



# Mississippi River Rail Crossing Study

Alternatives Analysis Report FINAL

**Bi-State Regional Commission (BSRC)**

May 12, 2020



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## Executive Summary

The Bi-State Regional Commission (BSRC) is pursuing a Mississippi River Rail Crossing Study to review existing railroad crossings and plan for the future of railroad operations across the Mississippi River in the Quad Cities region. Existing railroad crossings at the Government Bridge and Crescent Bridge are both over 100 years old with movable swing spans to accommodate river traffic and have been identified as needing replacement in the 2017 Iowa State Rail Plan. As identified in the project purpose and need, any rail bridge replacement should maintain and enhance, where possible, access to the national rail network; improve freight network capacity and reliability in the Quad Cities area; provide a competitive, cost effective network to maintain existing, and attract new, rail served industries; and provide a reliable river crossing for the proposed extension of the planned Chicago-to-Moline passenger rail service to Iowa City.

High-level conceptual alternatives identified for further analysis were the no build scenario, a no build – one bridge scenario where only one existing bridge remains in service, or a new bridge scenario where the existing bridges are replaced by a new bridge. Each of the various no build scenarios was analyzed and ultimately rejected in large part due to the age and condition of the existing rail bridges over the Mississippi River.

New bridge scenarios were further broken down to include potential alternatives within the immediate Quad Cities area (an area approximately bounded by Campbell's Island upriver and the existing Crescent Bridge downriver, or approximately from river mile 481 to river mile 489), and those alternatives outside of the immediate Quad Cities area. Alternatives outside of the immediate Quad Cities area were ultimately rejected due to the large amount of new railroad infrastructure that would have to be constructed as a result of the individual railroads that operate through the Quad Cities area diverging from each other on their respective routes.

Within the immediate Quad Cities area the BNSF Railway (BNSF), Canadian Pacific Railway (CP), and Iowa Interstate Railroad (IAIS), all operate in close proximity and often via joint usage agreements, minimizing the amount of new infrastructure required to get all three from one side of the Mississippi River to the other. Within the immediate Quad Cities footprint, potential river crossing locations were considered upriver between East Moline and Riverdale, in the vicinity of the existing Government Bridge, and in the vicinity of the existing Crescent Bridge.

Ultimately, the primary alternatives recommended for further study are located in the vicinity of the Crescent Bridge, with one alternative that avoids impacts to the existing Centennial Bridge but requires more length and more impacts to existing rail operations and the industrial area west of the Centennial Bridge, and another that impacts the existing Centennial Bridge but avoids significant impacts to existing rail operations and the industrial area west of the Centennial Bridge. Both proposed alignments rely on a high-fixed crossing on the Mississippi River that would separate rail operations from river navigation and grade separate the majority of roadway crossings along their respective corridors. The preferred alternative between these two alignment alternatives depends heavily on if the decision is made to replace the existing Centennial Bridge, which is nearly 80 years old and has a functionally obsolete typical section. If replacement of the Centennial Bridge is considered, a new multimodal bridge that carries both rail and roadway traffic could be constructed and impacts to the existing bridge would not be a concern. Without replacement of the Centennial Bridge the alternative that crosses further downriver and avoids impacting the existing bridge would be preferred.

In addition to the alternatives in the vicinity of the existing Crescent Bridge, an alternative parallel and immediately downriver of the existing Government Bridge is recommended for further study should insufficient funding be identified for construction of a high-fixed crossing near the Crescent Bridge. The alternative located adjacent to the existing Government Bridge would require significantly less track construction length than the other alternatives as it would connect to the existing rail network directly on either side of the Mississippi River. The shorter length prevents this alternative from gaining enough elevation for a high-fixed crossing, and would require a movable span across the existing locks at Lock and Dam 15, in a similar manner to the existing Government Bridge. The requirement for a movable span would require that rail traffic stop for river navigation, resulting in delays to freight and passenger movements across the bridge.

The preferred conceptual alternatives, as well as other conceptual alternatives reviewed as part of the Study, and potential next steps for project development and implementation, are further detailed in the following pages.



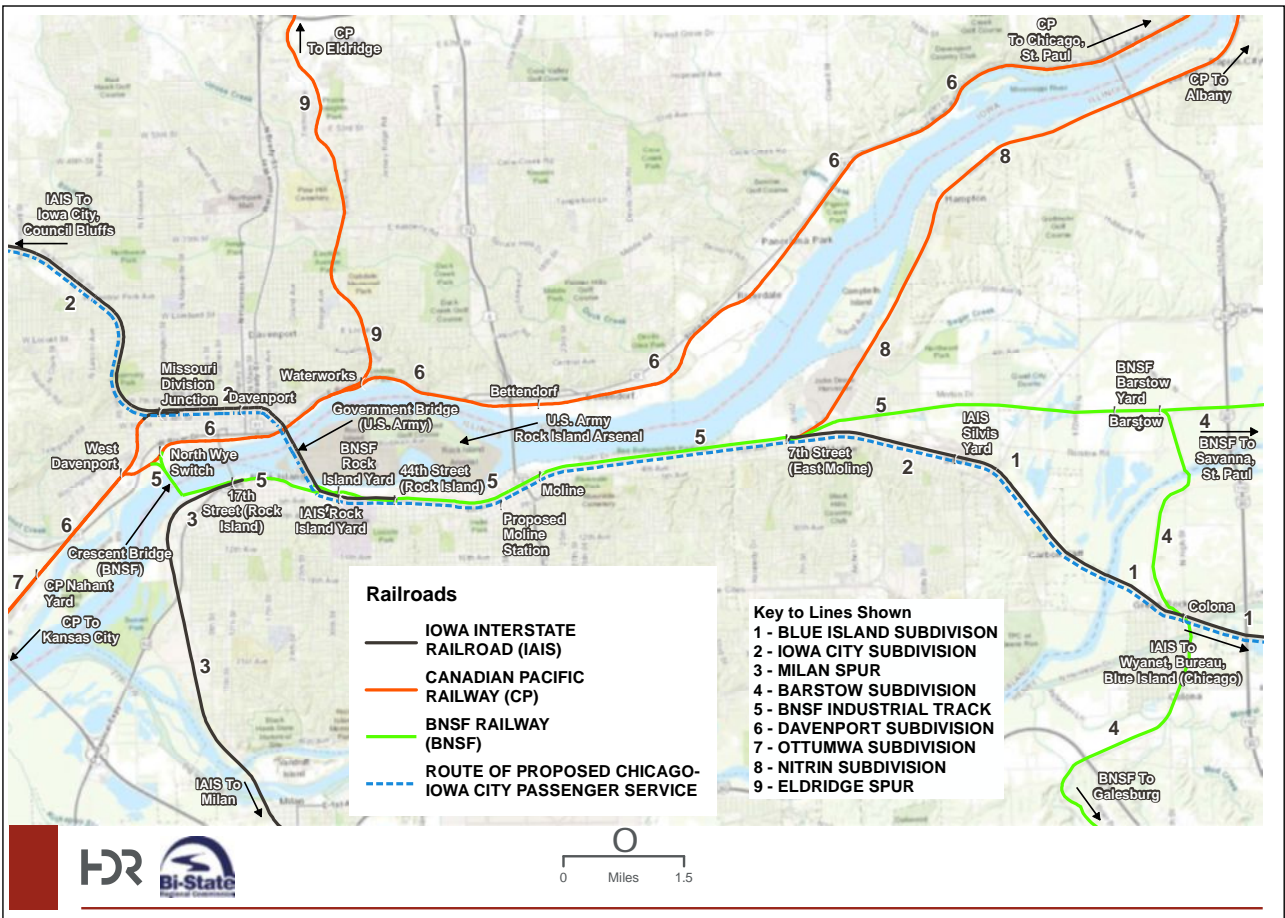
*Existing Government Bridge | Source: HDR*

## 1.0 Introduction

The Bi-State Regional Commission (BSRC) is undertaking the Mississippi River Rail Crossing Study (the Study) to examine the efficiency, capacity, and connectivity of the regional rail network centered on the Quad Cities and related Mississippi River rail crossings. The “Quad Cities” is a region of five cities in the U.S. states of Iowa and Illinois: Davenport and Bettendorf in southeastern Iowa, and Rock Island, Moline, and East Moline in northwestern Illinois. An Existing Conditions Report (dated August 16, 2019) and a Purpose and Need Report (dated January 10, 2020) have previously been issued as part of the overall Study process. These reports examined current rail operations in the Quad Cities, described existing Mississippi River rail crossings and provided a conceptual assessment of their condition, analyzed the potential for the existing rail crossings to continue to effectively function into the future, and identified the purpose and need for a rail crossing project in the Quad Cities region.

This Alternatives Analysis Report identifies and assesses potential conceptual alternatives for the continuation of rail access across the Mississippi River within the region for the railroad carriers currently serving the area, including the BNSF Railway (BNSF), the Canadian Pacific Railway (CP) and the Iowa Interstate Railroad (IAIS). In addition, the Quad Cities are located at the terminus of the proposed Chicago to Moline passenger rail project currently being developed by the Illinois Department of Transportation (Illinois DOT) with proposed service operated by the National Railroad Passenger Corporation (Amtrak), and with the potential for future extension to Iowa City and destinations further west in cooperation with the Iowa Department of Transportation (Iowa DOT). These conceptual alternatives will be screened at various levels and evaluated based on typical engineering principles, regulatory considerations, likely environmental impacts, known and anticipated rail demand and railroad operational characteristics, potential socioeconomic and community impacts, conceptual order-of-magnitude capital cost estimates, potential for public funding, and other criteria.

Figure 1: Existing Quad Cities Area Rail Network.



Source: Iowa DOT/HDR

The Study has been supported by input at critical milestones, with engagement from key public and private stakeholders, including railroads, public agencies, and other entities. Preliminary alternatives have been shared with stakeholders and the public at a BSRC Freight forum on February 24, 2020 and a Quad Cities Transportation Policy Committee Meeting on February 25, 2020. Both forums were held at the BSRC offices in Rock Island, Illinois.

**The primary purpose of the alternatives analysis presented in the following sections of this report is to identify and assess potential conceptual alternatives for consideration by BSRC, the railroads (BNSF, CP, and IAIS), other project stakeholders, and the public for potential future study and/or implementation.**

The Study project area, the existing Quad Cities Terminal Area rail network, and the location of existing rail-river crossings are shown in Figure 1.



IAIS Unit Grain Service | Source: HDR

## 2.0 Prior Studies

In addition to the Existing Conditions Report and the Purpose and Need Report previously completed as part of this Study effort, two prior studies, described below, highlighted the need to address existing Mississippi River rail crossings in the Quad Cities Area.

### 2015 BI-STATE REGION FREIGHT PLAN

This study identified that two key rail bridges provide access across the Mississippi River in the Quad Cities Area: the federally owned Government Bridge at the Rock Island Arsenal and the BNSF Railway-owned Crescent Bridge. Both rail bridges are over 100 years old, are not unrestricted 286K railcar compliant, and together the structures represent a potential freight rail bottleneck in the region.

### 2017 IOWA STATE RAIL PLAN

The 2017 Iowa State Rail Plan identified 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 miles per hour (mph), rail traffic is restricted by barge movements during navigation season, and railcar capacity of the structure is marginal for railcars with a maximum allowable gross weight of 286K. Need to replace structure.
- **Crescent Bridge:** Railroad bridge functionally obsolete; should be replaced.

Repair or replacement of the existing Government Bridge and the existing Crescent Bridge were included in a list of long-range projects within the Passenger and Freight Rail Capital Program in the 2017 Iowa State Rail Plan.



*Barge Service at Lock 15 | Source: HDR*

## 3.0 Project Purpose and Need

As identified in the previously issued Purpose and Need Report, the project purpose is to provide 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. The project needs are as follows:

- 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 the Iowa DOT.



IAIS Rock Island Yard | Source: HDR

## 4.0 Evaluation Criteria for Alternatives Analysis

The Purpose and Need Report identified three potential conceptual alternatives at a high level:

1. **No Build:** Both existing rail bridges remain in service, are operated generally in the same way as current operations, and bridge owners continue to perform routine maintenance and minor improvements to maintain service reliability.
2. **No Build – One Bridge:** One of the existing rail bridges is identified to remain in service with necessary improvements to support combined rail service at a single river crossing location.
3. **New Bridge:** A new rail bridge (or bridges) is constructed to replace one or both existing bridges with the capacity and capability to support future rail service.

These alternatives are further developed and evaluated as part of this report. The evaluation criteria identified in the Purpose and Need Report were as follows:

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

## 5.0 Potential Alternatives

### 5.1 No Build

Under the No Build Alternative, the existing rail network and Mississippi River rail crossings would continue to operate in much the same manner as they currently operate. The existing bridge owners and users would continue to perform routine ongoing maintenance in an effort to maintain service reliability and extend the usable life of each structure. As the Government Bridge was constructed in 1894 and the Crescent Bridge was constructed in 1900, both bridges are well over 100 years old and have outlived their anticipated design life. Bridge age alone is not necessarily an indicator of reliability, safety, or remaining service life, but the age of each structure, in conjunction with existing restrictions on rail car weight and operating speed, indicate that at some point major rehabilitation will be required to maintain the serviceability of each bridge. The future conditions under a no-build scenario are further detailed in the Purpose and Need Report.

### 5.2 No Build – One Bridge

Under the No Build – One Bridge Alternative, one of the existing rail bridges would be identified for continued operation. Necessary improvements would be made to the bridge and rail network to allow combined rail service across the bridge by all area rail carriers. The other bridge route would be abandoned and the existing bridge demolished or abandoned in place, as required. Under this alternative, major rehabilitation would likely be required for the remaining bridge at some point in the future to maintain the serviceability of the structure.

#### 5.2.1 NO BUILD – GOVERNMENT BRIDGE REMAINS

Maintaining the Government Bridge route under the No Build – Government Bridge Alternative would not require modifications to the rail network on the Illinois side of the Mississippi River, as all three railroads currently have direct access to the Illinois approach to the Government Bridge. On the Iowa side of the Mississippi River, the existing Missouri Division Junction interchange track between IAIS and CP provides a route for rail traffic between Illinois and CP's Nahant Yard, located just south of the Crescent Bridge. The interchange track is serviceable for its current usage to support rail car interchange between IAIS and CP, but would have to be rehabilitated to provide a reliable connection for regular usage by CP and BNSF trains that would be re-routed to the Government Bridge river crossing.



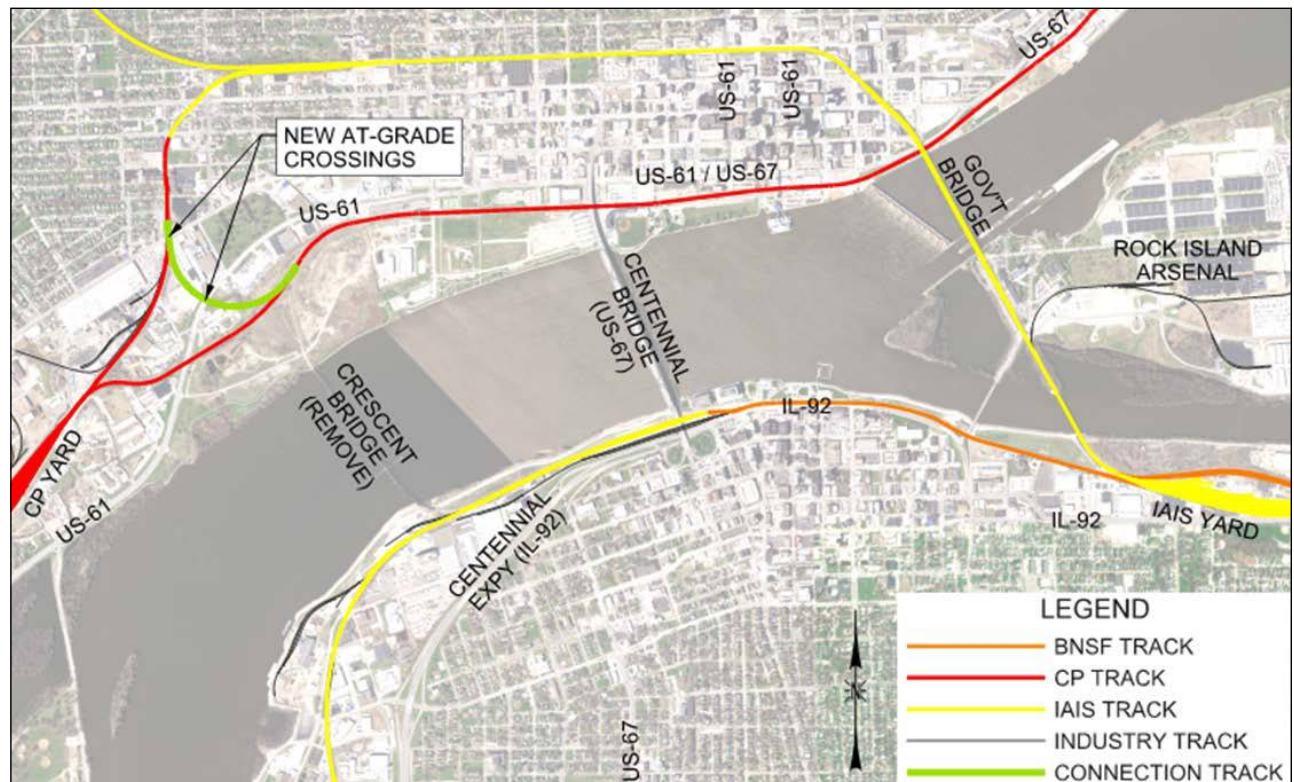
Existing Government Bridge at Lock 15 | Source: HDR

The existing Missouri Division Junction route would accommodate the vast majority of current traffic routings for IAIS and CP, but BNSF regularly operates a train between Clinton, Iowa, and Barstow, Illinois, that would require trains reverse direction in CP's Nahant Yard if the Government Bridge is utilized to cross the Mississippi River. To provide for this movement, a direct connection would be required allowing rail traffic from Illinois a direct path to travel north on the CP Davenport Subdivision main track as is currently allowed by the wye connection on the Iowa side of the Crescent Bridge. This connection track would connect to the existing Missouri Division Junction track in the vicinity of Rockingham Road and then curve south and east before connecting with the existing CP Davenport Subdivision main track in the vicinity of the connection to the existing north leg of the Crescent Bridge wye. The proposed connection track is shown in Figure 2. Constraints in the area, including the desire to minimize impacts to adjacent industries and the need for property acquisition, limit the connection track to a 25-mph design speed.

The connection track would modify the existing Rockingham Road highway-rail grade crossing, require a new highway-rail grade crossing of River Drive (U.S. Highway 61), and would significantly impact or require full acquisitions of existing industrial properties along the proposed alignment. Upon implementation of this alternative, the existing BNSF trackage from the Illinois approach to the Crescent Bridge, across the bridge, and through both legs of the wye would be abandoned and removed as necessary. The United States Coast Guard (USCG) could potentially designate the abandoned Crescent Bridge a hazard to navigation and require its removal.

The existing Government Bridge is owned, operated, and maintained by the United States Army Rock Island Arsenal with support from the United States Army Corps of Engineers (USACE) Rock Island District. IAIS operates across the bridge via agreement, and no other rail carrier currently has rights to operate across the bridge. As part of any scenario that shifts rail traffic onto the Government Bridge, new agreements would have to be negotiated between all parties. Based on stakeholder input, negotiation of a long-term agreement between all parties may require a change in ownership of the existing bridge, with the new owner taking responsibility for the maintenance and upkeep of the over 125-year old structure.

Figure 2: Government Bridge Only Alternative



Source: HDR

Any alternative that continues to utilize the existing Government Bridge crossing will still be subject to delays to rail and roadway traffic associated with river navigation. The maximum barge tow on this portion of the Mississippi River is 15 barges, requiring two cycles through the 600-foot-long lock plus time for breaking and then re-assembling the barge tow on either end of the lock. This requires that the movable span remain closed to rail and roadway traffic for up to 45 minutes for each barge tow that passes through the lock. To reduce the required time for barge traffic to navigate the lock, the existing lock could be upgraded to 1,200 feet in length, allowing the entire 15 barge tow plus tugboat to fit within the lock at the same time, thereby reducing transit times to approximately 10 minutes. A cost estimate has not been developed for upgrading the existing lock at Rock Island, however, in 2007, Congress authorized \$2.2 billion for the replacement of seven existing lock and dam structures on the Mississippi River and Illinois River downstream of Rock Island.

### 5.2.2 NO BUILD – CRESCENT BRIDGE REMAINS

Maintaining the Crescent Bridge Route under the No Build – One Bridge Alternative would not require modifications to the rail network on the Illinois side of the Mississippi River, as all three railroads currently have direct access to the Illinois approach to the Crescent Bridge. BNSF owns and maintains the bridge. Both BNSF and CP utilize the Crescent Bridge for their current operations and the bridge would not require any track modifications to support future operations. However, there is no existing direct connection that would support IAIS operations over the Crescent Bridge. IAIS trains would have to reverse directions in CP's Nahant Yard and again on their main line between the Taylor Street highway-rail grade crossing and the Mississippi River. This operation would disrupt normal operations in CP's Nahant Yard multiple times a day while IAIS cycles their through trains to get them from one side of the Mississippi River to the other. It would also require that IAIS break their trains, which often exceed 10,000 feet in length, into multiple pieces as there is only 7,000 feet of track available on the IAIS main line over the Davenport trainway between Missouri Division Junction and the Mississippi River. This operation would have to be repeated for every IAIS train crossing the river, which typically ranges from 6 to 10 trains per day, with each train blocking multiple highway-rail grade crossings in Davenport while trains are cycled. The major impacts to railroad operations and significant increase in vehicle crossing delay would necessitate a direct rail connection for the IAIS main line route.

For any alternative that utilizes the Crescent Bridge for all rail traffic crossing the Mississippi River in the Quad Cities, new agreements would have to be negotiated between BNSF, the railroad that owns, operates, and maintains the Crescent Bridge, and other rail operators. The existing Crescent Bridge and the approach on the Illinois side of the Mississippi River would likely require significant improvements to make this alternative feasible, as the existing river bridge does not support 286K rail car loadings and the 24th Street overhead bridge to the north (along the Illinois approach to the river crossing) does not provide sufficient vertical clearance to allow for double-stack container operations. Without significant improvements to this corridor the restrictions on car loadings and carload dimensions would significantly impact existing IAIS operations. Potential improvements include significant strengthening of the Crescent Bridge and replacing the 24th Street overhead bridge to provide sufficient vertical clearance for double-stack container operations.

The existing Government Bridge corridor could be abandoned between the Arsenal Spur, in the vicinity of Beck Avenue on Arsenal Island, and the connection to the existing IAIS track in the vicinity of Howell Street. The rail corridor would need to remain over the Sylvan Slough to continue to provide rail service to the Arsenal and potentially for capacity necessary for IAIS railroad switching operations at Rock Island. While rail service would be discontinued across the Government Bridge, roadway service would not necessarily be discontinued under this scenario and the river bridge would continue to carry existing roadway traffic. On the Iowa side of the Mississippi River, the existing rail corridor could be removed from the end of the Government Bridge to the intersection with the new connection track, in the vicinity of Howell Street, including removal of the elevated Davenport trainway.



Existing Crescent Bridge | Source: HDR

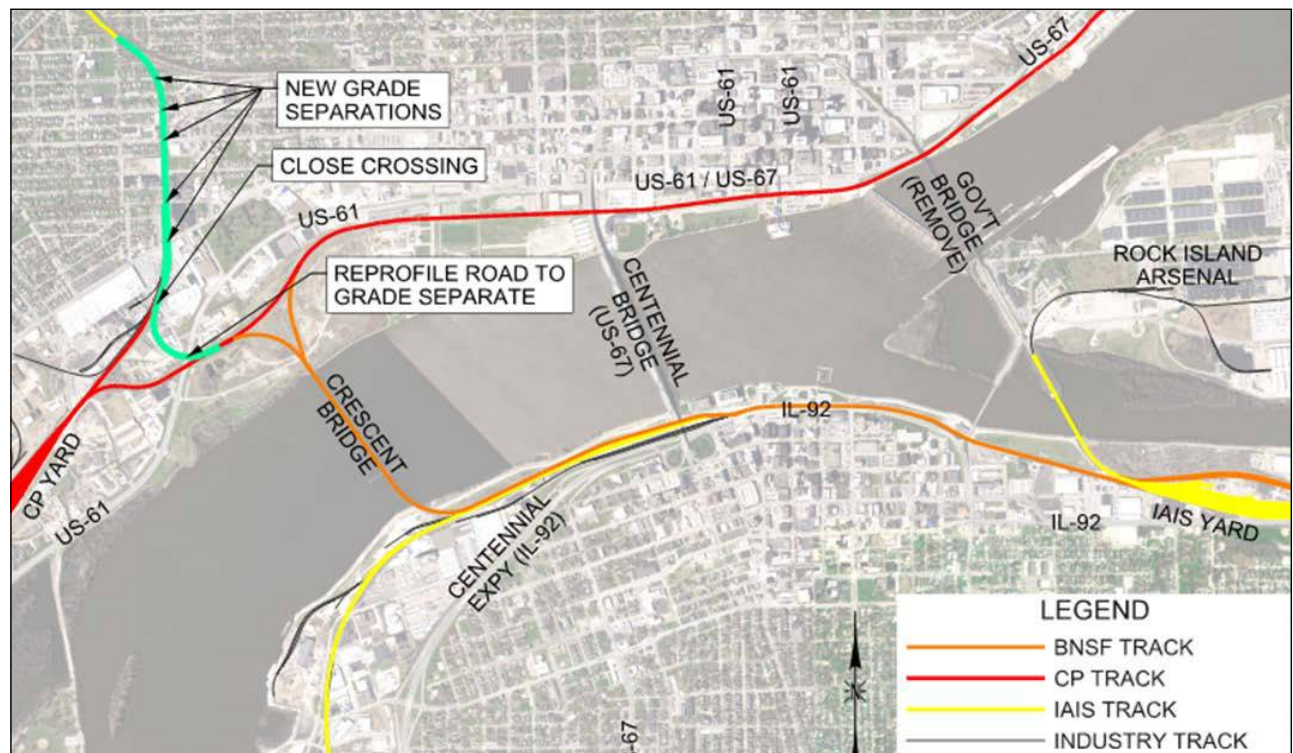
### 5.2.2.1 CRESCENT BRIDGE ALTERNATIVE 1

One alternative to provide direct access for IAIS between its existing main line on each side of the Mississippi River is to construct a connection from the existing CP main track west of the existing Crescent Bridge wye that would turn north and follow the existing Missouri Division Junction/Wilkes Avenue Corridor to a connection with the existing IAIS main track. This proposed connection is shown in Figure 3. Constraints in the area, specifically the limited space between the existing Crescent Bridge wye and the Missouri Division Junction track, necessitate the use of a 12°30' (459' radius) curve on this alignment and limit the track speed to 20 mph over the proposed connection. The portion of the connection track between the existing CP main track and Schmidt Road would significantly impact the industry located on the west side of Schmidt Road. From Schmidt Road and 3rd Street, the proposed alignment takes advantage of the existing Missouri Division Junction rail corridor with minimal outside impacts. North of 3rd Street, the proposed alignment continues along Wilkes Avenue, which would be vacated to accommodate the proposed rail corridor, and then curves to the west to connect with the existing IAIS corridor, impacting several residential properties to varying degrees throughout the process.

To maintain adequate clearance along River Drive (U.S. Highway 61), the existing roadway profile would have to be lowered to the north and east of the existing CP main track to maintain a similar elevation as that under the existing CP bridge. This would impact the existing intersection with Howell Street and industrial driveways in the vicinity. The highway-rail crossing at Howell Street would likely have to be closed or significantly modified as the connection track would not have sufficient clearance for a grade separation. In addition, the existing industrial trackage adjacent to the proposed connection track would have to remain to continue to serve existing industries in the area. Highway-rail grade crossings at Rockingham Road, as well as 1st Street, 3rd Street, 4th Street, and 5th Street, could all be grade separated as the connection track gains elevation to connect with the existing IAIS track.

A grade of approximately 1.2 percent is required to make the connection from the existing CP main line elevation to the elevation of the IAIS main track as it climbs out of the river valley. The 1.2 percent grade would be approximately equal to the existing westbound ruling grade on the IAIS, but this condition is not ideal so close to a yard as other speed restrictions could prevent trains from fully attaining the allowable timetable speed prior to entering the grade.

