ballast protection system to prevent construction or demolition debris and fines from fouling ballast. The geotextile ballast protection system shall be installed and maintained by the contractor to the satisfaction of the Railroad.
- The Railroad shall be kept aware of the construction schedule. The contractor shall provide timely communication to the Railroad when scheduling the work such that a representative may be present during the work. The contractor's schedule shall not dictate the work plan review schedule, and flagging shall not be scheduled prior to receipt of an accepted work plan.

- At any time during construction activities, the Railroad may require revisions to the previously approved procedures to address weather, site conditions, or other circumstances that may create a potential hazard to rail operations or facilities. Such revisions may require immediate interruption or termination of ongoing activities until such time the issue is resolved to the Railroad's satisfaction. The Railroad shall not be responsible for any additional costs or time claims associated with such revisions.
- Blasting will not be permitted to demolish a structure over or within railroad property. When blasting off railroad property but with potential to foul, vibration monitoring, track settlement surveying, and/or other protective measures may be required as determined by the Railroad.
- Blasting is not permitted adjacent to the Railroad's ROW without written approval from the Railroad.
- Mechanical and chemical means of rock removal must be explored before blasting is considered. If written permission for the use of explosives is granted, the agency or contractor must submit a work plan (see Section 1.08 & Section 1.10).

### Hoisting

All proposed hoisting operations with potential to foul shall be submitted in accordance with the following:

- A plan view drawing shall depict the work site, the track(s), the proposed location(s) of the lifting equipment, as well as the proposed locations for picking, any intermediate staging, and setting the load(s). All locations shall be dimensioned from the centerline of the nearest track. Crane locations shall also be dimensioned from a stationary point at the work site for field confirmation.
- Computations showing the anticipated weight of all picks. Computations shall be made based upon the field-verified plans of the existing structure. Pick weights shall account for the weight of concrete rubble or other materials attached to the component being removed; this includes the weight of subsequent rigging devices/components. Rigging components shall be sized for the subsequent pick weight.
- All lifting equipment, rigging devices, and other load bearing elements shall have a rated (safe lifting) capacity that is greater than or equal to 150% of the load it is carrying, as a factor of safety. Supporting calculations shall be furnished to verify the minimum capacity requirement is maintained for the duration of the hoisting operation.
- Dynamic hoisting operations are prohibited when carrying a load with the potential to foul. Cranes or other lifting equipment shall remain stationary during lifting (i.e., no moving picks).
- For lifting equipment, the manufacturer's capacity charts, including crane, counterweight, maximum boom angle, and boom nomenclature are to be submitted.
- A schematic rigging diagram must be provided to clearly call out each rigging component from crane hook to the material being hoisted. Copies of catalog or information sheets shall be provided to verify rigging weights and capacities.
- For built-up rigging devices, the contractor shall submit the following:
  - Details of the device, calling out material types, sizes, connections, and other properties.
  - Load test certification documents and/or design computations bearing the seal and signature of a professional engineer. Load tests shall be performed in the configuration of its intended use as part of the subject demolition procedure.
  - Copies of the latest inspection reports of the rigging device. The device shall be inspected within one (1) calendar year of the proposed date for use.
- A detailed drawing shall be provided showing the crane outrigger setup, including dimensions from adjacent slopes or facilities. The drawing shall indicate requirements for bearing surface preparation, including material requirements and compaction efforts. As a minimum, outriggers and/or tracks shall bear on mats positioned on level material with adequate bearing capacity.

- A complete written narrative shall be provided that describes the sequence of events, indicating the order of lifts and any repositioning or re-hitching of the crane(s).

## Demolition

The agency or its contractor shall submit a detailed procedure for a controlled demolition of any structure on, over, or adjacent to the ROW. The controlled demolition procedure must be approved by the Railroad prior to beginning work on the project.

Existing condition of the structure being demolished:

- The contractor shall submit as-built plans for the structure(s) being demolished.
- If as-built plans are unavailable, the contractor shall perform an investigation of the structure, including any foundations, substructures, etc. The field measurements are to be made under the supervision of the professional engineer submitting the demolition procedure. Findings shall be submitted as part of the demolition means and methods submittal for review by the Railroad.
- Any proposed method for temporary stabilization of the structure during the demolition shall be based on the existing plans or investigative findings and submitted as part of the demolition means and methods for review by the Railroad.

Demolition work plans shall include a schematic plan depicting the proposed locations of the following at various stages of the demolition:

- All cranes and equipment, calling out the operating radii.
- All proposed access and staging locations with all dimensions referenced from the centerline of the nearest track.
- Proposed locations for stockpiling material or locations for truck loading.
- The location, with relevant dimensions, of all tracks, other railroad facilities, and wires, poles, adjacent structures, or buried utilities that could be affected, showing that the proposed lifts are clear of these obstructions.
- Note that no crane or equipment may be set on the rails or track structure and no material may be dropped on railroad property.

Demolition submittal shall also include the following information:

- A time schedule for each of the various stages must be shown as well as a schedule for the entire lifting procedure and hoisting. The proposed time frames for all critical subtasks (i.e., torch/saw cutting various portions of the superstructure or substructure, dismantling splices, installing temporary bracing, etc.) shall be furnished so that the potential impact(s) to operations may be assessed and eliminated or minimized.
- The names and experience of the key contractor personnel involved in the operation shall be included in the contractor's means and methods submission.
- Design and supporting calculations shall be prepared, signed, and sealed by the professional engineer for items including the temporary support of components or intermediate stages and shall be submitted for review. A guardrail will be required to be installed in the proximity of temporary bents or shoring towers when located within twelve feet (12'-0") from the centerline of the track. The guardrail will be installed at the expense of the agency or its contractor.

Girders or girder systems shall be stable at all times during demolition. Temporary bracing shall be provided at the piers, abutments, or other locations to resist overturning and/or buckling of the member(s). The agency shall submit a design and details of the proposed temporary bracing system for review by the Railroad. Lateral wind forces for the temporary conditions shall be considered in accordance with the current version of AREMA.

Existing obsolete bridge piers shall be removed to a minimum of three feet (3'-0") below the finished grade, final ditch line invert, or as directed by the Railroad.

A minimum quantity of twenty-five (25) tons of approved granite track ballast may be required to be furnished and stockpiled on-site by the contractor or as directed by the Railroad.

The use of acetylene gas is prohibited for use on or over railroad property. Torch cutting shall be performed utilizing other materials such as propane.

Tracks, signals, structures, and other railroad facilities shall be protected from damage during demolition of existing structure or replacement of deck slab.

#### Demolition Debris Shield

- On-track or ground-level debris shields (such as crane mats) are prohibited for use.
- The demolition debris shield shall be installed prior to the demolition of the bridge deck or other relevant portions of the structure. The demolition debris shield shall be erected from the underside of the bridge over the track area to catch all falling debris. The debris shield shall not be the primary means of debris containment.
  - The demolition debris shield design and supporting calculations, all signed and sealed by a professional engineer, shall be submitted for review and acceptance.
  - The demolition debris shield shall have a minimum design load of 50 pounds per square foot (50 psf) plus the weight of the equipment, debris, personnel, and all other loads.
  - The contractor shall verify the maximum particle size and quantity of the demolition debris generated during the procedure does not exceed the shield design loads. Shield design shall account for loads induced by particle impact; however, the demolition procedure shall be such that impact forces are minimized. The debris shield shall not be the primary means of debris containment.
  - The contractor shall include installation/removal means and methods for the demolition debris shield as part of the proposed controlled demolition procedure submission.
  - The demolition debris shield shall provide twenty-three feet (23'-0") minimum vertical clearance or maintain the existing vertical clearance if the existing clearance is less than twenty-three feet (23'-0").
  - Horizontal clearance to the centerline of the track should not be reduced unless approved by the Railroad.
  - The contractor shall clean the demolition debris shield daily or more frequently as dictated either by the approved design parameters or as directed by the Railroad.

#### Vertical Demolition Debris Shield

This type of shield may be required for substructure removals in close proximity to tracks and other facilities, as determined by the Railroad.

The agency or its contractor shall submit detailed plans with detailed calculations prepared, signed, and sealed by a professional engineer of the protection shield.

#### Erection

The agency or its contractor shall submit a detailed procedure for erection of a structure with potential to foul. The erection procedure must be approved by the Railroad prior to beginning work on the project.

Erection work plans shall include a schematic plan depicting the following, at all stages of the construction:

- All proposed locations of all cranes and equipment, calling out the operating radii.



- All proposed access and staging locations with all dimensions referenced from the centerline of the nearest track.
- All proposed locations for stockpiling material or locations for truck loading.
- The location, with relevant dimensions, of all tracks, other railroad facilities, and wires, poles, adjacent structures, or buried utilities that could be affected, showing that the proposed lifts are clear of these obstructions.
- No crane or equipment may be set on the rails or track structure and no material may be dropped on railroad property.

For erection of a structure over the tracks, the following information shall be submitted for review and acceptance by the Railroad at least thirty (30) days prior to erection:

- As-built beam seat elevations – field surveyed upon completion of pier/abutment construction.
- Current top of rail (TOR) elevations – field measured at the time of as-built elevation collection.
- Computations verifying the anticipated minimum vertical clearance in the final condition that account for all deflection and camber based upon the current TOR and as-built beam seat elevations. The anticipated minimum vertical clearance shall be greater than or equal to that which is indicated by the approved plans. Vertical clearance (see definitions) is measured from TOR to the lowest point on the overhead structure at any point within six feet (6'-0") from the centerline of the track. Calculations shall be signed and sealed by a professional engineer.

Girders or girder systems shall be stable at all times during erection. No crane may unhook prior to stabilizing the beam or girder.

- Lateral wind forces for the temporary conditions shall be considered in accordance with the current version of AREMA.
- Temporary bracing shall be provided at the piers, abutments, or other locations to resist overturning and/or buckling of the member(s). The agency shall submit a design and details of the proposed temporary bracing system for review by the Railroad.
- Temporary bracing shall not be removed until sufficient lateral bracing or diaphragm members have been installed to establish a stable condition. Supporting calculations furnished by the professional engineer shall confirm the stable condition.

Erection procedure submissions shall also include the following information:

- A time schedule for each of the various stages must be shown as well as a schedule for the entire lifting procedure. The proposed time frames for all critical subtasks (i.e., performing aerial splices, installing temporary bracing, installation of diaphragm members, etc.) shall be furnished so that the potential impact(s) to operations may be assessed and eliminated or minimized.
- The names and experience of the key contractor personnel involved in the operation shall be included in the contractor's means and methods submission.
- A guardrail will be required to be installed in a track in the proximity of temporary bents or shoring towers when these are located within twelve feet (12'-0") from the centerline of the track.
- Design and supporting calculations prepared by the professional engineer for items including the temporary support of components or intermediate stages shall be submitted for review.

