



Mississippi River Rail Crossing Study

Purpose and Need Report FINAL

Bi-State Regional Commission (BSRC)

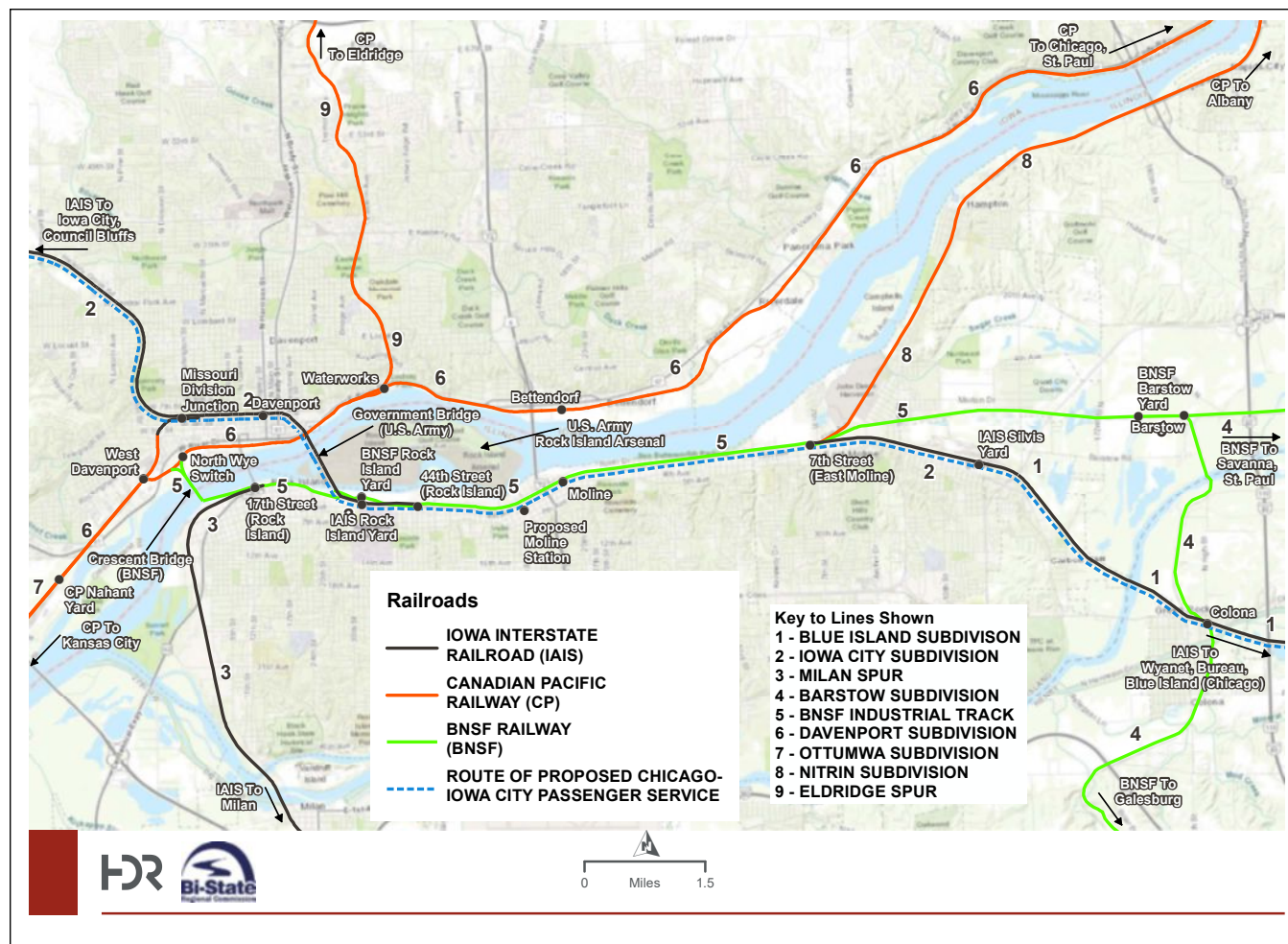
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1.0 Introduction