Figure 3: Crescent Bridge Only Alternative 1



Source: HDR

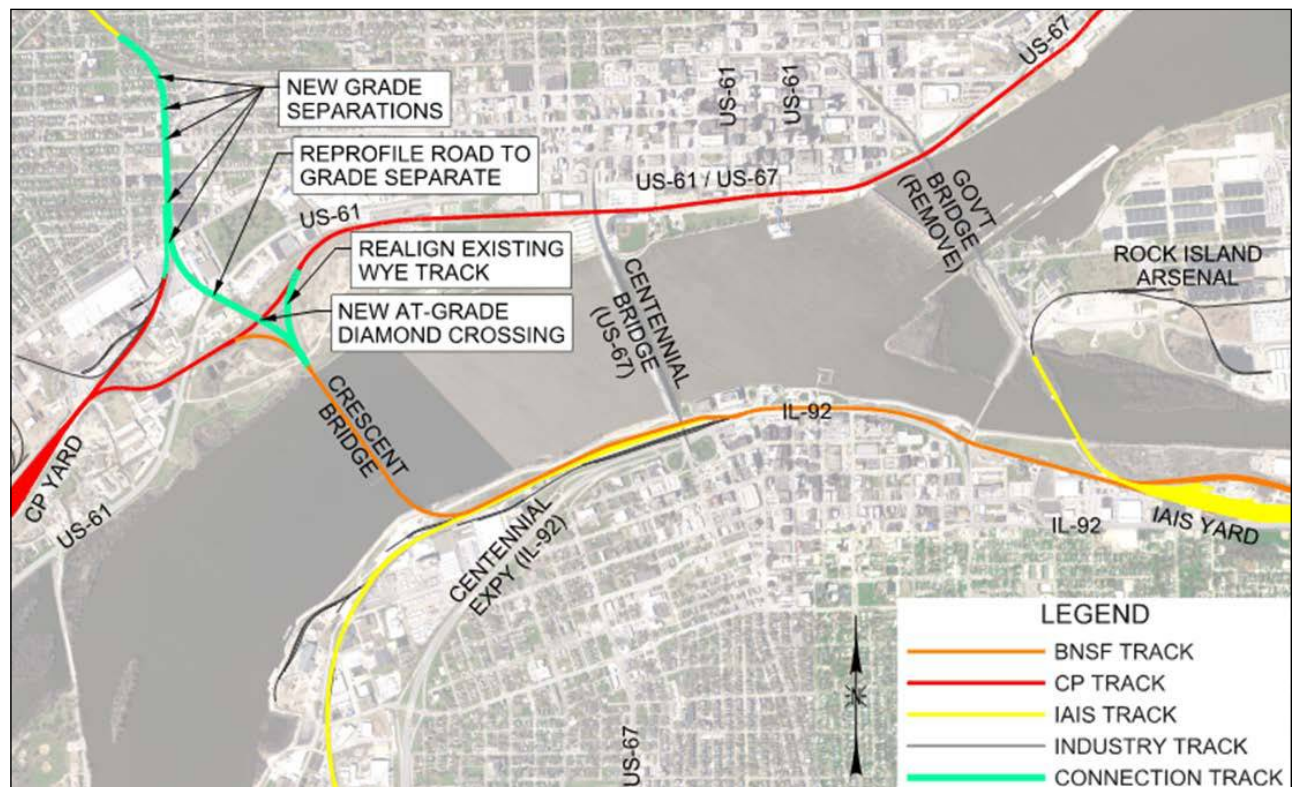
The existing Missouri Division Junction track would be replaced by the proposed connection, so a stub-end industrial track would have to be constructed at-grade from south of Rockingham Road to the vicinity of 1st Street or 2nd Street, depending on desired clear length, to allow for continued service to area industries.

### 5.2.2.2 CRESCENT BRIDGE ALTERNATIVE 2

A second alternative to provide direct access for IAIS between its existing main line on each side of the Mississippi River would be to connect to the nearby, existing Crescent Bridge wye and proceed generally north to follow the existing Missouri Division Junction/Wilkes Avenue Corridor to a connection with the existing IAIS main track. This proposed connection is shown in Figure 4. While this alternative would eliminate the need for a 12°30' (459' radius) curve, it would require crossing the existing CP main track at-grade via a diamond crossing. The proposed alignment would allow for 25 mph operation over the proposed connection track. The proposed alignment would potentially impact several industrial properties between the CP main track and Rockingham Road before utilizing the existing Missouri Division Junction corridor between Rockingham Road and 3rd Street. North of 3rd Street, the proposed alignment continues along Wilkes Avenue, which would be vacated to accommodate the proposed rail corridor, and then curves to the west to connect with the existing IAIS corridor, impacting several residential properties throughout the process.

To maintain adequate clearance over River Drive (U.S. Highway 61), the existing roadway profile may have to be lowered slightly in the vicinity of the proposed track crossings. This may impact the existing Division Street intersection as well as industrial driveways in the area. The highway-rail grade crossing at Rockingham Road could be grade separated, although the existing roadway profile may have to be lowered slightly to provide full roadway clearance. The roadway crossings at 1st through 5th Streets could all be grade separated based on the proposed connection track profile.

Figure 4: Crescent Bridge Only Alternative 2



Source: HDR

A track grade of approximately 1.3 percent is required to make the connection from the crossing diamond with the CP main line elevation to the elevation at the proposed connection with the IAIS main track. The 1.3 percent grade would be slightly higher than the existing westbound ruling grade on the IAIS; this condition would not be ideal so close to a yard as other speed restrictions could prevent trains from fully attaining the maximum allowable timetable speed prior to entering the grade.

This alternative would impact the existing Crescent Bridge wye connection to accommodate the proposed new rail connection. The north leg of the existing wye would be reconstructed to provide a more direct route for the new connection track. Existing wye track turnouts would remain in the same location and an existing flat spot would be removed from the existing alignment, allowing the degree of curvature on the proposed wye track to match the existing degree of curvature of approximately 6°00' (955' radius). The existing Missouri Division Junction track would be replaced by the proposed connection, and a stub-end industrial track would have to be constructed at-grade from south of Rockingham Road to the vicinity of 1st Street or 2nd Street, depending on desired clear length, to allow for continued service to area industries.

### 5.3 Build Alternatives

Several build scenarios were considered as part of this Alternatives Analysis effort. In the Quad Cities Area, a rail crossing over the Mississippi River is vital to rail-served industries, as well as the rail operators providing that service. While there is currently some redundancy in the existing rail network due to the presence of two railroad river crossings, both existing Quad Cities Area railroad river crossings are over 100 years old and have their own operational constraints. A review of potential new-build river crossing alternatives is especially important given the constraints associated with the existing Government Bridge and Crescent Bridge river crossings.

#### 5.3.1 REGIONAL ALTERNATIVES

Outside of the Quad Cities the nearest rail crossings of the Mississippi River are located approximately 35 miles upriver at an existing Union Pacific Railroad (UP) bridge at Clinton, Iowa, adjacent to U.S. Highway 30. The next closest rail crossing is approximately 79 miles downriver at an existing BNSF bridge at Burlington, Iowa, adjacent to U.S. Highway 34. The lack of other relatively close railroad river crossings in the immediate region, in combination with the built-up nature of the areas adjacent to the existing rail crossings, led to a review of potential regional alternatives for a new rail crossing.

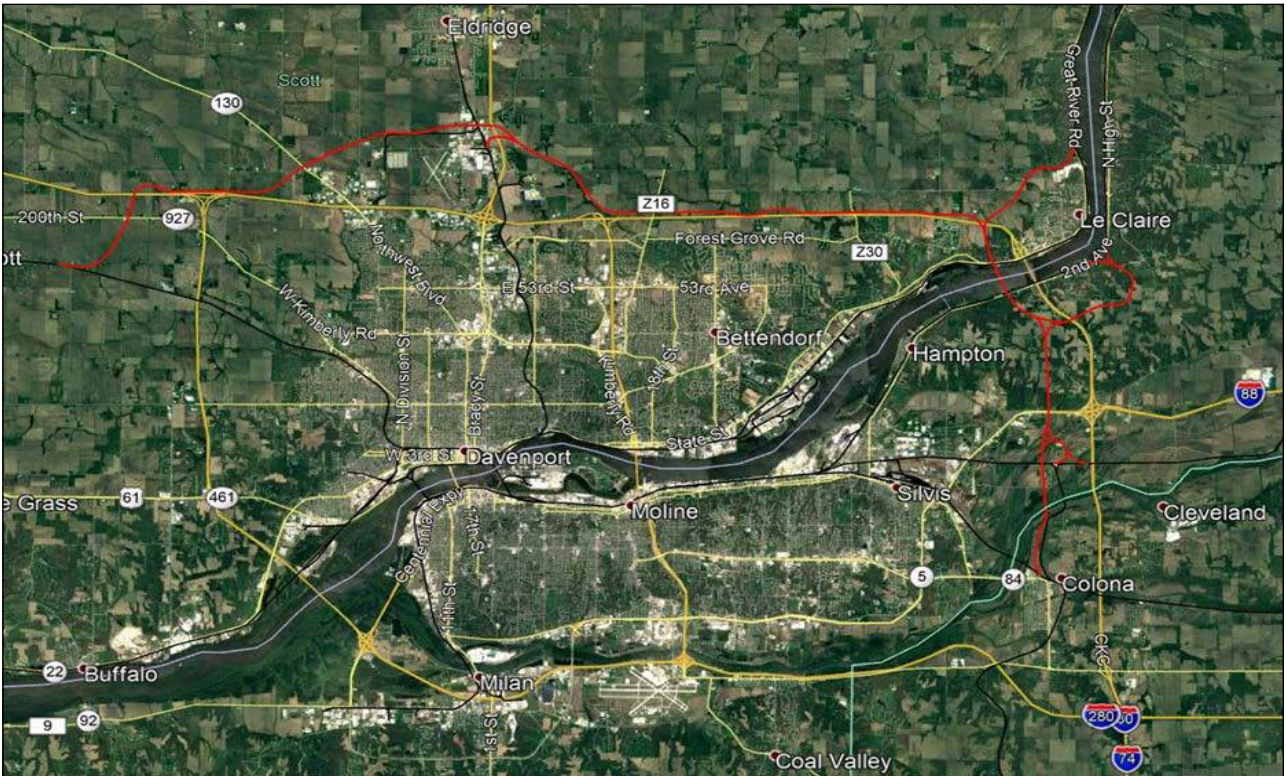
Several regional alternative concepts were reviewed, as further detailed in this section, but were ultimately removed from further consideration due in large part to the significant amount of greenfield rail corridor construction required for any alternative outside the area roughly bounded by 7th Street in East Moline to 7th Avenue in Rock Island on the Illinois side of the Mississippi River, and Bellingham Street in Riverdale and Schmidt Road in Davenport on the Iowa side of the Mississippi River. This area forms a synergy for a proposed river crossing, as all three railroads (BNSF, CP, and IAIS) are co-located on the Illinois side of the Mississippi River and are in close proximity on the Iowa side of the Mississippi River, within these limits. The further away from this location the proposed crossing gets, the further away the different railroad operations spread apart from each other, and the longer the construction length and associated impacts become. This area also keeps key railroad yards at Silvis (for IAIS) and Davenport (CP's Nahant Yard) outside of the crossing project limits and maintains rail operations generally as they exist currently.

##### 5.3.1.1 NORTH OF THE QUAD CITIES

North of the Quad Cities, the potential for a new crossing was considered in the vicinity of the existing Interstate 80 (I-80) bridge. As envisioned, the proposed river crossing alignment would start with a connection to the existing IAIS alignment in the vicinity of Colona, Illinois, and then proceed north roughly parallel to, and likely west of, the BNSF Barstow Subdivision main track. The proposed alignment would cross the Rock River before a grade separated crossing of the BNSF Industrial Track in the vicinity of Barstow, Illinois, with a connection track to the BNSF track. It would then continue north through a grade separation of Illinois Highway 92 to a high-fixed river crossing located approximately 0.5 mile west (downriver) of the existing I-80 bridge. CP has existing rail corridors on both sides of the Mississippi River at this location and a connection track would be constructed on the Illinois side to the CP Nitrin Spur and on the Iowa side to the CP Davenport Subdivision main track.

The alignment would cross over existing I-80 via a grade separation in the vicinity of 35th Street and then parallel the interstate, to the north side, to the vicinity of the I-80/Interstate 280 (I-280) system interchange. The exact alignment of the segment that parallels I-80 would have to be determined, as there is existing development adjacent to the interstate from

Figure 5: North of Quad Cities Alternative



Source: HDR / Google Earth

approximately U.S. Highway 61 to Wisconsin Avenue that would have to be considered. The existing CP Eldridge Spur would be crossed in the vicinity of U.S. Highway 61 and a connection to the spur would likely be constructed. The proposed alignment would cross back over existing I-80 west of the I-80/I-280 system interchange and connect with the existing IAIS alignment to the east of Walcott, Iowa. A conceptual sketch of this alternative is shown in Figure 5.

The total length of the main track for this alternative would be likely between 25 and 30 miles, with an additional 5 to 10 miles of track for making connections with the various existing rail corridors crossed by the proposed alignment. The alignment would require the acquisition of between 350 and 700 acres of property from various property owners, the majority of which would be undeveloped or agricultural land. However, there is the potential for some significant impacts and acquisitions from industrial, commercial, and residential parcels. Grade separations would be required at crossings of existing rail lines, highways, and major roadways.

This alternative would significantly alter existing rail operations in the Quad Cities and would bypass the existing IAIS Silvis Yard, which is a major terminal and yard on the IAIS system that classifies trains destined to, and coming from, Chicago and Peoria, Illinois. It would also bypass the proposed passenger station in Moline, which is the planned terminus of the Chicago-to-Moline passenger rail service currently under development by the State of Illinois. The alternative would eliminate any opportunity for the Iowa DOT to effectively extend the passenger service from Moline to Iowa City or other destinations within the state.

Due to the significant costs and property impacts associated with this alternative, and in conjunction with it not readily accommodating proposed passenger rail service or IAIS train operations, the alternative was removed from further consideration prior to additional development, including the identification of an actual rail alignment and profile for the alternative.

### 5.3.1.2 SOUTH OF THE QUAD CITIES

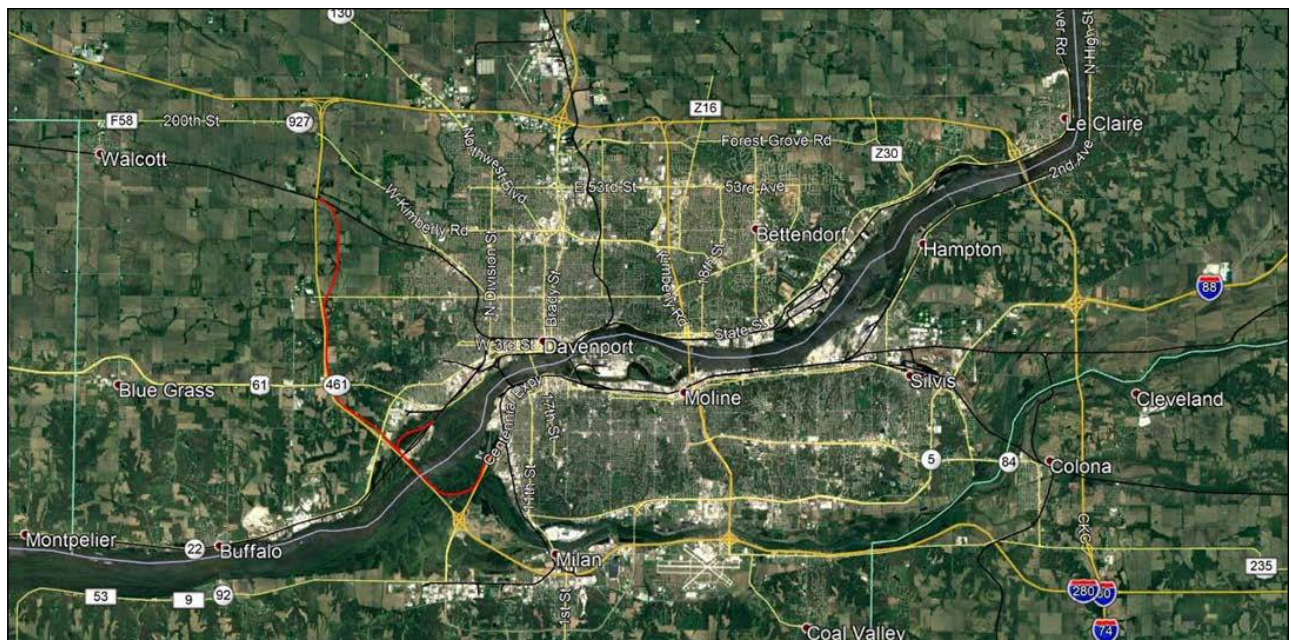
South of the Quad Cities, the potential for a new crossing in the vicinity of the existing I-280 interstate bridge was considered. As envisioned, the proposed river crossing alignment would start with a connection to the existing IAIS Milan Spur in the vicinity of the Centennial Expressway (Illinois Highway 92)/18th Avenue interchange and then proceed south parallel to and west of the Centennial Expressway (Illinois Highway 92) and across the Rock River before turning northwest to follow the I-280 alignment. The proposed alignment would include a high-fixed river crossing located just north (upriver) of the existing I-280 interstate bridge and a grade separation with the existing CP Davenport Subdivision main track on the Iowa side of the Mississippi River. A connection track would be constructed between the proposed railroad river crossing alignment and the existing CP main track. The alignment would continue north along the east side of I-280 to a connection with the existing IAIS alignment in the vicinity of the existing IAIS bridge over I-280. A conceptual sketch of this alternative is shown in Figure 6.

The total length of the main track for this alternative would be likely between 10 and 12 miles, with an additional 1 to 2 miles of track for making connections to the CP Davenport Subdivision main track. Improvements would also have to be made to the existing IAIS Milan Spur/BNSF Crescent Bridge alignment between the IAIS Rock Island Yard and the proposed crossing alignment, specifically at the 24th Street Bridge in Rock Island, to accommodate double-stack container rail shipments. The alignment would require the acquisition of between 100 and 250 acres of property from various property owners, the majority of which would be undeveloped or agricultural land. However, there is the potential for impacts and acquisitions from industrial, commercial, and residential parcels. Grade separations would be required at crossings of existing rail lines, highways, and major roadways.

This alternative would add approximately 5 miles to the existing IAIS route through the Quad Cities, and as much as 7 miles to the CP and BNSF routes that currently utilize the Crescent Bridge to cross the river. This route would not bypass any major rail yards or the proposed passenger station in Moline. The alignment does have the potential for significant environmental impacts, especially near the confluence of the Rock River and the Mississippi River in Illinois, where there are significant wetlands and area within the floodplain.

Due to the significant costs and property impacts associated with this alternative and the significant environmental impacts in the vicinity of the Rock River confluence with the Mississippi River, this alternative was removed from further consideration prior to significant development, including the identification of an actual rail alignment and profile for the alternative.

Figure 6: South of Quad Cities Alternative



Source: HDR / Google Earth

### 5.3.1.3 MUSCATINE

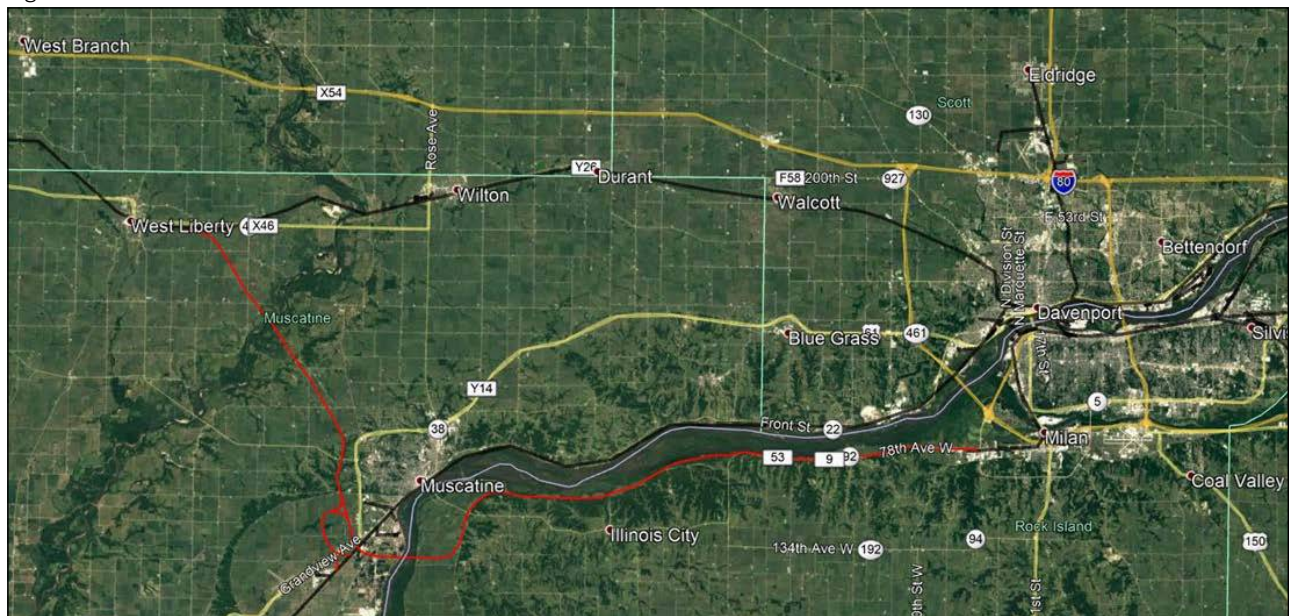
The Port of Muscatine is planning an expansion of their port facilities on the south side of Muscatine, Iowa. As part of the kickoff meeting for the Mississippi River Rail Crossing Study, Muscatine was mentioned as a potential alternate river crossing location due to the proposed port expansion. A railroad river crossing at Muscatine would likely involve a proposed alignment connecting to the end of the existing IAIS Milan Spur in the vicinity of the intersection of the Centennial Expressway with Andalusia Road. From that point the proposed alignment would continue generally east along the Illinois side of the Mississippi River. The actual river crossing would be via a high-fixed alignment located south of Muscatine in the vicinity of the proposed port expansion. The proposed alignment would cross the existing CP Ottumwa Subdivision main line and U.S. Highway 61 via a grade separation, and a separate connection track would be constructed to provide a connection to the CP alignment. From the south side of Muscatine, the proposed alignment would likely continue northwest and connect to the existing IAIS main track alignment in the vicinity of West Liberty, Iowa. A conceptual sketch of this alternative is shown in Figure 7.

The total length of the main track for this alternative would be likely between 45 and 60 miles, with an additional 1 to 2 miles of track for making a connection to the existing CP rail corridor crossed by the proposed alignment. The alignment would require the acquisition of between 600 and 1,200 acres of property from various property owners, the majority of which would be undeveloped or agricultural land. However, there is the potential for some significant impacts and acquisitions from industrial, commercial, and residential parcels, especially in the town of Andalusia and the vicinity of the Port of Muscatine. Grade separations would be required at crossings of existing rail lines, highways, and major roadways.

This alternative would significantly alter existing rail operations in the Quad Cities and add significant mileage to the rail routes currently used by CP and BNSF to access their customers in the region. It would also bypass existing IAIS customers from Davenport to West Liberty, Iowa, including major customers near Wilton and Durant. IAIS would need to retain a significant portion of their existing corridor between Davenport and the connection to the proposed alignment to continue providing service to shippers. There is also the potential for significant environmental impacts, especially along the portion of the alignment in Illinois that would parallel the bank of the Mississippi River. In some areas the bluffs along the Mississippi River extend essentially to the riverbank and provide little room for the addition of a rail corridor.

Due to the significant costs and property impacts, the potential environmental impacts, the additional route miles, and potential increase in operating costs for the rail operators associated with this alternative, this alternative was removed from further consideration prior to significant development, including the identification of an actual rail alignment and profile for the alternative.

Figure 7: Muscatine Alternative



Source: HDR / Google Earth



*Existing 7th Street Interlocking in East Moline | Source: HDR*

### **5.3.2 EAST ALTERNATIVES**

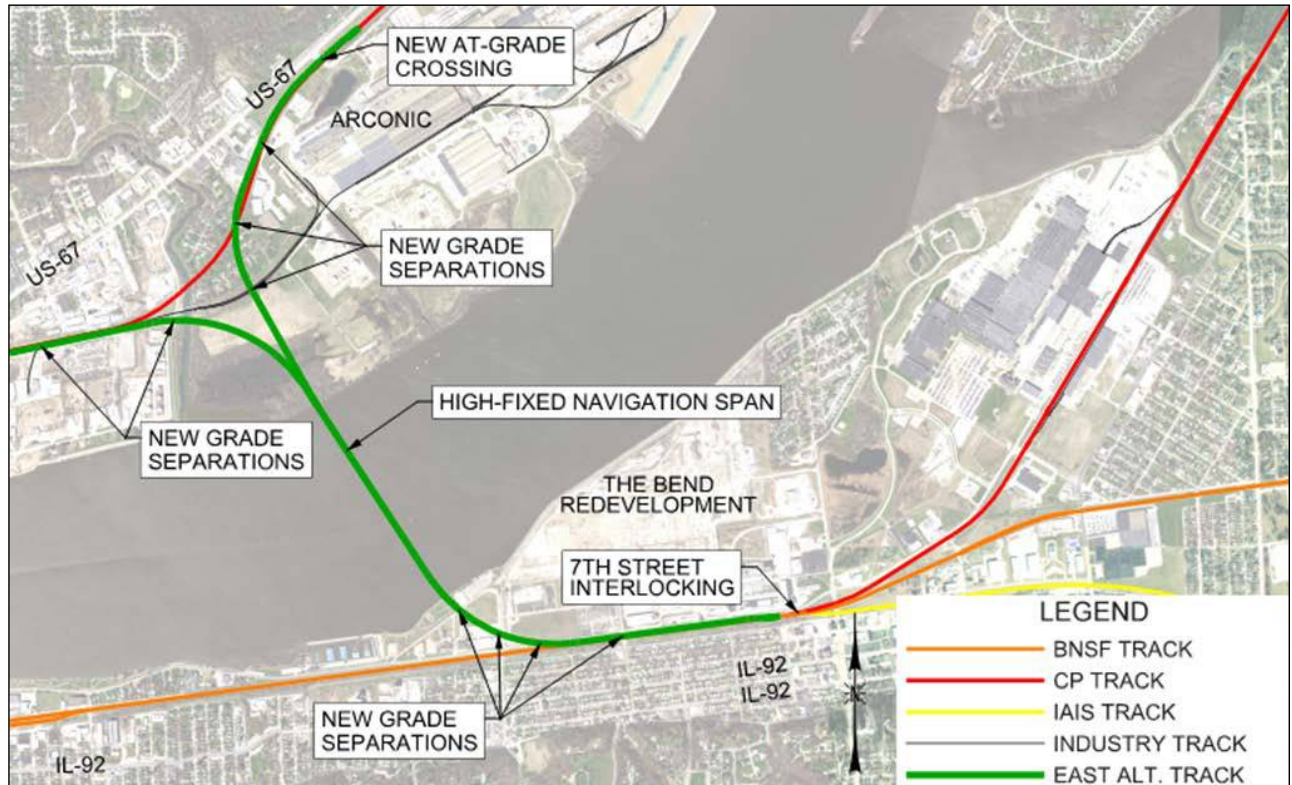
To the west of 7th Street in East Moline the separate BNSF, CP, and IAIS alignments join together and all railroads operate on the BNSF Industrial Track. This is also an area with a former industrial site on the Illinois side of the Mississippi River and an undeveloped area across the river on the Iowa side that present the opportunity for a potential railroad river bridge crossing. Any rail crossing in this location would need to connect with an east facing connection on the Illinois side of the Mississippi River and both east and west facing connections on the Iowa side of the Mississippi River in order to replicate currently available train routings and accommodate current rail carrier operations through the Quad Cities. Alternatives in this location would require a new track be constructed parallel to the existing CP Davenport Subdivision rail corridor, along the Mississippi River, between the proposed river bridge and a new connection to the Davenport trainway. The new track would be needed to accommodate the additional rail traffic from the revised river crossing.

#### **5.3.2.1 EAST ALTERNATIVE**

The east alternative would require installation of a new turnout immediately west of the existing 7th Street interlocking where the BNSF, CP, and IAIS corridors combine. From this connection point, a new track would be constructed between the existing corridor and River Drive that would provide enough length to gain the necessary elevation to cross the river with a high-fixed alignment. The proposed track would climb through a grade separation of 3rd Street before turning to the northwest and crossing over River Drive in the vicinity of 1st Street. This alignment on the Iowa side would avoid the majority of the area currently being redeveloped on a former industrial site and would include grade-separated road crossings, minimizing impacts to vehicular activity to the greatest extent possible. The main Mississippi River crossing would cross the river roughly perpendicular to the navigation channel, which is located near the Iowa riverbank in this area. This potential alternative is shown in Figure 8. Near the Iowa riverbank a turnout would be installed to allow for northbound movements along the CP corridor. The primary alignment would curve to the west and align to parallel the south side of the existing CP corridor. This parallel track construction is shown in Figure 9.

