

Chicago-Milwaukee
Amtrak Hiawatha Service
Draft Environmental Assessment

Appendix A
Detailed Analysis of Route and Design
Alternatives

A. Appendix A

Appendix A details the identification of alternatives and includes the in-depth analysis of route alternatives and project design alternatives that are summarized in the EA Chapter 2 – Definition of Alternatives.

As discussed in Chapter 2 of the EA, NEPA requires that agencies shall “rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.”¹ In following NEPA requirements, this document identifies and evaluates a range of alternatives for reasonableness, and eliminates alternatives from further analysis that are not found to be reasonable.

In intercity passenger rail corridor planning, the range of alternatives to be considered consists of a hierarchical array of Route, Service, Investment, and Design Alternatives, which is developed with the goal of examining a complete range of alternative means of fulfilling the purpose and need of the project.

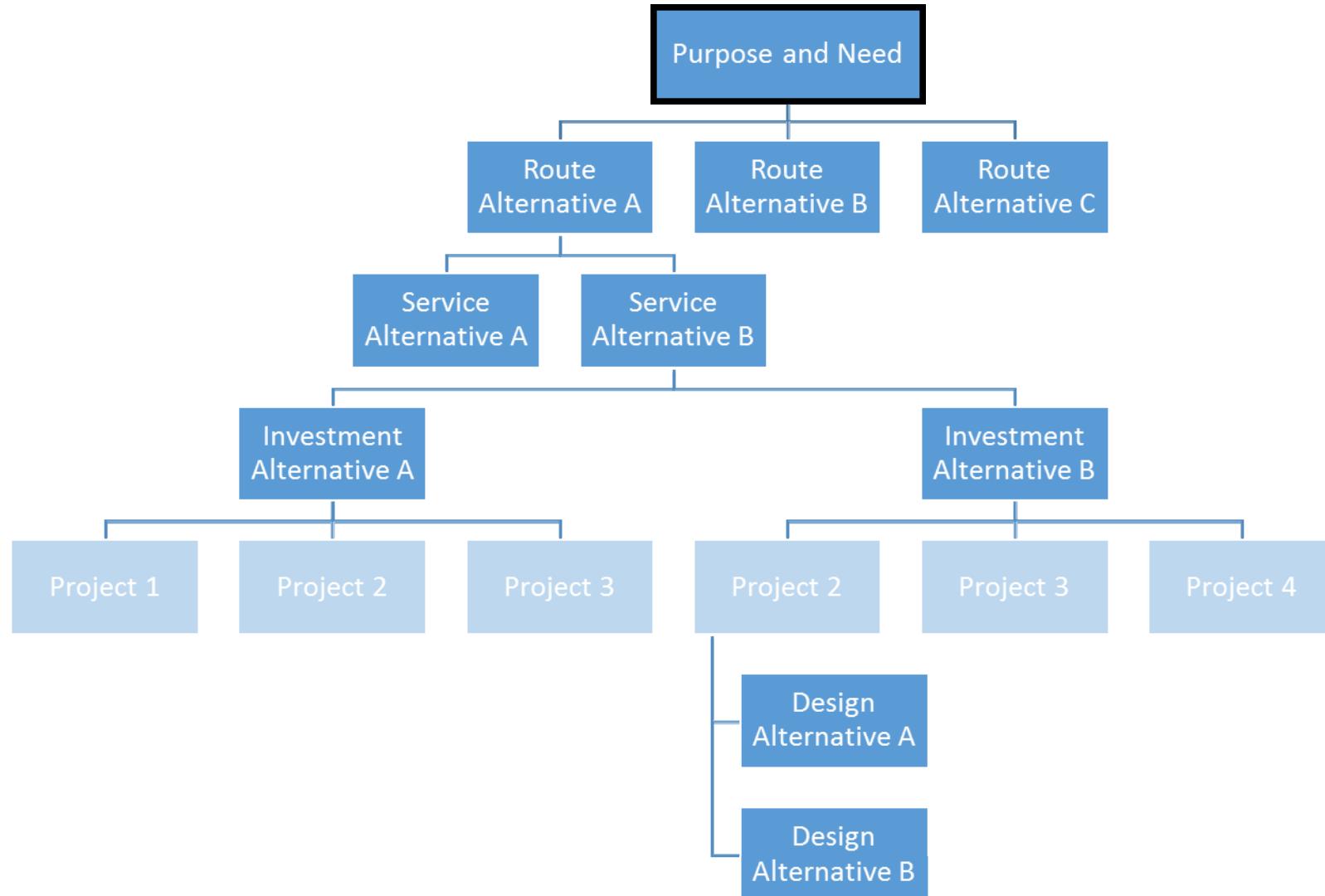
Within a particular corridor and with a given purpose and need established for a proposed intercity passenger rail service, there may be multiple physical routes (e.g., parallel existing rail lines that traverse the corridor) over which the service may be operated. Similarly, any one of these available “Route Alternatives” may be capable of supporting intercity passenger rail service with a range of basic service characteristics such as frequency levels, travel times, stopping patterns, train consist², and fare structures. For a particular combination of possible service characteristics (with each combination referred to as a “Service Alternative”), there may likewise be multiple options for the package of physical investments needed to support the operation of the service with those service characteristics. For each of the improvement projects that make up a particular “Investment Alternative” package, there may be multiple potential Design Alternatives for actually implementing the given project. Design Alternatives are the physical improvement alternatives that can be constructed for a particular project that achieve the same operational benefit as the overall project.

Figure A-1 illustrates the conceptual hierarchy of alternatives for intercity passenger rail corridor planning that will be evaluated as part of the NEPA process.

¹ 40 CFR 1502.14(a).

² The coupled vehicles making up a train (for example, a passenger train consist typically contains coaches, a cab car, and a locomotive)

Figure A-1
Conceptual Hierarchy of Alternatives for Intercity Passenger Rail Corridor Planning



A.1. Alternatives Analysis

In the alternatives analysis for the program, each Route, Service, Investment, and Design Alternative was examined in sequence in order to identify the reasonable build alternatives (in addition to the No-Build) to be included in the EA. At each level, a preliminary range of alternatives was first identified and then screened to eliminate alternatives that would not fulfill the purpose and need of the program, or which were determined not to be a reasonable means of meeting the purpose and need based on consideration of specific criteria related to engineering and operational requirements, safety, potential environmental impacts, and cost. The factors considered in this screening are summarized in Figure A-2.

Figure A-2
Criteria for Preliminary Range of Alternatives Screening

Purpose and Need	Reasonableness
<ul style="list-style-type: none">• Address existing and future passenger rail demand• Expand modal options to provide an alternative to traffic delay, reliability issues, and long travel times related to existing and future highway congestion in the corridor• Strengthen transportation connections to other transportation modes such as air, intercity bus, local transit, bicycle facilities, and ride sharing options• Enhance and improve the reliability of a successful, existing intercity passenger rail service and utilize the significant investments made in the <i>Hiawatha Service</i> over the past twenty years	<ul style="list-style-type: none">• Meets safety requirements• ,• Construction feasibility• Ability to meet railroad operational requirements• Potential impacts to environmental resources<ul style="list-style-type: none">○ 4(f)/historic properties○ Wetlands○ Critical habitat/endangered species○ Noise and vibration○ Environmental Justice/ community cohesion• Order of magnitude capital costs

To adequately assess the range of alternatives against these criteria, the Route, Service, Investment, and Design Alternatives under consideration were subjected to varying degrees of analysis related to service planning, conceptual engineering, and environmental impacts. In general, this assessment required that the analysis of alternatives at the more detailed levels of the hierarchy (e.g. Investment and Design Alternatives) be more complex and examine a greater level of detail than at the higher levels of the hierarchy (e.g. Route and Service Alternatives).

The purpose and need criteria are described in detail in Chapter 1 of the EA. The criteria for evaluating reasonableness, including engineering design and key environmental resources, are explained further below.

A.1.1. Engineering Alternative Evaluation Criteria

Four criteria are used to evaluate how effectively each design alternative meets the engineering design principles of the project: safety, order of magnitude capital costs, construction feasibility, and railroad operational requirements.

Safety – The safety criteria relates to the design alternative's ability to provide safety benefits to the surrounding community.

Order of Magnitude Capital Costs – Estimate high-level capital costs based on length of improvement, type of improvement, and land acquisition required.

Construction Feasibility – Evaluate whether the project would potentially have physical, community, or environmental-related barriers that cause construction of the project to be infeasible

Railroad Operations – Assess the impact of each design alternative on freight and passenger rail operations (positive and negative impacts)

A.1.2. Key Environmental Resource Evaluation Criteria

There are nineteen environmental resources that are evaluated as part of every FRA-led Environmental Assessment:

- Land use and zoning
- Socioeconomics
- Title VI and Environmental Justice
- Agriculture
- Transportation
- Noise and vibration
- Air quality
- Hazardous materials
- Public health and safety
- Cultural resources
- Critical habitat and endangered species
- Water resources and aquatic habitats
- Water quality
- Floodplains
- Wetlands
- Section 4(f) properties
- Section 6(f) properties
- Energy use and climate change
- Visual and aesthetic quality

In undertaking the alternatives analysis, all resources were considered. Five of these resources were used to evaluate the reasonableness of each design alternative: Section 4(f) properties, wetlands, critical habitats/endangered species, noise and vibration, and socioeconomic/ community cohesion. These environmental criteria were deemed most critical in evaluating the reasonableness of the design

alternatives and determining if avoidance alternatives were required. Analysis of the remaining environmental resources occurs in Chapter 3 of EA for the design alternatives that are carried forward.

Section 4(f)/Historic Properties – Evaluate whether a design alternative proposes use of publicly owned land from a public park, recreational area, wildlife and waterfowl refuge, or any land from a significant historic site. Section 4(f) forbids the approval of projects that require the conversion of land from these protected properties unless it can be demonstrated that there is no feasible and prudent alternative to use of land from the property, and the action includes all possible planning to minimize harm to the property resulting from such use. Section 106 of the National Historic Preservation Act requires Federal agencies to “take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment”.³

Wetlands – Evaluate whether a design alternative has the potential to impact wetlands. Wetlands are important because they support both aquatic and terrestrial species. Section 404 of the Clean Water Act provides protection for wetlands and other waters of the United States.

Critical Habitats/Endangered Species – Determine whether listed or proposed species and/or designated or proposed critical habitat occur in the area the design alternative potentially may affect. Impacts to Illinois Natural Areas and Land and Water Reserves should be avoided to the extent practical.

Noise and Vibration – Evaluate whether severe noise impacts occur and whether sensitive receptors are impacted by the proposed design alternative.

Socioeconomic/Community Cohesion – According to the IDOT Community Impact Assessment Manual, “cohesion is affected by actions that generate changes in the behavioral and perceptual aspects of the community⁴”. Assess the potential for the design alternative to impact cohesion by dividing or isolating communities or neighborhoods.

A.2. Route Alternatives Considered

Three Route Alternatives were identified and evaluated for each alternative’s ability to meet the purpose and need and reasonableness criteria. There are three main routes that serve rail traffic between Chicago’s two passenger terminals and Milwaukee’s Intermodal Station:

- Route Alternative A - Canadian Pacific’s Chicago & Milwaukee Subdivision (CP C&M Sub)
- Route Alternative B - Union Pacific’s Kenosha Subdivision (UP Kenosha Sub)
- Route Alternative C - Union Pacific’s Milwaukee Subdivision (UP Milwaukee Sub)

The purpose of this section of the report is to evaluate the three Route Alternatives for their ability to accommodate *Hiawatha Service* operations and meet the purpose and need of the project. Each of the

³ <http://www.achp.gov/106summary.html>

⁴ *Community Impact Assessment Manual*, Illinois Department of Transportation, 2007, Section 2-9

three Route Alternatives are depicted and evaluated in separate sections below.

A.2.1. Route Alternative A - Existing Amtrak Route

The current Amtrak *Hiawatha Service* uses the CP C&M Sub to operate between Chicago and Milwaukee. Figure A-3 depicts Route Alternative A.

Figure A-3
Route Alternative A – Existing Amtrak Route



The route departs Chicago from Chicago Union Station (CUS) and continues north on the Metra Milwaukee District North Line until Milepost 32.30 at Rondout, IL. At Rondout, the route continues on the CP C&M Subdivision until reaching the Milwaukee Intermodal Station (MIS) at MP 85.5. This route has three main tracks from CUS to Tower A-5 and two main tracks from Tower A-5 to MIS. The route is equipped with Centralized Traffic Control (CTC) and is dispatched by Amtrak and Metra between CUS and Tower A-2, and by Canadian Pacific (CP) between Tower A-2 and MIS. Amtrak stations along the route include CUS, Glenview, IL, Sturtevant, WI, Milwaukee Airport Rail Station (MARS) and MIS. Metra has 15 commuter stations between CUS and Rondout.

Metra operates 62 commuter trains between CUS and Deerfield, with 49 of those trains continuing north to Lake Forest and 47 continuing to Rondout where they diverge onto the Metra Fox Lake Subdivision. Commuter service also operates on Saturdays, Sundays and Holidays on approximately 2-hour headways. Approximately 25 CP freight trains use this route daily between Milwaukee and Tower A-20. Two additional freight operate between Tower A-20 and Tower A-5 where they depart the CP C&M Sub and turn west on the CP Elgin Subdivision.

Rondout is a complicated interlocking that controls movements on the CP C&M Mainline, movements to and from the Fox Lake Subdivision, and movements to and from the EJ&E, which intersects the CP C&M Subdivision just east of the Fox Lake Subdivision. Current operations are impacted greatly by the fact that the 17 mile Fox Lake Subdivision has a single track configuration. If an eastbound Fox Lake train is delayed on the Fox Lake Subdivision, Metra trains waiting to enter the Fox Lake Subdivision from the C&M Subdivision may hold on the main tracks for long periods of time, impacting CP, Amtrak, and other Metra trains. Additionally, all commuter train meeting points occur on the mainline south of Rondout, which severely limits schedule options for Amtrak service frequency increases.

Between CUS and Rondout, Metra trains making local stops effectively limit the times and speeds at which the intercity trains may operate. Schedules for intercity passenger trains must be carefully coordinated with Metra and freight trains operating in the corridor.

Since Route Alternative A is the existing Amtrak route, it meets the need of utilizing the significant investments that have been made in the *Hiawatha Service* over the past twenty years. The major *Hiawatha Service* improvements that WisDOT and IDOT have sponsored or supported are shown in Figure A-4.

Figure A-4
Major *Hiawatha Service* Improvements

Year	Major <i>Hiawatha Service</i> Improvements
1995	WisDOT and IDOT funded an increase in <i>Hiawatha Service</i> frequency from four to six daily round-trips (five on Sundays)
2002	WisDOT and IDOT funded an increase in <i>Hiawatha Service</i> frequency from six to seven daily round-trips (six on Sundays)
2005	WisDOT opened a new station, Milwaukee Airport Rail Station (MARS), at Milwaukee's General Mitchell International Airport. The additional <i>Hiawatha Service</i> stop serves the south Milwaukee metro region. MARS also facilitates train/air connections via a dedicated airport shuttle operating between the new station and the airport terminal.
2006	The Village of Sturtevant opened a new station to replace its previous facility.
2007	WisDOT and IDOT funded the addition of a fifth coach car to each <i>Hiawatha Service</i> train set to accommodate growing ridership. <i>Hiawatha Service</i> train capacity increased from approximately 277 seats to about 347 seats per train.
2007	WisDOT completed the renovation of downtown Milwaukee's Amtrak station. The new Milwaukee Intermodal Station (MIS) serves both Amtrak trains and intercity buses.
2009	WisDOT and IDOT funded the addition of a sixth coach car to each <i>Hiawatha Service</i> train to accommodate growing ridership. <i>Hiawatha Service</i> train capacity increased to approximately 416 seats per train.
2009	WisDOT secured a federal grant to improve <i>Hiawatha Service</i> on-time performance and ride quality by replacing the last segment of old, jointed rail in the corridor with new continuous welded rail.
2012	Using federal funding secured in 2010, WisDOT extended the MARS platform to accommodate growing use of the station.
2012	Using federal funding secured in 2010, WisDOT enhanced <i>Hiawatha Service</i> on-time performance through track and signal improvements (including new crossovers near Truesdell, WI) in Kenosha and Racine counties.
2012	Using federal funding secured in 2010, IDOT enhanced <i>Hiawatha Service</i> on-time performance through the replacement of two bridge decks near Wadsworth, IL
2014	Amtrak, with funding support from WisDOT and IDOT, implemented complementary on-board 4G Amtrak Connect Wi-Fi service in February 2014

Source: WisDOT

Any enhancements made to the Amtrak service using Route Alternative A would expand modal options and strengthen transportation connections to other modes because the improvements would be made to an already-successful route that is patronized by passengers demanding more opportunities to use the service. When frequencies are added to the *Hiawatha Service* schedule, opportunities for connections to intercity bus routes, air travel, transit, and other intercity passenger rail routes would increase. Travel within the corridor would be more robust and connections to modes that travel outside the corridor would be more accessible. This level of benefits can only be experienced if the existing Amtrak route, Route Alternative A, is utilized.

A.2.2. Route Alternative B - Union Pacific Kenosha Subdivision

The UP Kenosha Sub runs from downtown Chicago to Kenosha, WI, a southern suburb of Milwaukee. Metra's Union Pacific North Line uses the UP Kenosha Sub to operate commuter rail service between Chicago and Kenosha seven days a week. Figure A-5 illustrates Route Alternative B.

Figure A-5
Route Alternative B – UP Kenosha Sub



Route Alternative B departs Chicago from the Ogilvie Transportation Center (OTC) and travels north on the UP Kenosha Sub to the railroad control point St. Francis in Milwaukee, WI. The route exits the UP Kenosha Sub at St. Francis and continues on the UPRR National Avenue Industrial Lead to Washington

Street in Milwaukee. From Washington Street, Route Alternative B connects with the existing Amtrak route and runs on the CP C&M Sub until it reaches MIS at MP 85.5. The route has two main tracks between OTC and Kenosha, WI and between Washington Street and MIS and a single track between Kenosha and Washington Street. The UPRR dispatches the route. Amtrak stations along the route include the existing *Hiawatha Service* stop at Milwaukee Intermodal Station. The terminal station in Chicago is at Ogilvie Transportation Center.

The frequency of Metra commuter trains making local stops on this route would substantially limit the maximum speed and the scheduling options available to intercity passenger trains between OTC and Kenosha. There are currently 27 Metra stations between OTC and MIS. Metra operates 68 weekday commuter trains between Chicago and Winnetka with 58 of these trains continuing to Highland Park, 53 to Waukegan and 18 continuing from Waukegan to Kenosha. Commuter service also operates on Saturdays, Sundays and Holidays on approximately 2-hour headways. Special trains to and from the Ravinia Music Festival also operate during the summer months. The main tracks at Ravinia are both occupied by extra commuter trains following these events. UP operates 4 through freight trains between Lake Bluff and Milwaukee. All of these trains occupy the main track while serving industries and yards along the route.

A major deficiency of this route alternative is that there is no rail connection between OTC and Amtrak's main facilities at CUS which means that Route Alternative B cannot access CUS, and the *Hiawatha Service*'s Chicago terminal would be moved to OTC. Since all of Amtrak's passenger services are located at CUS, the fact that Route Alternative B would move the *Hiawatha Service* terminal to OTC is a detriment to all passengers traveling into, out of, and through Chicago on Amtrak. Entrances to CUS and OTC are 0.3 miles apart and not connected by walkways out of the elements. Figure A-6 illustrates the locations of CUS and OTC.

Figure A-6
Location of Chicago Union Station and Ogilvie Transportation Center



Passengers transferring between the *Hiawatha Service* and other Amtrak routes or intercity bus lines would be required to walk or use another mode of transportation to travel between stations. The move would cause confusion for passengers who have traveled on the *Hiawatha Service* out of CUS and for passengers new to Amtrak who need to transfer to other Amtrak routes.

Route Alternative B does not meet the purpose and need of enhancing and improving the reliability of the *Hiawatha Service* due to delays and insufficient capacity that would result from adding the passenger trains to the current congested Metra operations on the UP Kenosha Sub, without undertaking significant capacity improvements.

Potential ridership that Route Alternative B would serve on the UP Kenosha Sub has not been calculated, but the alternative would certainly impact existing and future passenger rail demand for the riders that currently access the *Hiawatha Service* mid-corridor, since a new route would not serve existing mid-corridor stations at Glenview, IL, Sturtevant, WI, and General Mitchell International Airport in Milwaukee. Route Alternative B eliminates existing transportation connections at Chicago Union Station, Glenview, Sturtevant, and General Mitchell International Airport that have been utilized and enhanced for decades.

Moving the *Hiawatha Service* to a new rail corridor would likely not expand modal options for passengers. The expansion of modal options is related to increased access to alternative modes of transportation in order to attract new ridership. Route Alternative B could actually reduce modal options because it eliminates important intermodal connections at General Mitchell International Airport and Chicago Union Station. Mid-corridor stations could be constructed on Route Alternative B,

but would not provide the same quantity of trip generation as the Airport and Union Station do.

A.2.3. Route Alternative C - Union Pacific Milwaukee Subdivision

The UP Milwaukee Sub runs from near Chicago's O'Hare International Airport northeast to Milwaukee. Generally, Route Alternative C runs parallel to and between Route Alternatives A and C. Route Alternative C follows the CP C&M Sub from Chicago Union Station until it intersects with the UP Milwaukee Sub near milepost 20 in Glenview, IL. Figure A-7 illustrates Route Alternative C.

Figure A-7
Route Alternative C – UP Milwaukee Sub



A passenger train using this route departs Chicago from CUS and travels north on the CP C&M Sub until it intersects with the UP Milwaukee Sub near Techny Road in Northbrook. A new connection would be constructed from the CP C&M Sub to the UP Milwaukee Sub through a golf course in the southeast quadrant. The route continues on the UP Milwaukee Sub 60 miles to the railroad control point St. Francis in Milwaukee, WI, where it connects to the UPRR National Avenue Industrial Lead to Washington Street in Milwaukee. From Washington Street, Route Alternative C connects with the existing Amtrak route and runs on the CP C&M Sub until it reaches MIS at MP 85.5.

