HIGHWAY DESIGN MANUAL

Chapter 23 Railroads

Revision 39

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# CHAPTER 23
## RAILROADS

<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.1  INTRODUCTION</td>
<td>23-1</td>
</tr>
<tr>
<td>23.2  GLOSSARY OF TERMS</td>
<td>23-1</td>
</tr>
<tr>
<td>23.3  DESIGN STANDARDS, LAWS, AND POLICIES</td>
<td>23-4</td>
</tr>
<tr>
<td>23.4  KEY SERVICES DELIVERED BY RAIL DESIGN AND SUPPORT SECTION</td>
<td>23-5</td>
</tr>
<tr>
<td>23.5  METRICATION OF RAILROAD PLANS AND SPECIFICATIONS</td>
<td>23-8</td>
</tr>
<tr>
<td>23.5.1 Design Guidance - Geometrics</td>
<td>23-8</td>
</tr>
<tr>
<td>23.5.2 Design Guidance - Materials</td>
<td>23-8</td>
</tr>
<tr>
<td>23.6  PROJECT SCOPING</td>
<td>23-9</td>
</tr>
<tr>
<td>23.7  HIGHWAY BRIDGE TO GRADE CROSSING</td>
<td>23-10</td>
</tr>
<tr>
<td>23.8  PRELIMINARY DESIGN</td>
<td>23-10</td>
</tr>
<tr>
<td>23.9  DETAILED DESIGN</td>
<td>23-12</td>
</tr>
<tr>
<td>23.10 BRIDGE, NEW CONSTRUCTION, RECONSTRUCTION, AND MISCELLANEOUS PROJECTS</td>
<td>23-12</td>
</tr>
<tr>
<td>23.10.1 Clearances</td>
<td>23-13</td>
</tr>
<tr>
<td>23.10.2 Drainage</td>
<td>23-17</td>
</tr>
<tr>
<td>23.10.3 Pedestrian Fencing</td>
<td>23-18</td>
</tr>
<tr>
<td>23.10.4 Alterations to Railroad Facilities</td>
<td>23-18</td>
</tr>
<tr>
<td>23.10.5 Staging</td>
<td>23-18</td>
</tr>
<tr>
<td>23.10.6 New, Relocated, or Existing Utilities on Railroad Property</td>
<td>23-19</td>
</tr>
<tr>
<td>23.10.7 Miscellaneous Projects</td>
<td>23-20</td>
</tr>
<tr>
<td>23.11 RESURFACING, RESTORATION, AND REHABILITATION (3R) PROJECTS</td>
<td>23-20</td>
</tr>
<tr>
<td>23.11.1 Project Coordination</td>
<td>23-21</td>
</tr>
<tr>
<td>23.11.2 General Design Considerations</td>
<td>23-23</td>
</tr>
<tr>
<td>23.11.3 Geometric Considerations</td>
<td>23-24</td>
</tr>
<tr>
<td>23.11.4 Drainage</td>
<td>23-25</td>
</tr>
<tr>
<td>23.11.5 Crossing Surface</td>
<td>23-26</td>
</tr>
<tr>
<td>23.11.6 Maintenance Paving</td>
<td>23-27</td>
</tr>
<tr>
<td>23.12 PLAN REQUIREMENTS FOR WORK AFFECTING RAILROADS</td>
<td>23-27</td>
</tr>
</tbody>
</table>
CHAPTER 23
RAILROADS

Contents

23.13 CONSTRUCTION ISSUES TO BE CONSIDERED DURING DESIGN ............... 23-28
  23.13.1 Excavation on Railroad Property ............................................. 23-28
  23.13.2 Demolition and Erection of Structures over Railroad Tracks ............... 23-28
  23.13.3 Contractor Temporary Crossings ............................................. 23-29
  23.13.4 Managing Traffic ............................................................ 23-29
  23.13.5 Blasting ............................................................. 23-30
  23.13.6 Drainage, Erosion and Sediment Control ..................................... 23-30

23.14 REFERENCES ................................................................. 23-31

LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>23-1</td>
<td>Railroad Data Sheet/Special Note</td>
<td>23-6</td>
</tr>
<tr>
<td>23-2</td>
<td>Special Note on Railroad Protective Liability Insurance</td>
<td>23-7</td>
</tr>
<tr>
<td>23-3</td>
<td>Vertical Clearance Determination</td>
<td>23-14</td>
</tr>
<tr>
<td>23-4</td>
<td>Embankment Zones and Excavation Restrictions</td>
<td>23-16</td>
</tr>
<tr>
<td>23-5</td>
<td>Grade Crossing Site Survey</td>
<td>23-22</td>
</tr>
</tbody>
</table>
23.1 INTRODUCTION

This chapter is intended to provide the designer with guidance when dealing with any bridge or highway project that crosses over, under, at-grade, or is in close proximity to, a railroad. In addition, this chapter emphasizes that whenever a railroad is affected by a bridge or highway project, the designer should contact the Design Services Bureau, Rail Agreements Unit, which is responsible for obtaining all project approvals and agreements from the railroad.

23.2 GLOSSARY OF TERMS


Ballast. Material selected for placement on the roadbed for the purpose of holding the track line and surface.

Class I Railroad. A railroad whose operating revenue is more than an annually designated amount ($225 million in 1998).

Class II Railroad. A railroad whose operating revenues is between $20.4 million and the Class I threshold.

Continuous Welded Rail. Rails welded together in lengths of 120 m (400 ft) or more, to minimize joints in mainline tracks to overcome the effects of expansion and contraction.

Empire Corridor. The Amtrak passenger line, connecting Penn Station in New York City to Rensselaer (the Hudson Line), Rensselaer to Buffalo (the Chicago Line), and Buffalo to Niagara Falls (the Niagara Branch).

Entry Permit. A permit that certain railroads will issue that covers right of entry onto railroad property by state or consultant employees for investigative purposes. Right of entry permits are usually associated with bridge inspection or preliminary engineering work such as necessary survey work, subsurface investigation, etc., used in the development of highway projects. The entry permit delineates liability responsibilities and can include reimbursement for minimal amounts of flagging services.

Escape Lane. When a grade crossing is in close proximity to an intersection, there is a possibility that highway traffic will be backed up with a vehicle stopped on the track. An escape lane, usually a shoulder of sufficient width, will allow a vehicle to get off the track if a train is approaching and the highway intersection has not cleared.

Gauge. The standard distance between rails measured between the inside faces of the rail head, 16 cm (5/8") below the rail head. In North America, the standard gauge is 1735 mm (4'-8 ½").
Intermodal Program Management Section (IPMS). A section within the Freight and Economic Development Division (FEDD) under the Office of Passenger and Freight Transportation of the NYSDOT that interfaces closely with the RDSS, Region, and railroad. As delegated by the Commissioner of Transportation, this section has the authority to determine the need for grade crossing warning devices. The IPMS also reviews and/or makes recommendations for warning device proposals, plans, and specifications.

Rail Design and Support Section (RDSS). A section within the Design Services Bureau under the Office of Engineering of the New York State Department of Transportation (NYSDOT). This section should be the initial point of contact for information when a highway project impacts a railroad. This section consists of two units, the Rail Agreement Unit and the Rail Design Squad.

Rail Agreement Unit (RAU). A unit within the Rail Design and Support Section responsible for acting as the primary liaison and negotiator between the NYSDOT and each railroad, from project development through construction. The RAU also forwards plans, specifications, and estimates (PS&E) packages to the railroads, and advances agreements, obligates funds, and grants preliminary engineering (PE) authority and construction authority to the railroads.

Rail Design Squad (RDS). Provides the technical advice on rail issues when construction or relocation of tracks are involved in a highway project. The RDS can also prepare the PS&E for the rail portion of the project, or assist consultants in the development of plans for more complex projects, or review plans prior to forwarding them to the railroad for comments.

Rail. The section of track which rolling stock and on track equipment runs directly on.

Railroad Facilities. Any railroad-owned or operated tracks, yards, buildings, communication and signal devices, or any other appurtenance or property necessary to operate the railroad.