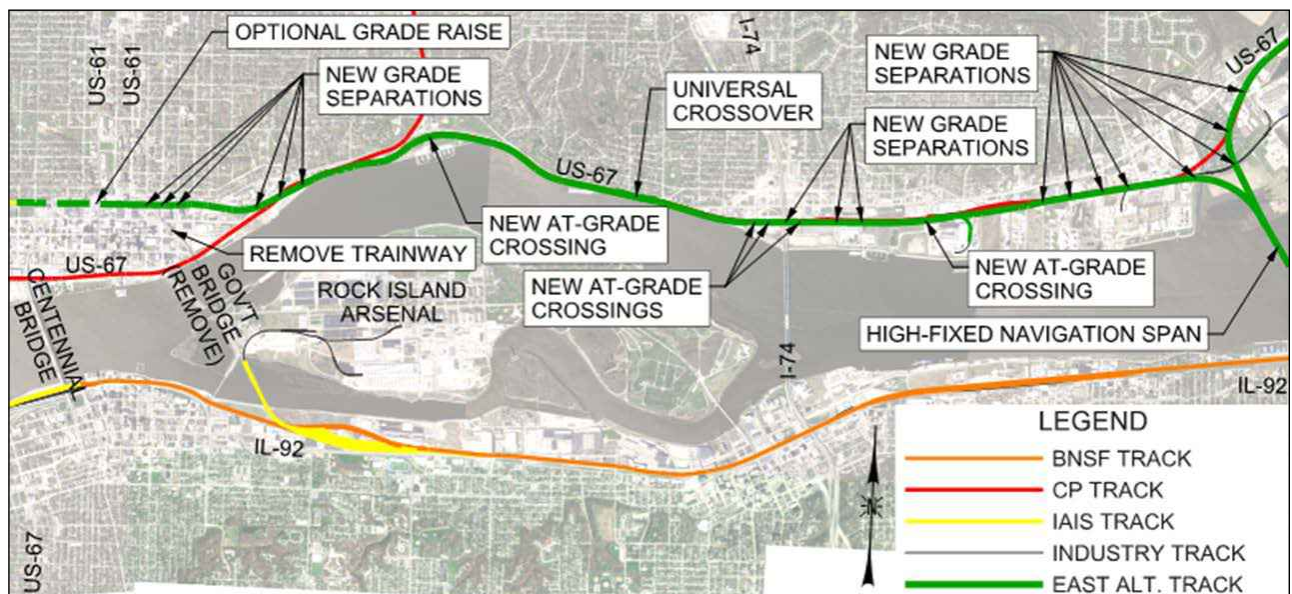
The construction of a new track parallel to the existing CP track is key to any alternative crossing in the east corridor. In the case of a high-fixed crossing, the track would remain elevated through grade separations with 42nd Street, 35th Street, 33rd Street, and 31st Street, as well as an industrial rail spur located east of 35th Street. The profile would descend to match the existing CP profile, in the vicinity of 26th Street. An existing industrial spur in this area would be reconfigured to connect to the proposed track with a crossover between the proposed track and existing CP track to allow operations across the proposed track into the industry. The alternative would require the addition of the new track to existing highway-rail grade crossings at 23rd Street, 13th

Figure 8: East Crossing Alternative



Source: HDR

Figure 9: East Crossing Alternative CP Parallel Track



Source: HDR

Street, and 12th Street as well as the alternate casino entrance at Lady Luck Boulevard. The alternative would also add a new track under the existing pedestrian bridge at the casino, the George Thuenen Drive Bridge, and the existing and currently under construction Interstate 74 (I-74) bridges in Bettendorf, Iowa.

West of the Bettendorf central business district, the track would continue to parallel the existing CP track between the track and the river, requiring the relocation or reconstruction of the existing riverfront trail in multiple locations. The corridor between Bettendorf and Mound Street has nearly 0.5 mile of tangent track in an otherwise curvilinear alignment, making it a potential location to construct a universal crossover between the new track and the existing CP track, allowing train movements between the tracks as necessary. The new track would continue through the Davenport water treatment plant, requiring modifications to the existing floodwall that surrounds the facility, and then begin to climb again to allow for a grade separation over the existing CP track and River Drive. The proposed track would squeeze into existing space through the marina area along the river and would require significant modifications to existing traffic patterns in the area. After crossing over the CP main track and River Drive, the proposed track would continue west to a connection with the existing Davenport trainway, in the vicinity of Brady Street. While modifications to the Davenport trainway west of Brady Street would not be required, they would be desirable to improve existing constrained roadway clearances under the trainway bridges.

The north leg of the wye connection on the Iowa side of the Mississippi River would remain high enough from the river crossing to provide for grade separations of the existing Arconic industrial rail spur and CP main track before turning to parallel the CP track to the northeast. The track profile would allow for a grade separation of Bellingham Road before descending to a highway-rail grade crossing with the existing Arconic entrance drive and then connecting to the existing CP track. To provide enough clearance for a grade separation over the CP track while meeting the existing crossing grade at the Arconic entrance drive a 1.1 percent grade would be required on the north leg of the wye. All other track grades on this alternative would be limited to a 1.0 percent maximum grade.

Any east alternative would require approximately 5 miles of additional track construction along the existing CP rail corridor to support non-CP rail traffic. While some right-of-way required for this alignment is already held by public agencies or the railroads, there would still be significant property acquisition from industries, commercial businesses, and residential properties along the proposed alignment. The built up nature of the area along the existing CP track means that several of the impacts will be significant in nature. Grade separations would be required at crossings of existing rail lines, highways, and major roadways. Several highway-rail grade crossings would see an additional track added to their footprint. Environmental impacts



*Existing CP Bridge over Duck Creek in Bettendorf, Iowa | Source: HDR*

would occur in the undeveloped area along the Iowa riverbank, where the alignment crosses the Mississippi River, and again along the river between Bettendorf and Mound Street. In these locations, the alternative squeezes another track in an already constrained corridor at the base of the river bluffs that contains River Drive, the existing CP track, and the riverfront trail.

This alternative would significantly alter existing rail operations in the Quad Cities, and would bypass the existing IAIS Rock Island Yard, which is currently used by IAIS for local service to Quad Cities Area customers, and rail car interchange between the three railroads. It would also bypass the proposed passenger station in Moline that is the planned terminus of the Chicago-to-Moline passenger service, as well as the proposed expansion of that service to Iowa City, Iowa.

The actual river crossing location does present the potential for multi-modal opportunities, as it is located approximately 2.5 miles upriver from the I-74 river crossing currently being reconstructed, and approximately 6.5 miles downriver from the existing I-80 river crossing. A shared bridge structure that accommodates highway and rail traffic (and potentially pedestrian traffic) could be attractive and would have easy connections to River Drive (U.S. Highway 67) on the Iowa side of the Mississippi River and River Drive as well as Illinois Highway 92 on the Illinois side of the Mississippi River. While railroad and highway bridges have different loading types and design requirements, a multimodal crossing would provide efficiencies over multiple separate crossings and would also make a potential crossing a more attractive recipient for various federal funding opportunities.

### 5.3.2.1 OTHER EAST ALTERNATIVES

In addition to the east corridor alternative previously detailed, other alternatives were briefly considered but ultimately removed from further consideration due to various constraints or operating concerns.

Initially, alternatives were reviewed that would require a low-moveable span to accommodate river navigation due to the relatively close proximity between the rail corridors and the riverbanks on each side of the Mississippi River. A low-movable alternative would require that the northbound connection cross the existing Arconic rail spur at-grade, in an area where the industrial spur is composed of three active parallel tracks. Any at-grade rail crossing at this location would drastically impact rail operations at the Arconic plant and brings into question the viability of such an alternative. The need to avoid an alternative that requires an at-grade crossing of the Arconic rail spur led to the investigation of a potential high-fixed alignment over the river at this location, and ultimately removed a low-movable alternative from further consideration.

Other crossing alignments in the east corridor would generally be located in a similar location to the previously detailed east alternative. Locations further upriver would result in significantly higher impacts to the former industrial site being redeveloped on the Illinois side of the Mississippi River in East Moline and locations further downriver would impact major industry on the Iowa side of the Mississippi River in Bettendorf. This limits river crossing locations to a fairly narrow corridor.



*"The Bend" Redevelopment in East Moline | Source: HDR*

The proposed track that parallels the existing CP corridor from the potential river crossing to the Davenport trainway could potentially have been located on either the north (landward) or south (riverward) side of the existing track. The south side was ultimately selected for the east alternative, as previously detailed, as it requires fewer modifications to the existing rail network and better fits through existing overhead crossings than the north side. A north side parallel alignment would take advantage of the elevation of a high-fixed alignment to get to the side of the CP corridor that the track ultimately needs to be on when it reaches the Davenport trainway, but would require modifications to the existing CP industrial yard located between 23rd and 31st Streets in Bettendorf. It would also require modifications either to the existing CP main track or River Drive in the corridor between downtown Bettendorf and the Davenport water treatment plant to fit the new track between the existing CP track and River Drive, and would require the existing CP track be realigned through the water treatment plant to prevent impacts to existing structures within the plant. On the west side of the treatment plant, the existing connection to the CP Eldridge Spur would have to be reworked to maintain connectivity. Ultimately, the proposed connection would likely have to be grade separated with River Drive, and climb enough to meet the existing Davenport trainway elevation on IAIS. The need to grade separate at River Drive also makes this an ideal location to cross the CP alignment for a parallel track on the south side of the existing CP corridor. Due to the fewer impacts along the length of the parallel track and the need to grade separate at either end, the parallel track was ultimately located on the south (riverward) side and the north (landward) side parallel track was removed from further consideration.

### **5.3.3 CENTRAL ALTERNATIVES**

Much of the area between the east crossing location and the existing Government Bridge crossing is developed along one or both sides of the Mississippi River and does not provide an obvious location for a new railroad river crossing. In the vicinity of the Government Bridge river crossing, there is an area that is not as heavily developed on the Illinois riverbank that provides the opportunity to look for proposed crossing locations. This area includes the existing Lock and Dam No. 15 structure that creates constraints as to where a potential alignment can be located, but also channelizes navigation to within the limits of the existing locks. This situation potentially allows for a shorter navigation span on the proposed bridge and reduces the likelihood of bridge strikes on a new crossing bridge at this location. The close proximity of existing rail infrastructure at this location also would minimize the amount of proposed new rail construction required to make necessary connections to existing rail crossings in this area.

#### **5.3.3.1 CENTRAL OFFSET ALTERNATIVE**

An alternative to construct a new railroad river crossing, while minimizing impacts to overall Quad Cities rail operations, is to construct a new bridge offset downriver of the existing Government Bridge. This allows a direct connection to the west end of the IAIS Rock Island Yard in Illinois and the Davenport trainway in Iowa. Ideally, the proposed bridge would be located far enough downriver so as to not impact operations of the existing Government Bridge swing span, which is 365'-7" long, centered on the pivot point, and would require an offset of at least 200 feet from the centerline of the existing bridge to the centerline of the proposed bridge. At this offset the proposed alignment would be located over the existing control building for the existing dam, making such an offset impractical. Offsetting further down river is also not practical as the bridge alignment would then cross over the dam itself, which includes a crane-way to support ongoing operation and maintenance of the dam. An offset west outside of the limits of the dam would place the alignment on the Iowa side of the Mississippi River through the Davenport central business district. An offset immediately upriver of the existing bridge would impact existing buildings within the limits of the Rock Island Arsenal, all of which are part of a designated historic district.

With the aforementioned constraints, the proposed central offset alignment as envisioned would be offset 150 feet from centerline of existing IAIS main track to centerline of proposed crossing track (143 feet from existing Government Bridge centerline to proposed bridge centerline). This offset will allow for the majority of the proposed bridge to be constructed without impacting the existing bridge. The navigation span over the locks would not be installed until everything else is in place, allowing the existing movable span to continue to operate until the new bridge is ready to be put in service. The proposed navigation span would be long enough to span the entire lock structure and provide enough clearance for the existing swing span to fully rotate. Due to the short approach length on each side of the proposed navigation span, this alternative would remain a low-movable span. The potential offset alignment is shown in Figure 10.



*Existing Dam 15 from Government Bridge | Source: HDR*



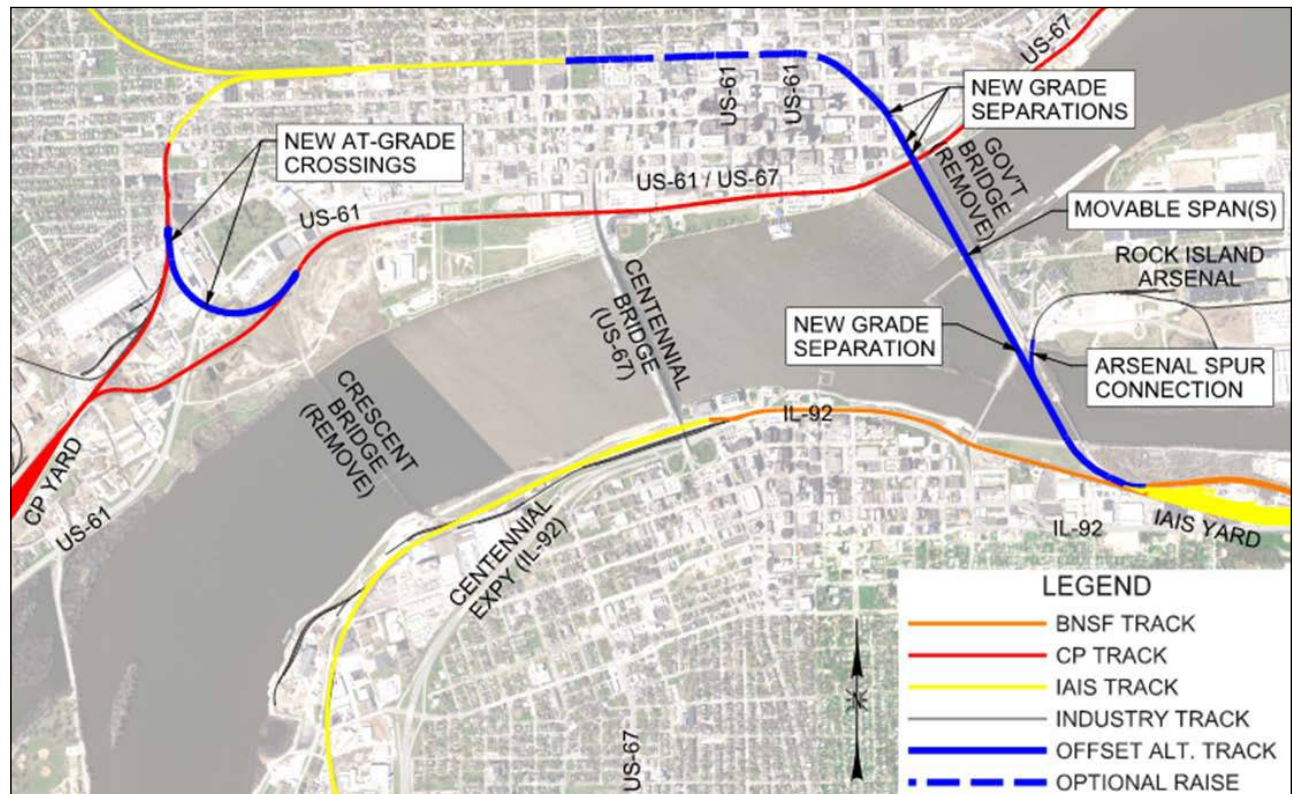
*Existing Government Bridge and Dam 15 from Davenport Trainway | Source: HDR*

The proposed alignment would start at the west end of the IAIS Rock Island Yard with a new connection to the BNSF yard tracks and then continue northwest parallel to the existing IAIS Government Bridge alignment. The connection for the Arsenal industrial spur would be relocated to the new track, allowing the current rail bridge over the Sylvan Slough and the elevated embankment on Arsenal Island to be removed.

The proposed alignment would run along the west end of Arsenal Island and cross the existing 24th Street alignment via a grade separation. The proposed track would be located on structure from riverbank to riverbank, including while adjacent to Arsenal Island, due to the elevation of the track and the proximity of the alignment to the shoreline of the island. On the lowa side of the Mississippi River the alignment would cross over the riverfront trail, CP Davenport Subdivision, and River Drive (U.S. Highway 67) via grade separation, then proceed over Bechtel Park and through the existing commercial properties located on the north side of 2nd Street before connecting to the existing IAIS alignment along the Davenport trainway between 3rd Street and 4th Street. While modifications to the Davenport trainway northwest of 4th Street would not be required, they would be desirable to improve existing roadway clearances under the trainway bridges.

This alternative would be constructed on existing undeveloped land in Illinois and along the shoreline of Arsenal Island, minimizing property impacts within the State of Illinois. On the lowa side of the Mississippi River the alignment would impact existing park property as well as several commercial parcels in the northeast quadrant of the intersection of 2nd Street and lowa Street in Davenport. While property impacts would be fairly minimal when compared to other alternatives, park property at Bechtel Park would be crossed by an elevated section of the proposed alignment. This alternative would be constructed adjacent to Arsenal Island and would require coordination with the Rock Island Arsenal during design, permitting, and construction. Arsenal Island is a designated historic district, and cultural/historical impacts may also have to be mitigated. The alignment would also cross over the top of Lock 15, in close proximity of the dam structure, and would require coordination with the USACE Rock Island District.

Figure 10: Central Offset Crossing Alternative



Source: HDR

To provide a route for northbound movements along the CP main, the proposed connection track described under the Government Bridge Only – No Build alternative would be constructed as part of this alternative. The proposed connection track is shown in Figure 10.

This alternative would generally maintain rail operations in the Quad Cities as they exist currently. It would also accommodate the proposed passenger station in Moline that is the planned terminus of the Chicago-to-Moline passenger service, as well as the proposed expansion of that service to Iowa City, Iowa. While this alternative would most closely replicate existing rail operations, it would also require a movable span over the navigation channel of the Mississippi River due to the lower profile elevation of the track. River traffic would continue to take precedence over rail traffic and would continue to delay rail traffic during the river navigation season.

Several types of movable spans are commonly utilized for railroad operations in North America, the most common of which are vertical lift, bascule, and swing bridges. Typically, a vertical lift bridge would be used to cross navigation spans of the width required along the Mississippi River. Due to the alignment being located within the limits of the existing lock, however, all three types are feasible at this location. A vertical lift span with a clear opening of approximately 300 feet could be utilized to span the entire lock. A swing span, similar to the existing government bridge movable span, could be utilized with the center pivot located on the center island between the two lock structures, or a pair of bascule bridges could be constructed, with a fixed track section on the center island for the open ends to rest on while in the closed position. Due to the proximity of the proposed alignment to the existing bridge, and the desire to maintain operations on the existing Government Bridge during construction, a vertical lift bridge spanning the entire lock structure best minimizes impacts to existing operations until traffic can be relocated to the new alignment.

Similarly to the No Build - Government Bridge Remains Alternative, this alternative would be subject to delays to rail traffic associated with river navigation. The existing lock could be upgraded to 1,200 feet in length to eliminate the need for double-locking barge tows and reduce barge tow transit times from approximately 45 minutes to approximately 10 minutes. A cost estimate has not been developed for upgrading the existing lock at Rock Island, however, in 2007, Congress authorized \$2.2 billion for the replacement of seven existing lock and dam structures on the Mississippi River and Illinois River downstream of Rock Island.



Existing Davenport Trainway at Perry Street | Source: HDR



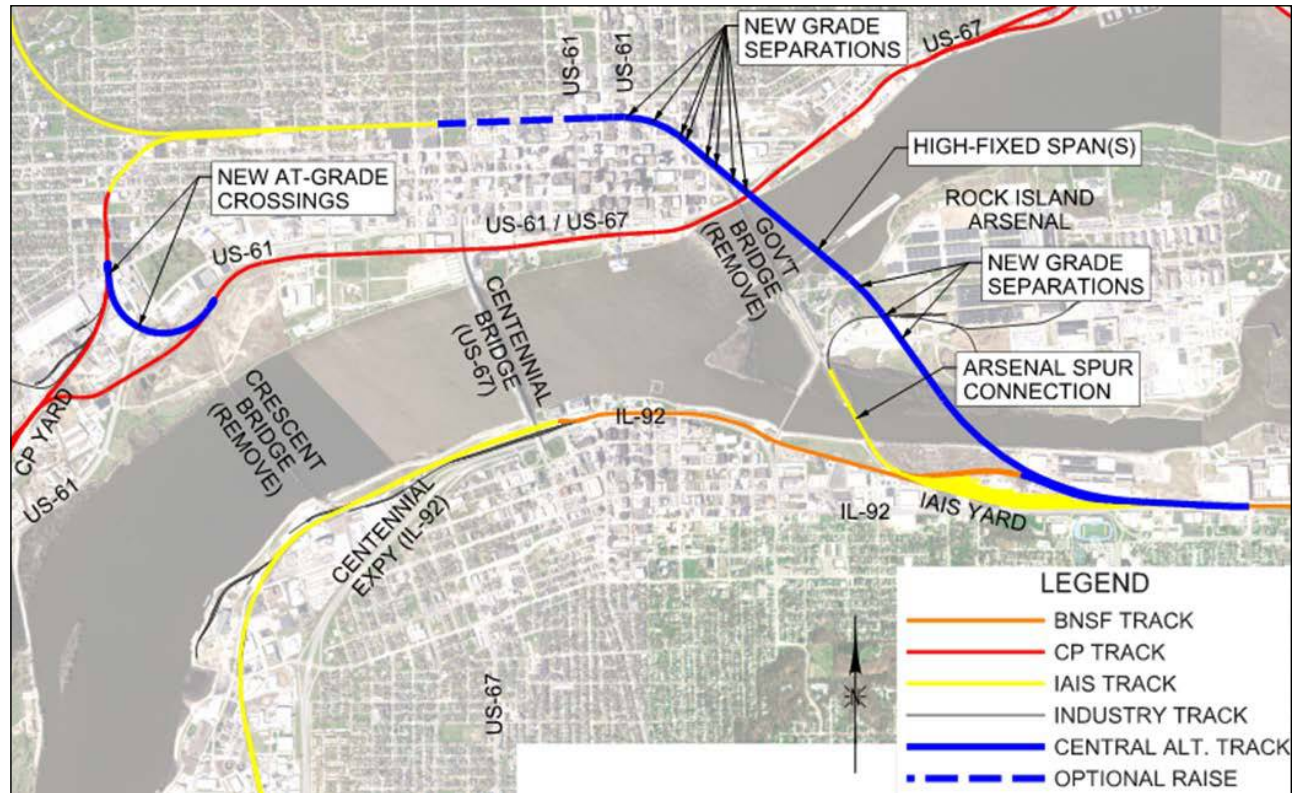
IAIS Rock Island Yard from 44th Street | Source: HDR

The actual river crossing location does present the potential for multi-modal opportunities, as it is located adjacent to an existing multimodal bridge that would be removed from service once the new alignment enters service due to conflicts with the existing movable span and the proposed track. A shared bridge structure that accommodates highway traffic as well as rail traffic, and potentially pedestrian traffic, would likely be required to maintain multiple access routes to Arsenal Island. The structure would have similar connections to River Drive (U.S. Highway 67) on the Iowa side of the Mississippi River and 24th Street on Arsenal Island, with continued access to Illinois Highway 92 on the Illinois side of the Mississippi River. While railroad and highway bridges have different loading types and design requirements, a multimodal crossing would provide efficiencies compared to providing multiple separate crossings and would make the potential crossing a more attractive recipient for various federal funding opportunities.

### 5.3.3.2 CENTRAL ALTERNATIVE

A potential alignment that could avoid some of the constraints associated with the offset alignment alternative was developed, located further upriver from the Government Bridge alignment. This alternative would cross Arsenal Island east of the existing Rock Island Arsenal buildings that are located on either side of Rock Island Avenue. To provide clearance over the existing Arsenal rail spur and roadways on Arsenal Island, as well as eliminate conflicts with river navigation, the alternative considers a high-fixed alignment over the navigation channel. The alternative remains far enough away from the existing Government Bridge alignment to completely avoid impacts to the existing bridge both during and after construction, allowing the bridge to continue to operate if the decision is made to maintain highway and pedestrian operations on the Government Bridge post construction. The potential central alignment is shown in Figure 11.

Figure 11: Central Crossing Alternative



Source: HDR

The proposed alignment would start west of the 44th Street highway-rail grade crossing in Rock Island and continue roughly along the existing BNSF yard track alignment before turning north to cross Sylvan Slough to the west of the existing industrial property located on the north side of the yard. The existing BNSF yard tracks would be shifted south to create room for the proposed crossing alignment. The alignment would cross Arsenal Island through an existing gravel lot and open areas with a profile that allows for grade separation of all road and rail crossings on the island. The alignment would cross the riverbank in the vicinity of the docks along the north side of Arsenal Island and continue over the upriver end of the locks, before crossing the Iowa riverbank approximately 250 feet upriver of the existing Government Bridge alignment. The skewed alignment relative to the existing bridge across the river it to avoid structures within the Rock Island Arsenal, cross the locks well outside the limits of the existing swing span operation, and connect back to the existing IAIS alignment on the Iowa side with minimal impacts when compared to a parallel alignment across the river. In Davenport, the alignment will roughly parallel the existing trainway alignment from the river to a connection with the existing track alignment in the vicinity of Perry Street. The track profile would drop from the navigation span and meet the existing track profile again in the vicinity of Brady Street. While modifications to the Davenport trainway west of Brady Street would not be required, they would be desirable to improve existing roadway clearances under the trainway bridges.

The connection for the Arsenal spur would be maintained via the existing rail alignment over the Sylvan Slough to the Arsenal Spur connection. The Government Bridge rail route would be abandoned between the existing Arsenal Spur and the connection between the existing and proposed routes along the Davenport trainway.



*Existing Davenport Trainway Looking West from Brady Street | Source: HDR*

This alternative would be constructed on existing undeveloped or railroad-owned land in Illinois and on undeveloped or gravel-surfaced parking through the limits of Arsenal Island, minimizing property impacts within the State of Illinois. On the Iowa side of the Mississippi River, the alignment would impact an existing commercial property on the southwest corner of 3rd Street and LeClaire Street as well several parking lot corners. This alternative would be constructed through the boundaries of the Rock Island Arsenal and would require extensive coordination with the Arsenal during design, permitting, and construction. Arsenal Island is a designated historic district, and cultural/historical impacts may also have to be mitigated. The alignment would also cross over the top of the lock and would require coordination with the USACE Rock Island District.

To provide a route for northbound movements along the CP main track from this alternative the proposed connection track described under the Government Bridge Only – No Build Alternative would be constructed as part of this alternative. The proposed connection track is shown in Figure 11.

This alternative would generally maintain rail operations in the Quad Cities as they exist currently. The primary exception is that IAIS local operations based out of Rock Island Yard that are destined for the Iowa side of the Mississippi River would have to depart the yard to the east along the BNSF Industrial Track, and then reverse directions to cross over the Mississippi River rather than simply departing to the west out of the yard. It would accommodate the proposed passenger station in Moline that is the planned terminus of the Chicago-to-Moline passenger service, as well as the proposed expansion of that service to Iowa City, Iowa.

Although the alternative does not fully replicate existing operations, it would allow for a high-fixed span over the navigation channel, effectively separating rail operations from river navigation. Additionally, the crossing location at the existing lock could potentially utilize separate navigation spans over each lock, rather than a single span over the entire structure. This would allow for the use of a pair of navigation spans in the range of 170 feet in length rather than a single span that would be approximately 340 feet in length. The reduced length would allow for the use of a more standardized and less costly span type rather than the need for a through truss. The use of separate navigation spans would require additional coordination with the USACE Rock Island District, as it would require that a pier be placed on the center island between the two locks.

The railroad river crossing location presents the potential for multi-modal opportunities. It is located adjacent to an existing multimodal bridge that would no longer carry rail traffic once the new alignment enters service and that could potentially have roadway and pedestrian traffic relocated as well. A shared bridge structure that accommodates highway traffic as well as rail traffic, and potentially pedestrian traffic, could either completely span Arsenal Island without direct access to the island, or a connection could be provided to allow for vehicle and/or pedestrian traffic to access the island from the new crossing. A shared roadway on the proposed alignment would be able to connect in the vicinity of River Drive (U.S. Highway 67) on the Iowa side of the Mississippi River and the vicinity of Illinois Highway 92 on the Illinois side of the Mississippi River. Any roadway connection on Arsenal Island would require some additional considerations, as the proposed rail alignment would be 40 feet or more above the existing ground elevation on the island and would also have to meet applicable security requirements for access to the secured perimeter of the Arsenal. Any access directly to Arsenal Island would also have to be coordinated with the Rock Island Arsenal. While railroad and highway bridges have different loading types and design requirements, a multimodal crossing would provide efficiencies over multiple separate crossings and would also make a potential crossing a more attractive recipient for various federal funding opportunities.

### 5.3.3.3 OTHER CENTRAL ALTERNATIVES

In addition to the central corridor alternatives previously detailed, other alternative were briefly considered but ultimately removed from further consideration due to various constraints and/or operating concerns.

The potential for a low-movable bridge corridor was considered along a similar alignment to the potential central alignment previously detailed. This would have reduced the length of track construction required on the bridge approaches to gain the necessary elevation for a high-fixed alignment. To maintain service along the Arsenal rail spur the proposed crossing alignment would have either had to stay high enough to grade separate the crossing, which results in little savings versus a high-fixed alignment, or low enough to cross the Arsenal Spur at-grade. In a scenario where the crossing profile stayed that low, the crossing would have required highway-rail grade crossings at all Arsenal Island road crossings. It would also have been challenging to provide adequate clearance for a grade separation with the CP Davenport Subdivision on the Iowa side of the Mississippi River, especially if the dip in the CP profile under the existing Government Bridge were to be removed. The proposed alignment, being at-grade across Arsenal Island, would likely raise additional security concerns and require additional coordination with the Rock Island Arsenal. Ultimately, a low-movable alternative in this corridor would have little benefit when compared to the offset alignment, especially when impacts to the Rock Island Arsenal are considered. The low-movable alternative at this location was removed from further consideration.