This route has three main tracks from CUS to Tower A-5 and two main tracks between Tower A-5 and the proposed new connection near Techny Road in Northbrook (Tower A-20). A single track would connect the CP C&M Sub to the UP Milwaukee Sub. From the new connection north, the UP is double track for 11 miles and single track for 50 miles until it connects to the UP National Avenue Industrial Lead. This route is dispatched by UPRR. Stations on this route would include existing *Hiawatha Service* stops at Chicago Union Station and Milwaukee Intermodal Station.

There are 11 Metra stations between CUS and the new connection near Techny Road in Northbrook. Metra operates 68 commuter trains each weekday between CUS and the proposed new connection. Saturday, Sunday and holiday service is also operated on approximately two-hour frequencies. Approximately 2 through freight trains per day also travel on this segment of track.

The number of freight trains traveling and staging on the UP Milwaukee Sub would substantially limit the maximum speed and the scheduling options available to intercity passenger trains. The UP Milwaukee Sub is a major route for UP and CP freight trains between Milwaukee and the major freight yards in Chicago (Bensenville for CP and Proviso for UP). Freight trains often stage at various locations along this route due to operating constraints in Des Plaines, IL where the route crosses the triple track UP Harvard Subdivision and the CN-Metra North Central Service. Metra operates 64 weekday trains on the UP Harvard Sub and 22 weekday trains on the North Central Service through Deval.⁵ Although there are no contractual curfews for freights operating on the UP Harvard and Milwaukee Subs and the CN, the railroads recognize the importance of commuter service during peak periods of 6-9 a.m. and 4-7 p.m. and use their best efforts to preserve the commuter schedule. UP currently runs 15-17 trains per day carrying sand from Wisconsin and coal from the Powder River Basin on the UP Milwaukee Sub from Milwaukee through its intersection with the CP C&M Sub through Deval and beyond.⁶

Although the UP Milwaukee Sub was originally constructed as a double track freight-only railroad to divert freight trains from the busy passenger and commuter lines, it is a busy single track freight corridor today. Operating intercity passenger rail service over this key freight train route would result in deterioration of freight service and delays to intercity passenger rail trains. Additionally, track, signal, and grade crossings need major upgrades to accommodate passenger rail service, and stations need to

⁵ https://metrarail.com/content/metra/en/home/maps_schedules/metra_system_map.html

⁶ Information provided by Union Pacific during a field inspection of the UP Milwaukee Subdivision on May 28, 2014

be constructed.

Similar to Route Alternative B, Route Alternative C does not meet the purpose and need of enhancing and improving the reliability of the *Hiawatha Service* due to delays and insufficient capacity that would result from adding the passenger trains to the current congested UP freight operations on the UP Milwaukee Sub without undertaking significant capacity improvements.

Potential ridership that Route Alternative C would serve on the UP Milwaukee Sub has not been calculated, but the alternative would certainly impact existing and future passenger rail demand for the riders that currently access the *Hiawatha Service* mid-corridor, since a new route would not serve existing mid-corridor stations at Glenview, IL, Sturtevant, WI, and the General Mitchell International Airport. The Alternative eliminates existing transportation connections at Glenview, Sturtevant, and at the airport that have been utilized and enhanced for decades.

Moving the *Hiawatha Service* to a new rail corridor would likely not expand modal options for passengers. The expansion of modal options is related to increased access to alternative modes of transportation in order to attract new ridership. Route Alternative C could actually reduce modal options because it eliminates an important intermodal connection at General Mitchell International Airport. Mid-corridor stations could be constructed on Route Alternative C, but would not provide the same quantity of trip generation as the Airport does.

A.2.4. Evaluation of Route Alternatives

The three Route Alternatives are evaluated against elements of the purpose and need of the project. Figure A-8 summarizes the evaluation. A description of the results follows Figure A-8.

Figure A-8
Evaluation of Route Alternatives

	Address Existing and Future Passenger Rail Demand	Expand Modal Options	Strengthen Transportation Connections	Improve Reliability of Existing Service	Overall Evaluation of Alternative
Route Alternative A – Existing Amtrak Route	✓	✓	✓	✓	Carry forward
Route Alternative B – UP Kenosha Sub	✗	✗	✗	✗	Do not carry forward
Route Alternative C – UP Milwaukee Sub	✗	✗	✗	✗	Do not carry forward

Route Alternative B and Route Alternative C were eliminated from further consideration because each proposes moving the well-established *Hiawatha Service* to a new rail corridor, thereby reducing modal options by eliminating important intermodal connections at existing mid-corridor stations. In addition, Route Alternative C would require the construction of a new rail connection through a golf course. A detailed Route Alternatives analysis is included in Appendix A. The No-Build Alternative and Build

Alternative (Route Alternative A) were retained for further study.

A.3. Analysis of Service Alternatives

Following the completion of the Route Alternatives analysis, five Service Alternatives for Route Alternative A were identified and evaluated for each alternative's ability to meet the purpose and need and reasonableness criteria. The five Service Alternatives include:

- Service Alternative A (No-Build Alternative) - Passenger service operating at a maximum of 79 MPH throughout the corridor at a frequency of 7 round-trips per day
- Service Alternative B – Passenger service operating at maximum of 79 MPH from Chicago Union Station to Rondout (Lake Forest, IL), at 90 MPH from Rondout to the Milwaukee Airport Rail Station (Milwaukee, WI), and at a maximum of 79 MPH from the airport station to Milwaukee Intermodal Station at a frequency of 10 round-trips per day
- Service Alternative C – Passenger service operating at a maximum of 79 MPH throughout the corridor and increasing the frequency of the *Hiawatha Service* from existing service levels of 7 round trips per day to 10 round trips per day
- Service Alternative D – Adding an additional coach car to each existing *Hiawatha Service* train set
- Service Alternative E – Changing *Hiawatha Service* ticketing procedures from unreserved to reserved

The purpose of this section of the report is to evaluate the five Service Alternatives for their ability to accommodate *Hiawatha Service* operations and meet the purpose and need of the project. Each of the five Service Alternatives are evaluated in separate sections below.

A.3.1. Service Alternative A – No-Build Alternative

The No-Build Service Alternative would maintain current maximum speeds of 79 MPH for passenger trains in the corridor. Frequency levels, travel times, stopping patterns, train equipment configuration, and fare structures would remain the same.

Service Alternative A would not meet the purpose and need of addressing existing and future passenger rail demand because no changes would be made to the existing service. It also would not expand modal options to provide an alternative to highway congestion, would not improve the reliability of the existing service, and would not strengthen connections to other transportation modes.

A.3.2. Service Alternative B – 90 MPH Alternative

The 90 MPH service alternative proposes to increase the maximum passenger speed from 79 MPH to 90 MPH between Rondout (Lake Forest, IL) and the Milwaukee Airport Rail Station, a distance of approximately 46 miles. Speeds south of Rondout are restricted to 79 MPH due to operating within Metra commuter rail territory with high volumes of commuter and freight rail traffic. A Train

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Performance Calculator developed for the corridor was used to estimate the reduction in travel time due to the speed increase over the 46 mile segment of the route. The speed increase is calculated to reduce travel times for Amtrak trains by 2 minutes. Figure A-9 depicts the speed regime for Service Alternative B.

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Figure A-9
Service Alternative B – 90 MPH Alternative



Capital improvements must be made to the track, grade crossings, and future PTC system in order to accommodate the proposed speed increase in this segment of track. Additionally, at 90 MPH, track

must be maintained to Class 5 standards, which will add significant cost to the operating and maintenance budget since the track is only maintained to Class 4 standards today. The existing 136 lb rail is sufficient for 90 MPH operations, but approximately 1/3 of the ties in the track segment should be replaced.

There are 26 public at-grade crossings in the portion of track that is proposed to have a speed increase. All of the crossings have two-quadrant gates with flashing lights. According to FRA's grade crossing guidelines⁷, "public crossing treatments for Emerging High-Speed Rail lines (where train speeds are between 80 and 110 MPH), should provide an additional level of safety by blocking all lanes of travel". This can be accomplished by installing four-quadrant gates or median barriers with two-quadrant gates at all public at-grade crossings. Capital costs to establish a sealed corridor will vary depending on whether four quadrant gates or median barriers are installed. Additionally, controls at all grade crossings will be modified to extend the train detection further from the crossings because trains operating at 90 MPH will activate grade crossing warning devices farther from the crossing than trains operating at 79 MPH.

Existing signal locations in the proposed 90 MPH segment of track are spaced adequately to support increased passenger speeds. The safe braking distance (SBD) of a 90 MPH passenger train, at approximately 7,800 feet⁸, is shorter than the SBD of a 60 MPH freight train, at over 8,000 feet⁹. The existing signal locations were originally designed to accommodate a 60 MPH freight train; therefore, no signal modifications are proposed.

On October 29, 2015, the Positive Train Control Enforcement and Implementation Act of 2015 became federal law. The Act extends the deadline for implementing Positive Train Control (PTC) to December 31, 2018 for each Class I carrier and each entity providing regularly scheduled intercity passenger rail transportation. PTC Systems are integrated command, control, communications, and information systems for controlling train movements with safety, security, precision, and efficiency.¹⁰ A PTC Implementation Plan must be submitted to the U.S. Secretary of Transportation within 90 days of the enactment of the Act. PTC must be implemented on the entire Amtrak route between Chicago and Milwaukee. Because this Environmental Assessment was in development at the time the PTC Implementation Plan was due, PTC-related design to accommodate 90 MPH service was not included. Therefore, additional capital cost will be borne to reconfigure the PTC system to account for 90 MPH passenger speeds. Because PTC technology is still evolving at the time of print of this EA, actual costs to reconfigure the I-ETMS system are unknown.

Service Alternative B would not meet the purpose and need of addressing existing and future passenger rail demand because an increase in speed would not alleviate demand for the service. It also would not

⁷ *Highway-Rail Grade Crossing Guidelines for High-Speed Passenger Rail*, November 2009

⁸ *Braking Distance Curves – Amtrak Braking Curve CE 205*, February 1, 2012

⁹ Braking Charts provided by Canadian Pacific, April 2010

¹⁰ <https://www.fra.dot.gov/Page/P0152>

expand modal options to provide an alternative to highway congestion, would not improve the reliability of the existing service, and would not strengthen connections to other transportation modes.

A.3.3. Service Alternative C – Increased Frequencies Alternative

The Chicago-Milwaukee intercity passenger rail corridor has been evaluated over the past twenty years in several studies that assessed a range of proposed operational alternatives to serve the corridor. Feasibility studies were previously conducted as part of the Midwest Regional Rail Initiative (MWRRI) and in support of the 2009 High Speed Intercity Passenger Rail (HSIPR) Program Track 2 Corridor Programs Application for the Chicago-Milwaukee-Madison corridor.

The purpose of the MWRRI was to develop a transportation plan for nine Midwestern states to “help meet future regional travel needs through significant improvements to the level and quality of regional passenger rail service.”¹¹ As part of the MWRRI, strategic assessments were completed to “determine the most beneficial and affordable service and equipment scenarios” for each of the MWRRI corridors, including the Chicago-Milwaukee corridor. Analyses focused on selecting an appropriate corridor operating plan that optimized capital costs, operating costs, travel times, level of infrastructure investment, frequency of service, and station amenities. The result of the MWRRI assessment was the identification of a shorter-term 10 round trip per day alternative and a long-term 17 round trip per day alternative and associated infrastructure improvements to support the alternatives. The MWRRI supported a phased approach to adding frequencies to the existing *Hiawatha Service*.

An RTC model and a Service Development Plan were completed for the Chicago-Milwaukee-Madison corridor in support of the 2009 HSIPR Application. Similar to MWRRI work, the RTC modeling effort also identified and analyzed 10 round trip per day and 17 round trip per day alternatives. The model determined the necessary capital improvements to accommodate the 10 and 17 round trip per day alternatives, and the Service Development Plan presented the financial results, operating statistics, and economic and public benefits of the short- and long-term frequency alternatives.

In the near term, the 10 round trip alternative meets the purpose and need of addressing passenger rail demand by expanding schedule options to provide additional early and late evening departures from Chicago and an additional morning departure from Milwaukee. As identified in the Purpose and Need chapter, an on-board survey of existing *Hiawatha Service* passengers indicated that the proposed schedule additions described above were highly desirable to existing passengers.

By providing additional trips, the *Hiawatha Service* is forecasted to attract an additional 100,000 passengers per year in 2019 as compared to ridership in 2019 at existing service levels.¹² Additional frequencies expand modal options that provide an alternative to traffic delay, reliability issues, and long travel times associated with highway congestion in the corridor.

¹¹ MWRRI Project Notebook, June 2014

¹² Route & Service Financial Evaluation for Ten Daily Round Trips on *Hiawatha Service* dated August 15, 2014 (Revised August 26, 2014)

As frequencies are added to the *Hiawatha Service* schedule, opportunities for connections to intercity bus routes, air travel, transit, and other intercity passenger rail routes will increase. Travel within the corridor will be more robust and connections to modes that travel outside the corridor will be more accessible.

As discussed in detail in later sections of this Appendix and in Chapter 2 of the EA, infrastructure improvements must be constructed in order to accommodate the proposed increase in frequencies. Many of the identified improvements will significantly enhance and improve the reliability of trains operating on the route.

The 10 round trip alternative meets the purpose and need without constructing extremely costly capital improvements associated with the long-term 17 round trip alternative. The State of Wisconsin supports a 10 round trip alternative and the project and railroad stakeholders agree that the 10 round trip alternative is the only feasible operational alternative for the corridor at this time. The 17 round trip alternative is removed from further analysis within this Environmental Assessment, but is identified as a future phase of the overall MWRRI plan for the corridor. The 10 round trip per day alternative is identified as the alternative for adding frequencies.

Service Alternative C would meet the purpose and need of meeting existing and future passenger demand by providing additional *Hiawatha Service* frequencies. Expanded schedules would also provide additional opportunities for alternatives to auto travel in the corridor. By implementing the infrastructure improvements needed to support the increased frequencies, reliability on the *Hiawatha Service* would be enhanced, and connections to other transportation modes would be strengthened.

A.3.4. Service Alternative D – Increased Capacity to Train Sets Alternative

Adding a seventh coach car to each *Hiawatha Service* train set would increase seat capacity by approximately 70 seats per train, bringing total train seat capacity to approximately 486 seats per train. The additional coach car would accommodate more riders on the existing trains in the Chicago-Milwaukee corridor. It would also ease near-capacity and over-capacity conditions on trains traveling during peak travel periods. However, while more capacity per train is provided, only two trains per day in each direction have historically had capacity issues. This alternative does not sufficiently address increasing demand for *Hiawatha Service* because it will not impact the limited train schedule options afforded to passengers. As discussed in the Purpose and Need chapter, on-board surveys conducted by WisDOT found that passengers strongly support complementing existing schedules with early and late evening departures from Chicago and Milwaukee.

Adding a seventh coach car to each *Hiawatha Service* train set does not strengthen transportation connections to other modes on its own - the schedule by which the *Hiawatha Service* operates inherently inhibits rail travel flexibility within the corridor. Limited passenger train schedule options impact the flexibility of traveling within the corridor and transferring to modes that serve destinations outside the corridor. Without increased schedule options, intermodal connections will not be

strengthened.

Existing reliability issues are related to Amtrak interference with freight and commuter trains and maintenance work on the route. This alternative does not improve reliability because infrastructure improvements have not been proposed to mitigate the reliability issues as part of the alternative.

Adding capacity to train sets also does not expand modal options as robustly as increasing frequencies does, because while additional capacity per train affords more people the opportunity to use the service, it does not provide additional mobility and transportation choices above existing levels.

Finally, adding a coach car to each train set will require the expenditure of capital funds to purchase the equipment and additional annual funds to operate (including personnel and fuel) and maintain the additional equipment.

A.3.5. Service Alternative E – Changed Ticketing Alternative

Changing the *Hiawatha Service* from unreserved ticketing to reserved ticketing would allow Amtrak to control the number of passengers traveling on each train. Moving to reserved ticketing would ease over-capacity conditions on peak *Hiawatha Service* trains. However, moving to reserved ticketing would not meet the stated purpose of addressing existing and future demand; without other service improvements, reserved ticketing essentially freezes ridership levels. If reserved ticketing were implemented, ridership growth would be restricted by limiting the number of passengers allowed on trains (some passengers may be turned away). Currently, with unreserved ticketing, no passengers are turned away from the *Hiawatha Service* trains, and passengers have the flexibility of choosing any train schedule with their ticket. Furthermore, this alternative does not meet the purpose of strengthening transportation connections to other modes and enhancing and improving the reliability of the existing service.

A.3.6. Evaluation of Service Alternatives

The five Service Alternatives are evaluated against elements of the purpose and need of the project. Figure A-10 summarizes the evaluation. A description of the results follows Figure A-10.

Figure A-10
Evaluation of Service Alternatives

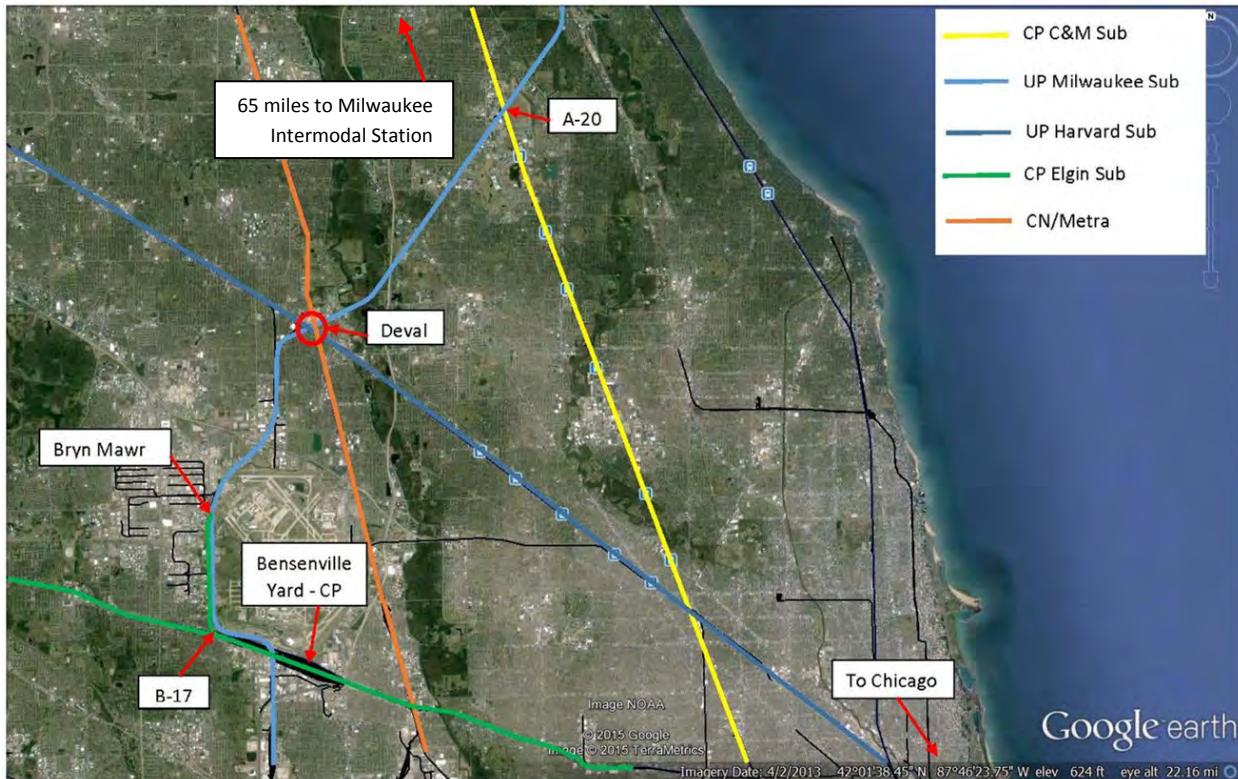
	Address Existing and Future Passenger Rail Demand	Expand Modal Options	Strengthen Transportation Connections	Improve Reliability of Existing Service	Overall Evaluation of Alternative
Service Alternative A – No-Build Alternative	X	X	X	X	Do not carry forward
Service Alternative B – 90 MPH Alternative	X	X	X	X	Do not carry forward
Service Alternative C – Increased Frequencies Alternative	✓	✓	✓	✓	Carry forward
Service Alternative D – Increased Capacity to Train Sets Alternative	X	X	X	X	Do not carry forward
Service Alternative E – Changed Ticketing Alternative	X	X	X	X	Do not carry forward

Although Service Alternative B would provide a travel time reduction of 2 minutes between the Glenview, IL station and the Milwaukee Airport Rail Station, it would not meet the purpose and need as it would not address existing and future passenger rail demand because an increase in speed would not alleviate demand for the service. It also would not be reasonable because it would require the expenditure of capital costs to construct additional track improvements and would pose significant increases in annual operating and maintenance costs. Service Alternative D would not meet the purpose and need as it would not improve reliability or expand modal options, and it would not be reasonable because it would require the expenditure of capital funds to purchase additional equipment and the expenditure of additional annual funds to operate and maintain the equipment. Service Alternative E would not meet the purpose and need as it would not address existing and future demand, would restrict ridership growth, would not strengthen connections to other modes, and would not enhance and improve the reliability of the existing service. As such, Service Alternative C was the sole Service Alternative (in addition to the No-Build Alternative, Service Alternative A) to be carried forward.

A.4. Analysis of Design Alternatives for the UPRR Siding Extension at A-20 Project

The UPRR Siding Extension at A-20 project is proposed to address freight and passenger rail delays on the existing Amtrak route that are caused by congestion within the Chicago Terminal Area rail network. Figure A-11 illustrates the Chicago Terminal Area.

Figure A-11
Chicago Terminal Area



Canadian Pacific (CP) owns and operates a large freight intermodal terminal at Bensenville Yard, just west of Chicago. It is one of three CP intermodal terminals in the U.S. and handles almost every type of freight CP transports including mixed manifests, stack trains, and unit trains carrying crude oil, ethanol, grain, and potash. Some CP trains traveling to Chicago from the north and west of the U.S. and Canada go directly down the CP C&M and connect with other railroads in Chicago. However, most CP trains use the CP C&M Sub to access Bensenville Yard.

In order to access Bensenville Yard, CP trains transfer from the CP C&M Sub to the Union Pacific Milwaukee Subdivision (UP Milwaukee Sub) at A-20 in Northbrook and then to the CP Elgin Subdivision at Bryn Mawr. From the CP Elgin Sub, trains can access Bensenville Yard. CP trains would only be accepted onto UP territory if it is assured that the CP train can travel through the corridor and clear all grade crossings and the UP at Bryn Mawr. Even if a CP train can exit the UP at Bryn Mawr, it may get stopped at the crossing with the Metra Milwaukee District West Line at B-17. In this scenario, the end of the train would still be in UP territory and would block UP trains. If it is not certain that a CP train can completely clear the UP at Bryn Mawr, the CP train may not be accepted onto UP territory.

