



## 1.1 General

The safest railroad crossing is no crossing at all. That is why both the OCR and WisDOT discourage the creation of new crossings, and actively seek the consolidation of crossings where it is feasible and reasonable to do so. Whenever an investment is made in a project that upgrades warning devices, or that involves an existing or new grade separation, the question should be asked whether any nearby crossings can be eliminated.

The next safest crossing is a grade separation structure to carry one mode over the other. Because of their high cost, the benefits of a structure must be carefully considered. The primary benefits of separation are safety and delay avoidance.

Sources of funding to replace existing or create new railroad separations include the STH or local highway improvement programs, and the hazard elimination portion of the WisDOT Railroad-Highway Crossing Safety Program. The highway improvement programs would fund projects where the railroad separation is a part of the overall roadway improvement, whereas the WisDOT Safety Program would fund separations at isolated, stand-alone locations where separation is deemed appropriate and justified. Safety funding is limited to the incremental safety benefit that a grade separation would provide over a grade crossing. User benefits coming from reduced delay or fuel costs for example, are not to be funded through safety programs.

## 1.2 Lead Times

See [Attachment 1.1](#) for a summary of the process for structures at railroad crossings.

Separation projects often require lengthy coordination and negotiations with the railroad, particularly if the railroad is to share in the costs, or where major facility changes are required, such as a shoo-fly or permanent offset alignment for underpass construction.

Because negotiations for structures are lengthy, lead-time is very important. It is essential that project managers recognize lead-time needs, and contact the RRC early to discuss railroad alternatives, decide on a course of action and begin railroad coordination. See [FDM 17-20 Attachment 5.1](#) for estimated lead times. All negotiations with the railroad will be handled by RHS.

### 1.2.1 Highway Overpass

The time required between the formal WisDOT proposal to the railroad and the bid letting for the structure depends on the need for railroad force work, the railroad's approval of the structure plan and whether railroad cost participation is required. If the work can proceed under s. 84.05 Wis. Stats., less time is needed to complete railroad negotiations than if an OCR hearing is required. If the railroad is unwilling to sign the stipulation and the matter is taken to the OCR for hearing, more time may be required. See [FDM 17-40-20](#) for a discussion of stipulations and agreements. Review with RHS whether an OCR hearing is likely to be needed. Early contact with the RRC and RHS is needed for timely completion of structure projects.

### 1.2.2 Highway Underpass

On a square foot basis a highway underpass structure costs about six (6) times more than a highway overpass due to railroad loading being heavier than highway loading. In addition, the railroad's review of highway and railroad structure plans is more detailed. A plan for handling railroad train traffic during construction is required. If Amtrak trains are involved, its service requirements are to be considered in the project arrangements. Construction scheduling requires consideration and planning to allow for track changes. Track is not readily constructed or shifted from mid-November to April or May. Requirements for trains to operate on a shoo-fly over winter months should be avoided when possible. The railroad force work agreement will usually include some track work. In addition, there may be utility facilities on railroad right of way that will require relocation, or pipeline under crossings that will require reinforcing under shoo-fly tracks, or new tracks on permanent alignment. The result of these additional activities is that more lead-time is required to reach agreement with the railroad and construct railroad plant changes. A four-year time frame from project inception to completion of arrangements prior to construction would not be unreasonable. See [FDM 17-40-35](#) and the Bridge Manual Standard Drawing 38.31 for more details on underpass structures.

### 1.3 Submittals For Railroad Coordination

See [Attachment 1.2](#) for a list of items to be furnished to the RRC to begin the railroad coordination process for a grade separation project.

#### **LIST OF ATTACHMENTS**

<a href="#">Attachment 1.1</a>	Process When the Railroad is Willing to Sign the Stipulation
<a href="#">Attachment 1.2</a>	Process When the Railroad is Unwilling to Sign the Stipulation
<a href="#">Attachment 1.3</a>	Process For <23' Vertical Clearance
<a href="#">Attachment 1.4</a>	Separated Grade Railroad Project Submittal Package

#### **FDM 17-40-5 Structure Criteria/Justification**

May 2, 2003

### 5.1 Options

Because of the high cost of structures, the project scoping should consider all reasonable alternatives to building or replacing a structure:

- An at-grade crossing
- Close the crossing
  - with improvements to adjacent crossings
  - with improvements to area roads connecting to adjacent crossings
- Relocate the highway
- Relocate the railroad