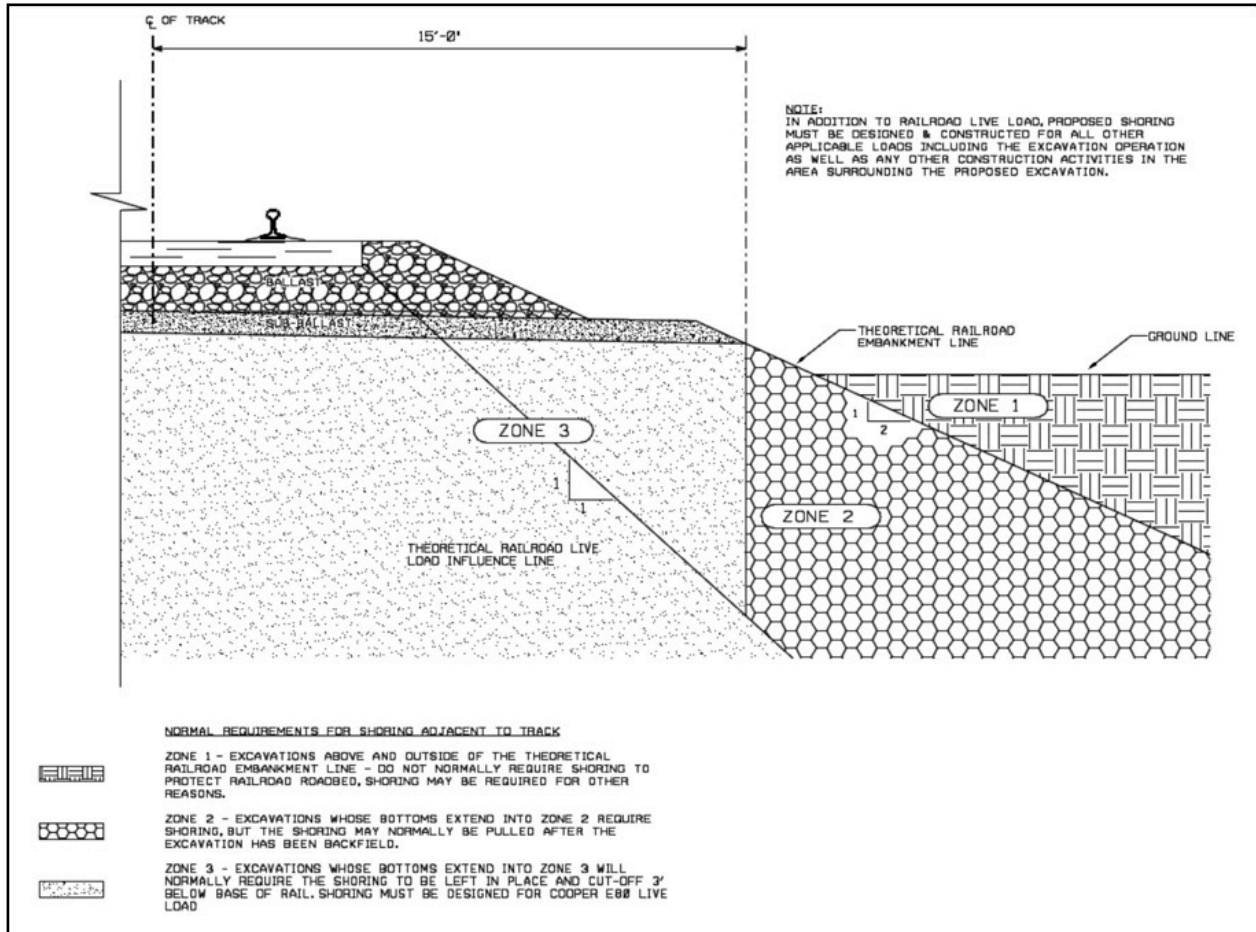
### Excavation and Shoring

The agency or its contractor shall submit a detailed design and procedure for the installation of a sheeting/shoring system adjacent to the tracks. Shoring protection shall be provided when excavating with

potential to foul, or as otherwise determined by the Railroad. Shoring shall be provided in accordance with AREMA, except as noted below.

Shoring may not be required if all of the following conditions are satisfied:

- The excavation does not encroach within the theoretical live load influence zone. Please refer to figure below.



- The track structure is situated on level ground, or in a cut section, and on stable soil.
- The excavation does not adversely impact the stability of a railroad facility (i.e., signal bungalow, drainage facility, undergrade bridge, building, etc.), or the stability of any structure on, over, or adjacent to railroad property with potential to foul.
- Shoring is not required by any governing federal, state, local, or other construction code.

Shoring is required when excavating the toe of an embankment. Excavation of any embankment that supports an active track structure without shoring will not be permitted.

Trench boxes are not an acceptable means of shoring. Trench boxes are prohibited for use on railroad property or within the theoretical railroad live load influence zone.

Shoring shall be a cofferdam-type, which completely encloses the excavation. However, where justified by site or work conditions, partial cofferdams with open sides away from the track may be permissible, as determined by the Railroad.

Cofferdams shall be constructed using interlocking steel sheet piles, or when approved by the engineer, steel soldier piles with timber lagging. Wales and struts shall be included when dictated by the design.

The use of tiebacks can be permissible for temporary shoring systems when conditions warrant. Tiebacks shall have a minimum clear cover of six feet (**6'-0"**), measured from the bottom of the rail. Upon completion of the work, tiebacks shall be grouted, cut off, and remain in place.

All shoring systems on or adjacent to the Railroad's ROW shall be equipped with railings or other fall protection and be compliant with the governing federal, state, or local requirements. The area around pits shall be graded to eliminate all potential tripping hazards.

Interlocking steel sheet piles shall be used for shoring systems that qualify with one or more of the following conditions:

- Within eighteen feet (**18'-0"**) of the nearest track centerline
- Within the theoretical live load influence zone
- Within slopes supporting the track structure
- As otherwise deemed necessary by the Railroad

Sheet piles qualifying for one or more of the requirements listed in this document shall not be removed. Sheet piles shall be left in place and cut off a minimum of three feet (**3'-0"**) below the finished grade, the ditch line invert, or as otherwise directed by the Railroad. The ground shall be backfilled and compacted immediately after sheet pile is cut off.

The following design considerations shall be considered when preparing the shoring design package:

- Shoring shall be designed to resist a vertical live load surcharge of **1,882 lbs.** per square foot, in addition to active earth pressure. The surcharge shall be assumed to act on a continuous strip, eight feet six inches (**8'-6"**) wide. Lateral pressures due to surcharge shall be computed using the strip load formula shown in the current version of AREMA.
- Allowable stresses in materials shall be in accordance with the current version of AREMA.
- A minimum horizontal clearance of ten feet (**10'-0"**) from the centerline of the track to face of nearest point of shoring shall be maintained, provided twelve feet (**12'-0"**) of roadbed is maintained with a temporary walkway and handrail system.
- For temporary shoring systems with potential to foul, piles shall be plumb under full dead load. Maximum deflection at the top of wall, under full live load, shall be as follows:
  - One-half inch (**.5"**) for walls within twelve feet (**12'-0"**) of track centerline (measured from the centerline of the nearest track to the nearest point of the supporting structure).
  - One inch (**1"**) for walls located greater than twelve feet (**12'-0"**) from track centerline.

Shoring work plans shall be submitted in accordance with this document, as well as the following additional requirements:

- The work plan shall include detailed drawings of the shoring systems, calling out the sizes of all structural members and details of all connections. Both plan and elevation drawings shall be provided, calling out dimensions from the face of shoring relative to the nearest track centerline. The elevation drawing shall also show the height of shoring and track elevation in relation to the bottom of excavation.
- Full design calculations for the shoring system shall be furnished.
- A procedure for cutting off the sheet pile, backfilling, and restoring the embankment shall be included.

## Track Monitoring

When work being performed has the potential to disrupt the track structure, a work plan must be submitted detailing a track monitoring program that will serve to monitor and detect both horizontal and vertical movement of the track and roadbed.

The program shall specify the survey locations, the distance between the location points, and frequency of monitoring before, during, and after construction. The Railroad reserves the right to modify the survey locations and monitoring frequency as necessary during the project.

The survey data shall be collected in accordance with the approved frequency and immediately furnished to the Railroad for analysis.

If any movement has occurred as determined by the Railroad, the Railroad, at its sole discretion, shall have the right to immediately require all contractor operations to be ceased, have the excavated area immediately backfilled, and/or determine what corrective action is required.

## Soil and Water Management

The Railroad must review and approve reuse of soil on railroad property.

If the soil cannot be reused on railroad property, it must be properly disposed of at an approved disposal facility. The Railroad prohibits any contractor from taking soils for off-property for reuse. Coordinate with the Railroad to handle waste characterization and profiling into an approved disposal facility. The Railroad prohibits any environmental sampling of its property unless approved in writing. If the agency has arrangements with a disposal facility not approved by the Railroad, the agency can request to evaluate the disposal facility. A request to evaluate alternate disposal facilities should take place prior to work being initiated on railroad property.

If dewatering is planned for a public project, the Railroad must review and approve the dewatering plan prior to work being initiated on or near railroad property. The Railroad prohibits the discharge of water onto its property without prior approval. The Railroad prohibits environmental sampling of groundwater or surface water.

All materials discarded by or on behalf of the Railroad will be managed in accordance with local, state, and federal regulations as well as best management practices and sustainability goals. To ensure that these goals are achieved, the Railroad has mechanisms in place to monitor waste management activities.

The cleanup and disposal of material from the surface preparation for painting and actual painting must comply with all appropriate regulations. The materials removed during the surface preparation must not impact the surrounding area, including ground, water, or air impacts. Materials must not be stored on railroad property.

## Drainage

For the installation of temporary or permanent shoring systems, including but not limited to soldier piles and lagging, and interlocked steel sheeting on or adjacent to the Railroad's ROW, the contractor may be required to submit a detailed track monitoring program for approval prior to performing any work near the Railroad's ROW.

When water is known or expected to be encountered, all plans and specifications must be submitted to the Railroad for approval before the process begins. Pumps of sufficient capacity to handle the flow shall be maintained at the site, provided the contractor has received approval to operate them. Pumps in operation shall be constantly attended on a 24-hour basis until, in the sole judgment of the Railroad, the operation can be safely halted. When dewatering, a process for monitoring for any settlement of track or structures must be in place.

If any track movement has occurred as determined by the Railroad, the Railroad, at its sole discretion, shall have the right to immediately require all contractor operations to be ceased, have the excavated area immediately backfilled, and/or determine what corrective action is required. Any corrective action required or performed by the Railroad, including the monitoring of corrective action of the contractor, will be at project expense.

All pipes, ditches, and other structures carrying surface drainage on railroad property and/or under track(s) shall be designed to carry the runoff from the **100-year, 24-hour design** storm without ponding of water against the roadbed.

Pipe(s) used to carry surface drainage on the Railroad's ROW shall have a minimum diameter of 24 inches (24").