Another location that can impact whether a CP train is accepted onto UP territory is Deval. The Deval Control Point controls movements on the UP Milwaukee Sub at its at-grade crossings with the Canadian

National (CN)/Metra North Central Service and the UP Harvard Sub in Des Plaines, IL. A single CN track and three UP Harvard Sub tracks cross the UP Milwaukee Sub approximately 5.5 miles south/west of A-20. Both the CN and UP carry Metra commuter rail trains and can be very congested during peak hours. Metra operates 64 weekday trains on the UP Harvard Sub and 22 weekday trains on the North Central Service through Deval.¹³ During peak hours, freight is often prevented from crossing Deval due to the high priority Metra traffic. UP may not accept CP trains onto its territory during peak Metra periods because the CP trains may have to hold on the UP mainline to wait for clearance across Deval.

If CP trains are not accepted onto the UP at A-20, the CP trains are forced to hold on the CP C&M mainline at a control point called Rondout, located 12 miles north of A-20 in Lake Forest, IL. Metra reported that in some cases, CP has been accepted onto the UP and enters Metra territory south of Rondout only to arrive at Shermer Road and be told to hold. When CP trains hold on the mainline in Metra territory, Metra and Amtrak train schedules can be affected significantly.

Infrastructure improvements must be constructed to reduce delays for passenger and freight rail by allowing CP trains to travel through the corridor and hold off the mainline while waiting to get access onto the UP, and to provide additional capacity on the C&M mainline.

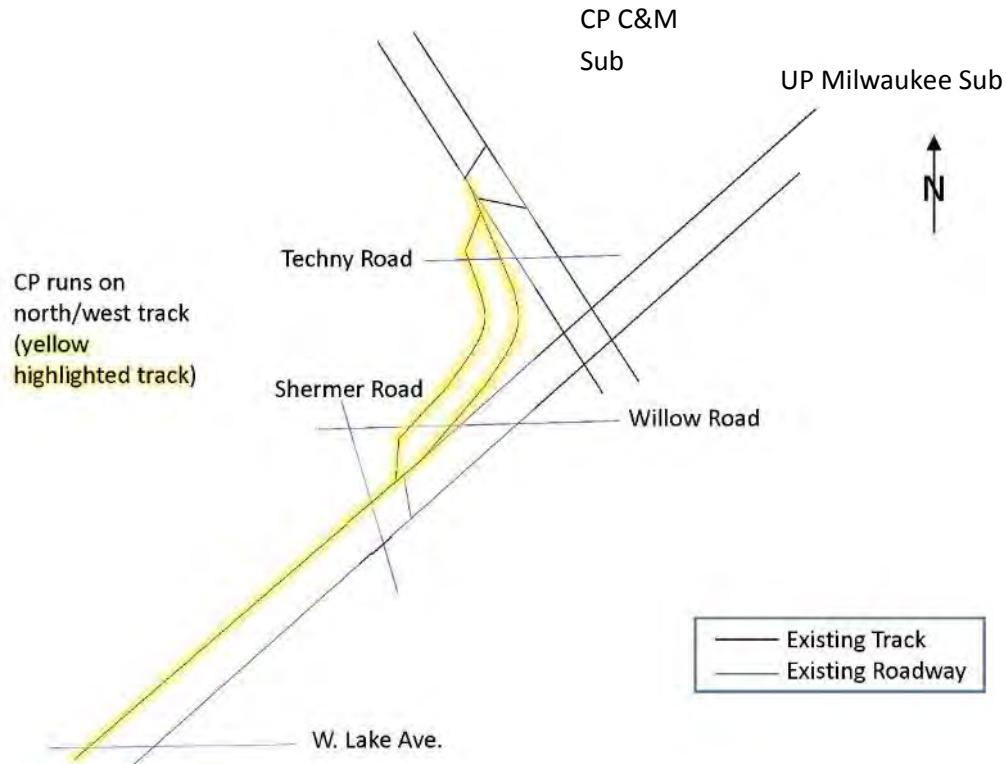
A.4.1. Existing Track Configuration at A-20

At A-20, the track is currently configured with one track connecting to the CP mainline and two tracks connecting to the UP mainline. The second connecting track reduces to single track approximately 275' south of the turnout from the CP mainline. These connecting tracks are considered "mainline" tracks in the CP time table. These two main tracks accommodate a 4,500' train clear of the grade crossing at Techny Road. When the tracks were constructed in the twentieth century, the connection was designed to accommodate freight trains just under a mile long between the CP and UP main tracks. However, typical train lengths have doubled since then. The connection no longer functions as intended.

Figure A-12 depicts the current track configuration at A-20.

¹³ https://metrarail.com/content/metra/en/home/maps_schedules/metra_system_map.html

Figure A-12
Current Track Configuration at A-20



CP trains operate on the western UP mainline track, highlighted in yellow in Figure A-12.

Several rail-related accidents, including a fatal accident in 2012, occurred at the Shermer Road Bridge on the UP Milwaukee Sub. The fatal accident was caused by the derailment of a coal train which collapsed the Shermer Road Bridge onto a vehicle, killing two. On the day of the accident, temperatures in the Chicago area were over 100 degrees, which heated the tracks and caused them to buckle at the site of the derailment. The reconstruction of the Shermer Road Bridge was completed by Union Pacific in December 2013. The roadway underneath the railroad bridge was reopened in July 2014. A derailment in 2009 occurred at the same location, causing one train to crash into the side of another. According to an FRA accident investigation, the probable cause of the derailment was a "binding truck bolster which caused the train car wheels to climb over the inside turnout closure rail leading to UP Main Track #1."¹⁴ The Villages of Glenview and Northbrook, which are located adjacent to the derailment location, have expressed concern about the safety of the Shermer Road Bridge. The new Shermer Road Bridge, completed in 2013, was designed to meet strict American Railway Engineering and Maintenance-of-Way (AREMA) standards for bridge and rail design.

¹⁴ FRA Office of Safety Accident Investigation Report HQ-2009-55, November 1, 2009

A.4.2. Proposed Alternatives

Six Design Alternatives were identified as alternatives that would meet the operational objectives of the project as follows:

- A-20 Alternative 1 – construct 11,000 foot holding track adjacent to the UP Milwaukee Subdivision on the west side of the existing two mainlines; construct new bridge over Shermer Road adjacent to the existing Shermer Road bridge. An 11,000 foot track is the longest section of track that can be constructed on the west side of the UP between Techny Road and West Lake Avenue.
- A-20 Alternative 2 – construct 10,000 foot track adjacent to the UP Milwaukee Subdivision on the east side of the existing two mainlines; construct new bridge over Shermer Road adjacent to the existing Shermer Road bridge; construct track swings to allow UP mainline operations to occur on eastern two tracks; CP trains would hold on former UP northern mainline. A 10,000 foot track is the longest section of track that can be constructed on the west/east side of the UP between Techny Road and West Lake Avenue.
- A-20 Alternative 3 – Construct the same improvements as Alternative 1 plus an additional 10,500 feet of track to the southwest on the west side of the UP. A 10,500 foot track is the longest section of track that can be constructed on the west side of the UP between West Lake Avenue and I-294.
- A-20 Alternative 4 – construct 10,000 foot track adjacent to the CP mainline on the west side of the existing main tracks north to Cherry Lane; permanently close Techny Road and Shermer Road grade crossings. A 10,000 foot track is the longest section of track that can be constructed on the west side of the CP between Shermer Road (on the UP) and Cherry Lane (on the CP).
- A-20 Alternative 5 – this alternative proposes a freight bypass for CP trains on the UP Milwaukee Subdivision from the Illinois-Wisconsin border to A-20. Requires construction of 30 miles of second main track and CTC, construction of a greenfield connection between UP and CP in Pleasant Prairie, WI; special track construction, new grade crossing construction
- A-20 Alternative 6 – the Village of Glenview proposed a service alternative consisting of the current 7 round trip service operating on the existing route and the additional 3 round trips operating on the UP Milwaukee Subdivision

The design alternatives are discussed below.

Design Alternative 1 – UPRR Siding Extension at A-20

Description of Design Alternative 1

Design Alternative 1 proposes a two-element solution: create a full two-track connection between the CP C&M Sub and the UP Milwaukee Sub and provide a new track long enough to accommodate a 10,000 foot CP train adjacent to the UP Milwaukee Sub. These improvements would allow a CP train to wait off

the C&M mainline until it receives approval to access the UP and would simultaneously allow a second CP train to exit the UP onto the C&M. The opposite is also true; a CP train can wait off the UP mainline until it receives approval to access the C&M and a second train can simultaneously exit the C&M onto the UP.

The second connection track that tapers down to a single track near Techny Road would be extended north to create a new point to access the UP Milwaukee Sub. The opposite end of the second connection track would be extended southeast parallel to the UP Milwaukee Sub on the north/west side of the UP. A new bridge over Shermer Road would be constructed to support the new track. The extended connection would end just north/east of the at-grade crossing with West Lake Avenue in the town of Glenview, IL. The new track can accommodate a train with a maximum length of approximately 11,000 feet between the West Lake Avenue and Techny Road at-grade crossings.

Alternative 1 is the alternative simulated by CP in their August 2013 modeling effort. CP determined that Alternative 1 would provide great operational benefit to freight service and would free up capacity on the C&M mainline.

The project spans from Metra Milepost 22.0 (Northbrook, IL) on the CP C&M Sub to UP Milepost 16.03 (West Lake Avenue, Glenview, IL) on the UP Milwaukee Sub and work includes grade crossing and signal modifications, track construction, embankment construction, and construction of a new bridge over Shermer Road adjacent to the existing bridge. The Project is approximately 4.17 miles in length, but the majority of the work occurs in the 2.5-mile segment between West Lake Avenue on the south end and just north of Techny Road on the north end.

Figure A-13 depicts the project location.

Figure A-13
Design Alternative 1 Project Location Map

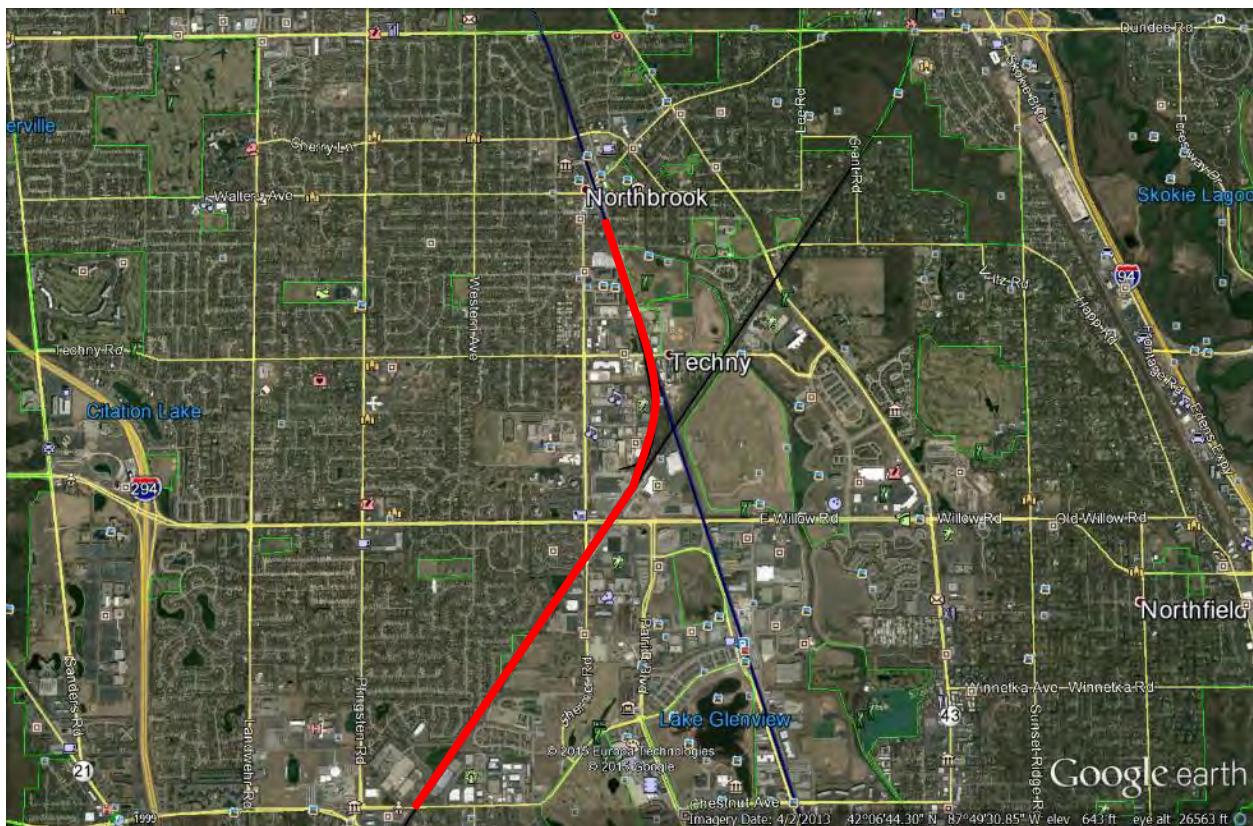
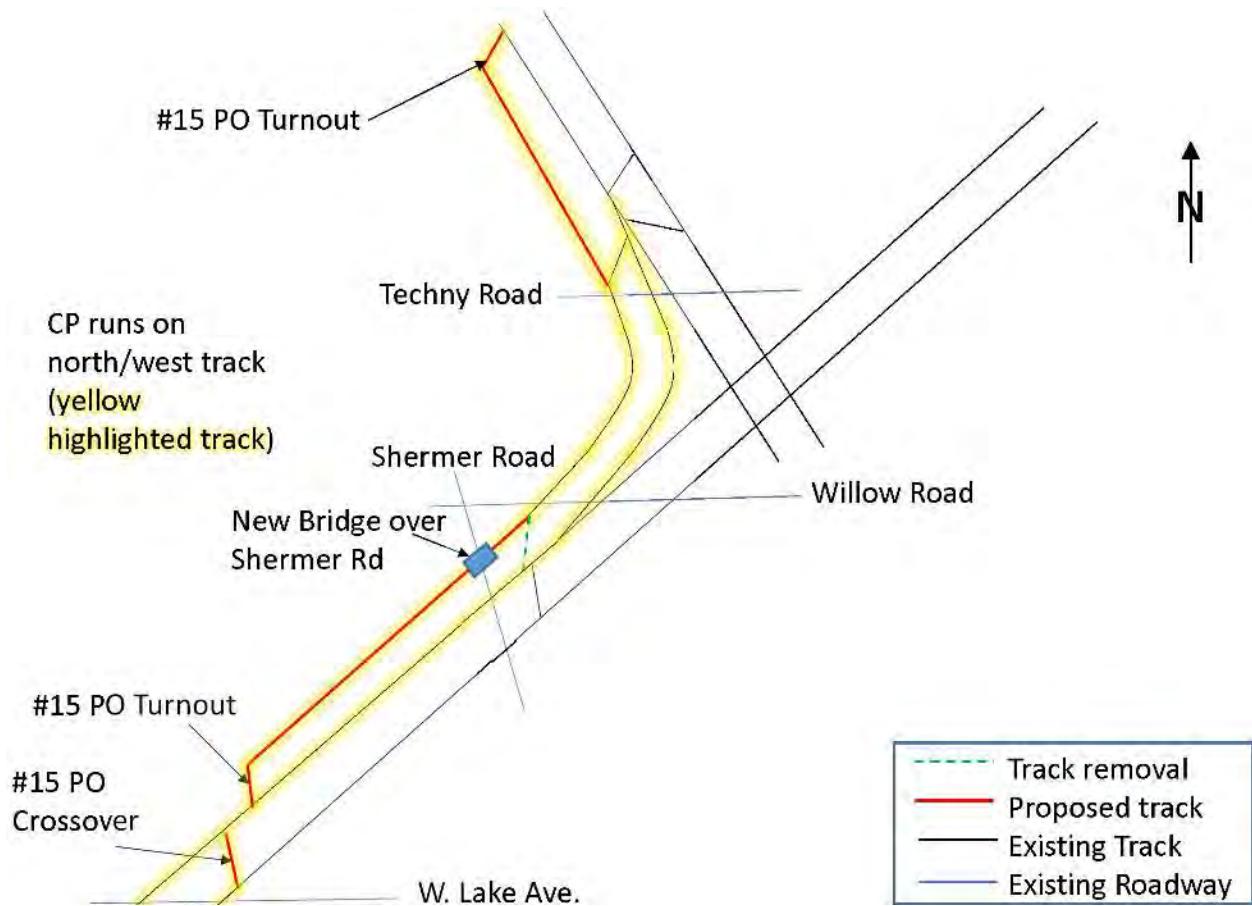


Figure A-14 illustrates the proposed Design Alternative 1 track configuration at A-20.

Figure A-14
Design Alternative 1 Proposed Track Configuration at A-20



Purpose and Need Evaluation of Design Alternative 1

Design Alternative 1 meets the purpose and need of the overarching EA because it would mitigate conflicts with freight and other passenger traffic in the corridor; would enhance and improve the reliability of the successful *Hiawatha Service* and the reliability of commuter and freight trains; and would provide for more schedule options to meet existing and future passenger demand.

Engineering Design Evaluation of Design Alternative 1

Safety

As part of the design, an existing turnout would be removed in the area of the previous derailments at the Shermer Road Bridge. This provides a reduction of risk of derailment near a bridge structure.

Order of Magnitude Capital Costs

The concept-level capital cost to construct Alternative 1 is estimated to be \$41.1 Million and includes a new bridge over Shermer Road adjacent to the existing bridge, signal work, and track construction on retained fill.

Construction Feasibility

No construction feasibility issues have been identified for this alternative. All track construction would occur within the railroad ROW.

Railroad Operations

This alternative would move held trains off the CP and UP mainlines and onto a dedicated CP track. Construction of this track would enable CP trains to move closer to Bensenville Yard which would provide CP more opportunities to get across Deval and B-17 and in a shorter period of time than in existing conditions. Reliability is expected to increase and delays decrease on the CP mainline.

Key Environmental Resource Evaluation of Design Alternative 1

Section 4(f)/Historic Properties

Work to construct Design Alternative 1 would occur adjacent to Jennings Park in Glenview, IL. Jennings Park is located at 3201 Barbara Drive and is a 5 acre park with a basketball court and playground. The park is located adjacent to the UP Milwaukee Sub right-of-way. No right-of-way acquisition is proposed as part of Design Alternative 1, and therefore, would not require the use of the park.

Wetlands

There are several wetlands located adjacent to and within the project area. National Wetlands Inventory mapping system was used to identify wetlands. Figure A-15 summarizes the findings.

Figure A-15
Design Alternative 1 Acreage of NWI Wetland Types

Wetland Type	Acres of Wetlands within 100' of the Rail Centerline	Impact
Freshwater Emergent Wetland (PEM)	0.34	No direct impact because wetlands are located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Freshwater Forested/Shrub Wetland (PFO/PSS)	20.12	No direct impact because wetland is located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Freshwater Pond (PUB)	1.77	No direct impact because pond is located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Riverine	12.04	Two rivers cross the project right-of-way but would not be directly impacted by project; possible temporary impacts during construction would be minimized using best management practices
Total	34.27	

Critical Habitats/Endangered Species

IDOT Bureau of Design and Environment conducted field surveys for this project and found the Illinois-listed oval milkweed in the Somme Prairie Nature Preserve (NP) and Illinois Natural Area Inventory (INAI) sites, which are located adjacent to Design Alternative 1 just north of Dundee Road in Northbrook. IDOT BDE determined that would be no adverse effect by this project on the oval milkweed found in the Somme Prairie NP and INAI.

IDOT BDE found no proposed or designated critical habitat for the federally listed species that may be present or in the vicinity of the design alternative: Northern Long-Eared Bat, Eastern Prairie Fringed Orchid, piping plover, red knot, Pitcher's thistle, leafy prairie-clover, Mead's milkweed, prairie bush-clover, Karner blue butterfly, Hine's emerald dragonfly, rattlesnake-master borer moth, and Eastern massasauga.

Noise and Vibration

A-20 Design Alternative 1 is proposed to be constructed in an area of mixed commercial/industrial land use and nearby single-family and multi-family residences. Several residences on Longmeadow Drive are located more than 100 feet but less than 200 feet from the noise-generating point of switch on the crossover at West Lake Avenue. Noise and vibration impacts between 100 and 200 feet of the point of switch would be moderate.

The noise analysis indicated that there is potential for noise impact from locomotives idling on the new track; however, based on information provided by UP and CP, engine idling noise occurs today in various locations including near West Lake Avenue and Shermer Road on the UP. In the proposed condition, idling noise would also occur near West Lake Avenue and Shermer Road on the UP. This assumes that engines are located at the head of each train. Because there is no proposed increase in train traffic and the idling noise would occur at the same locations, there would be no net change in idling noise level for the proposed condition.

In existing conditions, UP and CP freights generate moving train noise between West Lake Avenue and Shermer Road on the UP and north of Shermer Road on the CP. In the proposed condition, UP and CP freights would also generate moving train noise between West Lake Avenue and Shermer Road on the UP and north of Shermer Road on the CP, but trains using the new track would be moving on track that is 14' closer to the neighborhood on the west side of the UP between West Lake Avenue and Shermer Road than in existing conditions; however, these trains would not be traveling at full throttle, as the trains would be slowing to a stopped position at West Lake Avenue or Techny Road and would not present a severe impact on the adjacent surroundings.