### 5.2 General Criteria

Grade separation project selection is based on a favorable analysis of the following general criteria:

1. Grade separation structures are to be provided on all freeways and are highly desirable on expressways.
2. Consider a grade separation under the following criteria:
  - In rural areas, when the highway design speed exceeds 50 mph and the exposure factor<sup>1</sup> exceeds 75,000. This criterion does not apply to freeways, but should be considered for 65 mph expressways.
  - In urban areas, where train/highway traffic speeds are generally lower but the highway ADT higher, grade separation structures should be considered when the exposure factor exceeds 100,000.<sup>2</sup>
3. The existing terrain is economically suitable for separating the railroad and highway grades.
4. The construction of a crossing at grade is deemed uneconomical, excessively hazardous and would not serve the public interests.
5. The construction/maintenance benefit/cost analysis indicates a separation structure is cost competitive with an at-grade crossing.

Projects to replace existing grade separation structures should also generally satisfy the above criteria. However, the final determination to replace an existing grade separation structure with another structure at a crossing that no longer meets the exposure factors for grade separation, should still be decided based on favorable economic analysis, safety and public convenience. The above exposure factors for grade separation could be reduced by one third and a grade separation structure may still be considered reasonable based on the other factors. However, the removal of an unsatisfactory grade separation structure and the construction of a crossing at grade may also be determined to be economical and in the public interest where traffic operations and safety can be reasonably and adequately accommodated.

Structures cannot be justified solely on the basis of safety, because structures have hazards associated with them. Structures can become slippery with frost earlier than the approaches. Accident records indicate that as

<sup>1</sup> For divided rural highways, the exposure factor should be considered separately for each roadway when the median is  $\geq$  50 feet.

<sup>2</sup> For divided urban streets, the exposure factor should be considered separately for each roadway when the median is  $\geq$  24 feet.

many as 20% of structures over railroads experience structure related crashes in any one year.

### 5.3 Other Criteria

Exposure factors are an indication of the expected frequency of grade crossing accidents. In addition to exposure factors the following should be considered:

- Sharp crossing angle. (<30° intersection angle between centerlines)
- Four or more active mainline or passing tracks.
- Presence of high speed freight and passenger trains.
- Route of school and commercial buses.
- Significant percentages of trucks carrying hazardous materials.
- Potential for unusually long delays for motorists.
- Poor sight distances along tracks or to the crossing.
- Future expansion or reduction in railroad or highway facilities.

### 5.4 Railroad Participation in Costs

23 CFR contains the following provisions which are or may be relevant to grade separations:

1. State laws requiring railroads to share in the cost of work for the elimination of hazards at railroad-highway crossings shall not apply to federal-aid projects.
2. Projects for the reconstruction of existing grade separations are deemed to generally be of no ascertainable net benefit to the railroad and there shall be no required railroad share of the costs, unless the railroad has a specific contractual obligation with the state or its political subdivision to share in the costs.
3. On projects for the elimination of existing grade crossings at which active warning devices are not in place and have not been ordered installed by a state regulatory agency, or on projects which do not eliminate an existing crossing, there shall be no required railroad share of the project cost.
4. Railroads may voluntarily contribute a greater share of project costs than is required.
5. The cost of restoring the company's service by adjustments of existing facilities away from the project site, in lieu of and not to exceed the cost of replacing, adjusting or relocating facilities at the project site, is eligible for federal participation.
6. The railroad shall contribute a 5 per cent (5%) share when a structure replaces a highway-railroad crossing with active warning devices.

### 5.5 Analysis of Alternatives

The following factors should be evaluated during the analysis of alternatives.

1. Economics. Economic analysis should include consideration of construction costs, real estate and utility costs, and maintenance costs, funding eligibility, including both participating and non-participating costs. There may also be other contributing factors such as future land development proposals

*Examples:* The Village of McFarland rejected the at-grade crossing alternative for Terminal Drive because it would have required approximately two acres of prime commercial land in their Tax Incremental Financing District, valued at approximately \$60,000 per acre, at 100% local cost. Additionally, McFarland would lose the economic benefit by removing these two acres from the TIF district.

The Town of Bradford rejected the at-grade crossing alternative on Creek Road because it would require relocation of a major gas pipeline, estimated at a minimum of \$50,000, at 100% local cost.