The Bi-State Regional Commission (BSRC) is undertaking the Mississippi River Rail Crossing Study (the Study) that examines the efficiency, capacity, and connectivity of the regional railroad network centered on the Quad Cities and related Mississippi River rail crossings, particularly the Government and Crescent bridges, and will analyze potential feasible options available to rehabilitate or replace one or both of the two existing Mississippi River rail bridges. This report identifies a purpose and need for a Mississippi River rail crossing and presents the findings from the study with relation to the future conditions should no action be taken. The report will review previous recent planning efforts, existing conditions, and future demand. The study will also define conceptual level alternatives for rehabilitation or replacement as part of an alternatives analysis, and suggest goals and objectives for the freight rail efficiencies related to economic vitality and freight mobility. The study will conceptually evaluate feasible alternatives based on consideration of engineering concepts, environmental impacts, known current and anticipated railroad transportation demand and operations, socioeconomic and community impacts, conceptual order-of-magnitude capital cost estimates, potential for future public funding, and other criteria. Recommendations will be made that consider one or more preferred alternative(s) that can be considered by BSRC and other stakeholders for future study and potential implementation. The study will be supported by inputs at critical project milestones from effective strategic engagement with key public and private stakeholders, including railroads, public agencies, and other entities.

Figure 1: Existing Quad Cities Area Rail Network.



Source: Iowa DOT/HDR



2.0 Prior Studies

Two prior studies highlighted the need to address the existing Mississippi River rail crossings in the Quad Cities Area.

In 2015, the Bi-State Region Freight Plan was completed for the greater Quad Cities metropolitan area. There are two key rail bridges providing access across the Mississippi River, the federally-owned Government Bridge at the Rock Island Arsenal and the BNSF Railway-owned Crescent Rail Bridge, 1.5 miles downstream of the Government Bridge. Both bridges are over 100 years in age. Neither bridge meets unrestricted 286K railcar compliance, although the Government Bridge has been modified to allow 286K to cross with speed restricted to no more than 10 mph at the river crossing and an increased inspection schedule.

The Bi-State Region Freight Plan noted that a previous study conducted by Iowa Department of Transportation (Iowa DOT) identified the Government and Crescent bridges as freight rail bottlenecks, and recommended working with the local railroads to pursue upgrades that increase efficiency and connectivity of the Quad Cities Area rail system, including updating the railroad infrastructure to handle railcars with a maximum allowable gross weight of 286,000 lbs. (or 286k), and increase speeds in slow-zones and over bridges.



In its 2017 State Rail Plan, Iowa DOT listed 36 rail network bottlenecks in the state, including the Government and Crescent bridges, with the following explanations:

- Government Bridge: Existing bridge restricts all rail traffic to 10 mph, rail traffic is restricted by barge movements during navigation season, and railcar capacity of structure is marginal for railcars with a maximum allowable gross weight of 286,000 lbs. Need to replace structure.
- Crescent Bridge: Railroad bridge functionally obsolete; should be replaced.

Iowa DOT listed short-range and long-range passenger and freight rail projects under their Passenger and Freight Rail Capital Program in the 2017 Iowa State Rail Plan. Long-range projects include specific projects or prospective projects which could arise from various studies for which funding has not yet been committed, but have been identified as part of a multi-year program that exceed the four-year short-range period. Included on the list of long-range projects were:

- Rehabilitate or replace the existing Government Bridge over the Mississippi River between Davenport, Iowa, and Rock Island, Illinois, used by Iowa Interstate Railroad (IAIS) and Canadian Pacific Railway (CP).
- Replace Crescent Bridge over the Mississippi River at Davenport. Railroad bridge functionally obsolete and cannot handle 286k car weights. Bridge used by BNSF and CP should be replaced.