Railroad Flag Person. A person designated by the operating railroad to protect the interests of railroad operations in and around the project site.

Railroad Protection. A term used interchangeably with railroad flag person to mean that railroad facilities or operations are inspected and/or monitored to allow the safe passage of trains.

Railroad. Any privately or publicly owned freight, passenger, commuter, transit, switching, or terminal railroad.

Regional Rail Coordinator. The person designated to represent the Region in matters relating to railroads. The Rail Coordinator should be aware of Department policies, rules, regulations, design standards and practices, and rail issues which affect the Department. The Rail Coordinator may have an active role in the design and construction of rail projects.

Short Line Railroad. A railroad company which may originate or terminate freight traffic on its track, participates in division of revenue and is usually less than 160 km (100 miles) in length.
State-Railroad Force Account Agreement (SRA). An agreement document between the State of New York and a railroad company in which the railroad’s expenses are reimbursed under a force account method of payment. This method of reimbursement allows the railroad to be reimbursed for their actual labor, fringe benefit and overhead rate, and material used in support of a highway project. The length of time required to produce a fully executed agreement varies and the RAU should be consulted for questions regarding agreement requirements on specific projects.

- **Preliminary Engineering Agreement.** An SRA used to reimburse railroads for preliminary engineering (PE) in the development of highway projects. The PE agreement allows for reimbursement of railroad expenses in conjunction with reviews of scoping documents, design approval documents, preliminary and advance detail plans. The PE agreement can also be used to allow for right of entry and for reimbursement of flagging services if Department investigative surveys are close to railroad tracks.

- **Construction Phase Agreement.** An SRA which is typically used during the construction phase of a project. The agreement provides for a contractor’s right of entry, sets forth insurance requirements and describes maintenance responsibilities after the project is complete. For projects where the total estimated railroad force account is expected to be less than $15,000, the PE costs can be included in the Construction Phase Agreement.

Subballast. Any material which is spread on the finished subgrade below the ballast to provide better drainage, prevent upheaval by frost, and better distribute the load over the railroad.

Third Rail. A distribution system for electric railroads consisting of an insulated rail laid parallel to one of the running rails and arranged to provide a continuous supply of power to electric locomotives.

Track. Refers to the various components that comprise the track structure, such as tie plates, fasteners, ties, rail anchors, guardrails, etc.

Trainman’s Walkway. An unobstructed space suitable for a trainman’s use in walking along trains, extending to a line not less than 3 m (10’) from the centerline of track along the outer side of each exterior track of multiple tracks, and on each side of a single track. If there is any excavation near the walkway, a handrail with 3 m (10’) minimum clearance from centerline of track shall be placed.
23.3 DESIGN STANDARDS, LAWS, AND POLICIES

During the preliminary and detailed design of any project that affects a railroad, the applicable sections of the following standards, laws, or policies, or combination thereof, must be considered in order to ensure conformance to railroad criteria.

- Applicable Railroad Standards and Specifications
- Federal Highway Administration (F.H.W.A.) - Federal-Aid Policy Guide; Part 140, Part 646
- Federal Railroad Administration (FRA) Rules and Regulations
- Federal Manual on Uniform Traffic Control Devices
- NYSDOT Policy(ies) (e.g., Mainline Clearance Policy, Branchline Clearance Policy)
- NYSDOT Standard Specifications Construction and Materials, Section 105-09
- NYSDOT Highway Bridge to At-Grade Crossing Evaluation Procedure
- NYSDOT Manual of Uniform Traffic Control Devices
- NYSDOT Guidelines for the Design of Interconnected Grade Crossing/Highway Traffic Signal Systems
- NYS Railroad Law - Sections 51-a, 91, 93, 95, 97
- NYS Highway Law - Section 10, Subdivisions 21, 24-c, 26, 26-a, 26-b
- NYS Transportation Law - Article 10

Under the provision of Section 91 of the New York State "Railroad Law," any municipality in the State having jurisdiction over a public highway which crosses over, at grade, or under a railroad may petition the Commissioner of Transportation for approval of alterations to the crossing. Other sections of the "Railroad Law" listed below should be referred to as necessary.

- Section 51-a: Clearances (involving railroads).
- Section 93: Repair of bridges and subways at crossings.
- Section 95: Proceedings by the Commissioner of Transportation for alteration of existing crossings. (See Section 23.7 of this manual for the Highway Bridge to Grade Crossing procedure.)

In general, Section 10 Subdivisions 21, 24-c, 26, 26-a, and 26-b, of the New York State "Highway Law" defines the Department's role and responsibilities in performing alterations to highways and the associated railroad work that may be necessary because of the highway work.

Article 10 of the New York State "Transportation Law" covers grade crossing elimination projects. It outlines the procedures for a municipality or railroad to petition the State to eliminate public railroad at-grade crossings that are not on the State Highway System.
23.4 KEY SERVICES DELIVERED BY RAIL DESIGN AND SUPPORT SECTION

The key services delivered by the RDSS throughout the life of a project include the following.

Rail Design Squad:

- Produces the PS&E for the track portion of the Department's capital projects.
- Prepares preliminary estimates and design options for rail projects.
- Develops the Department's Special Specifications for rail items.
- Works with the RAU, Regions, and others in the negotiation of the scope of the rail work to be performed.
- Serves as the Department's technical advisor on rail issues for both design and construction.
- Reviews the work of consultants and assists them in their efforts regarding rail design.

Rail Agreement Unit:

- Provides coordination between the Regions and the railroads for highway projects where a railroad will be impacted.
- Serves as the Department’s negotiator with railroads, Regions, and other interested parties regarding the scope of the rail work to be performed.
- Prepares SRAs for preliminary engineering and construction agreements with the railroads.
- Provides coordination with FEDD for highway projects where a grade crossing is involved.
- Provision and maintenance of a Rail Agreement Status Report for review of Regional Design.
- Provides the Regions and DQAB with Special Notes for insertion into the contract plans and proposal, such as:
  - Railroad Data Sheet/Special Note (Figure 23-1) - Provides basic train data and information to the contractor. This note is used by the contractor's insurance company to calculate the contractor's premium for Railroad Protective Liability Insurance.
  - Special Note on Railroad Protective Liability Insurance (Figure 23-2) - Informs the contractor of Railroad Protective Liability Insurance requirements.
  - Other special notes that may be pertinent to a specific project.
  - Ensures that the State's Third Party Agreement procedures are followed in projects where the railroad needs to subcontract work.
  - Works with the Region and Main Office functional groups in administering the SRA (amended agreement, contract extension, billing issues, etc.).
RAILROADS

Figure 23-1 Railroad Data Sheet/Special Note

SPECIAL NOTE

PIN NO. __________________________
D NO. __________________________
BIN NO. __________________________
LOCATION: _______________________
MUNICIPALITY ___________________
COUNTY _________________________

FOR DOT USE ONLY

RAILROAD DATA

1. NAME OF RAILROAD/S
   a) owner __________________________
   b) operator ________________________
   c) trackage rights __________________

2. TYPE OF TRACK USAGE (i.e. main line/branch line/local siding/industrial)

3. LINE NAME/CODE ______________________

4. MILEPOST NO. ______________________

5. NUMBER OF TRACKS ________________

6. NUMBER AND FREQUENCY OF TRAINS:
   a) freight __________________________ (TRAINS PER DAY)
   b) passenger ________________________ (TRAINS PER DAY)

7. MAXIMUM AUTHORIZED TRAIN SPEED ______________________

THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 105-09; WORK AFFECTING RAILROADS IN THE STANDARD SPECIFICATIONS.
SPECIAL NOTES ON RAILROADS
PROTECTIVE LIABILITY INSURANCE INCLUDING AMENDED LIMITS

1. Each policy of railroad protective liability insurance shall be issued with limits of:

   **BODILY INJURY LIABILITY**
   **PROPERTY DAMAGE LIABILITY**

   Single limit of $2,000,000 combined Bodily Injury Liability and/or Property Damage Liability for each occurrence with a $6,000,000 Aggregate limit applying separately to each annual period.