2. Engineering Factors. Typical engineering factors such as grades, horizontal and vertical alignments, and drainage, as well as impacts to adjacent side road and driveways.
3. Roadway and Railroad Traffic. Typical roadway traffic information, such as volume and type. Typical train data needs to be obtained.
4. Environmental Impacts and Associated Costs. Typical environmental factors need to be reviewed. Impacts to surrounding properties, wetlands, agricultural lands, archaeological or historical resources, and 4(f) or 6(f) protected lands.
5. Road & Railroad Functional Classification. It is expected that elimination of railroad crossings on

arterial and collector highways would be less likely than on local roads.

6. Adjacent Crossing. The distance to, and condition of adjacent crossings.

*Example:* The Town of Ixonia supported the elimination of the Overland Drive bridge because of the close proximity and good condition of two adjacent at-grade crossings.

7. Public Safety. Public safety issues such as emergency vehicle access, number of bicycles, school busses and pedestrians need to be considered.

*Examples:* One reason that Dodge County rejected the at-grade crossing alternative for CTH KW is because the highway is functionally classified as a major collector, and is the major school bus route between Juneau, Lowell and Reeseville. The Town of Lebanon selected the bridge replacement alternative on Bluebird Road because it is the major route that emergency vehicles use to serve the properties south of the railroad.

## 5.6 Selected Alternative

1. OCR Hearing. An OCR hearing is required when an agreement cannot be reached with the railroad Under Section 84.05 W.S.
2. Even if agreement is reached, railroad policy may require an order from the OCR, primarily for liability reasons.
3. Project Proceeds Following OCR Decision. The normal project development process continues, including development of preliminary plans, and preparation of the environmental documentation, the Design Study Report and a proposal letter to the railroad.
4. Interim Design Memo. This early memo is required for all proposed structure projects on the local system. See [FDM 17-40-30](#).

## FDM 17-40-10 Alternatives to Structures

May 2, 2003

### 10.1 General

Structure proposals need to be thoroughly scrutinized to see if other, lower cost alternatives make sense. For example:

- should the crossing be changed to an at grade crossing by removing the structure and its embankments? On low volume, low speed crossings, particularly on local roads, this may be a viable option.
- can the crossing be closed, with or without upgrading the adjacent crossings for the rerouted street traffic?
- can the relocation of either the rail line or the roadway either eliminate or reduce the need for (or size of) a proposed structure.
- can improvements to adjacent crossings, or improvements to roads connecting to adjacent crossings, eliminate the need of the subject crossing?

The high cost of structures demands that all reasonable alternatives be considered early, long before the general public, local officials or the railroad have expectations of a new structure.

### 10.2 Create An At-Grade Crossing

WisDOT has eliminated many structures over low volume railroad lines which have resulted in at-grade crossings. This has been done where the existing structure is deteriorated and the criteria for replacement are not met. This is particularly attractive in urban areas where roadway embankments were originally constructed in order to create the separation, and where elimination of such embankments today are beneficial to adjacent properties.

In rural areas, where the terrain tends to create natural separation, the creation of an at-grade crossing by removing a structure may not be justified based on benefit cost. However where embankments can be readily removed, and the cost of a structure avoided, the at-grade alternative should be evaluated.

### 10.3 Highway Relocation

This alternative would not require an agreement with the railroad unless an existing railroad grade crossing having train activated warning devices is closed as a result of the highway relocation, or the relocation affects another grade crossing. If a crossing with active warning devices is altered from an at-grade to a grade separated crossing, or is eliminated by highway relocation, the railroad share of the cost would be based on five

percent of the project cost to relocate the highway or for a theoretical structure project to separate the existing crossing. Likewise, if the same crossing was permanently and totally closed, the railroad share would be five percent of the closing cost (cul de sac, etc). [see 23 CFR 646.210 (c)(3)]. There may be other factors to consider in determining the railroad's share of the project costs, and the amount would be negotiated. It is likely that a "lump sum" amount would be contributed by the railroad.

A hearing and an order from the Commissioner of Railroads would be required to close a grade crossing and to apportion the project costs, if not agreed to by the parties.