When calculating the capacity of existing or proposed drainage structures under track(s), the headwater calculation at the structure shall not be greater than one (1):

$$HW/D \leq 1.$$

Rate and quantity of storm water runoff from any proposed development shall not exceed the rate and quantity of runoff prior to development. This standard shall be maintained for all design storms up to the **100-year storm event**.

Pipes (casing or carrier) placed under tracks shall not be less than five feet six inches (5'-6") from base of rail to top of pipe at its shallowest point.

Pipelines laid longitudinally on ROW fifty feet (50'-0") or less from the centerline of the track shall be buried not less than four feet (4'-0") from ground surface to top of pipe. Where the pipeline is laid more than fifty feet (50'-0") from the centerline of the track, the minimum cover shall be at least three feet (3'-0").

Erosion prevention methods shall be used to protect railroad ditches and other drainage facilities during construction on and adjacent to ROW.

Permanent erosion and sediment pollution control facilities shall be designed for the **100-year storm**. Provide calculations and details of any riprap outlet protection and channel linings as needed within ROW.

Pipes and culverts within the theoretical live load influence zone shall conform to current AREMA recommendations and ASTM specifications. All such structures shall be designed to carry **Cooper E80** loading with diesel impact.

ROW shall not be utilized for retention, detention, or settling basins. Also, the Railroad embankment must not be used as any part of a detention pond structure.

Track roadbed fills shall not be used as dams or levees for retention of runoff.

Temporary sediment basins/traps shall not be constructed against track roadbed fill.

Formal approval of the proposed design by the appropriate governmental agency having jurisdiction shall be submitted to the Railroad for their review and acceptance.

Pipes and culverts are not to be located within the limits of a turnout or nor closer than fifty feet (50'-0") to any railroad bridge, building, or any other important structure.

When excavation for a pipeline or other structure will be within the theoretical railroad embankment line of an adjacent track, interlocking steel sheet piling will be required to protect the track(s). Trench boxes are prohibited for use on ROW within the theoretical railroad live load influence zone.

Blasting is not permitted on or adjacent to the Railroad's ROW without prior written approval.

Crossing of tracks at grade by equipment and personnel is prohibited except by prior arrangement with and as directed by the Railroad.

Temporary track supports may be required when a jacking, boring, or tunneling method of installation is used, depending upon the size and location of the drainage crossing. The agency's contractor shall furnish and supply the approved track supports, with the installation and removal performed by a person approved by the Railroad. The agency shall reimburse the Railroad for all costs associated with the installation and removal of the track supports.

Plans submitted to the Railroad for approval shall be prepared by a professional engineer and should indicate design, suitable topographic plan, and outline of total drainage area.

If the drainage is to discharge into an existing drainage channel on ROW and/or through a drainage structure under track(s), the computations must include the hydraulic analysis of any existing ditch and/or structure.

Extension of pipes, culverts, and other drainage structures previously installed under tracks shall be made with culvert or drainage structure having the same size, shape, and dimensions as the existing pipe. In no case shall the existing drainage structure be extended so that the hydraulic capacity is decreased or obstructed. In some cases, it may be necessary to extend existing outlets with pipe or culvert of a larger size. Details of connections to mismatched culverts shall be submitted for approval.

The agency may be required to provide reasonable corrective measures to alleviate an existing drainage problem within railroad property that may be affected by the proposed development. It shall be the responsibility of the agency to obtain all drainage easements and permits. The Railroad shall be indemnified and held harmless of any liability.

The agency is to provide information on groundwater recharge if infiltration is proposed adjacent to railroad property. Soils testing and certification by a registered professional engineer shall be required.

Emergency spillways discharging onto railroad property are to be designed and constructed so that the basin berm is protected against erosion.

Energy dissipating devices are to be placed at all outlets discharging to railroad property.

Concrete end walls shall be placed at outlets discharging to railroad property. All concrete outlet pipes on property must be equipped with a trash rack.

Under no conditions shall any person be allowed to modify, alter, or change a previously approved storm water management (SWM) facility discharging to railroad property unless an approved alternate facility is approved.

Design of the drainage system, including alterations of the existing drainage system on ROW, is the responsibility of the agency. Drainage shall not be diverted, directed toward the Railroad, or increased in quantity without prior written approval.

Supporting calculations must be provided for all proposed drainage and storm water management facilities that discharge onto or impact property.

Occupancies shall be designed, and their construction shall be accomplished, so that adequate and uninterrupted drainage of the Railroad's ROW is maintained.

If, in the course of construction, it may be necessary to block a ditch, pipe, or other drainage facility, temporary pipes, ditches, or other proposed drainage facilities shall be installed to maintain adequate drainage, as approved. Upon completion of the project, the temporary facilities shall be removed, and the permanent facilities restored.

Temporary and permanent erosion control and sedimentation (E&S) devices must be provided to prevent the flow of sediment onto and adjacent to railroad property.

The design shall take into account and provide upstream areas within the entire watershed in computing discharge, sizing of pipes, inlets, and other structures.

When applicable, the agency is to provide maintenance and operation of E&S/storm water facilities.

Plans shall include, but not be limited to, the following:

- Existing property boundaries, easements, etc.
- Existing drainage features and topography.
- Existing utility locations.
- Existing structures, tracks, roads, features, etc.
- Existing topography, including wetlands and all environmental features.
- Delineation & dimension of proposed property acquisition or property easements.
- Dimension distances from all temporary and proposed E&S and SWM facilities to railroad property line and/or easement.
- Dimension distances from all temporary and proposed E&S and SWM facilities to tracks.
- Dimension of all temporary and proposed encroachments within property.
- Existing contours.
- TOR elevations.
- Proposed contours, site grading, and drainage facilities.
- Proposed improvements, including easements and property lines and limit of disturbance.
- Details for all temporary and proposed drainage structures, SWM, and E&S best management practices (BMP) devices.
- Details for proposed E&S, SWM, and drainage collection and conveyance systems (pipes, ditches, etc.).
  - Location, size, slope, and type of pipe.
  - Ditch cross sections.
  - Invert elevations.
  - Grate and rim elevations.
- If applicable, identification of the 100-year floodplain if project is within a specified flood zone.
- E&S plans in compliance with all state and local requirements.
- Signature and seal of state-licensed professional engineer.

### **Design Calculations**

Pre- and post-development drainage area maps.

- Provide soils boundary lines & soil types.
- Delineate drainage areas.
- Provide time of concentration (T<sub>c</sub>) flow path.
- Provide weighted CN and c-values (as applicable to design method).

Pre-development 100-year runoff volume and flows for all facilities draining to or on ROW.

Post-development 100-year runoff volume and flows for all facilities draining to or on ROW.

- Verify no increase in rate or quantity of runoff to property from pre-development conditions.
- Provide hydraulic analysis (depth and velocity calculations) for all facilities draining to or on ROW (existing and proposed) and verify sufficient capacity for proposed flow is provided.

Design of proposed collection and conveyance systems (pipes, ditches, etc.)

- Required capacity for a **100-year, 24-hour storm**.
- Required a minimum diameter of **24-inches** for pipes within ROW.

Provide all temporary and permanent E&S and SWM BMP calculations.

Signature and seal of state-licensed professional engineer.

Project narrative/summary describing proposed improvements, drainage design, SWM and E&S methodologies, site soil and geological conditions (if known), flooding characteristics (if applicable), and state and local requirements used to produce designs.

Recommended: Photographs of the site and adjacent property as well as discharge locations and drainage facilities on property to receive runoff from the proposed development.

## Section 1.12 – Railroad Property Safety

All work on or near railroad property shall be conducted in accordance with the Railroad’s safety rules and regulations. Specifically, all agency’s employees and contractors, while on railroad property, shall be required to wear a hard hat, safety glasses with side shields, 6” lace up boots with a distinct heel, shirts with sleeves, and long pants; additional personal protective equipment may be required based on certain operations. The contractor and its employees shall always comply with the safety rules while occupying railroad property. Operations will be subject to inspection at any time. All personnel operating equipment must be qualified on it to perform task at hand.

The agency, its contractors, or any person refusing to comply with the Railroad’s safety rules may be removed from the property at the Railroad’s discretion. Although the GEC and the Railroad may perform site visits to verify compliance to safety rules and regulations, it is up to the agency and its contractors to adhere to all safety rules and regulations at all times.

Additionally, all equipment shall be used only in the manner it was designed for. All applicable safety rules shall be followed, including the use of seat belts on all equipment equipped with such. Equipment operators shall only operate equipment for which they are trained, certified, and qualified to operate. Operators shall have such credentials on their person anytime in which they operate on railroad property.

If an onsite flagman (see **Section 1.07**) is assigned, a job briefing must be performed by all persons entering the property even if no work is being performed. If a job function is being performed outside the view of the flagman, it is the responsibility of the agency and its contractors to brief with the flagman.

For additional safety requirements, please refer to “Contractor Safety Rules” document. It is the goal of the Railroad to have zero safety incidents every day.



## Section 2.01 – Public Road Crossing Openings and Closures

### Summary

The Railroad understands the importance of highway-rail grade crossings and their relevance to such priorities as economic development, emergency vehicle access, and other growth opportunities in the communities through which we operate. Because of the safety concerns associated with highway-rail grade crossings, however, every effort must be made to obtain alternative access or additional capacity using grade separations, or by other roads leading to existing crossings.

The Railroad shares the goal of eliminating at grade crossings with both the state DOTs and the Federal Railroad Administration (FRA). Likewise, the Federal Highway Administration (FHWA) Railroad-Highway Grade Crossing Handbook acknowledges that the first alternative that should always be considered for a highway-rail at-grade crossing is elimination. Elimination of a crossing provides the highest level of crossing safety because the point of intersection between highway and railroad is removed. Closing adjacent crossings simplifies the design, installation, and operation of highway-rail grade crossing warning systems.

The addition of any grade crossing brings the potential for incidents involving trains and motor vehicles. For this reason, both federal and state government policies discourage the creation of new grade crossings. As such the Railroad, other railroads, the United States Department of Transportation, and most state DOTs encourage communities to carefully consider all alternatives, including grade separations (crossings that go over or under railroad tracks), as opposed to the creation of new at-grade crossings.

The cost of a grade separation should not outweigh the enhanced safety it would provide for motorists.

Before agreeing to the establishment of a new crossing, the Railroad encourages communities to engage in a study with the purpose of identifying existing redundant public crossings for closure. To comply with and in support of the federal initiative to reduce grade crossings, the Railroad requires that the community identify the closure of three (3) or more comparable active public at-grade crossings.

As discussed above, the appropriate public authority will be expected to reimburse the Railroad for its cost of design, installation, and future maintenance of the crossing.