2. Before any work is started on the railroad company's right-of-way, the contractor shall furnish:

   (a) Owner Operator: ____________________________
       Trackage Rights: ____________________________

   (b) Owner Operator: ____________________________
       Trackage Rights: ____________________________

   (c) Owner Operator: ____________________________
       Trackage Rights: ____________________________

   (d) Owner Operator: ____________________________
       Trackage Rights: ____________________________

   (e) Owner Operator: ____________________________
       Trackage Rights: ____________________________

   with a policy of railroad protective liability insurance taken out singularly in the name of the railroad company(s) identified in each of the above lines (a), (b), (c), (d) and (e). Said policy(s) shall be subject first to the approval of each named railroad company and the contractor shall also furnish each named railroad company with a copy of the State of New York Department of Transportation's Form C-218, Certificate of Insurance for Construction and Reconstruction of State Highway Projects.

This Railroad Protective Liability Insurance Policy issued to the Company shall be in accordance with the U.S. Department of Transportation, Federal Highway Administration, Federal Aid Policy Guide, 13 CFR Part 646 Subpart A dated December 5, 1991.

The Contractor shall procure and maintain at his own expense, and without expense to the State or Railroad, the above captioned Railroad Protective Liability Insurance. The policies shall not be changed or cancelled until thirty (30) days written notice has been given to the Commissioner and the above listed Railroad(s).

Because of railroad involvement, the Contractor's attention is directed to Section 105-89, WORK AFFECTING RAILROADS, in the current "Standard Specifications, Construction and Material Publication of the New York State Department of Transportation".
23.5 METRICATION OF RAILROAD PLANS AND SPECIFICATIONS

FHWA encourages and NYSDOT has implemented the use of metric units in all projects; however, the Federal Railroad Administration (FRA) and the rail industry have not adopted metric units. Therefore, dual English and metric units must be used in the plans and specifications for all dimensions that are of interest to the railroad. This will normally include horizontal and vertical clearances from the tracks to various components of the structure. For a highway bridge, the structural details do not have to be in dual units.

The Department will review and approve a PS&E submitted in either English or metric units by a railroad for force account work.

23.5.1 Design Guidance - Geometrics

In addition to highway geometric data, railroad geometrics to be indicated on plans must include linear dimensions such as vertical clearances, horizontal clearances (distances from centerline of track to obstructions), horizontal and vertical curve data, and spiral criteria for all tracks at railroad at-grade crossings. Other features that should be indicated include pipelines that either cross over or under the railroad, boring logs, and information pertinent to the railroad that is found within the foundation design report. At a grade crossing location, the plans should include lane widths and the distance from the warning devices to the edge of roadway. For further information regarding this matter, contact the RDSS.

The metric policy as noted in Section 23.5 requires the use of dimensions in dual units to assist the railroads in assuring that their requirements have been met. The standard convention for the display of dual dimensions shall be metric value first, followed by the English units in parentheses, e.g., 3.6 m (11.81'). The standard convention will be that the metric number is the controlling value while the English unit will be substantially equivalent for information purposes.

Use common sense when defining metric dimensions that satisfy/meet existing nonmetric statutory requirements or industry standards (e.g., A.R.E.M.A.). For instance, when an English unit value represents a maximum or minimum limit that is to be met, the conversion must be in the direction which does not violate the original limit.

23.5.2 Design Guidance - Materials

Designation of materials for railroad work should follow the hierarchy listed below:

1. Common contract items should be standard metric designations in accordance with Department specifications. Examples include wood crossties, pipe, signs, and grading materials such as subballast and ballast. All pay items will be measured and paid for in metric units.
2. Dual dimensions must be used to accommodate railroad requirements. Examples include: crossties, crossing surfaces, and construction details such as spike clearance between the head of spike and the base of rail (3 mm (1/8”)) or rail weld temperature ($32 ^\circ C \pm 2.8 ^\circ N (90 ^\circ F \pm 5 ^\circ N)$).

3. Standard railroad designations may be used for items unique to the rail industry, especially where nonmetric industry standards are commonly used to specify the material. This includes rail and other track material. For example, for a specification calling for a 7/8" diameter track bolt, no metric designation should be given since it is specified in A.R.E.M.A. standards. These unique items are normally paid for under a metric specification.

### 23.6 PROJECT SCOPING

The relationship between the size or class of a railroad and design of a highway project often affects a project’s cost, scope, schedule, and quality. Early coordination by the project developer/designer with the Regional Rail Coordinator and with the RDSS during scoping and design is important in identifying railroad-related issues. The RDSS should be consulted by the scoping team to provide input in the development of the scoping document.

In preparing the scoping documents, the project developer should include a section on project impacts to railroad facilities as described in the Design Procedure Manual (DPM), Appendix B. The project developer should contact the RDSS, if necessary, to clarify any railroad-related questions that may arise during the development of the scoping document. The RDSS usually requires 2 copies of the complete scoping document for review, determination of railroad involvement, and forwarding to the affected railroad. The proposed project letting date, scheduled completion date, and project funding should be noted in the transmittal to the RDSS.

The RAU typically makes the initial contact with the affected railroad(s). At this stage, a preliminary engineering SRA is typically initiated with the railroad. This agreement will cover the expenses incurred by the railroad for reviewing scoping documents, design approval documents, preliminary and final plans, and any other railroad costs associated with the development of a project.
23.7 HIGHWAY BRIDGE TO GRADE CROSSING

The Department has developed the "Highway Bridge to At-Grade Crossing Evaluation Procedure" which is a standardized procedure for evaluating proposals to replace bridges over railroads with at-grade crossings. The designer should refer to the latest procedure which was distributed to all Regional Directors, on March 4, 1991, by the FEDD.

A proposal to revise this procedure is being considered. With this in mind, contact should be made with the FEDD whenever a bridge-to-grade-crossing proposal is being developed. The USDOT has adopted a policy which establishes a goal of eliminating all grade crossings on the National Highway System, with particular emphasis on principal rail lines. In addition, it should be noted that it is the policy of the NYSDOT not to remove a bridge and establish a grade crossing on any line where regularly scheduled intercity rail passenger service operates.

Concerns for safety should be strongly evaluated when investigating the retention or use of an at-grade crossing. "Railroad Law" requires that a regulatory hearing be convened to formally review the concept of a bridge to at-grade crossing proposal pursuant to the authority granted in Section 95 of the "Railroad Law." The Regions should anticipate having the principal role in testifying at the hearing concerning the appropriateness of removing the bridge. The Regions should contact the FEDD to determine the feasibility and safety of the proposed crossing. A consensus should be reached within the Department prior to the regulatory hearing.

23.8 PRELIMINARY DESIGN

During preliminary design, it may be necessary to send Department employees or consultants onto railroad property for soils investigations, site survey, hazardous waste screening or hazardous waste assessment, and to evaluate other impacts associated with the human and natural environment. Each railroad operating within the state has different requirements regarding right of entry for engineering or inspection within their right of way (ROW).

Although Department employees, agents, and contractors have the right to enter railroad property pursuant to Article 3, Section 30, Paragraph 17 of the "Highway Law," the railroad needs to be notified a few days in advance before entering their property. The Regional Office should contact the railroad to make arrangements with the railroad company to assign a railroad flag person to the site of work or inspection by DOT employees close to live railroad tracks. All tracks should be assumed to be live unless a railroad official indicates otherwise. Flag persons are necessary to insure the safety of DOT employees and to protect the operational interests of the railroad. On projects with minimal railroad involvement, reimbursement of the railroad's flagging expenses can be accomplished by the Region preparing a payment voucher and charging the flagging to the appropriate Project Identification Number (PIN). On projects with significant railroad involvement, the RAU will arrange a force account agreement to pay for flagging. In addition, some railroads require that the Department's consultant acquire permits prior to entry onto railroad property. With consultant-designed projects, it is the responsibility of the consultant to make arrangements with the railroad company and to pay the company directly for the flagging services.
On certain projects where rail design cannot be performed by the RDS or the designated consultant, it may become necessary for the railroad company to retain a consultant to provide design services on behalf of the railroad. If the cost of railroad-retained consultant design services is expected to exceed $25,000, then the railroad should prepare a request for proposal (RFP) and attempt to obtain 5 proposals from firms preapproved by NYSDOT. These proposal solicitation packages and proposals must be reviewed and approved by the RAU prior to award of a design contract. In lieu of this, the railroad may invoke an existing written, continuing contract with a consulting firm under which the firm regularly performs the same services for the railroad. If the railroad follows a standard procedure similar to the process outlined, the railroad may submit a description of that procedure to NYSDOT for approval prior to the process of contracting for engineering services. If the process satisfies the criteria, the railroad will be advised to follow their process and engage a consultant. At the discretion of NYSDOT’s Program Manager, the railroad may forego submitting documentation of their procedures and may instead submit a letter to the Program Manager attesting to the fact they have complied with the process and that the documentation is on file at the railroad’s corporate headquarters.