#### 10.4 Railroad Relocation

This alternative would require the approval of the railroad and a formal agreement. The probability of selecting this alternative to eliminate a grade crossing is unlikely due to the high cost of railroad facility construction. The same criteria would apply as contained in 23 CFR 646.210 (c)(3) to determine the apportionment of costs. If such an alternative were determined to be feasible and cost effective, a hearing and an order of the Commissioner of Railroads would be required to close the existing grade crossing, if not agreed to by the parties.

#### 10.5 Crossing Closure

See Section 17-35. A permanent closure would require the railroad to pay a 5% share of the closing costs (signing, beam guard, cul du sac, etc).

### FDM 17-40-15 Bridge Replacement Program

May 2, 2003

The objective of the Federal and State Bridge Replacement programs is the elimination of deficient bridges.

Both the State Trunk Highway Improvement Program and the Local Program have a bridge replacement sub-programs. These are the only funds that should be used to replace existing bridges, including highway bridges over railroad tracks, and then only when a proposed bridge replacement meets the criteria for bridge replacement program as well as the criteria in [FDM 17-40-5](#).

On the local system, a local unit of government may choose to either create a new bridge or replace a bridge that does not meet criteria. However that local unit must pay 100% of the incremental cost between the cost of the justifiable crossing treatment and the cost of the structure that they desire.

### FDM 17-40-20 Structure Agreements

March 27, 2008

#### 20.1 General

There are usually two agreements with a railroad for grade separation projects. One is the STIPULATION and includes all of the pertinent items and provisions for the structure, including construction, cost sharing, right of way, and maintenance. The other is an AGREEMENT (contract) for the performance of railroad force work and is necessary only when there are railroad facilities to be modified or installed. This usually involves adjustments of the railroad signal and communication lines, track changes made necessary by the project, and in some instances the construction of a temporary crossing for the contractor's construction operations.

*Note: The contract special provisions usually require the highway contractor to make the arrangements with the railroad for a temporary crossing. An exception may be necessary if more than one prime contractor is to use the temporary crossing, or if the project cannot be reasonably built without a crossing. In such case, the Railroads & Harbors Section (RHS) will make arrangements with the railroad for a crossing.*

A stipulation is required for grade separations on a new location and for replacement of existing structures or for widening of existing structures that require substructure enlargement. A stipulation is not required for a deck replacement that does not alter or add to the existing beam configuration, or reduce existing minimum vertical clearances over tracks.

During the time the Stipulation is being prepared and processed, the right-of-way conveyance is also prepared and sent to the railroad for execution. The conveyance document is usually signed after the Stipulation is fully executed. In some situations, temporary land interests may be granted by the stipulation. For a description of responsibilities to acquire interests in railroad property, see [FDM 17-55-5](#).

#### 20.2 Stipulation Process

The RHS coordinates with the railroad to obtain acceptance and approval for the project, including arrangements for work by railroad forces.

The procedure for developing the Stipulation is as follows:



1. The region prepares and sends to RHS the information referred to in [FDM 17-40 Attachment 1.2](#).
2. Preliminary Bridge Plans
  - Bureau of Structures (BOS) provides a copy of the bridge record for the existing structure if present and the approved preliminary bridge plan to RHS for structures on the State Trunk Highway System.
  - On consultant-designed structures, the consultant sends the preliminary bridge plans to the BOS for review. The BOS then sends the approved plans to RHS.
3. As detailed in Section 17-20 "Implementing Projects," the RHS sends a project proposal letter to the railroad along with preliminary bridge plans. The proposal sets forth the concept of the highway improvement, what work is required, when work is to take place, the proposed structure maintenance responsibility and the proposed apportionment of costs. The letter may authorize engineering by the railroad for any required railroad force work. Information on railroad flagging for subsequent highway construction may also be requested at this time. The proposal may include two copies of the structure plan for the railroad's review and comments.
4. If the preliminary bridge plans are acceptable to the railroad, the railroad will indicate their concurrence in the project concept and provide comments or acceptance of the preliminary bridge plan. (Cost sharing and right of way are negotiated later).  
  