### Process

- Appropriate public authority provides a written request to PPD outlining the reason for the new crossing or for seeking to convert a private crossing to a public one. Include the following:
  - A description of the proposed highway project, including proposed passive or active traffic control devices, and the need for preemption and/or interconnection with traffic signals, together with a scale drawing or sketch of the proposed highway and vicinity.
  - Expected annual average daily traffic (AADT), proposed vehicular speed limit, photographs, and aerial map. Please include any expected future development.
  - Identification of at-grade crossings to be closed. Include their vehicular speed limit, AADT, and traffic type.
  - The determination by the highway or regulatory authority of the need for passive or active traffic control devices and other safety treatments (i.e., signage, roadway medians, etc.), as selected by the highway authority consistent with applicable federal, state, and Manual on Uniform Traffic Control Devices (MUTCD) guidelines and requirements.
  - A plan to satisfy any appropriate regulatory authority's requirements, procedures, and approval. The project sponsor should coordinate with all applicable agencies (state, county, city, etc.) to ensure proper procedures are followed.

- Authorization for the Railroad to incur costs for its preliminary engineering to review the crossing request (whether or not its approved), design and construction expenses, and for the ongoing maintenance of the crossing surface and related grade crossing warning devices.
- PPD will review the request and follow up with appropriate state authorities.
- If it is approved by the Railroad, the state DOT, and appropriate roadway authorities, PPD will proceed with creating a project and starting the design review process. The design process will include, but is not limited to, the following:
  - Assignment of temporary DOT number.
  - Site survey & diagnostic review to determine level of protection.
  - Basis for design.
  - Estimate to complete.
  - Agency/sponsor and the Railroad enter into all applicable contracts.
  - RFP and vendor selection.
  - Design and order material.
  - Construct surface (must remain closed and inaccessible).
  - Install level of protection as indicated by DOT.
  - Testing and DOT signoff.
  - Open crossing and close offset crossings.
  - Update FRA to make DOT number permanent.

## **Section 2.02 – Highway-Rail Grade Crossing Warning Devices**

### **Summary**

PPD will process all projects proposing alterations to public highway-rail grade crossing warning systems. Included will be projects for opening new crossings, closing existing crossings, modifying or widening of existing crossings, installing new warning systems, removing and/or relocating existing warning systems and modifying/upgrading existing warning systems. This also pertains to preemption projects.

Each crossing has a unique DOT inventory identification number posted at the crossing. There is often more than one crossing on the same road. The number (i.e., DOT 654321D) must be used to identify the specific crossing in all communications with the Railroad to reduce possible confusion about the specific location.

Highway-rail grade crossing warning systems must adhere to all applicable federal and state standards and regulations; all local policies, laws, and ordinances; as well as the Railroad's standards. The state DOT and highway agency, not the Railroad, is responsible for determining the level of protection and configuration of warning devices for a public highway-rail grade crossing. In addition, the highway agency or other governmental agency responsible for making warning system and equipment determinations is responsible for selecting appropriate vehicular traffic control signs and/or devices for a specific public highway. Loop detection circuitry will not be designed, installed, owned, or maintained by the Railroad.

The highway agency must determine whether advanced or simultaneous preemption is needed.

The agency must also provide a traffic study to determine how much advanced preemption time is required if needed. The Railroad as well as AREMA and MUTCD discourage the use of excessive preemption times. The Railroad will furnish one preemption interconnection circuit of a normally closed contact that is designed to open upon the approach or presence of a train and will terminate the closed preemption interconnection circuit in a common cable junction box (set at ROW line) to be used for the interconnection of the traffic signals and the grade crossing warning devices.

Recommended practices and additional information are available in AREMA and the MUTCD.

The Railroad will provide engineering reviews, signal designs, and cost estimates for the installation of highway-rail grade crossing warning devices at the expense of the project sponsor as part of the preliminary engineering for a project. Changes to highway-rail grade crossing surfaces may also require engineering and pre-approval by the Railroad. Installation or modification of warning devices must be supervised and performed by a qualified entity as determined by the Railroad.

The Railroad typically does not allow the mixing of different equipment. If additional gates or equipment is added to a location, the entire location should be redesigned and upgraded to the latest standard.

If the roadway footprint changes in width, including adding a sidewalk or multiuse path, an easement review must be completed prior to the project construction start (**see Section 1.09**).

### **Process**

- Agency requests a diagnostic review.
- Agency sends review results, and PPD supplies agency with OOM estimate.
- Agency/sponsor and the Railroad enter into applicable contracts.
- PPD assigns a GEC to develop BOD, estimate to complete, and RFP.
- GEC solicits bids for design-build contractor.
- Contractor completes design and orders material.
- Utility concerns are resolved.
- Construct warning system.
- Testing and DOT signoff and update FRA.

## **Section 2.03 – Highway-Rail Grade Crossing Surface Maintenance**

### **Summary**

The crossing surface provides a path for highway vehicles to cross railroad tracks. The objective is to provide a safe, smooth, and cost-effective crossing for highway and railroad traffic. Highway and railroad maintenance work near highway-rail grade crossings must consider safety concerns for both highway and railroad traffic before, during, and after the work is implemented.

Each public crossing has a unique DOT inventory identification number posted at the crossing. There is often more than one crossing on the same road. The number (i.e., DOT 654321D) must be used to identify the specific crossing in all communications with the Railroad to reduce possible confusion about the specific location.

Railroad track is continuous through the crossing and includes railroad ties, rail, and fasteners below the surface of the crossing (joints shall not be made within the crossing). The crossing surface for highway traffic can be made of several different materials. Drainage is required for all four quadrants at a crossing.

Crossing surface material and construction methods are selected for each crossing based on the type of highway and railroad traffic, past experience, and funding available from highway agencies for individual projects. Highway agencies seeking replacement of crossing surfaces should contact PPD. The request for the work and the recommended surface must be reviewed and approved by the Railroad.

Crossing work requires closing the entire highway-rail grade crossing. Replacement of track components through a crossing requires removal of the crossing surface, replacement of track ballast, and surfacing the

track through the crossing prior to replacement of the crossing surface. If the subgrade needs to be improved, the application of a hot mixed asphalt underlayment should be considered. Drainage will be reestablished for all four quadrants. After the crossing surface is replaced, the highway approach paving is completed and then the road is opened to highway traffic. Replacement of the track and crossing surface usually requires that the highway be closed for several days. In the event the agency wants to reopen the crossing prior to allowing the asphalt to properly cool, the agency is responsible for any rutting that may occur.

If the roadway footprint changes in width, including adding additional lanes, a sidewalk, or a multiuse path, an easement review must be completed prior to the project construction start (**see Section 1.09**).

### **Process**

- Agency submits request to PPD.
- Agency and PPD research existing contractual requirements.
- Agency/sponsor and the Railroad enter into applicable contracts.
- The Railroad assigns GEC to develop estimate.
- The Railroad orders materials and schedules work.
- Reconstruct crossing:
  - Place barricades and close roadway.
  - Sawcut roadway.
  - Remove existing track panel, ballast, and sub-ballast.
  - Establish new foundation.
  - Install new track panel.
  - Run tonnage to settle system.
  - Install surface materials.
  - Install asphalt (and concrete if needed).
  - Let cool and cure.
  - Remove barricades.
- Cleanup.
- Agency signoff and update FRA.

## **Section 2.04 – Parallel Road Construction and Maintenance**

### **Summary**

#### **New Roadway Construction**

In the interest of public safety, parallel public roads shall be located off railroad property. Parallel roads involving intersections with existing or proposed highways where public or private crossings are present should be aligned to provide sufficient distance from the crossing for the largest vehicle (design vehicle) permitted to use the road to stop between the Railroad and the parallel road traffic control signs, markings, and warning devices without interfering with railroad operations, obstructing or preventing the operation of traffic control devices, or obstructing the crossing in any manner.

The design of highways and highway intersections and configuration of highway-rail grade crossings is the responsibility of the highway agency. Drainage for highway runoff, the railroad corridor, and adjacent property must be designed to reduce or maintain existing railroad drainage and to prevent standing water

and potential erosion. Access for railroad equipment to railroad property, structures, and track cannot be restricted or prevented.

Federal and state design manuals, the Manual on Uniform Traffic Control Devices (MUTCD), and additional recommended practices available in American Railway Engineering and Maintenance-of-Way Association (AREMA) manuals provide design information to be considered by the highway agency responsible for the project engineering. The table of contents of this document has additional information on the MUTCD and AREMA manuals and information.

If new construction encroaches on railroad property, an easement review must be completed prior to the project construction start (see **Section 1.09**).

### Maintenance of Existing Roadway

Projects that are either parallel or bisect as roadway crossings within the Railroad's ROW require both a ROE and the use of a qualified flagman at the cost of the project sponsor (see **Section 1.09**).

### Process

- Request a ROE through G&W Real Estate.
- Agency/sponsor and the Railroad will enter into applicable contracts, including contractor ROE agreement.
- Submit executed ROE and insurance documents to PPD.
- PPD coordinate with region to provide flagman.

## Section 2.05 – Overhead and Undergrade Bridges

### Summary

The Railroad requires that new overhead bridges (including existing bridge replacements) span the Railroad's right of way and have a minimum twenty-three feet (**23'-0"**) vertical clearance above top of rail. The Railroad requires that new undergrade bridges provide accommodations for future operating needs, as determined by the Railroad.

During project construction, rail operations must not be impeded. Temporary run-around track(s) and/or phased construction may be necessary as determined by the Railroad.

All bridge projects over or under the Railroad's ROW shall be governed by the appropriate criteria found in this document. This includes, but is not limited to, replacements, new construction, substructure modifications and/or repairs, superstructure replacement or repair, and deck replacement or overlay. The following criteria must be reviewed and approved by the Railroad prior to construction:

- Temporary and final drainage plans must be approved by the Railroad.
- The Railroad's access to its property must be maintained.
- Plans must show all tracks and horizontal and vertical track clearances for both the existing conditions and the proposed project.
- Bridge demolition criteria are found in the Construction Submission Criteria (see **Section 1.11**) in this document.
- Upon completion of construction, a full set of as-built drawings, showing actual measured vertical and horizontal clearances, shall be furnished to the Railroad.

If new construction is bisecting railroad property, an easement review must be performed prior to the project construction start (see **Section 1.09**). Please note that the project may require both a temporary construction easement and a permanent easement.

### Process

- Agency/sponsor and the Railroad enter into applicable contracts.
- PPD assigns GEC.
- GEC works with the agency to gather easement documentation and ROE.
- GEC works directly with the agency and its contractor on submittal reviews.
- GEC sends agency an estimate to complete project.
- Agency schedules construction.
- The Railroad supplies flagman.
- GEC provides CEI services.
- Project completion when both the Railroad and agency signoff.
- Agency submits as-built plans.

### Overhead Bridge Criteria

The Railroad has minimum requirements for outside parties constructing, rehabilitating, or replacing bridges over the Railroad's ROW. These requirements are intended to provide safe and continuous passage of all train traffic during and after construction of bridges over its tracks. Part of these requirements is for the outside party to submit a detailed plan of the project as well as provide details of the construction methodology. This document provides information on the requirements for overhead bridges over railroad property.

