CHAPTER 6
FINE-LEVEL SCREENING

Following coarse-level screening, each route alternative was evaluated against the fine-level screening criteria. Screening criteria developed along with the methodology for the alternatives analysis are presented in Section 4.2.2, and these screening criteria were refined following coarse-level screening. Table 4-2 presents the refined fine-level screening criteria, and the results of the fine-level screening for each route alternative carried forward through coarse-level screening are presented in Sections 6.1 through 6.5. Section 6.6 includes a fine-level screening of the No-Build Alternative. Although the No-Build Alternative did not meet the purpose and need for the Project, it was carried forward for evaluation based on CEQ's NEPA requirement to evaluate impacts of no action and to serve as a baseline for comparison of the route alternatives.

A summary of the screening results is provided in Section 6.7. As with coarse-level screening, the fine-level screening effort addressed the route alternatives from west of Chicago to Council Bluffs. In addition, the respective routes into Chicago were addressed during fine-level screening. Because all route alternatives converge to a common point at Council Bluffs, the portion of the route alternatives between Council Bluffs and Omaha was not included as a technical or economic criterion for comparison among the route alternatives (as discussed in Section 4.2.2.2.2, Technical/Economic Feasibility: Alignment), except for travel time comparison between the route alternatives and alternate travel modes.

As discussed in Section 5.8, Route Alternative 3 was deemed unreasonable during coarse-level screening and was eliminated from further study. Therefore, Route Alternative 3 is not discussed below.

For the fine-level analysis, buffers were applied to estimated current ROW for potential impact assessment based on the number of tracks currently present for a particular route alternative. The buffers in the fine-level analysis represent additional ROW that would have to be acquired for construction of additional track and improvements. On Route Alternatives 2 and 5, where there are already two existing tracks, the new track would need to be constructed approximately 45 to 50 feet away from the existing tracks to accommodate an access road between the tracks. On Route Alternatives 1, 4, and 4-A, where there is only one existing track, the new track would be constructed 25 feet away from the existing track. The acreage of the buffers was also divided into urban and rural categories, as appropriate, to accommodate additional assessment of potential impacts. Additional details on the buffers applied are included in the route alternative discussions in Sections 6.1 through 6.5.

The route alternatives within the endpoint cities of the Corridor, Chicago and Omaha, were evaluated in a different fashion from the fine-level screening from the route alternatives between the cities. At Chicago, the five route alternatives have similar capacity and infrastructure attributes that create common technical and economic feasibility characteristics for all of the route alternatives. At Omaha, the five route alternatives would use a common alignment between Omaha and Council Bluffs, where the five route alternatives diverge onto separate paths across Iowa.

In Chicago, all five route alternatives evaluated in the fine-level screening host high-density commuter passenger rail, some host intercity passenger rail, and all host local freight trains and industrial switching. Route Alternatives 2 and 5 host high-density through freight train traffic. All five route alternatives have multiple crossings with other rail lines, and other trains frequently enter and exit the route alternatives within the urban area, with complexity of train routings and density of traffic increasing as the route alternatives approach their termini at Chicago Union Station or La Salle Street Station. It was assumed that the Chicago-Omaha passenger trains would operate within the Chicago terminal at the same speeds as present-day commuter trains, enabling the Chicago-Omaha trains to be slotted into existing commuter-train schedules to avoid the necessity for construction of additional main tracks that would enable operation of the Chicago-Omaha trains at higher speeds. The requirement for additional main track would create substantial impacts on the adjoining urban area as existing ROW on all five route alternatives in most locations within Chicago does not have sufficient room for an additional main track. Operation at higher speeds than commuter trains also has the potential to require extensive reconstruction of the wayside signal system, and may not be feasible within the technical limitations of grade-crossing signal systems. Consequently, this would require extensive separation of grade crossings, which could also create substantial impacts on the adjoining urban area. Accordingly, it was assumed that the existing alignments of the route alternatives were suitable for support of the Chicago to Omaha service's proposed frequency of five round-trips daily, by adjusting train schedules to slot passenger trains into existing commuter train schedules. This assumption would require confirmation in a Tier 2 Project Level study.

At Council Bluffs, all five route alternatives converge, after crossing Iowa, to a common point where historically the freight railroads between Chicago and Omaha interchanged freight traffic with the freight railroads between Omaha and the West. At Omaha, there are at present two route possibilities across the Missouri River between Council Bluffs and Omaha. Two bridges were constructed across the Missouri River. The first constructed bridge (later replaced and modernized) carried the Union Pacific Railroad, and handled all of the passenger trains crossing the river between Council Bluffs and Omaha, and nearly all of the freight trains. The second constructed bridge carried the Illinois Central Railroad, and handled local trains serving industrial districts in Omaha. The Union Pacific bridge, a high-level, fixed, double-track bridge that has vertical clearance to normal marine navigation, is in use. The condition of the UP bridge was not investigated in detail, and its capability to host passenger trains for a long duration without rehabilitation or replacement is not known. The Illinois Central bridge, a low-level, single-track, double-swing bridge, is not in use and is in poor condition, with nonfunctional mechanical and electrical systems. The Union Pacific route passes alongside the former Omaha Union Station (now a museum) and near the former Burlington Route Station (now derelict). Amtrak's current *California Zephyr* station is located adjacent to the Burlington Route Station.

Capacity on the existing UP Missouri River bridge is likely to be insufficient for the addition of five passenger trains each direction operating daily on a fixed schedule. Council Bluffs is a major crew change and regional yard for UP. Freight trains frequently are lined up and waiting to either enter the Council Bluffs yard or accept crews. Switching activities at the Council Bluffs yard frequently require use of one of the main tracks on the bridge. Speed limits for freight trains are low for reasons of safety. UP currently routes some freight trains directionally through Council Bluffs to avoid congestion at this bridge, on the steep

descending eastward grade through Omaha toward the bridge, and in the Council Bluffs terminal. Some eastward freight trains pass through Council Bluffs, while some westward freight trains use the UP Blair Subdivision, crossing the Missouri River between Missouri Junction, Iowa, and Blair, Nebraska, and rejoining UP's transcontinental main line at Fremont, Nebraska. It may be possible to create capacity on the Missouri River bridge and in the Council Bluffs terminal area by adding capacity to the UP Blair Subdivision, which may entail a second Missouri River bridge at Blair to supplement or replace the existing single track bridge at Blair. RTC modeling would be required to explore these possibilities. Because the two endpoint terminals of the Corridor represent a separate case, they were evaluated separately from the routes between the terminals.

6.1 ROUTE ALTERNATIVE 1

Route Alternative 1is the northernmost of the route alternatives and is currently owned by CN. This route alternative is 516 miles long between Chicago Union Station and Council Bluffs.

6.1.1 Purpose and Need: Travel Demand

Route Alternative 1 would serve the intermediate major communities of Elgin and Rockford, Illinois, and Dubuque, Waterloo, and Fort Dodge, Iowa. The total population within 20 miles of these intermediate stops is approximately 774,000. Annual ridership and revenue from tickets sold for an assumed initial operation year of 2020 were forecast as:

- 505,000 to 590,000 riders and $15.2 to $17.7 million for 79 mph service
- 560,000 to 650,000 riders and $17.0 to $19.9 million for 90 mph service
- 615,000 to 715,000 riders and $19.0 to $22.2 million for 110 mph service

Ridership and revenue from tickets sold are third highest of the route alternatives, but revenue from tickets sold is relatively low for the ridership, as ridership is heavily influenced by short-haul, low-revenue from tickets sold trips between Chicago and Rockford, Illinois. Depending on the speed regime, ridership was estimated at approximately 175,000 to 220,000 fewer riders than Route Alternative 4-A, and revenue from tickets sold was estimated at $9.0 million to $11.7 million less than Route Alternative 4-A; Route Alternative 4-A had the highest estimated ridership and revenue from tickets sold of all alternatives (Table 6-7 includes estimated ridership and revenue from tickets sold data). Route Alternative 1 does not meet the purpose and need for travel demand because of low ridership and revenue from tickets sold forecasts west of Rockford, Illinois.

6.1.2 Purpose and Need: Competitive and Attractive Travel Modes

Route Alternative 1 has travel times that are the slowest of the five route alternatives, and is not competitive with personal automobiles between Chicago and Omaha. Route Alternative 1 does not meet the purpose and need of providing a competitive and attractive travel mode because of its very slow travel times, which is uncompetitive with the automobile as an alternative mode. However, Route Alternative 1 provides modal interconnectivity at all of its intermediate cities, and terminates at Chicago Union Station, meeting the purpose and need for modal interconnectivity.

6.1.3 Technical Feasibility: Passenger and Freight Capacity

Route Alternative 1 did not historically originate at Chicago Union Station, but instead originated at Central Station, nearer to the lakefront. However, a connection can be made to main line trackage leading to Chicago Union Station either via the Belt Railway of Chicago or the Western Avenue Corridor. This connection trackage is highly constrained by freight capacity and may require additional infrastructure to accommodate the proposed Chicago-Omaha passenger trains.

Route Alternative 1 is a light- to moderate-density, moderate-speed (40 mph) freight-only rail line once it emerges west of the Chicago core (west of the Indiana Harbor Belt) to Council Bluffs. Freight traffic decreases westward from approximately 12 trains daily between Chicago and Waterloo, Iowa, to approximately 8 trains daily between Waterloo and Fort Dodge, Iowa, to approximately 4 trains daily between Fort Dodge and Council Bluffs.

Route Alternative 1's present-day track and train-control infrastructure is matched to its freight speeds and traffic density. Centralized Traffic Control (CTC) signaling is active from Chicago to Fort Dodge. From Fort Dodge to Council Bluffs, wayside signaling is absent and trains are operated by Track Warrant Control (TWC). Sidings of sufficient length to meet-and-pass freight trains are located approximately once every 25 miles; however, most sidings and the parallel main track at siding locations have industry leads off them and thus are used also for switching industries. Grades and curvature on Route Alternative 1 are moderate except in northwestern Illinois and northeastern Iowa, a distance of approximately 100 miles, where the profile crosses numerous drainages on grades of up to 1.0 percent and curvature is as tight as 8 degrees.

Between Portage and East Dubuque, Illinois, a distance of 13 miles, Route Alternative 1 uses shared trackage with a high-density BNSF freight line along the Mississippi River. All trains operate on two BNSF main tracks that are located at the base of the bluffs along the east bank of the river. At East Dubuque, trains on Route Alternative 1 swing inshore from the BNSF, then pass through an 851-foot tunnel, emerge to cross the BNSF main tracks at grade, then cross the Mississippi River on a 336-foot pin-connected truss swing bridge constructed in 1900. Trackage in Dubuque is BNSF and CP.

Route Alternative 1 would likely require the addition of a second main track from Chicago to Waterloo to afford sufficient capacity for passenger trains to have the desired speed and reliability, and to enable freight trains to continue to serve industries. Between Waterloo and Council Bluffs, a second main track may only be required in locations where industries are located, with sidings of sufficient length for freight trains at intervals sufficient for efficient operation of freight trains. Because there are numerous at-grade crossings on this route alternative, sidings cannot hold freight trains for long periods of time for passenger train meet/pass events. It may be more feasible to construct long sections of second main track, instead of sidings, so that freight trains can make rolling meets with passenger trains and avoid blocking crossings for extended periods of time.