The potential for a crossing closer to the east end of Arsenal Island was also considered. The level of development is much lower on the eastern half of the island than the western half, making likely connection points in both Iowa and Illinois problematic with a railroad river crossing in this area. The rail corridor on the Illinois side of the Mississippi River is surrounded by the Moline central business district and the CP main line runs along the riverbank on the Iowa side of the Mississippi River, leaving no room to provide the necessary northbound and southbound connections. The lack of feasible connection points on either side of the Mississippi River removed this alternative from further consideration.

### 5.3.4 WEST ALTERNATIVES

To the west of the central corridor, the next location that supports a new river crossing is the vicinity of the existing Crescent Bridge crossing. Between the Government Bridge and Crescent Bridge, any proposed crossing would encounter the Davenport central business district on the Iowa side of the Mississippi River, making potential crossings in between the two existing crossings challenging. In the vicinity of the existing Crescent Bridge, the Iowa side of the Mississippi River opens up along the river and the existing Missouri Division Junction rail corridor provides a path from through a significant portion of the existing

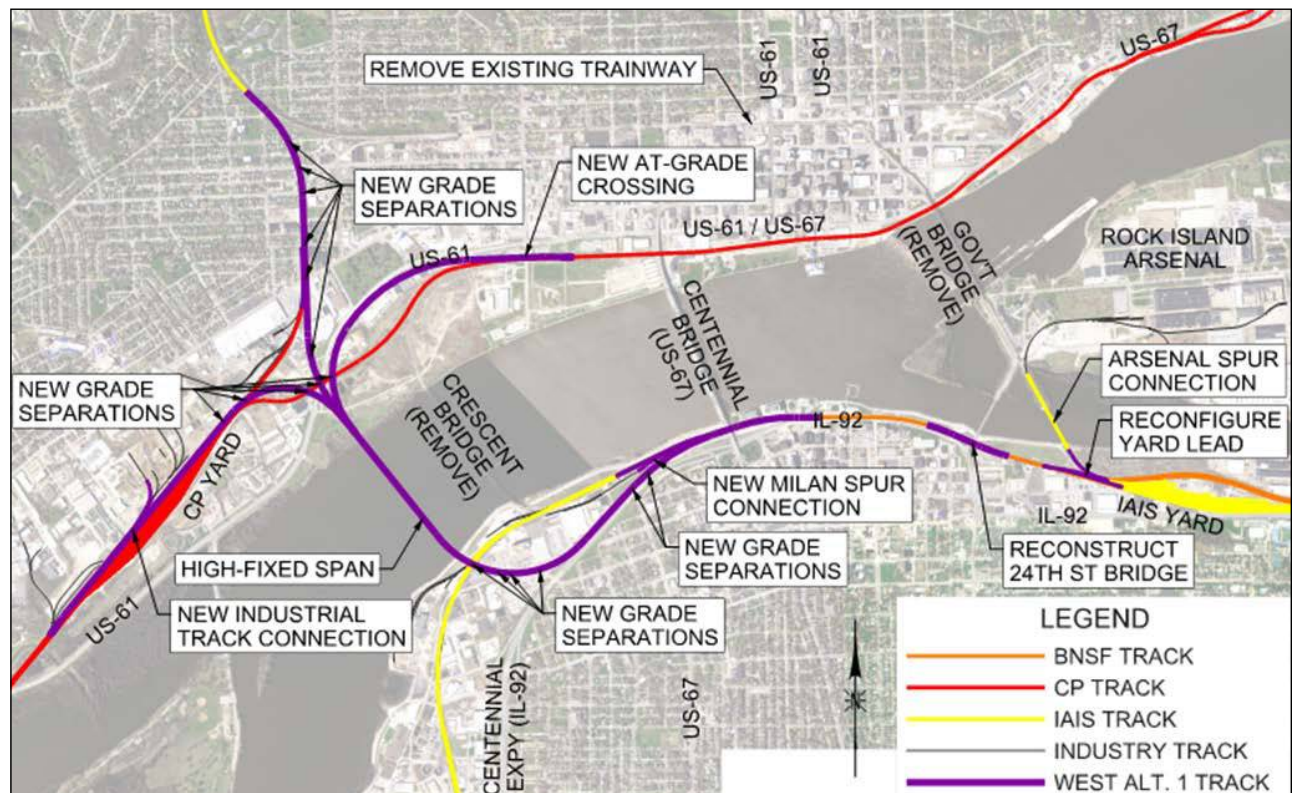
developed area on the way to a connection with the existing IAIS corridor. The terrain on the lowa side of the Mississippi River, with the existing IAIS corridor climbing out of the river valley, combined with the need to grade separate the crossing between the proposed crossing and the existing CP main track, naturally lends itself to pursuing a high-fixed alignment across the river at this location. Several different alignments were considered at a high level within the larger west crossing corridor, but ultimately only a few were developed to the point of conceptual alignments and profiles for further consideration.

### 5.3.4.1 WEST ALTERNATIVE 1

West Alternative 1 attempts to maximize the ability to grade separate the proposed crossing alignment from existing railroad and roadway corridors. The alternative relies on a river crossing location roughly parallel to and 0.25 mile downstream from the existing Crescent Bridge. This provides sufficient distance between the Centennial Bridge underpass and the navigation span to pass under the existing highway bridge and climb high enough for a high-fixed alignment with a reasonable track grade on the proposed river crossing. The potential West Alternative 1 crossing alignment is shown in Figure 12.

The proposed alignment would start at the west end of the existing IAIS Rock Island Yard and roughly follow the existing BNSF Crescent Bridge/IAIS Milan Spur alignment. The west end of the existing IAIS Rock Island Yard would be reconfigured to connect to the proposed crossing alignment rather than following the existing Government Bridge alignment, although the Government Bridge alignment would be maintained as far as the Arsenal spur to maintain rail service to the Rock Island Arsenal. The proposed crossing alignment would realign the existing track under 24th Street to flatten the existing track geometry, improve track speed, and reduce associated maintenance. The existing 24th Street Bridge would have to be replaced as part of any western alternative to improve vertical clearance for the rail corridor so that double-stack container operations can be supported. The proposed corridor would continue to roughly follow the existing track alignment along the Centennial Expressway (Illinois Highway 92) through the highway-rail grade crossing at 18th Street.

Figure 12: West Crossing Alternative 1



Source: HDR



*Existing Missouri Division Junction Interchange Track Looking South from 3rd Street | Source: HDR*

The proposed alignment would diverge from the existing track between the 18th Street and 17th Street crossings and continue along the north side of the existing Crescent Bridge alignment under the existing Centennial Bridge. The track profile would begin to climb west of 17th Street with the proposed track approximately 6 feet higher than the adjacent existing Crescent Bridge approach track by the Centennial Bridge crossing, which should have enough clearance under the existing superstructure to accommodate the raised elevation of the new track. The proposed alignment would then curve back to the southwest across the existing rail tracks to parallel the existing Centennial Expressway alignment. A connection track between the proposed river crossing track and the existing IAIS Milan Spur and industry tracks would be constructed west of the Centennial Bridge. The proposed alignment would be grade separated over 11th Street prior to turning to the northwest and crossing the 7th Street and 3rd Street corridors as well as the IAIS Milan Spur via grade separation and crossing the Mississippi River.

On the Iowa side of the Mississippi River, the proposed alignment would cross the CP main line alignment and the River Drive alignment at the same location, turning north to follow the existing Missouri Division Junction rail corridor and Wilkes Avenue and then turning northwest to connect to the existing IAIS main line alignment. The proposed crossing alignment profile would be elevated from the high-fixed crossing elevation and would fall to a low point between the Howell Street and Rockingham Road crossings before climbing again to meet the existing IAIS main line profile. The profile would drop from the river crossing to this sag location before climbing again, minimizing structure height along the proposed corridor while still providing sufficient clearance for grade separations between the proposed alignment and all road and rail crossings in Iowa.

A connection to the northbound CP main line would be made off the proposed river crossing alignment just north of the riverbank, curving east and to parallel River Drive to a new connection on the existing CP track east of Marquette Street. The northbound connection track would have a grade-separated crossing of the CP track before falling to an at-grade elevation by the Marquette Street highway-rail grade crossing. The southbound connection to the CP main line would connect to the river crossing alignment slightly further inland than the northbound connection and then turn southwest and follow the existing CP track to a new connection prior to Blackhawk Creek. The presence of several crossings along the southbound connection track necessitates the track remaining high enough to maintain clearance for grade separations of the CP main track, Missouri Division Junction track, and Schmidt Road prior to dropping to the connection with the existing CP track. An existing industrial track connection to a metal recycling plant would have to be relocated to the connection track, as sufficient clearance would not be available under the proposed southbound connection.

In addition to the metal recycling plant spur connection, the existing Missouri Division Junction track would be realigned through Rockingham Road to provide a tail track for serving the existing Purina plant, as the proposed river crossing alignment will be at a significantly higher elevation than the existing track.

This alternative would generally be constructed on existing undeveloped land, railroad right-of-way, or public right-of-way in Illinois until the alignment swings towards the river in the vicinity of 7th Street, after which the alignment would cross several industrial property parking lots. On the Iowa side of the Mississippi River the alignment would impact multiple existing industrial, commercial, and residential properties along the main crossing alignment and northbound and southbound connections to the CP main track. The existing road network on both sides of the river would generally avoid impacts with the alternative as the proposed alignments would be grade separated over the vast majority of crossings.

This alternative would generally maintain rail operations in the Quad Cities as they exist currently. Interchange of rail cars between IAIS and CP would need to be relocated to a new location as the existing Missouri Division Junction tracks would be removed. Opportunities for interchange exist in both the existing IAIS Rock Island Yard and CP Nahant Yard, which would have direct connections to the proposed crossing alignment. The alternative would accommodate the proposed passenger station in Moline that is the planned terminus of the Chicago-to-Moline passenger service, as well as the proposed expansion of that service to Iowa City, Iowa. The alternative would also provide a high-fixed crossing alignment over the river that would avoid schedule delays associated with bridge openings.

The proposed river crossing location presents the potential for multi-modal opportunities as it is located a little less than a mile downstream of the existing Centennial Bridge crossing that does not meet current geometric criteria for a major highway. A shared bridge structure that accommodates highway and railroad traffic (and potentially pedestrian traffic) could connect in the vicinity of River Drive (U.S. Highway 67) on the Iowa side of the Mississippi River and the vicinity of Illinois Highway 92 on the Illinois side of the Mississippi River. While railroad and highway bridges have different loading types and design requirements, a multimodal crossing would provide efficiencies over multiple separate crossings and would also make a potential crossing a more attractive recipient for various federal funding opportunities.

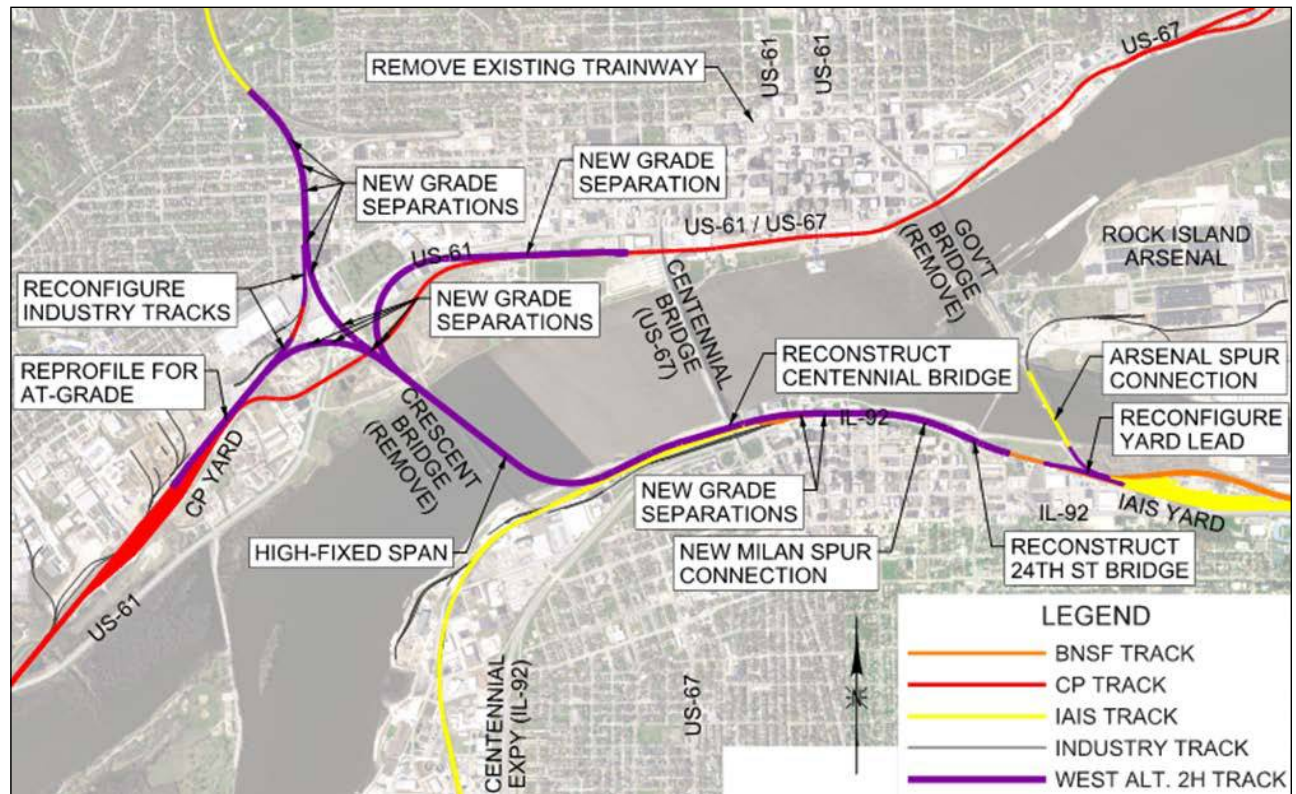
#### 5.3.4.2 WEST ALTERNATIVE 2-HIGH

West Alternative 2-High attempts to replicate the functionality of West Alternative 1 without impacting existing rail operations west of the Centennial Bridge crossing or the industrial area between Centennial Expressway and the Mississippi River. The alternative relies on a river crossing location skewed relative to and roughly in the same location as the existing Crescent Bridge, with the Illinois side upriver and the Iowa side downriver of the existing bridge approaches. This alternative would require that the existing Crescent Bridge be removed from service and all rail traffic be temporarily routed over the Government Bridge during construction. It would also impact the existing Centennial Bridge approach, as in order to gain enough elevation to cross the river with a high-fixed alignment the proposed track profile would not fit under the existing highway bridge. The potential West Alternative 2-High crossing alignment is shown in Figure 13.



IAIS Rock Island Yard with BNSF Interchange | Source: HDR

Figure 13: West Crossing Alternative 2 – High-Fixed



Source: HDR

The proposed alignment would start at the west end of the existing IAIS Rock Island Yard and roughly follow the existing BNSF Crescent Bridge/IAIS Milan Spur alignment. The west end of the existing IAIS Rock Island Yard would be reconfigured to connect to the proposed crossing alignment rather than following the existing Government Bridge alignment, although the Government Bridge alignment would be maintained as far as the Arsenal spur to maintain rail service to the Rock Island Arsenal. The proposed crossing alignment would realign the existing track under 24th Street to flatten the existing track geometry, improve track speed, and reduce associated maintenance. The existing 24th Street Bridge would have to be replaced as part of any western alternative to improve vertical clearance for the rail corridor so that double-stack container operations can be supported. The track profile would also begin to climb at 24th Street to gain enough elevation for a high-fixed river crossing. The proposed alignment would climb enough to provide for grade separated crossings of 17th Street and 18th Street. To maintain a connection to existing rail infrastructure west of 17th Street, a connection track would have to be constructed parallel to the primary river crossing alignment that would remain at grade and connect to existing tracks in the vicinity of 17th Street. At the existing Centennial Bridge the proposed alignment would be roughly 30 to 35 feet above existing ground, placing the proposed track at nearly the same elevation as the highway bridge. This impact would require significant reconstruction or replacement of the Centennial Bridge to make the alternative work. From the Centennial Bridge crossing, the proposed track would extend roughly another half mile along the river before turning to the northwest to cross the river.

On the Iowa side of the Mississippi River the proposed alignment would cross the CP main line alignment in the vicinity of the existing Crescent Bridge southbound wye track and River Drive before turning north to follow the existing Missouri Division Junction rail corridor and Wilkes Avenue, and turning northwest to connect to the existing IAIS main line alignment. The proposed crossing alignment profile would be elevated from the high-fixed crossing elevation and would fall to a low point between the River Road and Rockingham Road highway-rail grade crossings before climbing again to meet the existing IAIS main line profile. The profile would drop from the river crossing to this sag location before climbing again to minimize structure height along the proposed corridor while still providing sufficient clearance for grade separations between the proposed alignment and all road and rail crossings in Iowa.

A connection to the CP main line northbound would be made with a connection off the proposed river crossing alignment just north of the riverbank that would then curve to the east and parallel River Drive to a new connection on the existing CP track east of Marquette Street. The northbound connection track would have a grade-separated crossing of the CP track before falling to an at-grade elevation by the Marquette Street highway-rail grade crossing. The southbound connection to the CP main line would connect to the river crossing alignment slightly further inland than the northbound connection and then turn southwest and follow the existing CP track to a new connection prior to the metal recycling plant industrial rail spur. The existing Missouri Division Junction track would be reconfigured to connect to the southbound connection track west of Schmidt Road and have the east end realigned through Rockingham Road to provide a tail track for serving the existing Purina plant, as the proposed river crossing alignment will be at a significantly higher elevation than the existing track.

This alternative would generally be constructed on existing undeveloped land, railroad right-of-way, or public right-of-way in Illinois. On the Iowa side of the Mississippi River the alignment would impact multiple existing industrial, commercial, and residential properties along the main crossing alignment and northbound and southbound connections to the CP main track. The existing road network on both sides of the river would generally avoid impacts with the alternative as the proposed alignments would be grade separated over the vast majority of crossings. The primary exception to this is the Centennial Bridge alignment, which would be impacted by the proposed track on the Illinois side of the Mississippi River.

This alternative would generally maintain rail operations in the Quad Cities as they exist currently. Rail car interchange between IAIS and CP would have to be relocated to a new location as the existing Missouri Division Junction tracks would be removed, but opportunities for interchange exist in both the existing IAIS Rock Island Yard and CP Nahant Yard, which would have direct connections to the proposed crossing alignment. The alternative would accommodate the proposed passenger station in Moline that is the planned terminus of the Chicago-to-Moline passenger service, as well as the proposed expansion of that service to Iowa City, Iowa. The alternative would also provide a high-fixed crossing alignment over the Mississippi River that would avoid schedule delays associated with bridge openings.

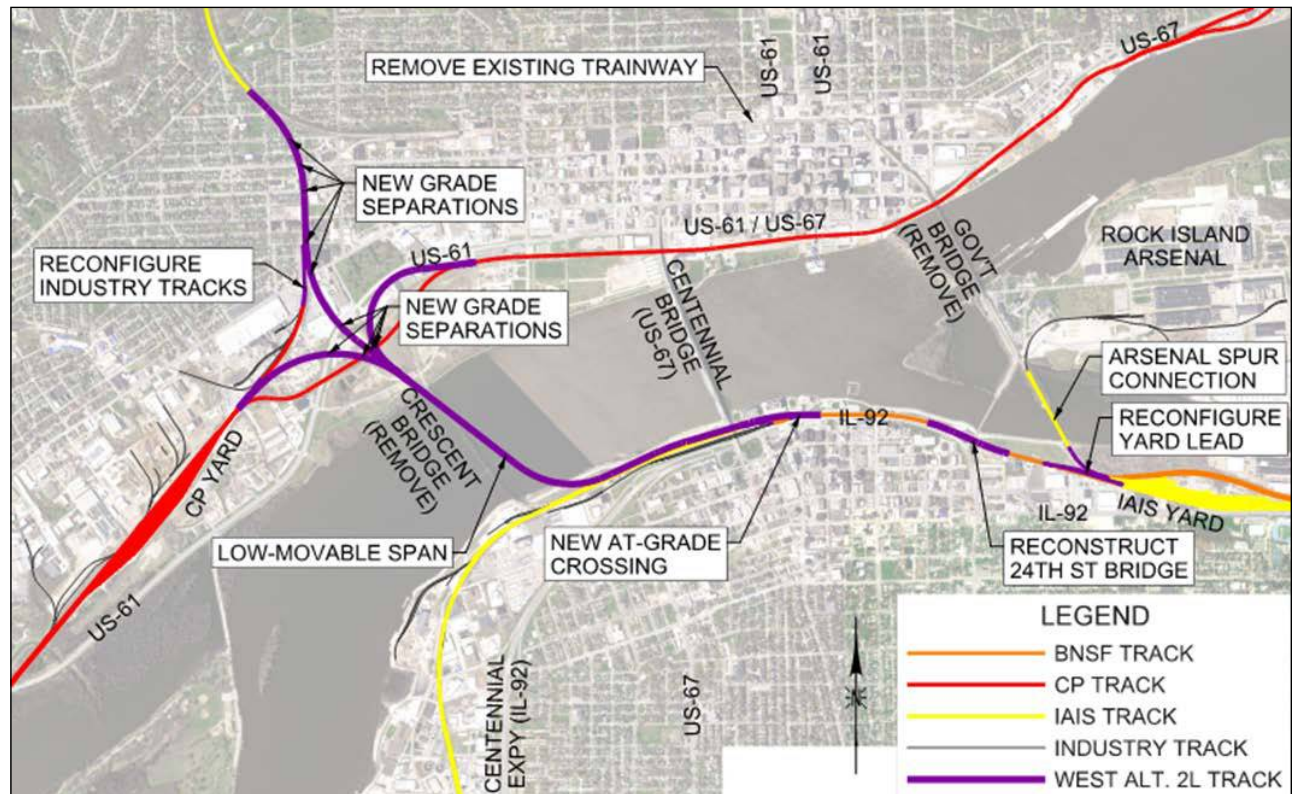
The proposed river crossing location presents the potential for multi-modal opportunities, as it is located near the existing Centennial Bridge crossing that does not meet current geometric criteria for a major highway and would be significantly impacted by the proposed rail alignment. A shared bridge structure that accommodates highway and rail traffic (and potentially pedestrian traffic) could connect in the vicinity of River Drive (U.S. Highway 67) on the Iowa side of the Mississippi River and the vicinity of Illinois Highway 92 on the Illinois side of the Mississippi River. While railroad and highway bridges have different loading types and design requirements, a multimodal crossing would provide efficiencies over multiple separate crossings and would also make a potential crossing a more attractive recipient for various federal funding opportunities.

#### **5.3.4.3 WEST ALTERNATIVE 2-LOW**

West Alternative 2-Low utilizes a similar horizontal alignment to West Alternative 2-High, but with a low-movable crossing of the river. This allows for the track profile to be lowered and eliminates the associated conflict with the Centennial Bridge and the need for an extended connection track to maintain rail access to the existing rail infrastructure west of 17th Street. The alternative relies on a river crossing location skewed relative to and roughly in the same location as the existing Crescent Bridge, with the Illinois side upriver and the Iowa side downriver of the existing bridge approaches. This alternative would require that the existing Crescent Bridge be removed from service and all rail traffic be temporarily routed over the Government Bridge during construction. The potential West Alternative 2-Low crossing alignment is shown in Figure 14.

The proposed alignment would start at the west end of the existing IAIS Rock Island Yard and roughly follow the existing BNSF Crescent Bridge/IAIS Milan Spur alignment. The west end of the existing IAIS Rock Island Yard would be reconfigured to connect to the proposed crossing alignment rather than following the existing Government Bridge alignment, although the Government Bridge alignment would be maintained as far as the Arsenal spur to maintain rail service to the Rock Island Arsenal. The proposed crossing alignment would realign the existing track under 24th Street to flatten the existing track geometry, improve track speed, and reduce associated maintenance. The existing 24th Street Bridge would have to be replaced as part of any western alternative to improve vertical clearance for the rail corridor so that double-stack container operations can be supported. The proposed corridor would continue to roughly follow the existing track alignment along the Centennial Expressway (Illinois Highway 92) through the highway-rail grade crossing at 18th Street.

Figure 14: West Crossing Alternative 2 – Low-Movable



Source: HDR



Wilkes Avenue Looking North from 3rd Street | Source: HDR

The proposed alignment would diverge from the existing track between the 18th Street and 17th Street highway-rail grade crossings, and reconnect with the existing Crescent Bridge alignment under the existing Centennial Bridge to improve the proposed river crossing geometry in comparison to the existing Crescent bridge approach track alignment. The track profile would also begin to climb in the vicinity of the Centennial Bridge crossing, resulting in a significantly lower profile for this alternative. From the Centennial Bridge crossing, the proposed track would extend roughly another half mile along the river before turning to the northwest to cross the river at an elevation roughly 35 feet lower than the high-fixed alternative.

On the Iowa side of the Mississippi River, the proposed alignment would cross the CP main line alignment in the vicinity of the existing Crescent Bridge southbound wye track and River Drive before turning north to follow the existing Missouri Division Junction rail corridor and Wilkes Avenue, and turning northwest to connect to the existing IAIS main line alignment. The proposed crossing alignment profile would climb from the navigation span to provide enough clearance for a grade separation of the existing CP main line track before flattening out to roughly Rockingham Road, at which point the profile would again climb to meet the existing IAIS main line profile. The profile would provide sufficient clearance for grade separations between the proposed alignment and all road and rail crossings in Iowa.

A connection to the southbound CP main line would be made with a connection off the proposed river crossing alignment just north of the riverbank, then curve to the west, cross the CP main line via grade separation, and fall to a proposed connection on the Missouri Division Junction track just to the east of the main line connection. The southbound connection profile would require a 1.8 percent grade to connect to the existing CP track prior to being required to cross over the existing Missouri Division Junction track and adjusting the profile to stay high and allow for grade separations of the proposed track and Schmidt Road crossing. The northbound connection to the CP main line would connect to the railroad river crossing alignment slightly further inland than the southbound connection and then turn north and east to follow the existing CP track to a new connection prior to the Marquette Street highway-rail grade crossing. The northbound connection track would also require a 1.8 percent grade to get over the CP main track and then connect to the existing CP main track prior to the existing Marquette Street highway-rail grade crossing. The existing Missouri Division Junction track would be reconfigured with the east end realigned through Rockingham Road to provide a tail track for serving the existing Purina plant, as the proposed river crossing alignment will be at a significantly higher elevation than the existing track.

This alternative would generally be constructed on existing undeveloped land, railroad right-of-way, or public right-of-way in Illinois. On the Iowa side of the Mississippi River, the alignment would impact multiple existing industrial, commercial, and residential properties along the main crossing alignment and connections to the northbound and southbound CP main track. The existing road network on both sides of the Mississippi River would generally avoid impacts with the alternative, as the proposed alignment would stay low enough to maintain the existing road network on the Illinois side of the Mississippi River and high enough to grade separate crossings on the Iowa side of the Mississippi River.

This alternative would generally maintain rail operations in the Quad Cities as they exist currently. Rail car interchange between IAIS and CP would have to be relocated to a new location as the existing Missouri Division Junction tracks would be removed, but opportunities for interchange exist in both the existing IAIS Rock Island Yard and CP Nahant Yard, which would have direct connections to the proposed crossing alignment. The alternative would accommodate the proposed passenger station in Moline that is the planned terminus of the Chicago-to-Moline passenger service, as well as the proposed expansion of that service to Iowa City, Iowa. The river crossing would continue to be a low-movable crossing in a similar manner to both existing rail crossings. The movable span would likely be a vertical lift span to provide the necessary unobstructed navigation span width to match remaining highway bridge clearances after the Crescent Bridge alignment is removed.

The river crossing location presents the potential for multi-modal opportunities as it is located near the existing Centennial Bridge crossing that does not meet current geometric criteria for a major highway and would be significantly impacted by the proposed rail alignment. A shared bridge structure that accommodates highway and rail traffic (and potentially pedestrian traffic) could connect in the vicinity of River Drive (U.S. Highway 67) on the Iowa side of the Mississippi River and the vicinity of Illinois Highway 92 on the Illinois side of the Mississippi River. A roadway alignment could either be constructed to have a movable span in a similar fashion to the rail crossing, or could utilize a different profile that would allow for a high-fixed roadway crossing at this location, as highway grades can be significantly higher than railroad grades while continuing to support the associated traffic type. While railroad and highway bridges have different loading types and design requirements, a multimodal crossing would provide efficiencies over multiple separate crossings and would also make a potential crossing a more attractive recipient for various federal funding opportunities.

#### 5.3.4.4 OTHER WEST ALTERNATIVES

In addition to the west corridor alternatives previously detailed, several other alternatives were briefly considered, but ultimately removed from further consideration due to various constraints and/or operating concerns.