The railroad will also develop a cost estimate and send it to RHS in accordance with the request contained in the proposal letter.
5. After negotiating with the railroad on all agreement items, the RHS will submit the Stipulation or submit a revised Stipulation to the railroad for signature. Two originals and one copy are sent to the railroad (three originals and one copy if a local unit of government has a project obligation or financial interest). If the Stipulation is acceptable to the railroad, the railroad will have the originals signed and returned to the RHS. The originals of the Stipulation are forwarded to the Contracts Manager in the Bureau of State Highway Programs for the Governor's approval and execution by the department if the stipulation includes a provision for an actual payment to be made to the railroad. If the stipulation provides for a future State payment by a subsequent force work agreement, or if no payment is required, the Section Chief in RHS may execute the stipulation on behalf of the department.
6. If negotiations per s. 84.05, Wis. Stats. fail to produce agreement, the matter will be placed before OCR. (refer to s. 195.29, Wis. Stats.) The OCR will investigate the matter and issue an order binding upon all persons. The order sets forth the design elements, terms for the construction, the apportionment of costs and the party responsible for maintenance of the structure.  
  
It is the policy of the WisDOT to send approved Stipulations for grade separation structures to the OCR for its information.

### 20.3 Agreement For Railroad Force Work

1. The content of an agreement for work by railroad forces would be similar to other force work agreements. (See [FDM 17-20-10](#) Contents of the Agreement.)
2. The RHS requests the plan and cost estimate from the railroad, prepares the agreement and sends it to the railroad for approval and signing. After its return to the RHS, it is forwarded to the Bureau of Financial Services for approval of the WisDOT and Governor.
3. If a railroad contribution is required to build the structure per 23 CFR, part 646.210, WisDOT and the railroad may agree to offset costs by providing force work in exchange for paying less for a railroad contribution. This would be covered in the stipulation and a separate force work agreement would not be needed if all the force work to be provided would be used to defray some or all of the required railroad share.

### 20.4 Structures On The Local System

See [FDM 17-10-30](#), "Exception" to normal cost sharing when repair costs exceed 15% of replacement costs.

## FDM 17-40-25 Costs/Cost Sharing

May 2, 2003

### 25.1 Background

Over the last 70 to 90 years the cost burden of work at both at-grade crossing and grade separation projects has shifted from the railroads to the public, largely because new roads crossed existing rail lines. Since the 1980's the principal of assessment of costs on the basis of benefits received has been liberally interpreted in

favor of the railroads. For example, no railroad contribution is required for grade crossing improvements under federal policies or for signal installations under s. 195.28, Wisconsin Statutes.

The landmark “Brandeis Decision” of 1935 established the principle of assessment of costs on the basis of benefits received. WisDOT policy in cost sharing negotiation is to do “what is reasonable under the circumstances” considering, among other things the “benefits received.”

Cost sharing is largely defined by 23 CFR 646.210, applicable Wisconsin Statutes. WisDOT authority is limited to what statutes explicitly provide. To the extent that the law allows, WisDOT’s guiding principle in cost sharing is to seek “what is reasonable under the circumstances.”

## 25.2 Railroad Participation

Railroad participation in the cost of a highway improvement project is required under the following conditions:

1. The railroad has responsibility for maintenance of the existing grade separation structure, or
2. A highway/rail grade crossing that has train activated warning devices is eliminated by separation of grades, highway relocation or railroad relocation.

The railroad’s share for conditions described in 1. above is typically its future savings in structure maintenance expense that are relinquished. The railroad contribution may be offset by the cost of railroad force work, (signal line adjustments, flagging, etc.) required for the project and the cost of granting the additional highway crossing easement. The railroad’s share of 2. above is 5 percent of the theoretical or actual structure cost, whichever is less. Refer to 23 CFR 646.210.

There are several factors to consider when determining if there is a benefit to the railroad when a separation structure is to be constructed or re-constructed, as a basis for negotiating railroad participation in project costs:

1. Which was there first, the highway or the railroad?
2. Is there an agreement or a regulatory authority order assigning responsibility?
3. Does the railroad go over the highway or does the highway go over the railroad?
4. If an existing structure, who is responsible for maintenance now?
5. Will federal aid funds be used in the planned improvement?
6. Is a safety project or an improvement project involved?
7. Is the question whether the railroad company should participate in the cost of the improvement or the cost of railroad force work or both?
8. Who is initiating the project?
9. Regardless of past policies or practices, is there a quantifiable net benefit to the railroad company?

## 25.3 Projects on the Local System

See [FDM 17-10-30](#), “EXCEPTION” to normal cost sharing when repair costs exceed 15% of structure replacement costs.