During preparation of the design approval document, it is the responsibility of the RAU to initiate contact with the railroad. Typical information required to be transmitted to the railroad includes:

- A brief description of the project.
- A location plan.
- An overall project schedule (including any accelerated schedule).
- The estimated amount of time the project will impact railroad facilities.
- Any required relocation of railroad facilities (including warning devices).
- The relocation of utilities on railroad property.
- The changes in clearances (both vertical and horizontal).

This information should be contained in the design approval document as described in Appendix B of the DPM. Submission of 3 copies of the design approval document should be sent to the RAU for review, comment, and distribution to the affected railroad(s). If more than one railroad is involved, additional copies should be included as determined by the RAU. If it has not already done so, the RAU will notify the railroad of a project in conjunction with the transmittal of the design approval document.
23.9 DETAILED DESIGN

Review by the railroad and resolution of railroad comments are necessary elements during detailed design and should not be postponed until late in the design stage. The responsible designer, project manager, or consultant manager should ensure that the number of advance detail plans, as listed below, which include any design or construction details that directly affect the railroad, are forwarded to the RDSS for review and comment.

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<tr>
<th>Railroad</th>
<th>Number of Plan Sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amtrak</td>
<td>5</td>
</tr>
<tr>
<td>Metro-North</td>
<td>5</td>
</tr>
<tr>
<td>Long Island Rail Road</td>
<td>3</td>
</tr>
<tr>
<td>CSXT</td>
<td>3</td>
</tr>
<tr>
<td>Norfolk Southern</td>
<td>3</td>
</tr>
<tr>
<td>New Jersey Transit</td>
<td>8</td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
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</tbody>
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It should be noted that the number of plan sets is subject to change due to the sale of rail lines, the complexity or scope of any given project, and its direct impact on the involved railroads.

After an initial review by the RDS, these documents, if acceptable, are then forwarded by the RAU to the railroad for technical review, comment/approval, and for development of the railroad force account estimate and crossing plans if required. Note that the railroad's review and response time is dictated by the nature and extent of the work affecting the railroads and by their staffing levels. As a general guideline, it should be expected that a railroad company will need an average of 60 days from receipt of a set of plans to complete a review and assemble comments from the several different units within the railroad that may need to review the plans independently. Processing time may depend on factors which are out of the Department's control. For instance, normal railroad operational activities may preempt reviews. Designers are urged to allow as much time as possible for railroad review. In general, the more complex the project, the greater the review time required.

The railroad typically grants approval of the project once all comments are resolved to the satisfaction of both the Department and the railroad. Railroad approval is implied when the Department receives a railroad signature on the construction force account agreement.

23.10 BRIDGE, NEW CONSTRUCTION, RECONSTRUCTION, AND MISCELLANEOUS PROJECTS

This section should be used as a guide for projects that replace or rehabilitate an existing bridge or construct a new bridge, provide a new highway alignment, replace an existing highway, or contain other miscellaneous types of work. Resurfacing, Restoration, and Rehabilitation (3R) projects are covered in Section 23.11.
23.10.1 **Clearances**

For projects which include replacement or rehabilitation of existing bridges, or construction of new bridges, horizontal clearances to the centerline of track or vertical clearances to the top of rail are prescribed by the following laws, policies, and specifications, or combination thereof:

- NYS Railroad Law - Section 51-a
- A.R.E.M.A. - Chapters 28 and 33
- NYSDOT - Mainline Vertical Clearance Policy (12/19/86)
- NYSDOT - Branchline Vertical Clearance Policy (6/10/93)

Note - The Branchline Vertical Clearance Policy should be used as a guide only, as it has not been formally adopted by the railroads operating within New York State.

Clearance distances should be considered during scoping, or at the latest, Design Phase I. Horizontal clearances to the centerline of track or vertical clearances from the top of rail are subject to operating requirements and standards adopted by each individual railroad, subject to limitations as set forth in the above referenced materials. For clarification of clearances on a specific railroad, the designer should contact the RDSS to determine the individual railroad's requirements.

The minimum vertical clearance over an operating mainline track is 6.71 m (22'-0"). See Chapter 2, Section 2.4.3 of the Department's Bridge Manual. The minimum vertical clearance should be shown on the structure plans measured within a distance of 1.83 m (6'-0") from either side of the centerline of track (2.45 m (8'-0") for CSXT). See Figure 23-3. It should be noted that A.R.E.M.A. criteria recommends 7.01 m (23'-0") vertical clearance and is the standard adopted by most Class 1 railroads as optimum clearance. The 7.01 m (23'-0") vertical clearance allows for further railroad maintenance activities. If in discussion with the Region it is determined to be feasible, design should be to this optimum standard.

Under exceptional circumstances, the railroad may agree to clearances less than 6.71m (22'-0"). This waiver should be negotiated through the RAU.

Whenever practical, highway bridge structures should have the piers and abutments located outside of the railroad ROW. All piers located less than 7.62 m (25'-0") from the centerline of track require a crash wall designed in accordance with specifications outlined in the current A.R.E.M.A. Manual, Chapter 8, Article 2.1.5.

All pier stems and footings should be located so they do not interfere with railroad drainage ditches or facilities. Where special conditions make this impossible, an explanation of these conditions must be submitted with the drainage plans for approval by the railroad.
Minimum vertical clearance will be the smallest of A, B, or any height within 1.83 m (6'-0") of the centerline of the track. The location(s) of the minimum vertical clearance is to be shown on the structure plan and elevation view. The actual value(s) should be given in the elevation view. Multiple track conditions and multiple span arrangements may require the minimum vertical clearance to be shown at more than one location.
Designers should determine the existence of a railroad access road running parallel to the tracks. The presence of an access road will have an impact on the overall horizontal clearances and needs to be addressed during Design Phase I. Typically, railroads do not allow their access roads to be obstructed with piers or abutments. Also, designers should be aware that railroads may eliminate one or more tracks, or in some instances, be planning on adding a track in the future. The designer should make early contact with the RDSS and the Regional Planning and Program Management (RPPM) Group for coordination.

Where applicable, the design of bridges along the Empire Corridor should accommodate an extra track for future high-speed rail. This will be determined on a case-by-case basis by the railroad, RDSS, and the FEDD.

Vertical and horizontal clearances must be adjusted so that the locomotive engineer's sight distance to railroad signals is not reduced or impaired. This adjustment is determined by each individual railroad. The designer should ensure that any railroad signals within the project limits are clearly marked on the plans.

All proposed temporary clearances for construction purposes must be submitted for railroad review prior to detailed design. The actual minimum temporary vertical and horizontal clearances should be shown on the advance and final plans.

Methods of construction should be correlated with the proposed temporary clearances to ensure constructibility. For instance, the footings of a pier constructed close to the tracks will require sheeting to be driven to support railroad live load. See Figure 23-4 and Section 23.13.1 for sheet piling requirements close to live tracks. If the driving of sheeting is in conflict with the railroad tracks, sheeting may not be feasible.

It is important that the Geotechnical Engineering Bureau (GEB) review the plans for projects with pile or sheet pile driving activities close to railroad facilities. The construction of a bridge over the railroad, excavation along or near the tracks, and construction of a retaining wall near the tracks are types of projects or activities that could warrant such reviews. Track monitoring in the form of profile surveys may be required by a railroad in an effort to identify any potential negative impacts caused by driving operations.