Plans and specifications for new or reconstructed bridges over the Railroad's ROW shall meet the following requirements:

#### General

- The Railroad's valuation station and the distance from the nearest milepost at the intersection of the centerline of the track and the centerline of the bridge shall be shown on the general plan.
- The existing and proposed minimum horizontal and vertical clearances shall be marked clearly on the general plan and elevation.
- At least one subsurface exploration boring for each substructure unit adjacent to the track shall be furnished to the Railroad during the design submittal. Borings shall provide enough information to design shoring and foundations.
- Prior to construction activities, all overhead bridge projects will require the procurement of the appropriate property rights from G&W Real Estate.
- All lifting equipment and connection devices shall have capacity for 150% of the actual lifting load. The factor of safety provided by the manufacturer in the lifting capacity data shall not be considered in the 150% requirement. A licensed professional engineer familiar with lifting and rigging and in the state where the construction work is proposed must sign and seal all plans and calculations related to critical lifting on the project.

#### Clearance

- Horizontal Clearance: Standard horizontal clearance from the centerline of the track to the face of the pier or abutment shall typically be twenty-five feet (25'-0") or greater, but never less than eighteen feet (18'-0"), measured perpendicular to the track. Provisions for future tracks, access roads, other railroad facilities, and drainage may require the minimum clearance be increased or the use of multi-span

structures. The toe of footings shall not be closer than eleven feet (11'-0") from the centerline of the track to provide adequate room for sheeting.

- Vertical Clearance: A standard vertical clearance of twenty-three feet (23'-0") shall be provided, measured from top of high rail to lowest point of structure in the horizontal clearance area, which extends six feet (6'-0") either side of the centerline of the track.
- Temporary construction clearances to be used shall be subject to approval by the Railroad, (typically reductions in clearance for construction are not permitted).
- As-built drawings showing actual clearances as constructed are to be provided to the Railroad.

### Crashwalls

- Reference the AREMA specifications that cover the requirements for crashwalls. Crashwalls are required when the face of the pier is closer than twenty-five feet (25'-0") from the centerline of the track, measured perpendicular to the track, except as noted below.
- Crashwalls shall meet the following requirements:
  - Crashwalls for single column piers shall be minimum two feet six inches (2'-6") thick and shall extend a minimum of six feet (6'-0") above the top of high rail for piers located between eighteen feet (18'-0") and twenty-five feet (25'-0") from the centerline of the nearest track. The wall shall extend minimum six feet (6'-0") beyond the column on each side in the direction parallel to the track.
  - For multi-column piers, the columns shall relate to a wall of the same thickness as the columns or two feet six inches (2'-6"), whichever is greater. The wall shall extend a minimum of two feet six inches (2'-6") beyond the end of the outside columns in a direction parallel to the track.
  - Reinforcing steel to adequately anchor the crashwalls to the column and footing shall be provided. For piers of heavy construction, crashwalls may be omitted. Solid piers with a minimum thickness of two feet six inches (2'-6") and length of twenty feet (20'-0"), single column piers of minimum four feet by twelve feet six inches (4'-0" x 12'-6") dimensions, or any other solid pier sections with equivalent cross sections and minimum two feet six inches (2'-6") thickness are considered as heavy construction.

### Drainage

Drainage from the bridge shall be preferably collected with drain pipes and drained away from the Railroad's ROW. When open scuppers are provided on the bridge, none shall be closer than twenty-five feet (25'-0") from the centerline of nearest track. Flow from the scuppers shall be directed away from railroad drainage ditches.

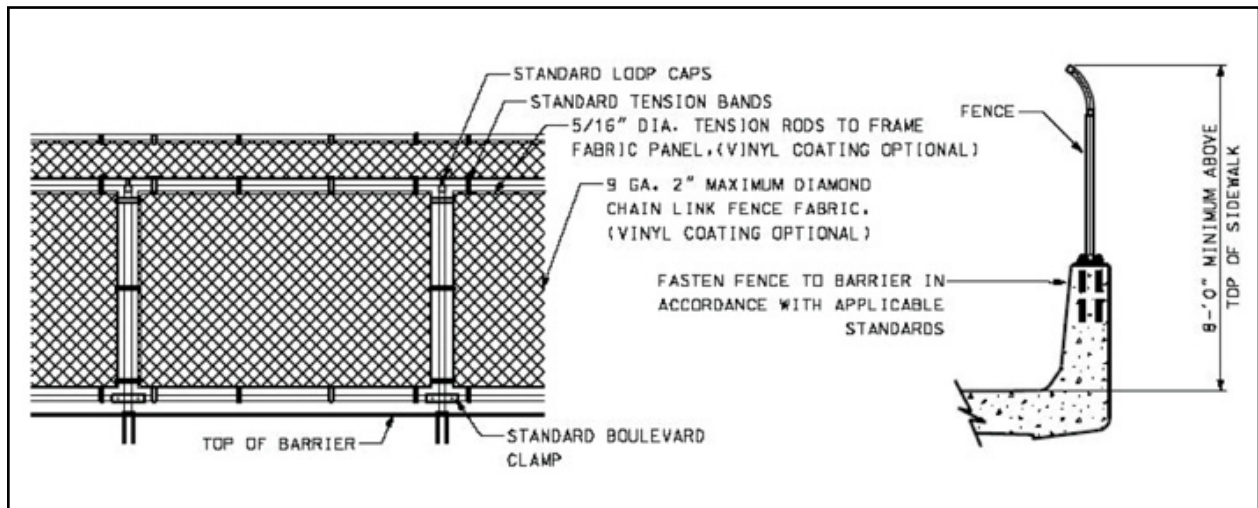
Projects including storm water systems shall be designed for a **100-year storm event** as a minimum. If storm water is drained on or to the Railroad ROW, calculations must be submitted to the Railroad to verify the **100-year storm event** is properly handled. Improvements to the adjacent drainage systems may be required at project expense to ensure the impacted system will meet the **100-year storm event** minimum condition.

During and after completion of construction, the outside party or its contractor must clear the Railroad's drainage ditches of all debris to the satisfaction of the Railroad.

### Fencing

All highway structures shall have a protective barrier fence to extend at least eight feet (8'-0") from the top of the sidewalk or driving surface adjacent to the barrier wall. The fence may be placed on top of the barrier wall. The fence shall be capable of preventing pedestrians from dropping debris onto the Railroad's ROW.

Openings in the fence shall not exceed two inches by two inches (2" x 2"). Fencing should also include anti-climb shields or be of a configuration to minimize the likelihood of climbing on the outside of the protective fencing. A chain link fence option is shown below.



### Excavation and Shoring

Shoring protection shall be provided when excavating adjacent to an active track. Shoring will be provided in accordance with AREMA, except as noted below.

Shoring will not be required if both the following conditions are satisfied:

- Excavation does not encroach upon a 1 horizontal to 1 vertical theoretical slope line starting at bottom corner of tie (theoretical live load influence zone).
- Track is on level ground or in a cut section and on stable soil.

When the track is on an embankment, excavating the toe of the embankment without shoring may affect the stability of the embankment. Therefore, excavation of the embankment toe without shoring will not be permitted.

Preferred protection is the cofferdam type that completely encloses the excavation. Where dictated by conditions, partial cofferdams with open sides away from the track may be used. Cofferdams shall be constructed using steel sheet piling or steel soldier piles with timber lagging. Wales and struts shall be provided as needed. The following shall be considered when designing cofferdams:

- Shoring shall be designed to resist a vertical live load surcharge of **1,882 lbs.** per square foot, in addition to active earth pressure. The surcharge shall be assumed to act on a continuous strip eight feet six inches (**8'-6"**) wide. Lateral pressures due to surcharge shall be computed using the strip load formula shown in AREMA.
- Allowable stresses in materials shall be in accordance with AREMA.
- A construction procedure for temporary shoring shall be shown on the drawing.
- Safety railing shall be installed when temporary shoring is within fifteen feet (**15'-0"**) of the centerline of the track.
- A minimum distance of ten feet (**10'-0"**) from the centerline of the track to the face of nearest point of shoring shall be maintained.

The contractor shall submit the following drawings and calculations for the Railroad's review and approval:



- Detailed drawings of the shoring systems showing sizes of all structural members, details of connections, and distances from the centerline of the track to the face of shoring. Drawing shall show a section that includes the height of shoring and track elevation in relation to the bottom of excavation.
- One set of calculations of the shoring design.
- The drawings and calculations shall be prepared by and bear the seal and signature of a licensed professional engineer in the state where the shoring is to be constructed. Shoring plans shall be approved by the Railroad.
- For sheeting and shoring within eighteen feet (18'-0") of the centerline of the track, within the theoretical live load influence zone, and in slopes, the contractor shall use sheet pile. No sheet pile in slopes or within eighteen feet (18'-0") of the centerline of the track shall be removed. Sheet piles shall be cut off three feet (3'-0") below the finished ground line. The remaining three feet (3'-0") shall be backfilled and compacted immediately after cutting off.

### Demolition of Existing Structure

The contractor shall submit a detailed procedure for demolition of existing structures over or adjacent to the Railroad's ROW. The procedure shall clearly indicate the capacity of cranes, location of cranes with respect to the tracks, and calculated lifting loads. The demolition procedure shall be approved by the Railroad.

The Railroad's tracks, signals, structures, and other facilities shall be protected from damage during demolition of existing structure or replacement of deck slab. As a minimum, both of the following methods shall be used:

- During demolition of the deck, a debris shield shall be erected from the underside of the bridge over the track area to catch falling debris. The shield shall be supported from girders or beams. The deck shall be removed by cutting it in sections and lifting each section out. The shield shall be designed, with supporting calculations, for a minimum of **50 pounds** per square foot plus the weight of the equipment, debris, personnel, and other loads to be carried.

Large pieces of deck shall not be allowed to fall on the debris shield:

- A ballast protection system consisting of geofabric or canvas shall be placed over the track structure to keep the ballast clean. The system shall extend along the track structure for a minimum of twenty-five feet (25'-0") beyond the limits of the demolition work, or farther if required by the Railroad.
- The contractor shall submit detailed plans, with supporting calculations, of the debris shield and ballast protection systems for approval prior to the start of demolition.
- Blasting will not be permitted to demolish a structure over or within the Railroad's ROW.

### Erection

The contractor shall submit a detailed procedure for erecting over or adjacent to ROW. The procedure shall clearly indicate the capacity of cranes, location of cranes with respect to the tracks, and calculated lifting loads. The erection procedure shall be approved by the Railroad.

### Pile Installation

For the installation of piles and sheeting for abutment foundations, pier foundations, retaining wall foundations, temporary and permanent shoring, and other structures on or adjacent to the Railroad's ROW, the contractor may be required to submit a detailed track monitoring program for review and approval by the Railroad.