## 25.4 Current Practice In Cost Sharing

1. Federal CFR 23 Part 646 dictates that when a separation replaces an at-grade crossing with active warning device, the railroad pays a mandatory 5 % of the total costs of the separation (bridge itself and minimum approaches and fill slopes, etc). This typically will be an estimated or theoretical portion of the total project cost, since the improvement project will typically involve more than this minimum work. The limitations are explained in Part 646.210(c).
2. It has also been WisDOT policy on local projects, to allow the railroad to pay the local share of costs when the project qualifies for any type of federal aid.
3. The railroad share for the replacement of an existing structure “in kind” is typically 15% of structure costs.
4. In negotiations, WisDOT often has the railroad share of costs offset by railroad contributions of real estate, flagging, needed force account work, etc. of equal value.

The affected railroad may also provide matching funds for railroad-highway projects when the improvement would be of particular benefit to them. One such example is, the replacement of a grade separation structure where the railroad has an existing responsibility for maintenance. When railroad lines were initially constructed, terrain and railroad profile requirements often required the railroad to construct separation structures. Section

190.08 W.S. requires railroads to maintain such crossings. If a highway improvement or safety project is undertaken to replace a railroad – maintained grade separation, railroad cost participation is expected and is subject to negotiations based on the facts of the specific location, including “who was there first” and “what is reasonable under the circumstances.” The present value of the railroad’s on-going maintenance responsibility should be included in cost participation negotiations. In the case of overpass structures, the highway authority usually takes over responsibility for routine repairs and maintenance, not including replacement, in exchange for railroad participation in the cost of the replacement structure. The amount or share is negotiated based on railroad responsibility and what’s reasonable under the circumstances. Cost sharing may be based on the following:

1. Railroad share is 15% of the cost to replace the existing structure “in kind.”
2. Railroad share is 5% of the cost to replace the existing structure with a new design.
3. Railroad share may be 100% of the required local match.

### **25.5 5 – Options-Grade Separations**

There are two ways of adjusting railroad facilities, either at the project site or by adjustment away from the project site. If the Department is indifferent to the choice and the railroad wishes to adjust away from the project site because of benefits which it would derive, the railroad could apply any WisDOT share to the desired project and contribute any additional funds required.

When replacing an existing grade separation for which the railroad has a maintenance obligation and where the highway preceded the railroad, WisDOT will seek a railroad contribution for adjustments to their facilities or improvement costs in recognition of the benefits the railroad receives from new and improved facilities, or relief from an obligation to construct or maintain a grade separation at railroad expense.

WisDOT policy requires a railroad contribution when a highway overpass structure for which the railroad has a maintenance obligation is replaced and the public takes over routine maintenance and repairs.

Also, WisDOT typically seeks a “used life” credit from railroads when an improvement project replaces used materials with newer materials which extends the service life of the railroad facility.

### **25.6 Summary**

With a few significant exceptions, most railroad force work is a relatively small cost element of improvement projects. The need to deliver the highway improvement and not miss letting dates puts pressure on WisDOT and the railroads to reach agreement. Providing sufficient lead time for railroad negotiations assists in reaching satisfactory agreement. Most projects are initiated by WisDOT, but the railroads are obligated to furnish plans and estimates promptly as requested.

### **25.7 Conclusions**

Railroads and highways must coexist since they interface with each other throughout the state. WisDOT policies and expectations for railroad cost sharing should continue to be fair, consistently applied and uniformly enforced. With continued urbanization and population growth, the points of contact between highway and railroad facilities will increase and there will continue to be a need for adjusting railroad and highway facilities.

WisDOT must continue to be fair, consistent and uniform in adopting and applying policies requiring a railroad contribution. WisDOT should analyze each project to ascertain what if any benefits accrue to the railroad. Where not prohibited by law, WisDOT will seek a railroad contribution on the basis of what is reasonable under the circumstances, including benefits received, consistent with overall state goals. If a railroad is not willing to participate in costs on such a basis, and where not pre-empted by federal or state laws, the project may be taken to the OCR for allocation of costs under 195.29(2) W.S. Time must be built into the project delivery schedule to allow for this administrative step.

## **FDM 17-40-30 Structure On Local System**

*March 27, 2008*

### **30.1 General**

Separation projects on the local road system are usually developed by consultants working for the local unit of government.

In order to assure statewide consistency in project scoping, eligibility, etc., it is important that the Regional Railroad Coordinator (RRC) be involved early in the project, to assure that;

- proper procedures are followed; including portal opening coordination
- scoping of projects follows the criteria herein



- estimates are reasonable
- construction scheduling is feasible.