Design Alternative 2 – UPRR Siding Extension on South/East Side of UP

Description of Design Alternative 2

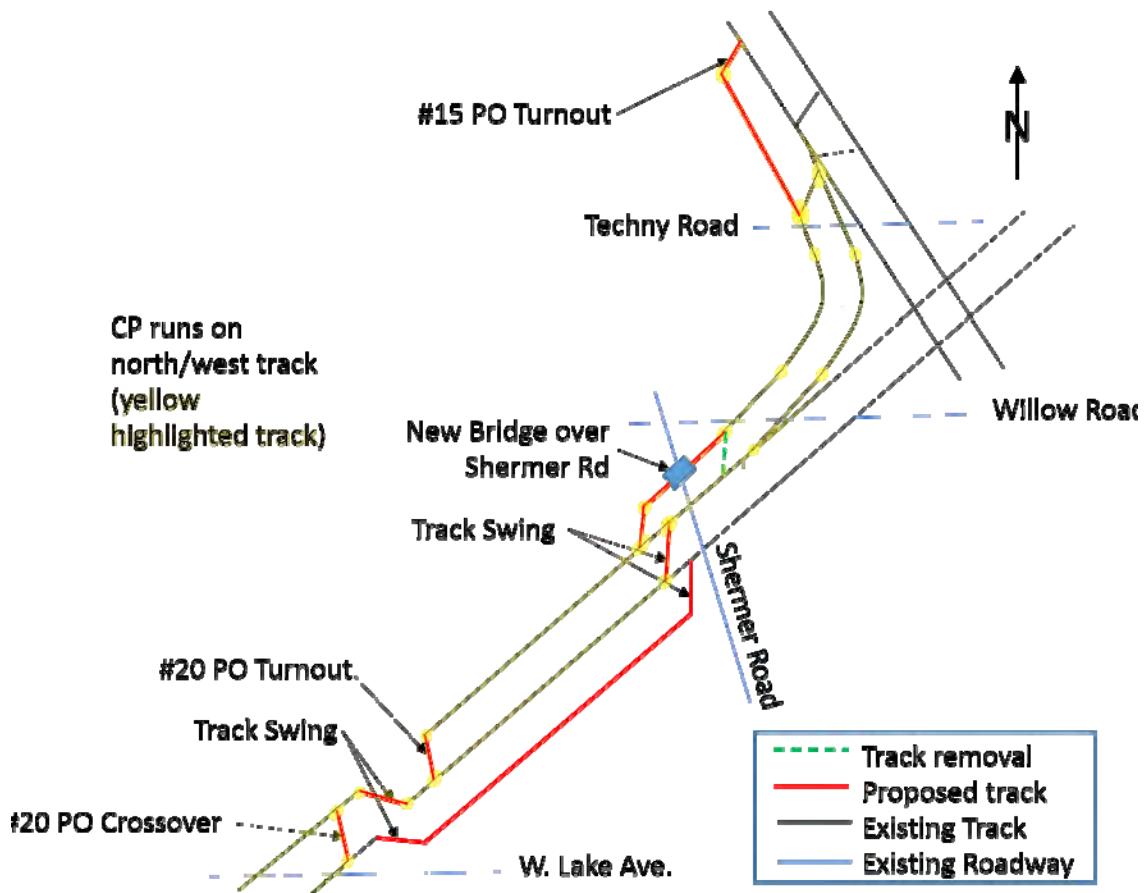
Design Alternative 2 proposes a two-element solution of creating a full two-track connection between the CP C&M Sub and the UP Milwaukee Sub and providing a new track long enough to accommodate a 10,000 foot CP train adjacent to the UP Milwaukee Sub. The difference between Design Alternative 1 and Design Alternative 2 is that the new track would be constructed on the south/east side of the UP between Shermer Road and West Lake Avenue in Alternative 2. UP mainline operations would be shifted to the newly constructed track and the former eastern mainline track. The former western mainline track would become the new CP track. Operationally, Alternative 2 would provide great operational benefit to freight service and would free up capacity on the C&M mainline.

The project spans from Metra Milepost 22.0 (Northbrook, IL) on the CP C&M Sub to UP Milepost 16.03 (West Lake Avenue, Glenview, IL) on the UP Milwaukee Sub and work includes grade crossing and signal modifications, track construction, embankment construction, and construction of a new bridge over Shermer Road adjacent to the existing bridge. The Project is approximately 4.17 miles in length, but the majority of the work occurs in the 2.5-mile segment between West Lake Avenue on the south end and just north of Techny Road on the north end.

See Figure A-13 under Design Alternative 1 for a depiction of the project location.

Figure A-16 illustrates the proposed Design Alternative 2 track configuration at A-20.

Figure A-16
Design Alternative 2 Proposed Track Configuration at A-20



Purpose and Need Evaluation of Design Alternative 2

Design Alternative 2 meets the purpose and need of the overarching EA because it would mitigate conflicts with freight and other passenger traffic in the corridor; would enhance and improve the reliability of the successful *Hiawatha Service* and the reliability of commuter and freight trains; and would provide for more schedule options to meet existing and future passenger demand.

Engineering Design Evaluation of Design Alternative 2

Safety

As part of the design, an existing turnout would be removed in the area of the previous derailments at the Shermer Road Bridge. This provides a reduction of risk of derailment near a bridge structure.

Order of Magnitude Capital Costs

The concept-level capital cost to construct Design Alternative 2 is estimated to be \$38.3 Million and includes a new bridge over Shermer Road adjacent to the existing bridge, signal work, and track construction on retained fill.

Construction Feasibility

No construction feasibility issues have been identified for this Alternative. All track construction would occur within the railroad ROW. Construction would be monitored in partnership with UP and CP to minimize impact to mainline UP operations during construction of the track shifts.

Railroad Operations

This alternative would move held trains off the CP and UP mainlines and onto a dedicated CP track. Construction of this track would enable CP trains to move closer to Bensenville Yard which would provide CP more opportunities to get across Deval and B-17 and in a shorter period of time than in existing conditions. Reliability is expected to increase and delays decrease on the CP mainline.

Key Environmental Resource Evaluation of Design Alternative 2

Section 4(f)/Historic Properties

Work to construct Design Alternative 2 would occur adjacent to Jennings Park in Glenview, IL. Jennings Park is located at 3201 Barbara Drive and is a 5 acre park with a basketball court and playground. The park is located adjacent to the UP Milwaukee Sub right-of-way. No right-of-way acquisition is proposed as part of Design Alternative 2, and therefore, would not require the use of the park.

Wetlands

There are several wetlands located adjacent to and within the project area. National Wetlands Inventory mapping system was used to identify wetlands. Figure A-17 summarizes the findings.

Figure A-17
Design Alternative 2 Acreage of NWI Wetland Types

Wetland Type	Acres of Wetlands within 100' of the Rail Centerline	Impact
Freshwater Emergent Wetland (PEM)	0.34	No direct impact because wetlands are located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Freshwater Forested/Shrub Wetland (PFO/PSS)	20.12	No direct impact because wetland is located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Freshwater Pond (PUB)	1.77	No direct impact because pond is located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Riverine	12.04	Two rivers cross the project right-of-way but would not be directly impacted by project; possible temporary impacts during construction would be minimized using best management practices
Total	34.27	

Critical Habitats/Endangered Species

IDOT Bureau of Design and Environment conducted field surveys for this project and found the Illinois-listed oval milkweed in the Somme Prairie Nature Preserve (NP) and Illinois Natural Area Inventory (INAI) sites, which are located adjacent to Design Alternative 2 just north of Dundee Road in Northbrook. IDOT BDE determined that would be no adverse effect by this project on the oval milkweed found in the Somme Prairie NP and INAI.

IDOT BDE found no proposed or designated critical habitat for the federally listed species that may be present or in the vicinity of the design alternative: Northern Long-Eared Bat, Eastern Prairie Fringed Orchid, piping plover, red knot, Pitcher's thistle, leafy prairie-clover, Mead's milkweed, prairie bush-clover, Karner blue butterfly, Hine's emerald dragonfly, rattlesnake-master borer moth, and Eastern massasauga.

Noise and Vibration

A-20 Design Alternative 1 is proposed to be constructed in an area of mixed commercial/industrial land use and nearby single-family and multi-family residences. Several residences on Longmeadow Drive are located more than 100 feet but less than 200 feet from the noise-generating point of switch on the crossover at West Lake Avenue. Noise and vibration impacts between 100 and 200 feet of the point of

switch would be moderate.

The noise analysis indicated that there is potential for noise impact from locomotives idling on the new track; however, based on information provided by UP and CP, engine idling noise occurs today in various locations including near West Lake Avenue and Shermer Road on the UP. In the proposed condition, idling noise would also occur near West Lake Avenue and Shermer Road on the UP. This assumes that engines are located at the head of each train. Because there is no proposed increase in train traffic and the idling noise would occur at the same locations, there would be no net change in idling noise level for the proposed condition.

In existing conditions, UP and CP freights generate moving train noise between West Lake Avenue and Shermer Road on the UP and north of Shermer Road on the CP. In the proposed condition, UP and CP freights would also generate moving train noise between West Lake Avenue and Shermer Road on the UP and north of Shermer Road on the CP, but trains using the new track would be moving on track that is 14' closer to the neighborhood on the west side of the UP between West Lake Avenue and Shermer Road than in existing conditions; however, these trains would not be traveling at full throttle, as the trains would be slowing to a stopped position at West Lake Avenue or Techny Road and would not present a severe impact on the adjacent surroundings.

Socioeconomic/Community Cohesion

Because Design Alternative 2 does not require land acquisition and all work would be completed within the railroad right-of-way, implementation of Design Alternative 2 would not cause any changes to land use, centers of employment, neighborhoods, or total population of the communities surrounding the project. There would be no segmentation, separation, or isolation of any areas of the communities due to the project.

Design Alternative 3 – Southwest Extension of UPRR Siding

Description of Design Alternative 3

Design Alternative 3 proposes a two-element solution: create a full two-track connection between the CP C&M Sub and the UP Milwaukee Sub and provide a new track long enough to accommodate a 10,000 foot CP train adjacent to the UP Milwaukee Sub. Alternative 3 differs in that the new track would be extended an additional 2 miles southeast. These improvements would allow a CP train to wait off the C&M mainline until it receives approval to access the UP and would simultaneously allow a second CP train to exit the UP onto the C&M. The opposite is also true; a CP train can wait off the UP mainline until it receives approval to access the C&M and a second train can simultaneously exit the C&M onto the UP. By constructing the additional 2 miles of track, a 10,000 foot train can wait to enter the UP between the I-294 Bridge and West Lake Avenue without blocking any grade crossings and would not hold adjacent to the neighborhoods between Shermer Road and West Lake Avenue.

The second connection track that tapers down to a single track near Techny Road would be extended north to create a new point to access the UP Milwaukee Sub. The opposite end of the second connection track would be extended southeast parallel to the UP Milwaukee Sub on the north/west side of the UP. A new bridge over Shermer Road would be constructed to support the new track. The new track would extend through West Lake Avenue (construct at-grade crossing), over East Lake Avenue (construct 125' single span bridge), under Milwaukee Avenue, over Central Parkway (construct 65' single span bridge), and end just north of the I-294 bridge (Glenview, IL).

Track still needs to be constructed from West Lake Avenue to north of Techny Road because a 10,000' train must be able to exit the CP C&M Sub and hold before gaining access to UP; the only way to accomplish this is to construct track the entire distance, even though trains would only hold at the south end of the project

The total project length is approximately 6.2 miles.

Figure A-18 depicts the project location for Design Alternative 3.

Figure A-18
Design Alternative 3 Project Location Map

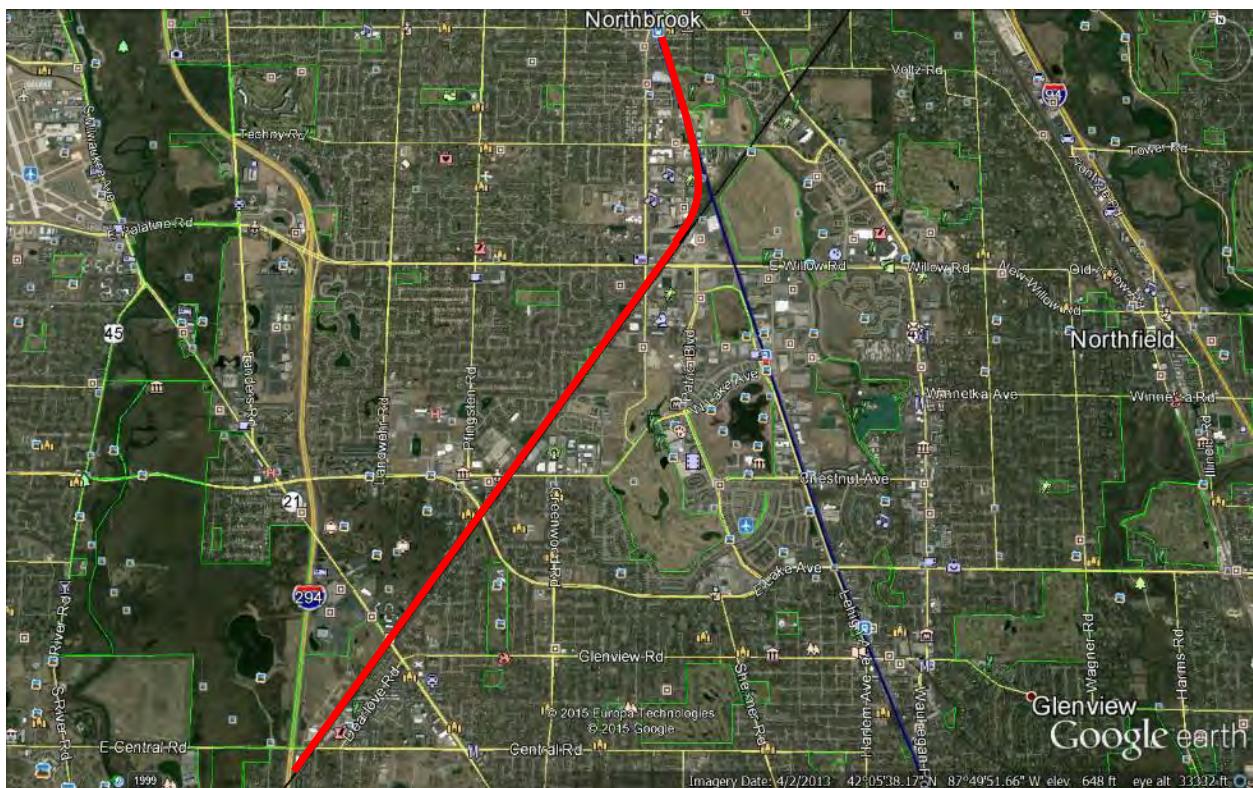
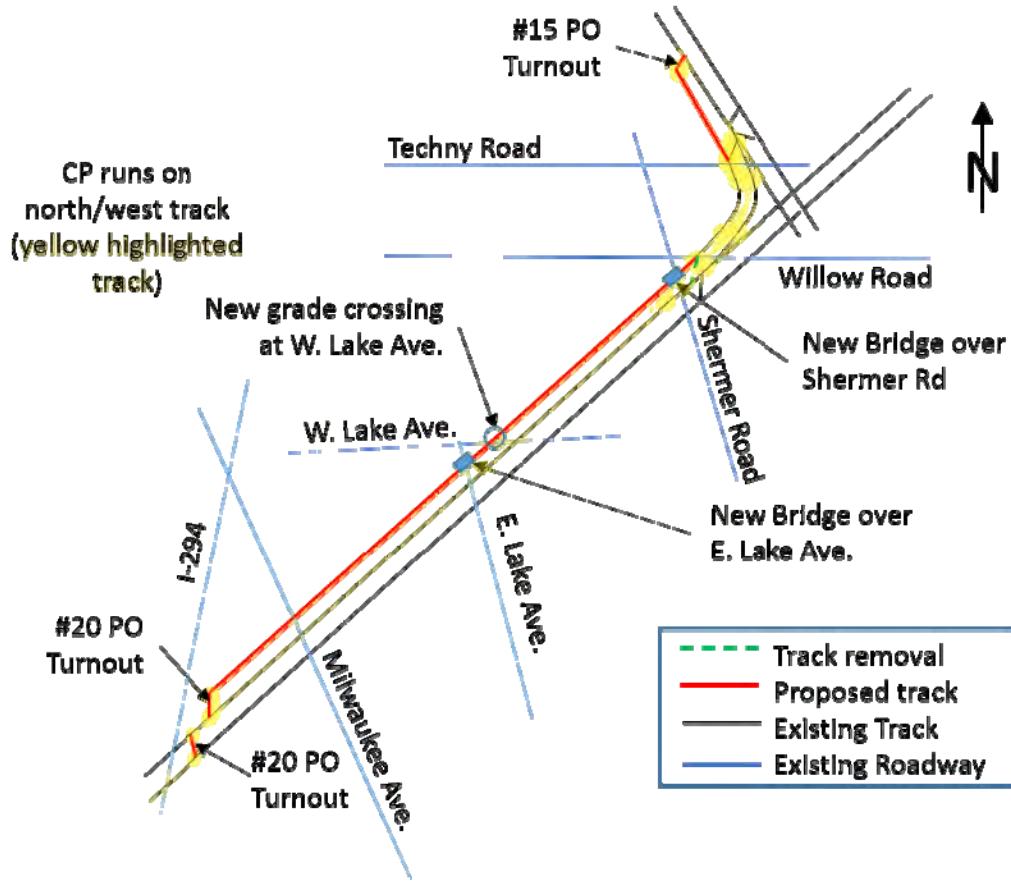


Figure A-19 illustrates the proposed Design Alternative 3 track configuration adjacent to the UP.

Figure A-19
Design Alternative 3 Proposed Track Configuration



Purpose and Need Evaluation of Design Alternative 3

Design Alternative 3 meets the purpose and need of the overarching EA because it would mitigate conflicts with freight and other passenger traffic in the corridor; would enhance and improve the reliability of the successful *Hiawatha Service* and the reliability of commuter and freight trains; and would provide for more schedule options to meet existing and future passenger demand.

Engineering Design Evaluation of Design Alternative 3

Safety

As part of the design, an existing turnout would be removed in the area of the previous derailments at the Shermer Road Bridge. This provides a reduction of risk of derailment near a bridge structure. However, an additional track would be constructed at the existing grade crossing at West Lake Avenue, which increases drivers' exposure to risk of collision with a train, thereby reducing safety.

Order of Magnitude Capital Costs

The concept-level capital cost to construct Design Alternative 3 is estimated to be \$58.5 Million and includes new bridges over Shermer Road, East Lake Avenue, and Central Avenue adjacent to the existing bridges, signal work, and track construction on retained fill.

Construction Feasibility

No construction feasibility issues have been identified for this alternative. All track construction would occur within the railroad ROW. Construction would be monitored in partnership with UP and CP to minimize impact to mainline UP operations during construction of the track shifts.

Railroad Operations

The purpose of Design Alternative 3 is to hold CP trains between West Lake Avenue and I-294, south of Glenview and the gated community near Shermer Road. Due to the extended length of the new track, it is possible that CP would stack two trains in the siding, which would cause the second train to hold adjacent to the gated community near Shermer Road. If two trains stacked on the new track, it would defeat the purpose of Design Alternative 3.

Key Environmental Resource Evaluation of Design Alternative 3

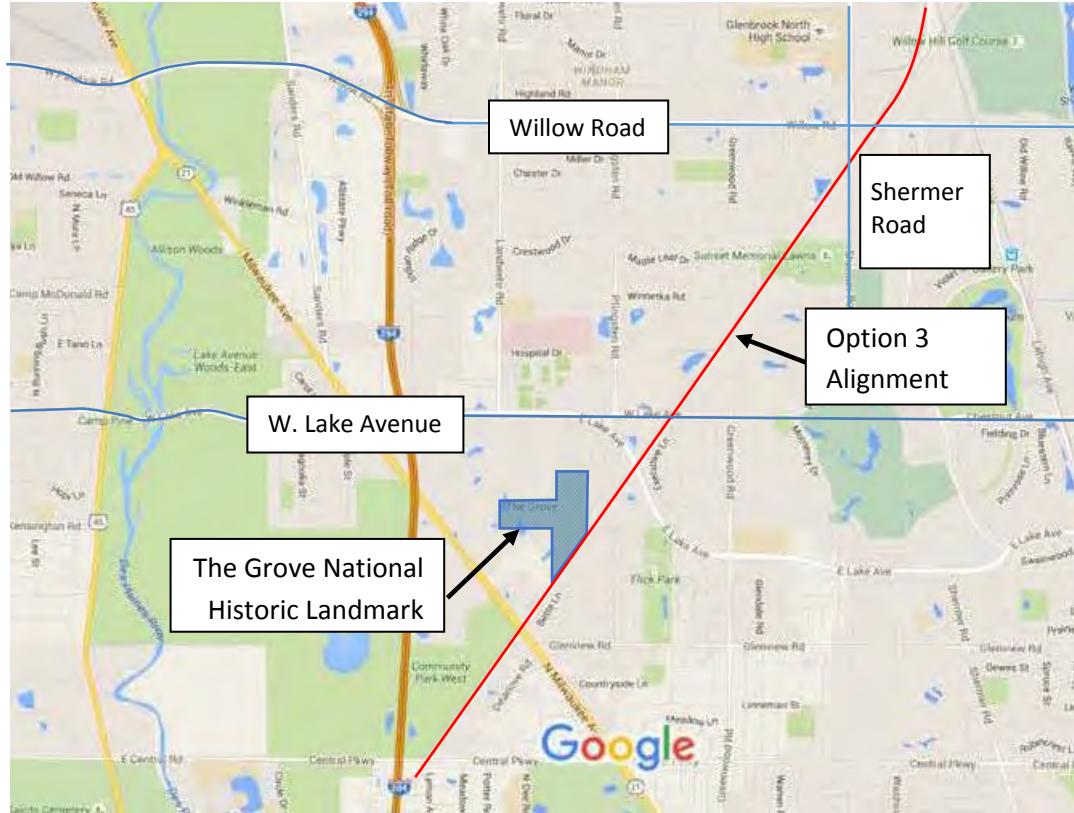
Section 4(f)/Historic Properties

Work to construct Design Alternative 3 would occur adjacent to Jennings Park in Glenview, IL. Jennings Park is located at 3201 Barbara Drive and is a 5 acre park with a basketball court and playground. The park is located adjacent to the UP Milwaukee Sub right-of-way. No right-of-way acquisition is proposed as part of Design Alternative 3, and therefore, would not require the use of the park.

Kennicott's Grove ("The Grove") is a National Historic Landmark that is preserved and maintained by the Glenview Park District. The Grove's property abuts Union Pacific's Milwaukee Sub right-of-way between East Lake Avenue and Milwaukee Avenue in Glenview. Figure A-20 illustrates The Grove's property in relation to the limits of Design Alternative 3.