The responsible designer or consultant manager should ensure that the GEB receives a copy of the preliminary plan that shows the proposed locations of any structures, substructures, or excavation relative to the railroad. This allows the GEB the opportunity to review the plans and soil boring logs and prepare a foundation design report (if necessary) that meets railroad requirements. GEB's final recommendation for the need for and extent of track monitoring, the soil boring logs, and foundation design report are forwarded to the railroad by the RAU, usually no later than the advance detail plan stage. The GEB and RAU consult throughout the design process in order to provide a coordinated response which will address the railroad's requirements and concerns.
NOTE: Consult Geotechnical Engineering Bureau when consideration is first given to excavating in proximity to railroads.

NOTE:

1. Sheet for the support of railroad tracks is not permitted closer than 3.05 m (10'-0") from the centerline of the nearest track.

2. Excavations located** outside of the theoretical railroad embankment do not require sheeting for the support of railroad tracks.

3. Sheet, installed prior to excavation, is required for excavations located** within the theoretical railroad embankment (Zones A & B). The following conditions apply to the design and construction of this sheeting:
   A. A Cooper's E-80 live load, applied as a Boussinesq distribution, must be used to account for the railroad surcharge. Contact the Geotechnical Engineering Bureau for assistance with the application and calculation of the railroad surcharge.
   B. Sheet shall be interlocking sheet piles, unless penetration cannot be obtained or dry, non-running, stable material will be encountered, in which cases the designer may consider soldier pile and lagging walls subject to railroad approval.
   C. During construction, the sheet shall not extend above the top of rail. After construction, sheeting for excavations located** in Zone A may be removed after the excavation is backfilled. (There are situations where this sheeting should be left in place, such as, to prevent settlement of spread footings, etc. Contact GEB.) Sheet for excavations located** in Zone B must be left in place. All sheeting left in place ("Interim Steel Sheet"") must be cut off 0.46 m (18") below existing ground line.

*For Norfolk Southern tracks, increase indicated quantities as follows:
   a. Distance from centerline of track to working point: 4.27 m (14'-0")
   b. Top of Rail down to working point: 1.10 m (3'-7.25")
   c. Slope of theoretical Railroad embankment line: 1(V) ON 2(H)

**The excavation location is defined as the point of intersection between the bottom of the excavation and the proposed line of sheeting at its closest offset from the railroad.
RAILROADS

If it is agreed that track monitoring is required, a special note is provided by the RAU which is included in the contract documents. As these requirements vary depending on the individual railroad, the RDSS should be contacted for clarification.

23.10.2 Drainage

Normally, bridge drainage systems and highway drainage are not permitted to drain onto railroad property. Designers should make every attempt to divert bridge and highway drainage away from railroad facilities. Any variation of this must have the approval of the Chief Engineer of the individual railroad. The RAU will negotiate for any variance.

The plans for bridge projects should show the proposed track and ditch section in relation to the bridge section and the flow pattern in the vicinity of the railroad. Highway and bridge drainage systems should conform with the existing topography and maintain the continuity of the existing drainage patterns.

An increase of drainage to railroad facilities may require the installation of new ditches and/or culverts. Any new ditches and culverts must be sized to accommodate the runoff due to construction, and the drainage must continue to its natural outlet. Ditches must be designed in accordance with Chapter 8 of this manual. In general, railroad drainage (e.g., ditches and culverts) should be designed for storms of 25 or 50 years. Railroads may specify that culverts under or ditches along their tracks be designed based on a 100-year storm. If it is necessary to convey highway drainage into an existing railroad ditch or culvert, then supporting hydrologic and hydraulic calculations, which verify the ability of the ditch or culvert to carry the additional runoff, must be provided to the RAU for transmittal to the railroad.

On occasion, it is necessary to design a bridge structure with a pier or abutment location that conflicts with a railroad ditch line. Sufficient space must be allowed for construction of a replacement track ditch parallel to the standard railroad roadbed section. If the railroad ditch cannot be provided, or if a pier will interfere with the ditch, then a culvert of sufficient size must be provided.

Where drainage improvements or changes are made within the project limits that require a cross culvert under the railroad track, the design and installation must conform with A.R.E.M.A., Chapter 1, Part 4. A plan showing the proposed cross culvert, method of installation, and drainage calculations must be sent to the RAU for transmittal to the railroad for approval.
23.10.3 **Pedestrian Fencing**

Pedestrian fencing is required on any bridge with a sidewalk that crosses over an active railroad. The purpose of the fencing is to increase pedestrian safety and protect the railroad against vandalism. Pedestrian fencing usually consists of chain link fence installed along the fascia. See the latest Bridge Detail (BD) sheets available from the Structures Design and Construction Division.

Fencing may also be installed on bridges without sidewalks where the railroad can identify a history of problems. In areas where change due to development has created pedestrian traffic generators, i.e., parks, shopping malls, schools, etc., fencing may also be required. Any requirements for fencing should be discussed with the RDSS.

23.10.4 **Alterations to Railroad Facilities**

Consideration must be given to any necessary alterations of railroad tracks and/or facilities. In general, design must be in accordance with A.R.E.M.A. and/or applicable railroad standards. Depending on the nature and extent of the work, sufficient time should be built into the project schedule to allow for railroad input, design, and/or review. If grade crossing warning devices are impacted in any way, the RDSS will contact the FEDD at an early stage in the project.

The design of railroad-related work is dictated by the nature and complexity of work, capabilities and staffing levels of the affected railroad(s), and the timing of the project. Railroad-related design can be performed by the RDS, Regional Design, consultants, or by the affected railroad. All requests for rail design assistance should be directed to the RDS (with a copy to the RDSS). Railroad design work performed by Regional Design, consultants, or by the affected railroad is to be submitted to the RDSS for procedural review and coordination of technical review by the RDS.

It should be noted that labor agreements between the larger, Class I railroads and their unions normally preclude a NYSDOT contractor from doing any railroad-related work on railroad property. In some circumstances, however, the railroads allow NYSDOT's contractor to perform railroad construction as part of NYSDOT's contract. This requires approval by the railroad prior to the preparation of the contract. Coordination of this activity is handled by the RDSS during plan development.

23.10.5 **Staging**

The coordination of highway projects and related railroad work should be considered in the scoping phase and very early in the design process. If the project requires railroad work at a specific time and the work is an integral part of progressing the project, then the designer should be aware that certain railroad work can only be performed during certain times of the year. For instance, in the northeast, it is impractical for a railroad to perform major track work during the winter months due to frost in the ground. The staging of railroad work could have a direct impact on the overall schedule; therefore, this work should be identified and the railroads notified by the RAU during preliminary design.
23.10.6 **New, Relocated, or Existing Utilities on Railroad Property**

It is important that any impacts to utilities on railroad property be determined no later than preliminary design. The following utilities could be present within the project limits crossing under the railroad, over the railroad, or running longitudinally with the railroad, either above or below grade.

- Railroad communication and signal facilities (C&S)
- Gas lines
- Water lines
- Communication and power lines (private carriers)
- Fiber optic cables (FOC)
- High voltage transmission lines (above ground for communities and underground for railroads)
- Storm water lines
- Sanitary sewer lines

All existing lines on or above railroad ROW should be shown and identified on preliminary plans. The presence of C&S lines depends on railroad operations. Designers should be aware that identifying the exact limits of underground railroad C&S lines may be very difficult as the "as-built" plans may not exist. Therefore, approximate limits of railroad C&S lines should be shown, if known. In general, if a designer knows that railroad C&S lines will be in conflict with the construction of a particular project, then the railroads should be advised as early as possible, since it may be necessary to temporarily relocate their lines as part of their force account work. Often, the affected railroad, after reviewing the project plans, will indicate that its lines may be in jeopardy during construction and may require temporary relocation.

It should also be noted that numerous communication companies have installed FOC along railroad ROW, typically close to the tracks, although locations vary. The presence of such facilities should be considered during project design. The location of these lines should be shown on the plans and appropriate measures for protection of the FOC by the communications company shall be addressed on the plans and in the contract documents. The cost of relocating FOC can be charged against the project, if the owner of the cable can demonstrate that the owner's occupancy permit for the cable on railroad property grants the owner an easement or compensable property rights. Relocation costs for FOC can be very expensive; therefore, the designer should consider design layouts which avoid their relocation.