3.0 Project Purpose

The Purpose of the Study is to examine various potential Mississippi River rail crossing options to consider the potential for a feasible, reliable, and cost-effective alternative that will maintain and potentially enhance the Bi-State Region's access to the national rail network on both sides of the Mississippi River, meet the needs of existing rail carriers and shippers, and provide an incentive for new shippers and industries to locate within the region.

4.0 Project Need

Project Needs were developed based on findings from previous studies and as well as the Bi-State Study Existing Conditions Report. The primary needs for the Project include:

- Maintain, and enhance where possible, access to the national rail network for rail shippers on both sides of the Mississippi River
- Improve Quad Cities Area freight network reliability
- Increase Quad Cities Area freight network capacity
- Provide a competitive, cost-effective Quad Cities Area rail network to maintain existing and attract new rail-served industries
- Provide a reliable river crossing for the proposed Quad Cities-Iowa City intercity passenger rail service currently under study by Iowa DOT

4.1 Maintain Access to the National Rail Network

Both the Crescent and Government bridges are over 100 years old. Both are movable bridges with swing spans that have a myriad of moving parts and sensitive, electrical signal and detection systems operating in the harsh environmental conditions in the Midwest. There is the potential for any movable bridge to face the risk of becoming stuck, either in the open or closed position. All of these conditions will delay trains or river traffic while Maintenance-of-Way (MOW) employees are summoned to the bridge's location and repairs are made.

The Government Bridge is owned and maintained by the United States Army, and the Crescent Bridge is owned and maintained by BNSF Railway. Both owners maintain the bridges to permit safe rail operations. The Government Bridge hosts rail operations on the upper deck and motor vehicle and pedestrian traffic on the lower deck. At some point major reconstruction or replacement of the bridges will be required to maintain continued rail operations across the Mississippi River within the Bi-State Region.

4.2 Improve Rail Network Reliability

The bridges impact railroad operations for a number of reasons, as follows:

- The maximum speed over both bridges is currently limited to 10 mph.
- Marine traffic has the right-of-way over rail traffic, and the bridges must open to allow river barges and other large watercraft to pass through. Because the bridges open on demand at any time, there are no operating windows that trains can be scheduled for uninterrupted movement. Some bridge openings have an open/close cycle time of as much as 30 to 45 minutes, which may cause more than one train to be delayed approaching the bridge and may prolong the waits of other trains at nearby sidings and yards where meets are planned to occur.

Increasing train speeds across the river bridges and reducing or eliminating conflicts with marine traffic will reduce train operating costs and may improve service times.



4.3 Increase Rail Network Capacity

The Crescent Bridge cannot handle railcars exceeding 268,000 lbs. in loaded gross weight, whereas the current industry standard is 286,000 lbs. BNSF customers whose freight crosses the Crescent Bridge must restrict the loading of their rail cars so as not to exceed this weight restriction. The bridge also cannot accommodate the clearance of double-stack intermodal container cars.

The Government Bridge was originally operated as a double-track bridge. Only one track is currently in service over the bridge, which limits track capacity on the corridor.

Increasing freight car weight limits will allow shippers to use higher capacity cars. Increasing rail network capacity will reduce capacity-induced delays, thus reducing train operating costs.

4.4 Provide a Competitive, Cost-Effective Rail Network to Maintain Existing and Attract New Rail-Served Industries

Increasing the rail capacity across the Mississippi River, by raising individual gross car weight limits to 286,000 lbs., and by increasing daily train volume capacity, will deliver competitive, cost-effective freight rail service for existing rail-served industries in the Quad Cities Area. In addition, rail-served industries that use high capacity or double-stack intermodal rail equipment will be able to consider locating future facilities currently served via the Crescent Bridge in the Bi-State Region.