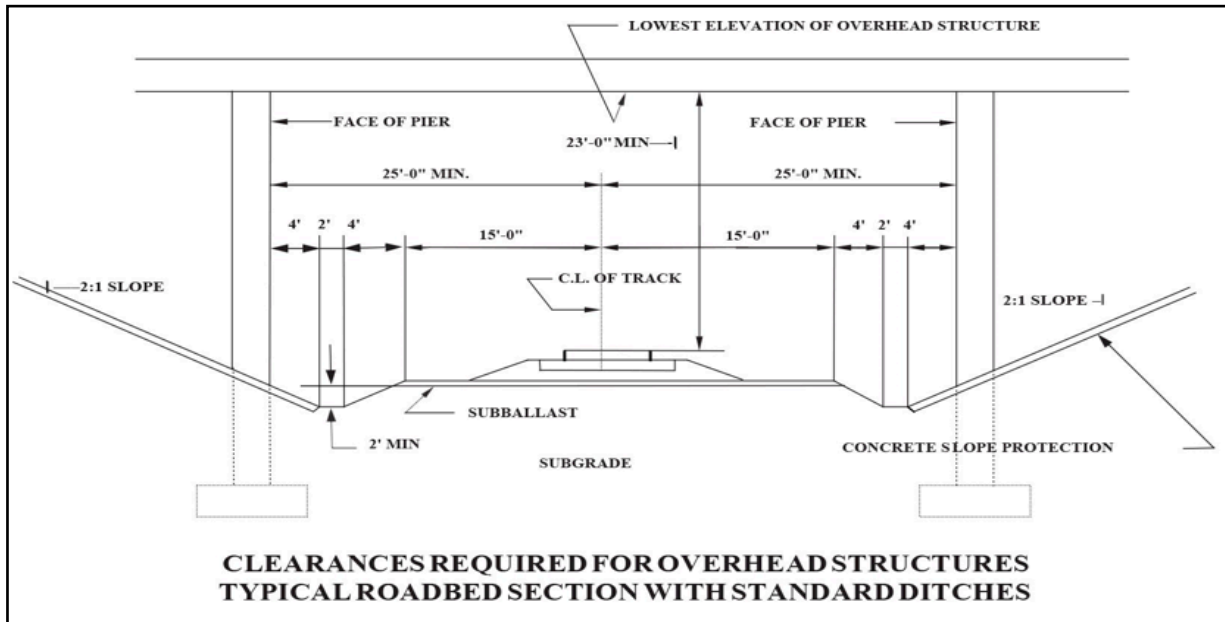
The program shall specify the survey locations, the distance between the location points, and the frequency of monitoring before, during, and after construction. The Railroad shall have the capability of modifying the survey locations and monitoring frequency as needed during the project.

If any settlement is observed, the Railroad shall be immediately notified. The Railroad shall have the right to immediately require all contractor operations to be ceased, have the excavated area immediately backfilled,

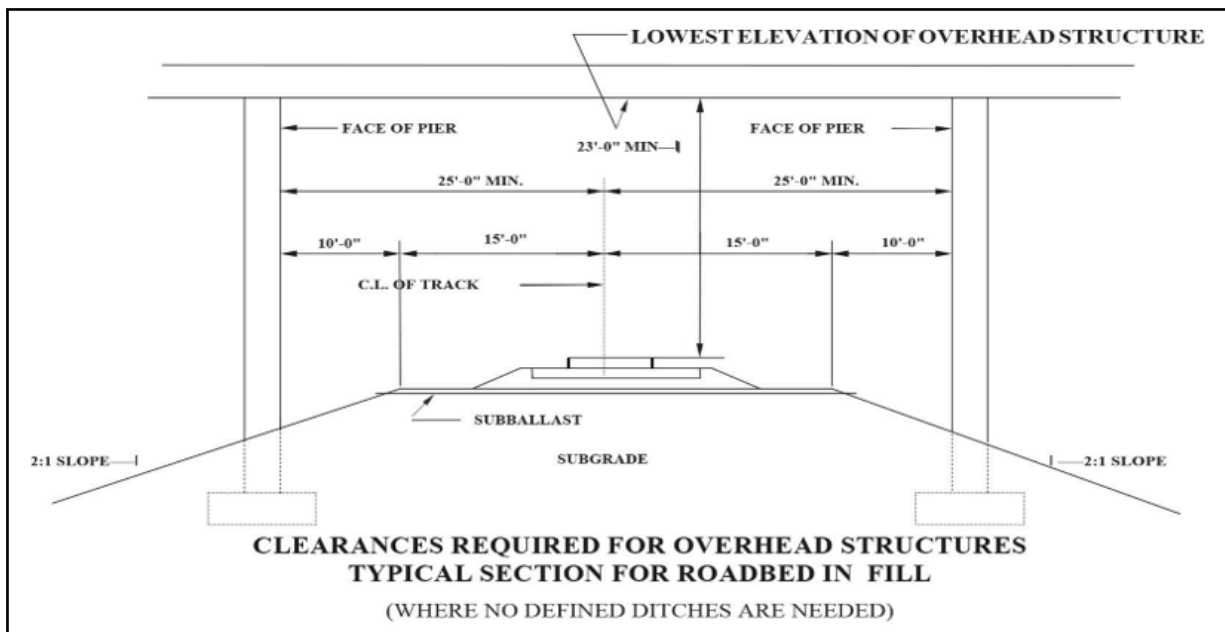
and/or determine what corrective action is required. Any corrective action required by the Railroad or performed by the Railroad, including the monitoring of corrective action of the contractor, will be at project expense.

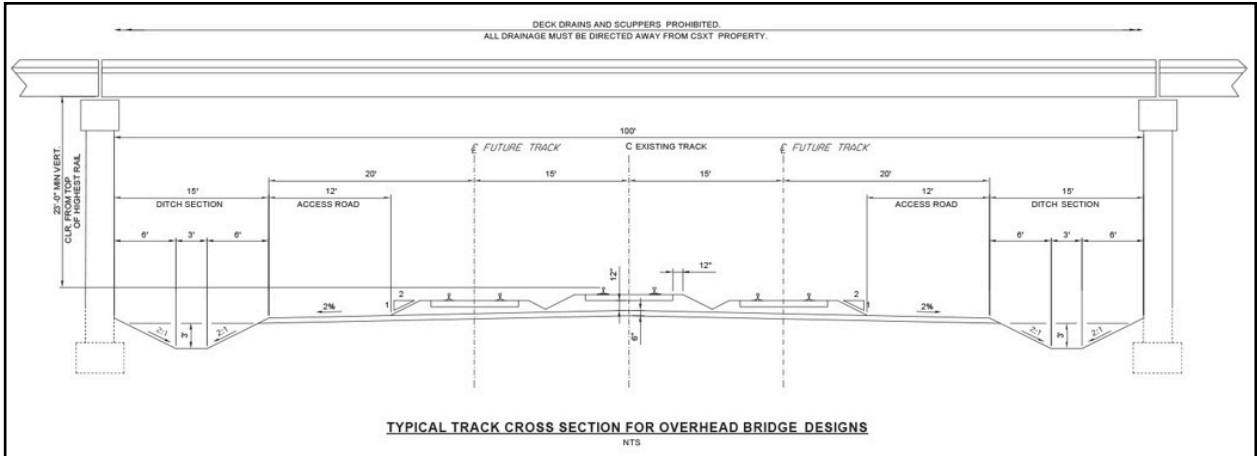
### Pedestrian Bridge

- Pedestrian overhead bridges shall span the entire width of the Railroad's ROW. Intermediate piers or other supports will not be permitted.
- Pedestrian overhead bridges shall be completely enclosed with protective canopy or by other means to prevent users from dropping debris onto the Railroad's ROW.



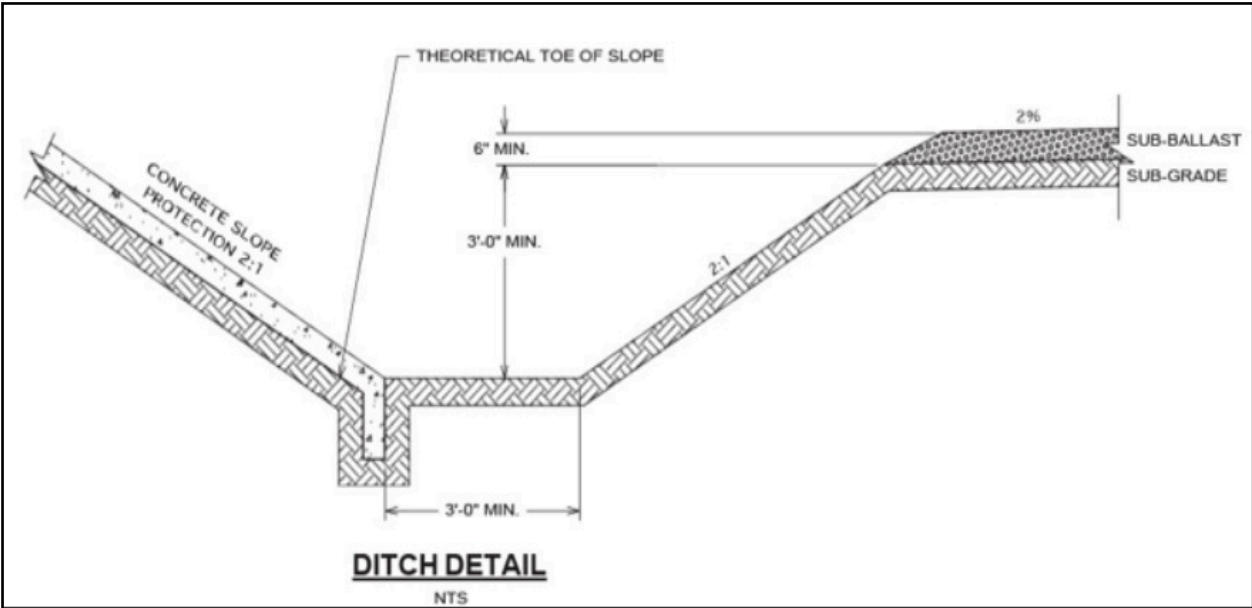
For multiple tracks, standard track centers are fifteen feet (15'-0") wide. An access road may be required to provide thirty-three feet (33'-0") minimum distance from the centerline of the track to the face of the pier.





The following applies to the typical cross section for bridges:

- Clear span width should account for the number of existing tracks at the specific project site. Each additional track adds fifteen feet (**15'-0"**) to the clear span width calculation.
- Horizontal dimensions shown are perpendicular to center of track.
- Crashwalls may be required based on specific parameters.
- Actual required horizontal clearances may need to be increased due to existing roadbed section, location of parallel ditches, hydrological conditions, and future track requirements.
- Theoretical toe of slope is based on the standard roadbed section. Actual toe of slope may vary due to ground line.
- The ditch section shown is the minimum acceptable section.
- The ditch section is to be increased as required by local conditions, based on hydrological and hydraulic studies.
- Horizontal dimensions shown are the minimum that will allow the construction of railroad standard roadbed section.