A bridge or highway project may require that a gas, water, sanitary, or communication line be relocated or installed either on a structure over the railroad or under the tracks. The railroad should be advised of the proposed crossing, as each railroad has its own procedure for the utility company to make application to the railroad for permission to occupy railroad property. For projects involving CSXT, the utility company will be required to enter into a license agreement with the railroad. This agreement will be arranged directly between the railroad and the utility company.

The specification for installation of any pipe or conduit under the railroad track, whether under pressure or not, is described in the A.R.E.M.A., Chapter 1, Part 5 and/or covered in railroad
specifications.

The need for encasement, jacketing, and venting of certain utilities will be addressed on a case-by-case basis.

23.10.7 **Miscellaneous Projects**

Projects located close to or over the railroad may at first appear to have no railroad involvement. Miscellaneous projects (bridge cleaning and painting, bridge joint replacement, lighting or signing, slope protection or drainage improvement) located in close proximity to the railroad should include a location map and description of the project sufficient to determine whether or not the railroad is affected by the project. The map and work description should be forwarded to the RDSS and the Regional Rail Coordinator early in project development for a determination of railroad involvement.

A railroad should be considered in close proximity when:

- Any part of the project will require work on, over, or under the railroad ROW.
- The project is likely to induce traffic onto a highway that crosses a railroad at grade.
- The construction or construction process is likely to interfere with the view of the warning devices for an at-grade crossing.
- The construction process is likely to cause traffic to back up over an at-grade crossing or switch into the opposing lane where the warning devices will not be effective.

On bridge cleaning projects in areas where track is electrified, water from the contractor’s operation shall not be allowed to fall upon the tracks or overhead cables. In addition, no cables or scaffolds that will decrease the vertical clearance may be suspended from the bridge.

23.11 **RESURFACING, RESTORATION, AND REHABILITATION (3R) PROJECTS**

During the project initiation or scoping phase of a 3R project, the developer/designer should determine if there is railroad involvement at a railroad-highway at-grade crossing. An improvement alternative to an at-grade crossing is elimination, either through grade separation of live track (see Section 23.10), or removal, in the case of a track(s) that is abandoned. Refer to the DPM, Appendix B for additional information on project impacts to railroad facilities to be included in the scoping document. If grade crossing warning devices are impacted in any way, the RDSS will contact the FEDD at an early stage.

The project developer/designer should alert the RDSS before preliminary design begins if it appears that any tracks within the project limits are unused. The RDSS will approach the affected railroad to inquire about their future plans for these track(s).

Improvements can be made to upgrade either the crossing surface, the warning devices, or both. Track work, other than surfacing, is usually limited to within 20 m (65’) of the crossing surface. If a railroad at-grade crossing is within the project limits, the designer should enlist the assistance of the Regional Rail Coordinator and the FEDD to inventory the physical characteristics of the crossing.
crossing, e.g., surface type and condition and warning devices. The Grade Crossing Site Survey form should be considered for use by the Region to help in the evaluation of alterations to at-grade crossings. Figure 23-5 shows a sample Grade Crossing Site Survey form.

In the event that no improvements are proposed for a crossing, the project developer/designer should consider the impact of the adjacent construction activities on the grade crossings located within or in close proximity to the project. Among the items to be considered are:

- The need for railroad flag persons to safeguard trucks and paving equipment.
- The necessity to mill the pavement near the grade crossing to ensure a smooth transition over the crossing.
- Traffic backups over the crossing caused by the construction activity, or shifting traffic onto the opposing lane where there will be no grade crossing warning devices.

When proposing any improvements or modifications at a railroad-highway grade crossing, for example, the crossing surface is to be upgraded, or the warning system is to be relocated and/or upgraded, the designer should refer to the New York State Manual of Uniform Traffic Control Devices (NYS MUTCD) and contact the FEDD. Final determination of improvements is made in conjunction with the RDSS, the railroad, and the FEDD.

23.11.1 Project Coordination

The RDSS is responsible for requesting layouts and for coordinating technical reviews and approvals of the proposed railroad grade crossing and signal improvements through the RDS and/or the FEDD. Recommendations for proper layout of grade crossing warning devices are made by the FEDD and/or the regional rail coordinator.
Figure 23-5 Sample Grade Crossing Site Survey

GRADE CROSSING SITE SURVEY

<table>
<thead>
<tr>
<th>P.M. -</th>
<th>DATE:</th>
<th>N.Y.S. INSPECTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CROSSING NAME</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOWN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COUNTY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAILROAD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRANCH/P.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCOPE:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Existing Features:

A. Highway:
1. No. of Lanes
2. Highway Width
   a. Travel Lanes
   b. Shoulders
   c. Median
3. Sidewalk Width
4. Mail Width
5. Angle of Crossing
6. Highway Speed
7. Surface Type
   a. Condition
8. Nearby Intersections or Driveways
   Yes (shorn on plan) No
9. Traffic signal within 200 ft. Yes No

B. Railroad:
1. No. of Tracks
2. Track ø Dimension
3. Track Speed
4. Rail Size
5. Rail Type
   CWR Joisted
6. Switches
   a. Direction
5. Wayside Signals: Direction
   Dist: ___
7. Other Grade Crossings: Direction
   Dist: ___ Warning Devices ___
8. Existing Warning Devices
   a. Type
   b. Condition
   c. Circuity
   d. Salvage - Scrap
   Usable

C. Miscellaneous:

<table>
<thead>
<tr>
<th>1. Existing Features</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Pavement markings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Warning Disc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Existing Conflicts (show or sketch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Utilities</td>
</tr>
<tr>
<td>b. Drainage Facilities</td>
</tr>
<tr>
<td>c. Overhead Restrictions</td>
</tr>
<tr>
<td>d. Visibility Obstructions</td>
</tr>
</tbody>
</table>

New Design: (sketch on back)

A. Dimensions:

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>G1</th>
<th>G2</th>
<th>G3</th>
<th>G4</th>
</tr>
</thead>
</table>

Stanchion to:
1. Highway ø
2. E.P. (Recommend 12")
3. Rail (10' to 15' Max)
4. From Rail to Cans Tip
   (10') (obtuse angle)
5. Cantilever - show dimensions on sketch if applicable

Signal House:
1. To Rail
2. To E.P.

Clearance Distance (acute angle)

B. Equipment Required:

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>Main Gate</th>
<th>Standard Flashers</th>
<th>Extra Lights</th>
<th>Sidewalk Gate</th>
<th>Bell</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>G2</td>
<td></td>
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<tr>
<td>G3</td>
<td></td>
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</tr>
<tr>
<td>G4</td>
<td></td>
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</tr>
</tbody>
</table>

C. Additional Work Required:
1. Cribbing/Ring Barrier Yes No
2. Fill Yes No
   Approx. Amount: _____ cu. yds.
3. Insulated Joints:
   Using Existing Install New Yes No
4. Clear Brush or Trees Yes No
5. Power Service Required: Use Existing New
6. Dist. to Closest Power Service
7. Utility Relocation Yes No

D. Comments:

E.F. - edge of pavement (outside driving lane)
C. = centerline

§23.11

3/15/02
23.11.2 General Design Considerations

The highway design must be compatible with the railroad-highway at-grade crossing. Vehicular and pedestrian safety will be the primary concern. Each location must be treated on an individual basis and its specific design may be influenced by such factors as motor vehicle and train operational requirements as well as highway traffic signal controller and track circuit limitations. The FEDD will provide technical assistance on the warning system aspects of this design and should be contacted at an early stage.

The geometric design of the railroad-highway at-grade crossing must be made concurrently with the determination of the type of warning devices to be used. Factors to be considered when identifying proposed at-grade crossing improvements include:

- Vehicular speeds and volumes.
- Train speeds and volumes.
- Accident history.
- Sight distance.
- Crossing skew.
- Number of tracks.
- Highway approach grade.
- Length of trains.
- Consistency of the type of warning devices with other at-grade crossings.
- Type of warning device circuitry.
- The presence of pedestrians and bicyclists.
- Use of the crossing by school buses or trucks carrying hazardous materials.
- Emergency services.