4.5 Provide a Reliable River Crossing for the Proposed Iowa DOT Quad Cities-Iowa City Passenger Rail Service

The Illinois Department of Transportation (Illinois DOT) is working to implement intercity passenger rail service from Chicago to Moline, Illinois. Iowa DOT is studying the development of an extension of this intercity passenger rail service from Moline, west to Iowa City. The planned two daily round trips would operate over the Iowa Interstate Railroad (IAIS) in the Quad Cities Area, which currently uses the Government Bridge. Any preferred alternative should be able to accommodate this proposed service with a high degree of reliability.



5.0 Evaluation Criteria for Alternatives Analysis

The Study will examine various alternatives for rail crossings of the Mississippi River in the Quad Cities Area to help determine a preferred alternative for future consideration. Alternatives to be studied will include, but are not be limited, to:

1. No Build: Both Bridges: Both bridges will remain in service, with potential improvements to increase service life and reliability.
2. No Build, One Bridge: One bridge will remain in service, with improvements to support combined rail services.
1. New Bridge: A new rail bridge or bridges will be constructed to replace one or both existing bridges and support future rail service. Up to three potential alternatives will be examined.

A high-level screening of alternatives will be conducted, with each alternative graded by the following categories. The ranking and value of each category will be determined with stakeholder input:

1. Railroad operational impacts
2. Capital costs
3. Operational costs
4. Environmental impacts
5. Environmental justice impacts
6. Historical and cultural impacts
7. Engineering and design
8. Regulatory requirements
9. Freight mobility
10. Railroad agreements
11. Socioeconomic factors
12. Public safety
13. Public support
14. Multimodal connectivity
15. Planned and programmed future transportation projects
16. Funding options



6.0 Future Conditions

The railroads operating in the area will likely continue to function in much the same way as they do currently with no significant changes to the existing rail infrastructure and rail operations in the Quad Cities Area. Based on stakeholder input, the railroads – including IAIS, BNSF, and CP – have not planned any significant changes in their operations, either due to changing operational philosophies (routing traffic through different corridors) or through an increase in volumes from major new customers. No significant investments are currently planned to either increase capacity or track speed to support rail freight movements through the study area, although there is currently an effort to develop intercity passenger rail between Chicago and Moline and on to Iowa City.

The U.S. Department of Transportation forecasts that total U.S. freight movements will increase approximately 37% between 2016 and 2040. Rail traffic in general will follow the trend of long-term, steady growth nationally and through the Quad Cities Area. Increases in rail volumes could potentially be handled by extending current train lengths or through additional trains. Additional train length will result in longer delays at existing roadway at-grade crossings and may impact available rail network capacity.

According to the 2045 Quad Cities Long Range Transportation Plan overall population and employment are also forecast to grow over a similar horizon. This growth could lead to additional vehicle trips that will lead to increases in roadway traffic volumes, including on roadways with existing at-grade crossings with the existing rail network, further increasing delays experienced by individual drivers.

Land use along existing rail corridors in the Quad Cities is generally built-up with primarily industrial and commercial usage along the Mississippi River transitioning to residential, light commercial, and agricultural uses further from the river. During stakeholder outreach it was noted that the communities that border the Mississippi River all have riverfront redevelopment initiatives in various stages of development, often with a focus on mixed-use and recreational development. Any alternatives that relocate rail lines or significantly change rail operations will need to consider future land use plans of the impacted communities.

6.1 BNSF Railway

The majority of BNSF Railway (BNSF) movements in the region operate via the north-south BNSF Barstow Subdivision through Colona and Barstow, Illinois, on the east side of the Quad Cities. Rail movements for customers in the Quad Cities Area and Clinton, Iowa, utilize the BNSF Industrial Track from Barstow through Moline and Rock Island to gain access to individual customers and the Crescent Bridge to cross the Mississippi River. BNSF utilizes operating rights on the Canadian Pacific Railway (CP) Davenport Subdivision to access customers in Clinton, Iowa once on the Iowa side of the river. There is currently an intercity passenger rail route that is under development between Chicago and Moline that is proposed to utilize the IAIS mainline and BNSF Industrial Track through the area. No other significant changes are currently anticipated in BNSF traffic or operations through the Quad Cities Area based on stakeholder input.