6.1.4 Technical/Economic Feasibility: Alignment

The alignment between Chicago and Freeport, Illinois, is relatively straight and is conducive to high-speed passenger rail with the addition of required main track capacity for passenger trains. However, between Freeport and Waterloo, the alignment is poorly adapted to high-speed passenger rail because of many sharp curves, the tunnel and at-grade crossing of the BNSF rail line at East Dubuque, the Dubuque industrial district, and lengthy grades of up to 1.0 percent. Between Dubuque and Waterloo, the alignment twists along drainage valleys and is not readily adaptable for higher speeds.

Because of the limited capacity and low speeds of the existing track and signal infrastructure, substantial additional construction would be required. Where the existing main track can be used, it would require heavy upgrade. A second main track at 25-foot track centers is feasible in most places, but in the drainages on either side of the Mississippi River, construction of a second main track would require extensive cut and fill work.

6.1.5 Technical/Economic Feasibility: Structures

The major structures along Route Alternative 1 include the single-track Mississippi River Bridge, and the Des Moines River Bridge near Fort Dodge, Iowa. Upgrades or even double-tracking of the tunnel at East Dubuque would likely also be necessary in order to generate adequate capacity and suitable passenger train speeds in this vicinity. The Mississippi River Bridge may create a challenge as it opens approximately eight times per day. Sufficient track capacity on either side of the bridge to hold passenger trains while the bridge is open may be costly to create. Replacement of the bridge is potentially necessary due to its age, capacity, and as it is single-track.

6.1.6 Technical/Economic Feasibility: Grade Crossings

Grade crossings on Route Alternative 1 are more numerous because of the route alternative length, but present no exceptional challenges when compared to other route alternatives. On a per grade-crossing basis, costs for improving or revising grade crossings would be similar to Route Alternative 4 and the Wyanet-Council Bluffs portion of Route Alternative 4-A, and less than Route Alternatives 2 and 5 where new, three-track grade crossings with tracks at up to 45-foot centers would be necessary.

6.1.7 Economic Feasibility

Route Alternative 1 has an estimated cost that is approximately $550,000,000 more than Route Alternative 4, the least expensive route alternative. Although the current railroad has moderate to low freight train density with single track, the relatively high number is indicative of the fact that this is the longest of the alternatives. The major factors in the cost are:

- The length of the route alternative (42 miles longer than other route alternatives) with concomitant additional costs for new earthwork, track, and signals. Because of the extra route length, this factor dominates the economics of Route Alternative 1.
- Replacement or modification of the East Dubuque Tunnel, and modification or replacement of the Mississippi River Bridge.

Route Alternative 1 has no outstanding operating, maintenance, or equipment cost differentiators other than its greater length, which would proportionally add fuel, labor, and track and equipment maintenance charges. Trainset equipment turn analysis indicates that trainsets would average about 1.5 turns per day on every route alternative except Route Alternative 1, where one or potentially two additional trainsets may be required compared to the other route alternatives to account for late-arriving trains and less time for overnight maintenance.

6.1.8 Environmental Concerns: Environmental Impacts

The environmental resources present within the estimated existing ROW and buffer for Route Alternative 1 are identified in Table 6-2.

Table 6-2. Route Alternative 1 Environmental Resources within ROW and Buffer

Environmental Resource	Resources within ROW and Buffer
Named Streams	42 streams (67stream crossings; 22,000 feet of streams)
Floodplain	Mississippi and Missouri River: 191 acres
Wetlands	260 wetlands (190 acres)
Farmland	1,500 acres
Threatened and Endangered Species Critical Habitat	4 Topeka shiner streams
NRHP-listed Properties	3 properties: • Zephaniah Kidder House in Epworth, Iowa • Mills Tower Historic District in Iowa Falls, Iowa • George W. Rogers Company Shot Tower in Dubuque, Iowa
Potential Section 4(f) (may also be Section 6(f)) Properties	29 properties: • 8 forest preserves in Illinois • Upper Mississippi River National Wildlife and Fish Refuge • 1 state preserve and 1 wildlife management area (WMA) in Iowa • 12 city parks in the Chicago area • 3 city parks in Iowa • The aforementioned NRHP-listed properties
Superfund NPL sites	5 sites: • Tri County Landfill in South Elgin, Illinois • Southeast Rockford Groundwater Contamination in Rockford, Illinois • People's Natural Gas in Dubuque, Iowa • Waterloo Sycamore-Elm Street Coal Gasification Plant in Waterloo, Iowa • Omaha Lead Site in Omaha,

With regard to noise, vibration and environmental justice populations, most of the area along Route Alternative 1 in the Chicago urban area (from Chicago to South Elgin, Illinois) is moderately to densely developed residential area. Other substantial residential areas in close proximity to Route Alternative 1 are located in Rockford, Freeport, Lena, and Galena, Illinois; and Dyersville, Waterloo, Webster City, Fort Dodge, and Council Bluffs, Iowa. Route Alternative 1 passes through mostly industrial or lightly developed areas in Dubuque, Iowa.

6.1.9 Environmental Concerns: Right-of-Way

Existing ROW was assumed to be 100 feet wide along the entire 516-mile route alternative. An estimated 35-foot buffer on the north side of existing ROW was assumed to be needed for Route Alternative 1, resulting in approximately 2,200 acres of new ROW that would be required. Of the ROW that would likely be acquired, approximately 600 acres are located in urban areas, and approximately 1,600 acres are located in rural areas.

6.2 ROUTE ALTERNATIVE 2

Route Alternative 2 is south of Route Alternative 1. Route Alternative 2 is owned by UP. This route alternative is 479 miles long between Chicago Union Station and Council Bluffs.

6.2.1 Purpose and Need: Travel Demand

Route Alternative 2 would serve the intermediate major communities of DeKalb, Illinois; and Clinton, Cedar Rapids, and Ames, Iowa. The total population within 20 miles of these intermediate stops is approximately 523,940. Annual ridership and revenue from tickets sold for an assumed initial operation year of 2020 were forecast as:

- 375,000 to 440,000 riders and $14.7 to $17.1 million for 79 mph service
- 415,000 to 485,000 riders and $16.3 to $19.1 million for 90 mph service
- 475,000 to 550,000 riders and $18.9 to $22.0 million for 110 mph service

Ridership and revenue from tickets sold are next to the lowest of the route alternatives. Depending on the speed regime, ridership was estimated at approximately 305,000 to 385,000 fewer riders than Route Alternative 4-A, and revenue from tickets sold was estimated at $9.5 million to $11.9 million less than Route Alternative 4-A; Route Alternative 4-A had the highest estimated ridership and revenue from tickets sold of all alternatives (Table 6-7 includes estimated ridership and revenue from tickets sold data). Route 2 does not meet the purpose and need for travel demand because of low ridership and revenue from tickets sold forecasts.

6.2.2 Purpose and Need: Competitive and Attractive Travel Modes

Route Alternative 2 has travel times that are the fastest of the five route alternatives, and is competitive with personal auto between Chicago and Omaha. Consequently, Route Alternative 2 meets the purpose and need of providing a competitive and attractive travel mode. Route Alternative 2 provides modal interconnectivity at all of its intermediate cities, and terminates at Chicago Union Station, thus meeting the purpose and need for modal interconnectivity.

6.2.3 Technical Feasibility: Passenger and Freight Capacity

Route Alternative 2 did not historically originate at Chicago Union Station, but instead originated at North Western Station, several blocks north and west of Chicago Union Station. However, a connection can be made to main line trackage leading to Chicago Union Station via Route Alternative 3 at or near Western Avenue. This trackage is highly constrained by commuter-train capacity and may require additional infrastructure to accommodate the proposed Chicago-Omaha passenger trains. Slots in the commuter schedules for Chicago-Omaha passenger trains may not be feasible, and schedules for Chicago-Omaha service may

have to be designed to fit around commuter schedules. Freight trains are generally constrained by commuter-train schedules. Track time for maintenance in the commuter-train territory may be constrained by the addition of Chicago-Omaha trains, requiring night-time track maintenance.

Route Alternative 2 is a high-density double- and triple-main-track commuter and freight rail line from Chicago to Elburn, with 56 weekday commuter trains at present and up to 80 freight trains per day. From Elburn to Missouri Valley, Iowa, the route is a high-density, double-main-track, freight-only line, with up to 80 freight trains per day. From Missouri Valley to Council Bluffs, the route is single track, mostly directional eastward, with up to 50 freight trains per day. Most freight trains travel in the fairly narrow speed range of 50 to 60 mph, but speeds of unit coal and grain trains decline to as little as 20 mph on ascending grades. Passenger service operating at 79, 90, or 110 mph would require many instances in a passenger train's trip where it would overtake a freight train. An example of the number of overtakes, assuming hourly freight trains, is presented in Figure 6-1, and the capacity impact of such overtakes is shown in Figure 4-1.

Route Alternative 1's present day track and train-control infrastructure is matched to its freight speeds and traffic density. UP has invested substantial sums since the 1990s to reinstall second main track that had been removed by the Chicago & North Western, to improve wayside signaling, and to replace the Kate Shelley Bridge (Des Moines River) near Boone, Iowa, with a new double-track high bridge. CTC signaling is active from Chicago to Council Bluffs. Industry leads are used to isolate local trains and unit trains working at grain elevators from the main tracks. Grades and curvature are moderate throughout this route.

Route Alternative 2 would likely require the addition of a third main track from the western boundary of the commuter territory to Missouri Valley, and a second main track from Missouri Valley to Council Bluffs, in order to obtain sufficient capacity for passenger trains. Passenger train/passenger train meet/pass events would likely require the addition of sections of fourth main track in order to avoid impedance with freight trains that are frequently closely spaced on the two existing main tracks.

6.2.4 Technical/Economic Feasibility: Alignment

Route Alternative 2 is relatively straight compared to the other route alternatives. However, it has the highest density of freight traffic of all the route alternatives. Addition of a third main track (and fourth main track, in some locations) presents extensive ROW, grading, and grade-crossing challenges. Current standards for UP include a maintenance access road between two of the main tracks where there are three or more main tracks. This is because roadway access is necessary for each track to enable efficient maintenance of track; where there are only two tracks, each track can be accessed from its respective side of the ROW. However, where there are three tracks, the track in the middle has no roadway access. This requires a third main track to be separated from existing double-track by 45 to 50 feet, in order to construct a roadway between the existing two tracks and the new, outer track. This is a major factor driving the complexity of the earthwork along Route Alternative 2.

At industrial spurs, where tracks leave the ROW to serve customers, new connections would need to be established to account for the third main track. With 45- to 50-foot track centers, this would require a substantial realignment of the industrial spur because spurs generally approach the railroad ROW at an angle. By moving the nearest main line 45 feet closer to the

industrial spur, it would be necessary to revise curves and turnouts at each location. In each case, additional crossovers would have to be provided to connect the new passenger track to the existing freight tracks so that freight trains could efficiently access the industrial spurs. Such crossovers come with a high cost, not only for the earthwork and track construction activities, but also from the signaling revisions that would be necessary in the main line.

The only area where the 45-foot track centers might not be required is in the short stretch between Missouri Valley and Council Bluffs, Iowa, where there is only a single track today. A second track would be needed in this area, but it is possible that it could be constructed on 20- or 25-foot centers to the existing track.