Railroad structure issues on all federal or state funded projects shall be reviewed with RHS early and consensus reached as to appropriate roles and actions. The region should be involved in project scoping with the assistance of the RHS as appropriate. However, there have been several instances where the local unit and their consultant have proposed replacement separation structures where there is no longer justification for a bridge. If the local unit chooses an improvement alternative that costs more than the solution WisDOT's criteria would warrant, then the local unit shall be responsible for 100% of the incremental cost above the minimum WisDOT solution or improvement alternative. Also note the "Exception" of [FDM 17-10-30](#) and "Current Practice In Cost Sharing" of [FDM 17-40-25](#) regarding railroad participation in the cost of the local match.

### 30.2 Interim Design Memo

On local road system projects, the project manager shall develop an "Interim Design Memo" prior to the finalization of a structure as the preferred alternative. An analysis of the various alternatives with supporting documentation for the preferred alternative shall be presented to the Local Program Manager, for ultimate approval by the Local Program Chief. The purpose of the "Interim Design Memo" is to:

- Document the selection of the preferred alternative
- Obtain concurrence by the Department in the preferred alternative
- Document the cost sharing responsibilities for the various alternatives
- Aid early coordination with RHS, including concurrence in project concept and petitioning OCR if a hearing will be needed.

WisDOT policy on local bridges recognizes the FRA/FHWA goal of reducing existing roadway rail crossings by 25%, most of which must occur on the local road system.

The "Interim Design Memo" calls for early region staff review of the alternatives that will be considered on each such project, including consideration of closures. The purpose is to obtain broad, conceptual agreement on the alternatives to be considered and justification for the recommended alternative. Factors that must be considered include:

1. opportunities to close nearby crossings
  - proximity to nearby crossings
  - volume of vehicular traffic affected
  - circuitry of travel
  - cost to maintain/continue the crossings
2. traditional factors
  - exposure (average annual trains/day X AADT)
  - speed of trains and vehicular traffic
  - functional classification of railroad and highway
  - nature of the traffic (repeat., local, vs arterial)
  - Cost of options
    - closure
    - at grade
    - replacement structure

If an alternative is chosen that costs more than the solution resulting from the application of WisDOT criteria (and thus is not economically justified), the local unit must pay 100% of the incremental cost.

### 30.3 Alternative Selection

In accordance with project development procedures, alternatives analysis is an important element of all projects. FHWA expects alternatives analysis during preliminary engineering on all projects.

The following are typical alternatives to be considered for replacing a railroad grade separation.

1. Bridge Replacement - A bridge replacement alternative on new location would generally require an OCR hearing, unless the highway authority and the railroad reach agreement. (See s. 84.05, Wis. Stats.)
2. At-grade crossing.

3. Elimination of crossing.
4. Elimination of crossing with improvement to adjacent crossing(s).
5. Elimination of crossing with improved access to adjacent crossing(s). This alternative could include improving the existing roadway system or building a new road system.

**FDM 17-40-35 Underpass Structures**

May 2, 2003

**35.1 General**

Construction of all grade separation structures is of great concern to the railroad due to the potential for accidents during construction. Excavations near tracks, driving and removal of sheeting, operating construction equipment along and over tracks and proper falsework clearances all require careful attention in order to assure safe train operations. Underpass construction typically requires track changes which disrupt train operations.

**35.2 Underpass Structures**

Underpass structures typically cost six times more than overpass structures because of the heavier loading of trains, and the cost of handling railroad traffic during construction. Underpass construction typically requires track changes which disrupt train operations.

Refer to the Bridge Manual Standard Drawings.

A walkway for train personnel may be included in the design on a site-specific basis. Considerations include structure proximity to switches, visibility of approaching trains, length of structure and refuge space available on the bridge deck. It is important to check on current railroad safety rules, FRA Safety requirements and OCR Statutes and rules.

The structures design section will make the determination of final bridge design.

**35.3 Maintaining Railroad Traffic During Underpass Construction**

A site-specific evaluation of how to accommodate necessary railroad traffic during construction is required. The evaluation may identify the need for a shoo-fly, (a temporary bridge to carry train traffic), or require the rerouting of train traffic over a detour during construction.