Appendix A
Detailed Analysis of Route and Design Alternatives

Figure A-20
Location of Design Alternative 3 in Relation to The Grove National Historic Landmark



The Grove sits on 143 acres of prairie grove land with natural areas consisting of wetlands areas, an oak-hickory savanna, and a tall grass prairie.¹⁵ The portion of The Grove that abuts the Alternative 3 alignment is used for recreation and education; over two miles of walking trails are provided and there are several buildings used for educational programming. Section 106 of the National Historic Preservation Act requires Federal agencies to “take into account” the effects of their actions on historic properties, including National Historic Landmarks listed in the National Register of Historic Places. Due to the location of The Grove and the nature of the services it provides, all necessary actions would be taken to avoid the National Historic Landmark.

Wetlands

There are several wetlands located adjacent to and within the project area. National Wetlands Inventory mapping system was used to identify wetlands. Figure A-21 summarizes the findings.

¹⁵ www.thegroveglenview.org

Figure A-21
Design Alternative 3 Acreage of NWI Wetland Types

Wetland Type	Acres of Wetlands within 100' of the Rail Centerline	Impact
Freshwater Emergent Wetland (PEM)	0.34	No direct impact because wetlands are located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Freshwater Forested/Shrub Wetland (PFO/PSS)	20.12	No direct impact because wetland is located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Freshwater Pond (PUB)	1.77	No direct impact because pond is located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Riverine	12.04	Two rivers cross the project right-of-way but would not be directly impacted by project; possible temporary impacts during construction would be minimized using best management practices
Total	34.27	

Critical Habitats/Endangered Species

IDOT Bureau of Design and Environment conducted field surveys for this project and found the Illinois-listed oval milkweed in the Somme Prairie Nature Preserve (NP) and Illinois Natural Area Inventory (INAI) sites, which are located adjacent to Design Alternative 3 just north of Dundee Road in Northbrook. IDOT BDE determined that would be no adverse effect by this project on the oval milkweed found in the Somme Prairie NP and INAI.

IDOT BDE found no proposed or designated critical habitat for the federally listed species that may be present or in the vicinity of the design alternative: Northern Long-Eared Bat, Eastern Prairie Fringed Orchid, piping plover, red knot, Pitcher's thistle, leafy prairie-clover, Mead's milkweed, prairie bush-clover, Karner blue butterfly, Hine's emerald dragonfly, rattlesnake-master borer moth, and Eastern massasauga.

Noise and Vibration

A-20 Design Alternative 3 is proposed to be constructed in an area of industrial land use and single-family residences. Multiple residences on Holly Lane and Linda Lane are located more than 100 feet but less than 200 feet from the noise-generating point of switch on the crossovers near I-294. Noise and vibration impacts between 100 and 200 feet of the points of switch would be moderate.

The noise analysis indicated that there is potential for noise impact from locomotives idling on the new track at the I-294 bridge and at West Lake Avenue. Based on information provided by UP and CP, engine idling noise occurs today in various locations including near West Lake Avenue. In the proposed condition, idling noise would also occur near West Lake Avenue and at I-294. This assumes that engines are located at the head of each train. There would be new idling train noise at I-294 within 400 feet of several residences on Holly Lane. However, due to the number of existing freight trains that currently operate in the corridor, noise impacts due to idling trains would be moderate.

In existing conditions, UP and CP freights generate moving train noise between I-294 and Shermer Road on the UP and north of Shermer Road on the CP. In the proposed condition, UP and CP freights would also generate moving train noise between I-294 and Shermer Road on the UP and north of Shermer Road on the CP but would be 14' closer to the neighborhoods on the west side of the UP between West Lake Avenue and I-294 than in existing conditions; however, these trains would not be traveling at full throttle, as the trains would be slowing to a stopped position at I-294 or Techny Road and would not present a severe impact on the adjacent surroundings.

Socioeconomic/Community Cohesion

Because Design Alternative 3 does not require land acquisition and all work would be completed within the railroad right-of-way, implementation of Design Alternative 3 would not cause any changes to land use, centers of employment, neighborhoods, or total population of the communities surrounding the project. There would be no segmentation, separation, or isolation of any areas of the communities due to the project.

Design Alternative 4 – Northwest Siding Extension

Description of Design Alternative 4

Design Alternative 4 proposes to extend the second connection track north from its terminus near Techny Road along the west side of the CP C&M Sub north to Cherry Lane for a total length of 10,000'. These improvements would allow a CP train to wait off the C&M mainline until it receives approval to access the UP, or wait off the UP mainline until it receives approval to access the C&M. To provide a continuous 10,000 foot track on which a freight train could hold, the grade crossings at Techny Road and Shermer Road would be permanently closed. The closures would allow a train to hold on the track without disrupting vehicular traffic across the grade crossing. Additionally, reconstruction of pedestrian and vehicular access to the Northbrook Metra Station is required to allow for the construction of the extended track on the west side of the existing CP tracks.

Figure A-22 depicts the project location.

Appendix A
Detailed Analysis of Route and Design Alternatives

Figure A-22
Design Alternative 4 Project Location Map

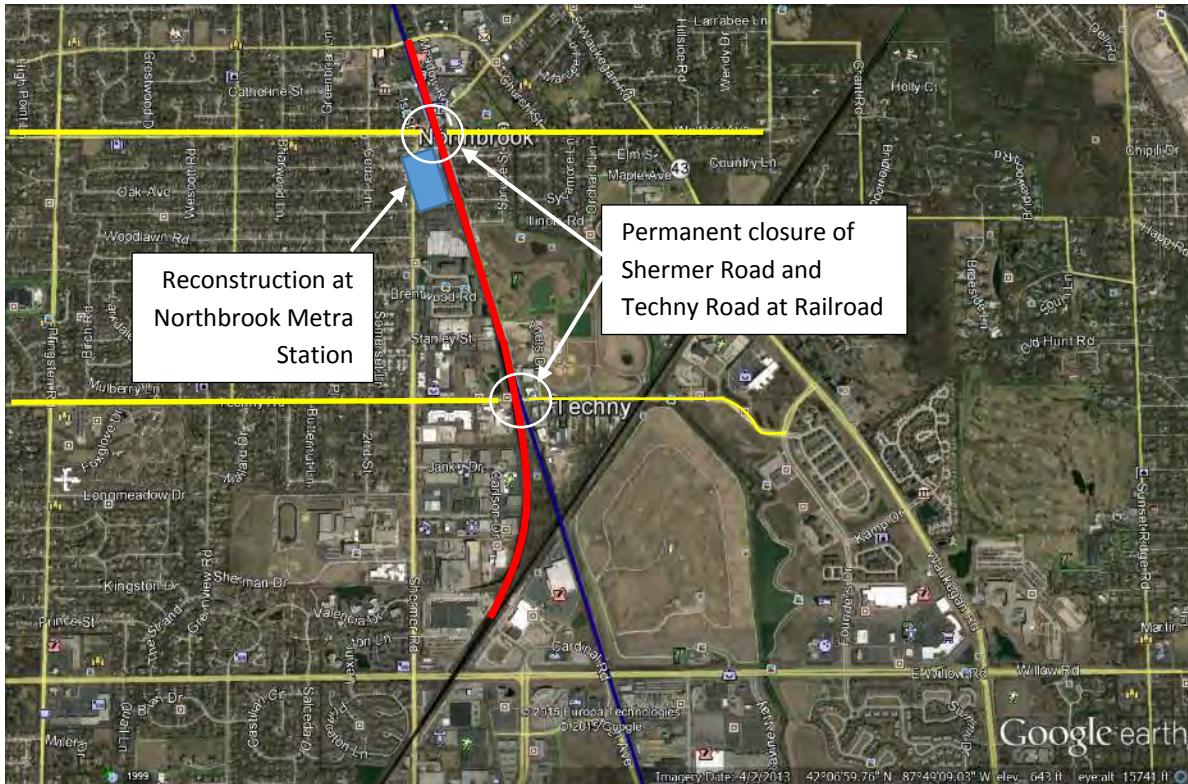


Figure A-23 illustrates the proposed Design Alternative 4 track configuration in the area of the Northbrook Metra Station.

Figure A-23
Design Alternative 4 Proposed Track Configuration

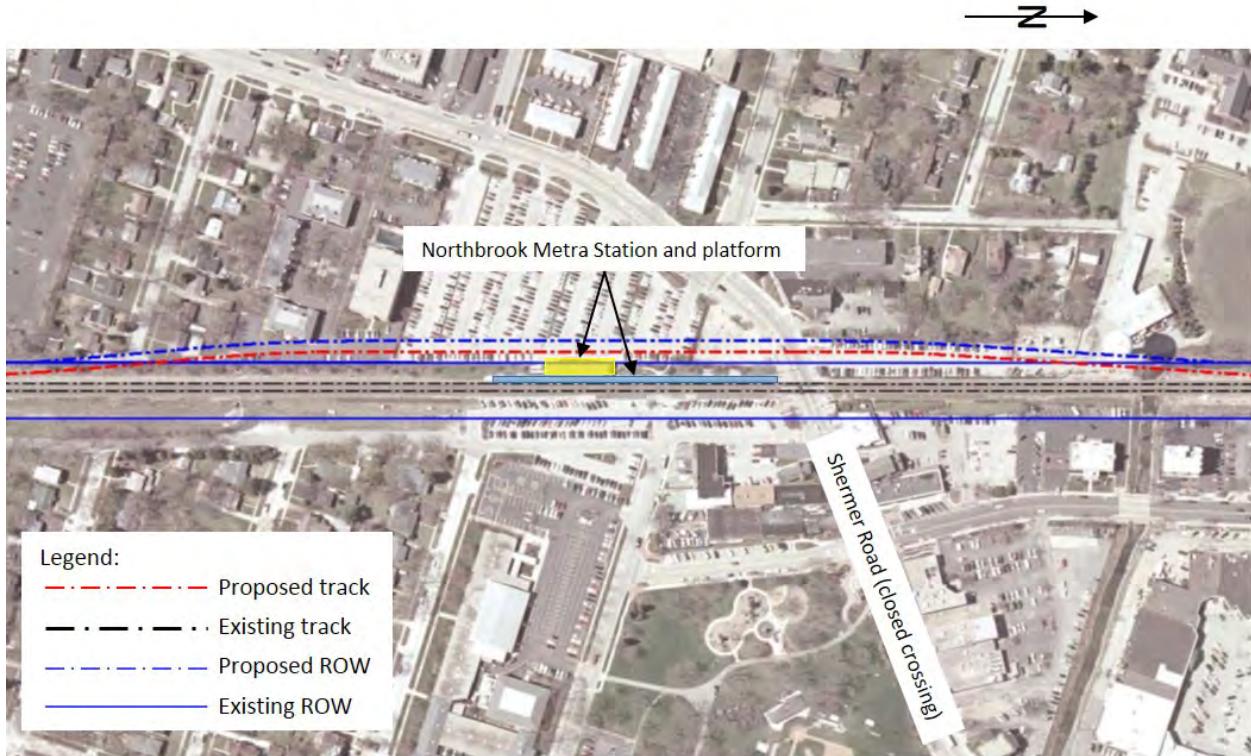


Figure A-23 shows that the proposed track would extend through the parking lot for the Northbrook Metra Station, requiring the reconstruction of the lot and construction of pedestrian access to the station and platform via tunnel under the new track or bridge over the track. This alternative assumes that the distance between the proposed track and the existing western track is approximately 60 feet in order to avoid impacting the location of the Metra station.

Purpose and Need Evaluation of Design Alternative 4

Design Alternative 4 meets the purpose and need of the overarching EA because it would mitigate conflicts with freight and other passenger traffic in the corridor; would enhance and improve the reliability of the successful *Hiawatha Service* and the reliability of commuter and freight trains; and would provide for more schedule options to meet existing and future passenger demand.

Engineering Design Evaluation of Design Alternative 4

Safety

Two grade crossings would be permanently closed as proposed in Design Alternative 4: Techny Road and Shermer Road. Grade crossing closures eliminate the risk of vehicle-train collisions at the crossing.

Order of Magnitude Capital Costs

The concept-level capital cost to construct Design Alternative 4 is estimated to be \$24.4 Million and includes track construction on retained fill, signal work, construction of an overhead and pedestrian bridge with elevator towers to cross the new track, and land acquisition. Land acquisition values were derived from the Cook County, Illinois property values for 2015.¹⁶ The capital cost does not include relocation of residents, demolition of buildings occupying the land to be developed, demolition of the portion of the Metra parking lot to be developed, and any station modifications needed. These items would increase the overall cost of the project.

Construction Feasibility

Construction in the area of the Northbrook Metra Station would be difficult due to the high amount of commuter traffic (both pedestrian and vehicular). Maintaining access to the station from the parking lot during construction would be critical and would require construction of at least one underground pedestrian tunnel or pedestrian overpass to allow passengers to access the station and platforms.

Railroad Operations

This alternative would move held trains off the CP and UP mainlines and onto a dedicated CP track. Construction of this track would enable CP trains to move closer to Bensenville Yard which would provide CP more opportunities to get across Deval and B-17 and in a shorter period of time than in existing conditions.

Key Environmental Resource Evaluation of Design Alternative 4

Section 4(f)/Historic Properties

Design Alternative 4 is not located adjacent to any Section 4(f) or historic properties and therefore does not require the use of these properties.

Wetlands

There are several wetlands located adjacent to and within the project area. National Wetlands Inventory mapping system was used to identify wetlands. Figure A-24 summarizes the findings.

¹⁶ <http://www.cookcountypropertyinfo.com/Pages/PIN-Search.aspx>

Figure A-24
Design Alternative 4 Acreage of NWI Wetland Types

Wetland Type	Acres of Wetlands within 100' of the Rail Centerline	Impact
Freshwater Emergent Wetland (PEM)	0.34	No direct impact because wetlands are located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Freshwater Forested/Shrub Wetland (PFO/PSS)	20.12	No direct impact because wetland is located outside the rail right-of-way; possible temporary impacts during construction would be minimized using best management practices
Riverine	12.04	Two rivers cross the project right-of-way but would not be directly impacted by project; possible temporary impacts during construction would be minimized using best management practices
Total	34.27	

Critical Habitats/Endangered Species

IDOT Bureau of Design and Environment conducted field surveys for this project and found the Illinois-listed oval milkweed in the Somme Prairie Nature Preserve (NP) and Illinois Natural Area Inventory (INAI) sites, which are located adjacent to Design Alternative 4 just north of Dundee Road in Northbrook. IDOT BDE determined that there would be no adverse effect by this project on the oval milkweed found in the Somme Prairie NP and INAI.

IDOT BDE found no proposed or designated critical habitat for the federally listed species that may be present or in the vicinity of the design alternative: Northern Long-eared Bat, Eastern Prairie Fringed Orchid, piping plover, red knot, Pitcher's thistle, leafy prairie-clover, Mead's milkweed, prairie bush-clover, Karner blue butterfly, Hine's emerald dragonfly, rattlesnake-master borer moth, and Eastern massasauga.

Noise and Vibration

A-20 Design Alternative 4 is proposed to be constructed in an area of commercial, industrial, and residential land use. A high-end condominium building on Meadow Road is located more than 100 feet but less than 200 feet from the noise-generating point of switch on the proposed turnout at Cherry Lane. Noise and vibration impacts between 100 and 200 feet of the point of switch would be moderate.

The noise analysis indicated that there is potential for noise impact from locomotives idling on the new track. Based on information provided by UP and CP, engine idling noise occurs today in various locations including near the Shermer Road bridge on the UP tracks. In the proposed condition, idling noise would

also occur near Shermer Road and new idling noise would occur at the Cherry Lane bridge. This assumes that engines are located at the head of each train. There would be new idling train noise at Cherry Lane within 400 feet of the condominium building and other sensitive receptors. However, due to the number of existing freight trains that currently operate in the corridor, noise impacts due to idling trains would be moderate.

In existing conditions, UP and CP freights generate moving train noise between West Lake Avenue and Shermer Road on the UP and north of Shermer Road on the CP. In the proposed condition, UP and CP freights would also generate moving train noise between West Lake Avenue and Shermer Road on the UP and north of Shermer Road on the CP but would be a minimum of 14' and a maximum of 50' closer to the residential areas on the west side of the CP between Techny Road and the Northbrook Metra Station than in existing conditions. Due to the close proximity of the proposed track to the residences on Oak Avenue, moderate impacts are anticipated.

Socioeconomic/Community Cohesion

There are significant socioeconomic concerns associated with the implementation of Design Alternative 4. The closure of Techny Road and Shermer Road grade crossings would substantially impact the ability for vehicles to travel across the tracks and access businesses, residences, and other facilities. The next grade crossing to the south is 0.8 miles from Techny Road and the next grade crossing to the north is 0.25 miles from Shermer Road. This is a critical issue for Northbrook since the station is located in the Central Business District and many businesses and residences are located near the Northbrook Metra Station.

Additionally, Design Alternative 4 does not coincide with the Village of Northbrook's plans for their downtown redevelopment. According to the Draft Northbrook Downtown Area Plan released on February 21, 2012, the lot on which the Metra station is located is proposed to be redeveloped with two luxury residential buildings and a structured parking garage for Metra commuters and other downtown users. The Plan states that the residential buildings should be "designed as iconic buildings, signaling the importance of downtown and the Metra Station."¹⁷ The new track proposed to be constructed would encroach the planned parking garage and would not match the aesthetics of the "iconic buildings" to be built.

Another detriment to Alternative 4 is that 1.55 acres of land acquisition would be required to construct the new track. Land use includes residential, commercial, and industrial. Part of the land needed to accommodate Alternative 4 is contained within the Northbrook Downtown Area Plan. Two single family homes would be taken to construction the project.

¹⁷ <http://www.northbrook.il.us/Modules>ShowDocument.aspx?documentid=4260>

Design Alternative 5 – UP Milwaukee Sub Freight Bypass

Description of Design Alternative 5

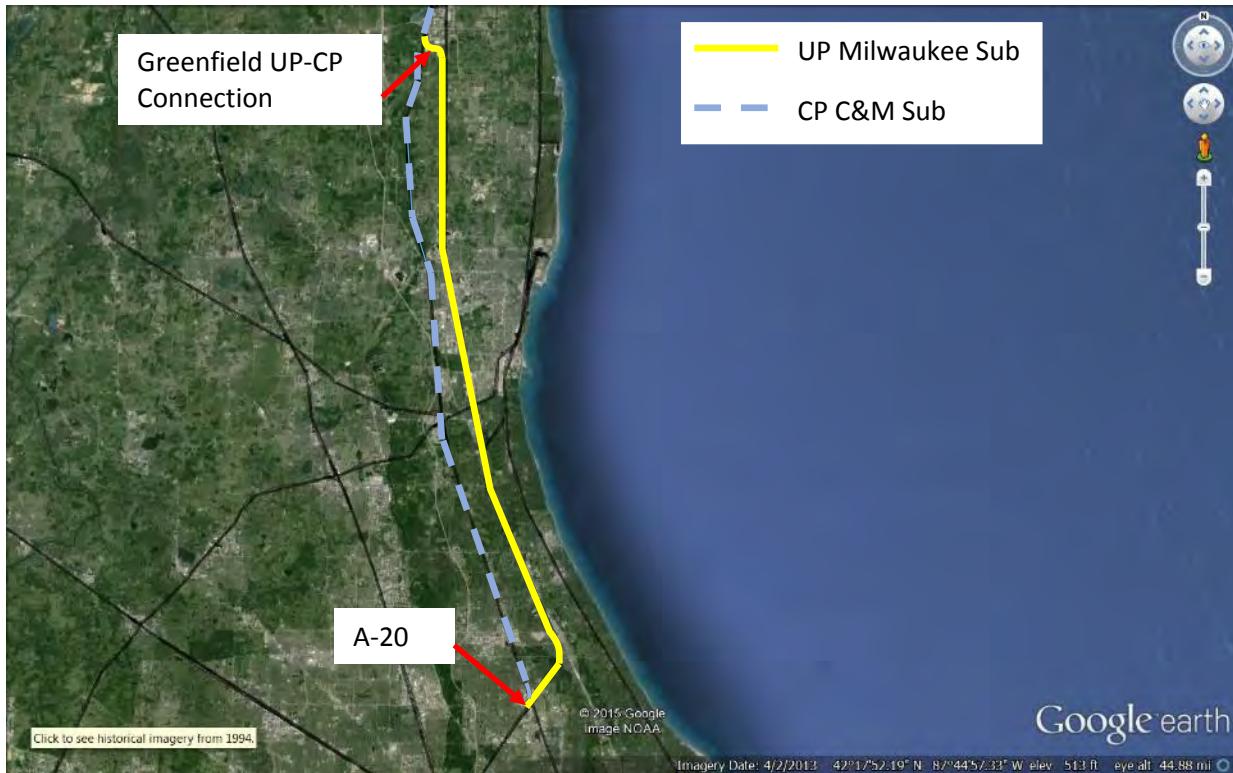
Design Alternative 5 proposes a freight bypass for CP trains on the UP Milwaukee Subdivision from just north of the Illinois-Wisconsin border to A-20. The alternative is intended to enhance the capacity of UP's Milwaukee Sub, enabling large volumes of bidirectional freight traffic to operate unimpeded by passenger operations in a 30 mile corridor. Once the improvements are constructed, UP has indicated that it would allow CP to shift its operations from the CP C&M Sub to the UP Milwaukee Sub. This action would provide more capacity for passenger trains on the CP C&M Sub, allow 24 hour freight operations, and eliminate the need for the UPRR Siding Extension at A-20 project.

A field inspection with Union Pacific occurred on May 28, 2014 to verify existing conditions and finalize proposed improvements that were deemed necessary in order to shift CP operations onto the UP Milwaukee Sub. Infrastructure improvements to the UP Milwaukee Sub include:

- Construction of 30 miles of second main track from Pleasant Prairie, WI to A-20 (Glenview, IL) and installation of 30 miles of CTC;
- Construction of a greenfield double track connection between UP and CP at the north end of the project
- Replacement of #10 and #15 crossovers with #20 crossovers
- Construction of new grade crossing surfaces and replacement of grade crossing warning devices at 12 crossings
- Modification, installation, or replacement of interlockings at 7 locations

Figure A-25 depicts the project location.

Figure A-25
Design Alternative 5 Project Location Map



Purpose and Need Evaluation of Design Alternative 5

The Bypass is not deemed necessary for 10 round trip *Hiawatha Service* operations, but is a good long-term solution that would support a full buildout of the corridor (17 *Hiawatha Service* round trips). Because the Preferred Operational Alternative is a 10 round trip scenario, the Bypass is outside the scope of the action of the EA. The Bypass should be reconsidered if service beyond 10 round trips is studied in the future.