The additional space required for the third main track may impinge on many of Route Alternative 2's existing rail-served customers located within the footprint of the third main track required to provide sufficient capacity for passenger trains. Relocation of industrial customers, or shifting of all main tracks to enable the tracks to skirt the footprint of industrial customers, may be required. This may be difficult in urban areas where industrial customers are located on both sides of the main tracks.

6.2.5 Technical/Economic Feasibility: Structures

Major structures on Route Alternative 2 are the Mississippi River Bridge at Clinton, Iowa, and the Kate Shelly High Bridge over the Des Moines River. The Mississippi River Bridge is a swing-span bridge that opens approximately eight times per day. In each case, there is only a two-track bridge and, in each case, an additional bridge would likely be required to avoid freight train congestion at either end of the bridge that would occur if the route narrowed from three to two main tracks to cross the bridges. These are major structures because of their size and, in the case of the Mississippi River bridge at Clinton, a new bridge would likely be required to be high-level to avoid hindrance to river navigation.

6.2.6 Technical/Economic Feasibility: Grade Crossings

Grade crossings on Route Alternative 2 present a distinct challenge where the new track is 45 feet or more away from the existing tracks. In this case, the distance between the two outside tracks would be in excess of 60 feet. Because railroad tracks are often higher than the surrounding roadway, the width of the "hump" at the grade crossings would be substantial, and the roadway profile at each crossing would also require substantial revision to account for the wider hump at the tracks. Finally, the existing grade crossing warning devices would require renewal; because the electric circuitry on each track is interconnected, the addition of a third track would necessitate revisions to the existing circuitry that would require new equipment in order to provide continuity of grade-crossing signal protection during construction, testing, and cut-over of new grade-crossing signal equipment.

6.2.7 Economic Feasibility

Route Alternative 2 presents many technical challenges and has an estimated cost that is approximately $1,005,000,000 more than Route Alternative 4, the least expensive route alternative. The major factors that contribute to the complexity are:

- The additional, third track located 45 feet away from the existing tracks and the associated earthwork. This would extend for well over 400 miles.

- Substantial modifications to industrial spurs and potential relocations of industrial customers necessitated by the wide track centers.
- New signaling systems for all three tracks for the entire route alternative extending over 400 miles.
- Two major bridges.

Route Alternative 2 has no outstanding operating, maintenance, or equipment cost differentiators compared to Route Alternatives 4, 5, and 4-A, except for a greater complexity of control points (track and signal systems) and wayside and grade-crossing signal systems compared to Route Alternatives 1, 4, and 4-A. Trainset equipment turn analysis indicates that trainsets would average about 1.5 turns per day on this route alternative. Trainset requirements are similar to Route Alternatives 4, 5, and 4-A, and potentially two fewer trainsets are required than Route Alternative 1.

6.2.8 Environmental Concerns: Environmental Impacts

The environmental resources present within the estimated existing ROW and buffer for Route Alternative 2 are identified in Table 6-3.

Table 6-3. Route Alternative 2 Environmental Resources within ROW and Buffer

Environmental Resource	Resources within ROW and Buffer
Named Streams	29 streams (45 stream crossings; 10,700 feet of streams)
Floodplain	Mississippi and Missouri River: 61 acres
Wetlands	320 wetlands (250 acres)
Farmland	2,120 acres
Threatened and Endangered Species Critical Habitat	4 Topeka shiner streams
NRHP-listed Properties	3 properties: • American Express Building in Carroll, Iowa • Chicago & North Western Passenger Depot and Baggage Room in Carroll, Iowa • Chicago & North Western Railway Power House in Chicago, Illinois.
Potential Section 4(f) (may also be Section 6(f)) Properties	31 properties: • 8 forest preserves in Illinois • Upper Mississippi River National Wildlife and Fish Refuge • 1 state park and 1 natural area in Illinois • 3 WMAs and 1 natural area in Iowa • 11 city parks in Illinois • 2 city parks in Iowa • The aforementioned NRHP-listed sites
Superfund NPL sites	4 sites: • Kerr-McGee Reed-Keppler Park in West Chicago, Illinois • Kerr-McGee Sewage Treatment Plant in West Chicago, Illinois • Lawrence Todtz Farm in Comanche, Illinois • Omaha Lead Site in Omaha, Nebraska

Most of the area along Route Alternative 2 in the Chicago urban area (from Chicago to West Chicago, Illinois) is moderately to densely developed residential area. Other substantial residential areas in close proximity to Route Alternative 2 are located in DeKalb, Dixon, Sterling, and Morrison, Illinois; and Nevada, Ames, Boone, and Council Bluffs, Iowa. Route Alternative 2 passes through mostly industrial or lightly developed areas in Clinton, Cedar Rapids, Tama, Marshalltown, and Carroll, Iowa. The closest residential area near the existing Amtrak Station in Omaha is located about 400 feet south of the rail line.

6.2.9 Environmental Concerns: Right-of-Way

Existing ROW was assumed to be 100 feet along the entire 479-mile route alternative. An estimated 55-foot buffer on the north side of existing ROW was assumed to be needed for Route Alternative 2, resulting in approximately 3,200 acres of new ROW that would be required. Of the ROW that would likely be acquired, approximately 950 acres are located in urban areas, and approximately 2,250 acres are located in rural areas.

6.3 ROUTE ALTERNATIVE 4

Route Alternative 4 is currently owned by three railroads. The Regional Transportation Authority (Illinois), operated by Metra, owns the route from La Salle Street Station (the line's terminus) to Joliet, Illinois. CSX Transportation owns the route from Joliet to Bureau, Illinois, but leases Utica to Bureau, Illinois, to IAIS. IAIS owns the route from Bureau, Illinois, to Council Bluffs. IAIS has trackage rights over CSX and Metra to Blue Island, Illinois. Originally, the entirety of this route was owned by the Rock Island. Upon the Rock Island's bankruptcy in 1980, the route was sold, in pieces, to Metra and predecessor companies of CSX and IAIS. This route alternative is 490 miles long between Chicago Union Station and Council Bluffs.

6.3.1 Purpose and Need: Travel Demand

Route Alternative 4 would serve the intermediate major communities of Joliet and Moline (one of the Quad Cities), Illinois; and Iowa City and Des Moines, Iowa. The total population within 20 miles of these intermediate stops is approximately 1,034,000. Annual ridership and revenue from tickets sold for an assumed initial operation year of 2020 were forecast as:

- 640,000 to 745,000 riders and $22.9 to $26.7 million for 79 mph service
- 690,000 to 805,000 riders and $24.9 to $29.1 million for 90 mph service
- 755,000 to 885,000 riders and $27.6 to $32.2 million for 110 mph service

Ridership and revenue from tickets sold are second highest of the route alternatives. Depending on the speed regime, ridership was estimated at approximately 40,000 to 50,000 fewer riders than Route Alternative 4-A, and revenue from tickets sold was estimated at $1.3 million to $1.7 million less than Route Alternative 4-A; Route Alternative 4-A had the highest estimated ridership and revenue from tickets sold of all alternatives (Table 6-7 includes estimated ridership and revenue from tickets sold data). Route 4 meets the purpose and need for travel demand.

6.3.2 Purpose and Need: Competitive and Attractive Travel Modes

Route Alternative 4 has travel times that are nearly as fast as Route Alternatives 4-A and 5, and is competitive with personal auto between Chicago and Omaha. Consequently, Route

Alternative 4 meets the purpose and need of providing a competitive and attractive travel mode. Route Alternative 4 provides modal interconnectivity at all of its intermediate cities, but does not terminate at Chicago Union Station, unless a connection is made from its route to La Salle Street Station to Chicago Union Station. This connection would be costly, have impacts on urban areas that the connection would be constructed through, and is not practical. Absent this connection, Route Alternative 4 provides substantially less modal interconnectivity at Chicago and therefore does not meet the purpose and need.

6.3.3 Technical Feasibility: Passenger and Freight Capacity

Route Alternative 4 did not historically originate at Chicago Union Station, but instead originated at La Salle Street Station, several blocks south and to the east of Union Station. There are several potential locations where a connection could be constructed from Route Alternative 4 to main line trackage that leads to Chicago Union Station; however these would require extensive acquisition of urban property, which would be costly and disruptive to neighborhoods, and are not considered to be practical.

Route Alternative 4 is a high-density commuter railroad from Chicago to Joliet, Illinois. There is little freight traffic between Chicago and Blue Island, where most CSX and IAIS freight trains enter and exit Route Alternative 4. Freight traffic is constrained by commuter-train schedules between Blue Island and Joliet. The Chicago to Joliet is highly constrained by commuter-train capacity and may require additional infrastructure to accommodate the proposed Chicago-Omaha passenger trains. Slots in the commuter schedules for passenger trains may not be feasible, and schedules for Chicago-Omaha service may have to be designed to fit around commuter schedules. Track time for maintenance in the commuter-train territory may be constrained by the addition of Chicago-Omaha trains, requiring night-time track maintenance.

From Joliet west through the Quad Cities to Homestead Junction, Iowa, approximately 20 miles west of Iowa City, Route Alternative 4 is a moderate-density, moderate-speed (40 mph) freight-only railroad. At Homestead Junction, freight traffic from the industrialized Cedar Rapids area enters the route for movement east. The Quad Cities is heavily congested as three railroads (IAIS, BNSF, and CP) converge to switch industries and interchange cars on a single main track that also serves as the switch lead to two railroad yards.

West of Homestead Junction, Route Alternative 4 is low-density except at Des Moines, where it crosses Union Pacific Railroad's "Spine Line" that runs between Kansas City and Minneapolis-St. Paul, in a rail terminal that has considerable congestion caused by industrial switching, yard switching, and interchange. Many freight trains operating on this route alternative exceed the length of the sidings, and freight/train meet/pass events are often conducted at terminals instead of at sidings. As part of the operations analysis conducted in 2010 in support of the Chicago to Iowa City High Speed Rail Service Development Plan, it was determined that the line was at capacity for the existing freight traffic between Wyanet and Iowa City, and the addition of two round trip passenger trains, would tax the existing system and require the addition of several sidings as well as and a second main track through the Quad Cities Terminal.

Route Alternative 4's present-day track and train-control infrastructure is matched to its freight speeds and traffic density. CTC is active from Chicago to Joliet. From Joliet to Council Bluffs, the wayside signal system has been deactivated and trains are operated by

TWC. Sidings of sufficient length to meet-and-pass freight trains are located at 25- to 50-mile spacing; however, most sidings and the parallel main track at siding locations have industry leads off them and thus are used also for switching industries. Grades on Route Alternative 4 are moderate and curvature is light except in two locations: the first is where the route follows the Illinois River from Joliet to Bureau, and the second is between Des Moines and Atlantic, Iowa.

Route Alternative 4 would likely require the addition of a second main track from Joliet to Homestead Junction to afford sufficient capacity for passenger trains to have the desired speed and reliability, and to enable freight trains to continue to serve industries. Between Homestead Junction and Council Bluffs, a second main track may only be required in locations where industries are located, with sidings of sufficient length for freight trains at intervals sufficient for efficient operation of freight trains, as well as second main track through the Des Moines terminal. Because there are numerous at-grade crossings on this route alternative, sidings cannot hold freight trains for long periods of time for passenger train meet/pass events. It may be more feasible to construct long sections of second main track, instead of sidings, so that freight trains can make rolling meets with passenger trains and avoid blocking crossings for extended periods of time.