### Undergrade Bridge Criteria

AREMA shall serve as the overarching authority for recommended practice in designing railroad bridges. The intent of this document is to provide criteria that supplements, modifies, and/or supersedes the applicable sections of AREMA for designing undergrade railway bridges that are to be owned and/or operated on by the Railroad. Additionally, these requirements help guide an outside party through the necessary procedures for interacting with the Railroad and delivering an acceptable structure that is constructible, inspectable, maintainable, long lasting, and reliable.

#### General

Bridge shall be designed in accordance with the applicable specifications from the current edition of AREMA. Applicable sections may include, but are not limited to, the following:

- Chapter 8 Concrete Structures and Foundations
- Chapter 9 Seismic Design for Railway Structures
- Chapter 15 Steel Structures

#### Special Considerations

- AREMA recommendations for dampproofing and deck waterproofing.
- Coating of structural steel shall be performed in accordance with AREMA.
- Bridge shall be located to provide optimal railroad geometry.

#### Construction Specifications

- Shall be in accordance with AREMA recommendations for fabrication and erection.
- Items not covered by shall be governed by applicable DOT specifications from the commonwealth, district, province, or state where the bridge is being constructed.

Non-traditional bridge systems require written notice of acceptance by the Railroad. The proposed use of such a system shall be presented for review with thorough investigation, data, and detailed engineering justification.

## Bridge Layout

The general plan drawing of the bridge shall show the Railroad valuation stations at the front face of backwalls, and centerline of piers or bents, along the centerline of the bridge. Distance from front face of low milepost backwall to low milepost nearest the bridge shall also be shown. The following criteria will serve as a guide for labeling the bridge layout.

- Railroad bridges are laid out in direction of increasing milepost, increasing from left to right on plans.
- Plans should denote the railroad direction and the nearest significant terminal or junction leading away from either end of the bridge.
- For through plate and truss bridges, the substructures are numbered starting with zero and increasing in the direction of increasing mileposts.
- Superstructures are numbered starting with 1 and increasing in the direction of increasing mileposts.
- Floor systems of through plate girder, through truss, and deck truss spans are numbered starting with 0 and increasing in the direction of increasing mileposts.
- Bridge components are numbered from left to right facing the direction of increasing milepost.

Low mile post backwall GPS coordinates shall be detailed on plans in degrees-minutes-seconds or decimal format with precision to six decimal places.

For bridges on curves, the girders, abutments, and piers shall be located with reference to chords.

## Clearances

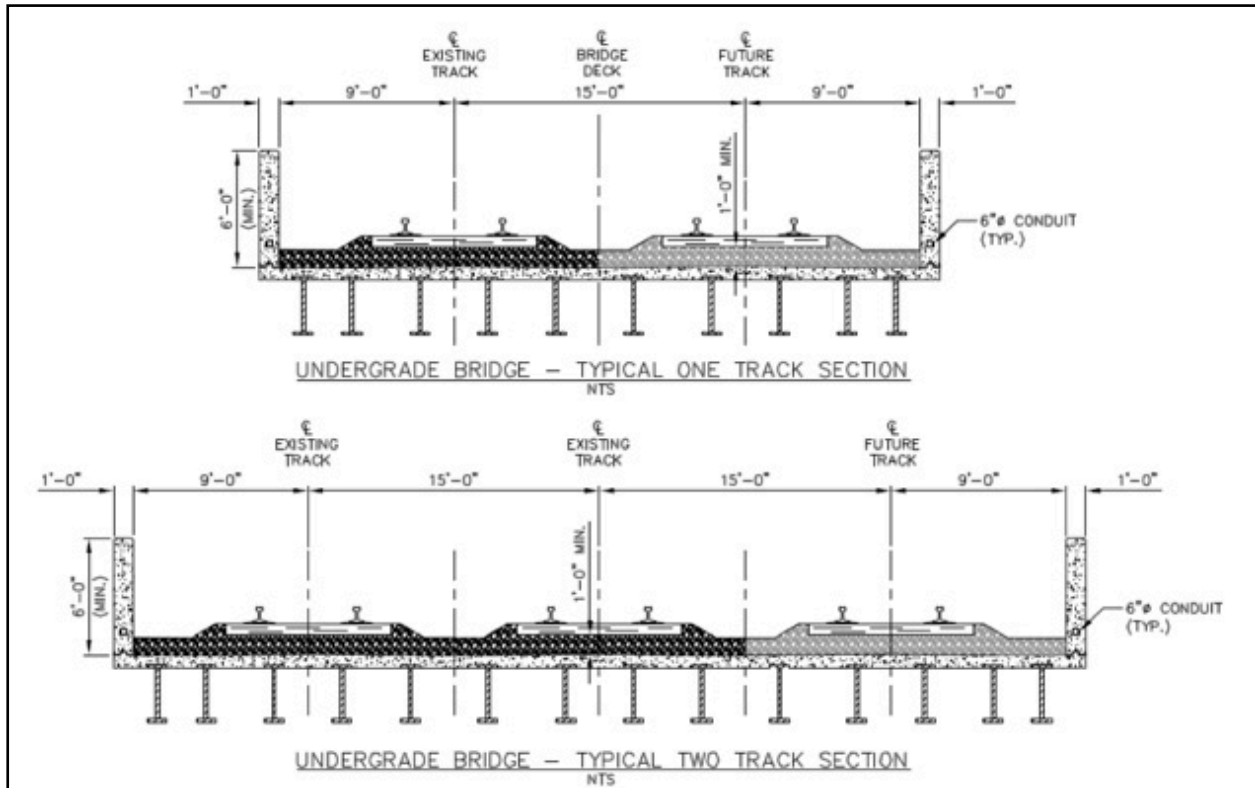
### Under Bridge Vehicular Clearances

- Undergrade structures shall be designed to ensure that the structure will be protected from oversized or unauthorized loads by providing sufficient vertical clearance and protective devices. Provide a minimum vertical clearance over the entire roadway width for all new or reconstructed structures as follows:
  - Sixteen feet six inches (**16'-6"**) for steel superstructure with 5 or more beams or 4 or more deck plate girders per track.
  - Seventeen feet six inches (**17'-6"**) for steel through plate girders or less than 4 deck plate girders per track with bolted bottom flanges.
  - Twenty feet (**20'-0"**) for steel through plate girders or less than 4 deck plate girders per track with welded bottom flanges.
  - Vertical clearance must not be violated due to the deflection of the superstructure.
- Roadway profile and design roadway vehicle information shall be provided and considered in vertical clearance design.

### Bridge Clearances

- Standard clearances on the bridge shall not be modified without written notice of approval by the Railroad. Any proposed modification shall be furnished with detailed engineering justification for review.
- Commonwealth, district, provincial, or state clearance laws must not be violated. Legal requirements must be upheld unless written permission for waiver is provided by the appropriate regulatory authority.
- Adequate clearance and capacity shall be provided for a future track.
- Track centers shall not be closer than fifteen feet (**15'-0"**).

- Minimum horizontal clearance on the bridge shall be provided as shown below:



- Standard clearances are for tangent track and increases must be provided to account for effects from curvature and superelevation.

### Design Loads

Railroad bridges shall be designed for all loads specified in AREMA.

Live loads for steel structures shall consider both the **Cooper E80** loading and the alternate live load with full diesel impact, whichever produces the greater stress. Live loads for concrete structures shall consider **Cooper E80** loading with full diesel impact.

All bridges shall be designed with non-composite interaction between superstructure and deck. Mechanical connections shall be provided as necessary to satisfy design load requirements.

The weight of the minimum ballast depth one foot (1'-0") plus an additional two feet (2'-0") of ballast below the tie shall be included when computing the dead load of the structure.

### Plans and Submittals

#### Preliminary Plans

- An electronic copy of type, size, and location (TS&L) plans shall be submitted to the Railroad for review and acceptance. The TS&L plan shall show plan view, elevation, and typical cross section of the proposed structure. Railroad acceptance must be granted before proceeding with design.
- Furnish cross sections showing the AREMA clearance envelope, topographic map with contours, and soil exploration data along with TS&L plans. Railroad acceptance must be granted before proceeding with design.

- The Railroad will assign a bridge designation (railroad, region, subdivision, MP) when TS&L plans are reviewed. This bridge designation shall be shown on all drawings.

### Construction Work Plans

- The Railroad may require construction work plans to be submitted, particularly when work is being performed in the proximity of an active track, with potential to foul.
- All construction work plans shall be submitted in accordance with the Construction Submission Criteria (see Section 1.11).

### Material Submissions

- Structural steel shop drawings shall be provided for review and acceptance prior to ordering material. Welding procedures shall be submitted with the structural steel shop drawings.
- Concrete mix designs shall be submitted for review and acceptance prior to ordering material.
- Third party testing reports shall be provided for review and acceptance in a timely manner.
- All other materials shall be provided in accordance with the plans. All materials shall be reviewed and approved by the agency or its representative. Proposed changes are subject to review and acceptance. Approved material submissions shall be furnished to the Railroad for confirmation and project documentation.

### Final Plans

- Provide electronic set of final signed and sealed design plans and calculations for acceptance.
- Submit special provisions or special specifications for acceptance.
- Provide an electronic set of as-built plans to the Railroad upon completion of construction. All changes shall be noted and clearly called out on a redlined set of as-built plans. All pages shall be clearly marked "AS-BUILT" and include the date of completion.

### Construction Considerations

After a construction contract is awarded, a copy of the contract shall be provided to the Railroad.

### Maintenance of Railroad Traffic

- It is essential that the construction be performed with minimum interference to rail traffic. Continuity of safe rail operations will be required for the duration of the project.
- The agency's design engineer should contact the PPD in the preliminary design stage to determine railroad operational requirements. The most effective method of maintaining traffic is to temporarily reroute traffic around the construction site using detour tracks. Detour tracks will be required where feasible. If detour tracks cannot be provided, the new superstructure shall be constructed adjacent to final location and rolled into place. Construction plans shall show complete details of temporary bridges and/or roll-in structure.
- A detailed construction procedure for maintaining traffic shall be shown on the plans. When construction requires total interruption of rail traffic, an estimate of the time required will be shown in the procedure. This interval must be within the approved time frame furnished by PPD.
- Prior to the start of construction, written approval from the Railroad for the construction procedure must be secured.

## Bridge Decks

### Walkways and Parapets

- Deck shall be a uniform ballast pan across all tracks and provide for a ballast walkway between all tracks and on the field side of the exterior tracks. Intermediate curbs shall not be permitted.
- All exterior walkways shall utilize the uniform ballast pan and be equipped with a **72-inch**-tall parapet wall, measured from top surface of bridge deck. Parapet walls should each include two six-inch ducts to accommodate signal and utility needs.
- Walkways and parapets shall be designed to satisfy the requirements specified by AREMA.