It may be necessary at certain at-grade crossing locations to provide an added margin of safety through the use of additional features such as:

- Escape lanes.
- "DO NOT STOP ON TRACKS" signs.
- Advance clear out of traffic signal phases.
- Turn restrictions, including variable message as well as "NO TURN ON RED" signing.

When only passive warning devices such as signs and pavement markings are used to alert drivers to the crossing location, the driver must determine whether or not there are train movements. Therefore, sight distance becomes a critical factor in determining the safety of passive warning devices and whether active warning devices are required. The reference material applicable for determining sight distance can be found in AASHTO's *A Policy on Geometric Design of Highways and Streets*.

If sight distance criteria cannot be met, active warning devices should be considered. When these devices are used, the driver is given a positive indication of the approach or presence of a train at the crossing. Active traffic control devices for highway-railroad grade crossings consist primarily of flashing light signals and automatic gates. It follows that a clear line of sight should be kept between the warning devices and the driver’s approach position for the minimum distance given in...
AASHTO. This should be considered when placing highway signs and should be brought to the attention of the utility companies.

Traffic control signals should normally be provided at coincident crossings - crossings where the railroad track crosses the highway within an intersection - when justified by standard intersectional warrants in the NYS MUTCD. They should not be provided at these crossings solely due to the fact a coincident crossing exists. Where signals are not provided, passive warning devices are used. Where a grade crossing exists within 60 m (200') of a signalized intersection and traffic queues over the crossing, a traffic signal (advanced head) or other means of clearing traffic must be installed.

Standards for design, placement, and installation of active warning devices are outlined in the NYS MUTCD. Also, input or advice relative to application or operation can be obtained from the FEDD, Regional Traffic Engineering and Safety Group, or the RDSS, depending on the type of devices being considered. For specific information on the need for railroad warning devices, placement or circuitry, designers should contact the FEDD. This Division makes the final Department determination concerning the need for and appropriate location of warning devices. The affected railroad must agree with this determination, as it is responsible for the operation and maintenance of the warning devices. For information on highway traffic signal interconnection with railroad preemption, designers should contact the Regional Traffic Engineering and Safety Group and the FEDD. For general information or guidance, the designer is urged to contact the RDSS. A guideline entitled “NYSDOT Guidelines for the Design of Interconnected Grade Crossing/Highway Traffic Signal Systems” is also available from the FEDD on this subject.

23.11.3 Geometric Considerations

The horizontal and vertical geometrics of a highway approaching an at-grade crossing should be designed and constructed in a manner that it is compatible with and promotes safe driving through the crossing. The following factors should be considered.

1. The railroad and highway shall cross as close to a right angle as the design permits. Skewed crossings generally produce a less satisfactory ride because of the alternating contact with the rails. In addition, skewed crossings generally reduce sight distance in one or more quadrants and create a potentially unsafe condition for bicycles and motorcycles. Designers should refer to AASHTO’s *A Policy on Geometric Design of Highways and Streets* for guidance regarding horizontal and vertical highway alignment through railroad crossings and the current AASHTO *Guide for the Development of Bicycle Facilities* for information about designing railroad crossings that will safely accommodate bicycle traffic.

2. Sharp horizontal highway curves approaching the crossing should be eliminated. If possible, the crossing should not occur on any horizontal highway curve. Proper highway superelevation relative to the railroad may be difficult to obtain, resulting in poor rideability.
3. At-grade highway intersections near a railroad-highway at-grade crossing can present special problems, particularly if signalized. Signal interconnection with the railroad's warning devices may be necessary. This will require field coordination between the railroad, the RDSS, the Regional Traffic Engineering and Safety Group, and the FEDD. Consult the NYS MUTCD to determine the appropriate signalization.

4. The full width of travel lanes, shoulders, and pedestrian facilities on the approach roadway should be carried through the crossing.

5. It is desirable that the at-grade crossing be made as level as possible, considering sight distance, rideability, braking and acceleration distances. Vertical curves should be of sufficient length to ensure an adequate view of the crossing.

6. The railroad geometric considerations include rate of change of grade, spiral length, superelevation, and transition length. The RDS can advise the designer of the design criteria that change depending on speed and railroad.

In some instances, the highway profile may not meet acceptable geometrics for a given design speed because of restrictive topography or limitations of ROW. Acceptable geometrics necessary to prevent drivers of low-clearance vehicles from dragging across or becoming hung-up on the crossing require the crossing surface to be at the same plane as the top of the rails for a distance of 0.6 m (2'-0") outside the rails. The surface of the highway should also be not more than 75 mm (3") higher or 75 mm (3") lower than the top of nearest rail at a point 9 m (30'-0") from the rail unless track superelevation dictates otherwise. See AASHTO’s A Policy on Geometric Design of Highways and Streets. Vertical curves should be used to traverse from the highway grade to the level plane of the rails.

23.11.4 Drainage

Drainage considerations at the crossing can affect the life and rideability of the crossing. Therefore, the following items should be considered during design.

- Subgrade preparation and proper ballast.
- Ditch maintenance and grading.
- Filter fabric installation on the proposed subgrade.
- Installation of perforated drainage pipe to collect and carry water to side ditches.
- Evaluation and remediation of existing drainage problems caused by railroad and/or highway profiles. For instance, current conditions could allow ponding which can contribute to subgrade saturation in the area of the crossing.

The work listed above can usually be performed by NYSDOT’s contractor in coordination with the railroad. The work limits are established on a case-by-case basis, and a determination is often made during project scoping.
23.11.5 **Crossing Surface**

The crossing surface must preserve the structure and stability of the crossing and provide good rideability. Many types of crossing surfaces exist. The type of surface should be commensurate with the highway traffic (including bicyclists and pedestrians, particularly those with disabilities) and train characteristics it must accommodate. The factors to consider when selecting a crossing type are initial cost, durability, and ease and cost of maintenance. A 20-year design life should be used. The railroad companies are responsible for maintenance of the crossing; therefore, their input into the crossing type is important. It should be noted that labor agreements between larger railroads and their unions normally preclude a NYSDOT contractor from doing any railroad related work on railroad property. However, smaller railroads, such as shortlines, may not have such stringent work agreements and it may be feasible, as well as more expedient, for the NYSDOT contractor to install the surface and/or perform necessary track work. The ultimate decision on type and extent of work the NYSDOT contractor is allowed to perform rests with the affected railroad and is decided on a project-by-project basis early in the preliminary design. If the Department’s construction contract includes railroad work, the RDS often can perform the trackwork and surface design. This effort is coordinated by the RDSS.

Crossing surfaces are generally categorized as low type and high type, described as follows:

**Low Type**
- Asphalt - An asphalt surface over the entire crossing area with wood timbers, additional rail, or rubber header forming the flangeway.

**High Type**
- Rubber Panels (Elastomeric) - Full depth rubber or steel reinforced molded rubber panels with a patterned surface. The inside or gage panels extend from rail to rail with flangeway openings provided. Each outside or field panel is designed to extend to the ends of crossties.
- Concrete Panels - Similar to rubber panels with a brush finish for improved traction. Concrete crossings are designed for crossings with high volumes of vehicles making turning movements and heavy commercial traffic. (Note: CSXT does not allow concrete panels to be installed on their tracks in New York State)
- Concrete Modular Panels - A track on concrete slab panel design. Mainly used where train traffic is of low speed and highway volume is high. (Note: CSXT and Norfolk Southern do not allow concrete modular panels to be installed on their tracks in New York State)

Highway approach paving should be performed according to the crossing manufacturer’s recommendations and details included in the plans. The timing of the paving and crossing work is to be finalized at the preconstruction meeting.

Technological developments have inspired the use of hybrid crossing surfaces. Railseal Interface, for instance, is a relatively new concept that combines both the asphalt and rubber surface. The rubber header material runs parallel to the rails on the gage and field side (inside and outside of rail), providing a flexible rubber interface between the rigid road surface materials and the flexible track structure.
23.11.6 **Maintenance Paving**

Maintenance paving type projects that go up to a railroad crossing will need a construction force account agreement with the affected railroads to provide for flagging and/or other support services that may be needed.