6.3.4 Technical/Economic Feasibility: Alignment

The alignment for this route alternative does not access Chicago Union Station, but instead serves La Salle Street Station, several blocks south and east of Chicago Union Station. La Salle Street is a stub-end station (trains enter and leave only from the station) that serves Metra commuter trains only. Chicago Union Station is a through station (trains can enter or leave from both the south and the north, or continue through the station in one direction), and serves Metra commuter trains as well as Amtrak long-distance and regional trains. Chicago Union Station is Amtrak's Midwest hub, as well as the proposed hub for the Midwest Regional Rail System, and thus offers connectivity among existing and proposed future passenger-rail routes that is not afforded by La Salle Street Station.

Chicago Union Station is directly served by Route Alternative 5 (from the south) and can be served by Route Alternatives 1 and 2. Route Alternative 4 approaches Chicago's downtown core from its south side and at four locations could potentially connect to rail lines that would afford direct access to Chicago Union Station:

- At Joliet, Route Alternative 4 crosses the BNSF transcontinental freight main line and UP's Chicago-St. Louis line at grade. A connection track constructed in the northwest quadrant of this crossing would afford access to either the BNSF or UP. This would in turn require use of either the Belt Railway of Chicago at McCook, or a connection at the Western Avenue corridor crossing, to obtain access to Route Alternative 5 to Union Station. The Joliet connection would occur through the Joliet downtown district and must mitigate heavy freight train traffic either on BNSF, the Belt Railway of Chicago, or the Western Avenue Corridor, and is not practical.
- At Englewood, Route Alternative 4 crosses the Norfolk Southern line to Union Station (used by Amtrak long-distance trains). A connection track constructed in the northwest quadrant would obtain access to Chicago Union Station. The Englewood connection would occur across an intersection of Interstate Highways

90 and 94, and two Chicago Transit Authority heavy-rail rapid transit lines, or alternatively, west of I-90 through approximately 15 blocks of residential neighborhood, and is not practical.

- At West 40th Street, Route Alternative 4 junctions with an NS freight line that runs west to Ashland Avenue Yard. Approximately ½ mile to the west, this freight line passes under the NS route to Chicago Union Station used by Amtrak long-distance trains. A connection track constructed in the northeast quadrant would obtain access to Chicago Union Station. This connection would occur in an industrial neighborhood, but present significant challenges to overcome vertical differential with surface streets, and must mitigate heavy freight traffic on the NS line to Ashland Avenue. This connection is not practical.
- Immediately south of La Salle Street Station, Route Alternative 4 could connect to Route Alternative 5 by constructing a connection through either residential neighborhoods or a park, and crossing the South Branch of the Chicago River. This connection is not practical.

The alignment for this route alternative is favorable for high speed rail except along the Illinois River, and between Des Moines and Atlantic, Iowa, where it is moderately curved. The most favorable characteristic is that between Joliet and West Liberty, Iowa (approximately 15 miles east of Iowa City), the route was expanded to two main tracks in the 1900-1950 era, but one track has since been removed. Though the proposed second track would be approximately 20 to 25 feet from the existing track, the original embankment could be incorporated as part of the new earthwork, thus generating potentially substantial savings.

West of West Liberty, entirely new embankment would have to be constructed for the second track. Unlike Route Alternatives 2 and 5, however, because there is only one track currently in existence, there is no need for an access road between tracks; both the existing and new tracks could be accessed from their respective sides of the ROW.

Because of the 20 to 25-foot track centers, the revisions associated with industrial spurs would be less substantial compared with those route alternatives that would build the new track on 45-foot centers to the existing tracks. This is because the narrower track centers create less disruption to the geometry of the existing spur tracks.

Because of the limited capacity and low speeds of the existing track and the lack of signal infrastructure, substantial additional construction would be required. Where the existing main track can be used, it would require heavy upgrade. Second main track at 25-foot track centers is feasible in most places without heavy earthwork.

6.3.5 Technical/Economic Feasibility: Structures

Route Alternative 4 presents a favorable situation with respect to major structures, with only one major structure, the double-track, swing-span, Government Bridge across the Mississippi River. A new structure across the Mississippi River is likely to not be required because the existing bridge has two tracks, though the second track is not at present in place across the fixed approach spans. Detailed analysis of the main Mississippi River span and approach spans has not been conducted to determine their continued long-term capability for service without substantial repair, rehabilitation, or replacement, but during the prior Chicago-Iowa City study work, no serious issues were identified.

At the moveable span itself, a small section of second track remains. This is crucial because this track would likely be "grandfathered" with respect to marine clearance requirements, meaning that no clearance variance would be required here as would likely be required by the U.S. Coast Guard for additional tracks across the Mississippi River on Route Alternatives 1, 2 and 5. All the more important is the fact that constructing a new moveable span would be, by far, the most expensive portion of a new structure.

Unlike many of the other route alternatives, a major structure would likely be required at Des Moines, to provide a grade separation of Route Alternative 4 with the north-south oriented UP Spine Line that at present crosses Route Alternative 4 at grade, and also serves a large regional classification yard. This intersection is heavily used at present, with many trains each day on the UP route, and continuous switching of UP's Des Moines yard and industries. Construction of a grade separation may require replacement of lost yard capacity track if there is insufficient room for the new track and approaches.

6.3.6 Technical/Economic Feasibility: Grade Crossings

Grade crossings on Route Alternative 4 present no exceptional challenges when compared to other route alternatives. Because many of the grade crossings of Route Alternative 4 already have roadway geometry and side entrances arranged for the now-missing second main track, it is expected that the addition of a second main track at grade crossings at a 25-foot track center would not be a major technical hurdle. While there would be impacts on the existing grade-crossing circuitry and the roadway profiles, the costs would be modest.

6.3.7 Economic Feasibility

Route Alternative 4 is the least expensive route alternative compared to other route alternatives. This is chiefly because:

- Much of the route was previously constructed as double track, and the embankment can be reused
- Where required, a new second main track could be at 25-foot centers while still allowing for maintenance access to each track, translating to lower construction complexity and thus lower construction costs, than those route alternatives that currently have two tracks and that would require a third track, at 45-foot track centers.
- The existing Mississippi River Bridge is double-track.
- Only one major structure is likely to be required: a grade-separation at Des Moines.

Route Alternative 4 has no outstanding operating, maintenance, or equipment cost differentiators compared to Route Alternatives 1, 2, 5, and 4-A, and is substantially shorter than Route Alternative 1. Trainset equipment turn analysis indicates that trainsets would average about 1.5 turns per day on this route alternative. Trainset requirements are similar to Route Alternatives 2, 5, and 4-A, and potentially two fewer trainsets are required than Route Alternative 1.

6.3.8 Environmental Concerns: Environmental Impacts

The environmental resources present within the estimated existing ROW and buffer for Route Alternative 4 are identified in Table 6-4.

Table 6-4. Route Alternative 4 Environmental Resources within ROW and Buffer

Environmental Resource	Resources within ROW and Buffer
Named Streams	41 streams (52 stream crossings; 21,200 feet of streams)
Floodplain	Mississippi and Missouri River: 40 acres
Wetlands	280 wetlands (190 acres)
Farmland	1,240 acres
Threatened and Endangered Species Critical Habitat	1 Topeka shiner stream
NRHP-listed Properties	9 properties: • Chicago, Rock Island & Pacific Railroad Depot in Marseilles, Illinois • Colonel Joseph Young Block in Davenport, Iowa • Littig Brothers Eagle Brewery in Davenport, Iowa • City Market in Davenport, Iowa • Bonaventura Heinz House in Davenport, Iowa • Adair Viaduct in Adair, Iowa • Chicago, Rock Island & Pacific Railroad Passenger Station in Iowa City, Iowa • Chicago, Rock Island, &Pacific Railroad Depot in Wilton, Iowa • Chicago, Rock Island, &Pacific Railroad Passenger Depot in Council Bluffs, Iowa
Potential Section 4(f) (may also be Section 6(f)) Properties	27 properties: • 5 forest preserves in Illinois • 1 state park and 5 city parks in Illinois • 7 city parks in Iowa • The aforementioned NRHP-listed sites
Superfund NPL sites	7 sites: • BP Amoco Chemical Company in Channahon, Illinois • Mattheisen Hegler Zinc in La Salle, Illinois • Ottawa City Landfill in La Salle, Illinois • Mobil Mining and Minerals in De Pue, Illinois • Des Moines TCE (trichloroethylene) in Des Moines, Iowa • Railroad Avenue Groundwater Contamination in Des Moines, Iowa • Omaha Lead Site in Omaha, Nebraska

Most of the area along Route Alternative 4 in the Chicago urban area (from Chicago to Joliet, Illinois) is moderately to densely developed residential area. Other substantial residential areas in close proximity to Route Alternative 4 are located in Morris, Marseilles, Ottawa, La Salle, Peru, Silvis, East Moline, and Moline, Illinois; and Davenport, Iowa City, and Grinnell, Iowa. Route Alternative 4 passes through mostly industrial or lightly developed areas in Geneseo, Illinois; and Newton, Des Moines, Atlantic, and Council Bluffs, Iowa. The

closest residential area near the existing Amtrak Station in Omaha is located about 400 feet south of the rail line.

6.3.9 Environmental Concerns: Right-of-Way

Existing ROW was assumed to be 100 feet along the entire 490-mile route alternative. An estimated 35-foot buffer on the north side of existing ROW was assumed to be needed for Route Alternative 4, resulting in approximately 2,100 acres of new ROW that would be required. Of the ROW that would likely be acquired, approximately 800 acres are located in urban areas, and approximately 1,300 acres are located in rural areas.

6.4 ROUTE ALTERNATIVE 5

Route Alternative 5 is now owned entirely by BNSF except for trackage immediately at Chicago Union Station. It is the southernmost of the route alternatives under consideration, extending from Chicago southward to Galesburg, Illinois, then west to Pacific Junction, Iowa, and then due north to Council Bluffs. This route alternative is 496 miles long between Chicago Union Station and Council Bluffs. The route is used by Amtrak's *California Zephyr* between Chicago and Pacific Junction, Iowa, and then a BNSF line on the west bank of the Missouri River near Plattsmouth, Nebraska, to access Omaha, bypassing Council Bluffs.

6.4.1 Purpose and Need: Travel Demand

Route Alternative 5 would serve the intermediate major communities of Naperville and Galesburg, Illinois, and Burlington and Osceola, Iowa. The total population within 20 miles of these intermediate stops is approximately 167,000. Annual ridership and revenue from tickets sold for an assumed initial operation year of 2020 were forecast as:

- 255,000 to 295,000 riders and $11.2 to $13.0 million for 79 mph service
- 285,000 to 330,000 riders and $12.5 to $14.5 million for 90 mph service
- 315,000 to 370,000 riders and $14.3 to $16.6 million for 110 mph service

Ridership and revenue from tickets sold are lowest of the route alternatives (Table 6-7 includes estimated ridership and revenue from tickets sold data). Depending on the speed regime, ridership was estimated at approximately 425,000 to 565,000 fewer riders than Route Alternative 4-A, and revenue from tickets sold was estimated at $13.0 million to $17.3 million less than Route Alternative 4-A; Route Alternative 4-A had the highest estimated ridership and revenue from tickets sold of all alternatives (Table 6-7 includes estimated ridership and revenue from tickets sold data). Route Alternative 5 does not meet the purpose and need for travel demand with only a range of 255,000 to 370,000 riders.