6.1.1 Crescent Bridge

The Crescent Bridge is owned, operated, and maintained by BNSF and is used to support service to its customers on the Iowa side of the Mississippi River. CP also has operating rights over the bridge and utilizes it to access its customers on the Illinois side of the river (on the CP Nitro Sub between East Moline and Albany, Illinois) from their mainline (CP Davenport Subdivision) on the Iowa side of the river. The bridge is on a secondary line for BNSF and was not designed to accommodate the 286k carloads that are the industry standard for rail transportation capacity. The rail line that connects to the Crescent Bridge also has clearance restrictions that prevent double-stack movements over the line. Upgrades to the bridge and approach segments to accommodate 286k carloads and improve clearance for double-stack movements would be significant and cost prohibitive based on current BNSF and CP traffic volumes. There are currently no future plans to undertake a significant improvement project to the bridge or the approaches on either side of the river based on stakeholder input.

The Crescent Bridge would eventually fall into disrepair and no longer be a viable option for a Mississippi River rail crossing in the area without ongoing maintenance. BNSF continues to perform periodic maintenance to the structural and mechanical components that allow the moveable span to swing open and allow for river traffic movements. The mechanical systems associated with moveable bridges typically have a shorter lifespan than the structural components of the bridge and will eventually require maintenance or replacement to maintain the bridge in working fashion. These repairs can be costly and it is conceivable that there may come a point where repair of the bridge becomes cost prohibitive to BNSF, at which point they could cease to operate over the Crescent Bridge. The bridge could potentially be deemed a hazard to navigation by the U.S. Coast Guard if not actively used, which would then require that the existing structure be removed from the navigation channel. The cost associated with removal of the bridge would also be significant, which will weigh into the railroad's decision about ongoing maintenance costs versus abandoning the current river crossing or replacing the bridge.

If the current Crescent Bridge route were to be abandoned, there would only be the existing Government Bridge crossing in the Quad Cities Area that supports rail movements across the Mississippi River. Neither BNSF nor CP currently have operating rights over the Government Bridge or the rail approaches on either side of the river, although they at times access the bridge to the mutual benefit of all railroads. Access to the Government Bridge route by the BNSF and CP is via the IAIS Rock Island Yard and IAIS Iowa City Subdivision on the Illinois side of the river and Missouri Division Junction (Davenport) on the Iowa side of the river. These connections on both sides of the river are currently unidirectional, with traffic across the bridge being able to go north on the Illinois side and south on the Iowa side of the river. While this is not an issue for current operations, the ability to move traffic north on the Iowa side of the river would either require a new connection to the CP Davenport Subdivision or require a run-around movement in the CP Davenport Yard to the south of the existing connection for trains to reverse direction.

If operations over the Crescent Bridge were to cease, an operating agreement were not able to be reached between the various parties to utilize the Government Bridge, and a viable different alternative to cross the Mississippi River was not available in the area, both BNSF and CP would be forced to significantly alter their operations.

6.2 Canadian Pacific Railway

The majority of the CP rail movements in the region operate via the CP Davenport and Ottumwa subdivisions along the Iowa side of the river. Rail movements for customers on the Iowa side of the river operate via this route and on the Illinois side of the river they operate via the IAIS Rock Island Yard, BNSF Industrial Track, and CP Nitro Spur, which are accessed via rights on the BNSF Crescent Bridge. The CP does not own or maintain an existing Mississippi River crossing in the area. There is currently an intercity passenger rail route that is under development between Chicago and Moline that is proposed to utilize the IAIS mainline and BNSF Industrial Track through the area. No other significant changes are currently anticipated in CP traffic or operations through the Quad Cities based on stakeholder input.