During critical construction phases, the railroad track may be taken out of service for periods ranging from several hours to several days depending on the type of line and frequency of train operations. A shoo-fly is essentially a “run around” and is commonly used to route train traffic around the underpass construction site. Shoo-flies are usually composed of three or four curves, so train operations over shoo-flies during winter months should be avoided if at all possible. In some situations, the underpass can be constructed on an offset alignment and the track permanently shifted to it.

Shoo-flies are designed for the speed at which trains are to be operated on the temporary alignment. On lines carrying high speed trains it may not be feasible or practicable to design the shoo-fly for maximum authorized speed. Embankment settlement and stabilization during the limited time the shoo-fly will be used should be considered in selecting the design speed. Where space allows, the shoo-fly might be 80-100 feet on center from the permanent alignment adjacent to the structure. The closer the shoo-fly is to construction; the more temporary track support will be required. Following are examples of possible shoo-fly design criteria which may serve as a guide for designers. The actual shoo-fly design is subject to approval of the railroad.

Design Speed (MPH)	Curvature (D <sub>c</sub> )	Spiral Length (ft)	Super – (1) Elevation (in)	Min Tangent Between Spiral Points on Reverse Curves (ft)
10	12	0	0	60
25	10	120	4	100
40	4	210	4	100
60	2	310	4	100
80				

(1) Further information can be found in AREMA Manual, Chapter 5, Part 3, Sections 3.1 and 3.3

Grades should preferably be consistent with those on the permanent alignment.

Grading and site work is normally performed by the WisDOT roadway contractors. Some railroads will allow WisDOT to arrange for Shoo-fly track construction to 12-20 feet on center from the permanent track. See [Attachment 35.1](#). The railroad company will normally make the final tie-ins by shifting its track to connect with the shoo-fly track. Either the contractor or the railroad could construct the permanent track across the new underpass, depending on the desires of the railroad.

After construction, the railroad will likewise make the shift from the shoo-fly to the permanent alignment.

### 35.4 False Work Bridge

In highly developed areas where a shoo-fly is not feasible, a false work bridge can be used to support track on existing railroad alignment. Consideration of this option requires considerable expertise in railroad design, and a full knowledge of railroad operational practices and constraints. Substructure units are constructed under the false work spans. The super structure may be constructed on the side and rolled into place. This type of construction requires extensive planning, railroad coordination and railroad force work. Constructing the false work bridge, driving permanent piling and setting and superstructure must be scheduled in windows between train operations, with much of the work performed by railroad forces.

## LIST OF ATTACHMENTS

[Attachment 35.1](#) General Shoo-Fly Case

## **FDM 17-40-40 Miscellaneous Structure Provisions**

June 19, 2013

### 40.1 Excessive Clearances

The region needs to review the bridge design before submitting to Railroad and Harbors Section (RHS). Chapter 23 CFR does not allow federal funds to reimburse the project for *excessive clearances*. The minimum clearances are not to exceed 23'-3 1/2" vertically between top of rail and bottom of structure and 20'-0" horizontally between near track centerline and embankment slope at the rail elevation. Clearances less than 23'-0" may be permitted in some situations with approval of the OCR. Refer to the Bridge Manual Standard Drawing 38.01 for clearance and crash protection requirements. If a service road is to be provided along the track, a horizontal clearance of 28'-0" is permitted along one side only.

Clearances exceeding these dimensions must be well documented as to need and approved by RHS.

### 40.2 Additional Track Space

It is possible to provide space for future tracks under highway overpass structures if this is requested by the railroad. 23 CFR Part 646.212(a)(2) permits this additional structure length and cost if the request is approved by WisDOT. Such approvals are based upon the justification furnished by the railroad and subsequent negotiations. The OCR has ruled that it does not have jurisdiction in this matter. If such additional space is requested, the RHS must be contacted before design of the structure begins. This will avoid unnecessary expense to the project and will assure consistency in WisDOT dealings with railroads.

### 40.3 Crash Protection

Decisions on the need for crash walls or piers of heavy construction adjacent to railroad track and their design should be based on the current AREMA Manual, Chapter 8 Sections 2,1.5 and Chapter 8, Section 2 Commentary, Section C2.1.5. Project Managers should confer with RHS and Bureau of Structures for current interpretations.

Also refer to the Bridge Manual Standard Drawing 38.01 and [Bridge Manual](#) for crash protection requirements for new and rehabilitation projects.