6.4.2 Purpose and Need: Competitive and Attractive Travel Modes

Route Alternative 5 has travel times that are the third fastest, and nearly as fast as Route Alternatives 2 and 4-A, and is competitive with personal auto between Chicago and Omaha. Consequently, Route Alternative 5 meets the purpose and need of providing a competitive and attractive travel mode. Although Route Alternative 5 serves Chicago Union Station, it provides substantially less modal interconnectivity at intermediate cities than Route Alternatives 1, 2, 4, and 4-A, and thus does not meet the purpose and need for modal interconnectivity.

6.4.3 Technical Feasibility: Passenger and Freight Capacity

Route Alternative 5 originates at Chicago Union Station, the proposed hub of the Midwest Regional Rail System, and provides a triple-track route as far west as Aurora, the western end of commuter-rail service. This trackage is highly constrained by commuter-train capacity and may require additional infrastructure to accommodate the proposed Chicago-Omaha passenger trains. Slots in the commuter schedules for Chicago-Omaha passenger trains may not be feasible, and schedules for Chicago-Omaha service may have to be designed to fit around commuter schedules. Freight trains are generally constrained by commuter-train schedules. Track time for maintenance in the commuter-train territory may be constrained by the addition of Chicago-Omaha trains, requiring night-time track maintenance.

Route Alternative 5 is a high-density double- and triple-main-track commuter and freight rail line from Chicago to Aurora, with 64 weekday commuter trains at present and up to 50 freight trains per day, as well as four Amtrak long-distance and four Amtrak regional passenger trains daily. From Aurora to Galesburg, Illinois, the route has moderate-density freight traffic and eight Amtrak trains per day, but freight traffic includes coal trains that are frequently staged in this section on one of the two main tracks, while awaiting connection or commuter-train slots in Chicago. From Galesburg to Pacific Junction, Iowa (approximately 15 miles south of Council Bluffs), the route is mostly double-main-track, freight-only, with up to 50 freight trains per day. From Pacific Junction to Council Bluffs, the route is single track, with 4 to 6 freight trains per day. Most freight trains travel in the fairly narrow speed range of 50 to 60 mph, but speeds of unit coal and grain trains decline to as little as 20 mph on ascending grades. Passenger service operating at 79, 90, or 110 mph would require many instances in passenger train's trip where it would overtake a freight train. An example of the number of overtakes, assuming hourly freight trains, is presented in Figure 6-1, and the capacity impact of such overtakes is shown in Figure 4-1.

Route Alternative 5's present day track and train-control infrastructure is matched to its freight speeds and traffic density. CTC signaling or current-of-traffic Automatic Block Signals are active from Chicago to Pacific Junction. From Pacific Junction to Council Bluffs, the main track is operated by TWC. Industry leads are used to isolate local trains and unit trains working at grain elevators from the main tracks between Chicago and Pacific Junction. Grades and curvature are moderate throughout this route.

Route Alternative 5 would likely require the addition of a third main track from the western boundary of the commuter territory to Pacific Junction, and a second main track from Pacific Junction to Council Bluffs, in order to obtain sufficient capacity for passenger trains. Passenger train/passenger train meet/pass events would likely require the addition of sections of a fourth main track in order to avoid impedance with freight trains that are frequently closely spaced on the two existing main tracks.

6.4.4 Technical/Economic Feasibility: Alignment

Route Alternative 5 is relatively straight compared to the other route alternatives, though not as straight as Route Alternative 2. However, it has the second-highest density of freight traffic of the route alternatives. Addition of a third main track (and fourth main track, in some locations) presents extensive ROW, grading, and grade-crossing challenges. Current standards for BNSF include a maintenance access road between two of the main tracks where there are three or more main tracks. This is because roadway access is necessary for each

track to enable efficient maintenance of track; where there are only two tracks, each track can be accessed from its respective side of the ROW. However, where there are three tracks, the track in the middle has no roadway access. This requires a third main track to be separated from existing double-track by 45 to 50 feet, in order to construct a roadway between the existing two tracks and the new, outer track. This is a major factor driving the complexity of the earthwork along Route Alternative 5.

At industrial spurs, where tracks leave the ROW to serve customers, new connections would need to be established to account for the third main track. With 45- to 50-foot track centers, this would require a substantial realignment of the industrial spur because spurs generally approach the railroad ROW at an angle. By moving the nearest main line 45 feet closer to the industrial spur, it would be necessary to revise curves and turnouts at each location. In each case, additional crossovers would have to be provided to connect the new passenger track to the existing freight tracks so that freight trains could efficiently access the industrial spurs. Such crossovers come with a high cost, not only for the earthwork and track construction activities, but also from the signaling revisions that would be necessary in the main line.

The only area where the 45-foot track centers might not be required is in the short stretch between Pacific Junction and Council Bluffs, Iowa, where there is only a single track today. A second track would be needed in this area, but it is possible that it could be constructed on 20- or 25-foot centers to the existing track.

The additional space required for the third main track may impinge on many of Route Alternative 5's existing rail-served customers located within the footprint of the third main track required to provide sufficient capacity for passenger trains. Relocation of industrial customers, or shifting of all main tracks to enable the tracks to skirt the footprint of industrial customers, may be required. This may be difficult in urban areas where industrial customers are located on both sides of the main tracks.

Route Alternative 5 passes through hilly terrain in southern Iowa and has many stream crossings. Addition of a third main track presents numerous challenges for side-hill cuts, fills, and stream crossings.

6.4.5 Technical/Economic Feasibility: Structures

The only major structure on Route Alternative 5 is the Mississippi River Bridge at Burlington, Iowa. The Mississippi River Bridge is a double-track, lift-span bridge that opens approximately eight times per day. BNSF has recently renewed this bridge and the fixed approach spans. Train speeds to the west of the bridge are slow due to curvature, urban development, and industrial development. An additional bridge would likely be required to avoid freight train congestion at either end of the bridge that would occur if the route narrowed from three to two main tracks at the bridge. A new bridge would likely be required to have high clearance to avoid hindrance to river navigation.

6.4.6 Technical/Economic Feasibility: Grade Crossings

Grade crossings on Route Alternative 5 present a distinct challenge where the new track is 45 feet or more away from the existing tracks. In this case, the distance between the two outside tracks would be in excess of 60 feet. Because railroad tracks are often higher than the surrounding roadway, the width of the "hump" at the grade crossings would be substantial,

and the roadway profile at each crossing would also require substantial revision to account for the wider hump at the tracks. Finally, the existing grade crossing warning devices would require renewal; because the electric circuitry on each track is interconnected, the addition of a third track would necessitate revisions to the existing circuitry that would require new equipment in order to provide continuity of grade-crossing signal protection during construction, testing, and cut-over of new grade-crossing signal equipment.

6.4.7 Economic Feasibility

Route Alternative 5 presents many technical challenges and has an estimated cost that is approximately $1,230,600,000 more than Route Alternative 4, the least expensive route alternative. The major factors that contribute to the complexity are:

- The additional, third track located 45 feet away from the existing tracks and the associated earthwork. This would extend for well over 400 miles. This track would require heavy earthwork due to the hilly terrain of southern Iowa, and has numerous drainage crossings requiring bridging.
- Substantial modifications to industrial spurs and potential relocations of industrial customers necessitated by the wide track centers.
- New signaling systems for all three tracks for the entire route alternative extending over 400 miles.
- One major bridge.

Route Alternative 5 has no outstanding operating, maintenance, or equipment cost differentiators compared to Route Alternatives 2, 4, and 4-A, except for a greater complexity of control points (track and signal systems) and wayside and grade-crossing signal systems compared to Route Alternatives 1, 4, and 4-A. Trainset equipment turn analysis indicates that trainsets would average about 1.5 turns per day on this route alternative. Trainset requirements are similar to Route Alternatives 2, 4, and 4-A, and potentially two fewer trainsets are required than Route Alternative 1.

6.4.8 Environmental Concerns: Environmental Impacts

The environmental resources present within the estimated existing ROW and buffer for Route Alternative 5 are identified in Table 6-5.

Table 6-5. Route Alternative 5 Environmental Resources within ROW and Buffer

Environmental Resource	Resources within ROW and Buffer
Named Streams	48 streams (74 stream crossings; 19,000 feet of streams)
Floodplain	Mississippi and Missouri River: 160 acres
Wetlands	340 wetlands (210 acres)
Farmland	2,030 acres
Threatened and Endangered Species Critical Habitat	None
NRHP-listed Properties	2 properties: • Chicago, Burlington, & Quincy Depot in Red Oak, Iowa • Chicago, Rock Island, & Pacific Railroad Passenger Depot in Council Bluffs, Iowa
Potential Section 4(f) (may also be Section 6(f)) Properties	25 properties: • 4 forest preserves in Illinois • 1 state forest and 1 WMA in Iowa • 2 county parks in Iowa • 15 city parks in Illinois • The aforementioned NRHP-listed sites
Superfund NPL sites	3 sites: • Iowa Army Ammunition Plant in Burlington, Iowa • Fairfield Coal Gasification Plant in Fairfield, Iowa • Omaha Lead Site in Omaha, Nebraska

The area along Route Alternative 5 in the Chicago urban area (from Chicago to Montgomery, Illinois) is a mix of industrial, commercial, and moderately to densely developed residential area. Other substantial residential areas in close proximity to Route Alternative 5 are located in Plano and Galesburg, Illinois. The urban areas of Somonauk, Mendota, Princeton, and Kewanee, Illinois; and Burlington, Mount Pleasant, Fairfield, Ottumwa, Osceola, Red Oak, Glenwood, and Council Bluffs, Iowa, are all a mix of industrial, commercial, and open space areas, with no substantial urban areas near the rail corridor. The closest residential area near the existing Amtrak Station in Omaha is located about 400 feet south of the rail line.

6.4.9 Environmental Concerns: Right-of-Way

Existing ROW was assumed to be 100 feet along the entire 496-mile route alternative. An estimated 50-foot buffer on the south side of existing ROW was assumed to be needed for Route Alternative 5, resulting in approximately 3,000 acres of new ROW that would be required. Of the ROW that would likely be acquired, approximately 850 acres are located in urban areas, and approximately 2,150 acres are located in rural areas.

6.5 ROUTE ALTERNATIVE 4-A

Route Alternative 4-A is composed of Route Alternative 5 between Chicago and Wyanet, Illinois, and Route Alternative 4 between Wyanet and Council Bluffs. This route alternative is 474 miles long between Chicago Union Station and Council Bluffs.

6.5.1 Purpose and Need: Travel Demand

Route Alternative 4-A would serve the intermediate major communities of Naperville and Moline, Illinois (one of the Quad Cities), and Iowa City and Des Moines, Iowa, which are the same communities served by Route Alternative 4 with the exception of Naperville, which is served by Route Alternative 5. The total population within 20 miles of these intermediate stops is approximately 1,034,000, the same population as Route Alternative 4. Annual ridership and revenue from tickets sold for an assumed initial operation year of 2020 were forecast as:

- 680,000 to 795,000 riders and $24.2 to $28.3 million for 79 mph service
- 735,000 to 855,000 riders and $26.4 to $30.8 million for 90 mph service
- 800,000 to 935,000 riders and $29.1 to $33.9 million for 110 mph service

Ridership and revenue from tickets sold are the highest of the route alternatives. Route 4-A meets the purpose and need for travel demand.