On the Iowa side of the Mississippi River, consideration was given to utilizing the Howell Street right-of-way a block to the west of the existing Wilkes Avenue/Missouri Division Junction rail corridor. Depending on the exact river crossing alignment, utilizing the Howell Street alignment would have allowed the potential rail corridor to avoid impacts to industries between River Drive and Rockingham Road. This would come at the expense of locating the proposed alignment in a corridor without existing rail traffic and significantly closer to existing schools near the north end of the proposed corridor. The alignment would have curved over the top of an existing middle school schoolyard. Ultimately, with the concurrence of project stakeholders the determination was made that it was preferable to follow existing rail corridors through the residential neighborhood as much as possible and to minimize impacts to neighborhood schools.

Consideration was also given to development of an option that utilized a single main line connection off the primary crossing alignment on the Iowa side of the Mississippi River that would then split again to provide access to northbound and southbound CP main line tracks. This option would reduce maintenance and operational impacts along the main crossing alignment, but was ultimately rejected as not being geometrically feasible. In order to provide a single main line connection, the connection in the direction of the turnout would remain much the same as in other alternatives, but the opposite connection would have to cross under the main line river crossing alignment to turn and go the opposite direction. In order to provide enough elevation change between the main line route and the connection track that would cross under the main line, the connection track would have to be in excess of 0.5 mile long prior to the crossing and there is not enough room to provide that much length without significant impacts to surrounding properties.

A potential crossing alignment that would line up with Sturdevant Street on the east side of the Davenport City Cemetery was also investigated. This alignment would have avoided impacts to some of the larger industries between River Drive and Rockingham Road, but would have still impacted other smaller industries as well as significantly more residential properties, as it cut diagonally through the neighborhood from roughly the intersection of Sturdevant Street and Rockingham Road to the intersection of 6th Street and Howell Street prior to connecting with the existing IAIS alignment. The alignment would have also been located much closer to the existing Centennial Bridge, and a high-fixed corridor would have impacted the roadway approaches to Centennial Bridge on both sides of the Mississippi River. Due to the large volume of impacts to various property types, as well as existing roadway infrastructure, this alternative was removed from further consideration.

In addition to a high-fixed profile for West Alternative 1, a low-moveable profile was also briefly considered. The impacts to the existing roadway and rail network associated with a low-movable profile on this alignment eliminated it from further consideration as it would have significantly more impacts to existing infrastructure, with a longer alignment than other comparable alternatives.



*Existing Schoolyard between 5th and 6th along Howell Street | Source: HDR*



*Sylvan Slough from Existing Railroad Bridge | Source: HDR*

## 6.0 Environmental Considerations

Potential environmental constraints in the project area were identified through a desktop analysis with publicly available electronic and hard copy information on hazardous materials, wetlands, floodplains, levees, and historic properties. The identified environmental constraints are shown on Figure 15 and include:

- Historic Resources: NHS National Register of Historic Places (NRHP)
- Wetlands: USGS National Wetland Inventory (NWI) Dataset
- Flood Zones and Levees: FEMA National Flood Hazard Layer (NFHL)

Due to the number of listed sites in Iowa and the lack of readily available digital mapping of sites in Illinois, hazardous materials are not depicted on Figure 15.

### 6.1 Hazardous Materials

Based on the number of known sites in Iowa, and the urban environment, it can be assumed that hazardous material sites are present in the vicinity of all three alternatives on both sides of the river. The Central Alternatives cross over, or are adjacent to, the Rock Island Arsenal, which is an active military base.

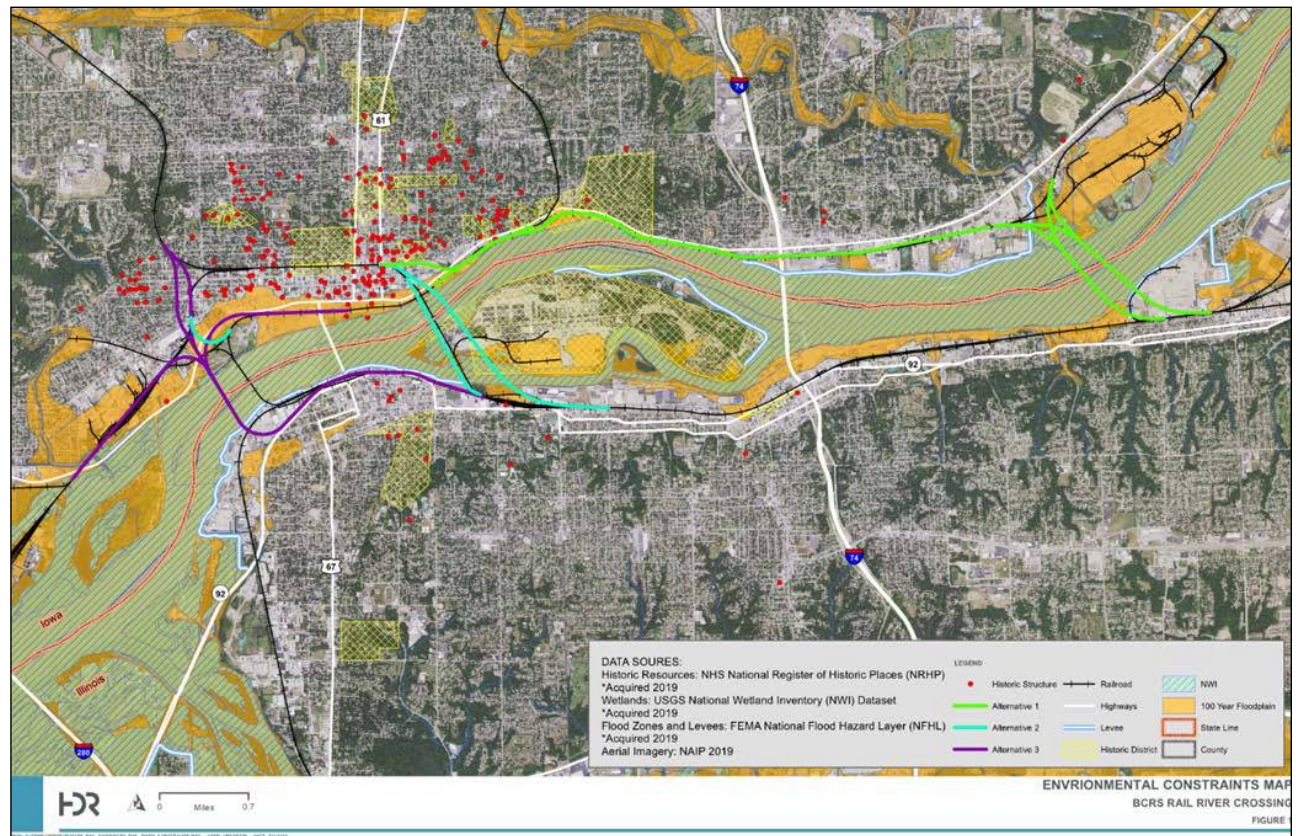
### 6.2 Historic Properties

Various historic properties and districts are present near each alternative. The East and Central Alternatives cross through historic districts. The west end of the East Alternative CP parallel track would cross through the Davenport Village and McClellan Heights Historic District at-grade. The Central Alternatives would cross over or would be adjacent to the Rock Island Arsenal.



*Historic Rock Island Arsenal Clock Tower | Source: HDR*

Figure 15: Environmental Constraints



Source: HDR

### 6.3 Floodplain and Levees

All alternatives would be located partly within Zone A floodplains. The East Alternative would encounter more floodplain acreage than other alternatives as it parallels the north bank of the Mississippi River. Each alternative would encounter existing levees. The East and Central Alternatives may impact a levee where the crossings are proposed to touch down. The West Alternatives would cross over a levee, but are not likely to impact it. All alternatives would likely need Section 408 permissions due to structure placement in the levee encroachment zones.

### 6.4 Wetlands and Waters of the U.S.

Wetlands are predominantly located adjacent to the Mississippi River and impacts are anticipated for all alternatives. Additionally, each alternative crosses over the Mississippi River, a navigable river, and will require additional coordination with the USCG and USACE.

Potential environmental constraints in the project area were identified through a desktop analysis with publicly available electronic and hard copy information on hazardous materials, wetlands, floodplains, levees, and historic properties. The identified environmental constraints are shown on Figure 15 and include:

- **Historic Resources:** NHS National Register of Historic Places (NRHP)
- **Wetlands:** USGS National Wetland Inventory (NWI) Dataset
- **Flood Zones and Levees:** FEMA National Flood Hazard Layer (NFHL)

Due to the number of listed sites in Iowa and the lack of readily available digital mapping of sites in Illinois, hazardous materials are not depicted on Figure 15.



*Western Avenue Crossing in Davenport | Source: HDR*

## 7.0 Highway Traffic Considerations

### 7.1 East Alternatives

This alternative makes use of existing highway-rail grade and grade separated crossings through Bettendorf and the eastern part of Davenport. The main vehicular traffic impact of this alternative would be a new highway-rail grade crossing along 12th Avenue in East Moline. The most recent Average Annual Daily Traffic (AADT) count along the impacted section is 7,450. Although lower in AADT, a significant impact to a neighborhood in Riverdale along Wisteria Lane and Kensington Street would occur as the new track would displace several houses. Additional impacts to traffic would occur in Bettendorf between East River Drive and the Mississippi River. The volumes along these roads range from a 2018 AADT of 140 to just over 2,180. Highway-rail grade crossings already exist at these locations, but the crossings would be improved to include a new track.

### 7.2 Central Alternatives

The majority of crossings for these alternatives are grade-separated, limiting the impact to traffic flow, particularly at the eastern end of Downtown Davenport and into east Rock Island. These alternatives utilize the existing Davenport trainway along the IAIS alignment from the end of the Government Bridge to the Western Avenue highway-rail grade separation. The various roadways that pass underneath the existing trainway have restricted vertical clearances ranging from 10'-0" to 13'-11" depending on the crossing. These alternatives would include the option to raise the existing trainway track and associated bridge elevations to improve or eliminate vertical clearance restrictions, however this would necessitate two potential closures: one at the current low-clearance bridge at Ripley Street and one to the current highway-rail grade crossing at Western Avenue.

The required connection between the Missouri Division Junction track and the CP main line northbound would require highway-rail grade crossings to Rockingham Road and West River Drive between Howell Street and Division Street. The 2018 Average Annual Daily Traffic (AADT) counts at these locations were 7,800 on Rockingham Road and 9,900 on West River Drive. Limited grade-separated alternative routes exist for traffic moving East-West to cross railroad tracks in this part of Davenport. As a result, this alternative would add vehicular traffic delay at times when a train is crossing.



*Existing Government Bridge | Source: HDR*

### 7.3 West Alternatives

Generally, from a traffic volume standpoint the west alternatives have the potential for impacts to lower volume roads. They would require the closure of Wilkes Avenue between Rockingham Road and about 5th Street in Davenport. The road does not carry significant traffic volume (about 200 AADT). Alternatives that considered utilizing the Howell Street (ranges from 200 to 675 AADT) corridor would have impacted a continuous north-south street that provides unique neighborhood connectivity, as it is the only through street for several blocks between west 2nd Street and Rockingham Road. This closure would run adjacent to Monroe Elementary and Smart Intermediate schools, which today likely provides access to many students and families.

Most of the alternative would be grade-separated in Illinois. This alternative could impact a potential future road project: the Illinois Highway 92 / Centennial Expressway relocation with the proposed 11th Street interchange in Rock Island. This project is shown as an illustrative project in the BSRC's Long Range Transportation Plan.



*Existing Davenport Trainway between Ripley Street and Western Avenue | Source: HDR*



*Howell Avenue Looking South from 6th Street | Source: HDR*



*Missouri Division Junction Interchange Track | Source: HDR*

## 7.4 Government Bridge Roadway Access

The existing Government Bridge carries railroad traffic on an upper deck and roadway traffic on a lower deck. The roadway connects to the intersection of LeClaire Street and 2nd Street in Davenport on the Iowa side of the Mississippi River and to Fort Armstrong Avenue along the west shore of Arsenal Island before connecting to the 24th Street Bridge to access the Illinois side of the Mississippi River. Under all of the alternatives considered as part of this study, with the exception of the Central Offset Alternative, the roadway function of the Government Bridge could remain even if the railroad crossing were to be removed from the bridge. There is a conflict between the alignment of the Central Offset Alternative and the movable swing span of the existing Government Bridge in the open position that would prevent the Government Bridge from remaining in operation upon implementation of the Central Offset Alternative and would require removal of the existing swing span to eliminate the conflict and still permit river navigation.



*Arsenal Island Roadway Approach to Government Bridge River Crossing | Source: HDR*

The existing Government Bridge roadway deck restricts the ability of the CP to raise its existing Davenport Subdivision main track under the bridge crossing. The existing CP main track profile dips down under the existing Government Bridge to provide adequate vertical clearance for unrestricted rail operations, creating a sump where the railroad is lower than the riverfront trail and River Drive on either side of the railroad alignment. This low spot is a constraint for CP as it requires stormwater to be pumped out of the depression, and can be especially problematic during flood events. Raising the existing bridge, or removing it entirely, would allow CP to raise the portion of their mainline currently in a depression to match the elevation of the track on either side and eliminate the issues associated with the current track profile.

The Rock Island Arsenal utilizes the Government Bridge as a means of access to and from the installation. As the bridge is owned by the Arsenal, any plans to modify or remove the bridge would be subject to review and approval by the Arsenal. While two means of vehicular access would remain to Arsenal Island without the Government Bridge, via 24th Street at the west end of the island and Rodman Avenue at the east end of the island, the Government Bridge is the only direct access from Arsenal Island to the Iowa side of the Mississippi River. The direct access to Iowa could be replaced via a multi-modal bridge under either the Central Offset Alternative or the Central Alternative, but other alternatives would not provide a direct connection should roadway access via the Government Bridge be removed.

Maintaining roadway access via the Government Bridge route while eliminating the vertical clearance conflict for the CP main line is challenging. For alternatives where rail traffic is removed from the existing Government Bridge the rail deck could be removed and the roadway level raised within the existing bridge spans, which would have the added benefit of eliminating the 11-foot clearance restriction from the existing roadway over the bridge. Simply raising the roadway elevation within the existing through trusses, however, would not actually raise the clearance over the existing CP corridor, as the low chord of the truss would continue to restrict clearance regardless of roadway elevation within the truss. Raising the low chord of the bridge over the CP corridor is also challenging as it would require the last main river span to be significantly raised or replaced to provide adequate clearance over the railroad. Raising the roadway bridge elevation would also impact the existing connection to the intersection of LeClaire Street and 2nd Street. The existing Government Bridge is listed on the National Register of Historic Places, and any modifications would also require coordination with the State Historic Preservations Officers (SHPO) of Iowa and Illinois.

Despite the challenges, any alternatives chosen for further study should also examine the potential for raising or removing the Government Bridge crossing over the CP corridor to eliminate the existing depression in the track profile. This would eliminate a potential bottleneck and increase reliability of railroad operations within the Quad Cities regional rail network.



*Existing Crescent Bridge | Source: HDR*

## 8.0 Alternatives Analysis Summary

Table 1 summarizes the findings of the Alternatives Analysis Study detailed in this report.

Table 1: Alternatives Analysis Summary

EVALUATION CRITERIA	NO BUILD ALTERNATIVES				BUILD ALTERNATIVES					
	EXISTING	NO-BUILD – ONE BRIDGE			EAST	CENTRAL		WEST		
	NO BUILD	NO BUILD - GOVERNMENT BRIDGE ONLY	NO BUILD - CRESCENT ONLY 1	NO BUILD - CRESCENT ONLY 2	EAST ALIGNMENT	OFFSET ALIGNMENT	CENTRAL ALIGNMENT	WEST ALTERNATIVE 1	WEST ALTERNATIVE 2 - HIGH	WEST ALTERNATIVE 2 - LOW
<b>Meets Project Purpose and Need:</b>										
- Maintain access to national rail network	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Improve freight network reliability	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
- Improve freight network capacity	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
- Provide competitive rail network	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
- Support passenger rail service	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
<b>Maintains Rail Network Operational Fluidity</b>	Potential Bottleneck	No	No	No	No	Yes	Yes	Yes	Yes	Yes
<b>Limits Height of Freight Cars (Double Stack)</b>	No	No	Yes, without 24th Street modification	Yes, without 24th Street modification	No	No	No	Yes, without 24th Street modification	Yes, without 24th Street modification	Yes, without 24th Street modification
<b>Limits Weight of Loaded Freight Cars (286K)</b>	Yes	Yes	Yes	Yes	No	No	No	No	No	No
<b>Maximum Main Track Grade</b>	N/A	N/A	1.20%	1.30%	1.00%	0.75%	0.80%	1.05%	1.00%	1.00%
<b>Maximum Connection Track Grade</b>	N/A	1.20%	N/A	N/A	1.10%	N/A	N/A	1.00%	1.00%	1.80%
<b>New Track Required</b>	N/A	0.5 Mile Connection	1.0 Mile Connection	1.0 Mile Connection	3.9 Miles Main Track;	1.1 Miles Main Track;	2.3 Miles Main Track;	3.0 Miles Main Track;	2.9 Miles Main Track;	2.6 Miles Main Track;
				0.2 Mile Wye Track	4.3 Miles 2nd Main Track;	0.5 Mile Connection	0.5 Mile Connection;	2.3 Miles Connections;	1.9 Miles Connections;	1.1 Miles Connections;
							0.9 Mile Yard Track	1.5 Miles Yard Track	1.6 Miles Yard Track	1.1 Miles Yard Track
<b>Estimated Capital Costs (\$ Millions)</b>	N/A	\$42.1	\$36.8	\$45.0	\$428.6	\$210.2	\$233.9	\$376.0	\$359.0	\$306.4
<b>Environmental Impacts</b>	N/A	Low	Low	Low	High	High	High	Medium	Medium	Medium
<b>Industrial/Commercial Property Impacts</b>	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Residential Property Impacts</b>	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
<b>Historical and Cultural Impacts</b>	No	No	No	No	Yes	Yes	Yes	No	No	No
<b>New Railroad Agreements Required</b>	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Right-of-Way Acquisition Required</b>	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Bridge Type</b>	Low-Movable x2	Low-Movable	Low-Movable	Low-Movable	High-Fixed	Low-Movable	High-Fixed	High-Fixed	High-Fixed	Low-Movable
<b>Navigational Impacts</b>	Yes	Yes	Yes	Yes	No	Yes	No	No	No	Yes
<b>Existing Roadway Network Impacts</b>	None	Low	Medium	Medium	High	Low	Low	Medium	Medium	Medium
<b>Potential for Multimodal Use of Bridge</b>	Existing	Existing	No	No	Yes	Yes	Yes	Yes	Yes	Yes
<b>Allows for Expansion of Passenger Rail Service West of Moline, IL</b>	Yes	Yes	Yes	Yes	Not without bypassing Moline	Yes	Yes	Yes	Yes	Yes
<b>Alternative Rank</b> Low = less preferred High = more preferred	Low	Low	Low	Low	Low	High	Medium	High	High	Medium



*IAIS Local Train Entering Rock Island Yard after Crossing Government Bridge | Source: HDR*

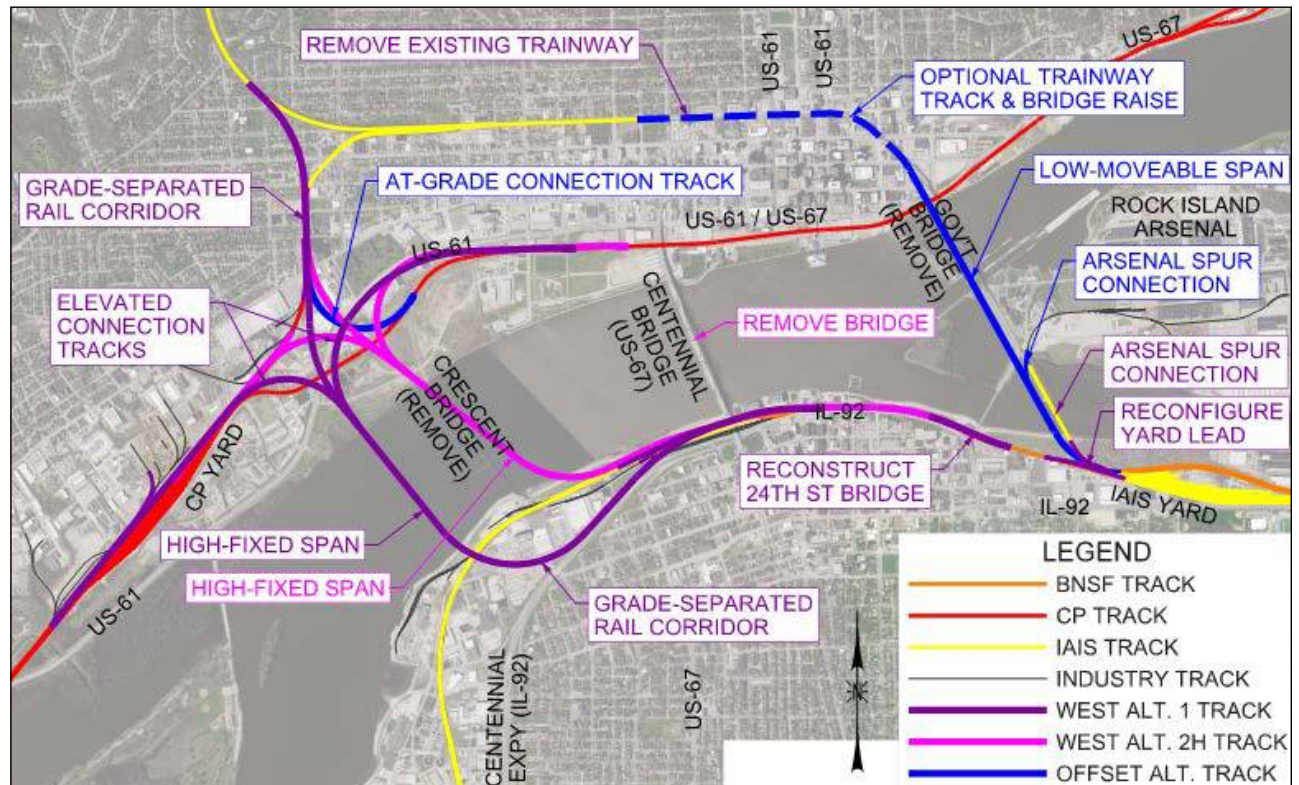
## 9.0 Recommendations

This Study reviewed various conceptual alternatives to maintain future rail access across the Mississippi River in the Quad Cities region. Based on the analysis and stakeholder input received during the Study, the need for a new river crossing to support rail traffic has been confirmed. Conceptual alternatives that continue to utilize one or both of the existing Mississippi River railroad crossings rely on structures that are over 100 years old and do not support unrestricted rail movements. Any rehabilitation project substantial enough to significantly extend the projected life of either structure would likely require significant component replacement and strengthening, after which the structure would still not meet current industry design guidance and construction practice. Any effort to replace the existing Mississippi River railroad crossings would require close coordination among multiple parties and a significant funding commitment.

As is typical for large-scale infrastructure projects, any new Mississippi River crossing will likely require significant public funding. Public funding opportunities would potentially be more available to a multi-modal crossing based upon current criteria and guidance. Given the desire for additional highway river crossings in the region that meet current design standards, the addition of a multimodal component to the project is an attractive way to increase the likelihood of public funding assistance and provide additional crossing and mobility opportunities in the region for vehicular and pedestrian traffic. Any project to develop a new Mississippi River crossing should also consider the potential for public-private partnerships and the possibility of any funding from multiple public and private stakeholders.

Based on the constraints associated with the potential crossing locations, existing development, known railroad operations, and cost efficiency, there are three conceptual build alternatives that rank significantly higher than other potential crossing alternatives. West Alternative 1 is the recommended alternative for a new railroad, and potentially multimodal, Mississippi River crossing without replacement of the existing Centennial Bridge. West Alternative 2-High is the recommended alternative for a new multimodal crossing that would also replace the Centennial Bridge roadway crossing. The Central Offset Alternative is the alternative recommended if insufficient funding is available for one of the primary recommended alternatives. The recommended alternatives are depicted in Figure 16 and described in more detail in the following subsections.

Figure 16: Recommended Alternatives



Source: HDR

## 9.1 West Alternative 1

West Alternative 1 is the recommended alternative for a new railroad river crossing that would not impact the existing Centennial Bridge river crossing. This alternative would provide for a high-fixed crossing alignment that would eliminate the existing conflict between rail operations and river navigation while continuing to support current railroad operational patterns in the Quad Cities. Rail operations would be removed from the existing Davenport trainway. The trainway could be removed or re-purposed, allowing for the elimination of several overhead railroad bridges with deficient vertical clearance for the roadways below, and the longstanding issue of vehicular bridge strikes. The proposed track profile would allow for grade separations of the existing roadway and railroad network, greatly enhancing safety and reducing the impacts that the alternative would have on traffic. This alternative would also allow for the proposed extension of the planned Chicago-to-Moline passenger service to Iowa City. As conceived, the alternative would support 40-mph rail operation, a significant improvement from the 10-mph speed restrictions on the existing railroad river crossings. The alternative would reduce adjacent highway-rail grade crossing delays, as rail traffic would be able to clear the crossings more quickly.

## 9.2 West Alternative 2-High

West Alternative 2 is the recommended alternative for a new multimodal river crossing with a roadway component that would replace the existing Centennial Bridge river crossing. Similarly to West Alternative 1, this alternative would provide a high-fixed crossing to eliminate the conflict between rail operations and river navigation. It would also remove rail operations from the existing Davenport trainway and provide for grade separations of roadway crossings along the proposed rail alignment. The alternative would support the proposed extension of the planned Chicago-to-Moline passenger service to Iowa City. The primary advantages of this alternative over West Alternative 1 are that it utilizes a shorter alignment with an associated reduced construction cost and that it does not impact existing IAIS and BNSF railroad operations or the industrial area west of the existing Centennial Bridge. The trade-off for the reduced impacts west of the existing Centennial Bridge is the impact



*CP Local Train in IAIS Rock Island Yard | Source: HDR*

to the Centennial Bridge. Replacement of the existing Centennial Bridge has been discussed at various levels due to existing deficiencies with the roadway typical section across the bridge. If replacement of the Centennial Bridge is considered in conjunction with construction of a multi-modal bridge in the vicinity then West Alternative 2-High becomes an attractive alternative when compared with West Alternative 1 due to its reduced impacts and construction cost.

### **9.3 Central Offset Alternative**

The Central Offset Alternative is another recommended conceptual alternative for a new railroad-river crossing. This alternative does not allow for a high-fixed crossing alignment and would require that rail traffic continue to operate on the Davenport trainway, but the reduced track and embankment construction would also reduce the associated construction cost and would be a viable alternative should insufficient funding be available for the West Alternative 1 crossing. The offset alternative would also support the proposed continuation of passenger rail service from Moline west to Iowa City. As conceived, the alternative would support 30-mph rail operation as existing curvature on the Davenport trainway prevents higher track speeds. Depending on funding availability, the central offset alignment can utilize track grade and structures on the Davenport trainway west of Iowa Street, or the planned track profile could be raised to allow existing bridge clearances to be improved along the trainway.



*Harrison Street (U.S. Highway 61) Bridge on Davenport Trainway | Source: HDR*

## 10.0 Potential Next Steps

The potential next steps outlined below suggest an approach for advancing any additional activities that may be pursued by stakeholders in the future, as related to the study and development of new or enhanced Mississippi River rail and multimodal crossings in the Quad Cities Region. Ongoing coordination is critical and will be required with the railroads; applicable federal, state, and local agencies; and the public through the process to confirm and fully develop one or more recommended alternative(s). Specific details about the potential process outlined below are subject to ongoing project stakeholder requirements, coordination, and approval.

### 10.1 Develop Consensus

BSRC, Iowa DOT, Illinois DOT, IAIS, BNSF, CP, and other public and private stakeholders should come to a consensus on recommendations for the potential development of new or enhanced Mississippi River crossing(s), as informed by this study and other applicable studies in the region, related stakeholder outreach, and a general understanding of the current and potential future transportation needs of the Bi-State Region within the context of future transportation planning and community and economic development for the region.

### 10.2 Confirm Lead Agency

Any future efforts to develop new or enhanced Mississippi River crossing(s) would be the responsibility of a lead public agency. This agency would be responsible for providing leadership, maintaining preliminary coordination and communication between stakeholders and with the public, working with public and private stakeholders at the state and local level, and the Mississippi River Crossings Study Committee (identified below) to pursue next steps and maintain momentum. The lead agency could potentially be an existing public agency or a new public agency could be created.

### 10.3 Establish a Mississippi River Crossings Study Committee

A Mississippi River Crossings Study Committee could be organized to support the lead agency to coordinate future activities and to galvanize support for the potential development of new or enhanced Mississippi River crossing(s) in the Quad Cities region.

The Committee would include representatives of several local stakeholder agencies, companies, organizations, and jurisdictions in the Quad Cities region. These stakeholders would include BSRC, railroads (including IAIS, BNSF, and CP), regional planning affiliations, municipalities, state agencies (including Iowa DOT and Illinois DOT), county agencies, universities and colleges, chambers of commerce, economic development agencies, major companies and employers, citizens' and advocacy groups, and others. Participation by representatives of these entities would be subject to internal approval within each entity. The committee would coordinate at established regular intervals to maintain momentum, and would support the lead agency on any future activities.