Minimum ballast depth shall be one foot (**1'-0"**) measured from top of deck waterproofing to the bottom of tie at the centerline of the low rail. This dimension shall be clearly labeled on cross section drawings.

On bridges, timber crossties (**7" x 9" x 8'6"**) shall be used, spaced at **19"** centers. Alternatively, concrete crossties may be used also at **20"** centers or steel crossties may be used at **24"** centers.

Track material shall be subject to review by the Railroad at project expense.

### Steel Deck Plates

- Steel deck plates shall be shop welded with a pair of **5/16-inch** continuous fillet welds to each floor beam or deck girder. Deck units shall be shop assembled with multiple beams per unit, and areas to be field welded shall be masked and field painted after welding is complete.
- The closing deck plate between adjacent deck units shall be fillet welded to the beams with continuous **5/16-inch** fillet welds at each beam. After deck plates are welded to the beam, space between deck plates shall be filled at the joint with material compatible with deck waterproofing membrane.
- The minimum thickness of steel deck plates shall be as follows:

<u>Plate Thickness</u>	<u>Maximum Clear Distance Between Beams</u>
½ inch	1'-6"
5/8 inch	2'-0"
¾ inch	2'-4"

- For multiple deck girders with steel deck plates:
  - Provide a welded field splice in the deck plate at or near the centerline of bearing of the girders. Provide a closing deck plate from the abutments to this field splice that is normal to the girders and normal to the long direction of the main deck plates. This will avoid splicing deck plates over the back wall.
  - Outside girders shall be spaced such that deck plates will not overhang the flange of the outside girders by more than 2 inches and a concrete parapet wall shall be provided. The wall shall be securely anchored to the deck girder and have a minimum width of **12 inches** at the top.

### Concrete Decks

- Bridge deck shall have adequate anchorage to the bridge superstructure. Shear studs shall not be permitted.
- The outside edge of the slab shall be not more than one foot six inches (**1'-6"**) from the centerline of the outside (fascia) girder.
- Provide a drip edge on the outside edge, bottom face of the deck slab.



## Deck Drainage & Waterproofing

- Top surface of waterproofing protection shall have a minimum transverse slope of **1/8"** per foot with a crown at the centerline of the deck.
- Top surface of waterproofing protection shall have a minimum longitudinal slope of **0.5%**.
- Concrete decks shall be designed and constructed to provide the required slopes and to direct water to deck drains.
- When the deck is level or slopes less than **0.5%**, underlayment is to be used to provide required slopes.
- Deck drains shall be cast iron and downspouts shall be ductile iron. Deck drains shall have a grate or perforated cover. Downspouts shall be provided with cleanouts at each change in direction.
- All bridge decks shall be waterproofed using membrane waterproofing.
- All deck joints between spans shall be watertight.
- Waterproofing shall be applied to the entire surface of the deck and the bottom three feet (**3'-0"**) of inside faces of parapets or curb plates. Materials and construction are to be in accordance with AREMA, Chapter 8.

## Superstructure

All bridges shall be composed of simple spans. Continuous spans are prohibited, and skewed spans are discouraged.

Design shall provide accommodations for future maintenance. Jacking locations as well as jack sizing shall be specifically denoted and laid out in the bridge plans. Jacks shall be sized to accommodate full dead load, including future ballast.

## Welded Plate Girders

- A full penetration groove weld shall be used for flange to web connection.
- No more than two flange section transitions will be permitted without special permission.
- When a lateral bracing system is required as recommended by AREMA, girder connections shall be bolted.
- Jacking stiffeners are required at all end diaphragms. These locations must be specifically called out in the plans.
- Bearing stiffeners shall be welded or milled to bear for both top and bottom flanges.
- All cross frames shall be designed in accordance with AREMA recommendations.

## Through Plate Girders

- Through plate girder bridges are only permitted for double track bridges. The use of intermediate girders in double track applications will not be permitted.
- Floor beam brackets (or knee braces) are stiffened diagonal plates that are bolted to the top flange of the floor beams and to vertical stiffeners on the through girder and shall be designed to satisfy AREMA recommendations.
- All stringers shall frame into floor beams.
- End floor beams and connections shall be designed such that the bridge can be jacked up by placing jacks between the end floor beams and pier or abutment. Jacking stiffeners shall be provided at points of jacking.

- Intermediate floor beams shall frame into the girder web using double connection angles and high strength bolts.
- All stringers shall have top and bottom flanges clipped at an angle not greater than **45 degrees** to permit field removal and installation.

### Substructure

Design shall provide accommodations for future maintenance. Jacking locations as well as jack sizing shall be specifically denoted and laid out in the bridge plans.

### Abutments and Wing Walls

- Abutment shall be designed in accordance with recommendations of AREMA, Chapter 8.
- The minimum abutment width shall be sufficient to provide for fifteen feet (**15'-0"**) track centers and standard road bed section.
- Wing walls shall be designed to support 2 horizontal to 1 vertical embankment slope as well as a level approach to the bridge walkways. MSE and sheet pile walls are not permissible.
- Provide minimum clearance necessary between end of structural steel and face of backwalls to accommodate expansion, but not less than two inches at each end.
- Provide keyways and water stops at all construction joints. Water stops shall be a hollow bulb **PVC 9" X 3/8"** (**bulb 3/4 inch inside diameter, 1 1/2 inch outside diameter**) continuous across joint.
- Two feet of porous backfill, measured horizontally, shall be provided full height below sub-ballast, behind all abutments and wing walls.
- Provide adequate drainage behind abutments and wing walls utilizing perforated pipe drains at the base of the abutments and wing walls. When abutment geometry does not allow for perforated pipe drains, weep holes may be required.
- Non-perforated pipe shall be connected to the perforated pipe and drain away from the bridge with a **1% minimum slope**.

### Piers

- Width of pier shall be minimum four feet (**4'-0"**), measured at the bearing seat.

## Section 2.06 – Cleaning and Painting of Bridges

### Summary

Requests are occasionally made by outside parties for various beautification projects, including painting of overhead and undergrade bridges. These requests are considered on a case-by-case basis by the Railroad. The cost of painting and future aesthetic maintenance will be the responsibility of the project sponsor proposing to paint the bridge.

All work over railroad property has the potential to impact rail operations. The Railroad will review bridge painting and cleaning projects to ensure environmental and engineering standards are met. This review, flagging protection, and construction monitoring costs will be paid for by the project sponsor.

### Process

- Project sponsor engages a public entity (unless the public entity is the sponsor).
- Sponsor contacts PPD to identify objective.

- Agency/sponsor and the Railroad enter into applicable contracts.
- PPD assigns GEC to receive and review submittals.
- Agency contractor to request ROE.
- Agency/sponsor indicates number of days on/over/around railroad property.
- GEC supplies estimate to complete, including flagmen coverage.
- GEC helps to coordinate an onsite flagman.
- Project work (onsite CEI may be required).
- Site cleanup.
- The Railroad and agency signoff.

### General

All proposals must comply with the Railroad's safety and environmental regulations and must not impact railroad property or operations. The public agency or its designee will be responsible for maintenance of the painted surfaces, including aesthetic damage caused by highway vehicles and vandalism. The Railroad will incur no costs or liabilities as a result of the project.

A written request by the party wishing to undertake such a project should be forwarded to the PPD for handling. The request should include information about the situation and the project objectives to assist with completion of the review. The following information should be included:

- The project sponsor and public agency that will execute appropriate agreements for implementation as well as future maintenance of the painted surfaces.
- Paint specifications, including color of the paint, that meet the Railroad's standards and methods for surface preparation, cleanup, and paint application.
- Qualifications and experience of the painting contractor. The Railroad will accept state qualified bridge painting contractors working for the responsible agency or company.
- The materials removed during the surface preparation must not impact the surrounding area, including ground, water, or air. Materials must not be stored on railroad property.
- Control of paint overspray and vapors during application. The work must be done complying with appropriate regulations and overspray controlled to prevent damage to adjacent property and vehicles in the area.
- Containment system cleanup and disposal of all paint and other material removed from the bridge. The cleanup and disposal of material from the surface preparation for painting and actual painting must comply with all appropriate regulations.
- Pictures and conceptual drawing should be submitted with the initial request from the community to simplify the initial review and comment by the Railroad.
- Work site safety plan, including keeping all personnel away from the tracks and fall protection measures where required.

## Section 2.07 – Quiet Zones

### Summary

The Railroad will fully comply with the train horn rules as specified by the FRA, which provides requirements for the sounding of locomotive horns when approaching public highway-rail grade crossings.

The rule also provides guidance for conditions under which a public authority with jurisdiction over the roadway crossing railroad tracks may apply for and establish Quiet Zones. A Quiet Zone is a section of a rail line that contains one or more consecutive public crossings at which locomotive horns are not routinely sounded. (For full details on the rules, please visit the FRA web site at [www.fra.dot.gov](http://www.fra.dot.gov) or contact the FRA's Office of Safety at **202-493-6299**). While the complete responsibility for completion of a Quiet Zone analysis and application rests with the public authority, it should be done in conjunction with the Railroad.

Each crossing has a unique DOT inventory identification number posted at the crossing. There is often more than one crossing on the same road. The crossing number (i.e., 654321D) must be used to identify the specific crossing in all communications with the Railroad to reduce possible confusion about the specific location. The rule clearly defines requirements that must be satisfied by the public authority requesting that a Quiet Zone be established or continued.

### Process

- Agency contacts the FRA on intent.
- Agency contacts PPD on intent.
- Agency/sponsor issues a legal reimbursement document or PE agreement.
- PPD assigns GEC.
- GEC will schedule a diagnostic review with agency/PPD/FRA/state DOT.
  - Please plan out your SSMs and ASMs in the FRA calculator prior to the site review.
- PPD to provide OOM for all SSMs and ASMs dictated by the review.
- Agency works with FRA to establish a notice of intent (NOI).
- Agency mails NOI and FRA calculator to PPD.
  - Please note that the estimate for ASMs and SSMs in the calculator is to not account for actual railroad expenses. For these, refer to OOM from PPD.
- All designs of ASMs and SSMs are reviewed by the Railroad at the expense of the agency.
- All ASMs and SSMs requiring modifications to the Railroad or signal system will be designed by the Railroad at the agency's expense (**see Section 2.03**).
- GEC supplies estimate to complete (including flagmen coverage if needed).
- Agency issues NTP for construction with a legal reimbursement document or construction agreement.
- Project work is completed (CEI may be required).
- The Railroad places "No Horn" signs.
- Agency and the Railroad signoff.
- Agency coordinates with FRA for final review.
- Agency works with FRA on notice of establishment (NOE).
- Agency mails certified copy of NOE to FRA/PPD/and state DOT.
- The Railroad complies within timeframe set in the rule.
- FRA database is updated.