Engineering Design Evaluation of Design Alternative 5

Safety

Design Alternative 5 reduces the number of freight trains traveling across at-grade crossings in the CP corridor, but increases the number of freight trains traveling across at-grade crossings in the UP corridor.

Order of Magnitude Capital Costs

This alternative has an estimated capital cost of \$135 million to construct.

Construction Feasibility

The UP Milwaukee Sub is a former two-track railroad and some of the second track's roadbed is preserved. Therefore, construction of the second main track would be less complicated than construction of a second track on completely new roadbed.

Railroad Operations

In order to implement the project, CP would enter into an agreement with UP in order to operate over UP's territory. CP would retain rights to use its own C&M Sub. This alternative does not guarantee that CP would remove all of its freight traffic from the C&M Sub or that congestion on the C&M Sub would be reduced. However, CP could improve its operations by using the UP Milwaukee Sub during Metra's peak hours (essentially 6:45 a.m. and 4:15-6:20 p.m. between Chicago Union Station and Rondout) on the C&M Sub.

Key Environmental Resource Evaluation of Design Alternative 5

Section 4(f)/Historic Properties

There are a number of Section 4(f) properties adjacent to Design Alternative 5. There are no Section 4(f) or historic properties located in the area where the two-track greenfield alignment would be constructed. Therefore, Design Alternative 5 does not require the use of Section 4(f) or historic properties.

Wetlands

As described earlier in this section, a two-track alignment on greenfield must be built at the north end of the Bypass to connect the CP and UP mainlines. The greenfield alignment bisects a zoned agricultural area and crosses several wetlands. These wetlands are identified in Figure A-26.

Figure A-26
Design Alternative 5 Acreage of NWI Wetland Types

Wetland Type	Acres of Wetlands within 100' of the Rail Centerline	Impact
Freshwater Emergent Wetland (PEM)	24.24	Wetlands would be directly impacted by the construction of the double track alignment
Freshwater Forested/Shrub Wetland (PFO/PSS)	12.89	Wetlands would be directly impacted by the construction of the double track alignment
Freshwater Pond (PUB)	4.25	Wetlands would be directly impacted by the construction of the double track alignment
Riverine	0.57	Wetlands would be directly impacted by the construction of the double track alignment
Total	41.95	

Critical Habitats/Endangered Species

A U.S. Fish & Wildlife Service IPaC report was run for Design Alternative 5. The report found no proposed or designated critical habitat for the federally listed species that may be present or in the vicinity of the design alternative: Piping Plover, Red Knot, Whooping Crane, Eastern Prairie Fringed Orchid, Leafy Prairie-clover, Mead's Milkweed, Pitcher's Thistle, Prairie Bush-clover, Hine's Emerald Dragonfly, Karner Blue Butterfly, Rattlesnake-master Borer Moth, Northern Long-eared Bat, and Eastern Massasauga.

Noise and Vibration

This proposed alternative is more complex than Alternatives 1-4. When freight trains are relocated from one route to another, it is likely that noise and vibration levels would be increased throughout the area around the tracks where the trains are relocated. The specific increases in noise and vibration would depend on both the amount of trains relocated and the relative amount (the percentage increase in the number of trains) of trains relocated. Due to the complex nature of this alternative, a quantitative noise and vibration assessment was not conducted. However, it can be inferred that noise levels on the UP Milwaukee Sub would increase.

Socioeconomic/Community Cohesion

Design Alternative 5 requires land acquisition for the greenfield portion of the route where the two-track alignment is proposed to be constructed. Approximately 105 acres of land must be purchased from private landowners to implement Alternative 5. A majority of the land required is zoned as residential. One property is commercial. Design Alternative 5 would not cause any changes to centers of employment, neighborhoods, or total population of the communities surrounding the project, but the construction of the project would impact the residents whose properties are taken.

Design Alternative 6 – Service Alternative

Description of Design Alternative 6

During the March 19, 2015 meeting with the Village of Glenview, a service alternative to the A-20 project was proposed. The Village asked that the team evaluate a 10 round trip alternative consisting of the current 7 round trip service (6 round trips on Sunday) operating on the existing Amtrak route and the additional 3 round trips operating on the UP Milwaukee Subdivision. The Village's theory was that if no additional frequencies operated over the CP C&M Subdivision, then many of the infrastructure improvements identified for the 10 round trip service, including A-20, would not need to be constructed.

Infrastructure improvements to support 3 additional round trips on the UP Milwaukee Sub are the same as required for Design Alternative 5. These improvements include:

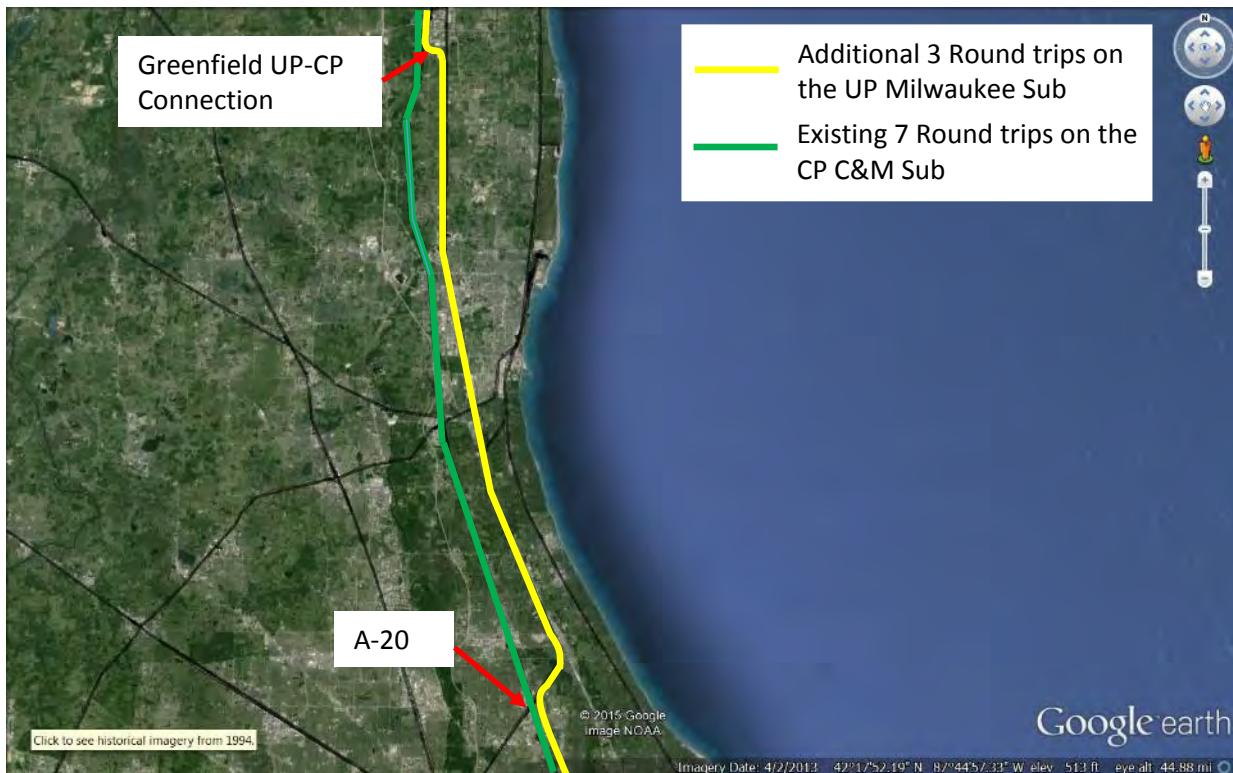
- Construction of 30 miles of second main track from Pleasant Prairie, WI to A-20 (Glenview, IL)

and installation of 30 miles of CTC;

- Construction of a greenfield double track connection between UP and CP at the north end of the project
- Replacement of #10 and #15 crossovers with #20 crossovers
- Construction of new grade crossing surfaces and replacement of grade crossing warning devices at 12 crossings
- Modification, installation, or replacement of interlockings at 7 locations

Figure A-27 depicts the project location.

Figure A-27
Design Alternative 6 Project Location Map



Purpose and Need Evaluation of Design Alternative 6

Design Alternative 6 does not meet the purpose and need of enhancing and improving the reliability of the *Hiawatha Service* due to delays and insufficient capacity that would result from adding the passenger trains to the current congested UP freight operations on the UP Milwaukee Sub without undertaking significant capacity improvements.

Potential ridership that Alternative 6 would serve on the UP Milwaukee Sub has not been calculated, but the alternative would certainly impact existing and future passenger rail demand for the riders that

currently access the *Hiawatha Service* mid-corridor, since a new route would not serve existing mid-corridor stations at Glenview, IL, Sturtevant, WI, and the General Mitchell International Airport. The Alternative eliminates existing transportation connections at Glenview, Sturtevant, and at the airport that have been utilized and enhanced for decades.

Moving the *Hiawatha Service* to a new rail corridor would likely not expand modal options for passengers. The expansion of modal options is related to increased access to alternative modes of transportation in order to attract new ridership. Alternative 6 could actually reduce modal options because it eliminates an important intermodal connection at General Mitchell International Airport. Mid-corridor stations could be constructed on Alternative 6, but would not provide the same quantity of trip generation as the Airport does.

Engineering Design Evaluation of Design Alternative 6

Safety

Design Alternative 6 increases the number of freight trains traveling across at-grade crossings in the UP corridor, and therefore increases the risk of vehicle-train collisions.

Order of Magnitude Capital Costs

This alternative would require the same improvements as Design Alternative 5 and has an estimated capital cost of \$135 million to construct.

Construction Feasibility

The UP Milwaukee Sub is a former two-track railroad and some of the second track's roadbed is preserved. Therefore, construction of the second main track would be less complicated than construction of a second track on completely new roadbed.

Railroad Operations

Although the UP Milwaukee Sub was originally constructed as a double track freight-only railroad to divert freight trains from the busy passenger and commuter lines, it is a busy single track freight corridor today. Operating intercity passenger rail service over this key freight train route would result in deterioration of freight service and delays to intercity passenger rail trains. Additionally, track, signal, and grade crossings need major upgrades to accommodate passenger rail service, and stations need to be constructed.

Key Environmental Resource Evaluation of Design Alternative 6

Section 4(f)/Historic Properties

There are a number of Section 4(f) properties adjacent to Design Alternative 6. There are no Section 4(f)

or historic properties located in the area where the two-track greenfield alignment would be constructed. Therefore, Design Alternative 6 does not require the use of Section 4(f) or historic properties.

Wetlands

As described earlier in this section, a two-track alignment on greenfield must be built at the north end of the Bypass to connect the CP and UP mainlines. The greenfield alignment bisects a zoned agricultural area and crosses several wetlands. These wetlands are identified in Figure A-28.

Figure A-28

Design Alternative 6 Acreage of NWI Wetland Types

Wetland Type	Acres of Wetlands within 100' of the Rail Centerline	Impact
Freshwater Emergent Wetland (PEM)	24.24	Wetlands would be directly impacted by the construction of the double track alignment
Freshwater Forested/Shrub Wetland (PFO/PSS)	12.89	Wetlands would be directly impacted by the construction of the double track alignment
Freshwater Pond (PUB)	4.25	Wetlands would be directly impacted by the construction of the double track alignment
Riverine	0.57	Wetlands would be directly impacted by the construction of the double track alignment
Total	41.95	

Critical Habitats/Endangered Species

A U.S. Fish & Wildlife Service IPaC report was run for Design Alternative 6. The report found no proposed or designated critical habitat for the federally listed species that may be present or in the vicinity of the design alternative: Piping Plover, Red Knot, Whooping Crane, Eastern Prairie Fringed Orchid, Leafy Prairie-clover, Mead's Milkweed, Pitcher's Thistle, Prairie Bush-clover, Hine's Emerald Dragonfly, Karner Blue Butterfly, Rattlesnake-master Borer Moth, Northern Long-eared Bat, and Eastern Massasauga.

Noise and Vibration

This proposed alternative is more complex than Alternatives 1-4. When new passenger trains are added to a route, it is likely that noise and vibration levels would be increased throughout the area around the tracks where the trains are relocated. The specific increases in noise and vibration would depend on both the amount of trains relocated and the relative amount (the percentage increase in the number of trains) of trains relocated. Due to the complex nature of this alternative, a quantitative noise and vibration assessment was not conducted. However, it can be inferred that noise levels on the UP Milwaukee Sub would increase.

Socioeconomic/Community Cohesion

Design Alternative 6 requires land acquisition for the greenfield portion of the route where the two-track alignment is proposed to be constructed. Approximately 105 acres of land must be purchased from private landowners to implement Alternative 6. A majority of the land required is zoned as residential. One property is commercial. Design Alternative 6 would not cause any changes to centers of employment, neighborhoods, or total population of the communities surrounding the project, but the construction of the project would impact the residents whose properties are taken.

A.4.3. Summary of UPRR Siding Extension at A-20 Design Alternatives Analysis

The design alternatives are evaluated on whether each meet the operational goals of the UPRR Siding Extension at A-20 Project using the evaluation criteria for the purpose and need of the overarching EA; engineering design; and key environmental resources. Figure A-29 summarizes the alternatives analysis. A check mark indicates that the design option meets the “reasonable and feasible” test for a particular criterion and an ‘X’ indicates that the alternative does not meet the “reasonable and feasible” test. A description of the results follows Figure A-29.

Appendix A
Detailed Analysis of Route and Design Alternatives

Figure A-29
Summary of UPRR Siding Extension at A-20 Design Alternatives Analysis

	Purpose and Need	Safety	Order of Magnitude Costs	Construction Feasibility	Railroad Operations	Section 4(f) / Historic Properties	Wetlands	Critical Habitat/ Endangered Species	Noise and Vibration	Socioeconomic / Community Cohesion	Overall Evaluation of Alternative
Design Alternative 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Carry forward to EA
Design Alternative 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Carry forward to EA
Design Alternative 3	✓	X	X	✓	X	X	✓	✓	X	✓	Do not carry forward
Design Alternative 4	✓	✓	X	X	✓	✓	✓	✓	X	X	Do not carry forward
Design Alternative 5	X	X	X	✓	X	✓	X	✓	X	X	Do not carry forward
Design Alternative 6	X	X	X	✓	X	✓	X	✓	X	X	Do not carry forward

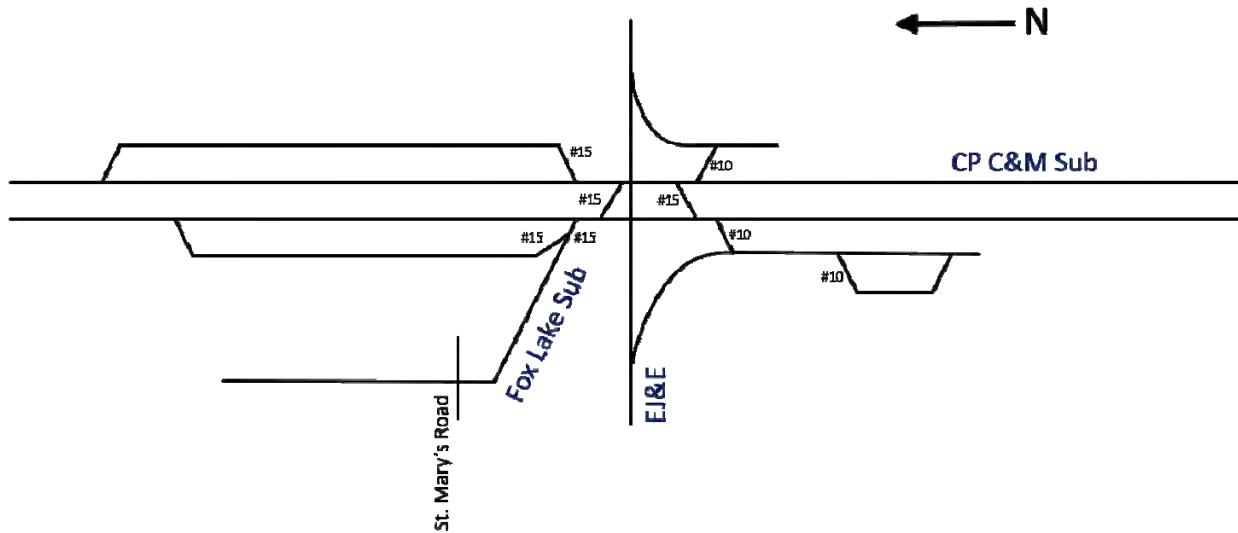
Alternative 3 was removed from further consideration because it would not meet the purpose and need as it does not meet operational requirements of the project. It also would not be reasonable because it would adversely impact the use of a Section 106 historic property (The Grove National Historic Landmark in Glenview, IL) and it would cost 2.4 times as much as the lowest cost option to construct. Alternative 4 was removed from further consideration because it would not be reasonable as it poses constructability issues and because it presents significant community access concerns associated with the bifurcation of the parking lot and the Metra station. Alternative 5 was removed from further consideration because it does not meet the purpose and need of the project as it is not deemed necessary for 10 round trip *Hiawatha Service*. It also would not be reasonable as it presents likely environmental impacts to communities around the UP Milwaukee Subdivision and it would cost 5.5 times as much as the lowest cost option to construct. Finally, Alternative 6 was removed from further consideration because it would not be reasonable as it splits the *Hiawatha Service* to minimize the impact of the improvements on the Village of Glenview, but provides no benefit to intermediate stations and would cost 5.5 times as much as the lowest cost option to construct. A-20 Design Alternatives 1 and 2 were carried forward.

A.5. Analysis of Design Alternatives for the Metra Fox Lake Second Track Project

Metra operates 62 weekday commuter trains between Chicago Union Station and Deerfield, IL, with 47 of those trains continuing north onto the Fox Lake Subdivision (toward Metra's terminus at Fox Lake, IL) through a railroad control point known as Rondout, located in Lake Forest, IL. Rondout is a complex interlocking (a configuration of switches and signals interconnected to direct trains along different routes¹⁸) that controls movements on the CP C&M Mainline, movements to and from the Fox Lake Subdivision, and movements to and from the Canadian National's Elgin, Joliet & Eastern line, which intersects the CP C&M Subdivision just east of the Fox Lake Subdivision junction. Figure A-30 depicts the existing track configuration at Rondout.

¹⁸ The American Railway Engineering and Maintenance-of-Way Association's *Practical Guide to Railway Engineering*, 2003

Figure A-30
Existing Track Configuration at Rondout



Current operations are affected greatly by the fact that the 17 mile Fox Lake Subdivision has a single track configuration. Because of the inability for Metra trains to meet each other on the Fox Lake Subdivision, if an eastbound Fox Lake train is delayed on the Fox Lake Subdivision, Metra trains waiting to enter the Fox Lake Subdivision from the C&M Subdivision must hold on the C&M main tracks to meet the delayed Fox Lake train, potentially for long periods of time. This in turn creates a traffic conflict on the C&M Subdivision that results in delays to CP, Amtrak, and other Metra trains. Additionally, the need to schedule all commuter trains so that meeting points occur on the C&M mainline south of Rondout severely limits schedule options for Metra and the *Hiawatha Service*.

Without constructing infrastructure at Rondout to clear the mainline of trains waiting to enter the Fox Lake Sub and optimizing operations through the interlocking, additional *Hiawatha Service* frequencies could not be accommodated.

A.5.1. Proposed Alternatives

The Metra Fox Lake Second Track project proposes to address these operational limitations by creating a second track on the Fox Lake Subdivision and through the Rondout control point to allow for simultaneous moves by Metra trains to and from the Fox Lake Subdivision, and to allow for Metra trains to meet each other (whether by schedule or due to delays) on Fox Lake Subdivision rather than on the CP C&M mainline. Two Design Alternatives were identified as alternatives that would meet the operational objectives of this project:

- Metra Fox Lake Alternative 1 – Construct a second track on the Fox Lake Subdivision from Rondout to just east of St. Mary's Road; replace signal equipment controlling the interlocking,

upgrade interlocking trackwork

- Metra Fox Lake Alternative 2 - Construct a second track on the Fox Lake Subdivision from Rondout to 1,500 feet west of St. Mary's Road; replace signal equipment controlling the interlocking, upgrade interlocking trackwork

The design alternatives are discussed below.

Design Alternative 1 – Metra Fox Lake Second Track

Description of Design Alternative 1

Design Alternative 1 proposes a three-element solution: remove several low-speed crossovers and turnouts within the Rondout interlocking limits and upgrade to higher speed crossovers between mainlines; reconstruct the existing single track on the Fox Lake Subdivision and extend it south through the EJ&E diamond until it reaches the siding from the CN; construct a second track on the Fox Lake Subdivision from the Rondout interlocking to just east of St. Mary's Road.

The project spans from Metra Milepost 31.9 to Milepost 33.85 and work includes track construction, embankment construction, crossover and turnout installation, signal modifications, replacement of the bridge over the North Branch of the Chicago River, and grade crossing modifications.

Figure A-31 depicts the project location.