6.5.2 Purpose and Need: Competitive and Attractive Travel Modes

Route Alternative 4-A has travel times that are the second fastest, and is competitive with personal auto between Chicago and Omaha. Consequently, Route Alternative 4-A meets the purpose and need of providing a competitive and attractive travel mode. Route Alternative 4-A provides modal interconnectivity at all of its intermediate cities and serves Chicago Union Station, thus meeting the purpose and need for modal interconnectivity.

6.5.3 Technical Feasibility: Passenger and Freight Capacity

Route Alternative 4-A originates at Chicago Union Station, the proposed hub of the Midwest Regional Rail System, and provides a triple-track route as far west as Aurora, the western end of commuter-rail service. This trackage is highly constrained by commuter-train capacity and may require additional infrastructure to accommodate the proposed Chicago-Omaha passenger trains. Slots in the commuter schedules for Chicago-Omaha passenger trains may not be feasible, and schedules for Chicago-Omaha service may have to be designed to fit around commuter schedules. Freight trains are generally constrained by commuter-train schedules. Track time for maintenance in the commuter-train territory may be constrained by the addition of Chicago-Omaha trains, requiring night-time track maintenance.

Route Alternative 4-A is a high-density double- and triple-main-track commuter and freight rail line from Chicago to Aurora, with 64 weekday commuter trains at present and up to 50 freight trains per day, as well as four Amtrak long-distance and four Amtrak regional passenger trains daily. From Aurora to Wyanet, Illinois, the route has moderate-density freight traffic and eight Amtrak trains per day, but freight traffic includes coal trains that are frequently staged in this section on one of the two main tracks, while awaiting connection or commuter-train slots in Chicago. From Wyanet west through the Quad Cities to Homestead Junction, Iowa, approximately 20 miles west of Iowa City, Route Alternative 4-A is a

moderate-density, moderate-speed (40 mph) freight-only railroad. At Homestead Junction, freight traffic from the industrialized Cedar Rapids area enters the route for movement east. The Quad Cities is heavily congested as three railroads (IAIS, BNSF, and CP) converge to switch industries and interchange cars on a single main track that also serves as the switch lead to two yards.

West of Homestead Junction, Route Alternative 4-A is low-density except at Des Moines, where it crosses Union Pacific Railroad's "Spine Line" that runs between Kansas City and Minneapolis-St. Paul, in a rail terminal that has considerable congestion caused by industrial switching, yard switching, and interchange. Many freight trains operating on this route alternative exceed the length of the sidings, and freight/train meet/pass events are often conducted at terminals instead of at sidings. As part of the operations analysis conducted in 2010 in support of the Chicago to Iowa City High Speed Rail Service Development Plan, it was determined that the line was at capacity for the existing freight traffic between Wyanet and Iowa City, and the addition of two round trip passenger trains would tax the existing system and require the addition of several sidings and a second main track through the Quad Cities Terminal.

Route Alternative 4-A's present-day track and train-control infrastructure is matched to its freight speeds and traffic density. CTC is active from Chicago to Wyanet on this two-main-track, and generally straight and flat portion of the route. From Wyanet to Council Bluffs, the wayside signal system has been deactivated and trains are operated by TWC. West of Wyanet, sidings of sufficient length to meet-and-pass freight trains are located at 25- to 50-mile spacing; however, most sidings and the parallel main track at siding locations have industry leads off them and thus are used also for switching industries. Grades on Route Alternative 4-A are moderate and curvature is light, except between Des Moines and Atlantic, Iowa.

Route Alternative 4-A would likely require the addition of a third main track from Aurora to Wyanet, and a second main track from Wyanet to Homestead Junction, to afford sufficient capacity for passenger trains to have the desired speed and reliability, and to enable freight trains to continue to serve industries. Between Homestead Junction and Council Bluffs, a second main track may only be required in locations where industries are located, with sidings of sufficient length for freight trains at intervals sufficient for efficient operation of freight trains, as well as second main track through the Des Moines terminal. Because there are numerous at-grade crossings on this route alternative, sidings cannot hold freight trains for long periods of time for passenger train meet/pass events. It may be more feasible to construct long sections of second main track, instead of sidings, so that freight trains can make rolling meets with passenger trains and avoid blocking crossings for extended periods of time.

6.5.4 Technical/Economic Feasibility: Alignment

The alignment for this route alternative is favorable for high speed rail except between Des Moines and Atlantic, Iowa, where it is moderately curved. The most favorable characteristic is that between Wyanet and West Liberty, Iowa (approximately 15 miles east of Iowa City), the route was expanded to two main tracks in the 1900-1950 era, but one track has since been removed. Though the proposed second track would be approximately 20 to 25 feet from the

existing track, the original embankment could be incorporated as part of the new earthwork, thus generating potentially substantial savings.

West of West Liberty, entirely new embankment would have to be constructed for the second track. Unlike Route Alternatives 2 and 5, however, because there is only one track currently in existence, there is no need for an access road between tracks in this segment; both the existing and new tracks could be accessed from their respective sides of the ROW.

6.5.5 Technical/Economic Feasibility: Structures

Route Alternative 4-A presents a favorable situation with respect to major structures, with only one major structure, the double-track, swing-span, Government Bridge across the Mississippi River. A new structure across the Mississippi River is likely to not be required because the existing bridge has two tracks, though the second track is not at present in place across the fixed approach spans. Detailed analysis of the main Mississippi River span and approach spans has not been conducted to determine their continued long-term capability for service without substantial repair, rehabilitation, or replacement, but during the prior Chicago-Iowa City study work, no serious issues were identified.

At the moveable span itself, a small section of second track remains. This is crucial because this track would likely be "grandfathered" with respect to marine clearance requirements, meaning that no clearance variance would be required here as would likely be required by the U.S. Coast Guard for additional tracks across the Mississippi River on Route Alternatives 1, 2 and 5. All the more important is the fact that constructing a new moveable span would be, by far, the most expensive portion of a new structure.

Unlike many of the other route alternatives, a major structure would likely be required at Des Moines, to provide a grade separation of Route Alternative 4-A with the north-south oriented UP Spine Line that at present crosses Route Alternative 4-A at grade, and also serves a large regional classification yard. This intersection is heavily used at present, with many trains each day on the UP route, and continuous switching of UP's Des Moines yard and industries. Construction of a grade separation may require replacement of lost yard capacity track if there is insufficient room for the new track and approaches.

6.5.6 Technical/Economic Feasibility: Grade Crossings

Grade crossings on Route Alternative 4-A present no exceptional challenges when compared to other route alternatives, except in the Chicago-Wyanet portion. Because many of the grade crossings of Route Alternative 4-A already have roadway geometry and side entrances arranged for the now-missing second main track, it is expected that the addition of a second main track at grade crossings at a 25-foot track center would not be a major technical hurdle. The existing two-main-track section from Aurora to Wyanet has a relatively low number of grade crossings, avoiding much of the expense and challenge that obtains to Route Alternatives 2 and 5 as a whole. While there would be impacts on the existing grade-crossing circuitry and the roadway profiles for the addition of an additional main track, the costs would be modest compared to modifications on Route Alternatives 4 and 5 where a substantial number of new, three-track grade crossings with tracks at up to 45-foot centers would be necessary.

6.5.7 Economic Feasibility

The economic feasibility of Route Alternative 4-A is favorable compared to other route alternatives and is approximately $147,200,000 more than Route Alternative 4, the least expensive route alternative. This is chiefly because:

- The addition of third main track is limited to the Aurora-Wyanet portion
- Where a second main track is added to an existing single main track, the new main track could be at 25-foot centers while still allowing for maintenance access to each track, translating to lower construction complexity and thus lower construction costs than those route alternatives that currently have two tracks and would require a third track at 45-foot track centers.
- The existing Mississippi River Bridge is double-track.
- Only one major structure is likely to be required: a grade-separation at Des Moines.
- East of Wyanet, Illinois, Route Alternative 4-A would be more complex because the existing ROW between Chicago Union Station and Aurora, Illinois, is constrained; an additional track would require ROW acquisition.

Note that Route Alternative 4-A's cost does not include a connection to Chicago Union Station.

Route Alternative 4-A has no outstanding operating, maintenance, or equipment cost differentiators compared to Route Alternatives 1, 2, and 5, and is substantially shorter than Route Alternative 1. Trainset equipment turn analysis indicates that trainsets would average about 1.5 turns per day on this route alternative. Trainset requirements are similar to Route Alternatives 2, 4, and 5, and potentially two fewer trainsets are required than Route Alternative 1.

6.5.8 Environmental Concerns: Environmental Impacts

The environmental resources present within the estimated existing ROW and buffer for Route Alternative 4-A are identified in Table 6-6.

Table 6-6. Route Alternative 4-A Environmental Resources within ROW and Buffer

Environmental Resource	Resources within ROW and Buffer
Named Streams	39 streams (44 stream crossings; 9,000 feet of streams)
Floodplain	Mississippi and Missouri River: 41 acres
Wetlands	220 wetlands (120 acres)
Farmland	1,370 acres
Threatened and Endangered Species Critical Habitat	1 Topeka shiner stream
NRHP-listed Properties	8 properties: • Colonel Joseph Young Block in Davenport, Iowa • Littig Brothers Eagle Brewery in Davenport, Iowa • City Market in Davenport, Iowa • Bonaventura Heinz House in Davenport, Iowa • Adair Viaduct in Adair, Iowa • Chicago, Rock Island & Pacific Railroad Passenger Station in Iowa City, Iowa • Chicago, Rock Island, & Pacific Railroad Depot in Wilton, Iowa • Chicago, Rock Island, & Pacific Railroad Passenger Depot in Council Bluffs, Iowa
Potential Section 4(f) (may also be Section 6(f)) Properties	36 properties: • 4 forest preserves in Illinois • 17 city parks in Illinois • 7 city parks in Iowa • The aforementioned NRHP-listed sites
Superfund NPL sites	3 sites: • Des Moines TCE in Des Moines, Iowa • Railroad Avenue Groundwater Contamination in Des Moines, Iowa • Omaha Lead Site in Omaha, Nebraska

The area along Route Alternative 4-A in the Chicago urban area (from Chicago to Montgomery, Illinois) is a mix of industrial, commercial, and moderately to densely developed residential area. Other substantial residential areas in close proximity to Route Alternative 4-A are located in Plano, Silvis, East Moline, and Moline, Illinois; and Davenport, Iowa City, and Grinnell, Iowa. Route Alternative 4-A passes through mostly industrial or lightly developed areas in Geneseo, Somonauk, Mendota, and Princeton, Illinois; and Newton, Des Moines, Atlantic, and Council Bluffs, Iowa. The closest residential area near the existing Amtrak Station in Omaha is located about 400 feet south of the rail line.