The CP route along the Iowa side of the river has experienced significant flooding at different times in its history, most recently during the Mississippi River flooding in spring 2019. The CP has worked to raise portions of its Davenport Subdivision to mitigate and avoid impacts from future flooding, but there are key points along the route where this is not feasible. The IAIS corridor, via the Government Bridge, crosses over the CP route on the Iowa side and the existing bridge clearance prevents CP from being able to raise their track in this location, leaving a sump that can easily flood when the river is high, disrupting rail operations over the entire route. CP has expressed interest in any alternatives that can alleviate this constraint and allow for more reliable operations during flood events through stakeholder outreach.

CP is not able to raise its current alignment under the bridge as long as the Government Bridge remains in place at its current alignment and elevation. Alternatives that remove the current Government Bridge entirely or raise its current low-chord elevation, while costly, would provide an opportunity to raise the existing CP track. Based on discussions with project stakeholders another potential alternative would be to relocate the CP from its current corridor along the river through downtown Davenport to the existing IAIS 5th Street corridor, which is at a much higher elevation than the current CP line. This could be accomplished by constructing a new connection between the CP alignment east of downtown in the vicinity of the intersection of US Highway 67 and Federal Street to the IAIS alignment in the vicinity of the intersection of 5th Street and Perry Street. The CP would then access its existing route west of Downtown Davenport via the existing Missouri Division Junction connection, although improvements to that alignment would also be required to accommodate mainline traffic. There are many details that still need to be determined to determine the feasibility of this alternative, including signalization, number of tracks along 5th Street, if the existing 5th Street roadway could be maintained, who would own and/or maintain the corridor, and who would control and dispatch the corridor. Existing mainline speeds on the CP are also higher than those on the IAIS through the existing corridor and raising speed in the corridor may be difficult due to the close proximity to adjacent residential and commercial properties and a number of highway-rail grade crossings between Downtown Davenport and Missouri Division Junction.

6.3 Iowa Interstate Railroad

The majority of IAIS rail movements in the region operate via the IAIS Blue Island and Iowa City subdivisions from east to west through the Quad Cities Area. Rail movements for customers in the Quad Cities utilize this route and the Government Bridge to cross the Mississippi River. There is currently an intercity passenger rail service that is under development between Chicago and Moline that is proposed to utilize the IAIS mainline and BNSF Industrial Track through the area. No other significant changes are currently anticipated in IAIS traffic or operations through the Quad Cities based on stakeholder outreach.

6.3.1 Government Bridge

The Government Bridge, including the rail corridor from the east bank to the west bank of the Mississippi River, is owned, operated, and maintained by the U.S. Government via the U.S. Army Corps of Engineers (USACE) Rock Island District. The portion of the corridor owned by the U.S. Government include the main Mississippi River Crossing, bridges over Sylvan Slough and Beck Avenue, and the embankments that connect the three structures, all in Rock Island, Illinois. The IAIS accesses the Government Bridge via lease agreement with the USACE and is responsible for maintaining its track through the corridor. The IAIS is also responsible for funding a portion of the ongoing maintenance of the three bridges that is defined by the lease agreement. Changes in rail operations and carrier rights across the bridge are subject to approval of the USACE.



The Government Bridge is a twin-deck structure that accommodates the IAIS rail traffic on the upper deck and vehicle and pedestrian traffic on the lower deck. The roadway portion on the bridge consists of a two-lane public roadway with sidewalks on either side. A vertical clearance of 11'-8" and horizontal geometry at the Iowa approach to the bridge restrict the type of trucks that the bridge can accommodate.

IAIS currently operates trains with cars up to 286k gross weight and double-stack movements over the bridge. This capability required some selective strengthening be performed and also requires ongoing inspections by the IAIS.