### 10.4 Conduct Additional Study

The Mississippi River Crossings Study Committee, in partnership with a broad array of public and private stakeholders in the region, could conduct additional study necessary to design, permit, and construct new or enhanced Mississippi River crossings in the Quad Cities region. The scope of future activities could include conceptual engineering for infrastructure and facilities; comprehensive capital and operations and maintenance cost estimates; environmental review and related documentation (including following the National Environmental Policy Act [NEPA] process and development of a decision document); railroad and traffic operations analysis and planning; comprehensive public outreach; financial planning; benefit-cost and public benefits and impacts analyses (including environmental justice); federal and state funding availability assessments; maintenance planning; and other efforts. These study components would likely be eligible as supporting documentation for any future federal or state grant applications to secure funding for the construction of new or enhanced Mississippi River crossings. This subsequent study should include additional coordination with IAIS, BNSF, and CP to identify any needs, challenges, constraints, and opportunities for the project(s) from the railroads' perspective, and to confirm the railroads' requirements in terms of current and anticipated future network and facility needs to preserve rail safety, capacity, access, functionality, efficiency, reliability, connectivity, and interoperability in the Quad Cities region. Subsequent study should also inform, and be informed by, and be integrated with other local, county, regional, and state planning initiatives and programs.

### 10.5 Identify Funding and Financing Options

The lead agency, in cooperation with the Mississippi River Crossings Study Committee, would coordinate with federal, state, and local agencies and local private partners to determine the potential for public-private partnerships and funding availability to support development of preferred alternative for new or enhanced Mississippi River crossing(s) in the Quad Cities region. In order for the project to be eligible to receive federal funding, a public agency (which is often the lead agency) may need to be identified or a new agency created to administer and manage the funding. It may be preferable to expand an existing public agency or establish a new public agency or similar mechanism to manage funding, if awarded in the future, and to spearhead design, permitting, and construction of any new or enhanced Mississippi River crossing(s).

### 10.6 Determine Potential Implementation

Phased implementation of a preferred alternative for new or enhanced Mississippi River crossing(s) could be employed to match available funding to design and construct it, state and local priorities, and railroad requirements, and also to bolster state and local support for broader implementation in the Quad Cities region. A first phase of implementation would require diminished infrastructure investment. Subsequent implementation phases could allow for expansion of the full concept for the preferred alternative(s).

### 10.7 Develop a Plan for Implementation

In consideration of the recommendations, established priorities, and the outcomes of ongoing study; preliminary information on funding needs, availability, and eligibility; and the potential for phased implementation, a comprehensive implementation plan should be developed that specifically lists the steps to implement the preferred alternative for new or enhanced Mississippi River crossing(s) in the Quad Cities region. The plan will be developed by the lead agency with support from



*Harrison Street (U.S. Highway 61) Bridge on Davenport Trainway | Source: HDR*

the Mississippi River Crossings Study Committee through the analysis of potential strategies for design, funding, and implementation of the river crossings. The implementation plan should be in concert with other local, county, regional, and state planning initiatives and programs and railroad requirements.

If a Final Decision is granted and approval is received from the federal lead agency, then the project could proceed to final design and construction. Regardless of project funding, permits and approvals will be required from various agencies including, but not limited to, the United States Coast Guard (USCG), the United States Army Corps of Engineers (USACE), the United States Fish and Wildlife Service (USFWS), and the Illinois and Iowa SHPO. Numerous options are available for construction, ranging from traditional design-bid-build to engineer-procure-construct, with each having their own benefits and drawbacks. The actual construction of the proposed railroad line is unlikely to present substantial risks; however, greater project risks are likely associated with environmental clearances and permits, right-of-way acquisition, utility relocation agreements, and commercial agreements.



Former IAIS Bridge 180.6 in Rock Island | Source: HDR

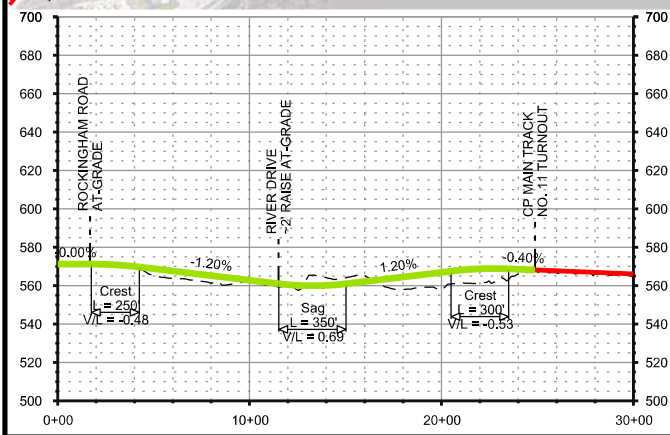
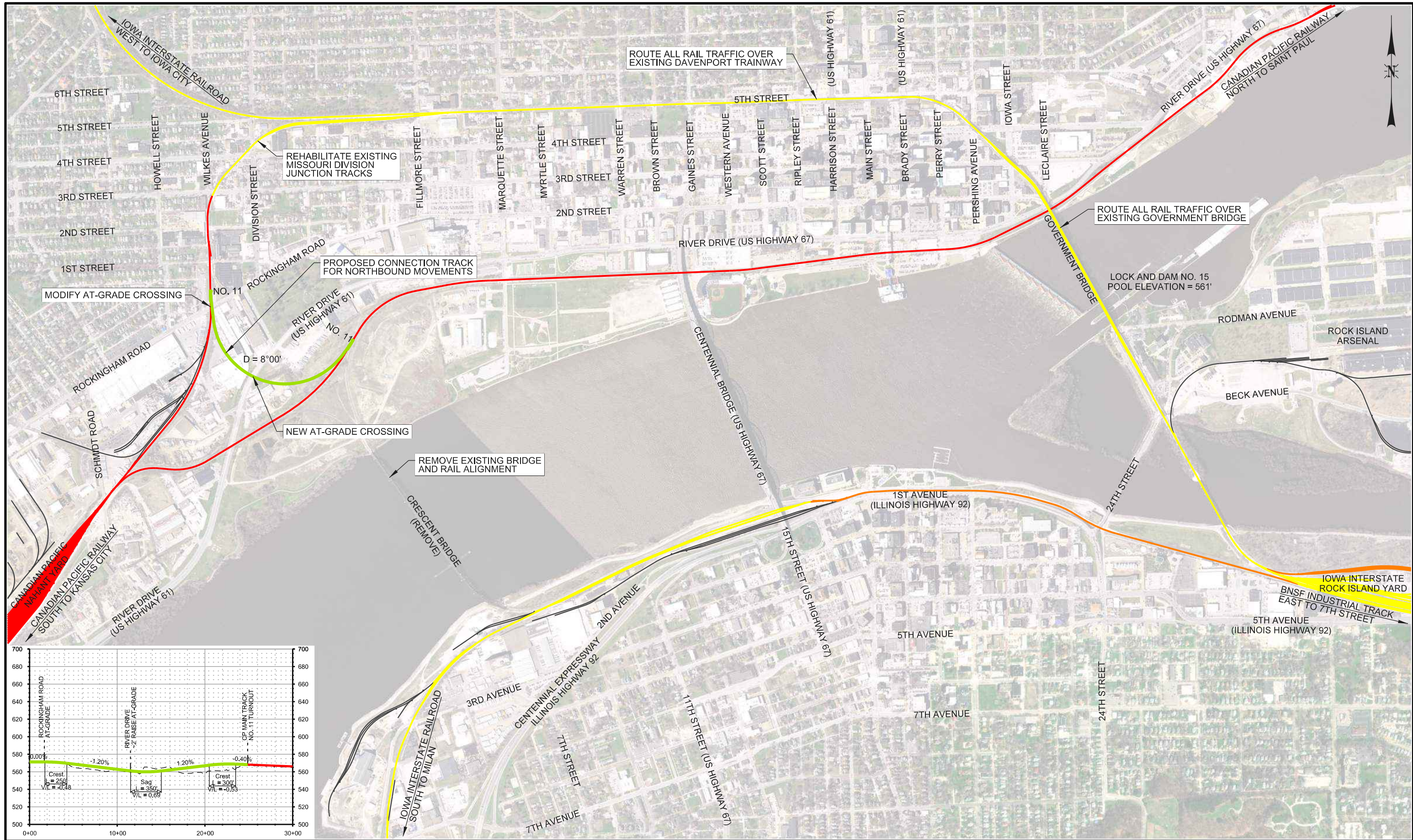
## 11.0 Acknowledgements

HDR would like to thank the project stakeholders that provided input into this study. The Bi-State Regional Commission, Bi-State Regional Commission Freight Forum, and Quad Cities Transportation Policy Committee all provided valuable input during in-person meetings and presentations of the Study at key milestones. The Illinois and Iowa Departments of Transportation have supported the effort and provided input from their respective State Rail Plans and Long-Range Transportation Plans. The Rock Island Arsenal provided an understanding as to the current operations at Lock and Dam 15, including how bottlenecks to river navigation and the freight rail network interface at the Government Bridge Mississippi River crossing. The BNSF Railway, Canadian Pacific Railway, and Iowa Interstate Railroad shared insights into their respective networks and operations in the Quad Cities area and provided valuable feedback on the various alternatives presented in this report. The input received from key stakeholders make this Study a more complete representation of the challenges and opportunities that surround maintaining Mississippi River crossings for rail traffic in the Quad Cities now and into the future, and their time and consideration is much appreciated.



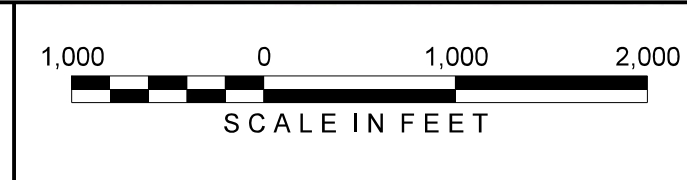
Appendix A  
Conceptual  
Alternative Exhibits





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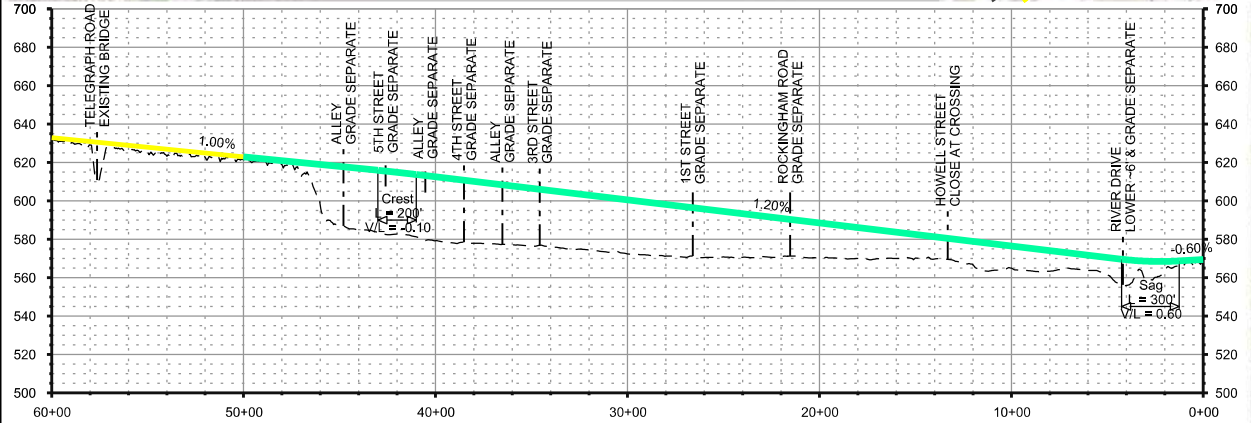
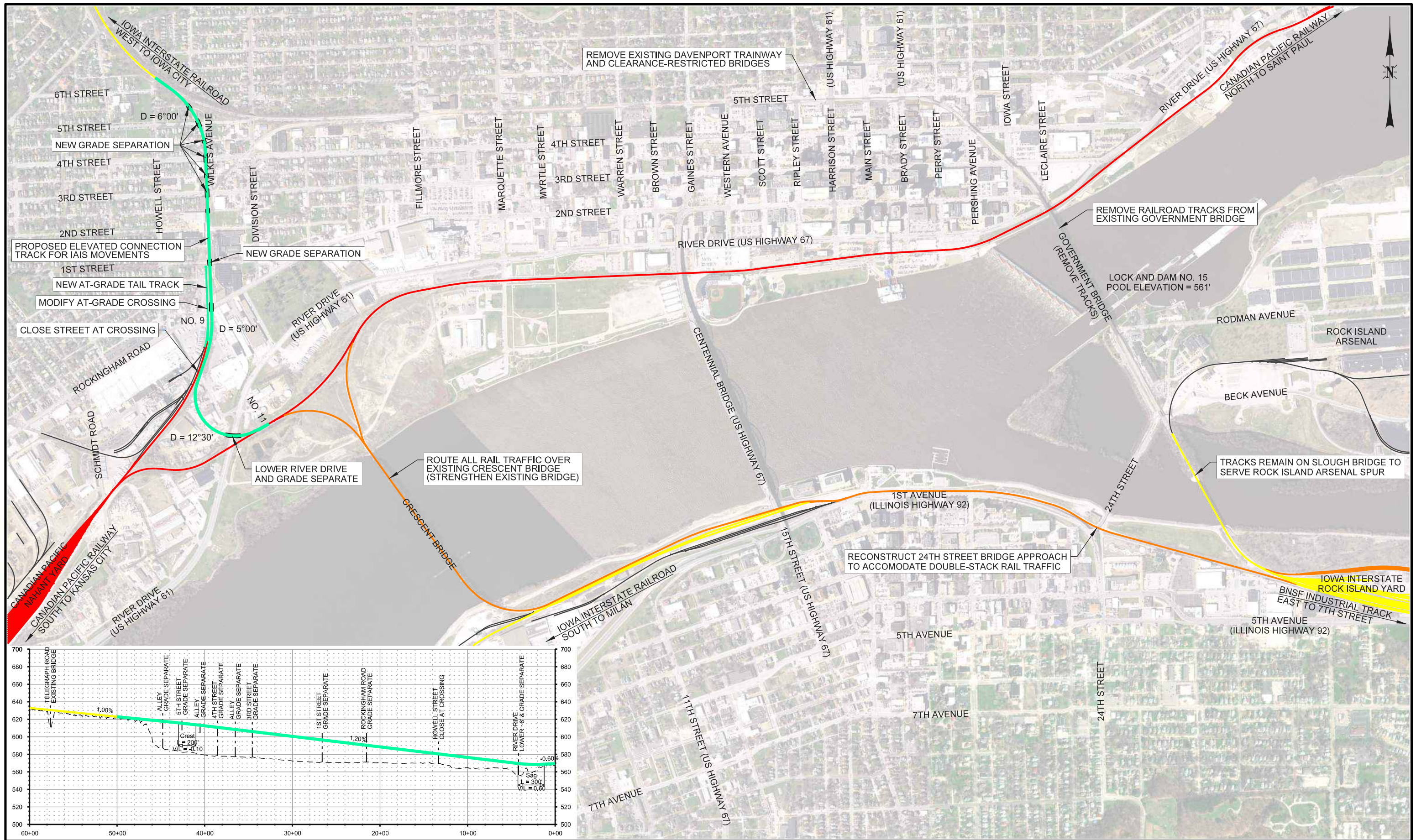
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**- CONCEPTUAL -**  
**NOT FOR CONSTRUCTION**



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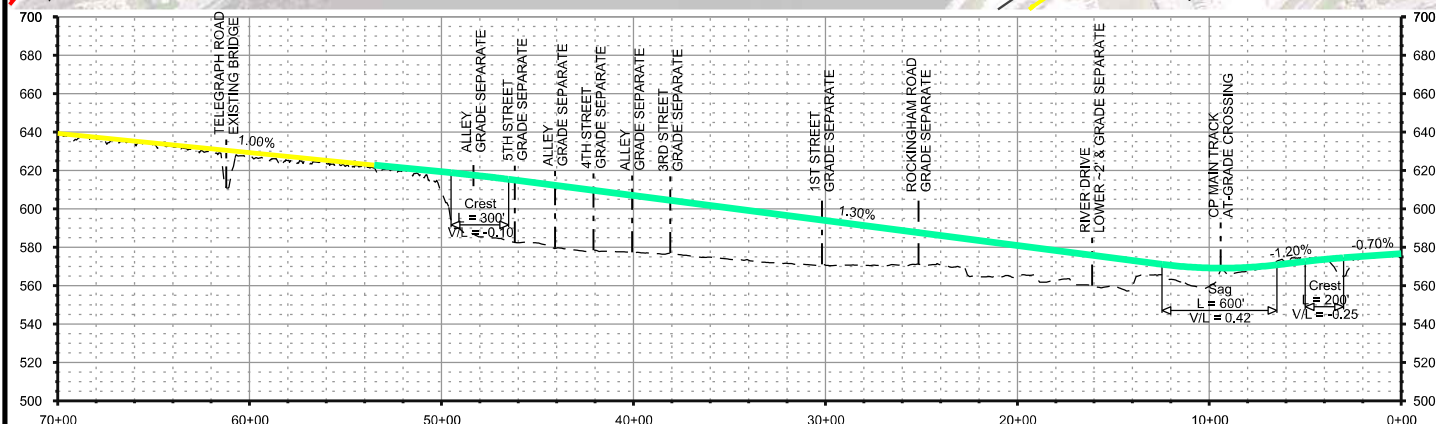
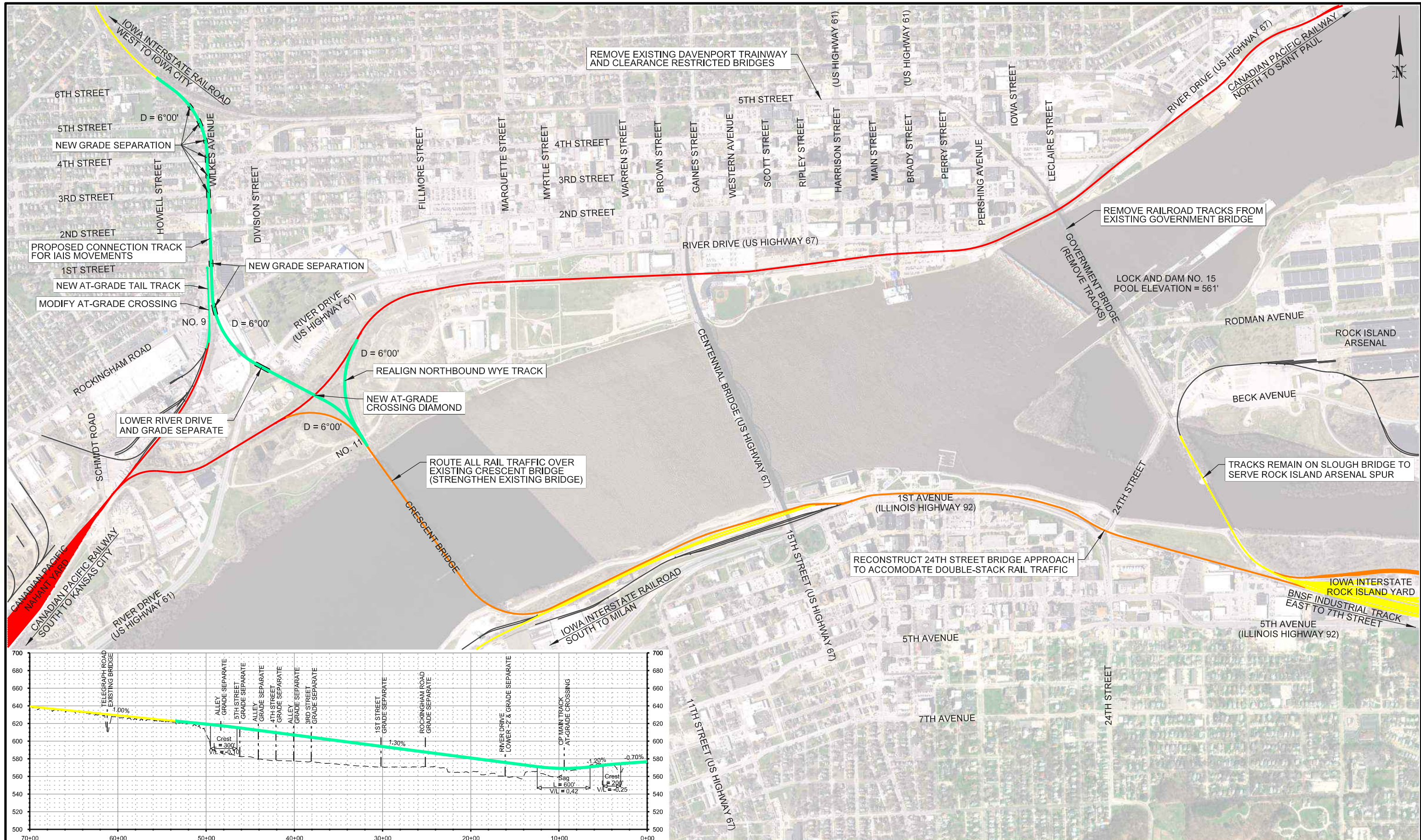
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- CONCEPTUAL -  
NOT FOR CONSTRUCTION



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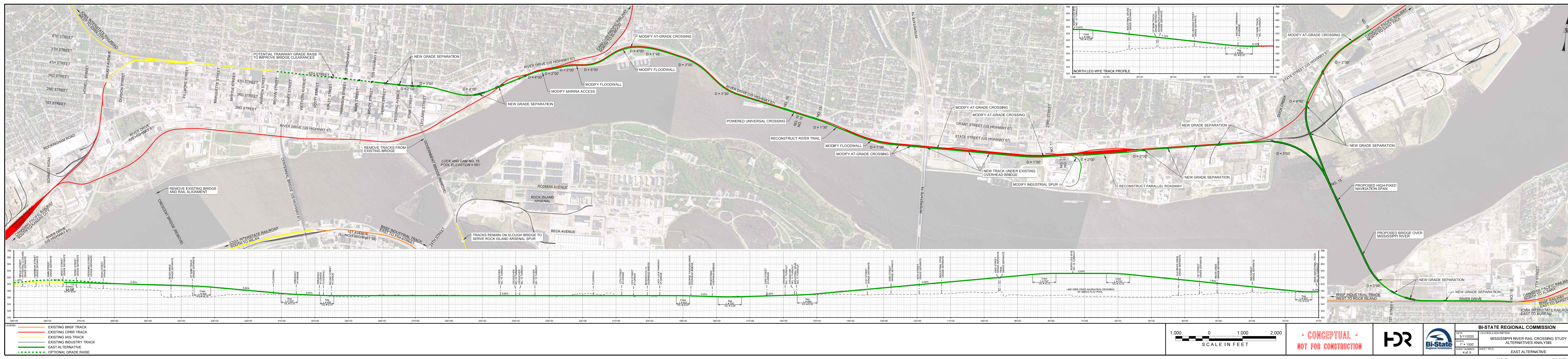
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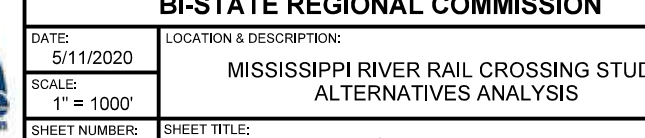
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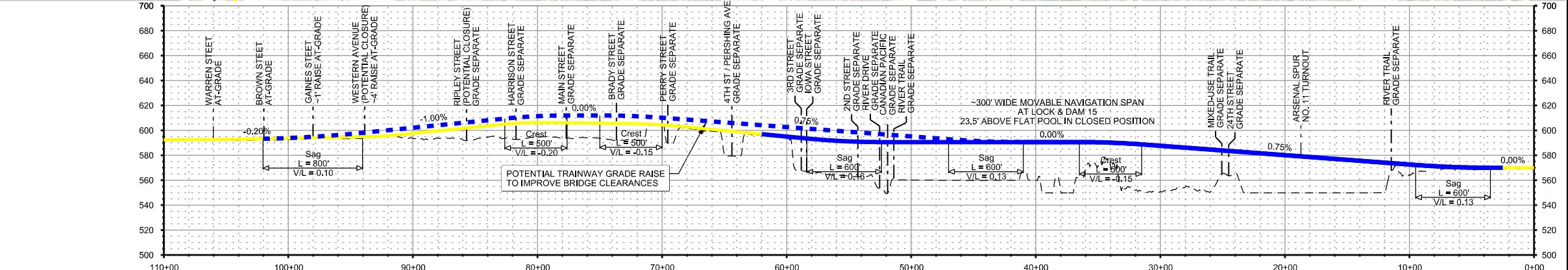
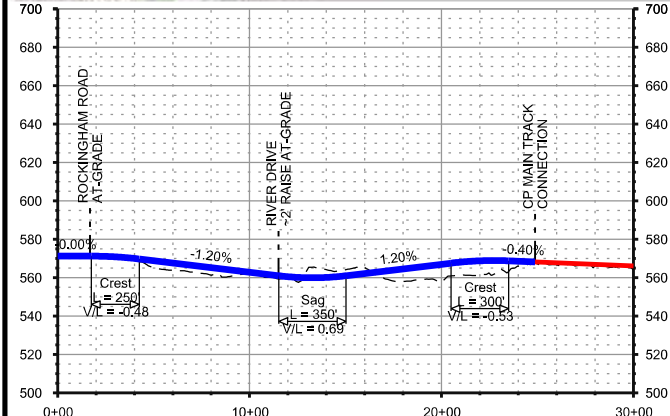
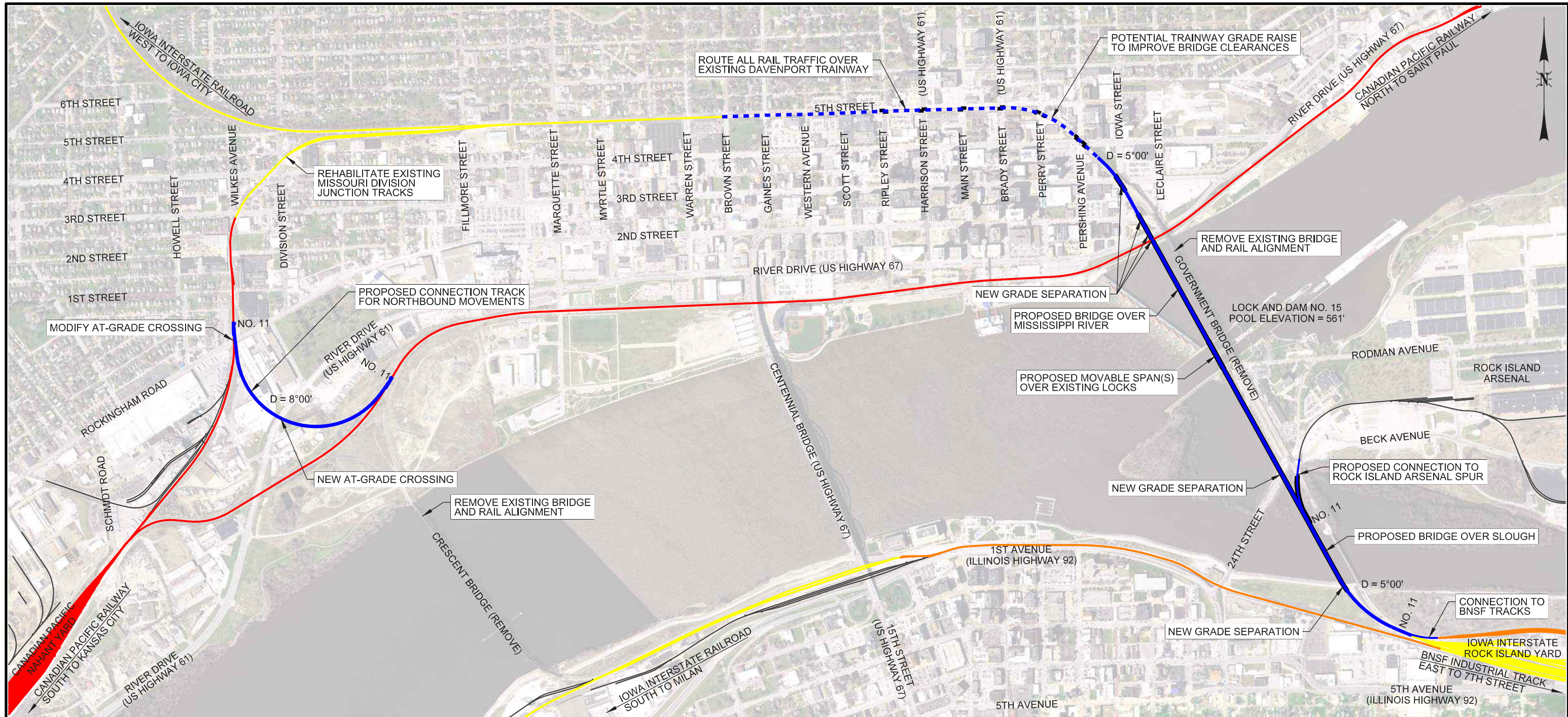
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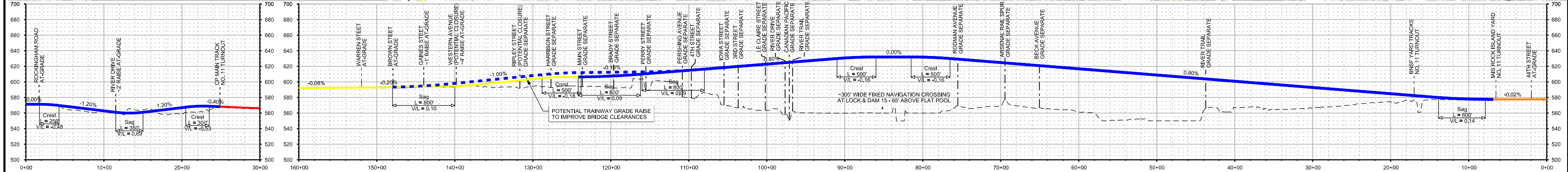
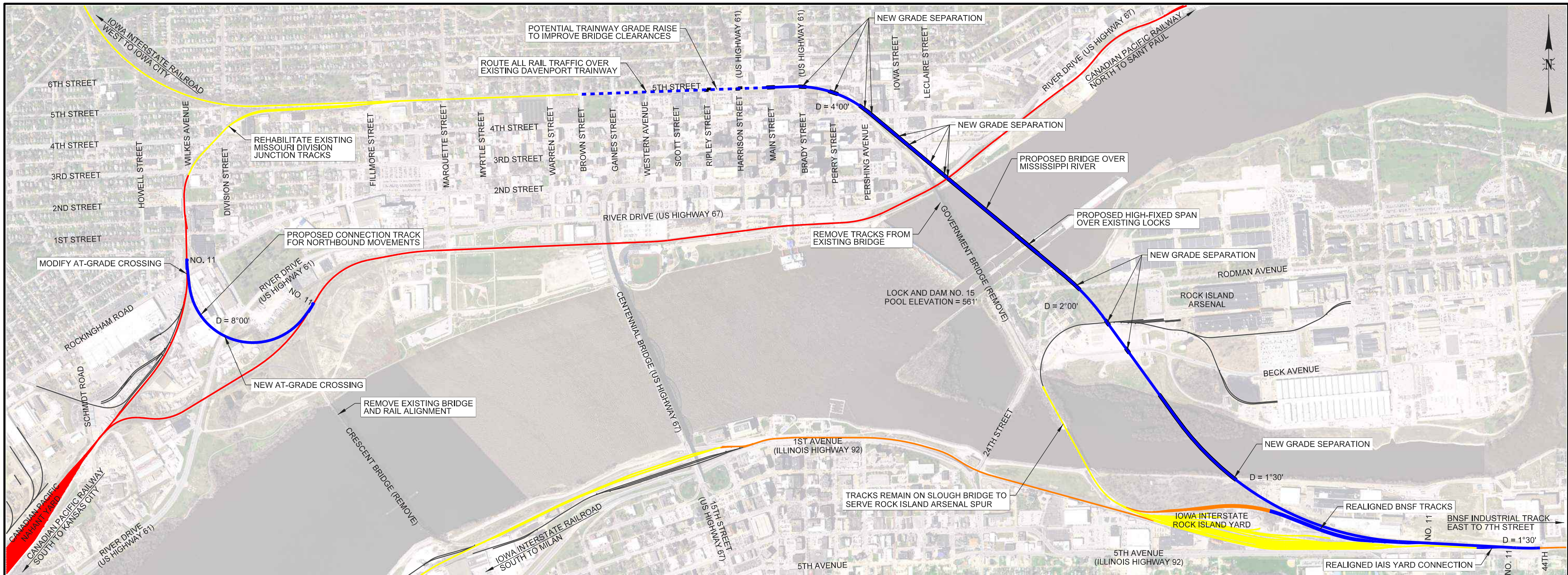
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NOT FOR CONSTRUCTION