6.5.9 Environmental Concerns: Right-of-Way

Existing ROW was assumed to be 100 feet along the entire 474-mile route alternative. An estimated 50-foot buffer on the south side of existing ROW from Chicago to Wyanet, Illinois, and a 35-foot buffer on the north side of existing ROW from Wyanet, Illinois, to Omaha was assumed to be needed for Route Alternative 4-A, resulting in approximately 2,200 acres of new ROW that would be required. The potential ROW needed for a connection at Wyanet between IAIS and BNSF track was included in the buffer. Of the ROW that would likely be acquired, approximately 800 acres are located in urban areas, and approximately 1,400 acres are located in rural areas.

6.6 NO-BUILD ALTERNATIVE

The No-Build Alternative would result in the continued extensive use of automobiles, as well as airplane and bus transportation, along the Chicago to Omaha corridor. Additionally, Amtrak's *California Zephyr* would continue along the corridor, and other passenger rail projects could develop service along sections of the corridor.

6.6.1 Purpose and Need: Travel Demand

The No-Build Alternative would not meet travel demand for passenger rail service along the Chicago to Omaha corridor because no additional transportation service would be provided.

6.6.2 Purpose and Need: Competitive and Attractive Travel Modes

The No-Build Alternative would not meet the need for competitive and attractive travel modes between Chicago and Omaha because no new mode would be provided. The Project would not exist as an option to spur more competition among existing travel modes.

6.6.3 Technical Feasibility: Passenger and Freight Capacity

The No-Build Alternative cannot be evaluated for technical feasibility of passenger and freight capacity because the Project would not be constructed. Other passenger rail sections of the Chicago to Omaha corridor would be evaluated for technical feasibility for passenger and freight capacity on their own merits as independent projects.

6.6.4 Technical/Economic Feasibility: Alignment

The No-Build Alternative cannot be evaluated for technical feasibility of alignment because the Project would not be constructed. Other passenger rail sections of the Chicago to Omaha corridor would be evaluated for technical feasibility of alignment on their own merits as independent projects.

6.6.5 Technical/Economic Feasibility: Structures

The No-Build Alternative cannot be evaluated for technical feasibility of structures because the Project would not be constructed. Other passenger rail sections of the Chicago to Omaha corridor would be evaluated for technical feasibility of structures on their own merits as independent projects.

6.6.6 Technical/Economic Feasibility: Grade Crossings

The No-Build Alternative cannot be evaluated for technical feasibility of grade crossings because the Project would not be constructed. Other passenger rail sections of the Chicago to Omaha corridor would be evaluated for technical feasibility of grade crossings on their own merits as independent projects.

6.6.7 Economic Feasibility

The No-Build Alternative cannot be evaluated for economic feasibility because the Project would not be constructed. However, Under the No-Build Alternative, other passenger rail sections of the Chicago to Omaha corridor could be independently determined to be economically feasible.

6.6.8 Environmental Concerns: Environmental Impacts

The Project would not be constructed under the No-Build Alternative, and not present major environmental challenges or impact sensitive areas. However, the current rail routes between Chicago and Omaha would continue to be used, resulting in continued minor environmental impacts such as air emissions, erosion and sedimentation from railroad grades to adjacent waterbodies and wetlands, and noise. Other modes of transportation would continue to be used and would likely be more congested in the future as travel demand increases, resulting in potential impacts to sensitive areas.

6.6.9 Environmental Concerns: Right-of-Way

The Project would not be constructed under the No-Build Alternative, and not require acquisition of ROW. However, other passenger rail sections of the Chicago to Omaha corridor could be developed and result in acquisition of ROW. Additionally, other travel modes could be more congested as travel demand increases, resulting in ROW acquisition for infrastructure improvements.

6.7 SUMMARY

The fine-level screening of the five route alternatives and the No-Build Alternative based on ability to meet purpose and need, environmental concerns, and technical and economic feasibility is summarized below, followed by a comparison of route alternatives.

6.7.1 Purpose and Need

The No-Build Alternative would not meet purpose and need, and would result in no ridership or revenue from tickets sold outside of what could occur under independent passenger rail initiatives. Table 6-7 shows the ridership and revenue from tickets sold forecast for the five route alternatives carried forward into fine-level screening under the three proposed maximum speed regimes. This table indicates that Route Alternatives 2 and 5 do not meet the purpose and need for attracting an adequate number of riders to make the service viable. Route Alternative 1 does not attract sufficient riders in Iowa to make it a viable service. While Route Alternative 1 would have substantial short-distance ridership from Rockford to Chicago, the fare recovered for the short trip would not be adequate to make the service viable.

Table 6-7. Stage 1 Forecast Results for Proposed Chicago-Omaha Passenger Rail Options

Annual Forecast 2020	Route Alternative 1	Route Alternative 2	Route Alternative 4	Route Alternative 5	Route Alternative 4-A
Design Speed 79 mph, 5 Round Trips Daily					
Ridership (thousands)	505-590	375–440	640–745	255–295	680–795
Revenue [a] (millions 2012 $)	$15.2-$17.7	$14.7–$17.1	$22.9–$26.7	$11.2–$13.0	$24.2–$28.3
Design Speed 90 mph, 5 Round Trips Daily					
Ridership (thousands)	560–650	415–485	690–805	285–330	735–855
Revenue (millions 2012 $)	$17.0–$19.9	$16.3–$19.1	$24.9–$29.1	$12.5–$14.5	$26.4–$30.8
Design Speed 110 mph, 5 Round Trips Daily					
Ridership (thousands)	615–715	475–550	755–885	315–370	800–935
Revenue (millions 2012 $)	$19.0–$22.2	$18.9–$22.0	$27.6–$32.2	$14.3–$16.6	$29.1–$33.9

Note: [a] Revenue forecast is for revenue from ticket sales only.

The ridership and revenue forecasts are influenced by populations served at intermediate cities (which creates ridership and revenue between pairs of intermediate cities, as well as between endpoint and intermediate cities), and by running times of trains on each route alternative. Preliminary running times are summarized in Table 6-8. These running times vary from 5.5 hours to nearly 8 hours, depending upon the characteristics of the route alternative (e.g., curvature and length), and the selected desired maximum speed of passenger trains. Among all five route alternatives, the time savings of higher speeds, end-to-end, were similar: approximately 30 minutes for 90 mph compared to 79 mph, and an additional 30 minutes for 110 mph compared to 90 mph.

Table 6-8. Comparative Running Times

Speed Regime	Route Alternative 1	Route Alternative 2	Route Alternative 4	Route Alternative 5	Route Alternative 4-A
79 MPH	Base 79 + 43 minutes	Base 79	Base 79 + 17 minutes	Base 79 + 18 minutes	Base 79 + 4 minutes
90 MPH	Base 90 + 43 minutes	Base 90	Base 90 + 22 minutes	Base 90 + 16 minutes	Base 90 + 8 minutes
110MPH	Base 110 + 40 minutes	Base 110	Base 110 + 25 minutes	Base 110 + 13 minutes	Base 110 + 14 minutes

*Note: Running Times include station dwell times but do not include recovery time or potential allowances for delays at movable bridges over navigable waterways. Running Times are based on common conceptual parameters for infrastructure among all **r**oute **a**lternatives. Running Times will require validation upon development of preliminary infrastructure, and will be subject to the terms and conditions of Service Outcome Agreements that would be agreed upon among host railroad(s) and service operator(s).*

6.7.2 Technical Feasibility

The No-Build Alternative has no technical feasibility issues because no Project would be constructed; however, any independent passenger rail initiatives or improvements of other modes would be evaluated for technical feasibility on their own merits. The five route alternatives evaluated in the fine-level screening are similar in some respects. All cross similar geography between the end point cities and all are freight railroads with similar traffic types, but dissimilar traffic densities. However, the route alternatives have widely divergent technical feasibility. This divergence is driven by three factors:

- Length of route – greater length requires more infrastructure improvements for higher-speed passenger trains.
- Density of freight train traffic – greater density requires more challenging improvements to accommodate passenger trains, including impacts on bridges, grade crossings, and conflicts with industrial spurs
- Access to Chicago Union Station – route alternatives without direct access require complex and challenging connections to be constructed in a dense urban core

A brief summary of each route alternative's technical feasibility is provided below.

Route Alternative 1 would likely require:

- An additional main track for approximately two-thirds of its route
- Substantial challenges to constructing this main track for approximately 50 miles in northwestern Illinois and northeastern Iowa, in narrow, winding river valleys
- Potential construction of a tunnel near East Dubuque
- Potential construction of a new high-level bridge over the Mississippi River
- Substantially longer length of route, requiring higher costs for capital, operation, and maintenance
- Extensive earthwork to improve speeds in areas of heavy curvature

Route Alternative 2 would likely require:

- An additional third main track for nearly all of its length, an additional second main track for the remainder, and fourth main track for passenger/passenger meet/pass events
- Significant challenges to constructing this main track, for ROW, reconfiguration or relocation of industrial tracks or industries, grade crossings, and grade separations
- Likely construction of new high-level bridges across the Mississippi and Des Moines rivers

Route Alternative 4 would likely require:

- An additional main track for approximately two-thirds of its route
- No substantial challenges to constructing this main track
- Potential construction of a rail/rail grade separation structure at Des Moines
- No requirement for a new high-level bridge over the Mississippi River
- A complex and potentially disruptive connection within the Chicago core in order to bring the route to Chicago Union Station
- Moderate earthwork to improve speeds in areas of moderate curvature

Route Alternative 5 would likely require:

- An additional third main track for nearly all of its length, an additional second main track for the remainder, and fourth main track for passenger/passenger meet/pass events
- Substantial challenges to constructing this main track, for ROW, reconfiguration or relocation of industrial tracks or industries, grade crossings, and grade separations
- Likely construction of new a high-level bridge across the Mississippi river

Route Alternative 4-A would likely require:

- An additional second main track for approximately one-half of its route
- An additional third main track for approximately one-tenth of its route
- Moderate challenges to constructing these additional main tracks
- Potential construction of a rail/rail grade separation structure at Des Moines
- Moderate earthwork to improve speeds in areas of moderate curvature

Route Alternative 4-A is the most technically feasible route because it has:

- The least challenging requirements for additional capacity
- Only one major structure of moderate complexity
- Nearly the shortest length
- Direct access to Chicago Union Station
- Nearly the least travel time

6.7.3 Economic Feasibility

The No-Build Alternative has no economic feasibility issues because no Project would be constructed; however, any independent passenger rail initiatives or improvements of other modes would be evaluated for economic feasibility on their own merits. The five route alternatives evaluated in the fine-level screening have widely divergent economic feasibility, driven by their technical feasibility and the resulting associated costs. Table 6-9 summarizes their economic feasibility by comparing their additive cost differences for implementation to Route Alternative 4 that had the lowest overall cost, and their additive forecast revenue differences.

Route Alternative 4 has the least relative implementation cost, and nearly the highest revenue, but does not access Chicago Union Station. Route Alternatives 4 and 4-A are the most economically feasible.

Table 6-9. Implementation Cost and Forecasted Revenue ($ millions) of Route Alternatives

	Route Alternative 1	Route Alternative 2	Route Alternative 4	Route Alternative 5	Route Alternative 4-A
Implementation Cost	Base + $550	Base + $1,005	Base	Base + $1,230.6	Base + $147.2
Forecasted Annual Revenue [a]	$15.2 to $22.2	$14.7 to $22.0	$22.9 to $32.2	$11.2 to $16.6	$24.2 to $33.9

Note: [a] Revenue forecast is for revenue from ticket sales only.