The RAU should be notified early in the process so that the necessary agreements can be obtained. The Region shall provide plans, a clear description of the work, and a project schedule to the RAU for forwarding to the railroad. As with highway projects, it should be expected that the railroad will need about 60 days to review the proposed work and provide comments. Once all comments are resolved, the process of developing a construction force account agreement can begin. Obtaining a fully executed agreement currently takes about 3 to 4 months, depending upon the railroad involved.

### 23.12 PLAN REQUIREMENTS FOR WORK AFFECTING RAILROADS

The plans for any highway project that impacts a railroad should clearly show and identify all existing and proposed highway and railroad facilities. Preliminary plans (included in design approval documents) and advance detail plans should show the highway work in accordance with Section 23.5.1 of this chapter, along with Appendix B and Appendix G, respectively, of the *Design Procedure Manual*.

Railroad communication and signal (C&S) wires, warning devices, power cables, third rail and appurtenances should be shown accurately on the preliminary and advance detail plans. If railroad C&S wires are within the project limits and there exists the potential for interference with construction operations, the designer should consider the possibility of placing the cables underground, either temporarily or permanently. It is desirable to place cables underground permanently when a highway bridge crosses over the tracks. This eliminates interference with future bridge maintenance operations. The request for this proposal should be made no later than the advance detail plan stage. See Section 23.10.6 for additional information.

Track plan and top-of-rail profile for a minimum of 90 m (300' ±), with an additional 20 m (65'±) for each 25 mm (1") change in highway elevation profile either side of the highway, the ditches and drainage patterns, railroad ROW lines, and equality stations for intersections of the highway with the centerline of railroad track(s) should also be shown. The top-of-rail survey is to be obtained by a survey crew, NOT by photogrametric stereo compilation methods. The distance and direction to the nearest railroad milepost should also be identified.

If a new structure is planned over or under a railroad, then the designer should contact the RAU for the proper maintenance note. This note is typically added on the preliminary structure plan sheet. If it is determined that the Department will be designing a crossing improvement as described in Section 23.10.4, then a request for rail design assistance should be forwarded to the RDS prior to the commencement of final survey work. The RDSS should be contacted for specific questions on the content of plans that meet railroad requirements.
Special railroad notes are prepared by the designer or the RDS to supplement the Standard Specifications. These special notes usually pertain to a specific project and are included in the plans or project proposal. The decision on who prepares the special note is typically mutually agreed upon by the designer and the RDS during detailed design.

23.13 CONSTRUCTION ISSUES TO BE CONSIDERED DURING DESIGN

The designer should refer to Section 105-09 of the Standard Specifications for information regarding general construction criteria in and around railroads. It should be noted that prospective contractors need to contact the affected railroad for access to the site for a prebid site inspection.

23.13.1 Excavation on Railroad Property

Excavation may be necessary during demolition or construction of any structures. A determination should be made early in Design Phase V whether excavation activities will impact railroad facilities. Generally, the railroad will not require steel sheet piling or H-piling for earth support when excavating outside the theoretical railroad embankment line. Steel sheet piling, designed for an E-80 loading, driven prior to excavation is required for earth support when construction excavation is within the theoretical railroad embankment line. Open excavation 3 m (10 ft.) from the centerline of the track will require handrails to protect the trainman’s walkway. See Figure 23-4 for the details of installing temporary or permanent steel sheet piling adjacent to track.

23.13.2 Demolition and Erection of Structures over Railroad Tracks

The method of demolition and erection of structures should minimize interference with railroad facilities. Special arrangements may be necessary to obtain windows (track outages) for certain construction activities, such as hoisting materials over the railroad tracks.

In metropolitan areas, demolition and construction or erection procedures may impose impacts to train or railroad passenger/pedestrian traffic that are unavoidable. In most cases, provisions must be made in the contract documents to preserve the continuity of traffic and protect the railroad facilities. During project development, these issues should be identified and the railroad notified of possible interference. Protection can range from the simple shield over a passenger platform to the more complicated busing of train passengers around a construction site. Depending on the extent of impacts to the railroad, the Region, or in particular the railroad, will perform community outreach to inform passengers or pedestrians of any temporary changes. The outreach could take the form of leaflets, newspaper ads, TV/radio announcements, or public meetings.

Each railroad has its own specifications and requirements for shielding during demolition procedures. Loading requirements for shields are typically part of the information that the railroad will supply during the review process. Contact the RDSS for further guidance regarding these types of projects.
23.13.3 **Contractor Temporary Crossings**

Contractor access could become a critical issue during construction. It may be necessary to propose to the railroad that it include within its force account a provision for a contractor's private grade crossing that is essential to the construction of the project. In order to remain consistent with Section 105-09F of the Standard Specifications, this would be proposed only if absolutely necessary as railroads typically are opposed to creating any new at-grade crossings. Other crossings or arrangements purely for the convenience of the contractor are handled exclusively between the contractor and the railroad and are not eligible for reimbursement under the terms of a State-Railroad Agreement. If any temporary crossing traverses an intercity rail corridor, the FEDD must be contacted and a hearing may be required in accordance with Section 97 of the New York State “Railroad Law.”

It should **not** be assumed that a railroad’s access road will be made available to the state’s contractor for construction activities. In some cases where there is enough room, the contractor may be required to construct a separate access road for their use on the railroad ROW parallel to the railroad’s access road. It will be the contractor’s responsibility to secure an easement with the railroad. In some instances, it may be advisable to have preliminary discussions with the railroad during the design phase regarding the contractor’s access to the site, especially if a temporary grade crossing may be required.

23.13.4 **Managing Traffic**

Project developers/designers should be aware of the importance of work zone planning where a railroad crossing exists within or near a work zone. Extra care should be taken to avoid creating conditions, either by lane reductions, flagging operations, or shifting traffic onto the opposing lane where vehicles can unexpectedly be stopped on railroad tracks or where warning devices are no longer effective. The impact of traffic over existing at-grade crossings should be assessed by the FEDD and/or the regional rail coordinator through the RAU to determine if any surface or signal improvements are necessary as part of the project. If the work phasing or physical layout cannot avoid the queuing of vehicles across the tracks, it may be necessary to provide flagpersons, escape lanes, or signs which indicate "DO NOT STOP ON TRACKS."

Care should be taken when placing construction warning signs to avoid obstructing the view of automatic flashing lights and gates. Generally, an unobstructed view from the motorist to the railroad flashers should be maintained for 105 m (350±). In addition, the view of construction signs should not be blocked by lights and gates.

The use of off-site or on-site detours or detour bridges must be considered. Care should be taken not to detour truck traffic over severely humped crossings. As indicated in Section 23.13.3, the designer should be aware of the railroad’s reluctance to approve temporary on-site at-grade crossings. If a detour bridge is utilized, the designer should be aware of the requirements of Sections 23.10.1 through 23.10.7.
23.13.5 **Blasting**

Railroads are opposed to any construction application which utilizes blasting closer than 75 m (250' ±) from their facilities. Blasting proposals must be considered on a case-by-case basis and inquiries should be directed to the RAU.

23.13.6 **Drainage, Erosion, and Sediment Control**

The general plans for a bridge should indicate the proposed methods of drainage, erosion, and sedimentation control, and address means to prevent sedimentation in ditches and culverts from fouling the track ballast and subballast. Existing track ditches must be maintained at all times throughout the construction period.
23.14 REFERENCES


6. Highway Bridge to At-Grade Crossing Evaluation Procedure, Freight Transportation Division (currently the Freight and Economic Development Division), New York State Department of Transportation, State Campus, Albany, New York, 12232.


17. Title 17, Volume B of the Official Compilation of Codes, Rules and Regulations of the State of New York (NYCRR), also known as the *New York State Manual of Uniform Traffic Control Devices*, West Group, 620 Opperman Drive, PO Box 64833, St. Paul, MN 55164-9752.