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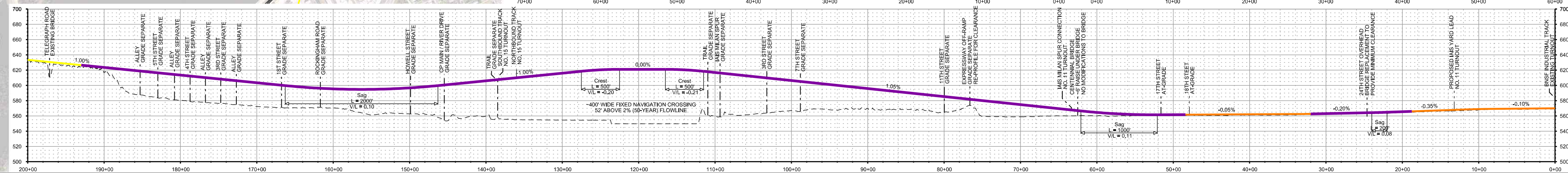
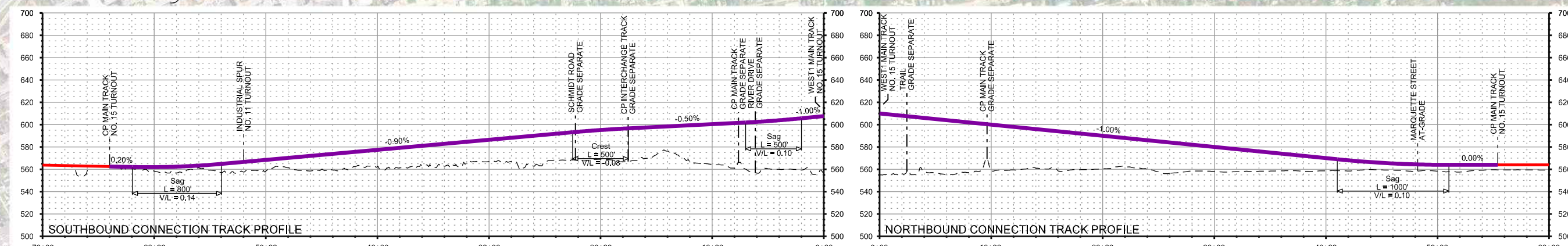
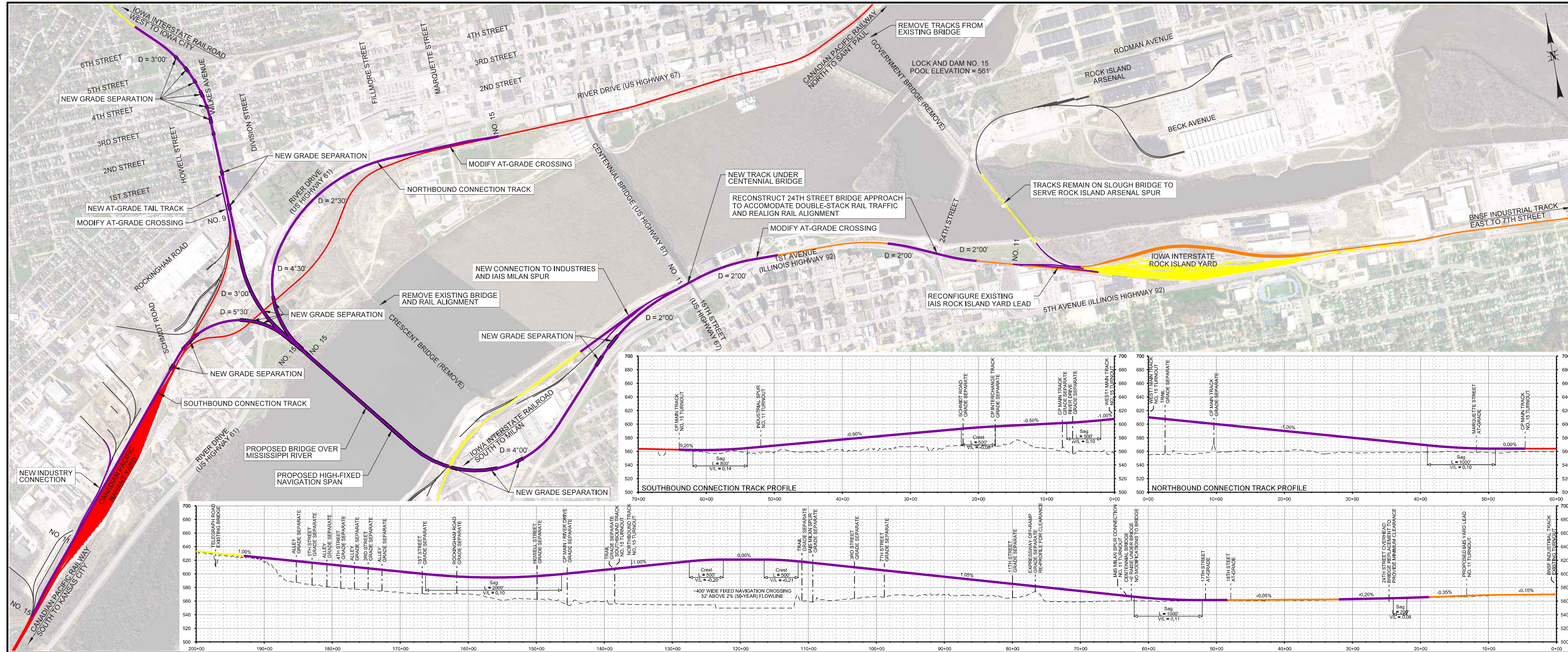
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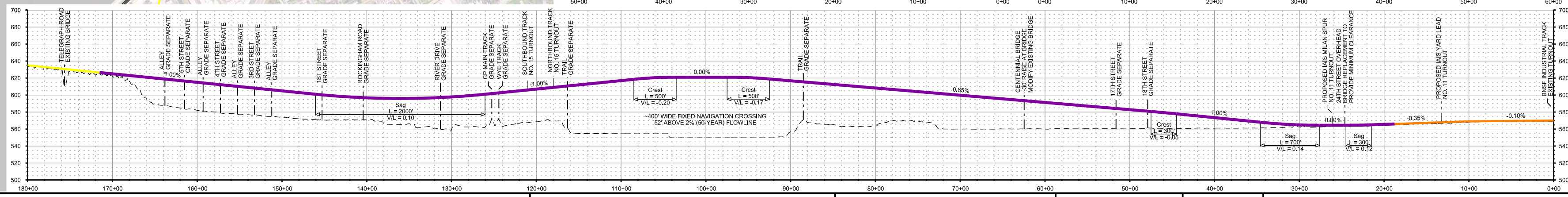
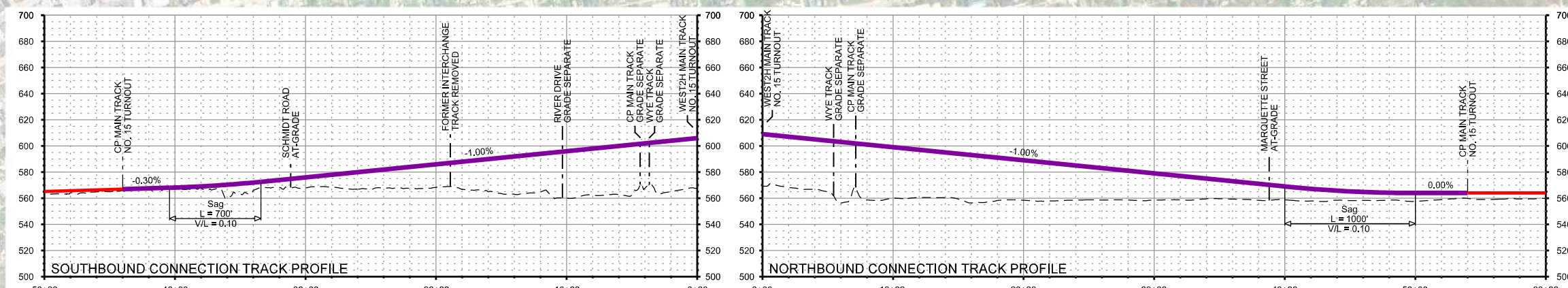
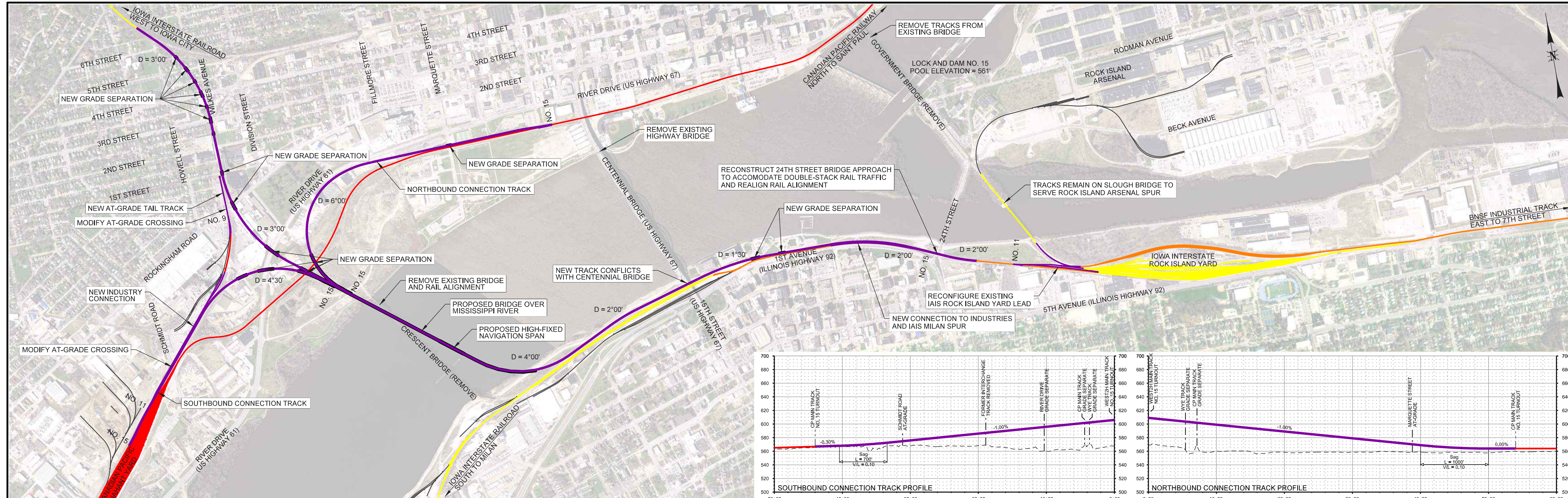
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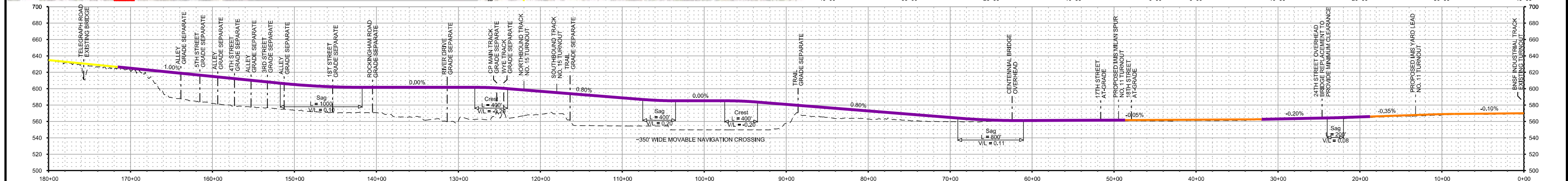
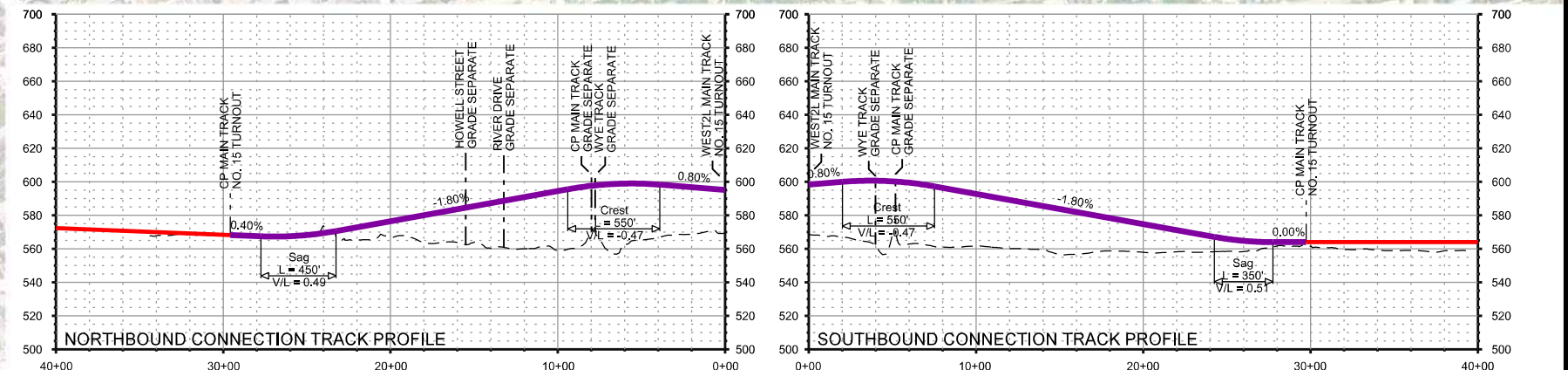
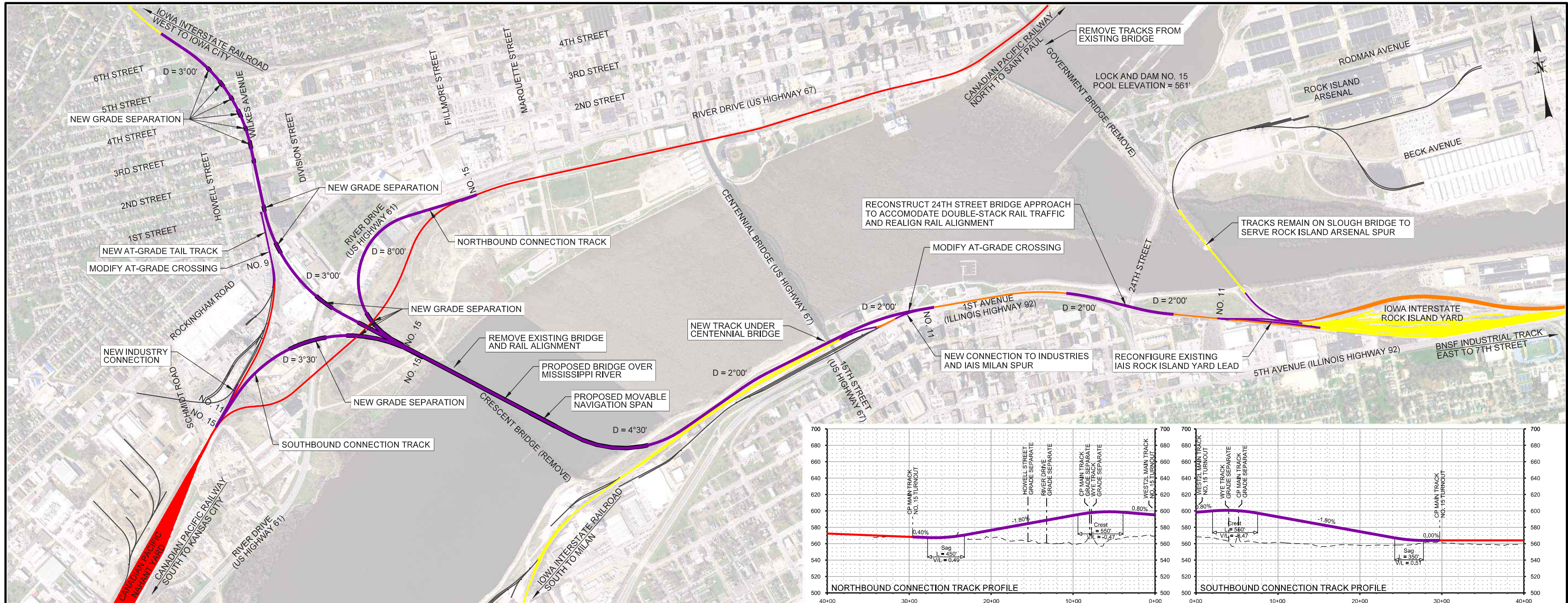
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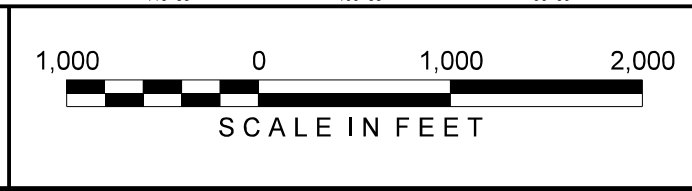


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- EXISTING INDUSTRY TRACK
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- CONCEPTUAL -  
NOT FOR CONSTRUCTION



<b>BI-STATE REGIONAL COMMISSION</b>	
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Appendix B  
Conceptual Alternative  
Cost Estimate Summary



Bi-State Regional Commission Mississippi River Rail Crossing Study - Alternatives Analysis Conceptual Construction Cost Estimates

Item Description	UOM	Unit Cost	Quantity											West Alternative 1	West Alternative 2-High	West Alternative 2-Low
			No Build: Existing	No Build: Government Bridge Only	No Build: Crescent Only 1	No Build: Crescent Only 2	East Alternative	East Alternative Trainway Raise	Offset Alternative	Offset Alternative Trainway Raise	Central Alternative	Central Alternative Trainway Raise				
<b>Track Construction</b>																
New Mainline Track	Track Foot	\$ 200		2,610	4,990	6,140	42,300	2,940	8,330	4,025	14,660	2,410	26,650	24,690	18,590	
New Yard/Industrial Track	Track Foot	\$ 180			1,075	1,075	1,200		820		4,680		7,785	8,350	3,995	
No. 9 Hand-Throw Turnout	Each	\$ 125,000			1	1							3	3	2	
No. 11 Hand-Throw Turnout	Each	\$ 150,000		2	1	1	3		4		6		8	6	7	
No. 15 Power Operated Turnout	Each	\$ 240,000					7						4	4	4	
Crossing Diamond	Each	\$ 250,000				1							1	1	1	
Track Rehabilitation	Track Foot	\$ 80		6,750	14,300	13,100	6,750		6,500		6,500		3,275	1,770	3,400	
Track Removal	Track Foot	\$ 10		8,750	21,500	22,675	18,300	2,940	17,550	4,025	23,670	2,410	44,400	39,800	34,760	
Turnout Removal	Each	\$ 10,000		4	8	8	8		8		10		23	18	17	
<b>Embankment/Grading</b>																
Subballast	Ton	\$ 40		4,160	9,130	10,790	65,440	4,250	13,990	5,820	29,100	3,490	52,950	50,550	35,470	
Standard Earthwork	Cubic Yard	\$ 20		12,000	20,000	30,000	140,000		50,000		24,000		120,000	300,000	390,000	
Retained Fill / LWCF	Cubic Yard	\$ 100			50,000	40,000	240,000	35,000	5,000	48,000	120,000	20,000	210,000	170,000	50,000	
<b>Railroad Structures</b>																
Concrete (<30' High)	Linear Foot	\$ 7,000			220	270	90		100				310	245	150	
Steel Beam Span (<30' High)	Linear Foot	\$ 10,000			130	130	260		685		207		715	585	990	
Steel Beam Span (>30' High)	Linear Foot	\$ 12,000							1,280				1,470	195		
Deck-Plate Girder (<40' High)	Linear Foot	\$ 16,000			160	160	1,790		455	170	1,790		760	500	2,500	
Deck-Plate Girder (>40' High)	Linear Foot	\$ 20,000					6,805		2,175		2,935		4,105	4,390	2,405	
Through-Plate Girder	Linear Foot	\$ 25,000			175	150	720	355	90	465	185	180	775	430	330	
Through-Truss	Each	\$ 25,000,000					1				1		1	1		
Movable Span	Each	\$ 35,000,000							1						1	
Government Bridge Removal	Lump Sum	\$ 5,000,000							1							
Slough Bridge Removal	Lump Sum	\$ 2,000,000							1							
Crescent Bridge Removal	Lump Sum	\$ 15,000,000		1			1		1		1		1	1	1	
Miscellaneous Drainage	Lump Sum	\$ 50,000		1	1	1	5		1		2		4	3	2	
<b>Roadway</b>																
Roadway Reconstruction	Square Yard	\$ 80		1,500	3,000	2,000	5,000						2,700	900	600	
24th Street Bridge Reconstruction	Each	\$ 3,500,000			1	1							1	1	1	
Centennial Bridge Removal	Each	\$ 20,000,000												1		
Grade Crossing Modification	Each	\$ 120,000		1			7						3	3	2	
New Grade Crossing	Each	\$ 200,000		1	1	1										
Crossing Signal Modification	Each	\$ 100,000		1	1	1	3						3	3	2	
New Crossing Signal	Each	\$ 250,000		1			1									
<b>Right-of-Way</b>																
Industrial	Acre	\$ 500,000		21	4	14	10				1		45	35	30	
Commercial	Acre	\$ 1,000,000					5		1		1		1	1	1	
Residential	Acre	\$ 750,000			1	1	3						2	2	2	
Undeveloped	Acre	\$ 40,000		5	1	3	30		1		3		7	7	7	
Demolition	Lump Sum	\$ 1		1,500,000	150,000	1,400,000	1,000,000		350,000		200,000		2,500,000	2,000,000	1,800,000	
Clearing	Acre	\$ 10,000		26	6	18	48		2		5		55	45	40	
<b>Permitting / Environmental</b>																
Cultural Resources Mitigation	Lump Sum	\$ 1		10,000	50,000	50,000	150,000		100,000		250,000		200,000	200,000	200,000	
T&E Mitigation	Lump Sum	\$ 1					250,000		100,000		100,000		50,000	50,000	50	
Wetlands Mitigation	Lump Sum	\$ 1					200,000		100,000		100,000		50,000	50,000	50	
Floodplain/Floodway Mitigation	Lump Sum	\$ 1					250,000		100,000		100,000		100,000	100,000	100,000	
Hazardous/Regulated Materials	Lump Sum	\$ 1		50,000	50,000	50,000	150,000		10,000		50,000		250,000	250,000	250,000	
<b>Utilities</b>																
Utility Allowance	Lump Sum	\$ 1		25,000	250,000	250,000	750,000	25,000	50,000	30,000	100,000	20,000	500,000	400,000	350,000	
<b>Professional Services</b>																
Preliminary Design / NEPA	Percentage			3%	3%	3%	4%	3%	4%	3%	4%	3%	4%	4%	4%	
Final Design	Percentage			4%	5%	5%	6%	4%	6%	4%	6%	4%	6%	6%	6%	
Project Management	Percentage			4%	5%	5%	5%	4%	5%	4%	5%	4%	5%	5%	5%	
Construction Administration	Percentage			3%	4%	4%	5%	3%	5%	3%	5%	3%	5%	5%	5%	
<b>Contingency</b>																
Contingency	Percentage			25%	25%	25%	30%	20%	30%	20%	30%	20%	30%	30%	30%	
SUBTOTAL:			\$ -	\$ 30,280,900	\$ 25,885,700	\$ 31,642,850	\$ 285,716,600	\$ 13,187,400	\$ 140,108,700	\$ 20,253,050	\$ 155,880,100	\$ 7,165,700	\$ 250,621,300	\$ 239,284,600	\$ 204,223,600	
Professional Services			\$ -	\$ 4,239,400	\$ 4,400,600	\$ 5,379,300	\$ 57,143,400	\$ 1,846,300	\$ 28,021,800	\$ 2,835,500	\$ 31,176,100	\$ 1,003,200	\$ 50,124,300	\$ 47,857,000	\$ 40,844,800	
Contingency			\$ -	\$ 7,570,300	\$ 6,471,500	\$ 7,910,800	\$ 85,715,000	\$ 2,637,500	\$ 42,032,700	\$ 4,050,700	\$ 46,764,100	\$ 1,433,200	\$ 75,186,400	\$ 71,785,400	\$ 61,267,100	
<b>TOTAL:</b>			\$ -	\$ 42,100,000	\$ 36,800,000	\$ 45,000,000	\$ 428,600,000	\$ 17,700,000	\$ 210,200,000	\$ 27,200,000	\$ 233,900,000	\$ 9,700,000	\$ 376,000,000	\$ 359,000,000	\$ 306,400,000	



Appendix C  
Existing Conditions Report





# Mississippi River Rail Crossing Study

Existing Conditions Report

**Bi-State Regional Commission (BSRC)**

August 16, 2019





## Introduction

The Bi-State Regional Commission (BSRC) is undertaking a study examining the efficiency, capacity, and connectivity of the regional railroad network centered on the Quad Cities and related Mississippi River rail crossings. This study will analyze the viable options to rehabilitate or replace the two existing Mississippi River rail bridges in the Quad Cities area.

The analysis of potential options will review previous recent planning efforts, report on existing conditions and future demand, define conceptual level alternatives for rehabilitation or replacement, and suggest goals and objectives for freight rail efficiencies related to economic vitality and freight mobility. The conceptual analysis will evaluate viable alternatives based on consideration of engineering concepts, environmental impacts, current and anticipated railroad transportation demand and operations, socioeconomic and community impacts, initial 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 entire process 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.