6.7.4 Environmental Concerns

No Chicago to Omaha Passenger Rail System Project would be constructed under the No-Build Alternative, and not result in construction impacts. However, the current rail routes between Chicago and Omaha would continue to be used, resulting in continued minor environmental impacts such as air emissions, erosion and sedimentation from railroad grades to adjacent waterbodies and wetlands, and noise. Other modes of transportation would continue to be used and would likely be more congested in the future as travel demand increases, resulting in potential impacts to sensitive areas. Other passenger rail sections of the Chicago to Omaha corridor could be developed and result in acquisition of ROW. Additionally, other travel modes could be more congested as travel demand increases, resulting in ROW acquisition for infrastructure improvements.

The environmental resources discussed below represent solely the resources within the estimated existing ROW and an estimated buffer of additional ROW that may need to be acquired and provide a conservative estimate of what the potential impacts would be for each of the route alternatives. As the design process proceeds for the one or more route alternatives carried forward for detailed evaluation in the Tier 1 Service Level EIS, a refined assessment of ROW needs would be established and potential impacts refined. Consequently, only environmental resources present in the estimated ROW and buffer can be identified during the fine-level screening process. There will be opportunities for impact avoidance and minimization through an interactive design and impact consideration process.

In addition to the general environmental conditions discussed in this analysis, each route alternative would present various technical challenges, requiring construction that would result in adverse environmental impacts along each route alternative. All of the route alternatives would need additional track for most or all of the length of the corridor from Chicago to Omaha.

Given all of the considerations discussed in Sections 6.1 to 6.5, Route Alternatives 2 and 5 would require the most complex construction and would likely have the most environmental impacts related to construction. Route Alternative 1 would be somewhat less complex than Route Alternatives 2 and 5. Route Alternatives 4 and 4-A have the least complex construction requirements.

The fine-level screening of several environmental resources indicates that Route Alternative 4-A would likely result in the fewest overall environmental impacts based on the relatively low amount of resources present within the estimated ROW and buffer considering likely construction requirements and the environmental setting, followed by Route Alternatives 4, 5, 2, and 1. Table 6-10 illustrates a comparison of the route alternatives

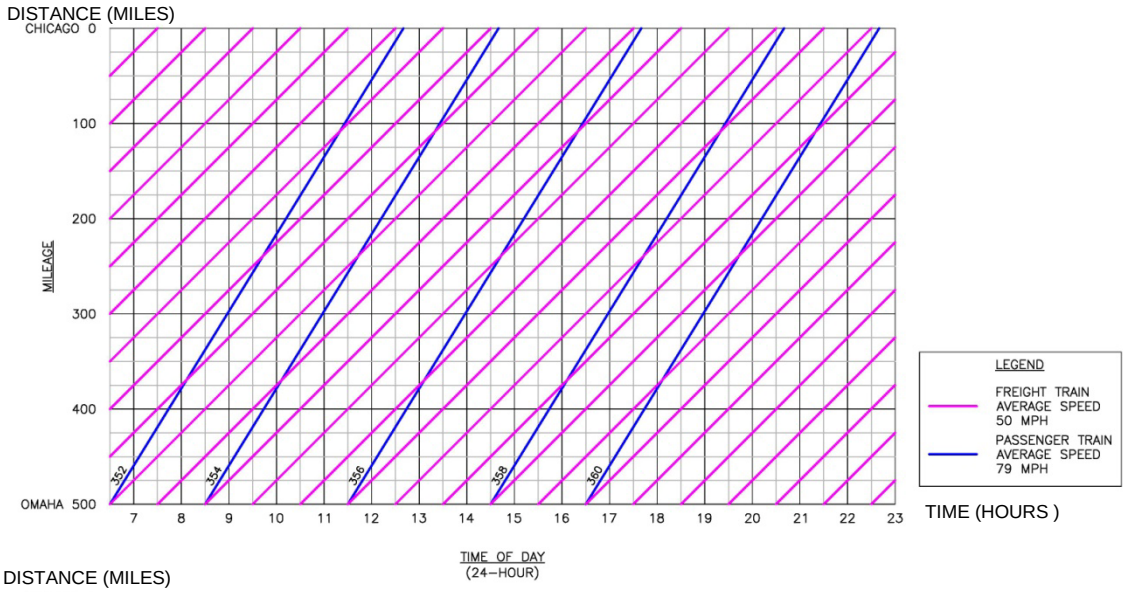
Although Route Alternative 4-A could potentially impact slightly more Section 4(f) and Section 6(f) resources than other alternatives, the analysis was based on a buffer without conceptual engineering, allowing flexibility in design to avoid or minimize impacts on the resources. Because Illinois forest preserves, which are considered to be a Section 4(f) resource, exist on both sides of the railroad ROW for all route alternatives, the potential exists for all route alternatives to impact Section 4(f) properties. Considering potential impacts on all resources, Alternative 4-A is likely to have the least overall impact to environmental resources.

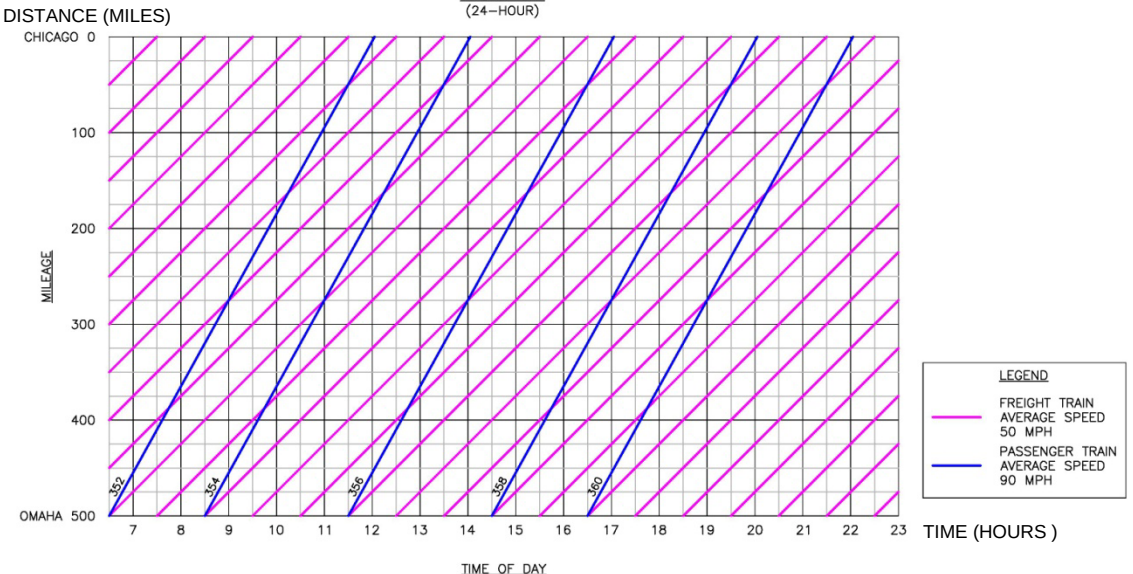
Route Alternative 2 would potentially require the most acres of ROW, followed by Route Alternatives 5, 4-A, 1, and 4. Route Alternative 2 would require the most urban acres, followed by Route Alternatives 5, 4-A, 4, and 1.

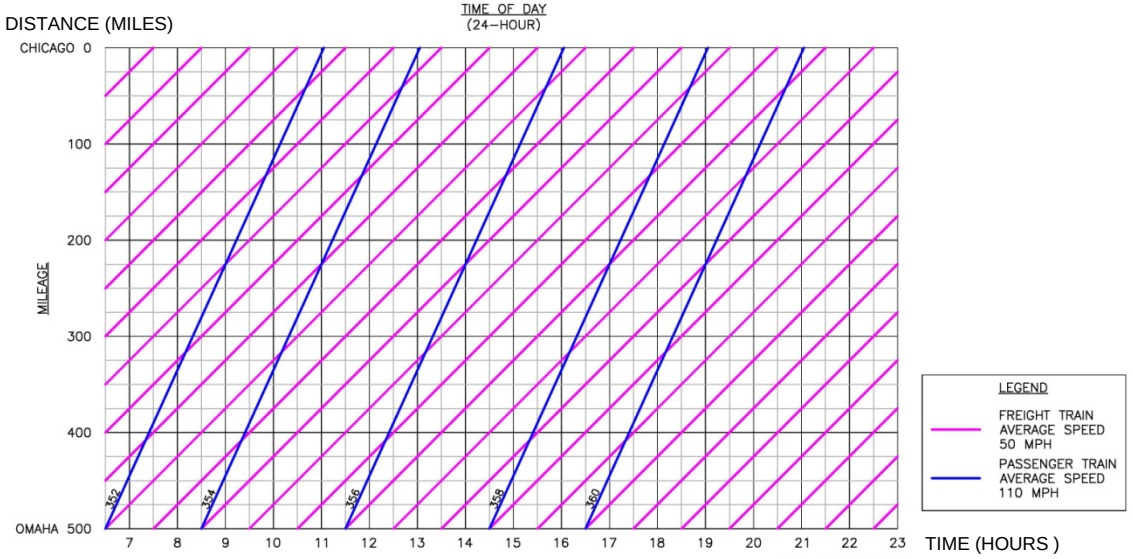
Table 6-10. Environmental Resources within ROW and Buffer for Route Alternatives

Criteria	Resources within ROW and Buffer				
	Route Alternative 1	Route Alternative 2	Route Alternative 4	Route Alternative 5	Route Alternative 4-A
Named Stream Count	42 (67 crossings)	29 (45 crossings)	41 (52 crossings)	48 (74 crossings)	39 (44 crossings)
Stream Length (ft)	22,000	10,700	21,200	19,000	9,000
Floodplain Acres (Mississippi and Missouri Rivers only)	190	60	40	160	40
Wetland Count	260	320	280	340	220
Wetland Acres	190	250	190	2109	120
Farmland Acres	1,500	2,120	1,240	2,030	1,370
Threatened and Endangered Species Critical Habitat	4 Topeka shiner streams	4 Topeka shiner streams	1 Topeka shiner stream	None	1 Topeka shiner stream
Cultural Resources (historic sites)	3	3	9	2	8
Section 4(f)/6(f) Properties	29	31	27	25	36
Hazardous Materials	5 Superfund sites	4 Superfund sites	7 Superfund sites	3 Superfund sites	3 Superfund sites

Note: Data was estimated by counting resource items within a buffer applied to approximate ROW boundaries. Consequently, the data estimated represent preliminary, approximate values and was rounded for several resources with more than 100 counts per resource category.







KEY ASSUMPTIONS:
- –FREIGHT TRAINS OPERATE AT CONSISTENT SPEEDS
- –FREIGHT TRAINS ARE EQUALLY SPACED THROUGHOUT THE DAY, EVERY DAY
- –NO MAINTENANCE OF WAY WORK WINDOWS
- –FREIGHT TRAINS ARE NOT SLOWED BY ADVERSE GRADES
- –FREIGHT TRAINS ARE NOT DELAYED BY PASSENGER TRAINS

Iowa Department of Transportation
Iowa Connections
Get on Board
Illinois Department of Transportation

Freight Train Overtake Events Required at Different Passenger Train Speeds

Chicago to Omaha
Regional Passenger Rail System Planning Study

DATE
April 2012

FIGURE
6-1