The Government Bridge would eventually fall into disrepair and no longer be a viable option for a Mississippi River crossing in the area without significant ongoing maintenance. The U.S. Government and IAIS continue to perform periodic maintenance to the structure and mechanical components that allow the moveable span to swing open and allow for river traffic movements to prevent the loss of this connection. The mechanical systems associated with moveable bridges typically have a shorter lifespan than the structural components of the bridge and will eventually require significant maintenance and/or replacement to maintain the bridge in working fashion. These repairs can be costly and it is conceivable that there could come a point where repair of the bridge becomes cost prohibitive, at which point bridge operations would cease. A cessation in bridge operations would also impact roadway and pedestrian traffic over the bridge, and as the bridge provides a means of access to government facilities on Arsenal Island. Every possible solution to keep the bridge in operation would be thoroughly explored before making a decision to close the bridge. It is not clear if the bridge would be deemed a hazard to navigation by the U.S. Coast Guard as river traffic is already restricted at the bridge location by the presence of the lock.

If the current Government Bridge route were to be abandoned there would only be the existing Crescent Bridge crossing in the area that supports rail movements across the river. The IAIS does not currently have rights over the Crescent Bridge or the rail approaches on either side of the river. Access to the Crescent Bridge route by the IAIS would be via the Milan Spur on the Illinois side of the river and the CP Davenport Subdivision, CP Davenport Yard, and Missouri Division Junction on the Iowa side of the river. The connections on the Illinois side of the river is currently unidirectional, with traffic across the bridge being able to go north. CP has a wye that allows their rail movements to proceed north or south on the Iowa side of the river, however, for the IAIS to reconnect to its existing mainline IAIS trains would have to go south through the wye to access the CP Davenport Yard, reverse directions to access Missouri Division Junction, and then reverse directions again to continue west on their current Iowa City Subdivision mainline through Davenport. A new connection would have to be constructed between the Crescent Bridge and the IAIS mainline to alleviate this see-saw maneuver. This connection would involve several potential conflicts including the existing CP Davenport Subdivision and the presence of residential and commercial development within the most likely corridor for the connection.

If operations over the Government Bridge were to cease, an operating agreement were not able to be reached between the IAIS and BNSF to utilize the Crescent Bridge, and a viable different alternative to cross the Mississippi River in the area was not available the IAIS would be forced significantly alter its operations.



6.4 Passenger Rail

There is currently an effort underway to restore intercity passenger rail service to the Quad Cities Area. The States of Illinois and Iowa received a federal grant to initiate passenger rail between Chicago and Iowa City via the Quad Cities. Currently the portion through Iowa is under study, but implementation of the service between the Quad Cities and Iowa City has been put on hold. The portion of the corridor between Chicago and Moline is still under development with the proposed route utilizing BNSF tracks between Chicago and Wyanet, Illinois, and the IAIS mainline from Wyanet to Moline. Some of the required projects to implement the service have already been constructed, including improvements to the BNSF Eola Yard near Chicago. The proposed passenger service will operate via the IAIS mainline and BNSF Industrial Track corridor through the Quad Cities Area to a proposed station in Moline. Future expansion of the service to Iowa City is proposed on the IAIS route via the Government Bridge to Iowa City, with eventual service having been studied as extending as far as Omaha. In addition to proposed intercity passenger rail service, as part of a TIGER grant application for development of a multimodal station in Moline, commuter rail was considered in the Quad Cities Area, also utilizing the IAIS and BNSF Industrial Track corridor.

Passenger rail service's success is determined heavily based on schedule reliability. The current Mississippi River crossings are both movable bridges, requiring that rail operations stop so that the bridges may be opened to allow for the passage of river traffic, which has the right-of-way over rail traffic. The unscheduled nature of bridge openings, coupled with the potential for mechanical breakdowns disrupting rail service is a potential impediment to the successful implementation of passenger rail service in the Quad Cities Area. The alternatives analysis will examine both low-level movable and high-fixed alignment alternatives and identify benefits and impacts associated with each.



5815 Council Street NE, Suite B
Cedar Rapids, IA 52402-5893
319.373.2536
hdrinc.com

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