The existing conditions report, contained herein, examines current train operations in the Quad Cities area; describes the two Mississippi River rail bridges, including the current use of both bridges, a history of the bridges, and an assessment of their existing conditions; and summarizes previous studies examining the rail crossings in the Quad Cities area.



Source: HDR

## Quad Cities Railroad Operations

The Quad Cities metropolitan area is a multimodal transportation crossroads. This area includes principal and secondary rail lines, as well as classification and industrial yards for the three freight rail carriers serving the area: BNSF Railway (BNSF), Canadian Pacific Railway (CP), and Iowa Interstate Railroad (IAIS). All three railways operate over much of the same network within the Quad Cities.

### BNSF Railway

BNSF is one of the largest Class I railroads in the country, operating over 32,000 miles of railway in 28 states and 2 Canadian provinces. BNSF operates a secondary route west of the Quad Cities, the Barstow Subdivision, which connects a major classification yard at Galesburg with routes to the Twin Cities and the Pacific Northwest. The BNSF Quad Cities Industrial Lead connects with the Barstow Subdivision at Barstow and continues west through Moline and Rock Island before crossing the Mississippi River on the Crescent Bridge and connecting to with CP's Davenport Subdivision on the Iowa side of the river.

There are currently no passenger trains serving the Quad Cities, but both the Illinois and Iowa Department of Transportation (DOT) are moving forward with projects that plan to connect the Quad Cities, Chicago, and Iowa City with passenger rail service. The proposed route would operate over the IAIS via the BNSF Industrial Track and the Government Bridge.

Although all three railroads have different routes entering the Quad Cities, a significant part of each railroad's operation involves using the BNSF Industrial Track. The BNSF Industrial Track extends from the BNSF Barstow Subdivision mainline at Barstow across the Mississippi River on the Crescent Bridge to the CP Davenport Subdivision in Davenport. The track is used by all three railroads between 7th Street in East Moline and 44th Street in Rock Island. Train volumes on this segment average between 12 and 14 trains per day.

The different freight traffic flows for the three railroads are identified below:

- BNSF – through trains between the BNSF Barstow Subdivision at Barstow, and Davenport and Clinton; local trains between Barstow and Rock Island, and Davenport and Bettendorf, Iowa.
- CP – local trains between Davenport and Rock Island, East Moline, and the CP Nitrin Subdivision between East Moline and Albany, Illinois.
- IAIS – through trains between the IAIS Blue Island and Davenport Subdivisions and local trains serving customers in Silvis, East Moline, Moline, Rock Island, and Davenport.

## Canadian Pacific Railway

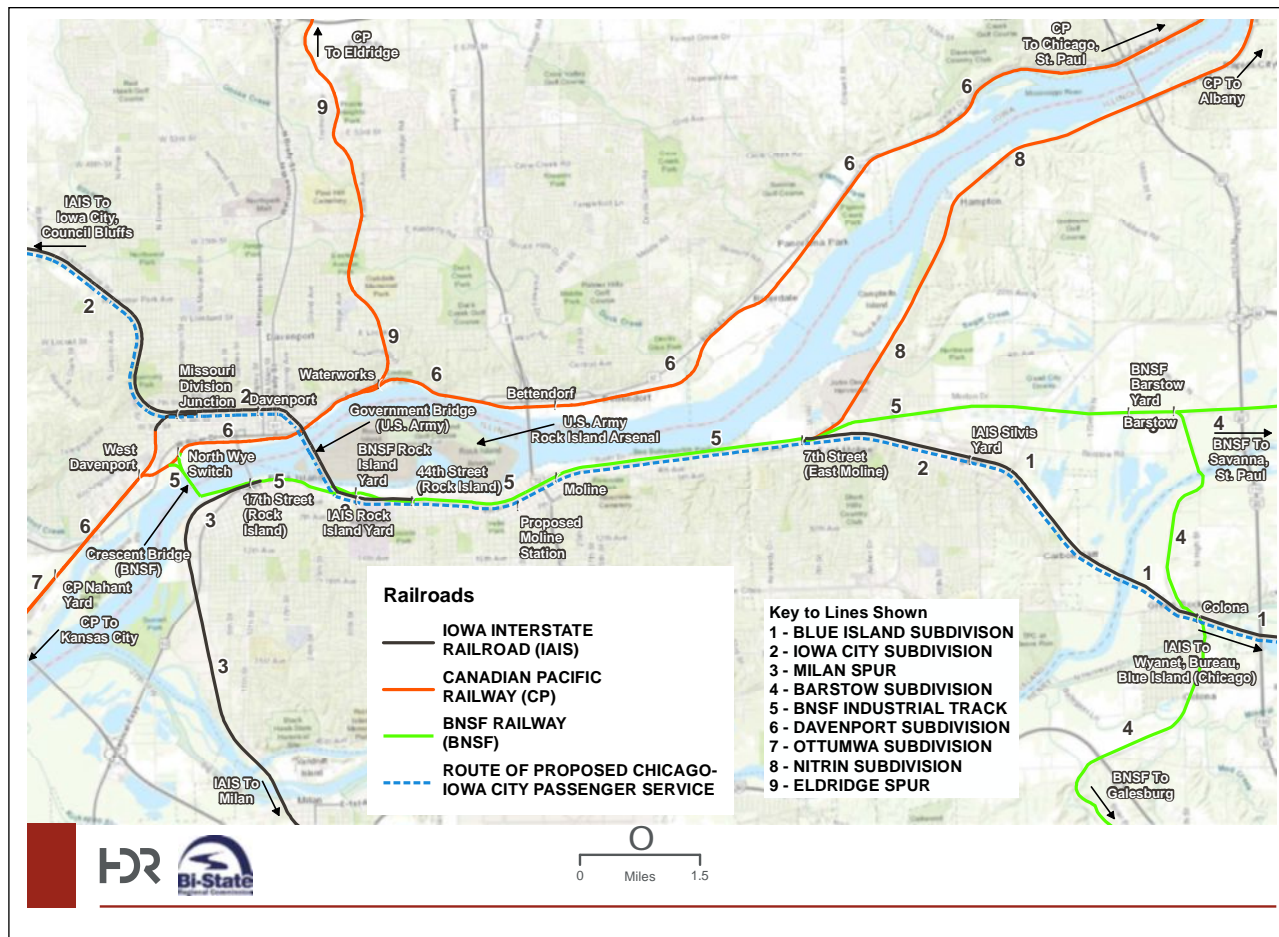
CP is a Class I (annual operating revenues greater than \$420 million) railroad, operating over 12,000 miles of railway in 10 states and 6 Canadian provinces. Most of CP's area business is on the Iowa side of the river, on the Davenport and Ottumwa Subdivisions, which is part of the CP corridor between Kansas City and the Twin Cities and Chicago. CP does have customers in Illinois, including Rock Island and Moline, and operates a branch line—the Nitrin Subdivision—north to Albany, Illinois. CP has trackage rights on IAIS and BNSF, and operates over the Crescent Bridge to access its Illinois customers and interchange traffic with both railroads.

## Iowa Interstate Railroad

The IAIS is a Class II (annual operating revenues between \$37 million and \$420 million) regional railroad that operates, over its own track or via trackage rights, between Chicago, Illinois; Peoria, Illinois; and Council Bluffs, Iowa. The IAIS was formed in 1984, acquiring tracks from the former Chicago, Rock Island, and Pacific Railroad (CRI&P).

The IAIS mainline operates through the Quad Cities, entering from the east on its Blue Island Subdivision at Silvis, Illinois, where it enters the IAIS Iowa City Subdivision and connects with the BNSF Industrial Track at 7th Street in East Moline, Illinois. IAIS operates over 5 miles of BNSF trackage to the Government Bridge, owned by the United States Army. On the Iowa side of the Government Bridge, the route operates over the Davenport, Iowa, elevated trainway and through the Fifth Street corridor. IAIS operates the greatest volume of trains in the Quad Cities, averaging 6-10 trains per day.

Figure 1: Detail of Quad Cities Area Rail Network





Source: HDR

# Quad Cities Mississippi River Rail Bridges

## Government Bridge

### **History**

The Government Bridge (sometimes referred to as The Arsenal Bridge) is a swing bridge that spans the Mississippi River between Rock Island and Davenport at River Mile 482.9. The drawbridge is owned and maintained by the U.S. Army Rock Island Arsenal, and IAIS operates on it through a property lease agreement.

The bridge is a twin-deck steel truss structure that accommodates rail traffic on the upper deck and vehicular and pedestrian traffic on the lower deck. From east to west, the Government Bridge is comprised of one movable truss span and six fixed truss spans. Historically, two main tracks of the IAIS predecessor CRI&P were in place over the bridge, but at present, the former westward main track is in use by IAIS as its single mainline track. The former eastward main track, while still in place over the full length of the span as a double-ended siding, is not used for meet-pass events between trains.

The Government Bridge includes one moveable truss span on the Rock Island side of the structure, which is opened as needed to allow the passage of river traffic through Lock and Dam No. 15 below. River traffic typically consists of river barges carrying bulk cargo and recreational watercraft.

The current bridge is actually the fourth rail bridge at this location. The first bridge, constructed in 1856 east of the current structure, was the first rail bridge in the country to cross the Mississippi River. The current bridge was constructed in 1894 and was built using the stone piers from the previous bridge at this location. The bridge was the first major bridge commission for engineer Ralph Modjeski, who also supervised its construction and was considered to be one of the foremost American bridge designers of the early 20th century.

In recent years, the bridge has been closed to vehicular traffic several times due to severe flooding of roadway approaches from the Mississippi River, most recently in May 2019. The bridge was also briefly closed after a CP train derailment on July 10, 2019.



Source: HDR

### **Rail Operations**

IAIS is the rail user of the Government Bridge. CP's route across the Mississippi River is via operating rights on the BNSF Crescent Bridge. Marine traffic has the right-of-way over rail traffic, and the bridge must open to allow river barges and other watercraft to pass through. The U.S. Coast Guard can levy a steep fine on railroads and other parties that block a navigable waterway with a closed drawbridge for what is determined to be an unreasonable amount of time. The bridge does not have scheduled opening or closing times. Bridge openings occur at random, and during peak shipping and recreational boating season on the Mississippi River, the bridge will open with greater frequency. A bridge tender, employed by the Rock Island Arsenal, continuously monitors rail and river traffic, and opens and closes the bridge for one mode or the other during river navigation season. During the winter season, when the Mississippi River is closed to navigation, the Government Bridge is left lined and locked for train and vehicle movement, and a bridge tender is not on duty.

Government Bridge impacts of railroad operations:

- **On-Demand Opening** – The bridge opens on demand at any time, which impedes scheduling uninterrupted operating windows. As a result, meets at sidings between opposing trains can become difficult for dispatchers to plan.
- **Varying Open/Close Cycles** – Bridge openings can range from 30 to 45 minutes per open/close cycle, which may cause the following impacts:
  - Approaching train delays – more than one train delay approaching the bridge.
  - Prolonged waits – of trains at nearby sidings and yards where meets are planned to occur.
  - Eastward grade crossing delays – Eastward IAIS freight trains approaching Davenport will hold back west of Missouri Division Junction if proper notice is given by the bridgetender. If not informed in time, the train may block as many as five grade crossings in downtown Davenport.
  - Westward grade crossing delays – Westward IAIS through trains may potentially block IAIS switching operations at the Rock Island Yard, and grade crossings between 44th Street in Rock Island to 7th Street in East Moline.
- **Track Speed Restrictions** – Current track speed for all trains across the Government Bridge, between Rock Island and Davenport, is restricted to 10 mph. This speed restriction is a quarter of the maximum authorized speed (40 mph) of the IAIS Iowa City Subdivision west of Davenport, which prolongs travel times and impacts track capacity.
- **Track Capacity** – The mainline track over the Government Bridge limits track capacity approaching the IAIS yard at Rock Island and the BNSF Industrial Track between Rock Island and East Moline.
- **Infrastructure Maintenance** – The drawbridge is more than 125 years old, which requires significant mechanical, electrical, and operating maintenance and upkeep.
- **Signal Displays** – The bridge is a manual interlocking and the bridgetender has authority over train movements. The bridgetender can give authority for train movements via signal indication by either displaying a red (stop) signal or lunar signal for the train to come across. A lunar signal is a restricting aspect that train crews are to be prepared to stop if an issue arises. Occasionally, signals authorizing movement across the bridge display a red indication. This can occur when the bridge reseating or other condition prevents the rails on either side of the movable portion from properly lining up. Alternatively, the signal sometimes displays a red indication even though the bridge is safely lined and locked for rail movement.
- **Drawbridge Position** – There are risks for drawbridges to stick in the open or closed positions, which causes train and river traffic delays for timeframes ranging from minutes up to hours while bridge and signal maintenance employees are dispatched and repairs are made. The horizontal curve on the truss bridge restricts movements of hi-wide shipments (transformers, windblades) across the bridge.



Source: HDR

The bridge can accommodate railcars with loaded weights up to 286,000 pounds, which is the current railroad industry standard. **Table 1** provides approximate information on average daily trains, bridge openings, and open/close cycle times for the Government Bridge

### Roadway Operations

The lower structure of the bridge consists of a two-lane public roadway with sidewalks on either side. Average daily traffic counts on the bridge range from 6,200 to 7,500 vehicles (Illinois DOT and Iowa DOT, respectively). The bridge has a vertical clearance of 11 feet 8 inches, which restricts the type of trucks that it can accommodate. Daily pedestrian and bicycle traffic counts were not available for inclusion in this report.

### Physical Condition

The existing bridge structure is maintained by the Rock Island Arsenal and is the primary means of accessing the Arsenal from the Iowa side of the river. IAIS maintains the track across the bridge and is responsible for funding a portion of the bridge structure maintenance through its lease with the US Army. The bridge is maintained in a condition to support the current rail/roadway traffic and loading, and is inspected regularly as required by the terms of the lease with the US Army .

The railroad portion of the bridge consists of rails that are directly fixed to a steel bridge deck via a series of steel rail seats that are welded to the bridge deck. The swing span is capable of rotating a full 360 degrees, and both tracks on the swing span are maintained to IAIS mainline standards because either track could line up with their main track depending on the orientation of the span. The tracks over the remaining fixed spans of the bridge are maintained with the current mainline to IAIS mainline standards, and the second track, now the Arsenal Siding, to a lower standard because it is used for only maintenance-of-way activities.

The roadway portion of the bridge consists of a two-lane road and sidewalks on metal grating below the railroad deck. Access to either end of the Government Bridge via roadway requires traversing reversing curves that in practice, along with the vertical clearance, limit the ability of large commercial vehicles to use the bridge.

The bridge tender cabin, located on the swing span, has closed-circuit television (CCTV) and railroad signal indications that allow the bridge tender to ensure that all roadway, pedestrian, and rail traffic is off the swing span prior to opening the span for river traffic. When the span is going to be opened, the tender activates drop gates that block roadway and pedestrian access to the swing span and changes the rail signal indication to stop approaching rail traffic. Once the river traffic has cleared, the span is closed and, upon verification that the span is properly seated, the drop gates are raised and traffic is allowed to resume.

Table 01: Government Bridge Operating Statistics (2015)

AVERAGE DAILY TRAINS (2015)	AVERAGE DAILY BRIDGE OPENINGS	STATUS
06-10 <sup>1</sup>	08	12:28

<sup>1</sup>: Additional train movements made while switching the west end of IAIS Rock Island Yard are not included in Daily Train Volume.



Source: HDR

## Crescent Bridge

### **History**

The Crescent Bridge is a steel truss through deck design with a swing span spanning the Mississippi River between Rock Island and Moline, slightly downstream from the Government Bridge at River Mile 481.4. It is owned and maintained by BNSF. The bridge was opened for rail service in 1900. The name of the bridge came from the curved crescent shape of the bridge combined with its Illinois and Iowa approaches.

### **Rail Operations**

BNSF trains use the bridge to access customers on the CP Davenport Subdivision between Davenport and Clinton, where BNSF has operating rights. CP uses the bridge to access customers on the Illinois side of the river as well as interchange cars with IAIS. Current train volume varies from two to four trains per day. Crescent Bridge operating statistics were not available for inclusion in this report, but daily bridge openings would be consistent with those of the Government Bridge. Average open/close cycle times were also not available for inclusion in this report.

Crescent Bridge impacts of railroad operations:

- Because the bridge opens on demand at any time, there are no operating windows when trains can be scheduled to ensure uninterrupted movement.
- The drawbridge is over 110 years old, with a myriad of moving parts and sensitive, electrical signal and detection systems operating in a harsh, continental climate environment. Generally speaking, there is the potential for any drawbridge 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 bridge and signal maintenance employees are summoned to the bridge's location and repairs are made.
- The Crescent Bridge cannot handle freight cars exceeding 268,000 pounds in loaded weight, whereas the current industry standard is 286,000 pounds. BNSF customers whose freight crosses the Crescent Bridge must restrict the loading of their cars so as not to exceed this weight limit, resulting, in many cases, in higher freight charges per ton of freight handled.
- Due to vertical clearance issues on the route, the Crescent Bridge cannot accommodate double stack intermodal cars.

### **Physical Condition**

The Crescent Bridge is owned and maintained by BNSF in a condition to support the current railroad operations across the bridge, and is inspected on a regular basis as required by Federal Railroad Administration regulation. The bridge was originally constructed as a secondary crossing location and was intended for lighter duty service than other BNSF Mississippi River crossings. Due in large part to its initial design and construction, it would likely require significant improvements to increase the loading capacity across the bridge above its current capacity.



Source: HDR

## Previous Studies

Two recent studies commissioned by project stakeholders have discussed, at a high level, the condition of the rail bridges and potential options to address condition and capacity issues.

### **Bi-State Region Freight Plan** **September 30, 2015**

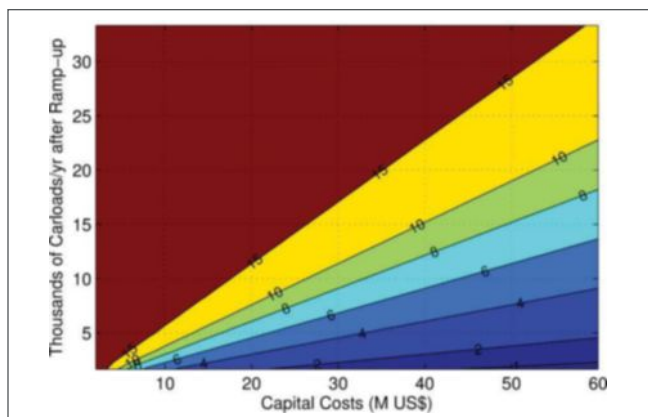
The *Bi-State Region Freight Plan* noted that a previous study conducted by Iowa DOT identified the Government Bridge as a freight rail bottleneck. The plan conducted a high-level benefit cost valuation of rehabilitation or replacement of the bridge. The following text and figure are taken from the *Bi-State Region Freight Plan* (Bi-State Regional Commission 2015):

The Iowa DOT recently conducted a study of railroad bottlenecks and identified the Government Bridge as the only Bi-State Region rail freight [sic] bottleneck of note...there is a good opportunity for a replacement bridge to provide efficiency to all three railroads in the region. Other points to include are:

- Is it feasible to replace this bridge in an adjacent area, upstream or downstream? If yes, the 1,608-foot span (total length) could be used for cost estimation.
- Government Bridge carries both vehicle traffic and rail traffic currently. It is double tracked for rail. Would replacement need the roadway element? Would the rail need to be double tracked?
- Government Bridge currently has a swing section to accommodate barge traffic navigating the locks. Could that function continue as required? Or would we leave it permanently open and let vehicles and rail freight use the replacement rail bridge and other highway facilities. Demolish the Government Bridge once replacement is in place? Security needs at the national level would suggest keeping a back-up rail bridge over this important river in working order, even with a replacement rail bridge built. It is also unlikely this bridge would be demolished as it is a designated National Landmark.
- The freight partners survey and interview process identified access to rail and getting cheaper and faster rail connections - but they did not note any particular bridge replacement location.
- A new rail freight transfer facility, whether bulk or intermodal, could be located so that would be served efficiently by the replacement rail bridge.

(Iowa DOT 2015)

FIGURE 8.10 BCR FOR RAIL BRIDGE PROJECT @ 7% DISCOUNTING



Source: Parsons Brinckerhoff Analysis

### Benefit Cost Valuation

The economic efficiency of the bridge rehabilitation will depend critically on:

- (1) The freight demand that can be accommodated by removing operational bottlenecks on the bridge
- (2) The costs of building the new bridge

The investments will also have positive impacts on general vehicular traffic, in addition to freight movement. These should also be considered in a benefit-cost analysis of the investment, however they are omitted in this case because they lie outside the scope of this work. The benefit-cost framework is only applied to the freight traffic on the bridge. The benefits result from the increase of rail capacity on the bridge, which would allow for additional tonnage to be transported through this corridor. It is assumed that without the investments, the bridge represents a bottleneck to rail freight movement in the region.

The analysis also assumed:

- Truck miles avoided per shipment: 1,000 miles
- Average tons per truckload: ~21 tons
- Growth of bulk market after 4 year ramp-up: 2.5 percent
- Rail to truck circuitry: 1.12
- Discount provided by rail costs over trucking: 20 percent
- Analysis horizon: 30 years of operations
- Emission rates: PRISM tailored for U.S. DOT project evaluation

These represent approximations of the most likely characteristics of the traffic that would use the bridge. Some of these parameters are more uncertain than others, but in most cases they are fairly standard across the U.S. It is assumed that the facility takes three years to be designed and built, and another 4 years for the demand to ramp-up. The main benefits of the facility would be in permitting the mode shift from truck to rail. Benefits and costs are discounted at a rate of 7% per year, following U.S. DOT guidance.

The results of the analysis are shown in Figure 8.10. The BCRs are displayed as the demand of the facility and capital costs change. Blue coloring indicates a low BCR ratio, which represents a project for which benefits are small relative to capital costs. It is difficult to make an assessment of the bridge replacement based solely on this information, because it does not include a monetization of benefits for passenger vehicles. The results of this analysis would have to be combined with a broader benefit-cost analysis to account all relevant benefits of the project.



## Iowa State Rail Plan

### February 2017

In the 2017 Iowa State Rail Plan, Iowa DOT listed 36 rail network bottlenecks in the state.

Typical bottlenecks in the state include:

- Insufficient capacity on main tracks and in terminals and rail yards to accommodate present and future train volumes, interchange of traffic between railroads, and provision of rail switching;
- Operating delays at railroad junctions and at movable bridge spans over principal navigable waterways;
- Bridges that constrain vertical and horizontal clearances and restrict the types of rail car equipment that can be accommodated; and,
- Potential effects on infrastructure and service for rail lines located in a major floodplain. (Iowa DOT 2017)

The Government and Crescent Bridges were included in the list of the 36 bottlenecks, 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” (Iowa DOT 2017).
- **Crescent Bridge** – “Railroad bridge functionally obsolete; should be replaced” (Iowa DOT 2017).

Iowa DOT listed short-range and long-range passenger and freight rail projects under their Passenger and Freight Rail Capital Program.

- The short-range projects and studies include those for which funding was made available by the state in 2016 to cover full or partial capital costs of implementation, and those that will likely be eligible based on past criteria for state funded rail projects and studies.
- 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.... The projects and studies ... are prioritized in terms of short-range projects and studies, that is, those which will occur in the first four years (2016 to 2019); and long-range projects and studies, that is, those that will be considered between Years 5 and 21 (2020 to 2040). (Iowa DOT 2017)

The following were included in the list of long-range projects:

- “Rehabilitate or replace the existing Government Bridge over the Mississippi River between Davenport, Iowa, and Rock Island, Illinois, used by IAIS and CP” (Iowa DOT 2017).
- “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” (Iowa DOT 2017).

## References

Bi-State Regional Commission. 2015. Bi State Region Freight Plan. Final Report. Prepared by Cambridge Systematics, Inc. September 30.

Iowa DOT. 2017. Iowa State Rail Plan. Final. February.

[https://iowadot.gov/iowainmotion/railplan/2017/IowaSRP2017\\_Complete.pdf](https://iowadot.gov/iowainmotion/railplan/2017/IowaSRP2017_Complete.pdf).

## Summary

The physical conditions of both bridges adequately support existing rail operations, albeit with some restrictions.

The Government Bridge carries the greater share of freight traffic, six to ten trains per day, along with vehicular traffic on the lower level. Bridge openings do adversely impact train operations, but there appears to be sufficient capacity to support existing service levels. The bridge also handles freight cars up to 286,000 pounds loaded weight.

The Crescent Bridge is currently used by two to four trains per day. The restricted freight car weight limit of 268,000 pounds per car does negatively impact customers whose freight is carried across the bridge. BNSF is maintaining the bridge to support 268,000-pound car weights, and has no current plans to upgrade or replace the bridge.

The preferred route for the potential introduction of passenger train service between Chicago, Moline, and Iowa City is over the Government Bridge. Any significant increase in train traffic over the bridge may necessitate discussion of bridge improvements or replacement, including reopening the second main track on the bridge. It is unknown what impact two operable main tracks may have on the bridge’s ability to accommodate 286,000-pound freight cars.



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Appendix D  
Purpose and Need Report





# Mississippi River Rail Crossing Study

Purpose and Need Report FINAL

**Bi-State Regional Commission (BSRC)**

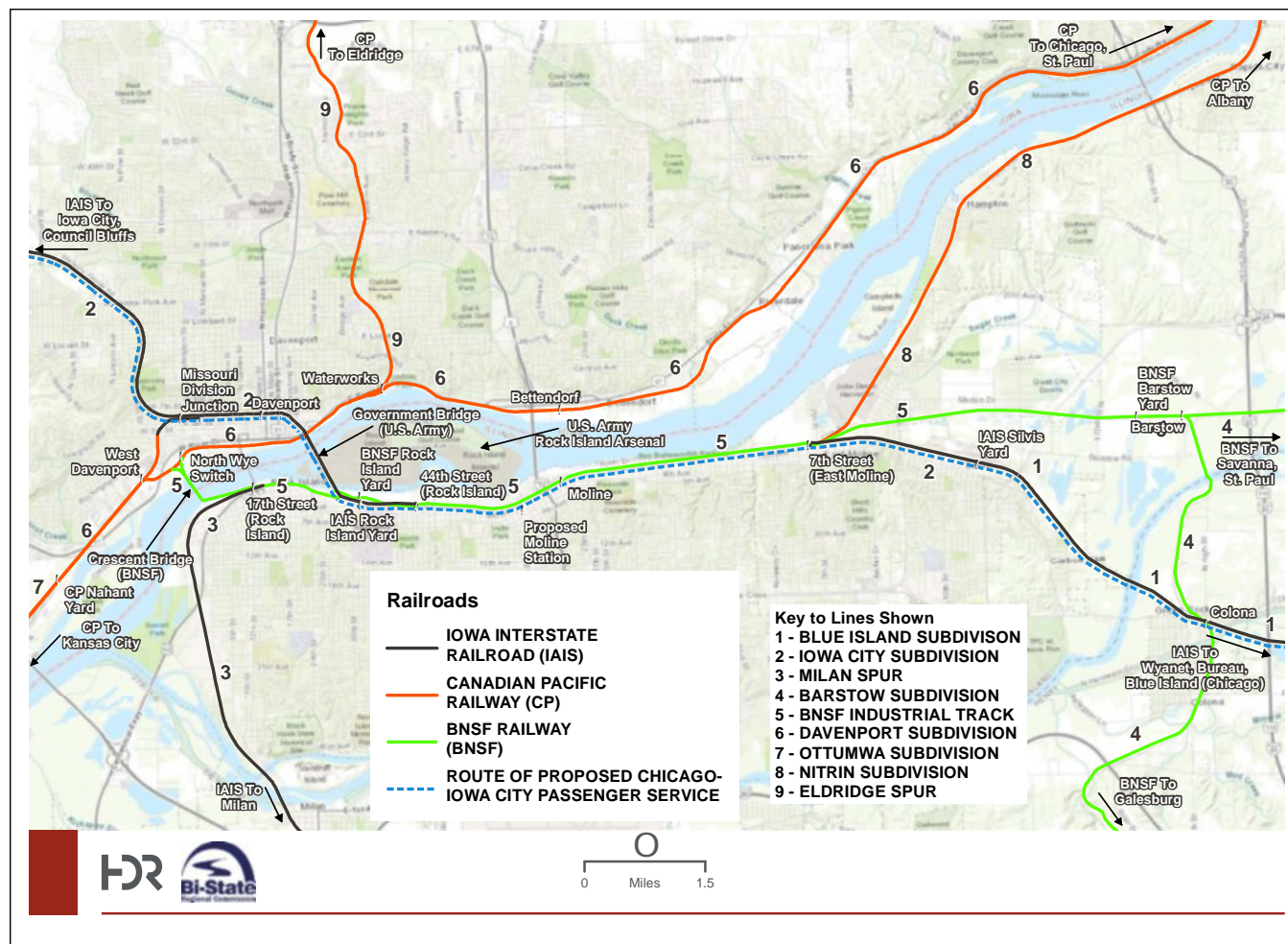
January 10, 2020



# 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 Nitrin 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 includes 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.



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