Figure A-31
Design Alternative 1 Project Location Map

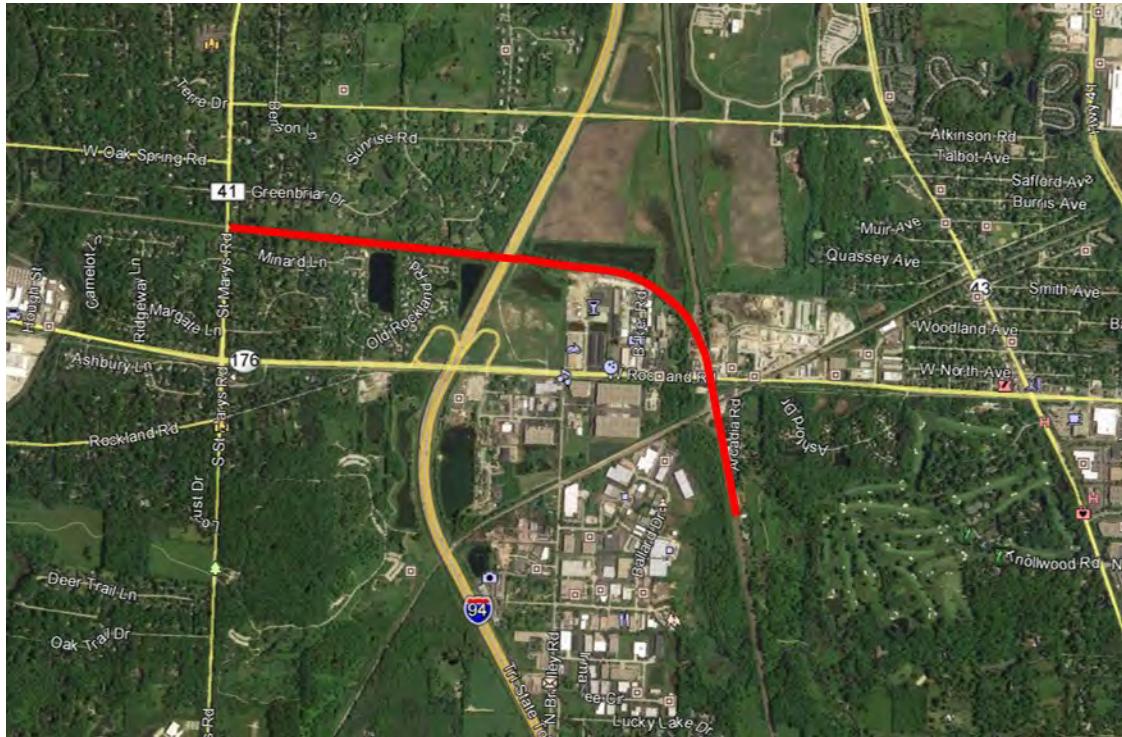
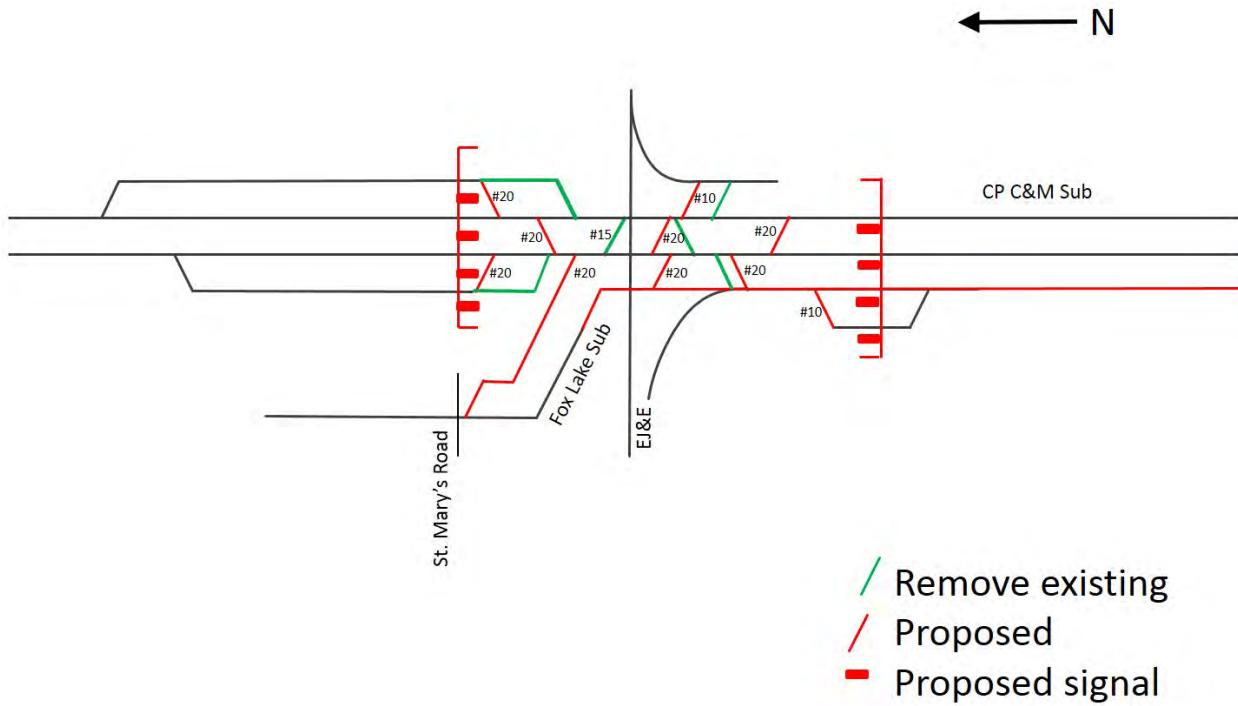


Figure A-32 illustrates the proposed Design Alternative 1 track configuration for the Metra Fox Lake Second Track project.

Figure A-32
Metra Fox Lake Second Track Design Alternative 1 Proposed Track Configuration



Purpose and Need Evaluation of Design Alternative 1

Design Alternative 1 meets the purpose and need of the overarching EA because it would mitigate conflicts with freight and other passenger traffic in the corridor; would enhance and improve the reliability of the successful *Hiawatha Service* and the reliability of commuter and freight trains; and would provide for more schedule options to meet existing and future passenger demand.

Engineering Design Evaluation of Design Alternative 1

Safety

There are no appreciable safety improvements as a result of this project.

Order of Magnitude Capital Costs

The concept-level capital cost to construct Alternative 1 is estimated to be \$35.8 Million and includes a replacement bridge over the North Branch of the Chicago River, signal work, and track construction on embankment and retained fill.

Appendix A
Detailed Analysis of Route and Design Alternatives

Construction Feasibility

No construction feasibility issues have been identified for this option.

Railroad Operations

This alternative would allow for simultaneous moves to and from the Fox Lake Subdivision and would allow a Metra train to hold off the CP C&M mainline and the Fox Lake mainline. These improvements would create capacity on the CP mainline and would optimize operations for all trains through the Rondout interlocking.

Key Environmental Resource Evaluation of Design Alternative 1

Section 4(f)/Historic Properties

There are no Section 4(f) or historic properties in the project area.

Wetlands

There are several wetlands located adjacent to and within the project area. Illinois BDE produced a Natural Resources Review of the project and delineated wetlands in the project area. Figure A-33 summarizes the findings.

Figure A-33

Design Alternative 1 Acreage of Wetlands

Wetland Type	Acres of Wetlands within 100' of the Rail Centerline	Impact
Forested wetland	0.02	Temporary impacts to the wetland are possible during construction. Construction would occur within the existing right-of-way and fill would not be added.
Wet meadow	0.03	Impact to wetland is probable. Portions of this site may be filled to construct the track on new embankment.
Marsh/wet meadow	0.08	Unanticipated. Construction in this area would occur on opposite side of track as this site.
Wet meadow	0.04	Impact to wetland is probable. Portions of the site may be filled to construct the track on new embankment.
Total	0.17	

Critical Habitats/Endangered Species

IDOT Bureau of Design and Environment conducted field surveys for this project. Middlefork Savanna Natural Area and Nature Preserve occur on the west side of the project at Rondout. State-listed species in the vicinity of the project include king rail, Wilson's phalarope, golden sedge, pale vetchling, marsh

speedwell, Eastern prairie fringed orchid, Iowa darter, and Blanding's turtle. According to the Illinois BDE, there would be no impact to the Middlefork Savanna INAI or NP "since no right-of-way will be taken from it and since no work will be done in this area".

IDOT BDE found no proposed or designated critical habitat for the federally listed species that may be present or in the vicinity of the design option: Northern Long-Eared Bat, Eastern Prairie Fringed Orchid, piping plover, red knot, Pitcher's thistle, leafy prairie-clover, Mead's milkweed, prairie bush-clover, Karner blue butterfly, Hine's emerald dragonfly, rattlesnake-master borer moth, and Eastern massasauga.

Noise and Vibration

The Metra Fox Lake Second Track project proposes the installation of numerous crossovers and turnouts in the area of Illinois Route 176 in Fox Lake, IL in an area of industrial and undeveloped land uses and nearby single-family and multi-family residences. The points of switches on the turnouts and crossovers are located more than 300 feet from the residences, and would not impact the residences.

A turnout is proposed to be constructed along the Fox Lake Line portion of the project, just east of the railroad's at-grade intersection with St. Mary's Road, adjacent to residential neighborhoods. The point of switch on the turnout is located more than 100 feet but less than 200 feet from one residence on Minard Lane. Additional residences on Minard Lane and Thornbury Lane are located more than 200 feet from the point of switch. Noise and vibration impacts between 100 and 200 feet of the point of switch would be moderate. At distances from the point of switch over 200 feet, there would be no impact.

The noise analysis also indicated that there is potential for noise impact from locomotives idling on the new track within 400 feet of the residences on Minard Lane and Thornbury Lane. However, due to the number of existing freight trains that currently operate in the corridor, noise impacts due to the idling trains would not be severe.

Socioeconomic/Community Cohesion

The Metra Fox Lake project proposes to acquire 0.78 acres of property from three parcels in Green Oaks, Illinois. Two of the three parcels are owned by the Illinois State Toll Highway Authority and one parcel is owned by Abbott Laboratories. Because the land acquisition required to implement Design Alternative 1 is minor, implementation of Design Alternative 1 would not cause any changes to land use, centers of employment, neighborhoods, or total population of the communities surrounding the project. There would be no segmentation, separation, or isolation of any areas of the communities due to the project.

Design Alternative 2 – Metra Fox Lake Second Track

Description of Design Alternative 2

Design Alternative 2 proposes the same solution for two of Alternative 1's three-element solution:

Appendix A
Detailed Analysis of Route and Design Alternatives

remove several low-speed crossovers and turnouts within the Rondout interlocking limits and upgrade to higher speed crossovers between mainlines; reconstruct the existing single track on the Fox Lake Subdivision and extend it south through the EJ&E diamond until it reaches the siding from the CN. Design Alternative 2 differs from Alternative 1 in that it proposes to construct a second track on the Fox Lake Subdivision from the Rondout interlocking to 1,500 feet west of St. Mary's Road.

The project spans from Metra Milepost 31.9 to Milepost 34.15 and work includes track construction, embankment construction, crossover and turnout installation, signal modifications, replacement of the bridge over the North Branch of the Chicago River, and grade crossing modifications.

Figure A-34 depicts the project location.

Figure A-34
Design Alternative 2 Project Location Map

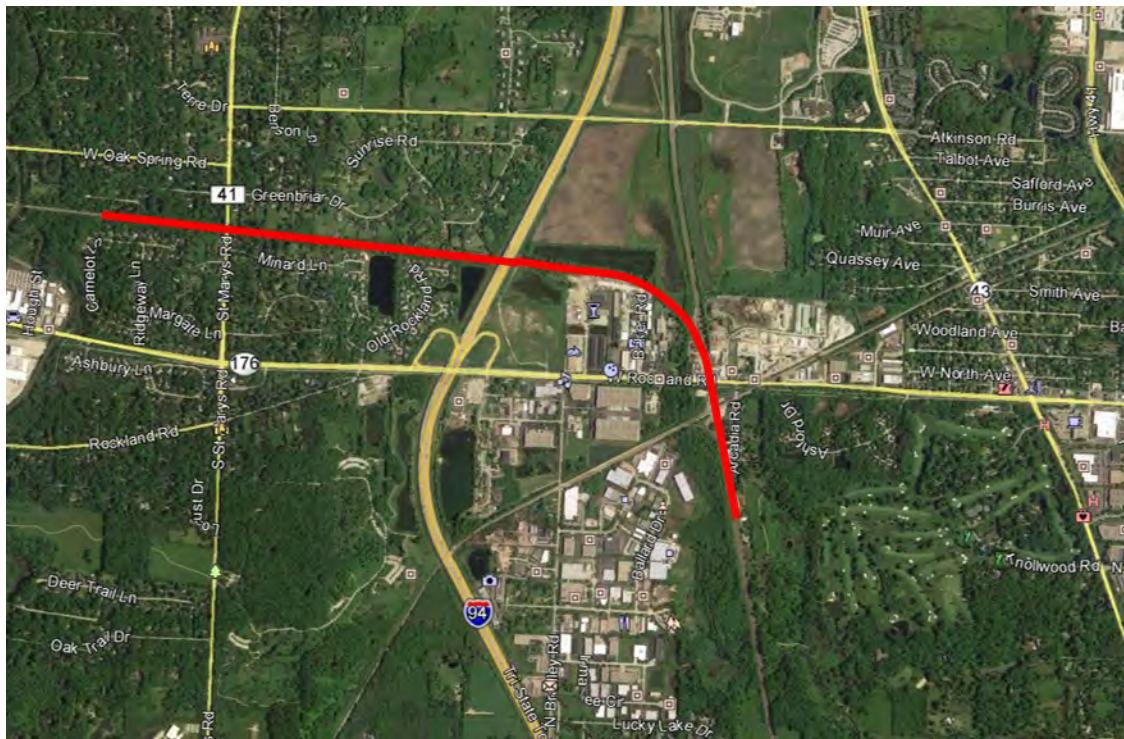
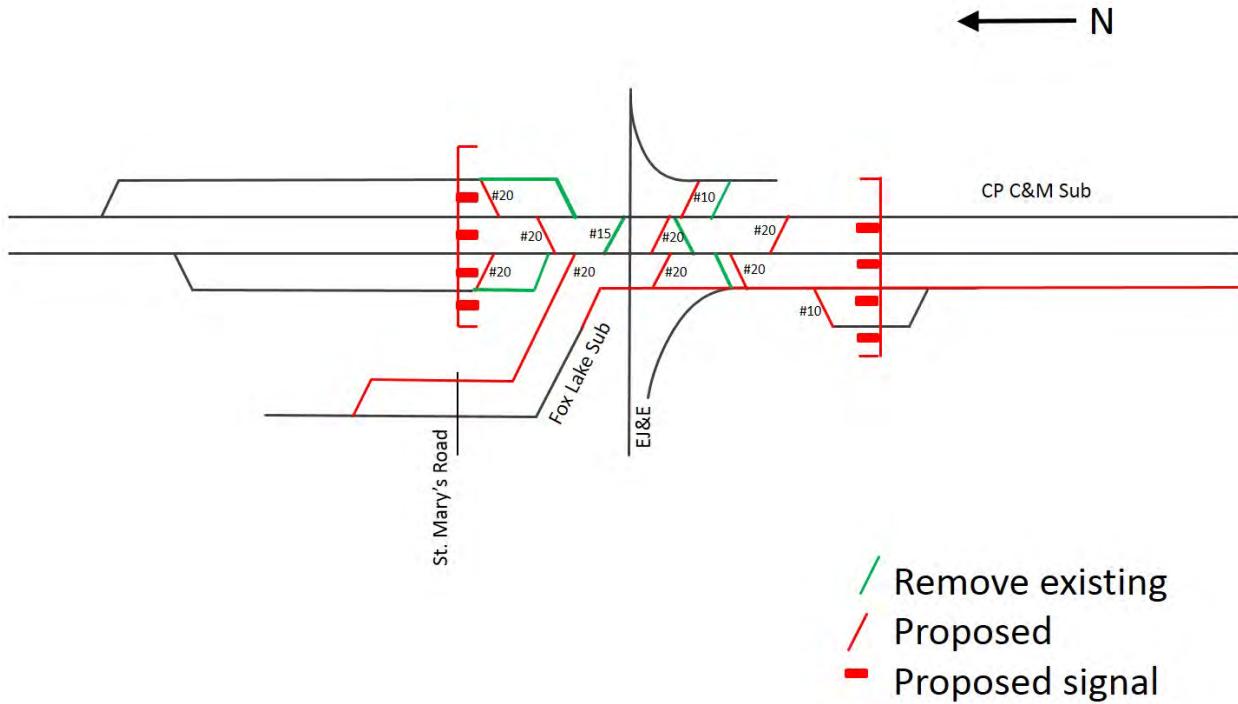


Figure A-35 illustrates the proposed Design Alternative 2 track configuration for the Metra Fox Lake Second Track project.

Figure A-35
Metra Fox Lake Second Track Design Alternative 2 Proposed Track Configuration



Purpose and Need Evaluation of Design Alternative 2

The extension of the new second track west of St. Mary's Road is not deemed necessary to accomplish the purpose and need of the overarching EA. The operational benefits of Design Alternative 2 are essentially equal to Design Alternative 1 and, as discussed under Engineering Design Evaluation, Design Alternative 2 is more costly.

Engineering Design Evaluation of Design Alternative 2

Safety

There are no appreciable safety improvements as a result of this project.

Order of Magnitude Capital Costs

The concept-level capital cost to construct Alternative 2 is estimated to be \$38.5 Million and includes a replacement bridge over the North Branch of the Chicago River, signal work, and track construction on

embankment and retained fill.

Construction Feasibility

No construction feasibility issues have been identified for this option.

Railroad Operations

This alternative would allow for simultaneous moves to and from the Fox Lake Subdivision and would allow a Metra train to hold off the CP C&M mainline and the Fox Lake mainline. These improvements would create capacity on the CP mainline and would optimize operations for all trains through the Rondout interlocking.

Key Environmental Resource Evaluation of Design Alternative 2

Section 4(f)/Historic Properties

There are no Section 4(f) or historic properties in the project area.

Wetlands

There are several wetlands located adjacent to and within the project area. Illinois BDE produced a Natural Resources Review of the project and delineated wetlands in the project area. Figure A-36 summarizes the findings.

Figure A-36
Design Alternative 2 Acreage of Wetlands

Wetland Type	Acres of Wetlands within 100' of the Rail Centerline	Impact
Forested wetland	0.02	Temporary impacts to the wetland are possible during construction. Construction would occur within the existing right-of-way and fill would not be added.
Wet meadow	0.03	Impact to wetland is probable. Portions of this site may be filled to construct the track on new embankment.
Marsh/wet meadow	0.08	Unanticipated. Construction in this area would occur on opposite side of track as this site.
Wet meadow	0.04	Impact to wetland is probable. Portions of the site may be filled to construct the track on new embankment.
Wet floodplain forest	<0.01	Temporary impacts to the wetland are possible during construction. Construction would occur within the existing right-of-way and fill would not be added.
Total	0.17	

Critical Habitats/Endangered Species

IDOT Bureau of Design and Environment conducted field surveys for this project. Middlefork Savanna Natural Area and Nature Preserve occur on the west side of the project at Rondout. State-listed species in the vicinity of the project include king rail, Wilson's phalarope, golden sedge, pale vetchling, marsh speedwell, Eastern prairie fringed orchid, Iowa darter, and Blanding's turtle. According to the Illinois BDE, there would be no impact to the Middlefork Savanna INAI or NP "since no right-of-way will be taken from it and since no work will be done in this area".

IDOT BDE found no proposed or designated critical habitat for the federally listed species that may be present or in the vicinity of the design option: Northern Long-Eared Bat, Eastern Prairie Fringed Orchid, piping plover, red knot, Pitcher's thistle, leafy prairie-clover, Mead's milkweed, prairie bush-clover, Karner blue butterfly, Hine's emerald dragonfly, rattlesnake-master borer moth, and Eastern massasauga.

Noise and Vibration

The Metra Fox Lake Second Track project proposes the installation of numerous crossovers and turnouts in the area of Illinois Route 176 in Fox Lake, IL in an area of industrial and undeveloped land uses and nearby single-family and multi-family residences. The points of switches on the turnouts and crossovers are located more than 300 feet from the residences, and would not impact the residences.

A turnout is proposed to be constructed along the Fox Lake Line portion of the project, 1500 feet west of the railroad's at-grade intersection with St. Mary's Road, adjacent to residential neighborhoods. The point of switch on the turnout would be located more than 100 feet but less than 200 feet from two residences on West Oak Pond Lane. Noise and vibration impacts between 100 and 200 feet of the point of switch would be moderate.

The noise analysis also indicated that there is potential for noise impact from locomotives idling on the new track within 400 feet of numerous residences on West Oak Pond Lane, Camelot Lane, and Old Hickory Lane. However, due to the number of existing freight trains that currently operate in the corridor, noise impacts due to idling trains would not be severe.

Socioeconomic/Community Cohesion

The Metra Fox Lake project proposes to acquire 0.78 acres of property from three parcels in Green Oaks, Illinois. Two of the three parcels are owned by the Illinois State Toll Highway Authority and one parcel is owned by Abbott Laboratories. Because the land acquisition required to implement Design Alternative 2 is minor, implementation of Design Alternative 2 would not cause any changes to land use, centers of employment, neighborhoods, or total population of the communities surrounding the project. There would be no segmentation, separation, or isolation of any areas of the communities due to the project.

A.5.2. Summary of Metra Fox Lake Second Track Design Alternatives Analysis

The design alternatives are evaluated on whether each meet the operational goals of the Metra Fox Lake Second Track Project using the evaluation criteria for the purpose and need of the overarching EA; engineering design; and key environmental resources. Figure A-37 summarizes the alternatives analysis. A check mark indicates that the design alternative meets the “reasonable and feasible” test for a particular criterion and an ‘X’ indicates that the alternative does not meet the “reasonable and feasible” test. A description of the results follows Figure A-37.

Figure A-37
Summary of Metra Fox Lake Second Track Design Alternatives Analysis

	Purpose and Need	Safety	Order of Magnitude Costs	Construction Feasibility	Railroad Operations	Section 4(f) / Historic Properties	Wetlands	Critical Habitat/ Endangered Species	Noise and Vibration	Socioeconomic / Community Cohesion	Overall Evaluation of Alternative
Design Alternative 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Carry forward to EA
Design Alternative 2	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓	Do not carry forward

Design Alternative 2 was removed from further analysis it does not meet the purpose and need of the project as the extension of the new second track west of St. Mary's Road was not deemed necessary for 10 round trip *Hiawatha Service*. It also would not be reasonable as it would cost 7.5% more than Alternative 1. As such, only Metra Fox Lake Design Alternative 1 was carried forward.

A.6. Analysis of Design Alternatives for the Rondout Siding Extension Project

The Rondout Siding Extension project is tied to the Metra Fox Lake Second Track project due to its proximity to that project. The purpose of the Rondout siding extension is to provide additional operational flexibility for freight and passenger trains traveling through the Rondout control point. By constructing a third track at least 10,000 feet in length, which is the average length of a freight train in this analysis, a train would be able to hold off the mainline, creating capacity for other trains on the mainline. The siding could also be used by trains as a main track during maintenance windows on the mainline.

A.6.1. Proposed Alternatives

Two design alternatives were identified as alternatives that would meet the operational needs of the project:

- Rondout Siding Extension Alternative 1 – Construct 9,000 feet of track on existing embankment; install signals, special trackwork, and a control point. The total length of the third track would be 13,000 feet which includes the existing running track near Rondout to be reconstructed. A 13,000 foot third track is the longest section of track that can be constructed between the Metra Fox Lake Subdivision and Illinois Route 60.
- Rondout Siding Extension Alternative 2 - Construct 14,000 feet of track on existing embankment and on an overhead structure; construct a new 130-foot bridge adjacent to the existing rail bridge over Illinois Route 60; install signals, special trackwork, and a control point. The total length of the third track would be 18,000 which includes the existing running track near Rondout to be reconstructed. On the south end of the extension, the third track would connect to the proposed Lake Forest universal crossover to be constructed north of Conway Road in Lake Forest.

The design alternatives are discussed below.

Design Alternative 1 – Rondout Siding Extension

Description of Design Alternative 1

Design Alternative 1 proposes to extend the existing siding by 9,000 feet and construct a new turnout to the mainline 200 feet north of the bridge over Illinois Route 60. A new control point would be established at the new turnout, new intermediate signals constructed, and the signal system modified.

Appendix A
Detailed Analysis of Route and Design Alternatives

The project spans from Metra Milepost 29.4 to Milepost 31.19 and work includes track construction, embankment construction, turnout installation, signal installation, and signal modifications.

Figure A-38 depicts the project location.

Figure A-38
Design Alternative 1 Project Location Map

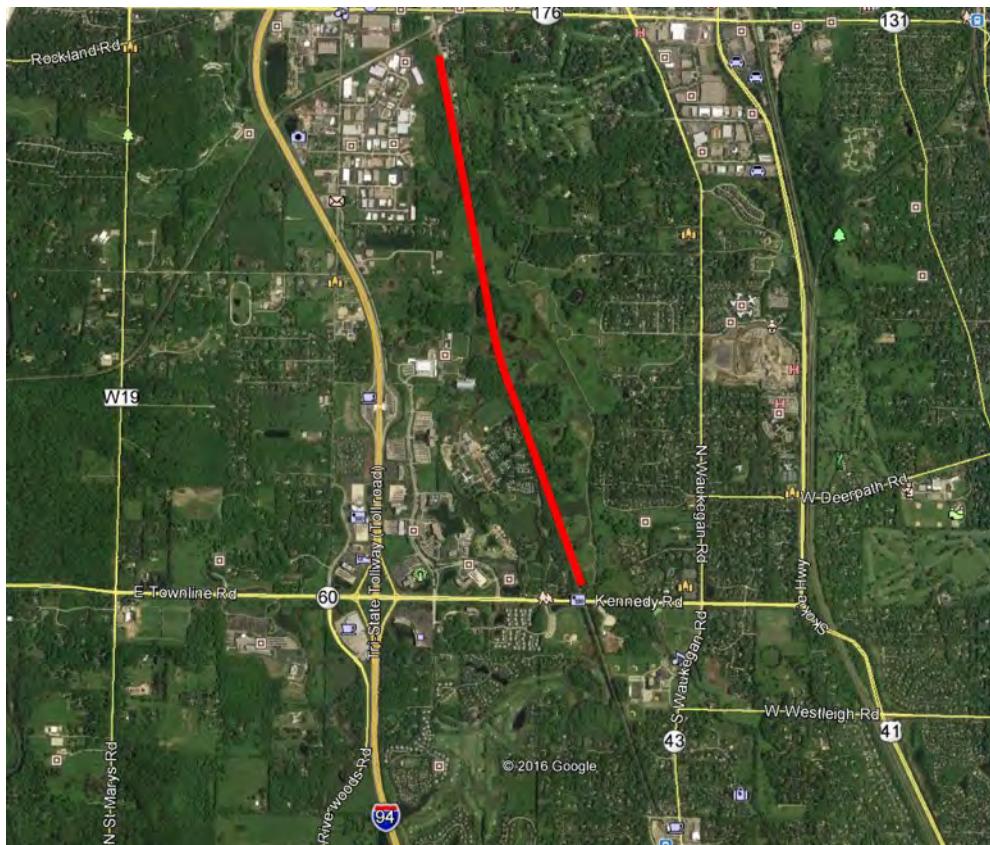
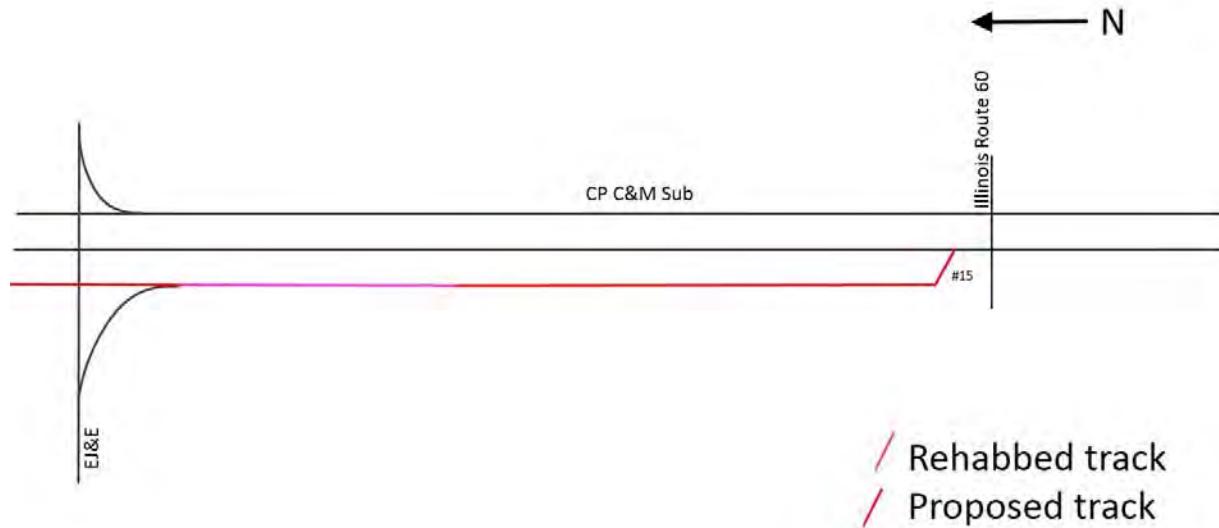


Figure A-39 illustrates the proposed Design Alternative 1 track configuration for the Rondout Siding Extension.

Figure A-39

Rondout Siding Extension Design Alternative 1 Proposed Track Configuration



Purpose and Need Evaluation of Design Alternative 1

Design Alternative 1 meets the purpose and need of the overarching EA because it would mitigate conflicts with freight and other passenger traffic in the corridor; would enhance and improve the reliability of the successful *Hiawatha Service* and the reliability of commuter and freight trains; and would provide for more schedule options to meet existing and future passenger demand.

Engineering Design Evaluation of Design Alternative 1

Safety

There are no appreciable safety improvements as a result of this project.

Order of Magnitude Capital Costs

The concept-level capital cost to construct Alternative 1 is estimated to be \$9.6 Million and includes signal work, track construction, and culvert extensions.

Construction Feasibility

No construction feasibility issues have been identified for this option.

Railroad Operations

The project would provide operational flexibility for both freight and passenger trains. The siding can be used to allow a Canadian Pacific train to hold off the mainline until it receives clearance to enter the UP Milwaukee Sub at A-20, providing capacity for Amtrak and Metra trains on the mainlines. The siding can also be used by Metra as a main track during maintenance windows on the mainline tracks.

Key Environmental Resource Evaluation of Design Alternative 1

Section 4(f)/Historic Properties

There is one Section 4(f) property in the vicinity of the project. The Middlefork Savanna Natural Area and Nature Preserve are located on the east and west sides of the project outside the railroad right-of-way. No right-of-way acquisition is proposed as part of Design Alternative 1, and therefore, would not require the use of the park.

Wetlands

There are several wetlands located adjacent to and within the project area. Illinois BDE produced a Natural Resources Review of the project and delineated wetlands in the project area. Figure A-40 summarizes the findings.

Figure A-40
Design Alternative 1 Acreage of Wetlands

Wetland Type	Acres of Wetlands within 100' of the Rail Centerline	Impact
Wet meadow	0.24	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Wetland pond	0.23	Impact to wetland is possible. Construction would occur on opposite side of track as the site but east and west sides are connected by a culvert through which water flows east towards the site.
Wet meadow	0.10	Impact to wetland is probable. Portions of the site may be filled to construct the track on new embankment.
Marsh/upland	0.21	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Wet meadow	0.16	Impact to wetland is probable. Portions of the site may be filled to construct the track on new embankment. East and west sides of track are connected by a culvert through which water flows east towards the site.
Sedge meadow	0.05	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Marsh	0.07	Impact to wetland is possible. Construction would occur on opposite side of track as the site but east and west sides are connected by a culvert through which water flows east towards the site.
Marsh	0.07	Impact to wetland is possible. Construction would occur on opposite side of track as the site but east and west sides are connected by a culvert through which water flows east towards the site.
Sedge meadow	0.27	Impact to wetland is possible. Construction would occur on opposite side of track as the site but east and west sides are connected by a culvert through which water flows east towards the site.
Wet formland	0.24	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Total	1.64	

Critical Habitats/Endangered Species

IDOT Bureau of Design and Environment conducted field surveys for this project. Middlefork Savanna Natural Area and Nature Preserve occur on the west side of the project at Rondout. State-listed species in the vicinity of the project include king rail, Wilson's phalarope, golden sedge, pale vetchling, marsh speedwell, Eastern prairie fringed orchid, Iowa darter, and Blanding's turtle. According to the Illinois

BDE, there would be no impact to the Middlefork Savanna INAI or NP “since no right-of-way will be taken from it and since no work will be done in this area”.

IDOT BDE found no proposed or designated critical habitat for the federally listed species that may be present or in the vicinity of the design option: Northern Long-Eared Bat, Eastern Prairie Fringed Orchid, piping plover, red knot, Pitcher’s thistle, leafy prairie-clover, Mead’s milkweed, prairie bush-clover, Karner blue butterfly, Hine’s emerald dragonfly, rattlesnake-master borer moth, and Eastern massasauga.

Noise and Vibration

As part of the Rondout Siding Extension project, a turnout is proposed to be constructed just north of Illinois Route 60 in an area of largely undeveloped land with several nearby single-family residences. The point of switch on the turnout to the new track is located more than 300 feet from the residences on Faculty Circle, and would not impact the residences.

The noise analysis indicated that there is potential for noise impact from locomotives idling on the new track. Because the locomotive end of the trains would idle at a location more than 400 feet from the residences on Faculty Circle, the new idling noise would not impact the residences.

Socioeconomic/Community Cohesion

Because Design Alternative 1 does not require land acquisition and all work would be completed within the railroad right-of-way, implementation of Design Alternative 1 would not cause any changes to land use, centers of employment, neighborhoods, or total population of the communities surrounding the project. There would be no segmentation, separation, or isolation of any areas of the communities due to the project.

Design Alternative 2 – Rondout Siding Extension

Description of Design Alternative 2

Design Alternative 2 proposes a similar solution as Design Alternative 1, but extends the siding an additional 4,800 feet and constructs a new turnout to the mainline 1,200 feet north of Conway Road.

The project spans from Metra Milepost 28.56 to Milepost 31.19 and work includes construction of a new bridge over Illinois Route 60 adjacent to the existing bridge, track construction, embankment construction, turnout installation, signal installation, and signal modifications.

Figure A-41 depicts the project location.

Figure A-41
Design Alternative 2 Project Location Map

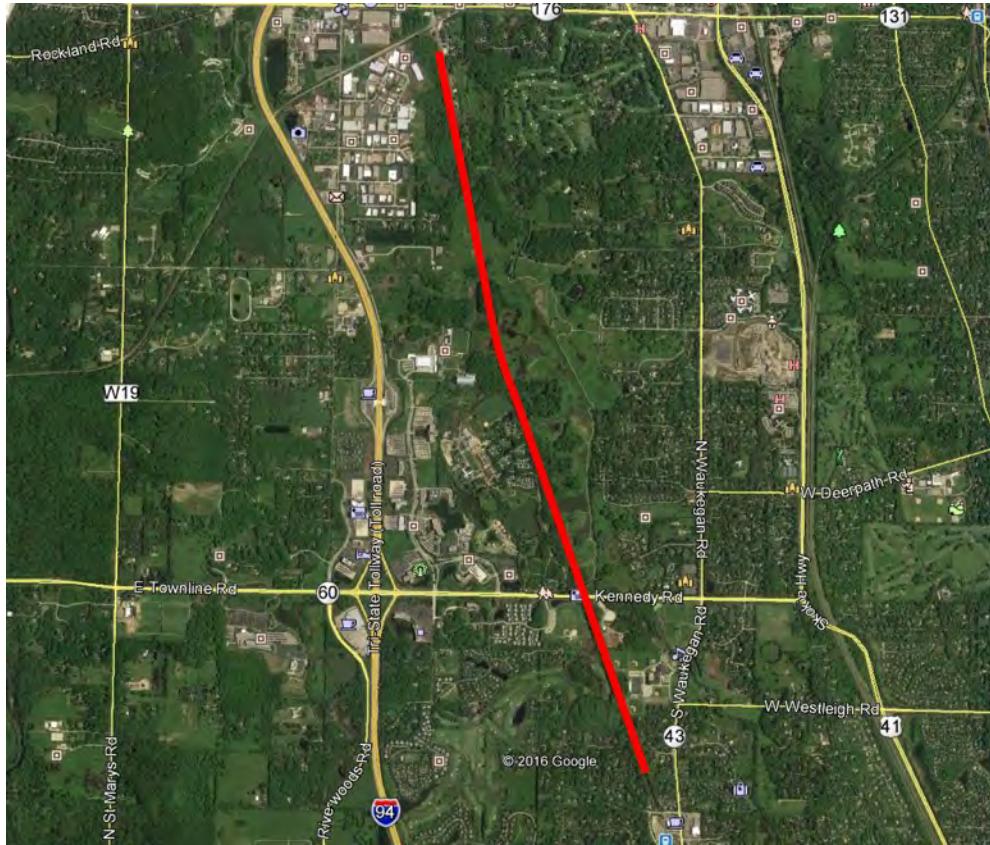
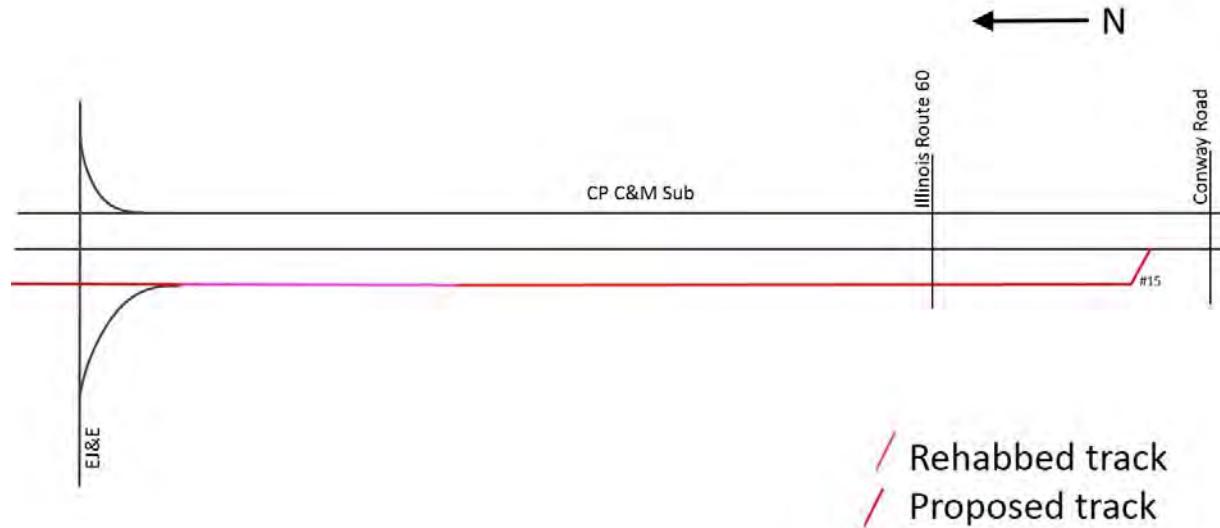


Figure A-42 illustrates the proposed Design Alternative 2 track configuration for the Rondout Siding Extension.

Figure A-42
Rondout Siding Extension Design Alternative 2 Proposed Track Configuration



Purpose and Need Evaluation of Design Alternative 2

The extension of the new siding south of Illinois Route 60 is not deemed necessary to accomplish the purpose and need of the overarching EA. The operational benefits of Design Alternative 2 are essentially equal to Design Alternative 1 and, as discussed under Engineering Design Evaluation, Design Alternative 2 is more costly.

Engineering Design Evaluation of Design Alternative 2

Safety

There are no appreciable safety improvements as a result of this project.

Order of Magnitude Capital Costs

The concept-level capital cost to construct Alternative 2 is estimated to be \$18.8 Million and includes a new bridge over Illinois Route 60, signal work, and track construction.

Construction Feasibility

No construction feasibility issues have been identified for this option.

Appendix A
Detailed Analysis of Route and Design Alternatives

Railroad Operations

The project would provide operational flexibility for both freight and passenger trains. The siding can be used to allow a Canadian Pacific train to hold off the mainline until it receives clearance to enter the UP Milwaukee Sub at A-20, providing capacity for Amtrak and Metra trains on the mainlines. The siding can also be used by Metra as a main track during maintenance windows on the mainline tracks.

Key Environmental Resource Evaluation of Design Alternative 2

Section 4(f)/Historic Properties

There are several Section 4(f) property in the vicinity of the project. The Middlefork Savanna Natural Area and Nature Preserve are located on the east and west sides of the project outside the railroad right-of-way. Construction would also occur adjacent to Townline Community Park in Lake Forest, IL. No right-of-way acquisition is proposed as part of Design Alternative 2, and therefore, would not require the use of the park.

Wetlands

There are several wetlands located adjacent to and within the project area. Illinois BDE produced a Natural Resources Review of the project and delineated wetlands in the project area. Figure A-43 summarizes the findings.

Figure A-43
Design Alternative 2 Acreage of Wetlands

Wetland Type	Acres of Wetlands within 100' of the Rail Centerline	Impact
Wet meadow	0.15	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Wet meadow	0.10	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Wet shrubland	0.09	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Wet meadow	0.24	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Wetland pond	0.23	Impact to wetland is possible. Construction would occur on opposite side of track as the site but east and west sides are connected by a culvert through which water flows east towards the site.
Wet meadow	0.10	Impact to wetland is probable. Portions of the site may be filled to construct the track on new embankment.
Marsh/upland	0.21	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Wet meadow	0.16	Impact to wetland is probable. Portions of the site may be filled to construct the track on new embankment. East and west sides of track are connected by a culvert through which water flows east towards the site.
Sedge meadow	0.05	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Marsh	0.07	Impact to wetland is possible. Construction would occur on opposite side of track as the site but east and west sides are connected by a culvert through which water flows east towards the site.
Marsh	0.07	Impact to wetland is possible. Construction would occur on opposite side of track as the site but east and west sides are connected by a culvert through which water flows east towards the site.
Sedge meadow	0.27	Impact to wetland is possible. Construction would occur on opposite side of track as the site but east and west sides are connected by a culvert through which water flows east towards the site.
Wet forbland	0.24	Unanticipated. Construction in this area would occur on opposite side of track as the site.
Total	1.98	

Critical Habitats/Endangered Species

IDOT Bureau of Design and Environment conducted field surveys for this project. Middlefork Savanna Natural Area and Nature Preserve occur on the west side of the project at Rondout. State-listed species in the vicinity of the project include king rail, Wilson's phalarope, golden sedge, pale vetchling, marsh speedwell, Eastern prairie fringed orchid, Iowa darter, and Blanding's turtle. According to the Illinois BDE, there would be no impact to the Middlefork Savanna INAI or NP "since no right-of-way will be taken from it and since no work will be done in this area".

IDOT BDE found no proposed or designated critical habitat for the federally listed species that may be present or in the vicinity of the design option: Northern Long-Eared Bat, Eastern Prairie Fringed Orchid, piping plover, red knot, Pitcher's thistle, leafy prairie-clover, Mead's milkweed, prairie bush-clover, Karner blue butterfly, Hine's emerald dragonfly, rattlesnake-master borer moth, and Eastern massasauga.

Noise and Vibration

Design Alternative 2 proposes that the turnout to the Rondout siding be located 1200' north of the Conway Road grade crossing in Lake Forest, IL. The turnout is located in an area of largely undeveloped land with nearby single-family residences. One residence on Leland Court would be located more than 100 feet but less than 200 feet from the noise-generating point of switch on the turnout. Noise and vibration impacts between 100 and 200 feet of the point of switch would be moderate.

The noise analysis indicated that there is potential for noise impact from locomotives idling on the new track. The locomotive end of the trains would idle within 400 feet of residences in the Abington Cambs Drive and Gavin Court neighborhoods. The idling locomotives would cause a moderate noise impact.

Socioeconomic/Community Cohesion

Because Design Alternative 2 does not require land acquisition and all work would be completed within the railroad right-of-way, implementation of Design Alternative 2 would not cause any changes to land use, centers of employment, neighborhoods, or total population of the communities surrounding the project. There would be no segmentation, separation, or isolation of any areas of the communities due to the project.

A.6.2. Summary of Rondout Siding Extension Design Alternatives Analysis

The design alternatives are evaluated on whether each meet the operational goals of the Rondout Siding Extension Project using the evaluation criteria for the purpose and need of the overarching EA; engineering design; and key environmental resources. Figure A-44 summarizes the alternatives analysis. A check mark indicates that the design alternative meets the "reasonable and feasible" test for a particular criterion and an 'X' indicates that the alternative does not meet the "reasonable and feasible" test. A description of the results follows Figure A-44.

Figure A-44
Summary Rondout Siding Extension Design Alternatives Analysis

	Purpose and Need	Safety	Order of Magnitude Costs	Construction Feasibility	Railroad Operations	Section 4(f)/ Historic Properties	Wetlands	Critical Habitat/ Endangered Species	Noise and Vibration	Socioeconomic/ Community Cohesion	Overall Evaluation of Alternative
Design Alternative 1	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	Carry forward to EA
Design Alternative 2	✗	✓	✗	✓	✓	✓	✗	✓	✗	✓	Do not carry forward

Appendix A
Detailed Analysis of Route and Design Alternatives

Design Alternative 2 was removed from further analysis because it would not be reasonable as the noise and vibration increase due to the project would impact sensitive residential receptors; track construction for Alternative 2 south of Illinois Route 60 would occur within numerous wetlands; and it would cost \$9.2 million (nearly twice) more than Alternative 1. As such, only Rondout Siding Extension Design Alternative 1 was carried forward.